AP ECET 2026

Civil Engineering

Complete Preparation Book

Concept Clarity | Smart Practice | Rank Booster Questions

BANDI DAYASAGAR

Diploma Mechanical Engineering,
B.Tech Mechanical Engineering,
M.Tech Thermal Engineering,
MS (Computer Information Systems), USA

An Initiative of Sagar Educational Society

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Dedication

This book is dedicated to all Diploma students who dream of becoming engineers and building a better future for themselves and their families.

To the students who study silently, who struggle quietly, and who continue moving forward even when the path feels difficult.

I was once in your place.
I understand your journey.

This book is for you.

May your hard work turn into success, and your effort turn into confidence.

Bandi Dayasagar

Preface

AP ECET is not just an entrance exam.

For Diploma students, it is a gateway to B.Tech and a better future.

Success in ECET does not depend on studying more books. It depends on understanding the exam pattern, focusing on important topics, and preparing in a smart way.

During my academic journey — from Diploma to B.Tech, M.Tech, and MS — I understood one important truth:

Students do not fail because they are weak.

They lose marks because they prepare without direction.

This book is written in very simple and clear language so that every student can understand concepts easily and prepare with confidence. Instead of lengthy theory, this book focuses on:

- Important concepts based on weightage
- Frequently repeated questions
- Clear formulas and comparison tables
- Practice questions from basic to rank level
- Smart revision strategy

Every unit is prepared after carefully analyzing previous ECET question papers and scoring patterns.

This book is designed not just to help you pass ECET, but to help you score maximum marks and build strong confidence for your B.Tech journey.

If you follow the structure given in this book with discipline and consistency, you can achieve excellent results.

Wishing you focus, confidence, and great success.

Bandi Dayasagar
Founder – Sagar Educational Society

Diploma – Mechanical Engineering
B.Tech – Mechanical Engineering
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ABOUT THE AUTHOR

BANDI DAYASAGAR

BANDI DAYASAGAR is an academician, researcher, and career mentor with a strong foundation in Mechanical Engineering and advanced expertise in Computer Information Systems. He began his academic journey with a Diploma in Mechanical Engineering, followed by B.Tech in Mechanical Engineering and M.Tech in Thermal Engineering under a under JNTUK University. He later completed MS (Computer Information Systems), USA from New England College with an outstanding CGPA of 3.96/4.00.

His academic and research interests focus on thermal engineering, power plant systems, fluid mechanics, computational simulations, and data-driven engineering analysis.

In 2020, he received the Research Excellence Award from the Institute of Scholars (InSc) for his published research work titled "Improving Thermal Power Plant Efficiency" published in International Journal of Recent Technology and Engineering, Volume 8, Issue 6, March 2020, Pages 1265–1274, ISSN: 2277-3878. His research focused on improving thermal power plant efficiency using analytical methods, simulations, and performance optimization techniques.

He has also completed multiple NPTEL e-verifiable certifications from premier IIT institutions, including Power Plant Engineering from IIT Roorkee; Introduction to Fluid Mechanics, Laws of Thermodynamics, and Conduction and Convection Heat Transfer from IIT Kharagpur; and Computational Fluid Dynamics for Inmpressible Flows along with IC Engines and Gas Turbines from IIT Guwahati.

Throughout his academic journey, he gained practical exposure through internships and research roles at prestigious national organizations including National Remote Sensing Centre (ISRO), Bharat Heavy Electricals Limited (BHEL), Rashtriya Ispat Nigam Limited (RINL), Indira Gandhi Centre for Atomic Research (IGCAR), and Dr. Narla Tata Rao Thermal Power Station (APGENCO). These experiences helped him combine theoretical knowledge with real industrial applications, simulations, and performance analysis.

With years of academic guidance experience, he founded Sagar Educational Society to mentor Diploma and Engineering students. His mission is to provide structured, exam-focused, and confidence-building preparation systems that help students achieve top ranks and build strong technical careers.

His teaching philosophy is simple:

Clear concepts. Smart preparation. Disciplined execution.

He strongly believes that with the right strategy and guidance, every hardworking student can achieve academic excellence and career success.

ACKNOWLEDGEMENT

This book is the result of many years of learning, teaching, and guiding students.

First, I thank my parents for their constant support, values, and belief in education. Their encouragement shaped my journey from Diploma to higher studies.

I sincerely thank my teachers and professors who guided me during my academic journey. Their knowledge, discipline, and clarity helped me build a strong foundation in engineering and technical education.

I am grateful to the institutions and organizations where I gained academic and practical experience. Each stage of my journey from Diploma to MS (CIS) helped me understand both theory and real-world applications.

I also thank the students I have mentored over the years. Your questions, struggles, and determination inspired me to create this book. This book is built from your needs and your challenges.

Special thanks to everyone who supported the preparation of this book directly or indirectly — through encouragement, feedback, and motivation.

Finally, I thank every student who chooses this book as a part of their preparation. Your trust means a lot.

This book is written with one clear purpose:
to help students prepare in a smart way, build confidence, and achieve success in AP ECET.

With gratitude,

BANDI DAYASAGAR **Diploma, B.Tech, M.Tech, MS (CIS), USA**

HOW TO USE THIS BOOK

Preparing for **AP ECET 2026 (Civil Engineering)** requires smart preparation, consistent practice, and a clear understanding of fundamental civil engineering concepts.

This book is carefully designed to guide you through all these stages so that you can prepare effectively and confidently.

This section will help you understand how to use this book in the most efficient way.

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1. Start with Unit-Wise Concept Revision

Each unit in this book is strictly based on the **AP ECET 2026 Civil Engineering syllabus**.

Before solving questions, briefly revise the key concepts of each unit such as:

- Strength of Materials
- Theory of Structures
- Reinforced Concrete Structures
- Surveying
- Hydraulics
- Irrigation Engineering

Understanding these core civil engineering concepts first will help you solve MCQs quickly and accurately during the exam.

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2. Practice Unit-Wise MCQs

After revising the concepts, start solving the **unit-wise objective questions** provided in this book.

These questions are designed to include:

- Concept-based questions
- Application-oriented questions
- Numerical problems similar to the ECET exam pattern

While practicing:

- Solve questions without immediately checking the answers.
- After completing a set of questions, verify your answers carefully.
- Review the explanations to understand where mistakes occurred.

This method helps you identify weak areas and improve both **accuracy and problem-solving speed**.

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3. Learn from the Explanations

Each question in this book includes a **clear and exam-oriented explanation**.

Do not simply check the correct option.

Always read the explanation because it helps you:

• Understand the concept behind the question
• Avoid repeating mistakes in similar problems
• Strengthen your civil engineering fundamentals

Many ECET questions are **conceptual variations of previous questions**, so understanding explanations is extremely important.

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4. Use Mock Tests for Exam Simulation

This book also includes **Grand Tests** designed according to the real **AP ECET exam pattern**.

Use these tests to:

• Improve problem-solving speed
• Test your accuracy under exam conditions
• Experience real exam pressure
• Identify weak topics that need revision

While attempting mock tests:

• Set a timer
• Avoid interruptions
• Treat it exactly like the real ECET exam

After completing the test, carefully analyze your mistakes and revise those topics.

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5. Revise the Most Repeated Questions

The **Most Repeated Previous Year Questions (PYQ) Section** contains frequently asked questions from previous ECET exams.

This section helps you:

• Understand ECET question trends
• Focus on high-probability civil engineering topics
• Strengthen important formulas and problem-solving techniques

Before the exam, revise this section multiple times to improve **confidence and accuracy**.

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6. Final Preparation Strategy

As the exam approaches:

- Revise important formulas regularly
- Practice numerical problems daily
- Solve previous questions again
- Focus on accuracy rather than rushing through problems
- Analyze mistakes from mock tests and avoid repeating them

Consistent revision and practice are the **keys to success in AP ECET**.

Final Advice

Success in **AP ECET** does not come from studying many books.

It comes from:

- Understanding civil engineering concepts clearly
- Practicing a large number of MCQs
- Revising important formulas and previous questions regularly

Use this book as your **daily practice guide**, and it will help you move closer to your goal of securing a good ECET rank and entering **B.Tech in Civil Engineering**.

TABLE OF CONTENTS

GRAND TEST SERIES

AP ECET 2026 Civil Engineering Weightage Table

1	**Strength of Materials**	Stresses & Strains, Hooke's Law, SFD/BMD, Bending & Shear Stresses	20	▲ **HIGH**
2	**Theory of Structures**	Deflection (Macaulay's/Mohr's), Columns (Euler/Rankine), Trusses, Dams	20	▲ **HIGH**
3	**RCC Structures**	Limit State Design, Beams (Singly/Doubly/T), Slabs, Columns, Footings	20	▲ **HIGH**
4	**Surveying**	Chain, Compass, Levelling, Theodolite, Tacheometry, GPS/GIS	15	➡ **MEDIUM**
5	**Hydraulics**	Bernoulli's, Fluid Pressure, Flow through pipes, Pumps & Turbines	15	➡ **MEDIUM**
6	**Irrigation Engg.**	Duty/Delta, Hydrology, Canal Irrigation, Cross Drainage Works	10	⬇ **LOW**

UNIT 1 - STRENGTH OF MATERIAS

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1. The internal resistance offered per unit area at any section of a body is called
1). Stress
2). Strain
3). Modulus of elasticity
4). Hooke's constant

Correct Answer: 1). Stress

Solution:
Stress is defined as the internal resisting force per unit area developed in a material due to external load.

$$\sigma = \frac{P}{A}$$

Where
P = applied load
A = cross-sectional area

Ref: Strength of Materials – R.K. Bansal

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2. Strain is defined as the ratio of
1). Change in length to original length
2). Original length to change in length
3). Stress to strain
4). Load to area

Correct Answer: 1). Change in length to original length

Solution:

$$\varepsilon = \frac{\Delta L}{L}$$

Where
ΔL = change in length
L = original length

Strain is dimensionless.

Ref: Mechanics of Materials – B.C. Punmia

3. According to Hooke's law, stress is proportional to strain within
1). Elastic limit
2). Plastic limit
3). Yield point
4). Breaking point

Correct Answer: 1). Elastic limit

Solution:

Hooke's law:

$$\sigma \propto \varepsilon$$

or

$$\sigma = E\varepsilon$$

This relation holds only within the **elastic limit of material**.

Ref: Strength of Materials – S. Ramamrutham

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4. The ratio of lateral strain to longitudinal strain is called
1). Bulk modulus
2). Poisson's ratio
3). Young's modulus
4). Rigidity modulus

Correct Answer: 2). Poisson's ratio

Solution:

$$\mu = \frac{\text{Lateral strain}}{\text{Longitudinal strain}}$$

For most metals:

$$\mu = 0.25 \text{ to } 0.35$$

Ref: Strength of Materials – R.K. Bansal

5. The unit of Young's modulus is
1). N
2). N/mm²
3). mm
4). N/mm

Correct Answer: 2). N/mm²

Solution:

$$E = \frac{\sigma}{\varepsilon}$$

Since strain is dimensionless, units of E are same as stress.

Unit:

$$N/mm^2$$

Ref: Mechanics of Materials – B.C. Punmia

6. The modulus of rigidity is denoted by
1). E
2). G
3). K
4). μ

Correct Answer: 2). G

Solution:

Modulus of rigidity represents the ratio of shear stress to shear strain.

$$G = \frac{\tau}{\gamma}$$

Ref: Strength of Materials – R.K. Bansal

7. The relation between Young's modulus and modulus of rigidity is

1). $E = 2G(1 + \mu)$
2). $E = G(1 + \mu)$
3). $E = G(1 - \mu)$
4). $E = 3G(1 + \mu)$

Correct Answer: 1). $E = 2G(1 + \mu)$

Solution:

Elastic constant relation:

$$E = 2G(1 + \mu)$$

Where
E = Young's modulus
G = Modulus of rigidity
μ = Poisson's ratio

Ref: Strength of Materials – R.K. Bansal

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8. The relation between Young's modulus and bulk modulus is

1). $E = 3K(1 - 2\mu)$
2). $E = 2K(1 + \mu)$
3). $E = K(1 + \mu)$
4). $E = K(1 - 2\mu)$

Correct Answer: 1). $E = 3K(1 - 2\mu)$

Solution:

Elastic constant relation:

$$E = 3K(1 - 2\mu)$$

Ref: Mechanics of Materials – B.C. Punmia

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9. A material which regains its original shape after removal of load is called

1). Elastic material
2). Plastic material

3). Brittle material
4). Composite material

Correct Answer: 1). Elastic material

Solution:

Elastic materials completely recover their original dimensions after unloading.

Example: steel within elastic limit.

Ref: Strength of Materials – Ramamrutham

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10. The point at which material begins to deform plastically is called

1). Yield point
2). Elastic limit
3). Ultimate stress
4). Breaking point

Correct Answer: 1). Yield point

Solution:

At yield point the material begins **permanent deformation**.

Ref: Strength of Materials – R.K. Bansal

---

11. The area under stress–strain curve up to elastic limit represents

1). Toughness
2). Resilience
3). Ductility
4). Hardness

Correct Answer: 2). Resilience

Solution:

Resilience is the **energy absorbed within elastic limit**.

Ref: Mechanics of Materials – B.C. Punmia

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12. The strain energy stored in a body due to loading is called

1). Potential energy
2). Strain energy
3). Thermal energy
4). Mechanical energy

Correct Answer: 2). Strain energy

Solution:

Energy stored due to deformation is called strain energy.

$$U = \frac{1}{2} P\delta$$

Ref: Strength of Materials – Bansal

---

13. The unit of strain energy is

1). N
2). Joule
3). N/mm
4). kg

Correct Answer: 2). Joule

Solution:

Energy is measured in **Joules**.

Ref: B.C. Punmia

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14. A beam fixed at one end and free at the other end is called

1). Simply supported beam
2). Continuous beam
3). Cantilever beam
4). Overhanging beam

Correct Answer: 3). Cantilever beam

Solution:

Cantilever beam has **one fixed support and one free end**.

Ref: S.S. Bhavikatti – Structural Analysis

---

15. The shear force at free end of a cantilever beam is

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:

Since no load exists beyond free end, shear force = 0.

Ref: Structural Analysis – Bhavikatti

---

16. The bending moment at the free end of a cantilever beam is

1). Maximum
2). Zero
3). Infinite
4). Minimum

Correct Answer: 2). Zero

Solution:

Moment = Force × distance

At free end distance = 0 → Moment = 0.

Ref: Structural Analysis – Bhavikatti

---

17. The bending moment at the fixed end of a cantilever carrying point load W at free end is

1). WL
2). WL/2
3). WL/4
4). W/L

Correct Answer: 1). WL

Solution:

For cantilever with point load at free end:

$$M = WL$$

Ref: Strength of Materials – R.K. Bansal

---

18. Maximum bending moment in a simply supported beam carrying UDL is

1). $wL^2/8$
2). $wL/4$
3). $wL^2/4$
4). wL

Correct Answer: 1). $wL^2/8$

Solution:

For UDL on simply supported beam:

$$M_{max} = \frac{wL^2}{8}$$

Ref: Structural Analysis – Bhavikatti

---

19. The point where shear force changes sign is

1). Point of contraflexure
2). Point of maximum moment
3). Point of zero moment
4). Neutral axis

Correct Answer: 2). Point of maximum moment

Solution:

Maximum bending moment occurs where **shear force = 0**.

Ref: Strength of Materials – Bansal

---

20. In a simply supported beam carrying central load, maximum bending moment occurs at

1). Supports
2). Mid span
3). Quarter span
4). Free end

Correct Answer: 2). Mid span

Solution:

For central load:

$$M_{max} = \frac{WL}{4}$$

Occurs at centre.

Ref: Structural Analysis – Bhavikatti

---

21. The point on the stress–strain curve where stress reaches maximum value is called
1). Yield point
2). Ultimate stress point
3). Elastic limit
4). Breaking point

Correct Answer: 2). Ultimate stress point

Solution:
Ultimate stress is the **maximum stress a material can withstand before necking begins**.

$$\sigma_u = \frac{\text{Maximum Load}}{\text{Original Area}}$$

Ref: Strength of Materials – R.K. Bansal

---

22. The ability of a material to undergo large deformation before fracture is known as
1). Elasticity
2). Toughness
3). Ductility
4). Hardness

Correct Answer: 3). Ductility

Solution:
Ductility allows materials to **stretch significantly before failure**.
Example: Mild steel.

Ref: Strength of Materials – Ramamrutham

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23. The property of a material to absorb energy before fracture is called
1). Toughness
2). Elasticity
3). Plasticity
4). Brittleness

Correct Answer: 1). Toughness

Solution:
Toughness represents the **total energy absorbed up to fracture**.

Ref: Mechanics of Materials – B.C. Punmia

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24. Bulk modulus is defined as the ratio of
1). Normal stress to volumetric strain
2). Shear stress to shear strain
3). Stress to longitudinal strain
4). Lateral stress to longitudinal strain

Correct Answer: 1). Normal stress to volumetric strain

Solution:

$$K = \frac{\text{Volumetric Stress}}{\text{Volumetric Strain}}$$

Ref: Strength of Materials – R.K. Bansal

---

25. If Poisson's ratio is 0.25, the relation between E and G becomes

1). $E = 2.5G$
2). $E = 2G$

3). $E = 3G$
4). $E = 4G$

Correct Answer: 1). $E = 2.5G$

Solution:

$$E = 2G(1 + \mu)$$
$$E = 2G(1 + 0.25)$$
$$E = 2.5G$$

Ref: Strength of Materials – Bansal

---

26. The volumetric strain is defined as

1). Change in volume / original volume
2). Change in length / original length
3). Change in area / original area
4). Stress / strain

Correct Answer: 1). Change in volume / original volume

Solution:

$$\varepsilon_v = \frac{\Delta V}{V}$$

Ref: Mechanics of Materials – B.C. Punmia

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27. The strain energy stored in a bar due to gradually applied load is

1). PL
2). $PL/2$
3). $P\delta$
4). $P\delta/2$

Correct Answer: 4). $P\delta/2$

Solution:

$$U = \frac{1}{2}P\delta$$

Where
P = load
δ = deformation

Ref: Strength of Materials – Bansal

---

28. Modulus of resilience is defined as

1). Energy stored per unit volume
2). Stress per unit area
3). Strain per unit length
4). Energy absorbed after fracture

Correct Answer: 1). Energy stored per unit volume

Solution:

$$U_r = \frac{\sigma^2}{2E}$$

Ref: Strength of Materials – Ramamrutham

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29. Composite bars are used when

1). Different materials carry load together
2). Only one material carries load
3). Load is zero
4). Material is brittle

Correct Answer: 1). Different materials carry load together

Solution:
Composite sections consist of **two or more materials rigidly connected** so they deform together.

Ref: Strength of Materials – R.K. Bansal

---

30. In composite bars, the strain in all materials is

1). Different
2). Same

3). Zero
4). Infinite

Correct Answer: 2). Same

Solution:
Since materials are rigidly connected:

$$\varepsilon_1 = \varepsilon_2$$

Ref: Strength of Materials – Bansal

---

31. A beam supported at both ends is called

1). Cantilever beam
2). Continuous beam
3). Simply supported beam
4). Fixed beam

Correct Answer: 3). Simply supported beam

Solution:
Simply supported beam has **one hinge and one roller support**.

Ref: Structural Analysis – Bhavikatti

---

32. An overhanging beam is

1). Beam with one fixed end
2). Beam extending beyond support
3). Beam with no supports
4). Beam with two fixed ends

Correct Answer: 2). Beam extending beyond support

Solution:
When part of beam extends beyond support, it is **overhanging beam**.

Ref: Structural Analysis – Bhavikatti

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33. The shear force at any section is defined as

1). Sum of vertical forces to one side
2). Sum of horizontal forces
3). Sum of moments
4). Sum of reactions only

Correct Answer: 1). Sum of vertical forces to one side

Solution:
Shear force is **algebraic sum of vertical forces on either side of section**.

Ref: Strength of Materials – Bansal

---

34. The bending moment at any section is defined as

1). Algebraic sum of moments about that section
2). Sum of vertical forces
3). Sum of horizontal forces
4). Reaction force

Correct Answer: 1). Algebraic sum of moments about that section

Solution:
Bending moment represents **tendency of beam to bend**.

Ref: Strength of Materials – Bansal

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35. The unit of bending moment is

1). N
2). N/mm
3). N·m
4). mm

Correct Answer: 3). N·m

Solution:

$$Moment = Force \times Distance$$

Unit:

$$N \times m = N \cdot m$$

Ref: Mechanics of Materials – Punmia

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36. When shear force is constant between two points, the bending moment diagram is

1). Straight line
2). Parabolic
3). Circular
4). Zero

Correct Answer: 1). Straight line

Solution:
If shear force is constant:

$$BM = linear$$

Ref: Structural Analysis – Bhavikatti

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37. When shear force varies linearly, bending moment diagram becomes

1). Straight line
2). Parabola
3). Circle
4). Zero

Correct Answer: 2). Parabola

Solution:
UDL produces **linear shear variation → parabolic BM diagram**.

Ref: Strength of Materials – Bansal

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38. The bending moment is maximum where

1). Load is maximum
2). Shear force is zero
3). Reaction is zero
4). Beam ends

Correct Answer: 2). Shear force is zero

Solution:

$$\frac{dM}{dx} = V$$

Maximum moment occurs when

$$V = 0$$

Ref: Strength of Materials – Bansal

---

39. The shear force diagram for UDL is

1). Horizontal line
2). Inclined straight line
3). Parabolic curve
4). Circular curve

Correct Answer: 2). Inclined straight line

Solution:
Under UDL:

$$V = wL$$

Shear changes linearly → straight line.

Ref: Structural Analysis – Bhavikatti

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40. The bending moment diagram for UDL is

1). Straight line
2). Parabolic curve
3). Horizontal line
4). Vertical line

Correct Answer: 2). Parabolic curve

Solution:
Since bending moment is integration of shear force, linear shear produces **parabolic bending moment diagram**.

Ref: Strength of Materials – R.K. Bansal

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41. A steel bar 2 m long elongates by 1 mm under a tensile load. The strain produced is
1). 0.0005
2). 0.001
3). 0.002
4). 0.005

Correct Answer: 1). 0.0005

Solution:

$$\varepsilon = \frac{\Delta L}{L}$$
$$\varepsilon = \frac{1}{2000}$$
$$\varepsilon = 0.0005$$

Ref: Strength of Materials – R.K. Bansal

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42. If a bar is subjected to tensile stress of 200 MPa and Young's modulus is 200 GPa, the strain is
1). 0.0001
2). 0.001
3). 0.01
4). 0.1

Correct Answer: 2). 0.001

Solution:

$$\varepsilon = \frac{\sigma}{E}$$
$$\varepsilon = \frac{200}{200000}$$
$$\varepsilon = 0.001$$

Ref: Mechanics of Materials – B.C. Punmia

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43. If Poisson's ratio is 0.3, the lateral strain corresponding to longitudinal strain of 0.002 is

1). 0.0006
2). 0.002
3). 0.003
4). 0.006

Correct Answer: 1). 0.0006

Solution:

$$\mu = \frac{\text{Lateral strain}}{\text{Longitudinal strain}}$$
$$\text{Lateral strain} = 0.3 \times 0.002$$
$$= 0.0006$$

Ref: Strength of Materials – R.K. Bansal

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44. If Young's modulus is 2×10^5 N/mm² and Poisson's ratio is 0.25, modulus of rigidity is

1). 80000 N/mm²
2). 60000 N/mm²
3). 50000 N/mm²
4). 40000 N/mm²

Correct Answer: 1). 80000 N/mm²

Solution:

$$E = 2G(1 + \mu)$$
$$200000 = 2G(1.25)$$
$$G = 80000$$

Ref: Strength of Materials – Bansal

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45. The maximum bending moment in a simply supported beam with central load W is

1). WL
2). WL/2
3). WL/4
4). WL/8

Correct Answer: 3). WL/4

Solution:

$$M_{max} = \frac{WL}{4}$$

Occurs at midspan.

Ref: Structural Analysis – Bhavikatti

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46. For a cantilever beam carrying uniformly distributed load w per unit length, maximum bending moment is

1). $wL^2/2$
2). $wL^2/4$
3). $wL^2/8$
4). $wL/2$

Correct Answer: 1). $wL^2/2$

Solution:

Maximum moment at fixed end:

$$M = \frac{wL^2}{2}$$

Ref: Strength of Materials – Bansal

---

47. In a cantilever beam with point load at free end, shear force diagram is

1). Horizontal line
2). Inclined line
3). Parabolic curve
4). Circular curve

Correct Answer: 1). Horizontal line

Solution:
Shear force remains constant throughout beam.

Ref: Structural Analysis – Bhavikatti

---

48. The bending moment diagram of a cantilever beam with point load at free end is

1). Straight line
2). Parabola
3). Circle
4). Horizontal line

Correct Answer: 1). Straight line

Solution:
Moment varies linearly from zero at free end to maximum at fixed end.

Ref: Strength of Materials – Bansal

---

49. The shear force at supports of a simply supported beam carrying central load W is

1). W
2). W/2
3). W/4
4). Zero

Correct Answer: 2). W/2

Solution:

$$R_A = R_B = \frac{W}{2}$$

Shear force equals reaction.

Ref: Structural Analysis – Bhavikatti

---

50. The bending moment at supports of simply supported beam is

1). Maximum
2). Zero
3). Infinite
4). Minimum

Correct Answer: 2). Zero

Solution:
Simply supported beam cannot resist moment at supports.

Ref: Strength of Materials – Bansal

---

51. If load acts downward on beam, shear force diagram decreases from left to right

1). True
2). False
3). Depends on beam length
4). Cannot be determined

Correct Answer: 1). True

Solution:
Downward load reduces shear force.

Ref: Structural Analysis – Bhavikatti

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52. A point where bending moment changes sign is called

1). Neutral axis
2). Point of contraflexure
3). Yield point
4). Shear center

Correct Answer: 2). Point of contraflexure

Solution:
At contraflexure moment changes from positive to negative.

Ref: Strength of Materials – Bansal

---

53. In a simply supported beam carrying UDL over entire span, maximum bending moment occurs

1). At supports
2). At midspan
3). At quarter span
4). At free end

Correct Answer: 2). At midspan

Solution:

$$M = \frac{wL^2}{8}$$

Occurs at centre.

Ref: Structural Analysis – Bhavikatti

---

54. If shear force diagram crosses zero, bending moment at that section is

1). Minimum
2). Maximum
3). Zero
4). Constant

Correct Answer: 2). Maximum

Solution:

$$\frac{dM}{dx} = V$$

If V=0 → moment extreme.

Ref: Strength of Materials – Bansal

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55. The shear force diagram for point load is

1). Straight horizontal line
2). Vertical jump
3). Parabolic curve
4). Circular curve

Correct Answer: 2). Vertical jump

Solution:
At point load shear changes suddenly.

Ref: Structural Analysis – Bhavikatti

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56. In bending moment diagram, slope represents

1). Load
2). Shear force
3). Stress
4). Strain

Correct Answer: 2). Shear force

Solution:

$$\frac{dM}{dx} = V$$

Ref: Strength of Materials – Bansal

---

57. If shear force diagram is zero, bending moment diagram will be

1). Constant
2). Increasing
3). Decreasing
4). Parabolic

Correct Answer: 1). Constant

Solution:
No change in moment if shear = 0.

Ref: Structural Analysis – Bhavikatti

---

58. The maximum shear force in a cantilever beam carrying load W at free end occurs

1). At free end
2). At fixed end
3). At midspan
4). At quarter span

Correct Answer: 2). At fixed end

Solution:
Maximum shear occurs at fixed support.

Ref: Strength of Materials – Bansal

---

59. For UDL acting on simply supported beam, shear force at midspan is

1). Maximum
2). Zero
3). Minimum
4). Infinite

Correct Answer: 2). Zero

Solution:
Shear force becomes zero at centre.

Ref: Structural Analysis – Bhavikatti

---

60. If beam span doubles, bending moment due to central load

1). Doubles
2). Triples
3). Quadruples
4). Halves

Correct Answer: 1). Doubles

Solution:

$$M = \frac{WL}{4}$$

Moment proportional to span L.

Ref: Strength of Materials – R.K. Bansal

---

61. A bar of length 1 m extends by 0.5 mm under load. The strain produced is
1). 0.0005
2). 0.005
3). 0.00005
4). 0.05

Correct Answer: 1). 0.0005

Solution:

$$\varepsilon = \frac{\Delta L}{L}$$
$$\varepsilon = \frac{0.5}{1000} = 0.0005$$

Ref: Strength of Materials – R.K. Bansal

---

62. If a bar of cross-section 200 mm² carries a load of 40 kN, the stress induced is
1). 100 N/mm²
2). 200 N/mm²
3). 300 N/mm²
4). 400 N/mm²

Correct Answer: 2). 200 N/mm²

Solution:

$$\sigma = \frac{P}{A}$$
$$\sigma = \frac{40000}{200}$$
$$\sigma = 200\ N/mm^2$$

Ref: Mechanics of Materials – B.C. Punmia

---

63. If Young's modulus is 2×10⁵ N/mm² and strain is 0.001, the stress is
1). 100 N/mm²
2). 200 N/mm²
3). 300 N/mm²
4). 400 N/mm²

Correct Answer: 2). 200 N/mm²

Solution:

$$\sigma = E\varepsilon$$
$$\sigma = 2 \times 10^5 \times 0.001$$
$$\sigma = 200\ N/mm^2$$

Ref: Strength of Materials – R.K. Bansal

---

64. A bar subjected to tensile load experiences reduction in diameter due to
1). Young's modulus
2). Poisson's effect
3). Shear stress
4). Bending stress

Correct Answer: 2). Poisson's effect

Solution:
Poisson's ratio causes **lateral contraction during tensile loading**.

Ref: Strength of Materials – Ramamrutham

---

65. If Poisson's ratio is zero, the material will
1). Change volume
2). Change lateral dimension
3). Not change lateral dimension
4). Break immediately

Correct Answer: 3). Not change lateral dimension

Solution:

$$\mu = 0$$

No lateral strain occurs.

Ref: Mechanics of Materials – Punmia

---

66. The area under complete stress-strain curve represents
1). Toughness
2). Elasticity
3). Resilience
4). Hardness

Correct Answer: 1). Toughness

Solution:
Total energy absorbed before fracture.

Ref: Strength of Materials – Bansal

---

67. If two bars of same material and equal area are connected in series, the stress in both bars will be

1). Same
2). Different
3). Zero
4). Infinite

Correct Answer: 1). Same

Solution:
Same load passes through both bars.

$$\sigma = \frac{P}{A}$$

Ref: Strength of Materials – Bansal

---

68. If two bars are connected in parallel, the load shared depends on

1). Length only
2). Area only
3). Modulus only
4). Area and modulus

Correct Answer: 4). Area and modulus

Solution:
Load distribution depends on stiffness AE.

Ref: Mechanics of Materials – Punmia

---

69. The shear force just to the right of a point load W increases by

1). W
2). W/2
3). Zero
4). WL

Correct Answer: 1). W

Solution:
Point load causes sudden change in shear.

Ref: Structural Analysis – Bhavikatti

---

70. For a cantilever beam with UDL, shear force diagram is

1). Horizontal line
2). Inclined straight line
3). Parabolic curve
4). Circular curve

Correct Answer: 2). Inclined straight line

Solution:
Shear varies linearly along beam.

Ref: Structural Analysis – Bhavikatti

---

71. Maximum bending moment in a cantilever with UDL occurs

1). At free end
2). At fixed end
3). At midspan
4). At quarter span

Correct Answer: 2). At fixed end

Solution:

$$M_{max} = \frac{wL^2}{2}$$

Ref: Strength of Materials – Bansal

---

72. If a simply supported beam carries two equal loads symmetrically, maximum moment occurs

1). At supports
2). At midspan
3). Under loads
4). At free end

Correct Answer: 2). At midspan

Solution:
Symmetry causes maximum moment at centre.

Ref: Structural Analysis – Bhavikatti

---

73. If no load acts on a beam section, the shear force diagram is

1). Horizontal
2). Inclined
3). Parabolic
4). Vertical

Correct Answer: 1). Horizontal

Solution:
No load → constant shear.

Ref: Strength of Materials – Bansal

---

74. If a beam carries UDL, bending moment diagram is

1). Straight line
2). Parabola
3). Circle
4). Horizontal line

Correct Answer: 2). Parabola

Solution:
Moment is integral of shear.

Ref: Structural Analysis – Bhavikatti

---

75. The unit of strain is

1). N
2). mm
3). Dimensionless
4). N/mm^2

Correct Answer: 3). Dimensionless

Solution:
Strain is ratio of two lengths.

Ref: Mechanics of Materials – Punmia

---

76. The modulus of elasticity for steel is approximately

1). 2×10^5 N/mm²
2). 2×10^4 N/mm²
3). 2×10^3 N/mm²
4). 2×10^2 N/mm²

Correct Answer: 1). 2×10^5 N/mm²

Solution:
Standard engineering value.

Ref: Strength of Materials – Bansal

---

77. When a beam bends downward, the top fibers experience

1). Tension
2). Compression
3). Shear
4). Torsion

Correct Answer: 2). Compression

Solution:
In sagging moment top fibers compress.

Ref: Strength of Materials – Bansal

---

78. The bottom fibers of a sagging beam experience

1). Compression
2). Tension
3). Shear
4). Bending

Correct Answer: 2). Tension

Solution:
Bottom fibers elongate.

Ref: Strength of Materials – Bansal

---

79. The point where bending stress becomes zero is called

1). Neutral axis
2). Centroid
3). Shear center
4). Support

Correct Answer: 1). Neutral axis

Solution:
At neutral axis bending stress is zero.

Ref: Strength of Materials – Ramamrutham

---

80. The bending moment diagram always starts from zero at

1). Fixed end
2). Hinged support
3). Cantilever fixed end
4). Point load

Correct Answer: 2). Hinged support

Solution:
Hinges cannot resist moment.

Ref: Structural Analysis – Bhavikatti

---

81. A bar of diameter 20 mm carries a tensile load of 31.4 kN. The stress induced is
1). 80 N/mm^2
2). 90 N/mm^2
3). 100 N/mm^2
4). 120 N/mm^2

Correct Answer: 3). 100 N/mm^2

Solution:

$$A = \frac{\pi d^2}{4}$$
$$A = \frac{3.14 \times 20^2}{4} = 314\, mm^2$$
$$\sigma = \frac{P}{A}$$
$$\sigma = \frac{31400}{314} = 100\, N/mm^2$$

Ref: Strength of Materials – R.K. Bansal

---

82. If stress is doubled within elastic limit, strain will
1). Become half
2). Remain constant
3). Double
4). Quadruple

Correct Answer: 3). Double

Solution:
From Hooke's law:

$$\sigma \propto \varepsilon$$

Ref: Strength of Materials – Ramamrutham

---

83. The ratio of volumetric stress to volumetric strain is called
1). Young's modulus
2). Bulk modulus
3). Modulus of rigidity
4). Poisson's ratio

Correct Answer: 2). Bulk modulus

Solution:

$$K = \frac{\text{Volumetric stress}}{\text{Volumetric strain}}$$

Ref: Mechanics of Materials – B.C. Punmia

---

84. If Young's modulus increases, deformation will
1). Increase
2). Decrease
3). Remain constant
4). Become infinite

Correct Answer: 2). Decrease

Solution:

$$\varepsilon = \frac{\sigma}{E}$$

Higher E → lower strain.

Ref: Strength of Materials – Bansal

---

85. The property of material to resist permanent deformation is called
1). Elasticity
2). Plasticity
3). Ductility
4). Toughness

Correct Answer: 1). Elasticity

Solution:
Elastic materials regain original shape after load removal.

Ref: Strength of Materials – Ramamrutham

---

86. In composite bars arranged in parallel, total load equals

1). Sum of loads carried by each bar
2). Load carried by first bar only
3). Load carried by second bar only
4). Zero

Correct Answer: 1). Sum of loads carried by each bar

Solution:

$$P = P_1 + P_2$$

Ref: Strength of Materials – Bansal

---

87. The shear force diagram for a beam without any load is

1). Inclined line
2). Horizontal line
3). Parabola
4). Circle

Correct Answer: 2). Horizontal line

Solution:
No change in shear → constant value.

Ref: Structural Analysis – Bhavikatti

---

88. A sudden change in shear force diagram occurs at

1). UDL
2). Point load
3). Support
4). Beam centre

Correct Answer: 2). Point load

Solution:
Point loads create abrupt shear change.

Ref: Structural Analysis – Bhavikatti

---

89. Maximum bending moment in a simply supported beam with UDL occurs at

1). Support
2). Midspan
3). Quarter span
4). Free end

Correct Answer: 2). Midspan

Solution:

$$M = \frac{wL^2}{8}$$

Ref: Strength of Materials – Bansal

---

90. The sign convention for sagging bending moment is

1). Negative
2). Positive
3). Zero
4). Infinite

Correct Answer: 2). Positive

Solution:
Sagging moment produces tension at bottom fibers.

Ref: Structural Analysis – Bhavikatti

---

91. Hogging bending moment produces

1). Tension at top
2). Compression at top
3). Zero stress
4). Shear stress only

Correct Answer: 1). Tension at top

Solution:
In hogging, beam bends upward.

Ref: Strength of Materials – Bansal

---

92. The bending moment diagram for point load is

1). Straight line
2). Parabolic
3). Circular
4). Horizontal

Correct Answer: 1). Straight line

Solution:
Moment varies linearly between loads.

Ref: Structural Analysis – Bhavikatti

---

93. If shear force diagram is triangular, bending moment diagram becomes

1). Linear
2). Parabolic
3). Cubic
4). Circular

Correct Answer: 2). Parabolic

Solution:
Integration of linear shear gives parabola.

Ref: Strength of Materials – Bansal

---

94. If load on beam increases, bending moment

1). Decreases
2). Remains constant
3). Increases
4). Becomes zero

Correct Answer: 3). Increases

Solution:
Moment directly proportional to load.

Ref: Structural Analysis – Bhavikatti

---

95. In a cantilever beam carrying load W at free end, reaction at fixed support is

1). W
2). W/2
3). Zero
4). WL

Correct Answer: 1). W

Solution:
Entire load is carried by fixed support.

Ref: Strength of Materials – Bansal

---

96. The bending moment at fixed end of cantilever with load W at free end is

1). WL
2). WL/2
3). WL/4
4). WL^2

Correct Answer: 1). WL

Solution:

$$M = WL$$

Ref: Strength of Materials – Bansal

---

97. The bending moment at free end of cantilever is

1). WL
2). Zero
3). W/2
4). WL^2

Correct Answer: 2). Zero

Solution:
No moment resistance at free end.

Ref: Structural Analysis – Bhavikatti

---

98. A beam extending beyond support on one side is called

1). Continuous beam
2). Cantilever
3). Overhanging beam
4). Fixed beam

Correct Answer: 3). Overhanging beam

Solution:
Part of beam projects beyond support.

Ref: Structural Analysis – Bhavikatti

---

99. If bending moment diagram crosses zero, the point is

1). Neutral axis
2). Point of contraflexure
3). Shear centre
4). Support

Correct Answer: 2). Point of contraflexure

Solution:
Moment sign changes here.

Ref: Strength of Materials – Bansal

---

100. If shear force is positive, bending moment diagram

1). Increases
2). Decreases
3). Remains constant
4). Becomes zero

Correct Answer: 1). Increases

Solution:

$$\frac{dM}{dx} = V$$

Ref: Structural Analysis – Bhavikatti

---

101. If shear force is negative, bending moment diagram

1). Increases
2). Decreases
3). Remains constant
4). Infinite

Correct Answer: 2). Decreases

Solution:
Negative shear → moment slope downward.

Ref: Strength of Materials – Bansal

---

102. The neutral axis passes through

1). Top fiber
2). Bottom fiber
3). Centroid
4). Support

Correct Answer: 3). Centroid

Solution:
Neutral axis always passes through centroid.

Ref: Strength of Materials – Ramamrutham

---

103. In pure bending, shear force is

1). Maximum
2). Zero
3). Infinite
4). Constant

Correct Answer: 2). Zero

Solution:
Pure bending occurs when shear force is zero.

Ref: Strength of Materials – Bansal

---

104. The load per unit length is called

1). Point load
2). Uniformly distributed load
3). Reaction
4). Moment

Correct Answer: 2). Uniformly distributed load

Solution:
UDL acts continuously along beam length.

Ref: Structural Analysis – Bhavikatti

---

105. The resultant of UDL over length L is

1). w
2). wL
3). wL^2
4). w/L

Correct Answer: 2). wL

Solution:
Total load = intensity × length.

Ref: Strength of Materials – Bansal

---

106. The location of resultant of UDL acts at

1). End of beam
2). Centre of span
3). Quarter span
4). Support

Correct Answer: 2). Centre of span

Solution:
UDL acts through centroid of load distribution.

Ref: Structural Analysis – Bhavikatti

---

107. The maximum shear force in simply supported beam occurs

1). At midspan
2). At supports
3). At quarter span
4). At free end

Correct Answer: 2). At supports

Solution:
Reactions produce maximum shear.

Ref: Strength of Materials – Bansal

---

108. If beam length increases, bending moment due to UDL varies as

1). L
2). L^2
3). L^3
4). L^4

Correct Answer: 2). L^2

Solution:

$$M = \frac{wL^2}{8}$$

Ref: Structural Analysis – Bhavikatti

---

109. The bending stress in beam depends on

1). Load only
2). Span only
3). Section modulus
4). Temperature

Correct Answer: 3). Section modulus

Solution:
Stress relation:

$$\sigma = \frac{M}{Z}$$

Ref: Strength of Materials – Bansal

---

110. The section modulus represents

1). Strength of beam section
2). Weight of beam
3). Length of beam
4). Load on beam

Correct Answer: 1). Strength of beam section

Solution:

$$Z = \frac{I}{y}$$

Higher section modulus → stronger beam.

Ref: Strength of Materials – R.K. Bansal

UNIT 2 - THEORY OF SIMPLE BENDING

---

1. The bending equation is expressed as

1). $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$
2). $\frac{M}{I} = \frac{E}{y} = \frac{\sigma}{R}$
3). $\frac{M}{\sigma} = \frac{I}{y} = \frac{E}{R}$
4). $\frac{I}{M} = \frac{\sigma}{y} = \frac{E}{R}$

Correct Answer: 1). $\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$

Solution:
The fundamental bending equation relates bending moment, stress, and radius of curvature.

$$\frac{M}{I} = \frac{\sigma}{y} = \frac{E}{R}$$

Where
M = bending moment
I = moment of inertia
σ = bending stress
y = distance from neutral axis
E = Young's modulus
R = radius of curvature

Ref: Strength of Materials – R.K. Bansal

---

2. The theory of simple bending is also called

1). Euler theory
2). Flexure theory
3). Torsion theory
4). Shear theory

Correct Answer: 2). Flexure theory

Solution:
The bending of beams due to external loads is called **flexure**.

Ref: Strength of Materials – Ramamrutham

---

3. In simple bending, plane sections before bending remain
1). Plane after bending
2). Curved after bending
3). Twisted
4). Irregular

Correct Answer: 1). Plane after bending

Solution:
One of the main assumptions of bending theory.

Ref: Strength of Materials – Bansal

---

4. The layer of beam which experiences zero stress is called
1). Neutral axis
2). Shear center
3). Centroid axis
4). Elastic axis

Correct Answer: 1). Neutral axis

Solution:
At neutral axis bending stress = 0.

Ref: Mechanics of Materials – B.C. Punmia

---

5. The neutral axis always passes through
1). Top fiber
2). Bottom fiber
3). Centroid of section
4). Support

Correct Answer: 3). Centroid of section

Solution:
For homogeneous beams neutral axis passes through centroid.

Ref: Strength of Materials – Bansal

---

6. The bending stress varies with distance from neutral axis as

1). Linearly
2). Parabolically
3). Exponentially
4). Logarithmically

Correct Answer: 1). Linearly

Solution:

$$\sigma = \frac{My}{I}$$

Stress proportional to y.

Ref: Strength of Materials – Bansal

---

7. Maximum bending stress occurs at

1). Neutral axis
2). Extreme fibers
3). Centroid
4). Supports

Correct Answer: 2). Extreme fibers

Solution:
Maximum distance from neutral axis gives maximum stress.

Ref: Strength of Materials – Ramamrutham

---

8. Section modulus is defined as

1). $\frac{I}{y}$
2). $\frac{y}{I}$
3). Iy
4). $\frac{I}{M}$

Correct Answer: 1). $\frac{I}{y}$

Solution:

$$Z = \frac{I}{y}$$

Ref: Strength of Materials – Bansal

---

9. Bending stress is given by

1). $\sigma = \frac{M}{I}$
2). $\sigma = \frac{My}{I}$
3). $\sigma = \frac{I}{My}$
4). $\sigma = \frac{M}{y}$

Correct Answer: 2). $\sigma = \frac{My}{I}$

Solution:
Derived from bending equation.

Ref: Strength of Materials – Bansal

---

10. If section modulus increases, bending stress will

1). Increase
2). Decrease
3). Remain constant
4). Become zero

Correct Answer: 2). Decrease

Solution:

$$\sigma = \frac{M}{Z}$$

Higher Z → lower stress.

Ref: Strength of Materials – Bansal

---

11. The unit of section modulus is

1). mm^2
2). mm^3
3). mm^4
4). mm

Correct Answer: 2). mm^3

Solution:

$$Z = \frac{I}{y}$$

Units:

$$mm^4/mm = mm^3$$

Ref: Mechanics of Materials – Punmia

---

12. In sagging bending moment

1). Top fibers compress
2). Bottom fibers compress
3). All fibers compress
4). No stress occurs

Correct Answer: 1). Top fibers compress

Solution:
Sagging causes compression at top and tension at bottom.

Ref: Strength of Materials – Bansal

---

13. In hogging bending moment

1). Top fibers in tension
2). Bottom fibers in tension
3). No stress
4). Uniform stress

Correct Answer: 1). Top fibers in tension

Solution:
Hogging bends beam upward.

Ref: Structural Analysis – Bhavikatti

---

14. The beam section most efficient in bending is

1). Rectangular
2). Circular
3). I-section
4). Square

Correct Answer: 3). I-section

Solution:
Material placed far from neutral axis increases moment of inertia.

Ref: Strength of Materials – Bansal

---

15. Moment of inertia represents

1). Strength of section
2). Resistance to bending
3). Resistance to shear
4). Load on beam

Correct Answer: 2). Resistance to bending

Solution:
Higher I → stronger bending resistance.

Ref: Mechanics of Materials – Punmia

---

16. The unit of moment of inertia is

1). mm^2
2). mm^3
3). mm^4
4). mm

Correct Answer: 3). mm^4

Solution:
Moment of inertia depends on area × distance².

Ref: Strength of Materials – Bansal

---

17. If bending moment doubles, bending stress will

1). Remain constant
2). Double
3). Halve
4). Quadruple

Correct Answer: 2). Double

Solution:

$$\sigma = \frac{My}{I}$$

Stress directly proportional to moment.

Ref: Strength of Materials – Bansal

---

18. If depth of beam increases, bending stress will

1). Increase
2). Decrease
3). Remain constant
4). Become zero

Correct Answer: 2). Decrease

Solution:
Larger depth increases moment of inertia.

Ref: Strength of Materials – Bansal

---

19. The bending stress at neutral axis is

1). Maximum
2). Minimum

3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
Since $y = 0$

$$\sigma = \frac{My}{I} = 0$$

Ref: Strength of Materials – Bansal

---

20. The radius of curvature in bending equation represents

1). Beam length
2). Curvature of beam
3). Beam load
4). Beam reaction

Correct Answer: 2). Curvature of beam

Solution:
R defines the curvature of the neutral axis during bending.

Ref: Strength of Materials – Bansal

---

21. The bending stress in a beam is directly proportional to
1). Distance from neutral axis
2). Width of beam
3). Area of beam
4). Length of beam

Correct Answer: 1). Distance from neutral axis

Solution:

$$\sigma = \frac{My}{I}$$

Since stress depends on **distance y from neutral axis**, it increases linearly as we move away from the neutral axis.

Ref: Strength of Materials – R.K. Bansal

---

22. For a rectangular section of width b and depth d, the moment of inertia about neutral axis is

1). $\frac{bd^2}{6}$

2). $\frac{bd^3}{12}$

3). $\frac{b^3d}{12}$

4). $\frac{bd}{12}$

Correct Answer: 2). $\frac{bd^3}{12}$

Solution:

Moment of inertia of rectangular section:

$$I = \frac{bd^3}{12}$$

Ref: Mechanics of Materials – B.C. Punmia

---

23. The section modulus for a rectangular section is

1). $\frac{bd^2}{6}$

2). $\frac{bd^2}{12}$

3). $\frac{b^2d}{6}$

4). $\frac{bd}{12}$

Correct Answer: 1). $\frac{bd^2}{6}$

Solution:

$$Z = \frac{I}{y}$$

$$I = \frac{bd^3}{12}, y = \frac{d}{2}$$

$$Z = \frac{bd^2}{6}$$

Ref: Strength of Materials – Bansal

---

24. For a circular section of diameter d, moment of inertia about centroidal axis is

1). $\frac{\pi d^4}{64}$
2). $\frac{\pi d^4}{32}$
3). $\frac{\pi d^3}{32}$
4). $\frac{\pi d^2}{64}$

Correct Answer: 1). $\frac{\pi d^4}{64}$

Solution:

Moment of inertia of circular section:

$$I = \frac{\pi d^4}{64}$$

Ref: Strength of Materials – Bansal

---

25. The section modulus of a circular section is

1). $\frac{\pi d^3}{32}$
2). $\frac{\pi d^3}{16}$
3). $\frac{\pi d^4}{32}$
4). $\frac{\pi d^4}{64}$

Correct Answer: 1). $\frac{\pi d^3}{32}$

Solution:

$$Z = \frac{I}{y}$$

$$Z = \frac{\pi d^4/64}{d/2}$$

$$Z = \frac{\pi d^3}{32}$$

Ref: Strength of Materials – Bansal

---

26. If depth of beam doubles, section modulus becomes

1). Double
2). Four times
3). Eight times
4). Sixteen times

Correct Answer: 2). Four times

Solution:

For rectangular section:

$$Z = \frac{bd^2}{6}$$

If depth doubles:

$$Z \propto d^2$$

So

$$(2d)^2 = 4d^2$$

Ref: Strength of Materials – Bansal

---

27. If width of beam doubles, section modulus becomes

1). Double
2). Four times
3). Eight times
4). Same

Correct Answer: 1). Double

Solution:

$$Z = \frac{bd^2}{6}$$

If b doubles → Z doubles.

Ref: Mechanics of Materials – Punmia

---

28. Bending stress is maximum at

1). Neutral axis
2). Centroid
3). Extreme fiber
4). Mid depth

Correct Answer: 3). Extreme fiber

Solution:
Maximum value occurs where y is maximum.

Ref: Strength of Materials – Bansal

---

29. If moment of inertia increases, bending stress

1). Increases
2). Decreases
3). Remains constant
4). Becomes zero

Correct Answer: 2). Decreases

Solution:

$$\sigma = \frac{My}{I}$$

Higher I reduces stress.

Ref: Strength of Materials – Bansal

---

30. The shear stress distribution in a rectangular beam is

1). Uniform
2). Triangular
3). Parabolic
4). Circular

Correct Answer: 3). Parabolic

Solution:
Shear stress varies parabolically across depth.

Ref: Strength of Materials – Ramamrutham

---

31. Maximum shear stress in rectangular section occurs at

1). Top fiber
2). Bottom fiber
3). Neutral axis
4). Support

Correct Answer: 3). Neutral axis

Solution:
Shear stress maximum at centroid.

Ref: Strength of Materials – Bansal

---

32. Shear stress at extreme fibers of rectangular beam is

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
At top and bottom fibers shear stress = 0.

Ref: Mechanics of Materials – Punmia

---

33. Maximum shear stress in rectangular beam is

1). $\frac{3}{2} \times$ average shear stress
2). Equal to average
3). Half of average
4). Double of average

Correct Answer: 1). $\frac{3}{2} \times$ average shear stress

Solution:

$$\tau_{max} = \frac{3}{2}\tau_{avg}$$

Ref: Strength of Materials – Bansal

---

34. Shear stress distribution in circular section is

1). Parabolic
2). Uniform
3). Linear
4). Triangular

Correct Answer: 1). Parabolic

Solution:
Similar to rectangular but different magnitude.

Ref: Strength of Materials – Bansal

---

35. Maximum shear stress in circular section is

1). $\frac{4}{3}\tau_{avg}$
2). $\frac{3}{2}\tau_{avg}$
3). $2\tau_{avg}$
4). $\frac{1}{2}\tau_{avg}$

Correct Answer: 1). $\frac{4}{3}\tau_{avg}$

Solution:

Circular section:

$$\tau_{max} = \frac{4}{3}\tau_{avg}$$

Ref: Strength of Materials – Bansal

---

36. In I-sections, most material is placed

1). Near neutral axis
2). Away from neutral axis
3). At centre
4). At supports

Correct Answer: 2). Away from neutral axis

Solution:
This increases moment of inertia and bending strength.

Ref: Strength of Materials – Bansal

---

37. The web of an I-section primarily resists

1). Bending stress
2). Shear stress
3). Torsion
4). Compression only

Correct Answer: 2). Shear stress

Solution:
Web carries most of shear force.

Ref: Structural Analysis – Bhavikatti

---

38. The flanges of I-beam resist mainly

1). Shear stress
2). Bending stress
3). Torsion
4). Compression only

Correct Answer: 2). Bending stress

Solution:
Flanges located far from neutral axis resist bending.

Ref: Strength of Materials – Bansal

---

39. If bending moment is zero, bending stress will be

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:

$$\sigma = \frac{My}{I}$$

If M = 0 → σ = 0.

Ref: Strength of Materials – Bansal

---

40. A beam designed for maximum bending strength should have

1). Minimum section modulus
2). Maximum section modulus
3). Minimum moment of inertia
4). Zero moment of inertia

Correct Answer: 2). Maximum section modulus

Solution:

$$\sigma = \frac{M}{Z}$$

Higher Z → lower stress → stronger beam.

Ref: Strength of Materials – Bansal

---

41. A simply supported beam carries a bending moment of 10 kN·m. If the section modulus is 500 cm³, the bending stress is
1). 200 MPa
2). 150 MPa
3). 100 MPa
4). 50 MPa

Correct Answer: 1). 200 MPa

Solution:

Convert units

$$M = 10\ kN \cdot m = 10 \times 10^6\ N\,mm$$
$$Z = 500\ cm^3 = 5 \times 10^5\ mm^3$$
$$\sigma = \frac{M}{Z}$$
$$\sigma = \frac{10 \times 10^6}{5 \times 10^5}$$
$$\sigma = 200\ N/mm^2$$

Ref: Strength of Materials – R.K. Bansal

---

42. If the bending moment increases three times, bending stress becomes
1). Same
2). Double
3). Triple
4). Half

Correct Answer: 3). Triple

Solution:

$$\sigma = \frac{M}{Z}$$

Stress directly proportional to bending moment.

Ref: Strength of Materials – Bansal

---

43. A rectangular beam has width 100 mm and depth 200 mm. The section modulus is

1). $6.67 \times 10^5 mm^3$
2). $3.33 \times 10^5 mm^3$
3). $1.67 \times 10^5 mm^3$
4). $8.33 \times 10^5 mm^3$

Correct Answer: 1). $6.67 \times 10^5 mm^3$

Solution:

$$Z = \frac{bd^2}{6}$$
$$Z = \frac{100 \times 200^2}{6}$$
$$Z = 6.67 \times 10^5\ mm^3$$

Ref: Strength of Materials – Bansal

---

44. A circular beam of diameter 100 mm has section modulus

1). $9.82 \times 10^4 mm^3$
2). $1.96 \times 10^5 mm^3$
3). $3.92 \times 10^5 mm^3$
4). $7.85 \times 10^4 mm^3$

Correct Answer: 1). $9.82 \times 10^4 mm^3$

Solution:

$$Z = \frac{\pi d^3}{32}$$
$$Z = \frac{3.14 \times 100^3}{32}$$
$$Z = 9.82 \times 10^4\ mm^3$$

Ref: Strength of Materials – Bansal

---

45. If bending moment is constant along beam length, the beam is under

1). Pure bending
2). Shear bending

3). Torsion
4). Compression

Correct Answer: 1). Pure bending

Solution:
Pure bending occurs when **shear force = 0** and moment constant.

Ref: Strength of Materials – Ramamrutham

---

46. The bending stress distribution across beam depth is

1). Linear
2). Parabolic
3). Uniform
4). Circular

Correct Answer: 1). Linear

Solution:

$$\sigma = \frac{My}{I}$$

Stress varies linearly from neutral axis.

Ref: Strength of Materials – Bansal

---

47. The maximum bending stress in a beam occurs

1). At centroid
2). At neutral axis
3). At extreme fiber
4). At midspan

Correct Answer: 3). At extreme fiber

Solution:
Stress highest where distance from NA maximum.

Ref: Strength of Materials – Bansal

---

48. The ratio of bending moment to bending stress is called

1). Section modulus
2). Moment of inertia
3). Elastic modulus
4). Radius of curvature

Correct Answer: 1). Section modulus

Solution:

$$Z = \frac{M}{\sigma}$$

Ref: Mechanics of Materials – Punmia

---

49. The shear stress in a beam depends on

1). Bending moment
2). Shear force
3). Beam length
4). Beam reaction

Correct Answer: 2). Shear force

Solution:
Shear stress arises due to transverse shear force.

Ref: Strength of Materials – Bansal

---

50. Maximum shear stress in rectangular section is

1). Equal to average shear
2). 1.5times average shear
3). Double average shear
4). Half average shear

Correct Answer: 2). 1.5times average shear

Solution:

$$\tau_{max} = \frac{3}{2}\tau_{avg}$$

Ref: Strength of Materials – Bansal

---

51. If the depth of beam increases, moment of inertia increases

1). Linearly
2). Quadratically
3). Cubically
4). Exponentially

Correct Answer: 3). Cubically

Solution:

$$I = \frac{bd^3}{12}$$

Ref: Strength of Materials – Bansal

---

52. If the width of rectangular beam doubles, moment of inertia becomes

1). Double
2). Four times
3). Eight times
4). Same

Correct Answer: 1). Double

Solution:

$$I = \frac{bd^3}{12}$$

Ref: Mechanics of Materials – Punmia

---

53. The bending stress is compressive at

1). Bottom fiber in sagging
2). Top fiber in sagging
3). Neutral axis
4). Support

Correct Answer: 2). Top fiber in sagging

Solution:
Sagging causes compression at top.

Ref: Strength of Materials – Bansal

---

54. The bending stress is tensile at

1). Top fiber in sagging
2). Bottom fiber in sagging
3). Neutral axis
4). Support

Correct Answer: 2). Bottom fiber in sagging

Solution:
Bottom fibers elongate.

Ref: Strength of Materials – Bansal

---

55. For equal area sections, the strongest beam section is

1). Circular
2). Square
3). I-section
4). Rectangular

Correct Answer: 3). I-section

Solution:
Material placed far from neutral axis increases strength.

Ref: Strength of Materials – Bansal

---

56. The centroid of symmetrical beam section lies

1). At mid-depth
2). At top fiber
3). At bottom fiber
4). Outside beam

Correct Answer: 1). At mid-depth

Solution:
Due to symmetry.

Ref: Mechanics of Materials – Punmia

---

57. The neutral axis divides beam into

1). Compression and tension zones
2). Two compression zones
3). Two tension zones
4). No stress zones

Correct Answer: 1). Compression and tension zones

Solution:
Above NA compression, below NA tension.

Ref: Strength of Materials – Bansal

---

58. Shear stress in I-beam is maximum at

1). Flange
2). Web
3). Neutral axis
4). Support

Correct Answer: 2). Web

Solution:
Web carries majority of shear force.

Ref: Structural Analysis – Bhavikatti

---

59. The flange of I-beam mainly resists

1). Shear stress
2). Bending stress
3). Torsion
4). Axial stress

Correct Answer: 2). Bending stress

Solution:
Flanges are far from NA → resist bending.

Ref: Strength of Materials – Bansal

---

60. If section modulus increases, beam strength

1). Decreases
2). Increases
3). Remains constant
4). Becomes zero

Correct Answer: 2). Increases

Solution:

$$\sigma = \frac{M}{Z}$$

Higher Z → lower stress → stronger beam.

Ref: Strength of Materials – Bansal

---

61. A beam experiences a bending moment of 6 kN·m. If section modulus is 300 cm³, the bending stress is
1). 100 MPa
2). 150 MPa
3). 200 MPa
4). 50 MPa

Correct Answer: 3). 200 MPa

Solution:

$$M = 6\,kN \cdot m = 6 \times 10^6\ Nmm$$
$$Z = 300\ cm^3 = 3 \times 10^5\ mm^3$$
$$\sigma = \frac{M}{Z}$$
$$\sigma = \frac{6 \times 10^6}{3 \times 10^5} = 200\ N/mm^2$$

Ref: Strength of Materials – R.K. Bansal

62. If the moment of inertia of a beam doubles while bending moment remains same, bending stress will

1). Double
2). Become half
3). Remain same
4). Become zero

Correct Answer: 2). Become half

Solution:

$$\sigma = \frac{My}{I}$$

Stress inversely proportional to I.

Ref: Strength of Materials – Bansal

63. For a rectangular section, if depth increases three times, moment of inertia becomes

1). 3 times
2). 6 times
3). 9 times
4). 27 times

Correct Answer: 4). 27 times

Solution:

$$I = \frac{bd^3}{12}$$

If $d = 3d$

$$I \propto d^3$$
$$3^3 = 27$$

Ref: Mechanics of Materials – Punmia

64. If bending stress at extreme fiber is 120 MPa and section modulus is 400 cm³, bending moment is

1). 24 kN·m
2). 36 kN·m
3). 48 kN·m
4). 60 kN·m

Correct Answer: 3). 48 kN·m

Solution:

$$Z = 400\ cm^3 = 4 \times 10^5\ mm^3$$
$$\sigma = 120\ N/mm^2$$
$$M = \sigma Z$$
$$M = 120 \times 4 \times 10^5$$
$$M = 4.8 \times 10^7\ Nmm$$
$$M = 48\ kN \cdot m$$

Ref: Strength of Materials – Bansal

---

65. If bending moment becomes zero, curvature of beam becomes

1). Maximum
2). Infinite
3). Zero
4). Constant

Correct Answer: 3). Zero

Solution:

From bending equation

$$\frac{M}{I} = \frac{E}{R}$$

If $M = 0$→ curvature zero.

Ref: Strength of Materials – Bansal

---

66. If Young's modulus increases, radius of curvature will

1). Increase
2). Decrease
3). Remain same
4). Become zero

Correct Answer: 1). Increase

Solution:

$$\frac{M}{I} = \frac{E}{R}$$
$$R = \frac{EI}{M}$$

Ref: Strength of Materials – Bansal

---

67. The bending stress distribution across beam depth is

1). Uniform
2). Linear
3). Parabolic
4). Circular

Correct Answer: 2). Linear

Solution:

$$\sigma = \frac{My}{I}$$

Ref: Strength of Materials – Bansal

---

68. In rectangular beam, shear stress is maximum at

1). Top fiber
2). Bottom fiber
3). Neutral axis
4). Midspan

Correct Answer: 3). Neutral axis

Solution:
Shear stress distribution parabolic with maximum at NA.

Ref: Strength of Materials – Bansal

---

69. Shear stress at extreme fibers of beam is

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
Shear stress becomes zero at beam edges.

Ref: Mechanics of Materials – Punmia

---

70. The ratio of maximum shear stress to average shear stress in rectangular beam is

1). 1
2). 1.33
3). 1.5
4). 2

Correct Answer: 3). 1.5

Solution:

$$\tau_{max} = \frac{3}{2}\tau_{avg}$$

Ref: Strength of Materials – Bansal

---

71. The ratio of maximum shear stress to average shear stress in circular section is

1). 1.25
2). 1.33
3). 1.5
4). 2

Correct Answer: 2). 1.33

Solution:

$$\tau_{max} = \frac{4}{3}\tau_{avg}$$

Ref: Strength of Materials – Bansal

---

72. Maximum bending stress occurs at

1). Neutral axis
2). Centroid
3). Extreme fibers
4). Beam supports

Correct Answer: 3). Extreme fibers

Solution:
Stress proportional to distance from NA.

Ref: Strength of Materials – Bansal

---

73. In pure bending condition, shear force is

1). Maximum
2). Zero
3). Minimum
4). Infinite

Correct Answer: 2). Zero

Solution:
Pure bending occurs when shear force = 0.

Ref: Strength of Materials – Bansal

---

74. The bending stress at neutral axis is

1). Maximum
2). Minimum

3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:

$$\sigma = \frac{My}{I}$$

When $y = 0$

Ref: Strength of Materials – Bansal

---

75. The section modulus of beam increases when

1). Depth increases
2). Width increases
3). Both increase
4). Load increases

Correct Answer: 3). Both increase

Solution:

$$Z = \frac{bd^2}{6}$$

Ref: Strength of Materials – Bansal

---

76. The strongest beam section for given area is

1). Rectangular
2). Circular
3). Square
4). I-section

Correct Answer: 4). I-section

Solution:
Material placed away from neutral axis increases bending resistance.

Ref: Strength of Materials – Bansal

---

77. In I-section beam, flanges mainly resist

1). Shear stress
2). Bending stress
3). Torsion
4). Axial stress

Correct Answer: 2). Bending stress

Solution:
Flanges are far from neutral axis.

Ref: Structural Analysis – Bhavikatti

---

78. The web of an I-beam resists mainly

1). Bending
2). Shear
3). Torsion
4). Compression

Correct Answer: 2). Shear

Solution:
Shear stress concentrated near neutral axis.

Ref: Strength of Materials – Bansal

---

79. If beam depth increases, bending stress

1). Increases
2). Decreases
3). Remains constant
4). Becomes zero

Correct Answer: 2). Decreases

Solution:

$$\sigma = \frac{M}{Z}$$

Ref: Strength of Materials – Bansal

---

80. The moment of inertia of rectangular section depends mainly on

1). Width
2). Depth
3). Area
4). Load

Correct Answer: 2). Depth

Solution:

$$I = \frac{bd^3}{12}$$

Ref: Mechanics of Materials – Punmia

---

81. The bending moment that causes compression at top and tension at bottom is

1). Hogging
2). Sagging
3). Pure bending
4). Shear bending

Correct Answer: 2). Sagging

Solution:
Sagging moment produces downward curvature.

Ref: Structural Analysis – Bhavikatti

---

82. Hogging moment produces

1). Compression at bottom
2). Tension at top
3). Tension at bottom
4). Zero stress

Correct Answer: 2). Tension at top

Solution:
Beam bends upward.

Ref: Strength of Materials – Bansal

---

83. The beam with maximum moment of inertia for given area is

1). Circular
2). Square
3). Rectangular
4). I-section

Correct Answer: 4). I-section

Solution:
Material distributed far from neutral axis.

Ref: Strength of Materials – Bansal

---

84. If bending moment doubles and section modulus doubles, bending stress

1). Doubles
2). Becomes half
3). Remains same
4). Quadruples

Correct Answer: 3). Remains same

Solution:

$$\sigma = \frac{M}{Z}$$

Ref: Strength of Materials – Bansal

---

85. In bending equation Erepresents

1). Elastic limit
2). Young’s modulus
3). Bending modulus
4). Strain energy

Correct Answer: 2). Young's modulus

Solution:
Material property.

Ref: Strength of Materials – Bansal

---

86. The curvature of beam is inversely proportional to

1). Bending moment
2). Radius of curvature
3). Moment of inertia
4). Section modulus

Correct Answer: 2). Radius of curvature

Solution:

$$Curvature = \frac{1}{R}$$

Ref: Strength of Materials – Bansal

---

87. Maximum shear stress occurs where

1). Bending moment maximum
2). Shear force maximum
3). Load maximum
4). Reaction maximum

Correct Answer: 2). Shear force maximum

Solution:
Shear stress proportional to shear force.

Ref: Strength of Materials – Bansal

---

88. The bending stress at top and bottom fibers are

1). Same magnitude opposite sign
2). Same magnitude same sign
3). Different magnitude
4). Zero

Correct Answer: 1). Same magnitude opposite sign

Solution:
One in compression and one in tension.

Ref: Strength of Materials – Bansal

---

89. If beam depth increases, moment of inertia

1). Decreases
2). Remains same
3). Increases
4). Becomes zero

Correct Answer: 3). Increases

Solution:

$$I = \frac{bd^3}{12}$$

Ref: Strength of Materials – Bansal

---

90. A beam is strongest when

1). Material concentrated near neutral axis
2). Material concentrated away from neutral axis
3). Material at centre
4). Uniform material distribution

Correct Answer: 2). Material concentrated away from neutral axis

Solution:
This increases section modulus and bending resistance.

Ref: Strength of Materials – Bansal

---

91. If the bending moment in a beam increases while section modulus remains constant, the bending stress will
1). Decrease
2). Remain constant
3). Increase
4). Become zero

Correct Answer: 3). Increase

Solution:

$$\sigma = \frac{M}{Z}$$

Since section modulus is constant, bending stress increases directly with bending moment.

Ref: Strength of Materials – R.K. Bansal

---

92. The distance between neutral axis and extreme fiber is called
1). Radius of curvature
2). Bending depth
3). Extreme fiber distance
4). Section modulus

Correct Answer: 3). Extreme fiber distance

Solution:
This distance is represented by **y** in the bending equation.

Ref: Mechanics of Materials – B.C. Punmia

---

93. In a beam under bending, compression occurs at the top fiber when the bending moment is
1). Hogging
2). Sagging
3). Zero
4). Constant

Correct Answer: 2). Sagging

Solution:
Sagging moment causes **compression at top and tension at bottom**.

Ref: Strength of Materials – Bansal

---

94. The bending stress at the neutral axis is
1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:

$$\sigma = \frac{My}{I}$$

At neutral axis $y = 0$.

Ref: Strength of Materials – Bansal

---

95. If beam depth is doubled, section modulus of rectangular beam becomes
1). Double
2). Four times
3). Eight times
4). Sixteen times

Correct Answer: 2). Four times

Solution:

$$Z = \frac{bd^2}{6}$$
$$(2d)^2 = 4d^2$$

Ref: Strength of Materials – Bansal

---

96. If beam width doubles while depth remains constant, section modulus becomes
1). Double
2). Four times
3). Eight times
4). Same

Correct Answer: 1). Double

Solution:

$$Z = \frac{bd^2}{6}$$

Ref: Mechanics of Materials – Punmia

---

97. The bending stress distribution over beam cross section is
1). Uniform
2). Linear
3). Parabolic
4). Circular

Correct Answer: 2). Linear

Solution:

$$\sigma = \frac{My}{I}$$

Stress varies linearly with distance from neutral axis.

Ref: Strength of Materials – Bansal

---

98. Maximum bending stress occurs at
1). Neutral axis
2). Centroid
3). Extreme fibers
4). Supports

Correct Answer: 3). Extreme fibers

Solution:
Distance from neutral axis is maximum at extreme fibers.

Ref: Strength of Materials – Bansal

---

99. The ratio of bending moment to section modulus gives
1). Strain
2). Stress
3). Shear force
4). Curvature

Correct Answer: 2). Stress

Solution:

$$\sigma = \frac{M}{Z}$$

Ref: Strength of Materials – Bansal

---

100. For a beam subjected to pure bending, the shear force is
1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
Pure bending occurs when shear force is zero.

Ref: Strength of Materials – Bansal

---

101. If moment of inertia increases, bending stress will
1). Increase
2). Decrease
3). Remain constant
4). Become infinite

Correct Answer: 2). Decrease

Solution:

$$\sigma = \frac{My}{I}$$

Ref: Strength of Materials – Bansal

---

102. The unit of section modulus is
1). mm^2
2). mm^3
3). mm^4
4). mm

Correct Answer: 2). mm^3

Solution:

$$Z = \frac{I}{y}$$

Units: $mm^4/mm = mm^3$

Ref: Mechanics of Materials – Punmia

---

103. The neutral axis divides beam section into
1). Two compression zones
2). Two tension zones
3). Compression and tension zones
4). Zero stress zones

Correct Answer: 3). Compression and tension zones

Solution:
Above NA compression, below NA tension.

Ref: Strength of Materials – Bansal

---

104. Shear stress in rectangular beam is zero at
1). Neutral axis
2). Extreme fibers
3). Supports
4). Midspan

Correct Answer: 2). Extreme fibers

Solution:
Shear stress distribution becomes zero at beam edges.

Ref: Strength of Materials – Bansal

---

105. The strongest beam section for bending among equal area sections is
1). Rectangular
2). Square
3). Circular
4). I-section

Correct Answer: 4). I-section

Solution:
Material distributed away from neutral axis increases bending strength.

Ref: Strength of Materials – Bansal

---

106. In I-beams, the web mainly carries
1). Bending stress
2). Shear stress
3). Torsion
4). Compression

Correct Answer: 2). Shear stress

Solution:
Shear force concentrated near neutral axis.

Ref: Structural Analysis – S.S. Bhavikatti

---

107. Flanges in I-beam resist mainly
1). Shear stress
2). Bending stress
3). Torsion
4). Axial stress

Correct Answer: 2). Bending stress

Solution:
Flanges located far from neutral axis resist bending.

Ref: Strength of Materials – Bansal

108. If bending moment becomes zero, bending stress becomes
1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:

$$\sigma = \frac{My}{I}$$

Ref: Strength of Materials – Bansal

109. The curvature of beam is directly proportional to
1). Young's modulus
2). Bending moment
3). Section modulus
4). Beam width

Correct Answer: 2). Bending moment

Solution:

$$\frac{1}{R} = \frac{M}{EI}$$

Ref: Strength of Materials – Bansal

110. A beam designed to resist large bending moments should have
1). Small section modulus
2). Large section modulus
3). Small moment of inertia
4). Low depth

Correct Answer: 2). Large section modulus

Solution:

$$\sigma = \frac{M}{Z}$$

Larger Z reduces bending stress and increases strength.

Ref: Strength of Materials – R.K. Bansal

UNIT 3 - THEORY OF STRUCTURES

---

1. The deflection of a beam is defined as
1). Change in slope of beam
2). Vertical displacement of beam from its original position
3). Horizontal displacement of beam
4). Rotation of beam

Correct Answer: 2). Vertical displacement of beam from its original position

Solution:
Deflection is the **vertical displacement of a point on a beam from its original unloaded position due to applied loads**.

Ref: Theory of Structures – S. Ramamrutham & R. Narayan

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2. The slope of a beam is defined as
1). Vertical displacement of beam
2). Angle between tangent to elastic curve and horizontal
3). Load per unit length
4). Bending moment

Correct Answer: 2). Angle between tangent to elastic curve and horizontal

Solution:
Slope represents the **rotation of beam section**.

$$\theta = \frac{dy}{dx}$$

Ref: Analysis of Structures – S.S. Bhavikatti

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3. The differential equation of elastic curve of a beam is
1). $EI\frac{d^2y}{dx^2} = M$
2). $EI\frac{dy}{dx} = M$
3). $EI\frac{d^3y}{dx^3} = M$
4). $EIy = M$

Correct Answer: 1). $EI\frac{d^2y}{dx^2} = M$

Solution:

The basic equation of beam deflection:

$$EI\frac{d^2y}{dx^2} = M$$

Where
E = Young's modulus
I = moment of inertia
M = bending moment

Ref: Analysis of Structures – S.S. Bhavikatti

---

4. The method used to determine slope and deflection by integrating bending moment equation is called
1). Moment area method
2). Macaulay's method
3). Double integration method
4). Conjugate beam method

Correct Answer: 3). Double integration method

Solution:
Deflection equation obtained by integrating twice.

Ref: Theory of Structures – Ramamrutham

---

5. Macaulay's method is mainly used for beams having
1). Only UDL
2). Multiple point loads
3). Only moment
4). Only fixed supports

Correct Answer: 2). Multiple point loads

Solution:
Macaulay's method simplifies calculations for beams with several loads.

Ref: Analysis of Structures – Bhavikatti

---

6. The maximum deflection of a cantilever beam carrying point load at free end is

1). $\frac{WL^3}{3EI}$
2). $\frac{WL^3}{6EI}$
3). $\frac{WL^3}{8EI}$
4). $\frac{WL^2}{2EI}$

Correct Answer: 1). $\frac{WL^3}{3EI}$

Solution:

For cantilever beam:

$$y = \frac{WL^3}{3EI}$$

Ref: Strength of Materials – R.K. Bansal

---

7. Maximum deflection of simply supported beam carrying central load is

1). $\frac{WL^3}{48EI}$
2). $\frac{WL^3}{24EI}$
3). $\frac{WL^3}{8EI}$
4). $\frac{WL^2}{2EI}$

Correct Answer: 1). $\frac{WL^3}{48EI}$

Solution:

Occurs at midspan.

Ref: Strength of Materials – Bansal

---

8. The slope at free end of cantilever with point load at free end is

1). $\frac{WL^2}{2EI}$
2). $\frac{WL^2}{3EI}$
3). $\frac{WL^2}{4EI}$
4). $\frac{WL^2}{6EI}$

Correct Answer: 1). $\frac{WL^2}{2EI}$

Solution:

Slope at free end:

$$\theta = \frac{WL^2}{2EI}$$

Ref: Strength of Materials – Bansal

---

9. Mohr's first theorem states that

1). Change in slope equals area of bending moment diagram divided by EI
2). Deflection equals area of bending moment diagram
3). Moment equals slope
4). Stress equals moment

Correct Answer: 1). Change in slope equals area of bending moment diagram divided by EI

Solution:

$$\Delta\theta = \frac{Area\ of\ BM}{EI}$$

Ref: Strength of Materials – Bansal

---

10. Mohr's second theorem states that

1). Deflection equals moment area
2). Deflection equals moment of area of BM diagram about the point
3). Stress equals moment
4). Slope equals deflection

Correct Answer: 2). Deflection equals moment of area of BM diagram about the point

Solution:

$$y = \frac{Moment\ of\ area\ of\ BM}{EI}$$

Ref: Strength of Materials – Bansal

---

11. A column is defined as a structural member subjected to

1). Bending load
2). Axial compressive load
3). Shear load
4). Torsion

Correct Answer: 2). Axial compressive load

Solution:
Columns carry compressive loads.

Ref: Strength of Materials – Bansal

---

12. A strut is defined as

1). Vertical column only
2). Member carrying compression in any direction
3). Member carrying tension
4). Horizontal beam

Correct Answer: 2). Member carrying compression in any direction

Solution:
Struts may be inclined.

Ref: Strength of Materials – Bansal

---

13. Slenderness ratio is defined as

1). $\frac{L}{k}$
2). $\frac{k}{L}$
3). $\frac{L^2}{k}$
4). $\frac{k^2}{L}$

Correct Answer: 1). $\frac{L}{k}$

Solution:

$$Slenderness\ Ratio = \frac{Effective\ Length}{Radius\ of\ Gyration}$$

Ref: Strength of Materials – Bansal

---

14. Euler's formula for crippling load is

1). $P = \frac{\pi^2 EI}{L^2}$
2). $P = \frac{EI}{L^2}$
3). $P = \frac{WL}{EI}$
4). $P = \frac{EI}{L}$

Correct Answer: 1). $P = \frac{\pi^2 EI}{L^2}$

Solution:

Euler critical load formula.

Ref: Strength of Materials – Bansal

---

15. Euler's formula is applicable for

1). Short columns
2). Long columns
3). Medium columns
4). Hollow columns

Correct Answer: 2). Long columns

Solution:
Valid for slender columns.

Ref: Strength of Materials – Bansal

---

16. Rankine formula is applicable for

1). Short columns
2). Long columns
3). Both short and long columns
4). Only steel columns

Correct Answer: 3). Both short and long columns

Solution:
Rankine formula combines crushing and buckling.

Ref: Strength of Materials – Bansal

---

17. A truss is defined as

1). Beam structure
2). Framework of triangular members
3). Plate structure
4). Column structure

Correct Answer: 2). Framework of triangular members

Solution:
Members connected at joints forming triangles.

Ref: Theory of Structures – Ramamrutham

---

18. Members of a perfect truss carry

1). Bending stress
2). Axial forces only
3). Shear forces
4). Torsion

Correct Answer: 2). Axial forces only

Solution:
Truss members carry tension or compression.

Ref: Theory of Structures – Ramamrutham

---

19. A perfect truss satisfies relation

1). $m = j + 2$
2). $m = 2j - 3$
3). $m = 3j - 2$
4). $m = j - 2$

Correct Answer: 2). $m = 2j - 3$

Solution:

m = members
j = joints

Ref: Theory of Structures – Ramamrutham

---

20. Rankine's formula for active earth pressure is

1). $P = \frac{1}{2}\gamma H^2 K_a$
2). $P = \gamma H$
3). $P = \gamma H^2$
4). $P = \frac{H}{\gamma}$

Correct Answer: 1). $P = \frac{1}{2}\gamma H^2 K_a$

Solution:

Active earth pressure formula.

Ref: Soil Mechanics – B.C. Punmia

---

21. The maximum deflection of a cantilever beam carrying uniformly distributed load over entire span is

1). $\frac{wL^4}{8EI}$

2). $\frac{wL^4}{30EI}$

3). $\frac{wL^4}{24EI}$

4). $\frac{wL^4}{12EI}$

Correct Answer: 1). $\frac{wL^4}{8EI}$

Solution:

Maximum deflection of cantilever with UDL:

$$y = \frac{wL^4}{8EI}$$

Occurs at free end.

Ref: Strength of Materials – R.K. Bansal

---

22. Maximum deflection of simply supported beam carrying uniformly distributed load over entire span is

1). $\frac{5wL^4}{384EI}$

2). $\frac{wL^4}{48EI}$

3). $\frac{wL^3}{3EI}$

4). $\frac{WL^3}{48EI}$

Correct Answer: 1). $\frac{5wL^4}{384EI}$

Solution:

Maximum deflection occurs at midspan.

Ref: Strength of Materials – R.K. Bansal

---

23. In Macaulay's method, brackets $< x - a >$ represent

1). Load intensity
2). Conditional term activated after load point
3). Shear force
4). Reaction force

Correct Answer: 2). Conditional term activated after load point

Solution:
The bracket term becomes active only when $x > a$.

Ref: Analysis of Structures – S.S. Bhavikatti

---

24. The slope at the center of a simply supported beam carrying central load is

1). Zero
2). Maximum
3). Infinite
4). Constant

Correct Answer: 1). Zero

Solution:
Due to symmetry slope at midspan is zero.

Ref: Strength of Materials – R.K. Bansal

---

25. The maximum slope of a simply supported beam with central load occurs at

1). Midspan
2). Supports
3). Quarter span
4). Free end

Correct Answer: 2). Supports

Solution:
Rotation occurs at supports.

Ref: Strength of Materials – Bansal

---

26. The effective length of a column with both ends hinged is

1). L
2). 2L
3). L/2
4). L/4

Correct Answer: 1). L

Solution:

Effective length factor = 1.

Ref: Strength of Materials – Bansal

---

27. The effective length of column with one end fixed and other free is

1). L
2). 2L
3). L/2
4). L/4

Correct Answer: 2). 2L

Solution:
This is the case of **cantilever column**.

Ref: Strength of Materials – Bansal

---

28. The effective length of column with both ends fixed is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 2). L/2

Solution:

Both ends fixed reduces effective length.

Ref: Strength of Materials – Bansal

---

29. Euler's crippling load is inversely proportional to

1). Length
2). Square of length
3). Cube of length
4). Radius of gyration

Correct Answer: 2). Square of length

Solution:

$$P = \frac{\pi^2 EI}{L^2}$$

Ref: Strength of Materials – Bansal

---

30. If length of column doubles, Euler buckling load becomes

1). Same
2). Half
3). One-fourth
4). Double

Correct Answer: 3). One-fourth

Solution:

$$P \propto \frac{1}{L^2}$$

Ref: Strength of Materials – Bansal

---

31. Radius of gyration is defined as

1). $\sqrt{\frac{A}{I}}$
2). $\sqrt{\frac{I}{A}}$
3). $\frac{I}{A}$
4). $\frac{A}{I}$

Correct Answer: 2). $\sqrt{\frac{I}{A}}$

Solution:

$$k = \sqrt{\frac{I}{A}}$$

Ref: Strength of Materials – Bansal

---

32. The slenderness ratio of column is

1). $\frac{L}{A}$
2). $\frac{L}{k}$
3). $\frac{A}{L}$
4). $\frac{I}{L}$

Correct Answer: 2). $\frac{L}{k}$

Solution:

Used to classify columns.

Ref: Strength of Materials – Bansal

---

33. A column fails by buckling when

1). Crushing stress exceeds yield stress
2). Lateral deflection occurs due to instability
3). Shear force becomes zero
4). Bending moment becomes zero

Correct Answer: 2). Lateral deflection occurs due to instability

Solution:
Buckling occurs due to instability.

Ref: Strength of Materials – Bansal

---

34. A truss joint is assumed to be

1). Rigid
2). Hinged
3). Fixed
4). Welded

Correct Answer: 2). Hinged

Solution:
Assumption in truss analysis.

Ref: Theory of Structures – Ramamrutham

---

35. In a truss, loads are assumed to act

1). At members
2). At joints only
3). Along members
4). At supports only

Correct Answer: 2). At joints only

Solution:
Ensures axial force in members.

Ref: Theory of Structures – Ramamrutham

---

36. A member carrying tension in a truss is called

1). Strut
2). Tie
3). Beam
4). Column

Correct Answer: 2). Tie

Solution:
Ties resist tension.

Ref: Theory of Structures – Ramamrutham

---

37. A member carrying compression in a truss is called

1). Tie
2). Strut
3). Beam
4). Girder

Correct Answer: 2). Strut

Solution:
Struts carry compressive force.

Ref: Theory of Structures – Ramamrutham

---

38. The total number of unknown forces in a truss is

1). Members only
2). Members + reactions
3). Joints only
4). Reactions only

Correct Answer: 2). Members + reactions

Solution:
Equilibrium equations determine them.

Ref: Theory of Structures – Ramamrutham

---

39. In retaining walls, active earth pressure acts

1). Toward soil
2). Away from soil
3). Horizontally toward wall
4). Vertically downward

Correct Answer: 3). Horizontally toward wall

Solution:
Active earth pressure pushes wall outward.

Ref: Soil Mechanics – B.C. Punmia

---

40. The middle third rule ensures

1). No shear stress
2). No tension in base of dam
3). Maximum compression
4). Zero bending moment

Correct Answer: 2). No tension in base of dam

Solution:
Resultant must lie within middle third.

Ref: Theory of Structures – Ramamrutham

---

41. A cantilever beam of length L carries a uniformly distributed load w over its entire span. The slope at the free end is
1). $\frac{wL^3}{6EI}$
2). $\frac{wL^3}{8EI}$
3). $\frac{wL^3}{24EI}$
4). $\frac{wL^2}{2EI}$

Correct Answer: 1). $\frac{wL^3}{6EI}$

Solution:
Slope at free end of cantilever with UDL:

$$\theta = \frac{wL^3}{6EI}$$

Ref: Strength of Materials – R.K. Bansal

---

42. The maximum deflection of cantilever beam with UDL occurs at
1). Fixed end
2). Free end
3). Midspan
4). Quarter span

Correct Answer: 2). Free end

Solution:
Deflection increases along span and is maximum at free end.

Ref: Strength of Materials – R.K. Bansal

---

43. In double integration method, constants of integration are determined using
1). Stress conditions
2). Boundary conditions
3). Load conditions
4). Moment conditions

Correct Answer: 2). Boundary conditions

Solution:
Slope and deflection conditions at supports determine constants.

Ref: Analysis of Structures – S.S. Bhavikatti

---

44. Mohr's first theorem relates
1). Deflection and slope
2). Change in slope and area of BM diagram
3). Shear and bending moment
4). Stress and strain

Correct Answer: 2). Change in slope and area of BM diagram

Solution:

$$\Delta\theta = \frac{\text{Area of BM diagram}}{EI}$$

Ref: Strength of Materials – Bansal

---

45. Mohr's second theorem relates
1). Deflection and moment of area of BM diagram
2). Stress and strain
3). Load and moment
4). Slope and curvature

Correct Answer: 1). Deflection and moment of area of BM diagram

Solution:

$$y = \frac{\text{Moment of area of BM diagram}}{EI}$$

Ref: Strength of Materials – Bansal

---

46. A column with effective length equal to its actual length has end conditions

1). Fixed–free
2). Fixed–fixed
3). Hinged–hinged
4). Fixed–hinged

Correct Answer: 3). Hinged–hinged

Solution:
Effective length factor = 1.

Ref: Strength of Materials – Bansal

---

47. If effective length of column decreases, buckling load will

1). Decrease
2). Increase
3). Remain same
4). Become zero

Correct Answer: 2). Increase

Solution:

$$P = \frac{\pi^2 EI}{L^2}$$

Ref: Strength of Materials – Bansal

---

48. A short column generally fails by

1). Buckling
2). Crushing
3). Shear
4). Torsion

Correct Answer: 2). Crushing

Solution:
Short columns fail by material crushing.

Ref: Strength of Materials – Bansal

---

49. A long column generally fails by
1). Shear
2). Crushing
3). Buckling
4). Torsion

Correct Answer: 3). Buckling

Solution:
Instability causes buckling.

Ref: Strength of Materials – Bansal

---

50. Rankine's formula combines
1). Crushing load and buckling load
2). Shear force and bending moment
3). Stress and strain
4). Load and deflection

Correct Answer: 1). Crushing load and buckling load

Solution:
Rankine formula:

$$\frac{1}{P} = \frac{1}{P_c} + \frac{1}{P_e}$$

Ref: Strength of Materials – Bansal

---

51. The critical load of a column depends on
1). Length only
2). Material only
3). Length, cross-section and end conditions
4). Load only

Correct Answer: 3). Length, cross-section and end conditions

Solution:
From Euler formula.

Ref: Strength of Materials – Bansal

---

52. A truss is said to be perfect when
1). $m = j + 1$
2). $m = 2j - 3$
3). $m = j - 2$
4). $m = 3j - 2$

Correct Answer: 2). $m = 2j - 3$

Solution:
Condition for stability of truss.

Ref: Theory of Structures – Ramamrutham

---

53. If $m > 2j - 3$, the truss is
1). Perfect
2). Deficient
3). Redundant
4). Unstable

Correct Answer: 3). Redundant

Solution:
Extra members cause indeterminacy.

Ref: Theory of Structures – Ramamrutham

---

54. If $m < 2j - 3$, the truss is
1). Perfect
2). Redundant
3). Deficient
4). Stable

Correct Answer: 3). Deficient

Solution:
Insufficient members lead to instability.

Ref: Theory of Structures – Ramamrutham

---

55. The method used to determine forces in truss members by considering equilibrium of joints is

1). Method of sections
2). Method of joints
3). Graphical method
4). Elastic method

Correct Answer: 2). Method of joints

Solution:
Based on equilibrium at joints.

Ref: Theory of Structures – Ramamrutham

---

56. In method of joints, maximum number of unknown member forces at a joint is

1). 1
2). 2
3). 3
4). 4

Correct Answer: 2). 2

Solution:
Two equilibrium equations available.

Ref: Theory of Structures – Ramamrutham

---

57. The method used to determine forces in selected members of truss directly is

1). Method of joints
2). Method of sections
3). Graphical method
4). Matrix method

Correct Answer: 2). Method of sections

Solution:
Useful when few member forces needed.

Ref: Theory of Structures – Ramamrutham

---

58. Active earth pressure coefficient $K_a$according to Rankine is

1). $\frac{1+\sin\phi}{1-\sin\phi}$
2). $\frac{1-\sin\phi}{1+\sin\phi}$
3). $\tan\phi$
4). $\cot\phi$

Correct Answer: 2). $\frac{1-\sin\phi}{1+\sin\phi}$

Solution:
Rankine active earth pressure coefficient.

Ref: Soil Mechanics – B.C. Punmia

---

59. The total active earth pressure on retaining wall of height H is

1). $\frac{1}{2}\gamma H^2 K_a$
2). $\gamma H K_a$
3). $\gamma H^2 K_a$
4). $\frac{\gamma H}{2}$

Correct Answer: 1). $\frac{1}{2}\gamma H^2 K_a$

Solution:
Triangular pressure distribution.

Ref: Soil Mechanics – B.C. Punmia

---

60. The point of application of active earth pressure is located at

1). H/2 from base
2). H/3 from base
3). H/4 from base
4). H from base

Correct Answer: 2). H/3 from base

Solution:
For triangular pressure distribution.

Ref: Soil Mechanics – Punmia

---

61. In gravity dams, the resultant of forces should lie within
1). Base
2). Middle third of base
3). Top third
4). Upstream face

Correct Answer: 2). Middle third of base

Solution:
Ensures no tensile stress.

Ref: Theory of Structures – Ramamrutham

---

62. If resultant falls outside middle third of dam base
1). No stress develops
2). Tensile stress develops
3). Only shear develops
4). No effect occurs

Correct Answer: 2). Tensile stress develops

Solution:
Which is undesirable in masonry dams.

Ref: Theory of Structures – Ramamrutham

---

63. The stability of retaining wall depends mainly on

1). Height of wall
2). Soil pressure
3). Weight of wall
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple forces affect stability.

Ref: Soil Mechanics – Punmia

---

64. The overturning moment of retaining wall is produced by

1). Self weight of wall
2). Earth pressure
3). Base reaction
4). Water pressure

Correct Answer: 2). Earth pressure

Solution:
Earth pressure causes overturning.

Ref: Soil Mechanics – Punmia

---

65. Factor of safety against overturning is

1). Stabilizing moment / overturning moment
2). Overturning moment / stabilizing moment
3). Weight / pressure
4). Moment / load

Correct Answer: 1). Stabilizing moment / overturning moment

Solution:
For safe design.

Ref: Soil Mechanics – Punmia

---

66. If base width of retaining wall increases, stability

1). Decreases
2). Increases
3). Remains same
4). Becomes zero

Correct Answer: 2). Increases

Solution:
Wider base increases resisting moment.

Ref: Soil Mechanics – Punmia

---

67. The critical section for overturning in retaining wall is

1). Top of wall
2). Mid height
3). Base of wall
4). Soil surface

Correct Answer: 3). Base of wall

Solution:
Overturning occurs about toe.

Ref: Soil Mechanics – Punmia

---

68. In truss analysis, tension members are assumed

1). Positive
2). Negative
3). Zero
4). Infinite

Correct Answer: 1). Positive

Solution:
Sign convention.

Ref: Theory of Structures – Ramamrutham

---

69. In truss analysis, compression members are assumed

1). Positive
2). Negative
3). Zero
4). Infinite

Correct Answer: 2). Negative

Solution:
Sign convention.

Ref: Theory of Structures – Ramamrutham

---

70. The structure formed by connecting members in triangular pattern is called

1). Frame
2). Truss
3). Beam
4). Column

Correct Answer: 2). Truss

Solution:
Triangular geometry ensures rigidity.

Ref: Theory of Structures – Ramamrutham

---

71. The Euler buckling load of a column increases when
1). Length increases
2). Moment of inertia increases
3). Radius of gyration decreases
4). Effective length increases

Correct Answer: 2). Moment of inertia increases

Solution:

$$P = \frac{\pi^2 EI}{L^2}$$

Buckling load directly proportional to moment of inertia.

Ref: Strength of Materials – R.K. Bansal

---

72. A column with one end fixed and other hinged has effective length equal to
1). L
2). 0.7L
3). 2L
4). L/2

Correct Answer: 2). 0.7L

Solution:
Effective length factor ≈ 0.7.

Ref: Strength of Materials – Bansal

---

73. A column with both ends fixed has critical load compared with hinged column

1). Same
2). Half
3). Double
4). Four times

Correct Answer: 4). Four times

Solution:

$$P = \frac{\pi^2 EI}{(L/2)^2}$$

Ref: Strength of Materials – Bansal

---

74. If effective length doubles, Euler critical load becomes

1). Double
2). Half
3). One-fourth
4). Four times

Correct Answer: 3). One-fourth

Solution:

$$P \propto \frac{1}{L^2}$$

Ref: Strength of Materials – Bansal

---

75. The Rankine formula for columns is

1). $P = \frac{P_c P_e}{P_c + P_e}$
2). $P = \frac{P_c}{P_e}$
3). $P = P_c + P_e$
4). $P = P_c - P_e$

Correct Answer: 1). $P = \frac{P_c P_e}{P_c + P_e}$

Solution:
Rankine combines crushing and buckling loads.

Ref: Strength of Materials – Bansal

---

76. The crushing load of column depends on

1). Area of cross-section
2). Length of column
3). Radius of gyration
4). Moment of inertia

Correct Answer: 1). Area of cross-section

Solution:

$$P_c = \sigma_c A$$

Ref: Strength of Materials – Bansal

---

77. In a truss, a member carrying zero force is called

1). Tie member
2). Strut member
3). Zero force member
4). Dummy member

Correct Answer: 3). Zero force member

Solution:
Occurs due to geometry and loading.

Ref: Theory of Structures – Ramamrutham

---

78. If two non-collinear members meet at a joint with no load, both members are

1). Compression members
2). Tension members
3). Zero force members
4). Rigid members

Correct Answer: 3). Zero force members

Solution:
Equilibrium requires both forces to be zero.

Ref: Theory of Structures – Ramamrutham

---

79. The method of sections is based on

1). Equilibrium of joints
2). Equilibrium of entire truss section
3). Stress analysis
4). Moment distribution

Correct Answer: 2). Equilibrium of entire truss section

Solution:
Cut section through members and apply equilibrium equations.

Ref: Theory of Structures – Ramamrutham

---

80. The number of equilibrium equations available in plane truss analysis is

1). 2
2). 3
3). 4
4). 5

Correct Answer: 3). 3

Solution:

$$\sum F_x = 0, \sum F_y = 0, \sum M = 0$$

Ref: Theory of Structures – Ramamrutham

---

81. Rankine active earth pressure coefficient decreases when

1). Angle of friction increases
2). Wall height increases
3). Soil weight increases
4). Soil pressure increases

Correct Answer: 1). Angle of friction increases

Solution:

$$K_a = \frac{1 - \sin\ \phi}{1 + \sin\ \phi}$$

Ref: Soil Mechanics – B.C. Punmia

---

82. If soil friction angle increases, active earth pressure

1). Increases
2). Decreases
3). Remains same
4). Becomes zero

Correct Answer: 2). Decreases

Solution:
Higher friction reduces lateral pressure.

Ref: Soil Mechanics – Punmia

---

83. Earth pressure distribution behind retaining wall is

1). Uniform
2). Triangular
3). Parabolic
4). Rectangular

Correct Answer: 2). Triangular

Solution:
Pressure increases linearly with depth.

Ref: Soil Mechanics – Punmia

---

84. Maximum earth pressure occurs at

1). Ground surface
2). Mid height
3). Base of wall
4). Top of wall

Correct Answer: 3). Base of wall

Solution:
Pressure proportional to depth.

Ref: Soil Mechanics – Punmia

---

85. The resultant earth pressure acts at

1). H/4 from base
2). H/3 from base
3). H/2 from base
4). H from base

Correct Answer: 2). H/3 from base

Solution:
Centroid of triangular pressure.

Ref: Soil Mechanics – Punmia

---

86. In gravity dam design, the resultant force must pass

1). Through top
2). Through centre
3). Within middle third
4). Outside base

Correct Answer: 3). Within middle third

Solution:
Prevents tension at base.

Ref: Theory of Structures – Ramamrutham

---

87. If resultant falls outside middle third, base experiences

1). Compression only
2). Shear only
3). Tension and compression
4). No stress

Correct Answer: 3). Tension and compression

Solution:
Tension occurs on one side.

Ref: Theory of Structures – Ramamrutham

---

88. The stability of a dam against sliding depends on

1). Weight of dam
2). Friction at base
3). Water pressure
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple forces determine stability.

Ref: Theory of Structures – Ramamrutham

---

89. The overturning moment in gravity dam is caused by

1). Self weight
2). Water pressure
3). Base friction
4). Earth pressure

Correct Answer: 2). Water pressure

Solution:
Hydrostatic pressure tends to overturn dam.

Ref: Theory of Structures – Ramamrutham

---

90. The resisting moment of dam is produced by

1). Water pressure
2). Weight of dam
3). Earth pressure
4). Wind pressure

Correct Answer: 2). Weight of dam

Solution:
Weight stabilizes dam.

Ref: Theory of Structures – Ramamrutham

---

91. The deflection of beam depends on

1). Load
2). Span
3). Elastic modulus and moment of inertia
4). All of these

Correct Answer: 4). All of these

Solution:
Deflection depends on several parameters.

Ref: Strength of Materials – Bansal

---

92. Increasing moment of inertia of beam will

1). Increase deflection
2). Decrease deflection
3). Not affect deflection
4). Increase slope

Correct Answer: 2). Decrease deflection

Solution:

$$y \propto \frac{1}{EI}$$

Ref: Strength of Materials – Bansal

---

93. Increasing modulus of elasticity reduces

1). Stress
2). Deflection
3). Shear
4). Load

Correct Answer: 2). Deflection

Solution:
Higher E increases stiffness.

Ref: Strength of Materials – Bansal

---

94. The elastic curve of beam represents

1). Stress diagram
2). Deflected shape of beam
3). Load distribution
4). Shear diagram

Correct Answer: 2). Deflected shape of beam

Solution:
Elastic curve shows beam deformation.

Ref: Analysis of Structures – Bhavikatti

---

95. The slope of beam is maximum where

1). Bending moment maximum
2). Deflection maximum
3). At supports
4). Where shear zero

Correct Answer: 3). At supports

Solution:
Supports allow rotation.

Ref: Strength of Materials – Bansal

---

96. The maximum deflection of simply supported beam occurs

1). At support
2). At midspan
3). At quarter span
4). At load point

Correct Answer: 2). At midspan

Solution:
Due to symmetry.

Ref: Strength of Materials – Bansal

---

97. The maximum slope in cantilever beam occurs

1). At free end
2). At fixed end
3). At midspan
4). At quarter span

Correct Answer: 1). At free end

Solution:
Rotation greatest at free end.

Ref: Strength of Materials – Bansal

---

98. The deflection at fixed end of cantilever is

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
Fixed support prevents displacement.

Ref: Strength of Materials – Bansal

---

99. In method of joints, forces are determined using

1). Two equilibrium equations
2). Three equilibrium equations
3). Four equilibrium equations
4). Five equilibrium equations

Correct Answer: 1). Two equilibrium equations

Solution:

$$\sum F_x = 0, \sum F_y = 0$$

Ref: Theory of Structures – Ramamrutham

---

100. The triangular shape of truss provides

1). Flexibility
2). Rigidity
3). Weakness
4). Instability

Correct Answer: 2). Rigidity

Solution:
Triangle is stable geometric shape.

Ref: Theory of Structures – Ramamrutham

---

101. In retaining walls, lateral earth pressure increases with

1). Depth
2). Width
3). Length
4). Temperature

Correct Answer: 1). Depth

Solution:

$$p = \gamma h K_a$$

Ref: Soil Mechanics – Punmia

---

102. The center of pressure for triangular distribution lies

1). H/2 from base
2). H/3 from base
3). H/4 from base
4). H/5 from base

Correct Answer: 2). H/3 from base

Solution:
Centroid of triangular area.

Ref: Soil Mechanics – Punmia

---

103. If soil unit weight increases, earth pressure

1). Decreases
2). Increases
3). Remains same
4). Becomes zero

Correct Answer: 2). Increases

Solution:

$$P = \frac{1}{2}\gamma H^2 K_a$$

Ref: Soil Mechanics – Punmia

---

104. The factor of safety against sliding depends on

1). Friction resistance
2). Weight of structure
3). Horizontal pressure
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple forces affect sliding stability.

Ref: Soil Mechanics – Punmia

---

105. The radius of gyration depends on

1). Area
2). Moment of inertia
3). Both I and A
4). Length

Correct Answer: 3). Both I and A

Solution:

$$k = \sqrt{\frac{I}{A}}$$

Ref: Strength of Materials – Bansal

---

106. The slenderness ratio increases when

1). Column length increases
2). Radius of gyration increases
3). Area increases
4). Load increases

Correct Answer: 1). Column length increases

Solution:

$$\lambda = \frac{L}{k}$$

Ref: Strength of Materials – Bansal

---

107. Long columns have

1). Small slenderness ratio
2). Large slenderness ratio
3). Zero slenderness ratio
4). Infinite slenderness ratio

Correct Answer: 2). Large slenderness ratio

Solution:
Slender columns buckle easily.

Ref: Strength of Materials – Bansal

---

108. Euler theory assumes column material is

1). Plastic
2). Perfectly elastic
3). Rigid
4). Brittle

Correct Answer: 2). Perfectly elastic

Solution:
Basic assumption in Euler theory.

Ref: Strength of Materials – Bansal

---

109. In truss analysis, compression members shorten and tension members

1). Shorten
2). Elongate
3). Break
4). Twist

Correct Answer: 2). Elongate

Solution:
Tension causes elongation.

Ref: Theory of Structures – Ramamrutham

---

110. The structure used for long span bridges and roofs is

1). Column
2). Truss
3). Slab
4). Footing

Correct Answer: 2). Truss

Solution:
Trusses efficiently carry loads over large spans.

Ref: Theory of Structures – Ramamrutham

---

111. The deflection of a beam is directly proportional to
1). Modulus of elasticity
2). Moment of inertia
3). Load on the beam
4). Width of beam

Correct Answer: 3). Load on the beam

Solution:

From deflection equation:

$$y \propto \frac{WL^3}{EI}$$

Deflection increases as load increases.

Ref: Strength of Materials – R.K. Bansal

---

112. If modulus of elasticity increases, deflection of beam
1). Increases
2). Decreases
3). Remains same
4). Becomes infinite

Correct Answer: 2). Decreases

Solution:

$$y \propto \frac{1}{E}$$

Ref: Strength of Materials – Bansal

---

113. The unit of flexural rigidity (EI) is

1). N
2). N·mm
3). N·mm²
4). N·mm² × mm²

Correct Answer: 3). N·mm²

Solution:

$$EI = E \times I$$

E → N/mm^2
I → mm^4

$$EI = N \cdot mm^2$$

Ref: Analysis of Structures – S.S. Bhavikatti

---

114. If span of beam doubles, deflection becomes

1). Double
2). Four times
3). Eight times
4). Sixteen times

Correct Answer: 3). Eight times

Solution:

$$y \propto L^3$$

Ref: Strength of Materials – Bansal

---

115. The slope of a beam is zero at

1). Free end of cantilever
2). Fixed support
3). Midspan of simply supported beam
4). Load point

Correct Answer: 2). Fixed support

Solution:
Rotation is prevented at fixed support.

Ref: Strength of Materials – Bansal

---

116. The slope of a cantilever beam carrying UDL is maximum at

1). Fixed end
2). Midspan
3). Free end
4). Quarter span

Correct Answer: 3). Free end

Solution:
Maximum rotation occurs at free end.

Ref: Strength of Materials – Bansal

---

117. The buckling load of column is directly proportional to

1). Length
2). Moment of inertia
3). Slenderness ratio
4). Area

Correct Answer: 2). Moment of inertia

Solution:

$$P = \frac{\pi^2 EI}{L^2}$$

Ref: Strength of Materials – Bansal

---

118. The column with largest buckling load is

1). Hinged–hinged
2). Fixed–fixed
3). Fixed–free
4). Fixed–hinged

Correct Answer: 2). Fixed–fixed

Solution:
Effective length smallest → highest buckling load.

Ref: Strength of Materials – Bansal

---

119. A very short column behaves like

1). Long column
2). Intermediate column
3). Crushing member
4). Beam

Correct Answer: 3). Crushing member

Solution:
Failure occurs due to crushing stress.

Ref: Strength of Materials – Bansal

---

120. The slenderness ratio decreases when

1). Column length decreases
2). Radius of gyration decreases
3). Load increases
4). Area decreases

Correct Answer: 1). Column length decreases

Solution:

$$\lambda = \frac{L}{k}$$

Ref: Strength of Materials – Bansal

---

121. The radius of gyration increases when

1). Moment of inertia increases
2). Area decreases
3). Load increases
4). Length increases

Correct Answer: 1). Moment of inertia increases

Solution:

$$k = \sqrt{\frac{I}{A}}$$

Ref: Strength of Materials – Bansal

---

122. A truss member is called redundant if

1). It carries compression
2). It carries tension
3). It is not required for stability
4). It is longer than others

Correct Answer: 3). It is not required for stability

Solution:
Redundant member increases determinacy.

Ref: Theory of Structures – Ramamrutham

---

123. The simplest truss structure is

1). Square
2). Triangle
3). Rectangle
4). Circle

Correct Answer: 2). Triangle

Solution:
Triangle provides stability.

Ref: Theory of Structures – Ramamrutham

---

124. If load acts at joint of truss, member forces are

1). Shear forces
2). Axial forces
3). Bending moments
4). Torsional forces

Correct Answer: 2). Axial forces

Solution:
Assumption in truss analysis.

Ref: Theory of Structures – Ramamrutham

---

125. In retaining wall, lateral earth pressure is zero at

1). Base
2). Mid height
3). Top
4). Bottom

Correct Answer: 3). Top

Solution:
Pressure increases with depth.

Ref: Soil Mechanics – Punmia

---

126. Earth pressure increases linearly with

1). Width
2). Depth
3). Length
4). Density

Correct Answer: 2). Depth

Solution:

$$p = \gamma h K_a$$

Ref: Soil Mechanics – Punmia

---

127. If height of retaining wall doubles, earth pressure becomes

1). Double
2). Four times
3). Same
4). Half

Correct Answer: 2). Four times

Solution:

$$P = \frac{1}{2}\gamma H^2 K_a$$

Ref: Soil Mechanics – Punmia

---

128. The resultant earth pressure acts

1). Horizontally
2). Vertically
3). Diagonally upward
4). Along wall

Correct Answer: 1). Horizontally

Solution:
Active earth pressure acts horizontally.

Ref: Soil Mechanics – Punmia

---

129. The overturning of retaining wall occurs about

1). Heel
2). Toe
3). Mid base
4). Top

Correct Answer: 2). Toe

Solution:
Overturning occurs about toe point.

Ref: Soil Mechanics – Punmia

---

130. Stability of retaining wall requires

1). Resultant within middle third
2). No shear stress
3). No load
4). No earth pressure

Correct Answer: 1). Resultant within middle third

Solution:
Ensures no tension in base.

Ref: Theory of Structures – Ramamrutham

---

131. The flexural rigidity of a beam is given by
1). EI
2). EA
3). EI^2
4). E/I

Correct Answer: 1). EI

Solution:
Flexural rigidity represents resistance to bending.

$$Flexural\ Rigidity = EI$$

Ref: Analysis of Structures – S.S. Bhavikatti

---

132. If flexural rigidity of beam increases, deflection will
1). Increase
2). Decrease
3). Remain constant
4). Become zero

Correct Answer: 2). Decrease

Solution:

$$y \propto \frac{1}{EI}$$

Ref: Strength of Materials – R.K. Bansal

---

133. The deflection of cantilever beam with central point load occurs at
1). Fixed end
2). Midspan

3). Free end
4). Quarter span

Correct Answer: 3). Free end

Solution:
Maximum deflection occurs at free end.

Ref: Strength of Materials – Bansal

---

134. In double integration method, the first integration gives
1). Deflection equation
2). Slope equation
3). Load equation
4). Stress equation

Correct Answer: 2). Slope equation

Solution:

$$EI\frac{d^2y}{dx^2} = M$$

Integrating once gives slope.

Ref: Analysis of Structures – Bhavikatti

---

135. The second integration in beam equation gives
1). Shear force
2). Bending moment
3). Deflection
4). Stress

Correct Answer: 3). Deflection

Solution:
Second integration gives deflection.

Ref: Analysis of Structures – Bhavikatti

---

136. The Euler formula assumes that column is
1). Perfectly straight

2). Free from initial stress
3). Loaded axially
4). All of these

Correct Answer: 4). All of these

Solution:
Euler theory assumptions include perfect geometry and axial loading.

Ref: Strength of Materials – Bansal

---

137. If moment of inertia increases four times, buckling load becomes

1). Double
2). Four times
3). Half
4). Same

Correct Answer: 2). Four times

Solution:

$$P \propto I$$

Ref: Strength of Materials – Bansal

---

138. If effective length reduces to half, Euler load becomes

1). Same
2). Double
3). Four times
4). Half

Correct Answer: 3). Four times

Solution:

$$P \propto \frac{1}{L^2}$$

Ref: Strength of Materials – Bansal

---

139. In truss analysis, compression members are also called

1). Ties
2). Struts
3). Beams
4). Girders

Correct Answer: 2). Struts

Solution:
Struts carry compressive forces.

Ref: Theory of Structures – Ramamrutham

---

140. Members carrying tension are called

1). Struts
2). Ties
3). Columns
4). Beams

Correct Answer: 2). Ties

Solution:
Tie members resist tension.

Ref: Theory of Structures – Ramamrutham

---

141. In method of joints, equilibrium equations used are

1). $\Sigma F_x = 0$
2). $\Sigma F_y = 0$
3). Both
4). Moment equation only

Correct Answer: 3). Both

Solution:
Two equations available per joint.

Ref: Theory of Structures – Ramamrutham

---

142. In method of sections, number of members cut should not exceed

1). 2
2). 3
3). 4
4). 5

Correct Answer: 2). 3

Solution:
Three equilibrium equations available.

Ref: Theory of Structures – Ramamrutham

---

143. The retaining wall resists earth pressure mainly by

1). Weight of wall
2). Soil pressure
3). Water pressure
4). Wind pressure

Correct Answer: 1). Weight of wall

Solution:
Gravity walls resist pressure by self-weight.

Ref: Soil Mechanics – B.C. Punmia

---

144. If coefficient of earth pressure increases, lateral pressure

1). Decreases
2). Increases
3). Remains constant
4). Becomes zero

Correct Answer: 2). Increases

Solution:

$$P = \frac{1}{2}\gamma H^2 K_a$$

Ref: Soil Mechanics – Punmia

145. The stability of retaining wall against sliding depends on

1). Friction between base and soil
2). Weight of wall
3). Horizontal pressure
4). All of these

Correct Answer: 4). All of these

Solution:
Sliding depends on several resisting forces.

Ref: Soil Mechanics – Punmia

146. The factor of safety against sliding is

1). Resisting force / Driving force
2). Driving force / Resisting force
3). Weight / pressure
4). Pressure / load

Correct Answer: 1). Resisting force / Driving force

Solution:
Ensures stability of wall.

Ref: Soil Mechanics – Punmia

147. If base width of retaining wall increases, overturning stability

1). Decreases
2). Increases
3). Remains same
4). Becomes zero

Correct Answer: 2). Increases

Solution:
Wider base increases resisting moment.

Ref: Soil Mechanics – Punmia

148. The pressure distribution under dam base is

1). Uniform
2). Triangular
3). Trapezoidal
4). Parabolic

Correct Answer: 3). Trapezoidal

Solution:
Due to eccentric loading.

Ref: Theory of Structures – Ramamrutham

---

149. Maximum compressive stress in dam occurs at

1). Heel
2). Toe
3). Mid base
4). Top

Correct Answer: 2). Toe

Solution:
Resultant shifts toward toe.

Ref: Theory of Structures – Ramamrutham

---

150. If resultant passes through center of base, pressure distribution becomes

1). Uniform
2). Triangular
3). Parabolic
4). Zero

Correct Answer: 1). Uniform

Solution:
Eccentricity zero.

Ref: Theory of Structures – Ramamrutham

---

151. The maximum bending moment occurs where

1). Shear force is zero
2). Load is maximum
3). Reaction is maximum
4). Slope is zero

Correct Answer: 1). Shear force is zero

Solution:

$$\frac{dM}{dx} = V$$

Ref: Strength of Materials – Bansal

---

152. If bending moment is constant, shear force is

1). Maximum
2). Zero
3). Infinite
4). Negative

Correct Answer: 2). Zero

Solution:
Pure bending condition.

Ref: Strength of Materials – Bansal

---

153. In retaining wall, the backfill soil produces

1). Active earth pressure
2). Passive earth pressure
3). Water pressure
4). Wind pressure

Correct Answer: 1). Active earth pressure

Solution:
Backfill exerts active pressure.

Ref: Soil Mechanics – Punmia

---

154. Passive earth pressure acts

1). Away from wall
2). Towards wall
3). Vertically
4). Downward

Correct Answer: 2). Towards wall

Solution:
Opposes wall movement.

Ref: Soil Mechanics – Punmia

---

155. If friction angle increases, active earth pressure

1). Increases
2). Decreases
3). Remains same
4). Becomes zero

Correct Answer: 2). Decreases

Solution:

$$K_a = \frac{1 - \sin\ \phi}{1 + \sin\ \phi}$$

Ref: Soil Mechanics – Punmia

---

156. The slope of beam at midspan of simply supported beam under central load is

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
Due to symmetry.

Ref: Strength of Materials – Bansal

---

157. The deflection of beam depends on

1). Load intensity
2). Span length
3). Material properties
4). All of these

Correct Answer: 4). All of these

Solution:
Deflection depends on multiple factors.

Ref: Strength of Materials – Bansal

---

158. The critical load of column increases when

1). Length decreases
2). Radius of gyration increases
3). Moment of inertia increases
4). All of these

Correct Answer: 4). All of these

Solution:
From Euler equation.

Ref: Strength of Materials – Bansal

---

159. The slenderness ratio determines

1). Stress distribution
2). Column stability
3). Shear force
4). Bending moment

Correct Answer: 2). Column stability

Solution:
Higher slenderness ratio increases buckling risk.

Ref: Strength of Materials – Bansal

---

160. The maximum slope of simply supported beam occurs at

1). Midspan
2). Supports
3). Quarter span
4). Load point

Correct Answer: 2). Supports

Solution:
Supports allow rotation.

Ref: Strength of Materials – Bansal

---

161. The Euler buckling load of a column varies inversely with
1). Length
2). Square of length
3). Cube of length
4). Radius of gyration

Correct Answer: 2). Square of length

Solution:

$$P = \frac{\pi^2 EI}{L^2}$$

Thus buckling load is inversely proportional to L^2.

Ref: Strength of Materials – R.K. Bansal

---

162. If length of column becomes three times, Euler load becomes

1). 1/3
2). 1/6
3). 1/9
4). 1/27

Correct Answer: 3). 1/9

Solution:

$$P \propto \frac{1}{L^2}$$

Ref: Strength of Materials – Bansal

---

163. The effective length factor for a column with one end fixed and other free is

1). 0.5
2). 0.7
3). 1
4). 2

Correct Answer: 4). 2

Solution:
Cantilever column effective length = 2L.

Ref: Strength of Materials – Bansal

---

164. A column with both ends hinged has effective length

1). L
2). L/2
3). 2L
4). 4L

Correct Answer: 1). L

Solution:
Pinned–pinned column effective length equals actual length.

Ref: Strength of Materials – Bansal

---

165. If column cross-section increases, buckling load

1). Decreases
2). Increases
3). Remains same
4). Becomes zero

Correct Answer: 2). Increases

Solution:

$$P \propto I$$

Ref: Strength of Materials – Bansal

---

166. Rankine formula is suitable for

1). Short columns only
2). Long columns only
3). Medium columns
4). All columns

Correct Answer: 4). All columns

Solution:
Rankine formula combines crushing and buckling theories.

Ref: Strength of Materials – Bansal

---

167. The Euler formula is valid when column length is

1). Very small
2). Moderate
3). Very large
4). Zero

Correct Answer: 3). Very large

Solution:
Applicable to slender columns.

Ref: Strength of Materials – Bansal

---

168. The slenderness ratio is given by

1). L/A
2). L/k
3). I/A
4). A/L

Correct Answer: 2). L/k

Solution:

$$\lambda = \frac{L}{k}$$

Ref: Strength of Materials – Bansal

---

169. If slenderness ratio increases, column stability

1). Increases
2). Decreases
3). Remains same
4). Becomes infinite

Correct Answer: 2). Decreases

Solution:
Higher slenderness → higher buckling risk.

Ref: Strength of Materials – Bansal

---

170. The radius of gyration depends on

1). Area only
2). Moment of inertia only
3). Both I and A
4). Length

Correct Answer: 3). Both I and A

Solution:

$$k = \sqrt{\frac{I}{A}}$$

Ref: Strength of Materials – Bansal

---

171. A truss with $m = 2j - 3$is called

1). Redundant truss
2). Deficient truss

3). Perfect truss
4). Compound truss

Correct Answer: 3). Perfect truss

Solution:
Perfect truss condition.

Ref: Theory of Structures – Ramamrutham

---

172. A truss with $m > 2j - 3$is

1). Perfect
2). Redundant
3). Deficient
4). Unstable

Correct Answer: 2). Redundant

Solution:
Extra members present.

Ref: Theory of Structures – Ramamrutham

---

173. A truss with $m < 2j - 3$is

1). Perfect
2). Redundant
3). Deficient
4). Stable

Correct Answer: 3). Deficient

Solution:
Insufficient members.

Ref: Theory of Structures – Ramamrutham

---

174. The simplest stable truss unit is

1). Square
2). Rectangle
3). Triangle
4). Circle

Correct Answer: 3). Triangle

Solution:
Triangle provides rigidity.

Ref: Theory of Structures – Ramamrutham

---

175. In truss analysis, members are assumed to be

1). Rigidly connected
2). Hinged connected
3). Fixed connected
4). Welded rigidly

Correct Answer: 2). Hinged connected

Solution:
Assumption in truss theory.

Ref: Theory of Structures – Ramamrutham

---

176. Loads in truss are assumed to act

1). On members
2). At joints
3). At supports only
4). On beam

Correct Answer: 2). At joints

Solution:
Ensures axial forces only.

Ref: Theory of Structures – Ramamrutham

---

177. The zero force member occurs when

1). Two non-collinear members meet without load
2). Three members meet
3). Load acts at joint
4). Member length increases

Correct Answer: 1). Two non-collinear members meet without load

Solution:
Both members become zero.

Ref: Theory of Structures – Ramamrutham

---

178. The method of joints is based on

1). Moment equilibrium
2). Force equilibrium
3). Stress equilibrium
4). Load equilibrium

Correct Answer: 2). Force equilibrium

Solution:

$$\Sigma F_x = 0, \Sigma F_y = 0$$

Ref: Theory of Structures – Ramamrutham

---

179. The method of sections uses

1). Two equations
2). Three equilibrium equations
3). One equation
4). Four equations

Correct Answer: 2). Three equilibrium equations

Solution:

$$\Sigma F_x, \Sigma F_y, \Sigma M$$

Ref: Theory of Structures – Ramamrutham

---

180. The most economical structural system for long spans is

1). Beam
2). Slab
3). Truss
4). Column

Correct Answer: 3). Truss

Solution:
Efficient load distribution.

Ref: Theory of Structures – Ramamrutham

---

181. In retaining wall, active earth pressure acts

1). Toward soil
2). Away from wall
3). Toward wall
4). Vertically

Correct Answer: 3). Toward wall

Solution:
Backfill soil pushes wall.

Ref: Soil Mechanics – Punmia

---

182. Passive earth pressure acts

1). Away from wall
2). Toward wall
3). Vertically
4). Horizontally outward

Correct Answer: 1). Away from wall

Solution:
Passive pressure resists wall movement.

Ref: Soil Mechanics – Punmia

---

183. Rankine active earth pressure coefficient is

1). $\frac{1+\sin\phi}{1-\sin\phi}$
2). $\frac{1-\sin\phi}{1+\sin\phi}$
3). $\tan\phi$
4). $\cot\phi$

Correct Answer: 2). $\frac{1-\sin\phi}{1+\sin\phi}$

Solution:
Rankine earth pressure relation.

Ref: Soil Mechanics – Punmia

---

184. If friction angle increases, earth pressure

1). Increases
2). Decreases
3). Remains same
4). Becomes zero

Correct Answer: 2). Decreases

Solution:
Higher friction reduces pressure.

Ref: Soil Mechanics – Punmia

---

185. The pressure distribution behind retaining wall is

1). Uniform
2). Triangular
3). Parabolic
4). Rectangular

Correct Answer: 2). Triangular

Solution:
Pressure increases linearly.

Ref: Soil Mechanics – Punmia

---

186. The total earth pressure on wall is

1). γH
2). $\frac{1}{2}\gamma H^2 K_a$
3). γH^2
4). $\frac{\gamma H}{2}$

Correct Answer: 2). $\frac{1}{2}\gamma H^2 K_a$

Solution:
Area of triangular distribution.

Ref: Soil Mechanics – Punmia

---

187. Resultant earth pressure acts at

1). H/2
2). H/3
3). H/4
4). H

Correct Answer: 2). H/3

Solution:
Centroid of triangle.

Ref: Soil Mechanics – Punmia

---

188. Stability against overturning requires

1). Stabilizing moment > overturning moment
2). Stabilizing moment < overturning moment
3). Moments equal
4). Zero moment

Correct Answer: 1). Stabilizing moment > overturning moment

Solution:
Ensures safety.

Ref: Soil Mechanics – Punmia

---

189. The overturning moment in retaining wall is caused by

1). Weight of wall
2). Earth pressure
3). Base friction
4). Water pressure

Correct Answer: 2). Earth pressure

Solution:
Soil pressure tends to overturn wall.

Ref: Soil Mechanics – Punmia

---

190. Resisting moment in retaining wall is produced by

1). Weight of wall
2). Earth pressure
3). Wind pressure
4). Soil pressure

Correct Answer: 1). Weight of wall

Solution:
Weight stabilizes wall.

Ref: Soil Mechanics – Punmia

---

191. In dam design, resultant must pass

1). Outside base
2). Through toe
3). Within middle third
4). Through heel

Correct Answer: 3). Within middle third

Solution:
Avoids tension.

Ref: Theory of Structures – Ramamrutham

---

192. If resultant passes through center, stress distribution becomes

1). Uniform
2). Triangular
3). Parabolic
4). Zero

Correct Answer: 1). Uniform

Solution:
No eccentricity.

Ref: Theory of Structures – Ramamrutham

---

193. Maximum compressive stress in dam occurs at

1). Heel
2). Toe
3). Mid base
4). Top

Correct Answer: 2). Toe

Solution:
Due to eccentricity.

Ref: Theory of Structures – Ramamrutham

---

194. If resultant shifts toward heel

1). Toe stress increases
2). Heel stress increases
3). Both decrease
4). No change

Correct Answer: 2). Heel stress increases

Solution:
Compression shifts toward heel.

Ref: Theory of Structures – Ramamrutham

---

195. The slope of beam equals

1). dy/dx
2). d^2y/dx^2
3). M/EI
4). V/EI

Correct Answer: 1). dy/dx

Solution:
Slope definition.

Ref: Analysis of Structures – Bhavikatti

---

196. Curvature of beam equals

1). dy/dx
2). d^2y/dx^2
3). d^3y/dx^3
4). M/EI

Correct Answer: 2). d^2y/dx^2

Solution:

$$EI\frac{d^2y}{dx^2} = M$$

Ref: Analysis of Structures – Bhavikatti

---

197. If EI increases, curvature

1). Increases
2). Decreases
3). Remains same
4). Infinite

Correct Answer: 2). Decreases

Solution:

$$\frac{1}{R} = \frac{M}{EI}$$

Ref: Strength of Materials – Bansal

---

198. Maximum deflection occurs where

1). Shear force maximum
2). Slope zero
3). Moment maximum
4). Reaction zero

Correct Answer: 2). Slope zero

Solution:
Deflection maximum when slope becomes zero.

Ref: Strength of Materials – Bansal

---

199. If beam span increases, deflection

1). Decreases
2). Increases
3). Remains same
4). Zero

Correct Answer: 2). Increases

Solution:

$$y \propto L^3$$

Ref: Strength of Materials – Bansal

---

200. Increasing beam depth will

1). Increase deflection
2). Reduce deflection
3). No change
4). Increase load

Correct Answer: 2). Reduce deflection

Solution:
Depth increases moment of inertia.

Ref: Strength of Materials – Bansal

---

201. Increasing moment of inertia reduces

1). Stress
2). Deflection
3). Shear
4). Load

Correct Answer: 2). Deflection

Solution:

$$y \propto \frac{1}{I}$$

Ref: Strength of Materials – Bansal

---

202. The elastic curve represents

1). Stress distribution
2). Deflected beam shape
3). Load diagram
4). Shear diagram

Correct Answer: 2). Deflected beam shape

Solution:
Elastic curve shows beam deformation.

Ref: Analysis of Structures – Bhavikatti

---

203. In cantilever beam slope at fixed end

1). Maximum
2). Zero
3). Infinite
4). Minimum

Correct Answer: 2). Zero

Solution:
Fixed support prevents rotation.

Ref: Strength of Materials – Bansal

---

204. Maximum deflection of cantilever occurs

1). Fixed end
2). Free end
3). Midspan
4). Quarter span

Correct Answer: 2). Free end

Solution:
Free end experiences maximum displacement.

Ref: Strength of Materials – Bansal

---

205. The most common truss used in bridges is

1). Pratt truss
2). Warren truss
3). Howe truss
4). All of these

Correct Answer: 4). All of these

Solution:
All are common bridge trusses.

Ref: Theory of Structures – Ramamrutham

---

206. The member carrying tension in Pratt truss are

1). Diagonals
2). Verticals
3). Top chord
4). Bottom chord

Correct Answer: 1). Diagonals

Solution:
Characteristic of Pratt truss.

Ref: Theory of Structures – Ramamrutham

---

207. The top chord of truss usually carries

1). Tension
2). Compression
3). Shear
4). Torsion

Correct Answer: 2). Compression

Solution:
Top chord compressive.

Ref: Theory of Structures – Ramamrutham

---

208. The bottom chord of truss carries

1). Compression
2). Tension
3). Shear
4). Torsion

Correct Answer: 2). Tension

Solution:
Bottom chord elongates.

Ref: Theory of Structures – Ramamrutham

---

209. The load in truss is transferred through

1). Bending
2). Axial forces
3). Shear forces
4). Torsion

Correct Answer: 2). Axial forces

Solution:
Members carry axial forces.

Ref: Theory of Structures – Ramamrutham

---

210. A truss bridge is economical because

1). Less material required
2). Efficient load transfer
3). High strength-to-weight ratio
4). All of these

Correct Answer: 4). All of these

Solution:
Trusses are structurally efficient.

Ref: Theory of Structures – Ramamrutham

---

211. Active earth pressure increases with

1). Height of wall
2). Soil density
3). Friction angle
4). Both height and density

Correct Answer: 4). Both height and density

Solution:

$$P = \frac{1}{2}\gamma H^2 K_a$$

Ref: Soil Mechanics – Punmia

---

212. Passive earth pressure develops when wall

1). Moves away from soil
2). Moves toward soil
3). Remains stationary
4). Rotates

Correct Answer: 2). Moves toward soil

Solution:
Passive pressure resists wall movement.

Ref: Soil Mechanics – Punmia

---

213. The lateral earth pressure at ground surface is

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
Pressure increases with depth.

Ref: Soil Mechanics – Punmia

---

214. The center of pressure for triangular distribution lies

1). H/2
2). H/3
3). H/4
4). H/6

Correct Answer: 2). H/3

Solution:
Centroid of triangle.

Ref: Soil Mechanics – Punmia

---

215. The stability against sliding depends on

1). Friction resistance
2). Weight of structure
3). Horizontal thrust
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple resisting forces.

Ref: Soil Mechanics – Punmia

---

216. If soil density increases, earth pressure

1). Decreases
2). Increases
3). Remains constant
4). Becomes zero

Correct Answer: 2). Increases

Solution:

$$P \propto \gamma$$

Ref: Soil Mechanics – Punmia

---

217. The base pressure in dam is zero when

1). Resultant at toe
2). Resultant outside base
3). Resultant within middle third
4). Resultant at heel

Correct Answer: 3). Resultant within middle third

Solution:
Ensures compression only.

Ref: Theory of Structures – Ramamrutham

---

218. Maximum deflection occurs where

1). Bending moment zero
2). Shear force zero
3). Slope zero
4). Reaction zero

Correct Answer: 3). Slope zero

Solution:
At maximum deflection slope becomes zero.

Ref: Strength of Materials – Bansal

---

219. The elastic curve equation is obtained by

1). Integrating load equation
2). Integrating bending moment equation twice
3). Integrating shear equation
4). Differentiating load equation

Correct Answer: 2). Integrating bending moment equation twice

Solution:
Double integration method.

Ref: Analysis of Structures – Bhavikatti

---

220. Increasing beam stiffness reduces

1). Load
2). Deflection
3). Moment
4). Shear

Correct Answer: 2). Deflection

Solution:
Higher stiffness reduces deformation.

Ref: Strength of Materials – Bansal

UNIT 4 - REINFORCED CONCRETE STRUCTURES

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1. The characteristic compressive strength of concrete is defined as
1). Maximum compressive strength of concrete
2). Average compressive strength of concrete
3). Strength below which not more than 5% of test results fall
4). Minimum compressive strength

Correct Answer: 3). Strength below which not more than 5% of test results fall

Solution:
Characteristic strength $f_{ck}$is defined in IS 456-2000 as the strength below which **not more than 5% of results are expected to fall**.

Ref: Reinforced Concrete Design – N. Krishna Raju

---

2. The characteristic strength of M20 concrete is

1). 10 MPa
2). 15 MPa
3). 20 MPa
4). 25 MPa

Correct Answer: 3). 20 MPa

Solution:
Grade designation:

$$M20 \Rightarrow f_{ck} = 20\ MPa$$

Ref: Limit State Design of Reinforced Concrete – P.C. Varghese

---

3. The modulus of elasticity of concrete as per IS 456-2000 is

1). $5000\sqrt{f_{ck}}$
2). $3000\sqrt{f_{ck}}$
3). $2000\sqrt{f_{ck}}$
4). $6000\sqrt{f_{ck}}$

Correct Answer: 1). $5000\sqrt{f_{ck}}$

Solution:

$$E_c = 5000\sqrt{f_{ck}}$$

Ref: Reinforced Concrete Structures – B.C. Punmia

---

4. The philosophy of Limit State Design is based on

1). Elastic theory
2). Ultimate strength theory
3). Probability theory and safety
4). Plastic theory

Correct Answer: 3). Probability theory and safety

Solution:
Limit state design ensures safety against **both collapse and serviceability**.

Ref: Reinforced Concrete Design – Krishna Raju

---

5. The two main limit states considered in RCC design are

1). Elastic and plastic
2). Strength and serviceability
3). Load and stress
4). Dead load and live load

Correct Answer: 2). Strength and serviceability

Solution:
Limit states include collapse and serviceability conditions.

Ref: RCC Design – Ramamrutham

---

6. The partial safety factor for concrete in limit state design is

1). 1.15
2). 1.5
3). 1.25
4). 1.75

Correct Answer: 2). 1.5

Solution:
As per IS 456-2000:

$$\gamma_c = 1.5$$

Ref: Reinforced Concrete Design – Krishna Raju

---

7. The partial safety factor for steel in limit state design is

1). 1.15
2). 1.25
3). 1.5
4). 1.75

Correct Answer: 1). 1.15

Solution:

$$\gamma_s = 1.15$$

Ref: Reinforced Concrete Design – Krishna Raju

---

8. The design strength of concrete is

1). $f_{ck}/1.5$
2). $f_{ck}/1.15$
3). $f_{ck}/2$
4). $f_{ck}/1.25$

Correct Answer: 1). $f_{ck}/1.5$

Solution:

$$f_{cd} = \frac{f_{ck}}{\gamma_c}$$

Ref: RCC Design – Ramamrutham

---

9. The minimum grade of concrete for RCC structures as per IS 456 is

1). M10
2). M15
3). M20
4). M25

Correct Answer: 3). M20

Solution:
Minimum grade specified for RCC work.

Ref: IS 456-2000

---

10. In RCC beams, steel reinforcement is provided mainly to resist

1). Compression
2). Tension
3). Shear
4). Torsion

Correct Answer: 2). Tension

Solution:
Concrete is weak in tension.

Ref: Reinforced Concrete Design – Krishna Raju

---

11. A singly reinforced beam has

1). Compression steel only
2). Tension steel only
3). Both tension and compression steel
4). No reinforcement

Correct Answer: 2). Tension steel only

Solution:
Reinforcement provided only in tension zone.

Ref: RCC Design – Ramamrutham

---

12. A doubly reinforced beam contains

1). Tension reinforcement only
2). Compression reinforcement only
3). Both tension and compression reinforcement
4). No reinforcement

Correct Answer: 3). Both tension and compression reinforcement

Solution:
Used when beam depth is restricted.

Ref: RCC Design – Ramamrutham

---

13. A T-beam is formed when

1). Beam cast separately
2). Beam cast monolithically with slab
3). Beam placed over slab
4). Beam without reinforcement

Correct Answer: 2). Beam cast monolithically with slab

Solution:
Slab acts as flange of beam.

Ref: Reinforced Concrete Design – Krishna Raju

---

14. Shear reinforcement in beams is provided to resist

1). Bending moment
2). Shear force
3). Axial force
4). Torsion only

Correct Answer: 2). Shear force

Solution:
Shear reinforcement prevents diagonal tension cracks.

Ref: RCC Design – Punmia

---

15. Development length is defined as

1). Length of beam
2). Length required to develop full stress in steel
3). Length of reinforcement
4). Length of slab

Correct Answer: 2). Length required to develop full stress in steel

Solution:
Ensures proper bond between steel and concrete.

Ref: RCC Design – Krishna Raju

---

16. The development length is given by

1). $Ld = \frac{\phi \sigma_s}{4\tau_{bd}}$
2). $Ld = \frac{\phi \sigma_s}{2\tau_{bd}}$
3). $Ld = \frac{\phi \sigma_s}{\tau_{bd}}$
4). $Ld = \frac{\phi}{4\tau_{bd}}$

Correct Answer: 1). $Ld = \frac{\phi \sigma_s}{4\tau_{bd}}$

Solution:
Standard formula from IS 456.

Ref: RCC Design – Krishna Raju

---

17. A one-way slab transfers load mainly in

1). Two directions
2). One direction
3). Three directions
4). Circular direction

Correct Answer: 2). One direction

Solution:
Occurs when $L_y/L_x > 2$.

Ref: RCC Design – Punmia

---

18. A two-way slab transfers load in

1). One direction
2). Two perpendicular directions
3). Three directions
4). Circular directions

Correct Answer: 2). Two perpendicular directions

Solution:
Occurs when $L_y/L_x < 2$.

Ref: RCC Design – Punmia

---

19. The minimum thickness of slab depends on

1). Span
2). Deflection control
3). Load
4). All of these

Correct Answer: 4). All of these

Solution:
Thickness determined by span, loads and deflection limits.

Ref: RCC Design – Krishna Raju

---

20. Torsion reinforcement in beams is provided in the form of

1). Longitudinal bars only
2). Stirrups only
3). Both longitudinal bars and stirrups
4). Mesh reinforcement

Correct Answer: 3). Both longitudinal bars and stirrups

Solution:
Torsion resisted by combined reinforcement.

Ref: RCC Design – Ramamrutham

---

21. The maximum compressive strain in concrete at ultimate limit state as per IS 456 is

1). 0.002
2). 0.0035
3). 0.003
4). 0.004

Correct Answer: 2). 0.0035

Solution:
IS 456 assumes the maximum compressive strain in concrete at extreme fiber in bending as **0.0035**.

Ref: Reinforced Concrete Design – N. Krishna Raju

---

22. The stress block in limit state design is assumed as

1). Rectangular
2). Parabolic
3). Parabolic-rectangular
4). Triangular

Correct Answer: 3). Parabolic-rectangular

Solution:
IS 456 uses **parabolic-rectangular stress block**.

Ref: Limit State Design of Reinforced Concrete – P.C. Varghese

---

23. The depth of neutral axis in a balanced section depends on

1). Grade of steel only
2). Grade of concrete only
3). Both steel and concrete grades
4). Beam span

Correct Answer: 3). Both steel and concrete grades

Solution:
Neutral axis depth varies with material properties.

Ref: Reinforced Concrete Design – Krishna Raju

---

24. The limiting depth of neutral axis for Fe415 steel is

1). 0.48d
2). 0.53d
3). 0.46d
4). 0.60d

Correct Answer: 1). 0.48d

Solution:
IS 456 values:

Fe250 → 0.53d
Fe415 → 0.48d
Fe500 → 0.46d

Ref: RCC Design – Ramamrutham

---

25. If neutral axis depth is greater than limiting depth, the section is

1). Balanced section
2). Over-reinforced section
3). Under-reinforced section
4). Safe section

Correct Answer: 2). Over-reinforced section

Solution:
Concrete crushes before steel yields.

Ref: RCC Design – Ramamrutham

---

26. If neutral axis depth is less than limiting depth, section is

1). Balanced
2). Over-reinforced
3). Under-reinforced
4). Unsafe

Correct Answer: 3). Under-reinforced

Solution:
Steel yields before concrete crushing.

Ref: RCC Design – Ramamrutham

27. Under-reinforced beams are preferred because

1). They are cheaper
2). They give warning before failure
3). They resist compression better
4). They reduce reinforcement

Correct Answer: 2). They give warning before failure

Solution:
Steel yields first providing ductile failure.

Ref: Reinforced Concrete Design – Krishna Raju

---

28. In doubly reinforced beams compression steel is provided when

1). Beam depth is restricted
2). Loads are very small
3). No tension occurs
4). Slab thickness increases

Correct Answer: 1). Beam depth is restricted

Solution:
Compression reinforcement increases moment capacity.

Ref: RCC Design – Punmia

---

29. The effective depth of beam is measured from

1). Top of beam to bottom of beam
2). Compression face to centroid of tension steel
3). Bottom to centroid of compression steel
4). Neutral axis to tension steel

Correct Answer: 2). Compression face to centroid of tension steel

Solution:
Effective depth d is measured to tension reinforcement.

Ref: Reinforced Concrete Design – Krishna Raju

---

30. The lever arm in RCC beam is

1). Distance between compression and tension forces
2). Beam depth
3). Span of beam
4). Neutral axis depth

Correct Answer: 1). Distance between compression and tension forces

Solution:
Lever arm produces resisting moment.

Ref: RCC Design – Ramamrutham

---

31. The moment of resistance of singly reinforced beam is

1). $M = T \times z$
2). $M = C \times z$
3). Both A and B
4). $M = W \times L$

Correct Answer: 3). Both A and B

Solution:
Tension = compression forces.

Ref: Reinforced Concrete Design – Krishna Raju

---

32. Shear failure in beams occurs due to

1). Flexural cracks
2). Diagonal tension cracks
3). Vertical cracks
4). Horizontal cracks

Correct Answer: 2). Diagonal tension cracks

Solution:
Shear cracks develop diagonally.

Ref: RCC Design – Punmia

---

33. Stirrups are used mainly to resist

1). Bending
2). Shear
3). Compression
4). Torsion only

Correct Answer: 2). Shear

Solution:
Stirrups resist diagonal tension.

Ref: RCC Design – Punmia

---

34. In RCC beams, torsion reinforcement consists of

1). Longitudinal bars only
2). Stirrups only
3). Combination of both
4). Mesh reinforcement

Correct Answer: 3). Combination of both

Solution:
Torsion resisted by longitudinal bars + stirrups.

Ref: RCC Design – Krishna Raju

---

35. The minimum reinforcement in slabs as per IS 456 is

1). 0.10%
2). 0.12%
3). 0.15%
4). 0.20%

Correct Answer: 2). 0.12%

Solution:
For HYSD bars.

Ref: IS 456-2000

---

36. The span to effective depth ratio is used for checking

1). Shear
2). Bending
3). Deflection
4). Torsion

Correct Answer: 3). Deflection

Solution:
Deflection control method.

Ref: RCC Design – Krishna Raju

---

37. In one-way slab, main reinforcement is provided along

1). Longer span
2). Shorter span
3). Both directions
4). Diagonal

Correct Answer: 2). Shorter span

Solution:
Load transferred along shorter span.

Ref: RCC Design – Punmia

---

38. In two-way slab, reinforcement is provided

1). Only along longer span
2). Only along shorter span
3). Both directions
4). No reinforcement

Correct Answer: 3). Both directions

Solution:
Load distributed in two directions.

Ref: RCC Design – Punmia

---

39. A slab behaves as one-way slab when

1). $L_y/L_x < 2$
2). $L_y/L_x > 2$
3). $L_y/L_x = 1$
4). $L_y/L_x = 2$

Correct Answer: 2). $L_y/L_x > 2$

Solution:
Load transferred mainly along shorter span.

Ref: RCC Design – Krishna Raju

---

40. A slab behaves as two-way slab when

1). $L_y/L_x < 2$
2). $L_y/L_x > 2$
3). $L_y/L_x > 3$
4). $L_y/L_x = 4$

Correct Answer: 1). $L_y/L_x < 2$

Solution:
Load transferred in both directions.

Ref: RCC Design – Krishna Raju

---

41. The limiting moment of resistance of a singly reinforced rectangular beam section is given by
1). $M_u = 0.138 f_{ck} b d^2$
2). $M_u = 0.167 f_{ck} b d^2$
3). $M_u = 0.36 f_{ck} b d^2$
4). $M_u = 0.48 f_{ck} b d^2$

Correct Answer: 1). $M_u = 0.138 f_{ck} b d^2$

Solution:
For Fe415 steel as per IS 456:

$$M_u = 0.138 f_{ck} b d^2$$

Ref: Reinforced Concrete Design – N. Krishna Raju

---

42. The limiting moment of resistance depends on

1). Grade of concrete
2). Beam dimensions
3). Grade of steel
4). All of these

Correct Answer: 4). All of these

Solution:
Moment capacity depends on material strength and beam size.

Ref: RCC Design – Ramamrutham

---

43. The depth of neutral axis in balanced section is determined by

1). Stress distribution
2). Strain compatibility
3). Equilibrium of forces
4). All of these

Correct Answer: 4). All of these

Solution:
Limit state design satisfies equilibrium and strain compatibility.

Ref: RCC Design – Krishna Raju

---

44. If actual neutral axis depth is less than limiting neutral axis depth, the section is

1). Balanced
2). Over reinforced
3). Under reinforced
4). Unsafe

Correct Answer: 3). Under reinforced

Solution:
Steel yields before concrete crushing.

Ref: RCC Design – Ramamrutham

---

45. The minimum cover for reinforcement in beams is generally

1). 10 mm
2). 15 mm
3). 20 mm
4). 25 mm

Correct Answer: 4). 25 mm

Solution:
Nominal cover protects steel from corrosion and fire.

Ref: IS 456-2000

---

46. The spacing of stirrups is governed by

1). Shear force
2). Bending moment
3). Span
4). Deflection

Correct Answer: 1). Shear force

Solution:
Higher shear requires closer stirrup spacing.

Ref: RCC Design – Punmia

---

47. The design shear strength of concrete depends on

1). Percentage of steel
2). Grade of concrete
3). Both A and B
4). Span of beam

Correct Answer: 3). Both A and B

Solution:
IS 456 shear tables depend on steel percentage and concrete grade.

Ref: RCC Design – Krishna Raju

---

48. If shear stress exceeds permissible value, shear reinforcement must be

1). Reduced
2). Increased
3). Removed
4). Ignored

Correct Answer: 2). Increased

Solution:
Stirrups resist excess shear.

Ref: RCC Design – Punmia

---

49. In a T-beam, the flange width depends on

1). Span of beam
2). Slab thickness
3). Beam spacing
4). All of these

Correct Answer: 4). All of these

Solution:
IS code provides formula for effective flange width.

Ref: RCC Design – Krishna Raju

---

50. The compression flange in T-beam is

1). Beam web
2). Slab portion
3). Bottom reinforcement
4). Beam depth

Correct Answer: 2). Slab portion

Solution:
Slab acts as flange under compression.

Ref: RCC Design – Ramamrutham

---

51. The main reinforcement in slab is placed

1). At top
2). At bottom
3). At center
4). At edges

Correct Answer: 2). At bottom

Solution:
Tension occurs at bottom.

Ref: RCC Design – Punmia

---

52. Distribution reinforcement in slab is provided

1). Along main reinforcement
2). Perpendicular to main reinforcement
3). Diagonally
4). Randomly

Correct Answer: 2). Perpendicular to main reinforcement

Solution:
Controls shrinkage cracks.

Ref: RCC Design – Punmia

---

53. The main function of distribution reinforcement is

1). Resist bending
2). Resist temperature and shrinkage stresses
3). Resist shear
4). Resist torsion

Correct Answer: 2). Resist temperature and shrinkage stresses

Solution:
Prevents cracking.

Ref: RCC Design – Punmia

---

54. The minimum diameter of reinforcement bars used in slabs is usually

1). 4 mm
2). 6 mm
3). 8 mm
4). 10 mm

Correct Answer: 3). 8 mm

Solution:
Common slab reinforcement.

Ref: RCC Design – Krishna Raju

---

55. The maximum spacing of main reinforcement in slabs is

1). 2d
2). 3d
3). 4d
4). 5d

Correct Answer: 2). 3d

Solution:
As per IS 456 provisions.

Ref: IS 456-2000

---

56. Columns mainly resist

1). Tension
2). Compression
3). Shear
4). Torsion

Correct Answer: 2). Compression

Solution:
Columns carry axial loads.

Ref: RCC Design – Krishna Raju

---

57. A short column fails mainly due to

1). Buckling
2). Crushing
3). Shear
4). Tension

Correct Answer: 2). Crushing

Solution:
Short columns fail by compressive stress.

Ref: RCC Design – Punmia

---

58. A column is considered long when

1). Slenderness ratio is small
2). Slenderness ratio is large
3). Load is small
4). Load is large

Correct Answer: 2). Slenderness ratio is large

Solution:
Long columns buckle.

Ref: RCC Design – Punmia

---

59. The effective length of column depends on

1). End conditions
2). Load
3). Reinforcement
4). Span

Correct Answer: 1). End conditions

Solution:
Different end conditions change buckling length.

Ref: RCC Design – Krishna Raju

---

60. The minimum number of longitudinal bars in a rectangular column is

1). 2
2). 4
3). 6
4). 8

Correct Answer: 2). 4

Solution:
As per IS 456 minimum reinforcement rule.

Ref: IS 456-2000

---

61. The minimum percentage of longitudinal reinforcement in RCC columns as per IS 456 is

1). 0.4%
2). 0.8%
3). 1.0%
4). 1.5%

Correct Answer: 2). 0.8%

Solution:
IS 456 specifies minimum longitudinal reinforcement for columns as **0.8% of gross cross-sectional area**.

Ref: Reinforced Concrete Design – N. Krishna Raju

---

62. The maximum percentage of longitudinal reinforcement in columns is

1). 2%
2). 4%
3). 6%
4). 8%

Correct Answer: 3). 6%

Solution:
Maximum longitudinal reinforcement allowed is **6%** to avoid congestion.

Ref: IS 456-2000

---

63. The minimum number of bars in circular column is

1). 4
2). 5
3). 6
4). 8

Correct Answer: 3). 6

Solution:
Circular columns require at least **6 longitudinal bars**.

Ref: RCC Design – Punmia

---

64. The spacing of lateral ties in columns should not exceed

1). Least lateral dimension
2). 16 times diameter of longitudinal bar
3). 300 mm
4). The least of the above

Correct Answer: 4). The least of the above

Solution:
IS 456 specifies tie spacing as minimum of these limits.

Ref: RCC Design – Krishna Raju

---

65. The minimum diameter of longitudinal bars in columns is

1). 8 mm
2). 10 mm
3). 12 mm
4). 16 mm

Correct Answer: 3). 12 mm

Solution:
As per IS 456 minimum diameter for column bars.

Ref: IS 456-2000

---

66. Effective length of column depends mainly on

1). Height of building
2). End restraints
3). Column size
4). Reinforcement

Correct Answer: 2). End restraints

Solution:
Boundary conditions determine effective length.

Ref: RCC Design – Krishna Raju

---

67. A column is considered short when

1). Slenderness ratio < 12
2). Slenderness ratio < 20
3). Slenderness ratio < 30
4). Slenderness ratio < 40

Correct Answer: 1). Slenderness ratio < 12

Solution:
As per IS 456 classification.

Ref: RCC Design – Punmia

---

68. A long column fails mainly due to

1). Crushing
2). Buckling
3). Shear
4). Tension

Correct Answer: 2). Buckling

Solution:
Slender columns fail by instability.

Ref: RCC Design – Punmia

---

69. In isolated column footing, one-way shear occurs at

1). Column face
2). Distance d from column face
3). Distance d/2 from column face
4). At edge of footing

Correct Answer: 2). Distance d from column face

Solution:
Critical section for one-way shear.

Ref: RCC Design – Krishna Raju

---

70. Two-way shear in footing is also called

1). Punching shear
2). Diagonal shear
3). Flexural shear
4). Torsional shear

Correct Answer: 1). Punching shear

Solution:
Occurs around column.

Ref: RCC Design – Punmia

---

71. The critical section for punching shear is located at

1). Column face
2). Distance d/2 from column face
3). Distance d from column face
4). Edge of footing

Correct Answer: 2). Distance d/2 from column face

Solution:
IS 456 punching shear location.

Ref: RCC Design – Krishna Raju

---

72. Footings are provided mainly to

1). Increase height of structure
2). Transfer loads safely to soil
3). Reduce reinforcement
4). Reduce span

Correct Answer: 2). Transfer loads safely to soil

Solution:
Footings distribute load to ground.

Ref: RCC Design – Punmia

---

73. The working stress method is based on

1). Ultimate load theory
2). Elastic theory
3). Plastic theory
4). Probability theory

Correct Answer: 2). Elastic theory

Solution:
Working stress method assumes linear elastic behavior.

Ref: RCC Design – Ramamrutham

---

74. In working stress method, stresses are kept within

1). Yield stress
2). Ultimate stress
3). Permissible stress
4). Collapse stress

Correct Answer: 3). Permissible stress

Solution:
Safety ensured by limiting stresses.

Ref: RCC Design – Ramamrutham

---

75. In working stress method, modular ratio is defined as

1). E_c/E_s
2). E_s/E_c
3). A_s/A_c
4). I_c/I_s

Correct Answer: 2). E_s/E_c

Solution:
Ratio of modulus of elasticity of steel to concrete.

Ref: RCC Design – Krishna Raju

---

76. The modular ratio is approximately taken as

1). 5
2). 10
3). 15
4). 20

Correct Answer: 3). 15

Solution:
Approximate value for normal design.

Ref: RCC Design – Ramamrutham

---

77. The neutral axis in working stress method is obtained from

1). Stress compatibility
2). Strain compatibility
3). Force equilibrium
4). All of these

Correct Answer: 4). All of these

Solution:
Equilibrium and compatibility conditions are used.

Ref: RCC Design – Krishna Raju

---

78. The lever arm in working stress method is

1). Distance between compression and tension forces
2). Beam depth
3). Span length
4). Reinforcement spacing

Correct Answer: 1). Distance between compression and tension forces

Solution:
Lever arm produces bending resistance.

Ref: RCC Design – Ramamrutham

---

79. The comparison between limit state and working stress method shows that

1). Limit state method is more economical
2). Working stress method is more economical
3). Both give same results
4). Limit state method is unsafe

Correct Answer: 1). Limit state method is more economical

Solution:
Limit state method utilizes material strength efficiently.

Ref: RCC Design – Krishna Raju

---

80. The main advantage of limit state method is

1). Simplicity
2). Economy and safety
3). Less reinforcement
4). Less concrete

Correct Answer: 2). Economy and safety

Solution:
Limit state design ensures safety and serviceability.

Ref: RCC Design – Krishna Raju

---

81. The maximum percentage of steel allowed in beams as per IS 456 is

1). 2%
2). 3%
3). 4%
4). 6%

Correct Answer: 3). 4%

Solution:
Maximum tension reinforcement in beams should not exceed **4% of cross-sectional area** to ensure proper concrete placement.

Ref: Reinforced Concrete Design – N. Krishna Raju

---

82. The minimum percentage of tension reinforcement in beams is

1). $0.85bd/f_y$
2). $0.47bd/f_y$
3). $0.87bd/f_y$
4). bd/f_y

Correct Answer: 2). $0.47bd/f_y$

Solution:
IS 456 formula for minimum reinforcement in beams.

Ref: RCC Design – Krishna Raju

---

83. The minimum clear cover for columns is generally

1). 20 mm
2). 25 mm
3). 40 mm
4). 50 mm

Correct Answer: 3). 40 mm

Solution:
IS 456 recommends **40 mm cover for columns**.

Ref: IS 456-2000

84. The spacing of main reinforcement in slabs should not exceed

1). 2d
2). 3d
3). 4d
4). 5d

Correct Answer: 2). 3d

Solution:
IS 456 spacing rule.

Ref: RCC Design – Punmia

85. The spacing of distribution reinforcement in slabs should not exceed

1). 3d
2). 4d
3). 5d
4). 6d

Correct Answer: 3). 5d

Solution:
Distribution bars spacing limit.

Ref: RCC Design – Punmia

86. The design bending stress in working stress method is

1). Ultimate stress
2). Yield stress
3). Permissible stress
4). Crushing stress

Correct Answer: 3). Permissible stress

Solution:
Working stress method limits stresses.

Ref: RCC Design – Ramamrutham

87. In working stress method, the permissible stress in steel is

1). $f_y/1.15$
2). $f_y/1.5$
3). $0.55f_y$
4). f_y

Correct Answer: 3). $0.55f_y$

Solution:
Permissible stress in steel.

Ref: RCC Design – Ramamrutham

---

88. The permissible stress in concrete in bending is approximately

1). $0.33f_{ck}$
2). $0.45f_{ck}$
3). $0.55f_{ck}$
4). $0.67f_{ck}$

Correct Answer: 1). $0.33f_{ck}$

Solution:
Working stress limit.

Ref: RCC Design – Ramamrutham

---

89. The neutral axis depth in working stress method depends on

1). Modular ratio
2). Steel area
3). Beam dimensions
4). All of these

Correct Answer: 4). All of these

Solution:
Neutral axis obtained from equilibrium.

Ref: RCC Design – Krishna Raju

---

90. The balanced section in working stress method occurs when

1). Steel reaches permissible stress and concrete reaches permissible stress simultaneously
2). Steel reaches yield stress first
3). Concrete reaches crushing stress first
4). Beam fails in shear

Correct Answer: 1). Steel reaches permissible stress and concrete reaches permissible stress simultaneously

Solution:
Balanced design condition.

Ref: RCC Design – Ramamrutham

---

91. In a balanced section, failure occurs due to

1). Shear
2). Compression
3). Simultaneous yielding of steel and crushing of concrete
4). Torsion

Correct Answer: 3). Simultaneous yielding of steel and crushing of concrete

Solution:
Balanced condition.

Ref: RCC Design – Krishna Raju

---

92. In under-reinforced beam failure occurs due to

1). Crushing of concrete
2). Yielding of steel
3). Shear failure
4). Torsion failure

Correct Answer: 2). Yielding of steel

Solution:
Preferred mode of failure.

Ref: RCC Design – Ramamrutham

---

93. In over-reinforced beam failure occurs due to

1). Steel yielding
2). Concrete crushing
3). Shear cracks
4). Torsion

Correct Answer: 2). Concrete crushing

Solution:
Brittle failure.

Ref: RCC Design – Ramamrutham

---

94. The effective span of simply supported beam is

1). Clear span
2). Center-to-center support distance
3). Lesser of clear span + effective depth or center-to-center distance
4). Greater of clear span or center-to-center distance

Correct Answer: 3). Lesser of clear span + effective depth or center-to-center distance

Solution:
IS 456 effective span rule.

Ref: IS 456-2000

---

95. The effective depth of slab is measured from

1). Top to bottom surface
2). Top surface to centroid of tension steel
3). Bottom surface to compression face
4). Neutral axis to bottom

Correct Answer: 2). Top surface to centroid of tension steel

Solution:
Effective depth definition.

Ref: RCC Design – Krishna Raju

---

96. The deflection control in RCC beams depends mainly on

1). Span/depth ratio
2). Concrete grade
3). Reinforcement spacing
4). Cover

Correct Answer: 1). Span/depth ratio

Solution:
Deflection controlled by span-depth limits.

Ref: RCC Design – Krishna Raju

---

97. The basic span-to-depth ratio for simply supported beam is

1). 15
2). 20
3). 25
4). 30

Correct Answer: 2). 20

Solution:
IS 456 value.

Ref: IS 456-2000

---

98. The basic span-to-depth ratio for cantilever beam is

1). 5
2). 7
3). 10
4). 12

Correct Answer: 3). 10

Solution:
IS 456 standard.

Ref: IS 456-2000

99. The basic span-to-depth ratio for continuous beam is

1). 20
2). 22
3). 26
4). 30

Correct Answer: 3). 26

Solution:
IS code recommendation.

Ref: IS 456-2000

100. The main purpose of providing cover to reinforcement is

1). Increase strength
2). Protect reinforcement from corrosion and fire
3). Reduce bending
4). Increase shear capacity

Correct Answer: 2). Protect reinforcement from corrosion and fire

Solution:
Cover protects steel bars.

Ref: RCC Design – Krishna Raju

101. The ultimate compressive stress in concrete as per limit state design is approximately taken as
1). $0.45f_{ck}$
2). $0.67f_{ck}$
3). $0.36f_{ck}$
4). $0.87f_{ck}$

Correct Answer: 3). $0.36f_{ck}$

Solution:
IS 456 rectangular stress block uses **0.36 fck** as compressive stress.

Ref: Reinforced Concrete Design – N. Krishna Raju

102. The resultant compressive force in concrete in limit state design is

1). $0.36 f_{ck} b x_u$
2). $0.45 f_{ck} b x_u$
3). $0.5 f_{ck} b x_u$
4). $0.67 f_{ck} b x_u$

Correct Answer: 1). $0.36 f_{ck} b x_u$

Solution:
Compressive force formula.

Ref: RCC Design – Krishna Raju

---

103. The tension force in steel in limit state design is

1). $0.36 f_{ck} b x_u$
2). $0.87 f_y A_s$
3). $f_y A_s$
4). $0.5 f_y A_s$

Correct Answer: 2). $0.87 f_y A_s$

Solution:
Steel design stress in LSM.

Ref: RCC Design – Krishna Raju

---

104. The moment of resistance of singly reinforced beam is

1). $M = C \times z$
2). $M = T \times z$
3). Both A and B
4). $M = WL$

Correct Answer: 3). Both A and B

Solution:
Compression equals tension forces.

Ref: RCC Design – Krishna Raju

105. The lever arm in limit state design is approximately

1). $0.87d$
2). $0.9d$
3). $0.95d$
4). d

Correct Answer: 2). $0.9d$

Solution:
Approximate lever arm.

Ref: RCC Design – Ramamrutham

106. The minimum spacing between reinforcement bars should be

1). Equal to bar diameter
2). Greater than bar diameter
3). Less than bar diameter
4). Zero

Correct Answer: 2). Greater than bar diameter

Solution:
Allows proper concrete compaction.

Ref: IS 456-2000

107. The main reinforcement in cantilever slab is provided

1). At top
2). At bottom
3). At center
4). At edges

Correct Answer: 1). At top

Solution:
Tension occurs at top in cantilever.

Ref: RCC Design – Punmia

108. The critical section for bending in footing occurs at

1). Edge of footing
2). Column face
3). Distance d from column
4). Distance d/2 from column

Correct Answer: 2). Column face

Solution:
Bending critical at column face.

Ref: RCC Design – Krishna Raju

109. One-way shear in footing occurs along a plane

1). Parallel to column face
2). Perpendicular to column face
3). Circular around column
4). Diagonal

Correct Answer: 1). Parallel to column face

Solution:
Occurs at distance d from column face.

Ref: RCC Design – Krishna Raju

110. Punching shear failure occurs due to

1). Bending
2). Shear around column
3). Torsion
4). Compression

Correct Answer: 2). Shear around column

Solution:
Occurs around column perimeter.

Ref: RCC Design – Punmia

111. The critical perimeter for punching shear is taken at

1). Column face
2). Distance d/2 from column face
3). Distance d from column face
4). Edge of footing

Correct Answer: 2). Distance d/2 from column face

Solution:
IS 456 punching shear rule.

Ref: RCC Design – Krishna Raju

---

112. The design shear strength of concrete increases with

1). Grade of concrete
2). Steel percentage
3). Both A and B
4). Span

Correct Answer: 3). Both A and B

Solution:
IS shear tables depend on both factors.

Ref: RCC Design – Krishna Raju

---

113. Torsion reinforcement in beams is provided as

1). Longitudinal bars only
2). Stirrups only
3). Both longitudinal bars and stirrups
4). Mesh reinforcement

Correct Answer: 3). Both longitudinal bars and stirrups

Solution:
Torsion resisted by closed stirrups and longitudinal bars.

Ref: RCC Design – Punmia

114. The minimum diameter of stirrups used in beams is

1). 4 mm
2). 6 mm
3). 8 mm
4). 10 mm

Correct Answer: 2). 6 mm

Solution:
Common minimum stirrup size.

Ref: RCC Design – Krishna Raju

115. The maximum spacing of stirrups should not exceed

1). 0.75d
2). d
3). 1.5d
4). 2d

Correct Answer: 1). 0.75d

Solution:
IS 456 shear reinforcement rule.

Ref: IS 456-2000

116. The minimum thickness of slab for residential buildings is generally

1). 80 mm
2). 100 mm
3). 120 mm
4). 150 mm

Correct Answer: 2). 100 mm

Solution:
Common slab thickness.

Ref: RCC Design – Punmia

117. The dead load of RCC slab depends on

1). Slab thickness
2). Density of concrete
3). Both A and B
4). Span

Correct Answer: 3). Both A and B

Solution:
Dead load calculation.

Ref: RCC Design – Krishna Raju

---

118. The density of reinforced concrete is approximately

1). 20 kN/m^3
2). 22 kN/m^3
3). 25 kN/m^3
4). 30 kN/m^3

Correct Answer: 3). 25 kN/m^3

Solution:
Standard value used in design.

Ref: RCC Design – Krishna Raju

---

119. In limit state design the load factor for dead load is

1). 1.2
2). 1.5
3). 1.25
4). 1.75

Correct Answer: 2). 1.5

Solution:
Load factor as per IS 456.

Ref: IS 456-2000

---

120. The load factor for dead load + live load combination is

1). 1.2
2). 1.5
3). 1.25
4). 1.0

Correct Answer: 2). 1.5

Solution:
Ultimate load factor.

Ref: IS 456-2000

---

121. The design load for limit state design is obtained by multiplying characteristic load by
1). Load factor
2). Safety factor
3). Stress factor
4). Strength factor

Correct Answer: 1). Load factor

Solution:

$$Design\ Load = Load\ Factor \times Characteristic\ Load$$

Ref: Reinforced Concrete Design – N. Krishna Raju

---

122. The characteristic load is defined as

1). Maximum possible load
2). Average load expected during life of structure
3). Minimum load acting on structure
4). Load including safety factor

Correct Answer: 2). Average load expected during life of structure

Solution:
Characteristic loads are statistically determined values.

Ref: RCC Design – Krishna Raju

---

123. The dead load of a structure consists of

1). Self-weight of structural members
2). Permanent fixtures
3). Walls and floors
4). All of these

Correct Answer: 4). All of these

Solution:
Dead load includes all permanent loads.

Ref: RCC Design – Ramamrutham

---

124. Live loads are

1). Permanent loads
2). Temporary loads acting on structure
3). Self-weight of building
4). Soil pressure

Correct Answer: 2). Temporary loads acting on structure

Solution:
Live loads vary during service life.

Ref: RCC Design – Krishna Raju

---

125. The design strength of steel in limit state method is

1). f_y
2). $0.87f_y$
3). $0.36f_y$
4). $0.45f_y$

Correct Answer: 2). $0.87f_y$

Solution:

$$Design\ Stress = 0.87f_y$$

Ref: RCC Design – Krishna Raju

---

126. The effective flange width of T-beam depends on

1). Span of beam
2). Slab thickness
3). Beam spacing
4). All of these

Correct Answer: 4). All of these

Solution:
IS 456 formula includes these parameters.

Ref: RCC Design – Ramamrutham

---

127. The web of T-beam mainly resists

1). Compression
2). Shear
3). Tension
4). Torsion

Correct Answer: 2). Shear

Solution:
Web carries shear force.

Ref: RCC Design – Punmia

---

128. In T-beam, flange mainly resists

1). Tension
2). Compression
3). Shear
4). Torsion

Correct Answer: 2). Compression

Solution:
Flange lies in compression zone.

Ref: RCC Design – Krishna Raju

---

129. The minimum clear spacing between bars in beams should be

1). Equal to bar diameter
2). Greater than bar diameter
3). Less than bar diameter
4). Zero

Correct Answer: 2). Greater than bar diameter

Solution:
Ensures proper compaction.

Ref: IS 456-2000

---

130. Anchorage length is another term for

1). Development length
2). Beam length
3). Span length
4). Column length

Correct Answer: 1). Development length

Solution:
Anchorage ensures stress transfer between steel and concrete.

Ref: RCC Design – Krishna Raju

---

131. The shear stress in beam is given by

1). V/bd
2). M/bd^2
3). V/b
4). M/d

Correct Answer: 1). V/bd

Solution:
Nominal shear stress formula.

Ref: RCC Design – Punmia

---

132. If shear stress exceeds permissible value

1). Increase depth of beam
2). Provide shear reinforcement
3). Increase concrete grade
4). All of these

Correct Answer: 4). All of these

Solution:
All methods reduce shear stress.

Ref: RCC Design – Krishna Raju

---

133. In column design, load carried by concrete is

1). $0.4f_{ck}A_c$
2). $0.45f_{ck}A_c$
3). $0.36f_{ck}A_c$
4). $0.87f_{ck}A_c$

Correct Answer: 1). $0.4f_{ck}A_c$

Solution:
Approximate formula for column design.

Ref: RCC Design – Krishna Raju

---

134. The load carried by steel in column is

1). $0.67f_yA_s$
2). $0.87f_yA_s$
3). f_yA_s
4). $0.45f_yA_s$

Correct Answer: 1). $0.67f_yA_s$

Solution:
Column design formula.

Ref: RCC Design – Krishna Raju

---

135. The main reinforcement in footing is placed

1). At top
2). At bottom
3). At center
4). At edges

Correct Answer: 2). At bottom

Solution:
Tension occurs at bottom.

Ref: RCC Design – Punmia

---

136. The minimum thickness of footing depends on

1). Shear
2). Bending
3). Bearing pressure
4). All of these

Correct Answer: 4). All of these

Solution:
Footing thickness determined by structural requirements.

Ref: RCC Design – Krishna Raju

---

137. In isolated footing the reinforcement is placed

1). One direction
2). Two directions
3). Three directions
4). Circular pattern

Correct Answer: 2). Two directions

Solution:
Resists bending in both directions.

Ref: RCC Design – Punmia

---

138. The bearing capacity of soil determines

1). Column size
2). Footing area
3). Beam span
4). Slab thickness

Correct Answer: 2). Footing area

Solution:
Footing area = Load / Safe bearing capacity.

Ref: RCC Design – Krishna Raju

---

139. If soil bearing capacity decreases, footing area

1). Decreases
2). Increases
3). Remains same
4). Becomes zero

Correct Answer: 2). Increases

Solution:
Area inversely proportional to SBC.

Ref: RCC Design – Krishna Raju

---

140. The purpose of reinforcement detailing is

1). Proper placement of steel
2). Structural safety
3). Construction clarity
4). All of these

Correct Answer: 4). All of these

Solution:
Proper detailing ensures structural performance.

Ref: RCC Design – Krishna Raju

141. The ultimate moment capacity of a singly reinforced beam increases when
1). Beam depth increases
2). Concrete grade increases
3). Steel area increases
4). All of these

Correct Answer: 4). All of these

Solution:
Moment capacity depends on beam dimensions and material strengths.

Ref: Reinforced Concrete Design – N. Krishna Raju

---

142. If the effective depth of beam doubles, the moment of resistance approximately becomes

1). Double
2). Four times
3). Eight times
4). Same

Correct Answer: 2). Four times

Solution:

$$M_u \propto d^2$$

Ref: RCC Design – Krishna Raju

---

143. The compression zone in a simply supported RCC beam is located

1). At top
2). At bottom
3). At center
4). At sides

Correct Answer: 1). At top

Solution:
In sagging bending moment, top fibers are compressed.

Ref: RCC Design – Ramamrutham

---

144. The tension zone in a simply supported beam is

1). Top
2). Bottom
3). Neutral axis
4). Middle

Correct Answer: 2). Bottom

Solution:
Bottom fibers undergo tension.

Ref: RCC Design – Ramamrutham

---

145. The neutral axis separates

1). Compression and tension zones
2). Shear and bending zones
3). Concrete and steel
4). Dead and live loads

Correct Answer: 1). Compression and tension zones

Solution:
Neutral axis divides compression and tension areas.

Ref: RCC Design – Krishna Raju

---

146. Increasing the percentage of steel in beam generally

1). Decreases moment capacity
2). Increases moment capacity
3). Has no effect
4). Decreases deflection

Correct Answer: 2). Increases moment capacity

Solution:
More steel increases tension capacity.

Ref: RCC Design – Krishna Raju

---

147. The purpose of providing compression reinforcement is

1). Increase shear resistance
2). Increase moment capacity
3). Reduce span
4). Increase cover

Correct Answer: 2). Increase moment capacity

Solution:
Compression steel increases strength when beam depth is limited.

Ref: RCC Design – Punmia

---

148. The shear reinforcement in beams is provided in the form of

1). Stirrups
2). Bent-up bars
3). Both A and B
4). Longitudinal bars only

Correct Answer: 3). Both A and B

Solution:
Shear reinforcement methods.

Ref: RCC Design – Krishna Raju

---

149. The angle of diagonal shear cracks in beams is approximately

1). 30°
2). 45°
3). 60°
4). 90°

Correct Answer: 2). 45°

Solution:
Typical diagonal crack angle.

Ref: RCC Design – Punmia

---

150. The critical section for shear in beams is

1). At support
2). At distance d from support
3). At midspan
4). At column face

Correct Answer: 2). At distance d from support

Solution:
Shear critical location.

Ref: RCC Design – Krishna Raju

---

151. In two-way slabs, bending occurs

1). In one direction
2). In two perpendicular directions
3). Only diagonally
4). Only at edges

Correct Answer: 2). In two perpendicular directions

Solution:
Load distributed in both directions.

Ref: RCC Design – Punmia

---

152. The corners of two-way slabs are reinforced when

1). Slab corners are free to lift
2). Slab corners are restrained
3). Slab span is small
4). Slab load is small

Correct Answer: 2). Slab corners are restrained

Solution:
Corner reinforcement prevents torsion cracks.

Ref: RCC Design – Krishna Raju

---

153. The main reinforcement in two-way slabs is placed

1). Along longer span only
2). Along shorter span only
3). Along both directions
4). Along diagonal

Correct Answer: 3). Along both directions

Solution:
Two-way bending.

Ref: RCC Design – Punmia

---

154. The effective length of column increases when

1). End restraints reduce
2). Column size increases
3). Reinforcement increases
4). Load decreases

Correct Answer: 1). End restraints reduce

Solution:
Less restraint increases buckling length.

Ref: RCC Design – Krishna Raju

---

155. A column subjected to axial load and bending is called

1). Short column
2). Long column
3). Beam-column
4). Cantilever column

Correct Answer: 3). Beam-column

Solution:
Combined axial and bending load.

Ref: RCC Design – Punmia

---

156. The design load carrying capacity of short column depends on

1). Concrete strength
2). Steel reinforcement
3). Cross-sectional area
4). All of these

Correct Answer: 4). All of these

Solution:
Column strength depends on materials and size.

Ref: RCC Design – Krishna Raju

---

157. The footing thickness is controlled mainly by

1). Bending
2). Shear
3). Bearing pressure
4). Torsion

Correct Answer: 2). Shear

Solution:
Shear often governs footing thickness.

Ref: RCC Design – Punmia

---

158. The reinforcement in footing is generally placed

1). At top
2). At bottom
3). At center
4). At edges

Correct Answer: 2). At bottom

Solution:
Bottom tension reinforcement.

Ref: RCC Design – Krishna Raju

---

159. The safe bearing capacity of soil is

1). Maximum load soil can carry
2). Load soil can safely carry without failure
3). Dead load of building
4). Load on column

Correct Answer: 2). Load soil can safely carry without failure

Solution:
Used for footing design.

Ref: RCC Design – Punmia

---

160. The reinforcement in columns is held in position by

1). Stirrups
2). Lateral ties
3). Links
4). All of these

Correct Answer: 4). All of these

Solution:
Ties maintain reinforcement position and resist buckling.

Ref: RCC Design – Krishna Raju

---

161. The bending moment capacity of a beam increases with
1). Increase in beam depth
2). Increase in steel area
3). Increase in concrete strength
4). All of these

Correct Answer: 4). All of these

Solution:
Moment capacity depends on material strengths and beam dimensions.

Ref: Reinforced Concrete Design – N. Krishna Raju

162. If the width of beam increases, bending stress in beam

1). Increases
2). Decreases
3). Remains same
4). Becomes zero

Correct Answer: 2). Decreases

Solution:
Increasing width increases moment capacity.

Ref: RCC Design – Krishna Raju

163. The purpose of shear reinforcement in beams is to

1). Increase bending strength
2). Prevent diagonal tension cracks
3). Increase compressive strength
4). Reduce span

Correct Answer: 2). Prevent diagonal tension cracks

Solution:
Shear reinforcement controls diagonal cracking.

Ref: RCC Design – Punmia

164. Bent-up bars in beams are provided to resist

1). Bending moment
2). Shear force
3). Torsion only
4). Compression

Correct Answer: 2). Shear force

Solution:
Bent-up bars assist shear resistance.

Ref: RCC Design – Krishna Raju

165. The angle of bent-up bars is usually

1). 30°
2). 45°
3). 60°
4). 90°

Correct Answer: 2). 45°

Solution:
Typical inclination used in RCC design.

Ref: RCC Design – Punmia

---

166. The torsional reinforcement in beams consists of

1). Closed stirrups
2). Longitudinal bars
3). Both A and B
4). Mesh reinforcement

Correct Answer: 3). Both A and B

Solution:
Torsion requires both types.

Ref: RCC Design – Krishna Raju

---

167. In slab design, the main reinforcement is placed

1). Along shorter span
2). Along longer span
3). Along diagonal
4). Along center

Correct Answer: 1). Along shorter span

Solution:
Load transferred along shorter span.

Ref: RCC Design – Punmia

---

168. The distribution reinforcement in slabs is placed

1). Parallel to main bars
2). Perpendicular to main bars
3). Diagonally
4). Randomly

Correct Answer: 2). Perpendicular to main bars

Solution:
Controls shrinkage cracks.

Ref: RCC Design – Punmia

---

169. The main function of distribution reinforcement is

1). Resist bending
2). Control temperature and shrinkage cracks
3). Resist shear
4). Increase strength

Correct Answer: 2). Control temperature and shrinkage cracks

Solution:
Secondary reinforcement purpose.

Ref: RCC Design – Krishna Raju

---

170. In cantilever slabs the tension reinforcement is placed

1). At bottom
2). At top
3). At center
4). At edges

Correct Answer: 2). At top

Solution:
Cantilever top fibers are in tension.

Ref: RCC Design – Punmia

---

171. The minimum diameter of column bars is

1). 8 mm
2). 10 mm
3). 12 mm
4). 16 mm

Correct Answer: 3). 12 mm

Solution:
IS 456 column reinforcement rule.

Ref: IS 456-2000

---

172. The minimum number of bars in rectangular column is

1). 2
2). 3
3). 4
4). 6

Correct Answer: 3). 4

Solution:
Minimum longitudinal reinforcement rule.

Ref: RCC Design – Krishna Raju

---

173. The minimum number of bars in circular column is

1). 4
2). 5
3). 6
4). 8

Correct Answer: 3). 6

Solution:
Circular column requirement.

Ref: RCC Design – Punmia

---

174. The lateral ties in columns are provided to

1). Hold reinforcement in place
2). Prevent buckling of longitudinal bars
3). Provide confinement
4). All of these

Correct Answer: 4). All of these

Solution:
Ties maintain stability of bars.

Ref: RCC Design – Krishna Raju

---

175. The spacing of lateral ties should not exceed

1). Least lateral dimension
2). 16 × bar diameter
3). 300 mm
4). Least of above

Correct Answer: 4). Least of above

Solution:
IS 456 requirement.

Ref: IS 456-2000

---

176. The main purpose of footing is

1). Reduce span
2). Transfer loads safely to soil
3). Increase building height
4). Increase beam strength

Correct Answer: 2). Transfer loads safely to soil

Solution:
Footings distribute loads to soil.

Ref: RCC Design – Punmia

---

177. The footing area is determined from

1). Column load and soil bearing capacity
2). Beam span
3). Slab thickness
4). Concrete grade

Correct Answer: 1). Column load and soil bearing capacity

Solution:

$$Area = \frac{Load}{SBC}$$

Ref: RCC Design – Krishna Raju

---

178. In isolated footing reinforcement is provided

1). One direction
2). Two directions
3). Three directions
4). Circular

Correct Answer: 2). Two directions

Solution:
Footing behaves as two-way slab.

Ref: RCC Design – Punmia

---

179. The maximum bending moment in footing occurs

1). At column face
2). At edge
3). At center
4). At corner

Correct Answer: 1). At column face

Solution:
Critical section for bending.

Ref: RCC Design – Krishna Raju

---

180. The punching shear failure in footing occurs around

1). Beam
2). Column
3). Edge
4). Slab

Correct Answer: 2). Column

Solution:
Shear around column perimeter.

Ref: RCC Design – Punmia

---

181. In working stress method, the basic assumption is

1). Plastic behavior
2). Elastic behavior
3). Ultimate behavior
4). Probabilistic behavior

Correct Answer: 2). Elastic behavior

Solution:
Linear stress-strain assumption.

Ref: RCC Design – Ramamrutham

---

182. In working stress method, stresses are limited to

1). Yield stress
2). Permissible stress
3). Ultimate stress
4). Crushing stress

Correct Answer: 2). Permissible stress

Solution:
Ensures safety.

Ref: RCC Design – Ramamrutham

---

183. The modular ratio represents

1). Strength ratio
2). Area ratio
3). Elastic modulus ratio
4). Stress ratio

Correct Answer: 3). Elastic modulus ratio

Solution:

$$m = \frac{E_s}{E_c}$$

Ref: RCC Design – Krishna Raju

---

184. The modular ratio increases when

1). Steel modulus increases
2). Concrete modulus decreases
3). Both A and B
4). Span increases

Correct Answer: 3). Both A and B

Solution:
Ratio of elastic moduli.

Ref: RCC Design – Krishna Raju

---

185. In WSM, the neutral axis is located by

1). Equilibrium of forces
2). Compatibility of strains
3). Stress distribution
4). All of these

Correct Answer: 4). All of these

Solution:
Combined analysis.

Ref: RCC Design – Ramamrutham

186. The lever arm in WSM is

1). Distance between compression and tension forces
2). Beam span
3). Beam depth
4). Steel diameter

Correct Answer: 1). Distance between compression and tension forces

Solution:
Moment arm for resisting moment.

Ref: RCC Design – Krishna Raju

187. Limit state method considers

1). Collapse safety
2). Serviceability
3). Both
4). Neither

Correct Answer: 3). Both

Solution:
Two limit states.

Ref: RCC Design – Krishna Raju

188. Working stress method is considered

1). More economical
2). Conservative
3). Unsafe
4). Plastic design

Correct Answer: 2). Conservative

Solution:
Higher safety factors.

Ref: RCC Design – Ramamrutham

189. Limit state method provides

1). Higher economy
2). Better material utilization
3). Reliable design
4). All of these

Correct Answer: 4). All of these

Solution:
Advantages of LSM.

Ref: RCC Design – Krishna Raju

---

190. In limit state design the factor of safety is applied to

1). Loads
2). Material strengths
3). Both
4). Neither

Correct Answer: 3). Both

Solution:
Partial safety factors.

Ref: IS 456-2000

---

191. The density of reinforced concrete is approximately

1). 20 kN/m^3
2). 22 kN/m^3
3). 25 kN/m^3
4). 30 kN/m^3

Correct Answer: 3). 25 kN/m^3

Solution:
Standard design value.

Ref: RCC Design – Krishna Raju

---

192. The dead load of slab is calculated using

1). Thickness and density
2). Span
3). Reinforcement area
4). Cover

Correct Answer: 1). Thickness and density

Solution:

$$DL = \gamma \times thickness$$

Ref: RCC Design – Krishna Raju

---

193. Increasing slab thickness will

1). Increase dead load
2). Decrease dead load
3). No change
4). Reduce span

Correct Answer: 1). Increase dead load

Solution:
Dead load proportional to thickness.

Ref: RCC Design – Krishna Raju

---

194. The design of RCC members must satisfy

1). Strength criteria
2). Serviceability criteria
3). Durability criteria
4). All of these

Correct Answer: 4). All of these

Solution:
Comprehensive design requirements.

Ref: IS 456-2000

---

195. The main purpose of reinforcement in concrete is

1). Resist tension
2). Increase compression strength
3). Reduce weight
4). Increase density

Correct Answer: 1). Resist tension

Solution:
Concrete weak in tension.

Ref: RCC Design – Krishna Raju

---

196. Concrete is strong in

1). Tension
2). Compression
3). Shear
4). Torsion

Correct Answer: 2). Compression

Solution:
Primary advantage of concrete.

Ref: RCC Design – Punmia

---

197. Steel reinforcement is strong in

1). Compression only
2). Tension only
3). Both tension and compression
4). Shear only

Correct Answer: 3). Both tension and compression

Solution:
Steel has high tensile strength.

Ref: RCC Design – Krishna Raju

---

198. RCC combines advantages of

1). Concrete only
2). Steel only
3). Concrete and steel
4). Brick and steel

Correct Answer: 3). Concrete and steel

Solution:
Composite action.

Ref: RCC Design – Krishna Raju

---

199. The bond between steel and concrete is due to

1). Adhesion
2). Friction
3). Mechanical interlock
4). All of these

Correct Answer: 4). All of these

Solution:
Bond mechanism.

Ref: RCC Design – Krishna Raju

---

200. Deformed bars improve

1). Bond strength
2). Concrete strength
3). Steel strength
4). Load factor

Correct Answer: 1). Bond strength

Solution:
Ribs increase interlocking.

Ref: RCC Design – Punmia

---

201. The typical yield strength of Fe415 steel is

1). 250 MPa
2). 300 MPa
3). 415 MPa
4). 500 MPa

Correct Answer: 3). 415 MPa

Solution:
Grade designation.

Ref: RCC Design – Krishna Raju

---

202. The grade M25 concrete means

1). 25 MPa compressive strength
2). 25 MPa tensile strength
3). 25 MPa shear strength
4). 25 MPa modulus

Correct Answer: 1). 25 MPa compressive strength

Solution:
Characteristic compressive strength.

Ref: RCC Design – Krishna Raju

---

203. The neutral axis in beam passes through

1). Compression zone
2). Tension zone
3). Zero stress zone
4). Maximum stress zone

Correct Answer: 3). Zero stress zone

Solution:
Stress zero at neutral axis.

Ref: RCC Design – Ramamrutham

---

204. Increasing beam width reduces

1). Shear stress
2). Bending stress
3). Both
4). None

Correct Answer: 3). Both

Solution:
Greater cross-section reduces stresses.

Ref: RCC Design – Krishna Raju

---

205. Increasing beam depth increases

1). Moment capacity
2). Shear capacity
3). Stiffness
4). All of these

Correct Answer: 4). All of these

Solution:
Depth strongly affects strength.

Ref: RCC Design – Krishna Raju

---

206. The span of slab is measured

1). Clear span
2). Center-to-center of supports
3). Effective span
4). All of these

Correct Answer: 3). Effective span

Solution:
Used in design.

Ref: IS 456-2000

---

207. The effective span of slab is

1). Clear span + effective depth
2). Center-to-center support distance
3). Lesser of above two
4). Greater of above two

Correct Answer: 3). Lesser of above two

Solution:
IS 456 rule.

Ref: IS 456-2000

---

208. The cover to reinforcement is measured from

1). Concrete surface to center of bar
2). Concrete surface to outer bar surface
3). Neutral axis
4). Beam center

Correct Answer: 2). Concrete surface to outer bar surface

Solution:
Definition of clear cover.

Ref: IS 456-2000

---

209. Adequate cover is provided to

1). Protect reinforcement from corrosion
2). Provide fire resistance
3). Ensure proper bond
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple functions.

Ref: RCC Design – Krishna Raju

---

210. The spacing of bars affects

1). Bond strength
2). Concrete compaction
3). Crack control
4). All of these

Correct Answer: 4). All of these

Solution:
Proper spacing essential.

Ref: RCC Design – Krishna Raju

---

211. The primary load resisting mechanism in RCC beams is

1). Compression in concrete and tension in steel
2). Compression in steel
3). Tension in concrete
4). Shear in steel

Correct Answer: 1). Compression in concrete and tension in steel

Solution:
Composite action.

Ref: RCC Design – Krishna Raju

---

212. The main design code for RCC in India is

1). IS 456
2). IS 800
3). IS 1893
4). IS 875

Correct Answer: 1). IS 456

Solution:
Indian standard for RCC design.

Ref: IS 456-2000

---

213. IS 456-2000 mainly deals with

1). Steel structures
2). RCC structures
3). Soil mechanics
4). Transportation engineering

Correct Answer: 2). RCC structures

Solution:
Code for plain and reinforced concrete.

Ref: IS 456-2000

---

214. RCC design ensures

1). Structural safety
2). Serviceability
3). Durability
4). All of these

Correct Answer: 4). All of these

Solution:
Objectives of RCC design.

Ref: RCC Design – Krishna Raju

---

215. The ultimate load is generally

1). Equal to working load
2). Greater than working load
3). Less than working load
4). Zero

Correct Answer: 2). Greater than working load

Solution:
Load factors applied.

Ref: RCC Design – Krishna Raju

---

216. The serviceability limit state checks

1). Strength only
2). Deflection and cracking
3). Shear only
4). Torsion only

Correct Answer: 2). Deflection and cracking

Solution:
Ensures usability.

Ref: RCC Design – Krishna Raju

---

217. Excessive deflection in beams causes

1). Structural collapse
2). Cracks in walls and finishes
3). Increase strength
4). No effect

Correct Answer: 2). Cracks in walls and finishes

Solution:
Serviceability problem.

Ref: RCC Design – Krishna Raju

---

218. Cracking in RCC occurs mainly due to

1). Tension
2). Temperature effects
3). Shrinkage
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple factors.

Ref: RCC Design – Krishna Raju

---

219. Reinforcement detailing ensures

1). Proper structural behavior
2). Ease of construction
3). Safety of structure
4). All of these

Correct Answer: 4). All of these

Solution:
Essential for performance.

Ref: RCC Design – Krishna Raju

---

220. The ultimate goal of RCC design is

1). Minimum cost
2). Maximum strength
3). Safe and durable structure
4). Maximum reinforcement

Correct Answer: 3). Safe and durable structure

Solution:
Design objective.

Ref: RCC Design – Krishna Raju

UNIT 6 – SURVEYING

1. Surveying is defined as the science of
1). Measuring earth curvature
2). Determining relative positions of points on earth surface
3). Studying soil properties
4). Designing structures

Correct Answer: 2). Determining relative positions of points on earth surface

Solution:
Surveying determines the **relative horizontal and vertical positions of points** on or near the earth's surface.

Ref: Surveying – B.C. Punmia

---

2. The principle of surveying is

1). Work from large scale to small scale
2). Work from whole to part
3). Work from part to whole
4). Work randomly

Correct Answer: 2). Work from whole to part

Solution:
Main control points are established first and then smaller details are filled in.

Ref: Surveying – B.C. Punmia

---

3. Chain surveying is suitable for

1). Large hilly areas
2). Mountainous regions
3). Small level areas
4). Dense forests

Correct Answer: 3). Small level areas

Solution:
Chain surveying is used where **area is small and terrain is fairly level**.

Ref: Surveying – B.C. Punmia

---

4. The main instrument used in chain surveying is

1). Compass
2). Chain
3). Theodolite
4). Level

Correct Answer: 2). Chain

Solution:
Distances are measured using chain or tape.

Ref: Surveying – B.C. Punmia

---

5. The standard length of metric chain is

1). 10 m
2). 20 m
3). 30 m
4). 40 m

Correct Answer: 2). 20 m

Solution:
Metric chains commonly used are **20 m and 30 m**.

Ref: Surveying – N.N. Basak

---

6. The process of measuring distance with chain is called

1). Chaining
2). Levelling
3). Traversing
4). Plotting

Correct Answer: 1). Chaining

Solution:
Measurement of horizontal distance using chain.

Ref: Surveying – B.C. Punmia

---

7. The arrow used in chain surveying is made of

1). Steel wire
2). Brass
3). Aluminum
4). Wood

Correct Answer: 1). Steel wire

Solution:
Arrows are **steel wires used to mark chain lengths**.

Ref: Surveying – B.C. Punmia

---

8. The number of arrows used in chain surveying is

1). 5
2). 10
3). 15
4). 20

Correct Answer: 2). 10

Solution:
10 arrows are normally supplied with chain.

Ref: Surveying – B.C. Punmia

---

9. The error due to sag in chain measurement is

1). Positive error
2). Negative error
3). Random error
4). No error

Correct Answer: 2). Negative error

Solution:
Sag increases measured length leading to underestimation.

Ref: Surveying – B.C. Punmia

---

10. The correction for temperature is required because

1). Chain expands or contracts
2). Chain becomes weak
3). Chain becomes shorter permanently
4). Chain rusts

Correct Answer: 1). Chain expands or contracts

Solution:
Temperature changes chain length.

Ref: Surveying – B.C. Punmia

---

11. The area of triangle can be calculated using

1). Heron's formula
2). Simpson's rule
3). Trapezoidal rule
4). All of these

Correct Answer: 1). Heron's formula

Solution:

$$Area = \sqrt{s(s-a)(s-b)(s-c)}$$

Ref: Surveying – B.C. Punmia

---

12. Compass surveying is mainly used when

1). Area is small
2). Area is large and undulating
3). Only levelling required
4). Only area calculation required

Correct Answer: 2). Area is large and undulating

Solution:
Compass measures bearings.

Ref: Surveying – N.N. Basak

---

13. The compass used in surveying is

1). Surveyor compass
2). Prismatic compass
3). Magnetic compass
4). All of these

Correct Answer: 4). All of these

Solution:
Different compass types used.

Ref: Surveying – B.C. Punmia

---

14. The bearing measured clockwise from north is called

1). Reduced bearing
2). Whole circle bearing
3). Magnetic bearing
4). True bearing

Correct Answer: 2). Whole circle bearing

Solution:
Measured from **0° to 360°**.

Ref: Surveying – B.C. Punmia

---

15. Reduced bearing is measured from

1). North only
2). South only
3). North or South towards East or West
4). East only

Correct Answer: 3). North or South towards East or West

Solution:
RB ranges **0°–90°**.

Ref: Surveying – B.C. Punmia

---

16. Local attraction in compass surveying occurs due to

1). Magnetic substances near compass
2). Wind
3). Rain
4). Sunlight

Correct Answer: 1). Magnetic substances near compass

Solution:
Metal objects disturb magnetic needle.

Ref: Surveying – B.C. Punmia

---

17. The difference between fore bearing and back bearing is

1). 90°
2). 120°
3). 180°
4). 360°

Correct Answer: 3). 180°

Solution:

$$BB = FB \pm 180^\circ$$

Ref: Surveying – B.C. Punmia

---

18. Levelling is used to determine

1). Horizontal distance
2). Vertical elevation
3). Bearing
4). Area

Correct Answer: 2). Vertical elevation

Solution:
Levelling determines difference in elevation.

Ref: Surveying – N.N. Basak

---

19. The main instrument used in levelling is

1). Compass
2). Level
3). Theodolite
4). Chain

Correct Answer: 2). Level

Solution:
Levelling instrument measures elevation.

Ref: Surveying – B.C. Punmia

---

20. The levelling staff is used to

1). Measure angles
2). Measure height differences
3). Measure bearings
4). Measure slope

Correct Answer: 2). Measure height differences

Solution:
Staff readings determine elevations.

Ref: Surveying – B.C. Punmia

---

21. The line of sight in levelling is called

1). Axis of telescope
2). Line of collimation
3). Horizontal axis
4). Vertical axis

Correct Answer: 2). Line of collimation

Solution:
Line through intersection of crosshairs.

Ref: Surveying – B.C. Punmia

---

22. The difference between backsight and foresight gives

1). Reduced level
2). Height of instrument
3). Rise or fall
4). Error

Correct Answer: 3). Rise or fall

Solution:
Used in rise and fall method.

Ref: Surveying – N.N. Basak

---

23. Contours are lines joining points having

1). Equal elevation
2). Equal slope
3). Equal distance
4). Equal bearing

Correct Answer: 1). Equal elevation

Solution:
Contour lines represent same height.

Ref: Surveying – B.C. Punmia

---

24. Closely spaced contours indicate

1). Flat ground
2). Gentle slope
3). Steep slope
4). Plateau

Correct Answer: 3). Steep slope

Solution:
Small spacing means steep gradient.

Ref: Surveying – B.C. Punmia

---

25. Widely spaced contours indicate

1). Steep slope
2). Gentle slope
3). Vertical cliff
4). Valley

Correct Answer: 2). Gentle slope

Solution:
Large spacing shows mild slope.

Ref: Surveying – B.C. Punmia

---

26. Theodolite is mainly used to measure

1). Distance
2). Horizontal and vertical angles
3). Area
4). Height

Correct Answer: 2). Horizontal and vertical angles

Solution:
Primary function of theodolite.

Ref: Surveying – B.C. Punmia

---

27. The horizontal axis of theodolite is also called

1). Trunnion axis
2). Vertical axis
3). Telescope axis
4). Bubble axis

Correct Answer: 1). Trunnion axis

Solution:
Axis about which telescope rotates.

Ref: Surveying – B.C. Punmia

---

28. The vertical axis of theodolite is used for

1). Horizontal rotation
2). Vertical rotation
3). Distance measurement
4). Levelling

Correct Answer: 1). Horizontal rotation

Solution:
Instrument rotates horizontally.

Ref: Surveying – B.C. Punmia

---

29. The Bowditch rule is used for

1). Levelling errors
2). Traverse adjustment
3). Area calculation
4). Bearing measurement

Correct Answer: 2). Traverse adjustment

Solution:
Corrects latitude and departure errors.

Ref: Surveying – B.C. Punmia

---

30. The principle of tacheometry is based on

1). Optical measurement of distance
2). Magnetic measurement
3). Mechanical measurement
4). Electronic measurement

Correct Answer: 1). Optical measurement of distance

Solution:
Distance determined using stadia intercept.

Ref: Surveying – B.C. Punmia

---

31. The chain survey is based on the principle of
1). Triangulation
2). Traversing
3). Levelling
4). Contouring

Correct Answer: 1). Triangulation

Solution:
Chain surveying divides the area into **a network of triangles** for accurate measurement.

Ref: Surveying – B.C. Punmia

---

32. The line joining two stations in chain surveying is called

1). Baseline
2). Tie line
3). Chain line
4). Check line

Correct Answer: 3). Chain line

Solution:
Chain lines are the **main survey lines** measured in the field.

Ref: Surveying – B.C. Punmia

---

33. A tie line is used to

1). Measure distance between stations
2). Locate interior details
3). Measure slope
4). Determine bearing

Correct Answer: 2). Locate interior details

Solution:
Tie lines help fix interior points in chain surveying.

Ref: Surveying – B.C. Punmia

---

34. A check line is used to

1). Check accuracy of survey
2). Measure slope
3). Measure elevation
4). Measure bearing

Correct Answer: 1). Check accuracy of survey

Solution:
Check lines verify the correctness of triangulation.

Ref: Surveying – B.C. Punmia

---

35. The process of ranging is

1). Fixing intermediate points on a straight line
2). Measuring elevation
3). Measuring angles
4). Measuring slope

Correct Answer: 1). Fixing intermediate points on a straight line

Solution:
Ranging ensures chain lines remain straight.

Ref: Surveying – N.N. Basak

---

36. Ranging can be done by

1). Direct ranging
2). Indirect ranging
3). Both A and B
4). Compass method

Correct Answer: 3). Both A and B

Solution:
Direct and indirect methods are used depending on visibility.

Ref: Surveying – B.C. Punmia

---

37. An obstacle in chaining that prevents chaining but not ranging is

1). River
2). Pond
3). Wall
4). Hill

Correct Answer: 1). River

Solution:
River prevents measurement but line of sight is visible.

Ref: Surveying – B.C. Punmia

---

38. An obstacle preventing both chaining and ranging is

1). River
2). Building
3). Dense forest
4). Wall

Correct Answer: 2). Building

Solution:
Both measurement and visibility blocked.

Ref: Surveying – B.C. Punmia

---

39. The prismatic compass measures

1). Reduced bearing
2). Whole circle bearing
3). True bearing
4). Grid bearing

Correct Answer: 2). Whole circle bearing

Solution:
Measured clockwise from magnetic north.

Ref: Surveying – B.C. Punmia

---

40. The range of whole circle bearing is

1). 0°–90°
2). 0°–180°
3). 0°–360°
4). 0°–270°

Correct Answer: 3). 0°–360°

Solution:
Full circle measurement.

Ref: Surveying – B.C. Punmia

---

41. The back bearing of a line whose fore bearing is 60° is

1). 120°
2). 180°
3). 240°
4). 300°

Correct Answer: 3). 240°

Solution:

$$BB = FB + 180^\circ$$
$$60^\circ + 180^\circ = 240^\circ$$

Ref: Surveying – B.C. Punmia

---

42. If the fore bearing is greater than 180°, back bearing is obtained by

1). Adding 180°
2). Subtracting 180°
3). Multiplying by 2
4). Dividing by 2

Correct Answer: 2). Subtracting 180°

Solution:

$$BB = FB - 180^\circ$$

Ref: Surveying – B.C. Punmia

---

43. Local attraction can be detected when

1). Fore bearing = Back bearing ±180°
2). Fore bearing ≠ Back bearing ±180°
3). Bearings are equal
4). Bearings are zero

Correct Answer: 2). Fore bearing ≠ Back bearing ±180°

Solution:
Difference indicates magnetic disturbance.

Ref: Surveying – B.C. Punmia

---

44. The line joining two survey stations is called

1). Survey line
2). Baseline
3). Chain line
4). All of these

Correct Answer: 4). All of these

Solution:
Different names depending on survey stage.

Ref: Surveying – B.C. Punmia

---

45. In levelling, backsight reading is taken on

1). Change point
2). Benchmark
3). Intermediate point
4). Staff station

Correct Answer: 2). Benchmark

Solution:
Backsight establishes height of instrument.

Ref: Surveying – N.N. Basak

---

46. The foresight reading is taken on

1). Benchmark
2). Change point
3). Starting point
4). Instrument station

Correct Answer: 2). Change point

Solution:
Used before moving instrument.

Ref: Surveying – N.N. Basak

---

47. The height of instrument method is used to determine

1). Reduced level
2). Bearing
3). Distance
4). Area

Correct Answer: 1). Reduced level

Solution:
Common levelling calculation method.

Ref: Surveying – N.N. Basak

---

48. The rise and fall method determines

1). Height differences between points
2). Bearings
3). Distances
4). Angles

Correct Answer: 1). Height differences between points

Solution:
Rise and fall indicates elevation changes.

Ref: Surveying – N.N. Basak

---

49. The arithmetic check in levelling is

1). ΣBS – ΣFS = Last RL – First RL
2). ΣBS + ΣFS = RL
3). ΣRL = ΣBS
4). ΣBS = ΣFS

Correct Answer: 1). ΣBS – ΣFS = Last RL – First RL

Solution:
Used to verify levelling calculations.

Ref: Surveying – N.N. Basak

---

50. Contour interval is

1). Vertical distance between contour lines
2). Horizontal distance between contours
3). Slope of ground
4). Area between contours

Correct Answer: 1). Vertical distance between contour lines

Solution:
Constant vertical spacing.

Ref: Surveying – B.C. Punmia

---

51. Theodolite is mainly used in

1). Chain surveying
2). Compass surveying
3). Precise angle measurement
4). Levelling

Correct Answer: 3). Precise angle measurement

Solution:
Measures horizontal and vertical angles.

Ref: Surveying – B.C. Punmia

---

52. The telescope of theodolite rotates about

1). Vertical axis
2). Horizontal axis
3). Optical axis
4). Level axis

Correct Answer: 2). Horizontal axis

Solution:
Also called trunnion axis.

Ref: Surveying – B.C. Punmia

---

53. The fundamental line of theodolite passing through center of lens and crosshair is

1). Line of collimation
2). Vertical axis
3). Horizontal axis
4). Bubble line

Correct Answer: 1). Line of collimation

Solution:
Defines line of sight.

Ref: Surveying – B.C. Punmia

---

54. Temporary adjustments of theodolite include

1). Centering
2). Levelling
3). Focusing
4). All of these

Correct Answer: 4). All of these

Solution:
Performed before observation.

Ref: Surveying – B.C. Punmia

---

55. Permanent adjustments of theodolite ensure

1). Instrument accuracy
2). Faster measurement
3). Larger survey area
4). Reduced cost

Correct Answer: 1). Instrument accuracy

Solution:
Maintains relationships among fundamental lines.

Ref: Surveying – B.C. Punmia

---

56. In traverse computation, latitude represents

1). North–South component
2). East–West component
3). Vertical component
4). Angular component

Correct Answer: 1). North–South component

Solution:
Latitude indicates northing or southing.

Ref: Surveying – B.C. Punmia

---

57. Departure represents

1). North–South component
2). East–West component
3). Vertical component
4). Angle component

Correct Answer: 2). East–West component

Solution:
Departure indicates easting or westing.

Ref: Surveying – B.C. Punmia

---

58. Bowditch rule is applied when

1). Angles measured precisely
2). Distances and angles measured with equal precision
3). Distances inaccurate
4). Angles inaccurate

Correct Answer: 2). Distances and angles measured with equal precision

Solution:
Also called compass rule.

Ref: Surveying – B.C. Punmia

---

59. Transit rule is used when

1). Angles are more precise than distances
2). Distances more precise than angles
3). Both equal precision
4). Neither measured

Correct Answer: 1). Angles are more precise than distances

Solution:
Transit rule distributes corrections.

Ref: Surveying – B.C. Punmia

---

60. Tacheometry is used to measure

1). Distance and elevation quickly
2). Area only
3). Bearing only
4). Angles only

Correct Answer: 1). Distance and elevation quickly

Solution:
Rapid surveying method using stadia.

Ref: Surveying – B.C. Punmia

---

61. In stadia tacheometry, the distance between stadia hairs is called
1). Stadia interval
2). Stadia constant
3). Staff intercept
4). Stadia factor

Correct Answer: 1). Stadia interval

Solution:
Distance between the upper and lower stadia hairs is known as stadia interval.

Ref: Surveying – B.C. Punmia

---

62. The staff intercept in tacheometry is

1). Distance between two staff readings
2). Distance between stadia hairs
3). Difference between upper and lower staff readings
4). Horizontal distance

Correct Answer: 3). Difference between upper and lower staff readings

Solution:
Staff intercept = upper reading − lower reading.

Ref: Surveying – B.C. Punmia

---

63. The stadia constant is equal to

1). f/i
2). i/f
3). f × i
4). f − i

Correct Answer: 1). f/i

Solution:
Stadia constant is the ratio of focal length to stadia interval.

Ref: Surveying – B.C. Punmia

---

64. In stadia tacheometry, the horizontal distance is given by

1). $D = ks + c$
2). $D = s/k$
3). $D = k/s$
4). $D = s + k$

Correct Answer: 1). $D = ks + c$

Solution:
Standard tacheometric formula.

Ref: Surveying – B.C. Punmia

---

65. The value of multiplying constant (k) in stadia tacheometry is usually

1). 50
2). 75
3). 100
4). 150

Correct Answer: 3). 100

Solution:
Common value for most instruments.

Ref: Surveying – B.C. Punmia

---

66. Tangential tacheometry is used when

1). Stadia hairs are not available
2). Distance very small
3). Distance very large
4). Only bearings measured

Correct Answer: 1). Stadia hairs are not available

Solution:
Uses angular observations.

Ref: Surveying – B.C. Punmia

---

67. The Global Positioning System (GPS) works based on

1). Radio waves
2). Satellite signals
3). Magnetic signals
4). Optical signals

Correct Answer: 2). Satellite signals

Solution:
GPS uses satellites to determine location.

Ref: Advanced Surveying – Satheesh Gopi

---

68. The number of satellites required for GPS positioning is

1). 2
2). 3
3). 4
4). 5

Correct Answer: 3). 4

Solution:
Minimum four satellites required for accurate positioning.

Ref: Advanced Surveying – Satheesh Gopi

---

69. GIS stands for

1). Geographic Information System
2). Global Information System
3). Geographical Internet System
4). Global Index System

Correct Answer: 1). Geographic Information System

Solution:
GIS stores and analyzes spatial data.

Ref: GIS – Kang-tsung Chang

---

70. GIS is mainly used for

1). Spatial data analysis
2). Distance measurement
3). Bearing measurement
4). Levelling

Correct Answer: 1). Spatial data analysis

Solution:
GIS integrates mapping and data analysis.

Ref: GIS – Kang-tsung Chang

---

71. In levelling, the benchmark is

1). Temporary point
2). Reference point with known RL
3). Instrument point
4). Random point

Correct Answer: 2). Reference point with known RL

Solution:
Benchmark has known elevation.

Ref: Surveying – N.N. Basak

---

72. Temporary benchmark is used when

1). Permanent benchmark not available
2). Survey completed
3). Levelling unnecessary
4). Area very large

Correct Answer: 1). Permanent benchmark not available

Solution:
Temporary reference point.

Ref: Surveying – N.N. Basak

---

73. The difference between backsight and foresight is

1). Rise or fall
2). Bearing
3). Distance
4). Angle

Correct Answer: 1). Rise or fall

Solution:
Determines elevation difference.

Ref: Surveying – N.N. Basak

---

74. If backsight is greater than foresight

1). Rise occurs
2). Fall occurs
3). No change
4). Error occurs

Correct Answer: 1). Rise occurs

Solution:
Elevation increases.

Ref: Surveying – N.N. Basak

---

75. If foresight is greater than backsight

1). Rise occurs
2). Fall occurs
3). No change
4). Error occurs

Correct Answer: 2). Fall occurs

Solution:
Elevation decreases.

Ref: Surveying – N.N. Basak

---

76. In contouring, a V-shaped contour indicates

1). Hill
2). Valley
3). Plateau
4). Cliff

Correct Answer: 2). Valley

Solution:
Contours form V-shape pointing upstream.

Ref: Surveying – B.C. Punmia

---

77. Closed contours with higher values inside indicate

1). Valley
2). Hill
3). Plain land
4). Plateau

Correct Answer: 2). Hill

Solution:
Elevation increases toward center.

Ref: Surveying – B.C. Punmia

---

78. Closed contours with lower values inside indicate

1). Hill
2). Valley
3). Depression
4). Ridge

Correct Answer: 3). Depression

Solution:
Depression surrounded by higher land.

Ref: Surveying – B.C. Punmia

---

79. Contour lines never

1). Intersect each other
2). Close on themselves
3). Show elevation
4). Represent slope

Correct Answer: 1). Intersect each other

Solution:
Contours do not cross.

Ref: Surveying – B.C. Punmia

---

80. Very close contour lines represent

1). Gentle slope
2). Steep slope
3). Flat land
4). Plateau

Correct Answer: 2). Steep slope

Solution:
Rapid elevation change.

Ref: Surveying – B.C. Punmia

---

81. In traverse surveying, the sum of interior angles of a closed traverse with n sides is

1). $180(n-2)$
2). $180(n-1)$
3). $90(n-2)$
4). $360(n-2)$

Correct Answer: 1). $180(n-2)$

Solution:
Polygon angle rule.

Ref: Surveying – B.C. Punmia

---

82. The algebraic sum of latitudes in a closed traverse should be

1). Positive
2). Negative
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
Closed traverse condition.

Ref: Surveying – B.C. Punmia

---

83. The algebraic sum of departures in closed traverse should be

1). Zero
2). Positive
3). Negative
4). Maximum

Correct Answer: 1). Zero

Solution:
Ensures closure.

Ref: Surveying – B.C. Punmia

---

84. If traverse does not close perfectly, the difference is called

1). Closing error
2). Survey error
3). Instrument error
4). Observation error

Correct Answer: 1). Closing error

Solution:
Occurs due to measurement inaccuracies.

Ref: Surveying – B.C. Punmia

---

85. Bowditch rule distributes closing error proportional to

1). Length of survey lines
2). Bearings
3). Angles
4). Heights

Correct Answer: 1). Length of survey lines

Solution:
Also called compass rule.

Ref: Surveying – B.C. Punmia

---

86. Transit rule distributes error proportional to

1). Departures and latitudes
2). Length of lines
3). Angles only
4). Bearings only

Correct Answer: 1). Departures and latitudes

Solution:
Transit rule correction.

Ref: Surveying – B.C. Punmia

---

87. In tacheometry, the intercept on staff is measured between

1). Upper and middle hair
2). Middle and lower hair
3). Upper and lower hair
4). Any two hairs

Correct Answer: 3). Upper and lower hair

Solution:
Staff intercept measurement.

Ref: Surveying – B.C. Punmia

---

88. GPS accuracy improves with

1). More satellites
2). Better receivers
3). Correction signals
4). All of these

Correct Answer: 4). All of these

Solution:
Improves positional accuracy.

Ref: Advanced Surveying – Satheesh Gopi

---

89. GIS stores data in the form of

1). Layers
2). Tables
3). Maps
4). All of these

Correct Answer: 4). All of these

Solution:
GIS integrates spatial layers and databases.

Ref: GIS – Kang-tsung Chang

---

90. GIS is widely used in

1). Urban planning
2). Transportation planning
3). Environmental studies
4). All of these

Correct Answer: 4). All of these

Solution:
GIS applications in civil engineering.

Ref: GIS – Kang-tsung Chang

---

91. The reduced level (RL) of a point represents

1). Horizontal distance
2). Elevation of a point relative to datum
3). Bearing of a point
4). Angle of slope

Correct Answer: 2). Elevation of a point relative to datum

Solution:
RL is the height of a point above or below a reference datum.

Ref: Surveying – N.N. Basak

---

92. In levelling, the height of instrument (HI) is

1). RL + BS
2). RL – BS
3). RL + FS
4). RL – FS

Correct Answer: 1). RL + BS

Solution:

$$HI = RL + BS$$

Ref: Surveying – N.N. Basak

---

93. Reduced level using HI method is calculated as

1). RL = HI + FS
2). RL = HI – FS
3). RL = HI + BS
4). RL = FS – HI

Correct Answer: 2). RL = HI – FS

Solution:
Foresight subtracted from HI.

Ref: Surveying – N.N. Basak

---

94. A positive rise indicates

1). Ground slopes downward
2). Ground slopes upward
3). No change in elevation
4). Error in levelling

Correct Answer: 2). Ground slopes upward

Solution:
Rise means elevation increase.

Ref: Surveying – N.N. Basak

---

95. A fall in levelling indicates

1). Increase in elevation
2). Decrease in elevation
3). No change
4). Instrument error

Correct Answer: 2). Decrease in elevation

Solution:
Fall means reduction in RL.

Ref: Surveying – N.N. Basak

---

96. The bubble tube in levelling instrument ensures

1). Vertical line
2). Horizontal line of sight
3). Distance measurement
4). Bearing measurement

Correct Answer: 2). Horizontal line of sight

Solution:
Bubble centered ensures horizontal alignment.

Ref: Surveying – B.C. Punmia

---

97. The line tangential to the level surface is called

1). Horizontal line
2). Vertical line
3). Slope line
4). Datum line

Correct Answer: 1). Horizontal line

Solution:
Basic levelling definition.

Ref: Surveying – B.C. Punmia

---

98. The vertical line passes through

1). Horizon
2). Center of earth
3). Telescope axis
4). Bubble tube

Correct Answer: 2). Center of earth

Solution:
Direction of gravity.

Ref: Surveying – B.C. Punmia

---

99. The line joining equal RL points forms

1). Chain line
2). Contour line
3). Tie line
4). Check line

Correct Answer: 2). Contour line

Solution:
Contour definition.

Ref: Surveying – B.C. Punmia

---

100. A ridge line on contour map appears as

1). V shape pointing downhill
2). V shape pointing uphill
3). Circle
4). Straight line

Correct Answer: 1). V shape pointing downhill

Solution:
Ridge contour pattern.

Ref: Surveying – B.C. Punmia

---

101. Theodolite can measure

1). Horizontal angles
2). Vertical angles
3). Both horizontal and vertical angles
4). Distance only

Correct Answer: 3). Both horizontal and vertical angles

Solution:
Primary function of theodolite.

Ref: Surveying – B.C. Punmia

---

102. The process of measuring horizontal angles using theodolite is called

1). Traversing
2). Ranging
3). Theodolite surveying
4). Levelling

Correct Answer: 3). Theodolite surveying

Solution:
Used for precise angle measurements.

Ref: Surveying – B.C. Punmia

---

103. The vertical circle of theodolite is used for

1). Horizontal angles
2). Vertical angles
3). Distance
4). Bearing

Correct Answer: 2). Vertical angles

Solution:
Measures elevation or depression.

Ref: Surveying – B.C. Punmia

---

104. The horizontal circle measures

1). Horizontal angles
2). Vertical angles
3). Distances
4). Elevations

Correct Answer: 1). Horizontal angles

Solution:
Graduated circle for horizontal measurement.

Ref: Surveying – B.C. Punmia

---

105. Temporary adjustments of theodolite include

1). Centering
2). Levelling
3). Focusing
4). All of these

Correct Answer: 4). All of these

Solution:
Performed before taking readings.

Ref: Surveying – B.C. Punmia

---

106. The principle of tacheometry is

1). Optical measurement of distance
2). Magnetic measurement
3). Mechanical measurement
4). Electrical measurement

Correct Answer: 1). Optical measurement of distance

Solution:
Distance obtained using stadia intercept.

Ref: Surveying – B.C. Punmia

---

107. In stadia tacheometry, the horizontal distance is proportional to

1). Staff intercept
2). Angle of elevation
3). Chain length
4). Bearing

Correct Answer: 1). Staff intercept

Solution:

$$D = ks + c$$

Ref: Surveying – B.C. Punmia

---

108. The additive constant (c) in stadia method is

1). f + d
2). f – d
3). f/i
4). i/f

Correct Answer: 1). f + d

Solution:
Depends on instrument construction.

Ref: Surveying – B.C. Punmia

---

109. GPS determines position using

1). Triangulation
2). Trilateration
3). Levelling
4). Traversing

Correct Answer: 2). Trilateration

Solution:
Distances from satellites determine position.

Ref: Advanced Surveying – Satheesh Gopi

---

110. GPS coordinates are expressed as

1). Latitude and longitude
2). Bearing and distance
3). Elevation only
4). Angle only

Correct Answer: 1). Latitude and longitude

Solution:
Geographical coordinate system.

Ref: Advanced Surveying – Satheesh Gopi

---

111. GIS data is represented in

1). Vector format
2). Raster format
3). Both vector and raster
4). Analog format

Correct Answer: 3). Both vector and raster

Solution:
GIS uses two major data models.

Ref: GIS – Kang-tsung Chang

---

112. Vector data represents

1). Points, lines and polygons
2). Images
3). Elevation grid
4). Photographs

Correct Answer: 1). Points, lines and polygons

Solution:
Used for precise mapping.

Ref: GIS – Kang-tsung Chang

---

113. Raster data represents

1). Continuous surfaces
2). Points only
3). Lines only
4). Angles

Correct Answer: 1). Continuous surfaces

Solution:
Used for elevation and imagery.

Ref: GIS – Kang-tsung Chang

---

114. A GIS buffer operation is used to

1). Create zone around features
2). Measure elevation
3). Measure bearing
4). Measure slope

Correct Answer: 1). Create zone around features

Solution:
Common spatial analysis tool.

Ref: GIS – Kang-tsung Chang

---

115. GIS overlay operation is used to

1). Combine spatial layers
2). Measure distance
3). Measure slope
4). Measure bearing

Correct Answer: 1). Combine spatial layers

Solution:
Overlay integrates datasets.

Ref: GIS – Kang-tsung Chang

---

116. Remote sensing is the science of

1). Collecting information without physical contact
2). Measuring distance using chains
3). Levelling ground
4). Measuring angles

Correct Answer: 1). Collecting information without physical contact

Solution:
Uses satellite imagery.

Ref: Advanced Surveying – Satheesh Gopi

---

117. Satellite imagery used in GIS comes from

1). Earth observation satellites
2). Weather satellites
3). Communication satellites
4). All of these

Correct Answer: 4). All of these

Solution:
Various satellite sources.

Ref: GIS – Kang-tsung Chang

---

118. GPS is widely used in

1). Navigation
2). Mapping
3). Surveying
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple engineering applications.

Ref: Advanced Surveying – Satheesh Gopi

---

119. Differential GPS improves

1). Position accuracy
2). Distance measurement
3). Bearing measurement
4). Elevation measurement

Correct Answer: 1). Position accuracy

Solution:
Correction signals improve accuracy.

Ref: Advanced Surveying – Satheesh Gopi

---

120. GIS helps engineers in

1). Urban planning
2). Transportation planning
3). Environmental management
4). All of these

Correct Answer: 4). All of these

Solution:
Major civil engineering applications.

Ref: GIS – Kang-tsung Chang

---

121. The smallest unit of raster data is

1). Pixel
2). Vector
3). Node
4). Vertex

Correct Answer: 1). Pixel

Solution:
Raster images consist of pixels.

Ref: GIS – Kang-tsung Chang

---

122. A node in GIS represents

1). End point of line
2). Pixel value
3). Height point
4). Angle measurement

Correct Answer: 1). End point of line

Solution:
Vector geometry component.

Ref: GIS – Kang-tsung Chang

---

123. The intersection of two contour lines indicates

1). Error in drawing
2). Steep slope
3). Valley
4). Hill

Correct Answer: 1). Error in drawing

Solution:
Contours never intersect.

Ref: Surveying – B.C. Punmia

---

124. Contours crossing a stream form

1). V shape pointing upstream
2). V shape pointing downstream
3). Circle
4). Straight line

Correct Answer: 1). V shape pointing upstream

Solution:
Indicates valley.

Ref: Surveying – B.C. Punmia

---

125. A plateau is represented by

1). Closed contours
2). Flat area surrounded by contours
3). Straight contours
4). Random contours

Correct Answer: 2). Flat area surrounded by contours

Solution:
High flat land.

Ref: Surveying – B.C. Punmia

---

126. The contour interval is constant for

1). Entire map
2). Small region only
3). Large region only
4). Sloping area only

Correct Answer: 1). Entire map

Solution:
Maintained constant.

Ref: Surveying – B.C. Punmia

---

127. The closer the contour lines, the

1). Steeper the slope
2). Gentler the slope
3). Lower the elevation
4). Higher the elevation

Correct Answer: 1). Steeper the slope

Solution:
Small spacing = steep terrain.

Ref: Surveying – B.C. Punmia

---

128. Widely spaced contours represent

1). Gentle slope
2). Steep slope
3). Valley
4). Cliff

Correct Answer: 1). Gentle slope

Solution:
Slow elevation change.

Ref: Surveying – B.C. Punmia

---

129. Contours that form concentric circles indicate

1). Hill
2). Valley
3). Ridge
4). Plain

Correct Answer: 1). Hill

Solution:
Elevation increases inward.

Ref: Surveying – B.C. Punmia

---

130. A depression contour is indicated by

1). Hachures inside contour
2). Straight contour
3). Broken contour
4). Thick contour

Correct Answer: 1). Hachures inside contour

Solution:
Marks depression.

Ref: Surveying – B.C. Punmia

---

131. Surveying helps engineers in

1). Planning
2). Designing
3). Construction
4). All of these

Correct Answer: 4). All of these

Solution:
Surveying essential in all stages.

Ref: Surveying – B.C. Punmia

---

132. The first step in any civil engineering project is

1). Surveying
2). Design
3). Construction
4). Cost estimation

Correct Answer: 1). Surveying

Solution:
Site data collection.

Ref: Surveying – B.C. Punmia

---

133. Surveying is essential for

1). Land measurement
2). Route alignment
3). Construction layout
4). All of these

Correct Answer: 4). All of these

Solution:
Major engineering applications.

Ref: Surveying – B.C. Punmia

---

134. The most modern surveying technique is

1). Chain surveying
2). Compass surveying
3). GPS surveying
4). Plane table surveying

Correct Answer: 3). GPS surveying

Solution:
Satellite-based surveying.

Ref: Advanced Surveying – Satheesh Gopi

---

135. GIS integrates

1). Spatial data
2). Attribute data
3). Mapping tools
4). All of these

Correct Answer: 4). All of these

Solution:
Comprehensive geospatial system.

Ref: GIS – Kang-tsung Chang

---

136. Digital elevation model (DEM) represents

1). Terrain elevation
2). Soil data
3). Land use
4). Road network

Correct Answer: 1). Terrain elevation

Solution:
Raster representation of elevation.

Ref: GIS – Kang-tsung Chang

---

137. Survey data accuracy depends on

1). Instrument precision
2). Observer skill
3). Measurement method
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple factors influence accuracy.

Ref: Surveying – B.C. Punmia

---

138. Errors in surveying may be

1). Systematic errors
2). Random errors
3). Personal errors
4). All of these

Correct Answer: 4). All of these

Solution:
Surveying error classification.

Ref: Surveying – B.C. Punmia

---

139. Systematic errors occur due to

1). Instrument imperfections
2). Environmental conditions
3). Incorrect procedures
4). All of these

Correct Answer: 4). All of these

Solution:
Predictable errors.

Ref: Surveying – B.C. Punmia

---

140. Random errors occur due to

1). Observer limitations
2). Environmental variations
3). Instrument limitations
4). All of these

Correct Answer: 4). All of these

Solution:
Unpredictable errors.

Ref: Surveying – B.C. Punmia

---

141. Personal errors occur due to

1). Human mistakes
2). Instrument faults
3). Environmental effects
4). Calculation errors

Correct Answer: 1). Human mistakes

Solution:
Carelessness or misreading.

Ref: Surveying – B.C. Punmia

---

142. Proper training of surveyor helps reduce

1). Personal errors
2). Systematic errors
3). Random errors
4). All errors

Correct Answer: 1). Personal errors

Solution:
Skill improves accuracy.

Ref: Surveying – B.C. Punmia

---

143. Survey accuracy improves with

1). Better instruments
2). Careful observations
3). Repeated measurements
4). All of these

Correct Answer: 4). All of these

Solution:
Standard surveying practice.

Ref: Surveying – B.C. Punmia

---

144. Modern surveying instruments include

1). Total station
2). GPS receiver
3). Digital level
4). All of these

Correct Answer: 4). All of these

Solution:
Advanced surveying tools.

Ref: Advanced Surveying – Satheesh Gopi

---

145. Total station combines

1). Electronic theodolite
2). Electronic distance meter
3). Computer processing
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated surveying instrument.

Ref: Advanced Surveying – Satheesh Gopi

---

146. EDM stands for

1). Electronic Distance Measurement
2). Electrical Distance Meter
3). Electronic Data Measurement
4). Electrical Data Meter

Correct Answer: 1). Electronic Distance Measurement

Solution:
Distance measured using electromagnetic waves.

Ref: Advanced Surveying – Satheesh Gopi

---

147. The most accurate modern surveying instrument is

1). Chain
2). Compass
3). Total station
4). Tape

Correct Answer: 3). Total station

Solution:
Provides precise digital measurements.

Ref: Advanced Surveying – Satheesh Gopi

---

148. Remote sensing data is captured using

1). Satellites
2). Aircraft
3). Drones
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple platforms used.

Ref: Advanced Surveying – Satheesh Gopi

---

149. Surveying is essential for

1). Land acquisition
2). Route surveys
3). Construction layout
4). All of these

Correct Answer: 4). All of these

Solution:
Broad civil engineering use.

Ref: Surveying – B.C. Punmia

---

150. The ultimate objective of surveying is

1). Accurate mapping of earth surface
2). Distance measurement
3). Angle measurement
4). Height measurement

Correct Answer: 1). Accurate mapping of earth surface

Solution:
Surveying provides reliable spatial data for engineering projects.

Ref: Surveying – B.C. Punmia

UNIT – 7 & 8 HYDRAULICS

---

1. The mass density of a fluid is defined as

1). Weight per unit volume
2). Mass per unit volume
3). Weight per unit area
4). Mass per unit area

Correct Answer: 2). Mass per unit volume

Solution:

$$\rho = \frac{m}{V}$$

Density is the mass contained in a unit volume of fluid.

Ref: Fluid Mechanics – R.K. Bansal

---

2. Specific weight of a fluid is defined as

1). Weight per unit volume
2). Mass per unit volume
3). Weight per unit area
4). Mass per unit area

Correct Answer: 1). Weight per unit volume

Solution:

$$\gamma = \frac{W}{V}$$

Ref: Fluid Mechanics – R.K. Bansal

---

3. Specific gravity is the ratio of

1). Density of fluid to density of water
2). Weight of fluid to weight of air
3). Density of water to density of fluid
4). Volume of fluid to volume of water

Correct Answer: 1). Density of fluid to density of water

Solution:

$$SG = \frac{\rho}{\rho_w}$$

Ref: Fluid Mechanics – R.K. Bansal

---

4. Surface tension is measured in

1). N/m
2). N/m^2
3). N
4). kg/m^3

Correct Answer: 1). N/m

Solution:
Surface tension is **force per unit length**.

Ref: Fluid Mechanics – P.N. Modi & Seth

---

5. Capillarity is caused due to

1). Gravity
2). Surface tension
3). Pressure
4). Density

Correct Answer: 2). Surface tension

Solution:
Capillary rise occurs due to surface tension.

Ref: Fluid Mechanics – R.K. Bansal

---

6. The SI unit of viscosity is

1). $N \cdot s/m^2$
2). N/m^2

3). m^2/s
4). kg/m^2

Correct Answer: 1). $N \cdot s/m^2$

Solution:
Dynamic viscosity unit.

Ref: Fluid Mechanics – R.K. Bansal

---

7. Kinematic viscosity is defined as

1). μ/ρ
2). ρ/μ
3). $\mu \times \rho$
4). μ^2/ρ

Correct Answer: 1). μ/ρ

Solution:

$$\nu = \frac{\mu}{\rho}$$

Ref: Fluid Mechanics – R.K. Bansal

---

8. Atmospheric pressure at sea level is approximately

1). 50 kPa
2). 101.3 kPa
3). 200 kPa
4). 500 kPa

Correct Answer: 2). 101.3 kPa

Solution:
Standard atmospheric pressure.

Ref: Fluid Mechanics – Khurmi

---

9. Gauge pressure is defined as

1). Absolute pressure minus atmospheric pressure
2). Atmospheric pressure minus absolute pressure
3). Sum of pressures
4). Zero pressure

Correct Answer: 1). Absolute pressure minus atmospheric pressure

Solution:

$$P_g = P_{abs} - P_{atm}$$

Ref: Fluid Mechanics – R.K. Bansal

---

10. Absolute pressure is

1). Gauge pressure + atmospheric pressure
2). Gauge pressure – atmospheric pressure
3). Atmospheric pressure only
4). Vacuum pressure

Correct Answer: 1). Gauge pressure + atmospheric pressure

Solution:

$$P_{abs} = P_g + P_{atm}$$

Ref: Fluid Mechanics – R.K. Bansal

---

11. The pressure exerted by a liquid at rest is

1). Dynamic pressure
2). Hydrostatic pressure
3). Atmospheric pressure
4). Gauge pressure

Correct Answer: 2). Hydrostatic pressure

Solution:

$$P = \rho g h$$

Ref: Fluid Mechanics – R.K. Bansal

---

12. The centre of pressure lies

1). Above centroid
2). At centroid
3). Below centroid
4). At surface

Correct Answer: 3). Below centroid

Solution:
Pressure increases with depth.

Ref: Fluid Mechanics – P.N. Modi & Seth

---

13. A piezometer measures

1). Velocity
2). Pressure head
3). Discharge
4). Density

Correct Answer: 2). Pressure head

Solution:
Simple device for pressure measurement.

Ref: Fluid Mechanics – Khurmi

---

14. A manometer measures

1). Pressure difference
2). Velocity
3). Discharge
4). Area

Correct Answer: 1). Pressure difference

Solution:
Uses liquid columns.

Ref: Fluid Mechanics – R.K. Bansal

15. Flow in which velocity does not change with time is

1). Steady flow
2). Unsteady flow
3). Uniform flow
4). Turbulent flow

Correct Answer: 1). Steady flow

Solution:
Velocity constant with time.

Ref: Fluid Mechanics – R.K. Bansal

16. Flow in which velocity varies with time is

1). Uniform flow
2). Steady flow
3). Unsteady flow
4). Laminar flow

Correct Answer: 3). Unsteady flow

Solution:
Time dependent flow.

Ref: Fluid Mechanics – R.K. Bansal

17. Laminar flow occurs when Reynolds number is

1). < 2000
2). 2000–4000
3). > 4000
4). > 10000

Correct Answer: 1). < 2000

Solution:
Laminar flow regime.

Ref: Fluid Mechanics – R.K. Bansal

18. Turbulent flow occurs when Reynolds number is

1). < 2000
2). 2000–4000
3). > 4000
4). < 1000

Correct Answer: 3). > 4000

Solution:
Highly mixed flow.

Ref: Fluid Mechanics – R.K. Bansal

---

19. Continuity equation is based on

1). Conservation of energy
2). Conservation of mass
3). Conservation of momentum
4). Newton's law

Correct Answer: 2). Conservation of mass

Solution:

$$A_1V_1 = A_2V_2$$

Ref: Fluid Mechanics – R.K. Bansal

---

20. Bernoulli's theorem is based on

1). Conservation of mass
2). Conservation of energy
3). Newton's law
4). Momentum principle

Correct Answer: 2). Conservation of energy

Solution:

$$\frac{P}{\gamma} + \frac{V^2}{2g} + z = constant$$

Ref: Fluid Mechanics – R.K. Bansal

---

21. Pitot tube is used to measure

1). Pressure
2). Velocity of flow
3). Discharge
4). Density

Correct Answer: 2). Velocity of flow

Solution:
Measures stagnation pressure.

Ref: Fluid Mechanics – R.K. Bansal

---

22. Venturimeter measures

1). Velocity
2). Discharge
3). Pressure
4). Density

Correct Answer: 2). Discharge

Solution:
Based on Bernoulli's principle.

Ref: Fluid Mechanics – R.K. Bansal

---

23. The coefficient of discharge is defined as

1). Actual discharge / theoretical discharge
2). Theoretical discharge / actual discharge
3). Velocity / area
4). Pressure / area

Correct Answer: 1). Actual discharge / theoretical discharge

Solution:

$$C_d = \frac{Q_a}{Q_t}$$

Ref: Fluid Mechanics – R.K. Bansal

---

24. The coefficient of velocity is

1). Actual velocity / theoretical velocity
2). Theoretical velocity / actual velocity
3). Velocity / area
4). Discharge / area

Correct Answer: 1). Actual velocity / theoretical velocity

Solution:

$$C_v = \frac{V_a}{V_t}$$

Ref: Fluid Mechanics – R.K. Bansal

---

25. The coefficient of contraction is

1). Jet area / orifice area
2). Orifice area / jet area
3). Velocity ratio
4). Pressure ratio

Correct Answer: 1). Jet area / orifice area

Solution:

$$C_c = \frac{A_j}{A_o}$$

Ref: Fluid Mechanics – R.K. Bansal

---

26. The relation between coefficients is

1). Cd = Cv / Cc
2). Cd = Cc × Cv

3). Cd = Cv – Cc
4). Cd = Cc + Cv

Correct Answer: 2). Cd = Cc × Cv

Solution:
Standard relation.

Ref: Fluid Mechanics – R.K. Bansal

---

27. A notch is used to measure

1). Pressure
2). Discharge in open channels
3). Velocity
4). Density

Correct Answer: 2). Discharge in open channels

Solution:
Used in small channels.

Ref: Fluid Mechanics – Modi & Seth

---

28. The triangular notch is also called

1). V-notch
2). U-notch
3). Square notch
4). Rectangular notch

Correct Answer: 1). V-notch

Solution:
Triangular opening.

Ref: Fluid Mechanics – R.K. Bansal

---

29. Weirs are generally used for

1). Measuring large discharge
2). Measuring small discharge

3). Measuring pressure
4). Measuring velocity

Correct Answer: 1). Measuring large discharge

Solution:
Used across rivers or canals.

Ref: Fluid Mechanics – R.K. Bansal

---

30. A sharp crested weir has

1). Thick crest
2). Thin crest
3). Rounded crest
4). Wide crest

Correct Answer: 2). Thin crest

Solution:
Water springs clear of crest.

Ref: Fluid Mechanics – R.K. Bansal

---

31. The theoretical velocity of flow through an orifice under head $H$is given by
1). $V = \sqrt{gH}$
2). $V = \sqrt{2gH}$
3). $V = gH$
4). $V = H^2$

Correct Answer: 2). $V = \sqrt{2gH}$

Solution:
From **Torricelli's theorem**:

$$V = \sqrt{2gH}$$

Ref: Fluid Mechanics – R.K. Bansal

---

32. The discharge through an orifice is

1). $Q = AV$
2). $Q = A/V$
3). $Q = V/A$
4). $Q = A + V$

Correct Answer: 1). $Q = AV$

Solution:

$$Q = Area \times Velocity$$

Ref: Fluid Mechanics – R.K. Bansal

---

33. The coefficient of discharge for an orifice is usually

1). 0.2
2). 0.4
3). 0.6
4). 1.0

Correct Answer: 3). 0.6

Solution:
Typical value for sharp-edged orifice.

Ref: Fluid Mechanics – R.K. Bansal

---

34. When the orifice is fully submerged, it is called

1). Free orifice
2). Submerged orifice
3). Partially submerged orifice
4). Circular orifice

Correct Answer: 2). Submerged orifice

Solution:
Both sides of orifice under water.

Ref: Fluid Mechanics – Modi & Seth

35. The coefficient of velocity for an orifice is approximately

1). 0.6
2). 0.7
3). 0.8
4). 0.98

Correct Answer: 4). 0.98

Solution:
Velocity losses are small.

Ref: Fluid Mechanics – R.K. Bansal

36. The coefficient of contraction is approximately

1). 0.2
2). 0.62
3). 0.80
4). 1.0

Correct Answer: 2). 0.62

Solution:
Typical contraction coefficient.

Ref: Fluid Mechanics – R.K. Bansal

37. The vena contracta is

1). Point of maximum velocity
2). Point of minimum jet area
3). Point of maximum pressure
4). Point of zero velocity

Correct Answer: 2). Point of minimum jet area

Solution:
Jet contracts after leaving orifice.

Ref: Fluid Mechanics – R.K. Bansal

38. External mouthpieces are used to

1). Increase discharge
2). Reduce pressure
3). Reduce velocity
4). Reduce discharge

Correct Answer: 1). Increase discharge

Solution:
Mouthpieces increase effective discharge.

Ref: Fluid Mechanics – R.K. Bansal

---

39. The discharge over rectangular notch is proportional to

1). $H^{1/2}$
2). $H^{3/2}$
3). H^2
4). H^3

Correct Answer: 2). $H^{3/2}$

Solution:

$$Q \propto H^{3/2}$$

Ref: Fluid Mechanics – R.K. Bansal

---

40. The discharge over triangular notch varies as

1). H^2
2). $H^{5/2}$
3). $H^{3/2}$
4). H

Correct Answer: 2). $H^{5/2}$

Solution:
Standard V-notch relation.

Ref: Fluid Mechanics – R.K. Bansal

---

41. A weir differs from a notch because

1). Notch is small structure
2). Weir is used in large channels
3). Both A and B
4). Neither

Correct Answer: 3). Both A and B

Solution:
Notches for small flow measurement.

Ref: Fluid Mechanics – R.K. Bansal

---

42. Francis formula is used for

1). Rectangular weir discharge
2). Pipe flow
3). Pump efficiency
4). Turbine power

Correct Answer: 1). Rectangular weir discharge

Solution:
Standard discharge equation.

Ref: Fluid Mechanics – Modi & Seth

---

43. Bazin's formula is related to

1). Pipe flow
2). Weir discharge
3). Orifice flow
4). Pump efficiency

Correct Answer: 2). Weir discharge

Solution:
Used in weir calculations.

Ref: Fluid Mechanics – Modi & Seth

---

44. Flow through pipes experiences

1). Major losses
2). Minor losses
3). Both A and B
4). No losses

Correct Answer: 3). Both A and B

Solution:
Losses due to friction and fittings.

Ref: Fluid Mechanics – R.K. Bansal

---

45. Major loss in pipe flow occurs due to

1). Pipe friction
2). Pipe bends
3). Pipe valves
4). Pipe entry

Correct Answer: 1). Pipe friction

Solution:
Friction loss dominates.

Ref: Fluid Mechanics – R.K. Bansal

---

46. Minor losses occur due to

1). Bends
2). Valves
3). Pipe entrance
4). All of these

Correct Answer: 4). All of these

Solution:
Local disturbances.

Ref: Fluid Mechanics – R.K. Bansal

---

47. Darcy-Weisbach equation is used to calculate

1). Velocity
2). Head loss due to friction
3). Pressure
4). Discharge

Correct Answer: 2). Head loss due to friction

Solution:

$$h_f = \frac{fLV^2}{2gD}$$

Ref: Fluid Mechanics – R.K. Bansal

---

48. Chezy's formula is used in

1). Pipe flow
2). Open channel flow
3). Pump flow
4). Turbine flow

Correct Answer: 2). Open channel flow

Solution:

$$V = C\sqrt{RS}$$

Ref: Fluid Mechanics – Modi & Seth

---

49. Manning's equation is used to calculate

1). Velocity in open channels
2). Velocity in pipes
3). Pump discharge
4). Turbine efficiency

Correct Answer: 1). Velocity in open channels

Solution:

$$V = \frac{1}{n} R^{2/3} S^{1/2}$$

Ref: Fluid Mechanics – Modi & Seth

---

50. Reynolds number is given by

1). VD/ν
2). V/ν
3). D/ν
4). V^2/D

Correct Answer: 1). VD/ν

Solution:

$$Re = \frac{VD}{\nu}$$

Ref: Fluid Mechanics – R.K. Bansal

---

51. Hydraulic Gradient Line (HGL) represents

1). Pressure head line
2). Energy line
3). Velocity line
4). Elevation line

Correct Answer: 1). Pressure head line

Solution:
Represents piezometric head.

Ref: Fluid Mechanics – Khurmi

---

52. Total Energy Line (TEL) represents

1). Pressure energy only
2). Total energy of fluid
3). Velocity only
4). Elevation only

Correct Answer: 2). Total energy of fluid

Solution:

$$TEL = \frac{P}{\gamma} + \frac{V^2}{2g} + z$$

Ref: Fluid Mechanics – Khurmi

---

53. The TEL is always

1). Above HGL
2). Below HGL
3). Same as HGL
4). Parallel to ground

Correct Answer: 1). Above HGL

Solution:
Velocity head separates TEL and HGL.

Ref: Fluid Mechanics – Khurmi

---

54. In laminar flow the velocity profile is

1). Parabolic
2). Linear
3). Circular
4). Random

Correct Answer: 1). Parabolic

Solution:
Laminar flow distribution.

Ref: Fluid Mechanics – R.K. Bansal

---

55. In turbulent flow the velocity distribution is

1). Uniform
2). Irregular

3). Parabolic
4). Linear

Correct Answer: 2). Irregular

Solution:
Turbulent mixing occurs.

Ref: Fluid Mechanics – R.K. Bansal

---

56. The most economical rectangular channel section occurs when

1). b = 2y
2). b = y
3). b = 3y
4). b = y/2

Correct Answer: 1). b = 2y

Solution:
Width = twice depth.

Ref: Fluid Mechanics – Modi & Seth

---

57. The most economical trapezoidal channel occurs when

1). Hydraulic radius maximum
2). Wetted perimeter minimum
3). Both A and B
4). None

Correct Answer: 3). Both A and B

Solution:
Condition for maximum efficiency.

Ref: Fluid Mechanics – Modi & Seth

---

58. Centrifugal pumps work on the principle of

1). Centrifugal force
2). Gravity

3). Atmospheric pressure
4). Surface tension

Correct Answer: 1). Centrifugal force

Solution:
Rotating impeller imparts energy.

Ref: Fluid Mechanics – R.K. Bansal

---

59. The purpose of draft tube in turbine is

1). Increase turbine efficiency
2). Reduce pressure
3). Increase speed
4). Reduce discharge

Correct Answer: 1). Increase turbine efficiency

Solution:
Recovers kinetic energy.

Ref: Fluid Mechanics – R.K. Bansal

---

60. Pelton turbine is classified as

1). Reaction turbine
2). Impulse turbine
3). Mixed flow turbine
4). Axial turbine

Correct Answer: 2). Impulse turbine

Solution:
Operates with high head water jet.

Ref: Fluid Mechanics – R.K. Bansal

---

61. The hydraulic radius is defined as
1). Area / Wetted perimeter
2). Wetted perimeter / Area
3). Velocity / Area
4). Discharge / Area

Correct Answer: 1). Area / Wetted perimeter

Solution:

$$R = \frac{A}{P}$$

Where
A = Area of flow
P = Wetted perimeter

Ref: Fluid Mechanics – R.K. Bansal

---

62. Wetted perimeter is defined as

1). Total boundary in contact with fluid
2). Total cross-sectional area
3). Surface area of water
4). Surface area of channel

Correct Answer: 1). Total boundary in contact with fluid

Solution:
Channel boundary touching water.

Ref: Fluid Mechanics – P.N. Modi & Seth

---

63. The hydraulic mean depth is another name for

1). Hydraulic radius
2). Hydraulic diameter
3). Velocity head
4). Pressure head

Correct Answer: 1). Hydraulic radius

Solution:
Both represent **A/P**.

Ref: Fluid Mechanics – R.K. Bansal

---

64. The Chezy constant depends on

1). Roughness of channel
2). Hydraulic radius
3). Slope
4). All of these

Correct Answer: 4). All of these

Solution:
C varies with channel conditions.

Ref: Fluid Mechanics – Modi & Seth

---

65. In Manning's equation, n represents

1). Roughness coefficient
2). Velocity coefficient
3). Discharge coefficient
4). Friction factor

Correct Answer: 1). Roughness coefficient

Solution:
Represents surface roughness.

Ref: Fluid Mechanics – Modi & Seth

---

66. Manning's equation is

1). $V = C\sqrt{RS}$
2). $V = \frac{1}{n}R^{2/3}S^{1/2}$
3). $V = \sqrt{2gH}$
4). $V = AV$

Correct Answer: 2). $V = \frac{1}{n}R^{2/3}S^{1/2}$

Solution:
Used for open channel velocity.

Ref: Fluid Mechanics – Modi & Seth

---

67. The slope used in Manning's equation represents

1). Bed slope
2). Energy slope
3). Channel slope
4). Water surface slope

Correct Answer: 2). Energy slope

Solution:
Slope of energy grade line.

Ref: Fluid Mechanics – Modi & Seth

---

68. Flow in open channel occurs due to

1). Pressure difference
2). Gravity
3). Pumping action
4). Atmospheric pressure

Correct Answer: 2). Gravity

Solution:
Driven by gravitational force.

Ref: Fluid Mechanics – R.K. Bansal

---

69. In open channel flow, pressure is

1). Atmospheric pressure
2). Hydrostatic pressure
3). Dynamic pressure
4). Gauge pressure

Correct Answer: 2). Hydrostatic pressure

Solution:
Pressure distribution is hydrostatic.

Ref: Fluid Mechanics – R.K. Bansal

---

70. Specific energy of flowing liquid is

1). Potential energy + velocity energy
2). Pressure energy only
3). Kinetic energy only
4). Potential energy only

Correct Answer: 1). Potential energy + velocity energy

Solution:

$$E = y + \frac{V^2}{2g}$$

Ref: Fluid Mechanics – R.K. Bansal

---

71. A rectangular channel is most economical when

1). Width = 2 × depth
2). Width = depth
3). Width = 3 × depth
4). Width = depth/2

Correct Answer: 1). Width = 2 × depth

Solution:
Minimum wetted perimeter condition.

Ref: Fluid Mechanics – Modi & Seth

---

72. In trapezoidal channel the most economical section occurs when

1). Half top width = sloping side
2). Hydraulic radius maximum
3). Wetted perimeter minimum
4). Both 2 and 3

Correct Answer: 4). Both 2 and 3

Solution:
Most efficient flow section.

Ref: Fluid Mechanics – Modi & Seth

---

73. Major loss in pipe flow increases with

1). Pipe length
2). Velocity of flow
3). Friction factor
4). All of these

Correct Answer: 4). All of these

Solution:

$$h_f = \frac{fLV^2}{2gD}$$

Ref: Fluid Mechanics – R.K. Bansal

---

74. Minor losses occur due to

1). Pipe bends
2). Pipe valves
3). Pipe expansion and contraction
4). All of these

Correct Answer: 4). All of these

Solution:
Local disturbances in flow.

Ref: Fluid Mechanics – R.K. Bansal

---

75. The head loss due to sudden enlargement is

1). $(V_1 - V_2)^2/2g$
2). $V^2/2g$
3). $V_1^2/2g$
4). $V_2^2/2g$

Correct Answer: 1). $(V_1 - V_2)^2/2g$

Solution:
Energy loss due to expansion.

Ref: Fluid Mechanics – R.K. Bansal

76. The head loss due to sudden contraction is

1). $V^2/2g$
2). $KV^2/2g$
3). V^2/g
4). $2V^2/g$

Correct Answer: 2). $KV^2/2g$

Solution:
K = loss coefficient.

Ref: Fluid Mechanics – R.K. Bansal

77. Hydraulic Gradient Line represents

1). Pressure head + elevation head
2). Total energy head
3). Velocity head
4). Pressure head only

Correct Answer: 1). Pressure head + elevation head

Solution:

$$HGL = \frac{P}{\gamma} + z$$

Ref: Fluid Mechanics – Khurmi

78. Total Energy Line represents

1). Pressure head
2). Velocity head
3). Total energy head
4). Elevation head

Correct Answer: 3). Total energy head

Solution:

$$TEL = \frac{P}{\gamma} + \frac{V^2}{2g} + z$$

Ref: Fluid Mechanics – Khurmi

---

79. In pipe flow TEL is always

1). Above HGL
2). Below HGL
3). Equal to HGL
4). Parallel to ground

Correct Answer: 1). Above HGL

Solution:
Difference equals velocity head.

Ref: Fluid Mechanics – Khurmi

---

80. The efficiency of centrifugal pump depends on

1). Hydraulic efficiency
2). Mechanical efficiency
3). Volumetric efficiency
4). All of these

Correct Answer: 4). All of these

Solution:
Total efficiency = product of all efficiencies.

Ref: Fluid Mechanics – R.K. Bansal

---

81. The impeller of centrifugal pump is used to

1). Increase pressure of water
2). Increase velocity of water
3). Increase discharge
4). All of these

Correct Answer: 4). All of these

Solution:
Rotating impeller transfers energy.

Ref: Fluid Mechanics – R.K. Bansal

---

82. The casing of centrifugal pump is used to

1). Convert velocity energy into pressure energy
2). Reduce velocity
3). Increase discharge
4). Increase suction head

Correct Answer: 1). Convert velocity energy into pressure energy

Solution:
Diffuser converts kinetic energy.

Ref: Fluid Mechanics – R.K. Bansal

---

83. Priming in centrifugal pump means

1). Removing air from pump and suction pipe
2). Increasing pump speed
3). Filling water tank
4). Reducing pressure

Correct Answer: 1). Removing air from pump and suction pipe

Solution:
Necessary before starting pump.

Ref: Fluid Mechanics – R.K. Bansal

---

84. Pelton turbine is used for

1). Low head
2). Medium head
3). High head
4). Very low head

Correct Answer: 3). High head

Solution:
Impulse turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

85. Francis turbine is used for

1). High head
2). Medium head
3). Low head
4). Very low head

Correct Answer: 2). Medium head

Solution:
Reaction turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

86. Kaplan turbine is used for

1). High head
2). Medium head
3). Low head
4). Very high head

Correct Answer: 3). Low head

Solution:
Axial flow reaction turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

87. Draft tube is used in

1). Pelton turbine
2). Reaction turbines
3). Pumps only
4). Orifices

Correct Answer: 2). Reaction turbines

Solution:
Used in Francis and Kaplan turbines.

Ref: Fluid Mechanics – R.K. Bansal

---

88. Draft tube converts

1). Pressure energy to kinetic energy
2). Kinetic energy to pressure energy
3). Potential energy to kinetic energy
4). Mechanical energy to pressure energy

Correct Answer: 2). Kinetic energy to pressure energy

Solution:
Improves turbine efficiency.

Ref: Fluid Mechanics – R.K. Bansal

---

89. Hydro-electric power plants convert

1). Chemical energy to electrical energy
2). Hydraulic energy to electrical energy
3). Mechanical energy to chemical energy
4). Thermal energy to electrical energy

Correct Answer: 2). Hydraulic energy to electrical energy

Solution:
Water energy drives turbines.

Ref: Fluid Mechanics – Modi & Seth

---

90. Major components of hydroelectric plant include

1). Dam
2). Turbine
3). Generator
4). All of these

Correct Answer: 4). All of these

Solution:
Essential components.

Ref: Fluid Mechanics – R.K. Bansal

---

91. According to Bernoulli's theorem, the total energy of a flowing fluid remains
1). Increasing
2). Decreasing
3). Constant
4). Zero

Correct Answer: 3). Constant

Solution:
For ideal fluid flow:

$$\frac{P}{\gamma} + \frac{V^2}{2g} + z = constant$$

Ref: Fluid Mechanics – R.K. Bansal

---

92. The pressure head of a fluid is given by

1). P/γ
2). $V^2/2g$
3). z
4). PV

Correct Answer: 1). P/γ

Solution:
Pressure energy per unit weight.

Ref: Fluid Mechanics – R.K. Bansal

---

93. Velocity head of flowing liquid is

1). V/g
2). $V^2/2g$
3). $2g/V$
4). V^2/g

Correct Answer: 2). $V^2/2g$

Solution:
Represents kinetic energy.

Ref: Fluid Mechanics – R.K. Bansal

---

94. Elevation head represents

1). Pressure energy
2). Potential energy
3). Kinetic energy
4). Mechanical energy

Correct Answer: 2). Potential energy

Solution:
Height above datum.

Ref: Fluid Mechanics – R.K. Bansal

---

95. The Venturimeter works on the principle of

1). Pascal's law
2). Bernoulli's theorem
3). Archimedes principle
4). Newton's law

Correct Answer: 2). Bernoulli's theorem

Solution:
Pressure difference used to calculate discharge.

Ref: Fluid Mechanics – R.K. Bansal

---

96. The smallest section of venturimeter is called

1). Inlet
2). Throat
3). Outlet
4). Diffuser

Correct Answer: 2). Throat

Solution:
Velocity maximum at throat.

Ref: Fluid Mechanics – R.K. Bansal

---

97. The coefficient of discharge of venturimeter is approximately

1). 0.6
2). 0.75
3). 0.98
4). 1.5

Correct Answer: 3). 0.98

Solution:
Venturimeter is highly accurate.

Ref: Fluid Mechanics – R.K. Bansal

---

98. Pitot tube measures

1). Static pressure
2). Velocity of fluid
3). Discharge
4). Density

Correct Answer: 2). Velocity of fluid

Solution:
Measures stagnation pressure.

Ref: Fluid Mechanics – R.K. Bansal

---

99. Pitot tube is based on

1). Bernoulli's theorem
2). Pascal's law
3). Newton's law
4). Archimedes principle

Correct Answer: 1). Bernoulli's theorem

Solution:
Velocity obtained from pressure difference.

Ref: Fluid Mechanics – R.K. Bansal

---

100. Flow through large orifice depends on

1). Head of liquid
2). Area of orifice
3). Coefficient of discharge
4). All of these

Correct Answer: 4). All of these

Solution:

$$Q = C_d A\sqrt{2gH}$$

Ref: Fluid Mechanics – R.K. Bansal

---

101. Discharge through rectangular notch is given by

1). $Q = C_d b\sqrt{2g}H^{3/2}$
2). $Q = AV$
3). $Q = C_d A\sqrt{2gH}$
4). $Q = V^2/g$

Correct Answer: 1). $Q = C_d b\sqrt{2g}H^{3/2}$

Solution:
Standard formula.

Ref: Fluid Mechanics – R.K. Bansal

---

102. Discharge through triangular notch depends on

1). Head only
2). Angle only
3). Head and notch angle
4). Area only

Correct Answer: 3). Head and notch angle

Solution:
V-notch formula.

Ref: Fluid Mechanics – R.K. Bansal

---

103. A broad crested weir has

1). Narrow crest
2). Wide crest
3). Sharp crest
4). Curved crest

Correct Answer: 2). Wide crest

Solution:
Flow remains attached.

Ref: Fluid Mechanics – Modi & Seth

---

104. Sharp crested weir produces

1). Free falling jet
2). Attached flow
3). No flow
4). Laminar flow

Correct Answer: 1). Free falling jet

Solution:
Water springs clear.

Ref: Fluid Mechanics – Modi & Seth

---

105. Flow in pipes is mainly affected by

1). Pipe diameter
2). Pipe length
3). Roughness of pipe
4). All of these

Correct Answer: 4). All of these

Solution:
Affect friction loss.

Ref: Fluid Mechanics – R.K. Bansal

---

106. Head loss due to pipe friction is proportional to

1). Pipe length
2). Square of velocity
3). Inversely proportional to pipe diameter
4). All of these

Correct Answer: 4). All of these

Solution:

$$h_f = \frac{fLV^2}{2gD}$$

Ref: Fluid Mechanics – R.K. Bansal

---

107. Reynolds number indicates

1). Flow regime
2). Pipe roughness
3). Pressure loss
4). Pipe diameter

Correct Answer: 1). Flow regime

Solution:
Laminar or turbulent classification.

Ref: Fluid Mechanics – R.K. Bansal

---

108. Flow in open channels is classified as

1). Uniform flow
2). Non-uniform flow
3). Steady flow
4). All of these

Correct Answer: 4). All of these

Solution:
Different flow types.

Ref: Fluid Mechanics – Modi & Seth

---

109. Uniform flow means

1). Velocity constant along channel
2). Velocity changes along channel
3). Pressure constant
4). Depth constant

Correct Answer: 1). Velocity constant along channel

Solution:
Depth and velocity constant.

Ref: Fluid Mechanics – Modi & Seth

---

110. Non-uniform flow means

1). Velocity constant
2). Velocity changes with distance
3). Pressure constant
4). Depth constant

Correct Answer: 2). Velocity changes with distance

Solution:
Occurs in gradually varied flow.

Ref: Fluid Mechanics – Modi & Seth

---

111. In open channel flow the driving force is

1). Gravity
2). Pressure
3). Pump
4). Wind

Correct Answer: 1). Gravity

Solution:
Slope creates flow.

Ref: Fluid Mechanics – Modi & Seth

---

112. The specific energy of flow is minimum at

1). Critical depth
2). Maximum depth
3). Minimum velocity
4). Maximum velocity

Correct Answer: 1). Critical depth

Solution:
Specific energy curve property.

Ref: Fluid Mechanics – R.K. Bansal

---

113. Hydraulic jump occurs in

1). Subcritical flow
2). Supercritical flow
3). Transition from supercritical to subcritical
4). Laminar flow

Correct Answer: 3). Transition from supercritical to subcritical

Solution:
Energy dissipation phenomenon.

Ref: Fluid Mechanics – R.K. Bansal

---

114. Hydraulic jump is useful for

1). Energy dissipation
2). Increasing velocity
3). Increasing discharge
4). Increasing pressure

Correct Answer: 1). Energy dissipation

Solution:
Used in spillways.

Ref: Fluid Mechanics – Modi & Seth

---

115. The power developed by turbine depends on

1). Head
2). Discharge
3). Efficiency
4). All of these

Correct Answer: 4). All of these

Solution:

$$P = \rho g Q H \eta$$

Ref: Fluid Mechanics – R.K. Bansal

---

116. The unit of discharge is

1). m^3/s
2). m/s
3). kg/m^3
4). N/m^2

Correct Answer: 1). m^3/s

Solution:
Volume flow rate.

Ref: Fluid Mechanics – R.K. Bansal

---

117. Hydraulic turbines convert

1). Mechanical energy to hydraulic energy
2). Hydraulic energy to mechanical energy
3). Electrical energy to hydraulic energy
4). Thermal energy to mechanical energy

Correct Answer: 2). Hydraulic energy to mechanical energy

Solution:
Water energy drives turbine runner.

Ref: Fluid Mechanics – R.K. Bansal

---

118. Pelton wheel is suitable for

1). Low head high discharge
2). High head low discharge
3). Medium head medium discharge
4). Very low head

Correct Answer: 2). High head low discharge

Solution:
Impulse turbine application.

Ref: Fluid Mechanics – R.K. Bansal

---

119. Kaplan turbine is

1). Impulse turbine
2). Reaction turbine
3). Cross flow turbine
4). Mixed flow turbine

Correct Answer: 2). Reaction turbine

Solution:
Axial flow turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

120. Francis turbine is

1). Impulse turbine
2). Reaction turbine
3). Cross flow turbine
4). Axial turbine

Correct Answer: 2). Reaction turbine

Solution:
Mixed flow reaction turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

121. The theoretical discharge through an orifice is given by

1). $Q = A\sqrt{2gH}$
2). $Q = C_d A\sqrt{2gH}$
3). $Q = AV$
4). $Q = H^2$

Correct Answer: 1). $Q = A\sqrt{2gH}$

Solution:
This is the **theoretical discharge equation** derived from Torricelli's theorem.

Ref: Fluid Mechanics – R.K. Bansal

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122. The actual discharge through an orifice is

1). $Q = A\sqrt{2gH}$
2). $Q = C_d A\sqrt{2gH}$
3). $Q = V^2/2g$
4). $Q = AV$

Correct Answer: 2). $Q = C_d A\sqrt{2gH}$

Solution:
Coefficient of discharge accounts for losses.

Ref: Fluid Mechanics – R.K. Bansal

---

123. The vena contracta occurs

1). At the orifice
2). Just outside the orifice
3). Far from the orifice
4). Inside the tank

Correct Answer: 2). Just outside the orifice

Solution:
Jet contracts after leaving orifice.

Ref: Fluid Mechanics – R.K. Bansal

---

124. For a rectangular notch, discharge is proportional to

1). $H^{3/2}$
2). $H^{5/2}$
3). H^2
4). H

Correct Answer: 1). $H^{3/2}$

Solution:
Standard rectangular notch relation.

Ref: Fluid Mechanics – R.K. Bansal

---

125. For a triangular notch, discharge is proportional to

1). $H^{3/2}$
2). $H^{5/2}$
3). H^2
4). H

Correct Answer: 2). $H^{5/2}$

Solution:
Characteristic V-notch relation.

Ref: Fluid Mechanics – R.K. Bansal

---

126. Notches are generally used for

1). Large discharge measurement
2). Small discharge measurement
3). Pressure measurement
4). Velocity measurement

Correct Answer: 2). Small discharge measurement

Solution:
Common in laboratory channels.

Ref: Fluid Mechanics – R.K. Bansal

---

127. Weirs are generally used for

1). Large discharge measurement
2). Small discharge measurement
3). Velocity measurement
4). Pressure measurement

Correct Answer: 1). Large discharge measurement

Solution:
Used across rivers or canals.

Ref: Fluid Mechanics – Modi & Seth

---

128. Head loss in pipes increases with

1). Increase in velocity
2). Increase in pipe length
3). Decrease in pipe diameter
4). All of these

Correct Answer: 4). All of these

Solution:
All parameters affect friction loss.

Ref: Fluid Mechanics – R.K. Bansal

---

129. In Darcy–Weisbach equation, f represents

1). Friction factor
2). Flow factor
3). Velocity factor
4). Roughness coefficient

Correct Answer: 1). Friction factor

Solution:
Dimensionless pipe friction factor.

Ref: Fluid Mechanics – R.K. Bansal

---

130. Hydraulic Gradient Line indicates

1). Pressure head + elevation head
2). Velocity head
3). Energy head
4). Total head

Correct Answer: 1). Pressure head + elevation head

Solution:

$$HGL = \frac{P}{\gamma} + z$$

Ref: Fluid Mechanics – Khurmi

---

131. The difference between TEL and HGL equals

1). Velocity head
2). Pressure head
3). Elevation head
4). Friction loss

Correct Answer: 1). Velocity head

Solution:

$$TEL - HGL = \frac{V^2}{2g}$$

Ref: Fluid Mechanics – Khurmi

---

132. Hydraulic jump occurs when

1). Velocity increases suddenly
2). Supercritical flow changes to subcritical flow
3). Pressure decreases suddenly
4). Depth decreases suddenly

Correct Answer: 2). Supercritical flow changes to subcritical flow

Solution:
Sudden rise in water depth.

Ref: Fluid Mechanics – R.K. Bansal

---

133. Hydraulic jump is useful for

1). Increasing velocity
2). Energy dissipation
3). Increasing pressure
4). Increasing discharge

Correct Answer: 2). Energy dissipation

Solution:
Used downstream of spillways.

Ref: Fluid Mechanics – Modi & Seth

---

134. Reynolds number depends on

1). Velocity
2). Diameter
3). Kinematic viscosity
4). All of these

Correct Answer: 4). All of these

Solution:

$$Re = \frac{VD}{\nu}$$

Ref: Fluid Mechanics – R.K. Bansal

135. If Reynolds number is 5000, the flow is

1). Laminar
2). Turbulent
3). Transition
4). Steady

Correct Answer: 2). Turbulent

Solution:
Re > 4000 indicates turbulent flow.

Ref: Fluid Mechanics – R.K. Bansal

136. In laminar flow, head loss varies as

1). Velocity
2). $Velocity^2$
3). $Velocity^3$
4). $Velocity^4$

Correct Answer: 1). Velocity

Solution:
Laminar flow relationship.

Ref: Fluid Mechanics – R.K. Bansal

137. In turbulent flow, head loss varies as

1). Velocity
2). $Velocity^2$
3). $Velocity^3$
4). $Velocity^4$

Correct Answer: 2). $Velocity^2$

Solution:
Turbulent friction law.

Ref: Fluid Mechanics – R.K. Bansal

138. Open channel flow occurs when

1). Flow has free surface
2). Flow under pressure
3). Flow inside pipe
4). Flow in vacuum

Correct Answer: 1). Flow has free surface

Solution:
Examples: canals and rivers.

Ref: Fluid Mechanics – Modi & Seth

---

139. The most economical rectangular channel occurs when

1). Width = 2 × depth
2). Width = depth
3). Width = 3 × depth
4). Width = depth/2

Correct Answer: 1). Width = 2 × depth

Solution:
Hydraulic radius maximum.

Ref: Fluid Mechanics – Modi & Seth

---

140. Wetted perimeter of rectangular channel is

1). $b + 2y$
2). $b + y$
3). $2b + y$
4). $b + 3y$

Correct Answer: 1). $b + 2y$

Solution:
Two sides and bottom in contact.

Ref: Fluid Mechanics – Modi & Seth

---

141. The unit of hydraulic radius is

1). Meter
2). m^2
3). m^3
4). m/s

Correct Answer: 1). Meter

Solution:

$$R = \frac{Area}{Perimeter}$$

Ref: Fluid Mechanics – R.K. Bansal

---

142. The slope used in Chezy's formula represents

1). Bed slope
2). Energy slope
3). Channel slope
4). Water surface slope

Correct Answer: 2). Energy slope

Solution:
Energy gradient.

Ref: Fluid Mechanics – Modi & Seth

---

143. Centrifugal pumps are used to

1). Lift water to higher levels
2). Increase pressure
3). Supply water in pipelines
4). All of these

Correct Answer: 4). All of these

Solution:
Common water lifting device.

Ref: Fluid Mechanics – R.K. Bansal

144. The main part of centrifugal pump is

1). Impeller
2). Casing
3). Shaft
4). All of these

Correct Answer: 4). All of these

Solution:
Essential pump components.

Ref: Fluid Mechanics – R.K. Bansal

145. Turbines convert

1). Mechanical energy into hydraulic energy
2). Hydraulic energy into mechanical energy
3). Electrical energy into mechanical energy
4). Thermal energy into electrical energy

Correct Answer: 2). Hydraulic energy into mechanical energy

Solution:
Water drives turbine runner.

Ref: Fluid Mechanics – R.K. Bansal

146. Kaplan turbine is suitable for

1). High head
2). Medium head
3). Low head
4). Very high head

Correct Answer: 3). Low head

Solution:
Axial flow turbine.

Ref: Fluid Mechanics – R.K. Bansal

147. Francis turbine is

1). Impulse turbine
2). Reaction turbine
3). Cross flow turbine
4). Axial turbine

Correct Answer: 2). Reaction turbine

Solution:
Mixed flow reaction turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

148. Pelton wheel works on

1). Reaction principle
2). Impulse principle
3). Pressure principle
4). Vacuum principle

Correct Answer: 2). Impulse principle

Solution:
Water jet strikes buckets.

Ref: Fluid Mechanics – R.K. Bansal

---

149. Draft tube increases

1). Velocity of water
2). Turbine efficiency
3). Pressure loss
4). Discharge

Correct Answer: 2). Turbine efficiency

Solution:
Recovers kinetic energy.

Ref: Fluid Mechanics – R.K. Bansal

---

150. Hydroelectric plants convert

1). Hydraulic energy into electrical energy
2). Mechanical energy into hydraulic energy
3). Thermal energy into electrical energy
4). Chemical energy into mechanical energy

Correct Answer: 1). Hydraulic energy into electrical energy

Solution:
Water turbines drive generators.

Ref: Fluid Mechanics – R.K. Bansal

---

151. The discharge through a pipe is given by
1). $Q = AV$
2). $Q = A/V$
3). $Q = V/A$
4). $Q = A + V$

Correct Answer: 1). $Q = AV$

Solution:
Discharge is the product of area and velocity.

Ref: Fluid Mechanics – R.K. Bansal

---

152. If pipe diameter increases, discharge

1). Decreases
2). Increases
3). Remains constant
4). Becomes zero

Correct Answer: 2). Increases

Solution:
Larger cross-sectional area increases discharge.

Ref: Fluid Mechanics – R.K. Bansal

---

153. The hydraulic gradient line always slopes in the direction of

1). Flow
2). Opposite to flow
3). Vertical direction
4). Horizontal direction

Correct Answer: 1). Flow

Solution:
Energy gradually decreases along flow.

Ref: Fluid Mechanics – Khurmi

---

154. The velocity head is

1). V/g
2). $V^2/2g$
3). $2g/V$
4). V^2/g

Correct Answer: 2). $V^2/2g$

Solution:
Represents kinetic energy of flowing fluid.

Ref: Fluid Mechanics – R.K. Bansal

---

155. The difference between total energy line and hydraulic gradient line equals

1). Pressure head
2). Velocity head
3). Elevation head
4). Friction head

Correct Answer: 2). Velocity head

Solution:

$$TEL - HGL = \frac{V^2}{2g}$$

Ref: Fluid Mechanics – Khurmi

156. A pipe flowing full behaves as

1). Open channel
2). Closed conduit
3). Free surface flow
4). Gravity flow

Correct Answer: 2). Closed conduit

Solution:
Flow under pressure.

Ref: Fluid Mechanics – R.K. Bansal

157. When pipe diameter decreases, velocity

1). Decreases
2). Increases
3). Remains same
4). Becomes zero

Correct Answer: 2). Increases

Solution:
From continuity equation.

Ref: Fluid Mechanics – R.K. Bansal

158. In a venturimeter the pressure is minimum at

1). Inlet
2). Throat
3). Outlet
4). Pipe wall

Correct Answer: 2). Throat

Solution:
Velocity maximum at throat.

Ref: Fluid Mechanics – R.K. Bansal

159. In a pitot tube the stagnation pressure occurs when

1). Velocity becomes zero
2). Velocity becomes maximum
3). Pressure becomes zero
4). Pressure becomes constant

Correct Answer: 1). Velocity becomes zero

Solution:
Fluid brought to rest.

Ref: Fluid Mechanics – R.K. Bansal

---

160. The coefficient of discharge of mouthpiece is approximately

1). 0.62
2). 0.70
3). 0.85
4). 0.98

Correct Answer: 3). 0.85

Solution:
Higher than simple orifice.

Ref: Fluid Mechanics – R.K. Bansal

---

161. A submerged orifice discharges under

1). Constant head difference
2). Atmospheric pressure
3). Zero pressure
4). Vacuum pressure

Correct Answer: 1). Constant head difference

Solution:
Both sides submerged.

Ref: Fluid Mechanics – R.K. Bansal

---

162. The crest of a weir is

1). Bottom of weir
2). Top edge of weir
3). Side wall of weir
4). Base of channel

Correct Answer: 2). Top edge of weir

Solution:
Water flows over crest.

Ref: Fluid Mechanics – Modi & Seth

---

163. A broad crested weir behaves similar to

1). Open channel
2). Pipe flow
3). Orifice flow
4). Jet flow

Correct Answer: 1). Open channel

Solution:
Flow follows channel profile.

Ref: Fluid Mechanics – Modi & Seth

---

164. Head loss in pipes is mainly due to

1). Friction
2). Velocity
3). Pressure
4). Density

Correct Answer: 1). Friction

Solution:
Major loss source.

Ref: Fluid Mechanics – R.K. Bansal

---

165. The unit of viscosity is

1). $N \cdot s/m^2$
2). N/m^2
3). kg/m^3
4). m/s

Correct Answer: 1). $N \cdot s/m^2$

Solution:
SI unit of dynamic viscosity.

Ref: Fluid Mechanics – R.K. Bansal

---

166. Specific weight is expressed as

1). N/m^3
2). N/m^2
3). kg/m^3
4). m^3/s

Correct Answer: 1). N/m^3

Solution:

$$\gamma = \rho g$$

Ref: Fluid Mechanics – R.K. Bansal

---

167. Surface tension is measured in

1). N/m
2). N/m^2
3). kg/m^3
4). m^2/s

Correct Answer: 1). N/m

Solution:
Force per unit length.

Ref: Fluid Mechanics – R.K. Bansal

---

168. Capillary rise occurs due to

1). Surface tension
2). Gravity
3). Density
4). Pressure

Correct Answer: 1). Surface tension

Solution:
Liquid rises in small tubes.

Ref: Fluid Mechanics – R.K. Bansal

---

169. Atmospheric pressure is measured using

1). Barometer
2). Manometer
3). Piezometer
4). Pitot tube

Correct Answer: 1). Barometer

Solution:
Standard pressure measuring instrument.

Ref: Fluid Mechanics – Khurmi

---

170. Gauge pressure is

1). Pressure above atmospheric pressure
2). Pressure below atmospheric pressure
3). Absolute pressure
4). Vacuum pressure

Correct Answer: 1). Pressure above atmospheric pressure

Solution:

$$P_g = P_{abs} - P_{atm}$$

Ref: Fluid Mechanics – R.K. Bansal

---

171. If Reynolds number is 1500, the flow is

1). Turbulent
2). Laminar
3). Transition
4). Steady

Correct Answer: 2). Laminar

Solution:
Re < 2000.

Ref: Fluid Mechanics – R.K. Bansal

---

172. If Reynolds number is 3000, the flow is

1). Laminar
2). Turbulent
3). Transition
4). Steady

Correct Answer: 3). Transition

Solution:
2000–4000 transition region.

Ref: Fluid Mechanics – R.K. Bansal

---

173. If Reynolds number is 6000, the flow is

1). Laminar
2). Turbulent
3). Transition
4). Uniform

Correct Answer: 2). Turbulent

Solution:
Re > 4000.

Ref: Fluid Mechanics – R.K. Bansal

---

174. The specific energy in open channel flow is

1). Potential + kinetic energy
2). Pressure energy only
3). Kinetic energy only
4). Potential energy only

Correct Answer: 1). Potential + kinetic energy

Solution:

$$E = y + \frac{V^2}{2g}$$

Ref: Fluid Mechanics – R.K. Bansal

---

175. Critical depth occurs when

1). Specific energy minimum
2). Velocity minimum
3). Pressure maximum
4). Depth maximum

Correct Answer: 1). Specific energy minimum

Solution:
Important flow condition.

Ref: Fluid Mechanics – R.K. Bansal

---

176. Hydraulic jump causes

1). Energy loss
2). Energy gain
3). No change in energy
4). Increase in velocity

Correct Answer: 1). Energy loss

Solution:
Energy dissipated by turbulence.

Ref: Fluid Mechanics – Modi & Seth

177. Hydraulic jump is commonly used in

1). Spillways
2). Canal falls
3). Energy dissipation structures
4). All of these

Correct Answer: 4). All of these

Solution:
Protects downstream structures.

Ref: Fluid Mechanics – Modi & Seth

178. Centrifugal pump imparts energy using

1). Rotating impeller
2). Gravity
3). Pressure difference
4). Surface tension

Correct Answer: 1). Rotating impeller

Solution:
Impeller adds kinetic energy.

Ref: Fluid Mechanics – R.K. Bansal

179. Pump efficiency is

1). Output power / input power
2). Input power / output power
3). Discharge / head
4). Velocity / pressure

Correct Answer: 1). Output power / input power

Solution:
Efficiency definition.

Ref: Fluid Mechanics – R.K. Bansal

180. Francis turbine operates under

1). Low head
2). Medium head
3). Very high head
4). Zero head

Correct Answer: 2). Medium head

Solution:
Most widely used reaction turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

181. Pelton turbine operates under

1). Low head
2). Medium head
3). High head
4). Zero head

Correct Answer: 3). High head

Solution:
Impulse turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

182. Kaplan turbine operates under

1). High head
2). Medium head
3). Low head
4). Very high head

Correct Answer: 3). Low head

Solution:
Axial flow reaction turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

183. Kaplan turbine runner blades are

1). Fixed
2). Adjustable
3). Stationary
4). Rigid

Correct Answer: 2). Adjustable

Solution:
Improves efficiency.

Ref: Fluid Mechanics – R.K. Bansal

---

184. The draft tube is placed

1). Before turbine
2). After turbine
3). Inside turbine
4). Above turbine

Correct Answer: 2). After turbine

Solution:
Connected to turbine outlet.

Ref: Fluid Mechanics – R.K. Bansal

---

185. Draft tube increases

1). Velocity
2). Pressure recovery
3). Discharge
4). Head loss

Correct Answer: 2). Pressure recovery

Solution:
Converts kinetic energy.

Ref: Fluid Mechanics – R.K. Bansal

---

186. Hydroelectric power plant converts

1). Hydraulic energy into electrical energy
2). Electrical energy into hydraulic energy
3). Mechanical energy into thermal energy
4). Chemical energy into mechanical energy

Correct Answer: 1). Hydraulic energy into electrical energy

Solution:
Water drives turbine and generator.

Ref: Fluid Mechanics – R.K. Bansal

---

187. Major component of hydroelectric plant is

1). Dam
2). Turbine
3). Generator
4). All of these

Correct Answer: 4). All of these

Solution:
Essential components.

Ref: Fluid Mechanics – R.K. Bansal

---

188. Water stored in dam possesses

1). Potential energy
2). Kinetic energy
3). Mechanical energy
4). Thermal energy

Correct Answer: 1). Potential energy

Solution:
Due to height.

Ref: Fluid Mechanics – R.K. Bansal

---

189. Turbine converts

1). Hydraulic energy into mechanical energy
2). Mechanical energy into hydraulic energy
3). Electrical energy into hydraulic energy
4). Thermal energy into hydraulic energy

Correct Answer: 1). Hydraulic energy into mechanical energy

Solution:
Water energy drives runner.

Ref: Fluid Mechanics – R.K. Bansal

---

190. Generator converts

1). Mechanical energy into electrical energy
2). Electrical energy into mechanical energy
3). Hydraulic energy into electrical energy
4). Thermal energy into mechanical energy

Correct Answer: 1). Mechanical energy into electrical energy

Solution:
Coupled to turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

191. The SI unit of discharge is

1). m^3/s
2). m/s
3). N/m^2
4). kg/m^3

Correct Answer: 1). m^3/s

Solution:
Volume flow rate.

Ref: Fluid Mechanics – R.K. Bansal

---

192. Flow velocity is measured in

1). m/s
2). m^3/s
3). N/m^2
4). kg/m^3

Correct Answer: 1). m/s

Solution:
Speed of fluid particles.

Ref: Fluid Mechanics – R.K. Bansal

---

193. Hydraulic head is measured in

1). Meter
2). Meter/second
3). N/m^2
4). kg/m^3

Correct Answer: 1). Meter

Solution:
Height of water column.

Ref: Fluid Mechanics – R.K. Bansal

---

194. Pressure head equals

1). P/γ
2). $V^2/2g$
3). z
4). P/V

Correct Answer: 1). P/γ

Solution:
Pressure energy per unit weight.

Ref: Fluid Mechanics – R.K. Bansal

---

195. Velocity head equals

1). V/g
2). $V^2/2g$
3). V^2/g
4). $2g/V$

Correct Answer: 2). $V^2/2g$

Solution:
Represents kinetic energy.

Ref: Fluid Mechanics – R.K. Bansal

---

196. Elevation head equals

1). Height above datum
2). Velocity head
3). Pressure head
4). Discharge

Correct Answer: 1). Height above datum

Solution:
Potential energy component.

Ref: Fluid Mechanics – R.K. Bansal

---

197. Total head equals

1). Pressure head
2). Velocity head
3). Elevation head
4). Sum of all heads

Correct Answer: 4). Sum of all heads

Solution:

$$H = \frac{P}{\gamma} + \frac{V^2}{2g} + z$$

Ref: Fluid Mechanics – R.K. Bansal

198. Bernoulli's equation applies to

1). Ideal fluid flow
2). Viscous flow
3). Turbulent flow
4). Laminar flow only

Correct Answer: 1). Ideal fluid flow

Solution:
Neglects friction losses.

Ref: Fluid Mechanics – R.K. Bansal

199. Venturimeter measures

1). Pressure
2). Velocity
3). Discharge
4). Density

Correct Answer: 3). Discharge

Solution:
Pressure difference used to calculate flow rate.

Ref: Fluid Mechanics – R.K. Bansal

200. The ultimate goal of hydraulic engineering is

1). Efficient utilization of water resources
2). Increase pressure
3). Increase velocity
4). Increase density

Correct Answer: 1). Efficient utilization of water resources

Solution:
Hydraulics helps design efficient water systems.

Ref: Fluid Mechanics – R.K. Bansal

UNIT 9 & 10 IRRIGATION ENGINEERING

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1. Irrigation is defined as the artificial application of water to the soil for the purpose of

1). Increasing rainfall
2). Supplying moisture for crop growth
3). Preventing soil erosion
4). Reducing evaporation

Correct Answer: 2). Supplying moisture for crop growth

Solution:
Irrigation provides water to crops when natural rainfall is insufficient.

Ref: Irrigation Engineering – S.K. Garg

---

2. The necessity of irrigation arises mainly due to

1). Insufficient rainfall
2). Uneven distribution of rainfall
3). Growing water-demanding crops
4). All of these

Correct Answer: 4). All of these

Solution:
Irrigation ensures reliable crop production.

Ref: Irrigation Engineering – S.K. Garg

---

3. Perennial irrigation means

1). Water supplied only during floods
2). Water supplied throughout crop period
3). Water supplied once a year
4). Water supplied by wells only

Correct Answer: 2). Water supplied throughout crop period

Solution:
Water supply regulated through canals.

Ref: Irrigation Engineering – B.C. Punmia

---

4. Inundation irrigation means

1). Irrigation by canals
2). Irrigation using flood water without regulation
3). Irrigation by pumps
4). Irrigation by wells

Correct Answer: 2). Irrigation using flood water without regulation

Solution:
Flood water diverted to fields.

Ref: Irrigation Engineering – S.K. Garg

---

5. Flow irrigation is irrigation in which water flows to fields by

1). Pumping
2). Gravity
3). Pressure
4). Capillary action

Correct Answer: 2). Gravity

Solution:
Fields lie below water source.

Ref: Irrigation Engineering – B.C. Punmia

---

6. Lift irrigation requires

1). Gravity flow
2). Pumping
3). Rainfall
4). Canal flow

Correct Answer: 2). Pumping

Solution:
Water lifted using mechanical devices.

Ref: Irrigation Engineering – S.K. Garg

---

7. Kharif crops are grown during

1). Winter season
2). Monsoon season
3). Summer season
4). Spring season

Correct Answer: 2). Monsoon season

Solution:
Examples: rice, maize, cotton.

Ref: Irrigation Engineering – S.K. Garg

---

8. Rabi crops are grown during

1). Winter season
2). Summer season
3). Monsoon season
4). Spring season

Correct Answer: 1). Winter season

Solution:
Examples: wheat, barley, mustard.

Ref: Irrigation Engineering – S.K. Garg

---

9. Duty of water is defined as

1). Area irrigated by unit discharge
2). Volume of water used by crop
3). Depth of irrigation water
4). Canal discharge

Correct Answer: 1). Area irrigated by unit discharge

Solution:

$$Duty = \frac{Area}{Discharge}$$

Ref: Irrigation Engineering – S.K. Garg

10. Delta of a crop is defined as

1). Total depth of water required by crop
2). Canal discharge
3). Crop yield
4). Rainfall intensity

Correct Answer: 1). Total depth of water required by crop

Solution:
Depth of water needed for entire crop period.

Ref: Irrigation Engineering – S.K. Garg

---

11. Base period of a crop is

1). Time between first and last irrigation
2). Time between sowing and harvesting
3). Duration of rainfall
4). Duration of irrigation

Correct Answer: 1). Time between first and last irrigation

Solution:
Measured in days.

Ref: Irrigation Engineering – S.K. Garg

---

12. The relationship between duty (D), delta (Δ) and base period (B) is

1). $\Delta = \frac{8.64B}{D}$
2). $\Delta = \frac{D}{B}$
3). $\Delta = DB$
4). $\Delta = B/D$

Correct Answer: 1). $\Delta = \frac{8.64B}{D}$

Solution:
Standard irrigation formula.

Ref: Irrigation Engineering – S.K. Garg

---

13. Check flooding method is suitable for

1). Flat land
2). Steep slopes
3). Hilly areas
4). Rocky land

Correct Answer: 1). Flat land

Solution:
Water allowed to spread over fields.

Ref: Irrigation Engineering – B.C. Punmia

---

14. Basin irrigation is commonly used for

1). Orchards
2). Rice crops
3). Wheat crops
4). Cotton crops

Correct Answer: 1). Orchards

Solution:
Water applied around tree basin.

Ref: Irrigation Engineering – S.K. Garg

---

15. Furrow irrigation is mainly used for

1). Row crops
2). Rice
3). Orchards
4). Grass crops

Correct Answer: 1). Row crops

Solution:
Water flows through furrows between rows.

Ref: Irrigation Engineering – S.K. Garg

---

16. Sprinkler irrigation is suitable for

1). Sandy soils
2). Uneven lands
3). Light soils
4). All of these

Correct Answer: 4). All of these

Solution:
Water sprayed like rainfall.

Ref: Irrigation Engineering – B.C. Punmia

---

17. Drip irrigation supplies water

1). Continuously to entire field
2). Drop by drop near plant roots
3). By flooding
4). Through canals

Correct Answer: 2). Drop by drop near plant roots

Solution:
Highly efficient irrigation method.

Ref: Irrigation Engineering – S.K. Garg

---

18. Hydrology deals with

1). Study of water movement on earth
2). Study of soil properties
3). Study of rainfall only
4). Study of rivers only

Correct Answer: 1). Study of water movement on earth

Solution:
Includes rainfall, runoff and storage.

Ref: Engineering Hydrology – K. Subramanya

---

19. Rainfall is measured using

1). Rain gauge
2). Barometer
3). Anemometer
4). Hydrometer

Correct Answer: 1). Rain gauge

Solution:
Records precipitation depth.

Ref: Engineering Hydrology – K. Subramanya

---

20. Symon's rain gauge is a

1). Non-recording rain gauge
2). Recording rain gauge
3). Storage rain gauge
4). Digital rain gauge

Correct Answer: 1). Non-recording rain gauge

Solution:
Common rain gauge used in India.

Ref: Engineering Hydrology – K. Subramanya

---

21. Recording rain gauge records

1). Total rainfall
2). Rainfall intensity and duration
3). Wind velocity
4). Humidity

Correct Answer: 2). Rainfall intensity and duration

Solution:
Provides continuous record.

Ref: Engineering Hydrology – K. Subramanya

---

22. Catchment area is

1). Area draining water to a river
2). Area under irrigation
3). Area of reservoir
4). Area of rainfall measurement

Correct Answer: 1). Area draining water to a river

Solution:
Also called drainage basin.

Ref: Engineering Hydrology – K. Subramanya

---

23. Runoff is defined as

1). Rainfall stored in soil
2). Portion of rainfall flowing over land surface
3). Rainfall evaporated
4). Rainfall absorbed by plants

Correct Answer: 2). Portion of rainfall flowing over land surface

Solution:
Water reaching streams.

Ref: Engineering Hydrology – K. Subramanya

---

24. Ryve's formula is used to estimate

1). Flood discharge
2). Canal discharge
3). Reservoir capacity
4). Rainfall intensity

Correct Answer: 1). Flood discharge

Solution:
Empirical flood estimation formula.

Ref: Irrigation Engineering – S.K. Garg

---

25. Dicken's formula is used for

1). Flood discharge calculation
2). Canal discharge
3). Pump efficiency
4). Turbine power

Correct Answer: 1). Flood discharge calculation

Solution:

$$Q = CA^{3/4}$$

Ref: Irrigation Engineering – S.K. Garg

---

26. Diversion head works are constructed across

1). Rivers
2). Canals
3). Reservoirs
4). Wells

Correct Answer: 1). Rivers

Solution:
To divert water into canals.

Ref: Irrigation Engineering – B.C. Punmia

---

27. The main component of diversion head works is

1). Weir or barrage
2). Canal head regulator
3). Silt excluder
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple components regulate water flow.

Ref: Irrigation Engineering – B.C. Punmia

---

28. A barrage differs from a weir because

1). It has gates to control flow
2). It is smaller
3). It is temporary
4). It stores water

Correct Answer: 1). It has gates to control flow

Solution:
Barrage uses adjustable gates.

Ref: Irrigation Engineering – S.K. Garg

---

29. Reservoir storage includes

1). Dead storage
2). Live storage
3). Surcharge storage
4). All of these

Correct Answer: 4). All of these

Solution:
Different storage zones.

Ref: Irrigation Engineering – S.K. Garg

---

30. Dead storage is the storage below

1). Minimum drawdown level
2). Maximum water level
3). Crest level
4). Canal level

Correct Answer: 1). Minimum drawdown level

Solution:
Cannot be used for irrigation.

Ref: Irrigation Engineering – S.K. Garg

---

31. Live storage in a reservoir is the water stored between

1). River bed level and minimum drawdown level
2). Minimum drawdown level and full reservoir level
3). Full reservoir level and maximum water level
4). Crest level and river bed level

Correct Answer: 2). Minimum drawdown level and full reservoir level

Solution:
Live storage is the useful storage available for irrigation and water supply.

Ref: Irrigation Engineering – S.K. Garg

---

32. Surcharge storage in a reservoir is the storage between

1). River bed and MDDL
2). MDDL and FRL
3). FRL and MWL
4). MWL and crest

Correct Answer: 3). FRL and MWL

Solution:
Used temporarily during floods.

Ref: Irrigation Engineering – S.K. Garg

---

33. Dead storage is provided mainly to

1). Store water for irrigation
2). Store flood water
3). Allow sediment deposition
4). Increase discharge

Correct Answer: 3). Allow sediment deposition

Solution:
Sediments settle in dead storage zone.

Ref: Irrigation Engineering – S.K. Garg

---

34. A gravity dam resists water pressure mainly by

1). Weight of dam
2). Arch action
3). Buttress action
4). Reinforcement

Correct Answer: 1). Weight of dam

Solution:
Self-weight balances water pressure.

Ref: Irrigation Engineering – B.C. Punmia

---

35. Gravity dams are generally constructed with

1). Earth
2). Concrete or masonry
3). Steel
4). Timber

Correct Answer: 2). Concrete or masonry

Solution:
Rigid dam structure.

Ref: Irrigation Engineering – S.K. Garg

---

36. A dam whose height is less than 30 m is called

1). Low dam
2). Medium dam
3). High dam
4). Very high dam

Correct Answer: 1). Low dam

Solution:
Classification based on height.

Ref: Irrigation Engineering – S.K. Garg

---

37. The elementary profile of a gravity dam is

1). Rectangular
2). Triangular
3). Trapezoidal
4). Circular

Correct Answer: 2). Triangular

Solution:
Simplified theoretical profile.

Ref: Irrigation Engineering – B.C. Punmia

---

38. The major failure of gravity dam occurs due to

1). Overturning
2). Sliding
3). Crushing
4). All of these

Correct Answer: 4). All of these

Solution:
Dam stability checks.

Ref: Irrigation Engineering – S.K. Garg

---

39. Drainage galleries in gravity dams are provided to

1). Reduce uplift pressure
2). Increase weight of dam
3). Increase storage
4). Increase velocity

Correct Answer: 1). Reduce uplift pressure

Solution:
Drainage reduces pressure below dam.

Ref: Irrigation Engineering – B.C. Punmia

---

40. Ogee spillway is generally used in

1). Gravity dams
2). Earth dams
3). Canal falls
4). Barrages

Correct Answer: 1). Gravity dams

Solution:
Matches shape of water nappe.

Ref: Irrigation Engineering – S.K. Garg

---

41. A siphon spillway works on the principle of

1). Bernoulli's theorem
2). Siphonic action
3). Pascal's law
4). Surface tension

Correct Answer: 2). Siphonic action

Solution:
Water flows over dam automatically.

Ref: Irrigation Engineering – B.C. Punmia

---

42. Non-rigid dams are constructed using

1). Concrete
2). Masonry
3). Earth or rockfill
4). Steel

Correct Answer: 3). Earth or rockfill

Solution:
Flexible dam structure.

Ref: Irrigation Engineering – S.K. Garg

---

43. Earth dams are mainly constructed using

1). Concrete
2). Soil
3). Steel
4). Masonry

Correct Answer: 2). Soil

Solution:
Compacted earth materials.

Ref: Irrigation Engineering – B.C. Punmia

---

44. The main failure of earth dams occurs due to

1). Seepage
2). Overtopping
3). Piping
4). All of these

Correct Answer: 4). All of these

Solution:
Major failure mechanisms.

Ref: Irrigation Engineering – S.K. Garg

---

45. Phreatic line in an earth dam represents

1). Water seepage line
2). Pressure line
3). Energy line
4). Flow velocity line

Correct Answer: 1). Water seepage line

Solution:
Separates saturated and unsaturated zones.

Ref: Irrigation Engineering – B.C. Punmia

---

46. Canal alignment is decided based on

1). Topography
2). Soil conditions
3). Economy
4). All of these

Correct Answer: 4). All of these

Solution:
Proper alignment reduces cost and losses.

Ref: Irrigation Engineering – S.K. Garg

---

47. Canal sections are generally

1). Circular
2). Rectangular
3). Trapezoidal
4). Square

Correct Answer: 3). Trapezoidal

Solution:
Stable and economical section.

Ref: Irrigation Engineering – S.K. Garg

---

48. Berm in canal section is

1). Flat strip between canal bank and cutting
2). Canal lining
3). Canal slope
4). Canal bottom

Correct Answer: 1). Flat strip between canal bank and cutting

Solution:
Provides stability to canal banks.

Ref: Irrigation Engineering – B.C. Punmia

---

49. Balanced depth of cutting occurs when

1). Excavated earth equals embankment earth
2). Excavated earth less than embankment earth
3). Excavated earth more than embankment earth
4). No excavation required

Correct Answer: 1). Excavated earth equals embankment earth

Solution:
Economical canal design.

Ref: Irrigation Engineering – S.K. Garg

---

50. Canal lining is provided to

1). Reduce seepage losses
2). Increase velocity
3). Reduce maintenance
4). All of these

Correct Answer: 4). All of these

Solution:
Improves efficiency.

Ref: Irrigation Engineering – S.K. Garg

---

51. Lacey's theory is used for

1). Canal design in alluvial soil
2). Dam design
3). Flood estimation
4). Pump design

Correct Answer: 1). Canal design in alluvial soil

Solution:
Stable canal section theory.

Ref: Irrigation Engineering – S.K. Garg

---

52. Lacey's silt factor depends on

1). Velocity
2). Grain size of silt
3). Canal depth
4). Canal slope

Correct Answer: 2). Grain size of silt

Solution:

$$f = 1.76\sqrt{d}$$

Ref: Irrigation Engineering – S.K. Garg

---

53. Cross drainage works are required when

1). Canal crosses natural drain
2). River crosses canal
3). Drain crosses canal
4). All of these

Correct Answer: 4). All of these

Solution:
Ensures uninterrupted flow.

Ref: Irrigation Engineering – B.C. Punmia

---

54. Aqueduct is used when

1). Canal passes over drainage channel
2). Drain passes over canal
3). Canal joins river
4). Canal ends

Correct Answer: 1). Canal passes over drainage channel

Solution:
Canal carried over drain.

Ref: Irrigation Engineering – B.C. Punmia

---

55. Super passage is used when

1). Drain passes over canal
2). Canal passes over drain
3). Canal passes under drain
4). Canal ends

Correct Answer: 1). Drain passes over canal

Solution:
Drain carried over canal.

Ref: Irrigation Engineering – B.C. Punmia

---

56. Canal siphon is used when

1). Canal passes below drain
2). Canal passes above drain
3). Drain passes above canal
4). Drain passes below canal

Correct Answer: 1). Canal passes below drain

Solution:
Canal flows under pressure.

Ref: Irrigation Engineering – S.K. Garg

---

57. Level crossing occurs when

1). Canal and drain meet at same level
2). Canal above drain
3). Drain above canal
4). Canal below drain

Correct Answer: 1). Canal and drain meet at same level

Solution:
Regulators control flow.

Ref: Irrigation Engineering – B.C. Punmia

---

58. The function of canal head regulator is

1). Control water entering canal
2). Increase canal velocity
3). Reduce rainfall
4). Increase storage

Correct Answer: 1). Control water entering canal

Solution:
Regulates discharge.

Ref: Irrigation Engineering – S.K. Garg

---

59. The main purpose of irrigation engineering is

1). Efficient water distribution
2). Increase crop yield
3). Control floods
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple benefits of irrigation systems.

Ref: Irrigation Engineering – S.K. Garg

---

60. The ultimate aim of irrigation systems is

1). Maximum crop production
2). Efficient water management
3). Sustainable agriculture
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated water resource management.

Ref: Irrigation Engineering – S.K. Garg

---

61. The unit of duty of water is
1). hectares per cumec
2). m^3/s
3). meters
4). m^2

Correct Answer: 1). hectares per cumec

Solution:
Duty indicates the **area irrigated per unit discharge**.

Ref: Irrigation Engineering – S.K. Garg

---

62. If duty of water increases, the delta of crop

1). Increases
2). Decreases
3). Remains constant
4). Becomes zero

Correct Answer: 2). Decreases

Solution:

$$\Delta = \frac{8.64B}{D}$$

Higher duty means less water depth.

Ref: Irrigation Engineering – S.K. Garg

---

63. If base period increases, delta

1). Decreases
2). Increases
3). Remains same
4). Becomes zero

Correct Answer: 2). Increases

Solution:
Longer crop period requires more water.

Ref: Irrigation Engineering – S.K. Garg

64. Duty of water depends on

1). Crop type
2). Climate conditions
3). Soil type
4). All of these

Correct Answer: 4). All of these

Solution:
Duty varies with environmental and crop factors.

Ref: Irrigation Engineering – S.K. Garg

65. The delta of a crop is generally expressed in

1). centimeters
2). meters
3). liters
4). hectares

Correct Answer: 1). centimeters

Solution:
Represents water depth required.

Ref: Irrigation Engineering – S.K. Garg

66. The base period of wheat crop is approximately

1). 60 days
2). 90 days
3). 120 days
4). 150 days

Correct Answer: 3). 120 days

Solution:
Typical base period value.

Ref: Irrigation Engineering – S.K. Garg

67. The base period of rice crop is approximately

1). 90 days
2). 120 days
3). 150 days
4). 200 days

Correct Answer: 2). 120 days

Solution:
Typical crop duration.

Ref: Irrigation Engineering – S.K. Garg

---

68. Ryve's formula for maximum flood discharge is

1). $Q = CA^{3/4}$
2). $Q = CA^{2/3}$
3). $Q = CA$
4). $Q = C\sqrt{A}$

Correct Answer: 2). $Q = CA^{2/3}$

Solution:
Empirical formula for flood estimation.

Ref: Irrigation Engineering – S.K. Garg

---

69. Dicken's formula is

1). $Q = CA^{3/4}$
2). $Q = CA^{2/3}$
3). $Q = CA$
4). $Q = C\sqrt{A}$

Correct Answer: 1). $Q = CA^{3/4}$

Solution:
Widely used flood estimation formula.

Ref: Irrigation Engineering – S.K. Garg

---

70. In Dicken's formula, C represents

1). Catchment area
2). Rainfall intensity
3). Flood coefficient
4). Velocity

Correct Answer: 3). Flood coefficient

Solution:
Depends on catchment characteristics.

Ref: Irrigation Engineering – S.K. Garg

---

71. Diversion head works are used to

1). Store water
2). Divert river water into canals
3). Generate electricity
4). Prevent floods

Correct Answer: 2). Divert river water into canals

Solution:
Water diverted for irrigation.

Ref: Irrigation Engineering – B.C. Punmia

---

72. The main structure of diversion head works is

1). Weir or barrage
2). Canal regulator
3). Silt excluder
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple components regulate water.

Ref: Irrigation Engineering – B.C. Punmia

---

73. A barrage differs from a weir because

1). Barrage has gates
2). Barrage is temporary
3). Barrage stores water
4). Barrage is smaller

Correct Answer: 1). Barrage has gates

Solution:
Flow controlled using gates.

Ref: Irrigation Engineering – S.K. Garg

---

74. Percolation in irrigation structures refers to

1). Seepage of water through soil
2). Flow of water in canals
3). Evaporation loss
4). Rainfall infiltration

Correct Answer: 1). Seepage of water through soil

Solution:
Water seeps through foundation.

Ref: Irrigation Engineering – S.K. Garg

---

75. Uplift pressure acts

1). Downward
2). Upward
3). Horizontally
4). Diagonally

Correct Answer: 2). Upward

Solution:
Acts beneath hydraulic structures.

Ref: Irrigation Engineering – B.C. Punmia

---

76. Uplift pressure tends to

1). Increase stability of dam
2). Reduce stability of dam
3). Increase weight of dam
4). Increase velocity

Correct Answer: 2). Reduce stability of dam

Solution:
Opposes weight of structure.

Ref: Irrigation Engineering – S.K. Garg

---

77. Gravity dams are classified as rigid dams because

1). They are flexible
2). They resist loads by rigidity
3). They use soil material
4). They float on water

Correct Answer: 2). They resist loads by rigidity

Solution:
Rigid structural behavior.

Ref: Irrigation Engineering – B.C. Punmia

---

78. The weight of gravity dam acts

1). Horizontally
2). Vertically downward
3). Upward
4). Diagonally

Correct Answer: 2). Vertically downward

Solution:
Provides stability against water pressure.

Ref: Irrigation Engineering – S.K. Garg

---

79. The main force acting on gravity dam is

1). Water pressure
2). Uplift pressure
3). Weight of dam
4). All of these

Correct Answer: 4). All of these

Solution:
Dam design considers multiple forces.

Ref: Irrigation Engineering – S.K. Garg

---

80. Spillways are provided in dams to

1). Store water
2). Release excess flood water
3). Increase storage
4). Increase velocity

Correct Answer: 2). Release excess flood water

Solution:
Prevents dam overtopping.

Ref: Irrigation Engineering – B.C. Punmia

---

81. Ogee spillway profile resembles

1). Water nappe profile
2). Circular arc
3). Straight line
4). Triangle

Correct Answer: 1). Water nappe profile

Solution:
Matches shape of overflowing water.

Ref: Irrigation Engineering – S.K. Garg

---

82. Earth dams are suitable for

1). Wide valleys
2). Narrow valleys
3). Rocky valleys
4). Steep valleys

Correct Answer: 1). Wide valleys

Solution:
Large base width required.

Ref: Irrigation Engineering – B.C. Punmia

---

83. The main advantage of earth dams is

1). Low cost
2). Simple construction
3). Use of local materials
4). All of these

Correct Answer: 4). All of these

Solution:
Economical dam type.

Ref: Irrigation Engineering – S.K. Garg

---

84. Seepage in earth dams occurs through

1). Body of dam
2). Foundation
3). Abutments
4). All of these

Correct Answer: 4). All of these

Solution:
Water may seep through multiple paths.

Ref: Irrigation Engineering – B.C. Punmia

---

85. Phreatic line indicates

1). Pressure distribution
2). Seepage line
3). Velocity line
4). Energy line

Correct Answer: 2). Seepage line

Solution:
Boundary between saturated and unsaturated zones.

Ref: Irrigation Engineering – S.K. Garg

---

86. Canal alignment should follow

1). Natural contours
2). Minimum earthwork
3). Stable ground
4). All of these

Correct Answer: 4). All of these

Solution:
Proper alignment reduces cost and maintenance.

Ref: Irrigation Engineering – S.K. Garg

---

87. The bottom width of canal is called

1). Bed width
2). Canal depth
3). Canal slope
4). Canal lining

Correct Answer: 1). Bed width

Solution:
Width at canal base.

Ref: Irrigation Engineering – S.K. Garg

---

88. Canal banks are provided to

1). Prevent overflow
2). Guide water flow
3). Protect canal sides
4). All of these

Correct Answer: 4). All of these

Solution:
Banks stabilize canal.

Ref: Irrigation Engineering – B.C. Punmia

---

89. Canal lining reduces

1). Seepage losses
2). Weed growth
3). Maintenance
4). All of these

Correct Answer: 4). All of these

Solution:
Improves canal efficiency.

Ref: Irrigation Engineering – S.K. Garg

---

90. Lacey's theory assumes that

1). Channel is stable in alluvial soil
2). Channel is rigid
3). Channel is lined
4). Channel is circular

Correct Answer: 1). Channel is stable in alluvial soil

Solution:
Lacey theory developed for alluvial canals.

Ref: Irrigation Engineering – S.K. Garg

---

91. The depth of water required by a crop during its entire growth period is called
1). Duty
2). Delta
3). Base period
4). Discharge

Correct Answer: 2). Delta

Solution:
Delta represents the **total depth of irrigation water required** for the crop.

Ref: Irrigation Engineering – S.K. Garg

---

92. The relationship between duty (D), base period (B) and delta (Δ) is

1). $\Delta = \frac{8.64B}{D}$
2). $\Delta = \frac{D}{8.64B}$
3). $\Delta = DB$
4). $\Delta = B/D$

Correct Answer: 1). $\Delta = \frac{8.64B}{D}$

Solution:
Important irrigation formula used in ECET.

Ref: Irrigation Engineering – S.K. Garg

---

93. If duty increases, the amount of water required per hectare

1). Increases
2). Decreases
3). Remains constant
4). Becomes zero

Correct Answer: 2). Decreases

Solution:
Higher duty means more area irrigated per unit discharge.

Ref: Irrigation Engineering – S.K. Garg

---

94. The command area of a canal is

1). Total area irrigated by canal system
2). Area under reservoir
3). Catchment area
4). Area under rainfall

Correct Answer: 1). Total area irrigated by canal system

Solution:
Area served by irrigation system.

Ref: Irrigation Engineering – S.K. Garg

---

95. Gross command area (GCA) includes

1). Cultivable land only
2). Cultivable + uncultivable land
3). Irrigated land only
4). Non-irrigated land

Correct Answer: 2). Cultivable + uncultivable land

Solution:
Total command area.

Ref: Irrigation Engineering – S.K. Garg

---

96. Cultivable command area (CCA) represents

1). Area suitable for cultivation
2). Total command area
3). Irrigated land only
4). Forest area

Correct Answer: 1). Area suitable for cultivation

Solution:
CCA excludes uncultivable land.

Ref: Irrigation Engineering – S.K. Garg

---

97. Intensity of irrigation is defined as

1). Percentage of area irrigated to cultivable area
2). Water depth applied
3). Crop yield
4). Rainfall intensity

Correct Answer: 1). Percentage of area irrigated to cultivable area

Solution:

$$Intensity = \frac{Area\ irrigated}{CCA} \times 100$$

Ref: Irrigation Engineering – S.K. Garg

---

98. The rainfall intensity is defined as

1). Depth of rainfall per unit time
2). Total rainfall
3). Rainfall per year
4). Rainfall per day

Correct Answer: 1). Depth of rainfall per unit time

Solution:
Measured in mm/hr.

Ref: Engineering Hydrology – K. Subramanya

---

99. Runoff coefficient depends on

1). Rainfall intensity
2). Catchment characteristics
3). Soil type
4). All of these

Correct Answer: 4). All of these

Solution:
Important hydrology factor.

Ref: Engineering Hydrology – K. Subramanya

---

100. The time taken by rainwater to reach outlet of catchment is called

1). Base period
2). Time of concentration
3). Lag time
4). Runoff time

Correct Answer: 2). Time of concentration

Solution:
Important parameter in hydrology.

Ref: Engineering Hydrology – K. Subramanya

---

101. The maximum flood discharge increases with

1). Catchment area
2). Rainfall intensity
3). Runoff coefficient
4). All of these

Correct Answer: 4). All of these

Solution:
Factors affecting flood estimation.

Ref: Irrigation Engineering – S.K. Garg

---

102. The purpose of a barrage is to

1). Store water
2). Divert water into canals
3). Generate power
4). Increase rainfall

Correct Answer: 2). Divert water into canals

Solution:
Water diverted using gates.

Ref: Irrigation Engineering – B.C. Punmia

---

103. The canal head regulator is used to

1). Control canal discharge
2). Increase water level
3). Reduce velocity
4). Store water

Correct Answer: 1). Control canal discharge

Solution:
Regulates water entering canal.

Ref: Irrigation Engineering – B.C. Punmia

---

104. Silt excluder is provided to

1). Remove silt from canal
2). Remove silt before entering canal
3). Increase velocity
4). Store silt

Correct Answer: 2). Remove silt before entering canal

Solution:
Prevents sediment entry.

Ref: Irrigation Engineering – B.C. Punmia

---

105. Silt ejector is used to

1). Remove silt already in canal
2). Increase velocity
3). Store silt
4). Reduce discharge

Correct Answer: 1). Remove silt already in canal

Solution:
Installed in canal downstream.

Ref: Irrigation Engineering – B.C. Punmia

---

106. The main force acting on gravity dam due to water is

1). Hydrostatic pressure
2). Atmospheric pressure
3). Wind pressure
4). Wave pressure

Correct Answer: 1). Hydrostatic pressure

Solution:
Acts horizontally.

Ref: Irrigation Engineering – S.K. Garg

---

107. The uplift pressure acts

1). Horizontally
2). Vertically upward
3). Vertically downward
4). Diagonally

Correct Answer: 2). Vertically upward

Solution:
Occurs beneath dam foundation.

Ref: Irrigation Engineering – B.C. Punmia

---

108. Factor of safety against sliding is

1). Ratio of resisting force to driving force
2). Driving force / resisting force
3). Weight / pressure
4). Pressure / weight

Correct Answer: 1). Ratio of resisting force to driving force

Solution:
Ensures dam stability.

Ref: Irrigation Engineering – S.K. Garg

---

109. Spillways are designed to pass

1). Normal discharge
2). Flood discharge
3). Canal discharge
4). Reservoir storage

Correct Answer: 2). Flood discharge

Solution:
Prevents dam overtopping.

Ref: Irrigation Engineering – B.C. Punmia

---

110. Earth dams are most suitable where

1). Wide valleys exist
2). Narrow valleys exist
3). Rocky valleys exist
4). Deep valleys exist

Correct Answer: 1). Wide valleys exist

Solution:
Large base required.

Ref: Irrigation Engineering – S.K. Garg

---

111. The upstream face of earth dam is protected by

1). Riprap
2). Concrete
3). Masonry
4). Steel

Correct Answer: 1). Riprap

Solution:
Protects against wave action.

Ref: Irrigation Engineering – B.C. Punmia

---

112. The downstream slope of earth dam is generally

1). Steeper
2). Flatter
3). Vertical
4). Horizontal

Correct Answer: 2). Flatter

Solution:
Provides stability.

Ref: Irrigation Engineering – S.K. Garg

---

113. Canal discharge depends on

1). Canal area
2). Flow velocity
3). Channel slope
4). All of these

Correct Answer: 4). All of these

Solution:

$$Q = AV$$

Ref: Irrigation Engineering – S.K. Garg

---

114. The velocity of flow in canals should be

1). Too high
2). Too low
3). Neither too high nor too low
4). Zero

Correct Answer: 3). Neither too high nor too low

Solution:
Avoid erosion and silting.

Ref: Irrigation Engineering – S.K. Garg

---

115. Lacey's theory applies to

1). Alluvial canals
2). Concrete canals
3). Pipe flow
4). Reservoirs

Correct Answer: 1). Alluvial canals

Solution:
Stable channel design.

Ref: Irrigation Engineering – S.K. Garg

---

116. Lacey's silt factor depends on

1). Silt size
2). Canal slope
3). Discharge
4). Velocity

Correct Answer: 1). Silt size

Solution:

$$f = 1.76\sqrt{d}$$

Ref: Irrigation Engineering – S.K. Garg

---

117. Cross drainage works allow

1). Canal to cross natural drainage
2). River to cross canal
3). Drain to cross canal
4). All of these

Correct Answer: 4). All of these

Solution:
Ensures uninterrupted flow.

Ref: Irrigation Engineering – B.C. Punmia

---

118. Aqueduct carries

1). Canal over drainage channel
2). Drain over canal
3). Canal under drain
4). Canal under road

Correct Answer: 1). Canal over drainage channel

Solution:
Canal water flows above.

Ref: Irrigation Engineering – B.C. Punmia

---

119. Super passage carries

1). Drain over canal
2). Canal over drain
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Drain over canal

Solution:
Drain water flows above.

Ref: Irrigation Engineering – B.C. Punmia

---

120. Canal siphon carries

1). Canal under drain
2). Drain under canal
3). Canal over drain
4). Drain over canal

Correct Answer: 1). Canal under drain

Solution:
Canal water flows below drain.

Ref: Irrigation Engineering – B.C. Punmia

---

121. The crest level of a dam refers to

1). Bottom of dam
2). Top of dam structure
3). Water level in reservoir
4). Foundation level

Correct Answer: 2). Top of dam structure

Solution:
Crest is the highest structural level of the dam.

Ref: Irrigation Engineering – S.K. Garg

---

122. Full reservoir level (FRL) is defined as

1). Minimum operating level of reservoir
2). Maximum water level during normal operation
3). Maximum flood level
4). Water level at river bed

Correct Answer: 2). Maximum water level during normal operation

Solution:
Normal operating storage level.

Ref: Irrigation Engineering – S.K. Garg

---

123. Maximum water level (MWL) occurs during

1). Normal irrigation
2). Flood conditions
3). Canal discharge
4). Reservoir empty condition

Correct Answer: 2). Flood conditions

Solution:
Temporary rise during flood.

Ref: Irrigation Engineering – S.K. Garg

---

124. The minimum drawdown level (MDDL) indicates

1). Lowest reservoir level for operation
2). Maximum reservoir level
3). River bed level
4). Spillway level

Correct Answer: 1). Lowest reservoir level for operation

Solution:
Below this level water cannot be withdrawn.

Ref: Irrigation Engineering – S.K. Garg

---

125. The main function of spillway is to

1). Store water
2). Release surplus flood water
3). Divert water into canal
4). Reduce sediment

Correct Answer: 2). Release surplus flood water

Solution:
Prevents overtopping of dam.

Ref: Irrigation Engineering – B.C. Punmia

---

126. Overtopping failure of earth dam occurs when

1). Excess water flows over dam crest
2). Dam slides
3). Dam cracks
4). Dam settles

Correct Answer: 1). Excess water flows over dam crest

Solution:
Major cause of earth dam failure.

Ref: Irrigation Engineering – S.K. Garg

---

127. Piping failure in earth dams occurs due to

1). Internal erosion caused by seepage
2). Earthquake
3). Flooding
4). Wind action

Correct Answer: 1). Internal erosion caused by seepage

Solution:
Seepage carries soil particles.

Ref: Irrigation Engineering – B.C. Punmia

---

128. Rockfill dams are classified as

1). Rigid dams
2). Non-rigid dams
3). Gravity dams
4). Buttress dams

Correct Answer: 2). Non-rigid dams

Solution:
Flexible dam structure.

Ref: Irrigation Engineering – S.K. Garg

---

129. Canal slope is provided to

1). Maintain flow velocity
2). Prevent erosion
3). Ensure gravity flow
4). All of these

Correct Answer: 4). All of these

Solution:
Proper slope ensures stable flow.

Ref: Irrigation Engineering – S.K. Garg

---

130. The trapezoidal canal section is preferred because

1). It is stable
2). It is economical
3). Easy to construct
4). All of these

Correct Answer: 4). All of these

Solution:
Most commonly used canal section.

Ref: Irrigation Engineering – S.K. Garg

---

131. Berm is provided in canals to

1). Increase water depth
2). Strengthen canal banks
3). Reduce velocity
4). Increase discharge

Correct Answer: 2). Strengthen canal banks

Solution:
Provides stability and safety.

Ref: Irrigation Engineering – B.C. Punmia

---

132. Canal lining materials include

1). Concrete
2). Brick
3). Asphalt
4). All of these

Correct Answer: 4). All of these

Solution:
Different materials used based on conditions.

Ref: Irrigation Engineering – S.K. Garg

---

133. Canal lining helps in

1). Reducing seepage losses
2). Increasing canal efficiency
3). Preventing weed growth
4). All of these

Correct Answer: 4). All of these

Solution:
Improves canal performance.

Ref: Irrigation Engineering – S.K. Garg

---

134. In Lacey's theory, the silt factor depends on

1). Grain size of bed material
2). Canal slope
3). Water depth
4). Canal velocity

Correct Answer: 1). Grain size of bed material

Solution:

$$f = 1.76\sqrt{d}$$

Ref: Irrigation Engineering – S.K. Garg

---

135. The stable velocity in canals depends on

1). Silt factor
2). Hydraulic radius
3). Channel slope
4). All of these

Correct Answer: 4). All of these

Solution:
Lacey's theory parameters.

Ref: Irrigation Engineering – S.K. Garg

---

136. The purpose of cross drainage works is to

1). Allow canal to cross natural drainage
2). Prevent canal overflow
3). Increase canal discharge
4). Store water

Correct Answer: 1). Allow canal to cross natural drainage

Solution:
Ensures uninterrupted flow.

Ref: Irrigation Engineering – B.C. Punmia

---

137. Types of cross drainage works include

1). Aqueduct
2). Super passage
3). Canal siphon
4). All of these

Correct Answer: 4). All of these

Solution:
Different structures depending on levels.

Ref: Irrigation Engineering – B.C. Punmia

---

138. Aqueduct is used when

1). Canal bed above drainage bed
2). Drain bed above canal bed
3). Canal bed below drain bed
4). Both beds same level

Correct Answer: 1). Canal bed above drainage bed

Solution:
Canal passes over drain.

Ref: Irrigation Engineering – B.C. Punmia

---

139. Super passage is used when

1). Drain bed above canal bed
2). Canal bed above drain bed
3). Canal under drain
4). Canal above road

Correct Answer: 1). Drain bed above canal bed

Solution:
Drain carried above canal.

Ref: Irrigation Engineering – B.C. Punmia

---

140. Canal siphon is used when

1). Canal bed below drainage bed
2). Canal bed above drainage bed
3). Both beds same level
4). Canal above drain

Correct Answer: 1). Canal bed below drainage bed

Solution:
Canal flows under pressure.

Ref: Irrigation Engineering – S.K. Garg

---

141. Level crossing occurs when

1). Canal and drain beds are at same level
2). Canal above drain
3). Drain above canal
4). Canal below drain

Correct Answer: 1). Canal and drain beds are at same level

Solution:
Both flows controlled by regulators.

Ref: Irrigation Engineering – B.C. Punmia

---

142. Canal regulator is provided to

1). Control discharge in canal
2). Increase velocity
3). Increase storage
4). Prevent evaporation

Correct Answer: 1). Control discharge in canal

Solution:
Regulates water supply.

Ref: Irrigation Engineering – S.K. Garg

---

143. Escapes in canal system are used to

1). Dispose excess water
2). Increase discharge
3). Store water
4). Reduce velocity

Correct Answer: 1). Dispose excess water

Solution:
Prevents canal damage.

Ref: Irrigation Engineering – B.C. Punmia

---

144. Canal falls are provided to

1). Reduce canal bed slope
2). Control velocity
3). Maintain bed level
4). All of these

Correct Answer: 4). All of these

Solution:
Energy dissipation structure.

Ref: Irrigation Engineering – S.K. Garg

---

145. A canal distributary is

1). Main canal branch
2). Small channel distributing water to fields
3). Drainage channel
4). River channel

Correct Answer: 2). Small channel distributing water to fields

Solution:
Supplies water to farms.

Ref: Irrigation Engineering – S.K. Garg

---

146. Water courses are

1). Channels connecting distributary to fields
2). Main canal branches
3). Reservoir channels
4). Drainage channels

Correct Answer: 1). Channels connecting distributary to fields

Solution:
Carry water to farms.

Ref: Irrigation Engineering – B.C. Punmia

---

147. Canal capacity depends on

1). Cross sectional area
2). Flow velocity
3). Channel slope
4). All of these

Correct Answer: 4). All of these

Solution:

$$Q = AV$$

Ref: Irrigation Engineering – S.K. Garg

---

148. The velocity of water in canals should be

1). Too high
2). Too low
3). Moderate
4). Zero

Correct Answer: 3). Moderate

Solution:
Avoid silting and erosion.

Ref: Irrigation Engineering – S.K. Garg

---

149. The main aim of irrigation planning is

1). Efficient water utilization
2). Maximum crop yield
3). Sustainable agriculture
4). All of these

Correct Answer: 4). All of these

Solution:
Proper irrigation improves productivity.

Ref: Irrigation Engineering – S.K. Garg

---

150. The ultimate objective of irrigation engineering is

1). Increase agricultural production
2). Efficient water management
3). Prevent drought
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated irrigation development.

Ref: Irrigation Engineering – S.K. Garg

---

151. The main source of irrigation water in India is

1). Rainfall
2). Rivers
3). Groundwater
4). All of these

Correct Answer: 4). All of these

Solution:
Irrigation water can come from rainfall storage, rivers, reservoirs, and groundwater.

Ref: Irrigation Engineering – S.K. Garg

---

152. The percentage of cultivable command area irrigated during a season is called

1). Irrigation duty
2). Irrigation intensity
3). Crop ratio
4). Delta

Correct Answer: 2). Irrigation intensity

Solution:

$$Intensity = \frac{Area\ irrigated}{CCA} \times 100$$

Ref: Irrigation Engineering – S.K. Garg

---

153. If the duty of water is 1000 hectares/cumec, the area irrigated by 2 cumecs is

1). 1000 hectares
2). 2000 hectares
3). 500 hectares
4). 1500 hectares

Correct Answer: 2). 2000 hectares

Solution:

$$Area = Duty \times Discharge$$
$$= 1000 \times 2 = 2000\ hectares$$

Ref: Irrigation Engineering – S.K. Garg

---

154. If base period increases, duty of water

1). Increases
2). Decreases
3). Remains constant
4). Becomes zero

Correct Answer: 2). Decreases

Solution:
Longer crop duration requires more water depth.

Ref: Irrigation Engineering – S.K. Garg

---

155. The depth of water required by a crop during the base period is

1). Duty
2). Delta
3). Rainfall
4). Discharge

Correct Answer: 2). Delta

Solution:
Delta represents **total irrigation water depth required**.

Ref: Irrigation Engineering – S.K. Garg

---

156. The storage provided below the minimum drawdown level is

1). Live storage
2). Dead storage
3). Surcharge storage
4). Flood storage

Correct Answer: 2). Dead storage

Solution:
Water below MDDL cannot be used.

Ref: Irrigation Engineering – S.K. Garg

157. The storage used for irrigation purposes is

1). Dead storage
2). Live storage
3). Surcharge storage
4). Flood storage

Correct Answer: 2). Live storage

Solution:
Water available between **MDDL and FRL**.

Ref: Irrigation Engineering – S.K. Garg

158. Reservoir capacity mainly depends on

1). Catchment area
2). Rainfall
3). Runoff
4). All of these

Correct Answer: 4). All of these

Solution:
Hydrological parameters determine storage.

Ref: Engineering Hydrology – K. Subramanya

159. Diversion head works are generally constructed across

1). Rivers
2). Canals
3). Reservoirs
4). Wells

Correct Answer: 1). Rivers

Solution:
To divert water into canals.

Ref: Irrigation Engineering – B.C. Punmia

160. A barrage is mainly used to

1). Store water
2). Control river flow using gates
3). Increase rainfall
4). Increase reservoir storage

Correct Answer: 2). Control river flow using gates

Solution:
Adjustable gates regulate discharge.

Ref: Irrigation Engineering – S.K. Garg

---

161. The primary function of canal head regulator is

1). Control water entering canal
2). Store water
3). Increase velocity
4). Prevent floods

Correct Answer: 1). Control water entering canal

Solution:
Regulates discharge entering canal system.

Ref: Irrigation Engineering – B.C. Punmia

---

162. Silt excluder removes silt

1). From canal water
2). Before entering canal
3). After entering canal
4). From reservoir

Correct Answer: 2). Before entering canal

Solution:
Installed near headworks.

Ref: Irrigation Engineering – B.C. Punmia

---

163. Silt ejector removes silt

1). Before entering canal
2). After entering canal
3). From river bed
4). From reservoir

Correct Answer: 2). After entering canal

Solution:
Installed inside canal.

Ref: Irrigation Engineering – B.C. Punmia

---

164. Gravity dams are suitable for

1). Narrow valleys with strong foundations
2). Wide valleys
3). Weak foundations
4). Sandy soil

Correct Answer: 1). Narrow valleys with strong foundations

Solution:
Heavy structure requires strong base.

Ref: Irrigation Engineering – S.K. Garg

---

165. The major resisting force in gravity dam is

1). Water pressure
2). Weight of dam
3). Uplift pressure
4). Wind pressure

Correct Answer: 2). Weight of dam

Solution:
Self-weight stabilizes structure.

Ref: Irrigation Engineering – S.K. Garg

---

166. Sliding failure of dam occurs when

1). Horizontal forces exceed resisting forces
2). Dam overtops
3). Foundation cracks
4). Water level falls

Correct Answer: 1). Horizontal forces exceed resisting forces

Solution:
Dam moves along base.

Ref: Irrigation Engineering – B.C. Punmia

---

167. Overturning failure occurs when

1). Water pressure causes dam to rotate
2). Dam slides
3). Dam sinks
4). Dam cracks

Correct Answer: 1). Water pressure causes dam to rotate

Solution:
Moment due to water pressure exceeds resisting moment.

Ref: Irrigation Engineering – S.K. Garg

---

168. Drainage galleries are provided to

1). Inspect dam interior
2). Reduce uplift pressure
3). Drain seepage water
4). All of these

Correct Answer: 4). All of these

Solution:
Important structural feature.

Ref: Irrigation Engineering – B.C. Punmia

---

169. The upstream slope of earth dam is generally

1). Steeper
2). Flatter
3). Vertical
4). Horizontal

Correct Answer: 2). Flatter

Solution:
Provides stability against water pressure.

Ref: Irrigation Engineering – S.K. Garg

---

170. The downstream slope of earth dam is protected against

1). Seepage erosion
2). Rain erosion
3). Wind erosion
4). All of these

Correct Answer: 4). All of these

Solution:
Protective measures required.

Ref: Irrigation Engineering – B.C. Punmia

---

171. Canal discharge depends on

1). Cross-sectional area
2). Flow velocity
3). Channel slope
4). All of these

Correct Answer: 4). All of these

Solution:

$$Q = AV$$

Ref: Irrigation Engineering – S.K. Garg

---

172. The bed slope of canal is provided to

1). Maintain gravity flow
2). Reduce seepage
3). Increase rainfall
4). Increase storage

Correct Answer: 1). Maintain gravity flow

Solution:
Water flows due to gravity.

Ref: Irrigation Engineering – S.K. Garg

---

173. Canal banks are provided to

1). Contain flowing water
2). Protect canal sides
3). Prevent overflow
4). All of these

Correct Answer: 4). All of these

Solution:
Essential structural component.

Ref: Irrigation Engineering – B.C. Punmia

---

174. Lacey's theory is used for designing

1). Reservoirs
2). Alluvial canals
3). Gravity dams
4). Spillways

Correct Answer: 2). Alluvial canals

Solution:
Stable channel design.

Ref: Irrigation Engineering – S.K. Garg

---

175. The silt factor in Lacey's theory depends on

1). Grain size of silt
2). Canal velocity
3). Canal depth
4). Canal slope

Correct Answer: 1). Grain size of silt

Solution:

$$f = 1.76\sqrt{d}$$

Ref: Irrigation Engineering – S.K. Garg

---

176. The main objective of cross drainage works is

1). Prevent canal overflow
2). Allow canal and drainage to cross each other
3). Increase discharge
4). Store water

Correct Answer: 2). Allow canal and drainage to cross each other

Solution:
Ensures uninterrupted flow.

Ref: Irrigation Engineering – B.C. Punmia

---

177. Aqueduct carries

1). Canal over drain
2). Drain over canal
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Canal over drain

Solution:
Canal water flows above drainage.

Ref: Irrigation Engineering – B.C. Punmia

---

178. Super passage carries

1). Drain over canal
2). Canal over drain
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Drain over canal

Solution:
Drain water flows above canal.

Ref: Irrigation Engineering – B.C. Punmia

---

179. Canal siphon carries

1). Canal under drain
2). Drain under canal
3). Canal over drain
4). Drain over canal

Correct Answer: 1). Canal under drain

Solution:
Canal water flows under pressure.

Ref: Irrigation Engineering – S.K. Garg

---

180. Level crossing occurs when

1). Canal and drain beds at same level
2). Canal above drain
3). Canal below drain
4). Drain above canal

Correct Answer: 1). Canal and drain beds at same level

Solution:
Both flows regulated.

Ref: Irrigation Engineering – B.C. Punmia

---

181. Canal fall is provided to

1). Reduce bed slope
2). Control velocity
3). Dissipate energy
4). All of these

Correct Answer: 4). All of these

Solution:
Important canal structure.

Ref: Irrigation Engineering – S.K. Garg

---

182. Escapes are provided in canals to

1). Dispose excess water
2). Increase discharge
3). Reduce velocity
4). Store water

Correct Answer: 1). Dispose excess water

Solution:
Protect canal system.

Ref: Irrigation Engineering – B.C. Punmia

---

183. Water courses carry water from

1). Main canal to distributary
2). Distributary to field
3). Reservoir to canal
4). River to reservoir

Correct Answer: 2). Distributary to field

Solution:
Small field channels.

Ref: Irrigation Engineering – S.K. Garg

---

184. Canal distributaries receive water from

1). Main canal
2). Reservoir
3). Drain
4). River

Correct Answer: 1). Main canal

Solution:
Branch channels of canal system.

Ref: Irrigation Engineering – S.K. Garg

---

185. Irrigation improves

1). Crop yield
2). Soil moisture
3). Agricultural productivity
4). All of these

Correct Answer: 4). All of these

Solution:
Major benefit of irrigation.

Ref: Irrigation Engineering – S.K. Garg

---

186. The main aim of irrigation planning is

1). Efficient water use
2). Crop production increase
3). Drought mitigation
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated water management.

Ref: Irrigation Engineering – S.K. Garg

---

187. Hydrology helps irrigation engineering in

1). Rainfall analysis
2). Runoff estimation
3). Flood prediction
4). All of these

Correct Answer: 4). All of these

Solution:
Hydrology supports irrigation planning.

Ref: Engineering Hydrology – K. Subramanya

---

188. Catchment area determines

1). Reservoir storage
2). Flood discharge
3). Runoff
4). All of these

Correct Answer: 4). All of these

Solution:
Catchment characteristics affect water availability.

Ref: Engineering Hydrology – K. Subramanya

---

189. The main irrigation season in India is

1). Winter
2). Summer
3). Monsoon
4). Spring

Correct Answer: 3). Monsoon

Solution:
Major crop season.

Ref: Irrigation Engineering – S.K. Garg

---

190. Drip irrigation is most suitable for

1). Water scarcity regions
2). Orchard crops
3). Vegetable crops
4). All of these

Correct Answer: 4). All of these

Solution:
Highly efficient irrigation method.

Ref: Irrigation Engineering – S.K. Garg

---

191. Sprinkler irrigation simulates

1). Canal irrigation
2). Natural rainfall
3). Flood irrigation
4). Drip irrigation

Correct Answer: 2). Natural rainfall

Solution:
Water sprayed through nozzles.

Ref: Irrigation Engineering – S.K. Garg

---

192. Furrow irrigation is suitable for

1). Row crops
2). Rice crops
3). Orchards
4). Grass

Correct Answer: 1). Row crops

Solution:
Water flows between crop rows.

Ref: Irrigation Engineering – S.K. Garg

---

193. Basin irrigation is commonly used for

1). Orchards
2). Wheat crops
3). Cotton crops
4). Maize crops

Correct Answer: 1). Orchards

Solution:
Water supplied around tree basin.

Ref: Irrigation Engineering – B.C. Punmia

---

194. Check flooding irrigation is suitable for

1). Flat land
2). Steep land
3). Rocky land
4). Sandy land

Correct Answer: 1). Flat land

Solution:
Water spreads uniformly.

Ref: Irrigation Engineering – S.K. Garg

---

195. Lift irrigation requires

1). Gravity flow
2). Pumping devices
3). Canal slope
4). River flow

Correct Answer: 2). Pumping devices

Solution:
Water lifted mechanically.

Ref: Irrigation Engineering – S.K. Garg

---

196. Flow irrigation occurs when

1). Water flows by gravity
2). Water pumped to field
3). Rainfall irrigation
4). Reservoir irrigation

Correct Answer: 1). Water flows by gravity

Solution:
Fields lie below source.

Ref: Irrigation Engineering – S.K. Garg

---

197. Irrigation reduces

1). Crop failure risk
2). Drought effects
3). Rainfall dependence
4). All of these

Correct Answer: 4). All of these

Solution:
Ensures stable agricultural production.

Ref: Irrigation Engineering – S.K. Garg

---

198. Reservoirs are constructed mainly to

1). Store water
2). Regulate river flow
3). Provide irrigation supply
4). All of these

Correct Answer: 4). All of these

Solution:
Multipurpose water resource structures.

Ref: Irrigation Engineering – S.K. Garg

---

199. The ultimate objective of irrigation engineering is

1). Efficient water resource utilization
2). Increase crop production
3). Ensure food security
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated irrigation development.

Ref: Irrigation Engineering – S.K. Garg

---

200. Irrigation engineering mainly deals with

1). Water supply to crops
2). Water storage and distribution
3). Flood control
4). All of these

Correct Answer: 4). All of these

Solution:
Irrigation engineering integrates hydrology, structures, and agriculture.

Ref: Irrigation Engineering – S.K. Garg

AP ECET CIVIL – MOST REPEATED PYQs (2019–2025)

Top 300 High Probability Questions

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1. Hooke's law states that within elastic limit
1). Stress is inversely proportional to strain
2). Stress is directly proportional to strain
3). Stress is equal to strain
4). Stress is independent of strain

Correct Answer: 2). Stress is directly proportional to strain

Solution:

$$\sigma \propto \epsilon$$

Within elastic limit.

Ref: Strength of Materials – R.K. Bansal

---

2. The ratio of lateral strain to longitudinal strain is called

1). Young's modulus
2). Bulk modulus
3). Poisson's ratio
4). Modulus of rigidity

Correct Answer: 3). Poisson's ratio

Solution:

$$\mu = \frac{Lateral\ strain}{Longitudinal\ strain}$$

Ref: Strength of Materials – R.K. Bansal

---

3. The unit of Young’s modulus is

1). N
2). N/m
3). N/m^2
4). m^2

Correct Answer: 3). N/m^2

Solution:
Young’s modulus is stress/strain.

Ref: Strength of Materials – R.K. Bansal

---

4. The bending moment at the free end of a cantilever beam is

1). Maximum
2). Zero
3). Minimum
4). Constant

Correct Answer: 2). Zero

Solution:
Free end has no resisting moment.

Ref: Strength of Materials – R.K. Bansal

---

5. The shear force at the free end of cantilever beam is

1). Maximum
2). Zero
3). Minimum
4). Infinite

Correct Answer: 2). Zero

Solution:
No load beyond free end.

Ref: Strength of Materials – R.K. Bansal

---

6. In a simply supported beam with UDL, the maximum bending moment occurs at

1). Support
2). Midspan
3). Quarter span
4). Free end

Correct Answer: 2). Midspan

Solution:

$$M_{max} = \frac{wL^2}{8}$$

Ref: Strength of Materials – R.K. Bansal

---

7. The bending stress in a beam is given by

1). $M/I = \sigma/y$
2). $M/I = \sigma/y = E/R$
3). $E/I = M/y$
4). $R/I = M/y$

Correct Answer: 2). $M/I = \sigma/y = E/R$

Solution:
Fundamental bending equation.

Ref: Strength of Materials – R.K. Bansal

---

8. The section modulus is defined as

1). I/y
2). I/A
3). A/I
4). y/I

Correct Answer: 1). I/y

Solution:

$$Z = \frac{I}{y}$$

Ref: Strength of Materials – R.K. Bansal

---

9. Shear stress in a rectangular beam is maximum at

1). Top fiber
2). Bottom fiber
3). Neutral axis
4). Edge

Correct Answer: 3). Neutral axis

Solution:
Shear stress distribution is parabolic.

Ref: Strength of Materials – R.K. Bansal

---

10. In a circular section beam, shear stress is

1). Maximum at outer fiber
2). Maximum at center
3). Zero at center
4). Uniform

Correct Answer: 2). Maximum at center

Solution:
Maximum shear stress occurs at center.

Ref: Strength of Materials – R.K. Bansal

---

11. Euler's formula for buckling load of column is

1). $P = \frac{\pi^2 EI}{L^2}$
2). $P = \frac{EI}{L^2}$
3). $P = \frac{\pi EI}{L}$
4). $P = EI/L$

Correct Answer: 1). $P = \frac{\pi^2 EI}{L^2}$

Solution:
Critical load formula.

Ref: Strength of Materials – R.K. Bansal

---

12. Slenderness ratio is defined as

1). L/r
2). r/L
3). L/A
4). A/L

Correct Answer: 1). L/r

Solution:

$$Slenderness = \frac{Effective\ length}{Radius\ of\ gyration}$$

Ref: Strength of Materials – R.K. Bansal

---

13. The centroid of a triangle lies at

1). h/2
2). h/3 from base
3). h/4
4). h/6

Correct Answer: 2). h/3 from base

Solution:
Standard centroid location.

Ref: Strength of Materials – Bansal

---

14. In truss analysis the joints are assumed to be

1). Fixed
2). Rigid
3). Pin joints
4). Welded joints

Correct Answer: 3). Pin joints

Solution:
Members carry only axial forces.

Ref: Theory of Structures – S. Ramamrutham

---

15. The method used for truss analysis joint by joint is

1). Method of sections
2). Method of joints
3). Moment distribution method
4). Slope deflection method

Correct Answer: 2). Method of joints

Solution:
Equilibrium applied at joints.

Ref: Theory of Structures – Ramamrutham

---

16. The active earth pressure theory was developed by

1). Rankine
2). Coulomb
3). Newton
4). Pascal

Correct Answer: 1). Rankine

Solution:
Rankine earth pressure theory.

Ref: Soil Mechanics – B.C. Punmia

---

17. Characteristic strength of concrete means

1). Average strength
2). Minimum strength
3). Strength below which only 5% results fall
4). Maximum strength

Correct Answer: 3). Strength below which only 5% results fall

Solution:
Definition from **IS 456:2000**.

Ref: Reinforced Concrete – B.C. Punmia

---

18. The grade M20 concrete indicates

1). 20 N/mm² compressive strength
2). 20 N compressive strength
3). 20 kg strength
4). 20 MPa tensile strength

Correct Answer: 1). 20 N/mm² compressive strength

Solution:
28-day cube strength.

Ref: RCC – B.C. Punmia

---

19. Development length in RCC depends on

1). Diameter of bar
2). Bond stress
3). Steel stress
4). All of these

Correct Answer: 4). All of these

Solution:

$$L_d = \frac{\phi\sigma_s}{4\tau_{bd}}$$

Ref: RCC – B.C. Punmia

---

20. Chain surveying is based on

1). Principle of triangulation
2). Principle of levelling
3). Principle of contouring
4). Principle of GPS

Correct Answer: 1). Principle of triangulation

Solution:
Area divided into triangles.

Ref: Surveying – B.C. Punmia

---

21. The bearing of a line measured clockwise from north is called
1). Whole circle bearing
2). Reduced bearing
3). Magnetic bearing
4). True bearing

Correct Answer: 1). Whole circle bearing

Solution:
Whole circle bearing ranges from **0° to 360°** measured clockwise from north.

Ref: Surveying – B.C. Punmia

---

22. The instrument used for measuring horizontal angles in surveying is

1). Compass
2). Theodolite
3). Dumpy level
4). Plane table

Correct Answer: 2). Theodolite

Solution:
Theodolite measures both **horizontal and vertical angles**.

Ref: Surveying – B.C. Punmia

---

23. The instrument used for levelling is

1). Theodolite
2). Dumpy level
3). Compass
4). Plane table

Correct Answer: 2). Dumpy level

Solution:
Used to determine elevation differences.

Ref: Surveying – B.C. Punmia

---

24. The line joining points of equal elevation is called

1). Benchmark
2). Contour
3). Datum line
4). Survey line

Correct Answer: 2). Contour

Solution:
Contours represent **same elevation on maps**.

Ref: Surveying – B.C. Punmia

---

25. Local attraction in compass surveying is caused by

1). Magnetic substances
2). Gravity
3). Wind
4). Rainfall

Correct Answer: 1). Magnetic substances

Solution:
Iron objects disturb compass needle.

Ref: Surveying – B.C. Punmia

---

26. A piezometer measures

1). Velocity
2). Pressure head
3). Discharge
4). Density

Correct Answer: 2). Pressure head

Solution:
Simple pressure measuring device.

Ref: Fluid Mechanics – R.K. Bansal

---

27. A venturimeter is used to measure

1). Pressure
2). Velocity
3). Discharge
4). Density

Correct Answer: 3). Discharge

Solution:
Works using Bernoulli's principle.

Ref: Fluid Mechanics – R.K. Bansal

---

28. Reynolds number is used to determine

1). Velocity
2). Pressure
3). Flow type
4). Discharge

Correct Answer: 3). Flow type

Solution:
Determines **laminar or turbulent flow**.

Ref: Fluid Mechanics – R.K. Bansal

---

29. The critical Reynolds number for pipe flow is approximately

1). 1000
2). 2000
3). 4000
4). 6000

Correct Answer: 2). 2000

Solution:
Below 2000 → laminar flow.

Ref: Fluid Mechanics – R.K. Bansal

---

30. The continuity equation is based on

1). Newton's law
2). Conservation of mass
3). Pascal's law
4). Energy law

Correct Answer: 2). Conservation of mass

Solution:

$$A_1V_1 = A_2V_2$$

Ref: Fluid Mechanics – R.K. Bansal

---

31. Bernoulli's theorem represents conservation of

1). Energy
2). Momentum
3). Mass
4). Pressure

Correct Answer: 1). Energy

Solution:

$$\frac{P}{\gamma} + \frac{V^2}{2g} + z = constant$$

Ref: Fluid Mechanics – R.K. Bansal

---

32. The coefficient of discharge for an orifice is approximately

1). 0.3
2). 0.62

3). 0.85
4). 1.0

Correct Answer: 2). 0.62

Solution:
Typical value for sharp edged orifice.

Ref: Fluid Mechanics – R.K. Bansal

---

33. Hydraulic radius is defined as

1). Area / wetted perimeter
2). Wetted perimeter / area
3). Velocity / area
4). Area × velocity

Correct Answer: 1). Area / wetted perimeter

Solution:

$$R = \frac{A}{P}$$

Ref: Fluid Mechanics – R.K. Bansal

---

34. The discharge over a rectangular notch varies as

1). $H^{3/2}$
2). $H^{5/2}$
3). H^2
4). H

Correct Answer: 1). $H^{3/2}$

Solution:
Standard notch formula.

Ref: Fluid Mechanics – R.K. Bansal

---

35. The discharge over a triangular notch varies as

1). $H^{3/2}$
2). $H^{5/2}$
3). H^2
4). H

Correct Answer: 2). $H^{5/2}$

Solution:
Characteristic relation.

Ref: Fluid Mechanics – R.K. Bansal

---

36. Chezy's formula for open channel flow is

1). $V = C\sqrt{RS}$
2). $V = RS$
3). $V = CR$
4). $V = S/R$

Correct Answer: 1). $V = C\sqrt{RS}$

Solution:
Velocity equation for open channels.

Ref: Fluid Mechanics – R.K. Bansal

---

37. Manning's equation is

1). $V = C\sqrt{RS}$
2). $V = \frac{1}{n}R^{2/3}S^{1/2}$
3). $V = RS$
4). $V = R/S$

Correct Answer: 2). $V = \frac{1}{n}R^{2/3}S^{1/2}$

Solution:
Common equation for channel flow.

Ref: Fluid Mechanics – Modi & Seth

---

38. Pelton wheel turbine works on

1). Reaction principle
2). Impulse principle
3). Pressure principle
4). Hydraulic principle

Correct Answer: 2). Impulse principle

Solution:
Water jet strikes buckets.

Ref: Fluid Mechanics – R.K. Bansal

---

39. Francis turbine is a

1). Impulse turbine
2). Reaction turbine
3). Axial turbine
4). Radial turbine

Correct Answer: 2). Reaction turbine

Solution:
Mixed flow reaction turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

40. Kaplan turbine is suitable for

1). High head
2). Medium head
3). Low head
4). Very high head

Correct Answer: 3). Low head

Solution:
Axial flow turbine.

Ref: Fluid Mechanics – R.K. Bansal

---

41. The depth of water required by crop during base period is

1). Duty
2). Delta
3). Discharge
4). Rainfall

Correct Answer: 2). Delta

Solution:
Total water depth required.

Ref: Irrigation Engineering – S.K. Garg

---

42. The unit of duty of water is

1). hectares/cumec
2). m^3/s
3). meters
4). mm

Correct Answer: 1). hectares/cumec

Solution:
Area irrigated per unit discharge.

Ref: Irrigation Engineering – S.K. Garg

---

43. The relationship between duty and delta is

1). Directly proportional
2). Inversely proportional
3). Equal
4). Independent

Correct Answer: 2). Inversely proportional

Solution:

$$\Delta = \frac{8.64B}{D}$$

Ref: Irrigation Engineering – S.K. Garg

---

44. Flood discharge in rivers can be estimated using

1). Ryve’s formula
2). Dicken’s formula
3). Rational formula
4). All of these

Correct Answer: 4). All of these

Solution:
Empirical flood estimation formulas.

Ref: Irrigation Engineering – S.K. Garg

---

45. Diversion head works are used to

1). Store water
2). Divert river water into canals
3). Generate electricity
4). Increase rainfall

Correct Answer: 2). Divert river water into canals

Solution:
Main irrigation structure.

Ref: Irrigation Engineering – B.C. Punmia

---

46. A barrage differs from a weir because

1). Barrage has gates
2). Barrage is smaller
3). Barrage stores water
4). Barrage is temporary

Correct Answer: 1). Barrage has gates

Solution:
Flow controlled using gates.

Ref: Irrigation Engineering – S.K. Garg

---

47. The most economical rectangular channel occurs when

1). width = depth
2). width = 2 × depth
3). width = 3 × depth
4). width = depth/2

Correct Answer: 2). width = 2 × depth

Solution:
Condition for maximum hydraulic efficiency.

Ref: Fluid Mechanics – R.K. Bansal

---

48. Canal lining is provided to

1). Reduce seepage
2). Increase velocity
3). Reduce maintenance
4). All of these

Correct Answer: 4). All of these

Solution:
Improves canal efficiency.

Ref: Irrigation Engineering – S.K. Garg

---

49. Lacey's theory is used for

1). Dam design
2). Canal design in alluvial soil
3). Pump design
4). Reservoir design

Correct Answer: 2). Canal design in alluvial soil

Solution:
Stable channel theory.

Ref: Irrigation Engineering – S.K. Garg

---

50. Cross drainage works are provided when

1). Canal crosses drain
2). Drain crosses canal
3). Both flows intersect
4). All of these

Correct Answer: 4). All of these

Solution:
Ensures uninterrupted flow.

Ref: Irrigation Engineering – B.C. Punmia

---

51. Aqueduct carries

1). Canal over drain
2). Drain over canal
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Canal over drain

Solution:
Canal water passes above.

Ref: Irrigation Engineering – B.C. Punmia

---

52. Super passage carries

1). Drain over canal
2). Canal over drain
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Drain over canal

Solution:
Drain passes above canal.

Ref: Irrigation Engineering – B.C. Punmia

---

53. Canal siphon carries

1). Canal under drain
2). Canal over drain
3). Drain under canal
4). Drain over canal

Correct Answer: 1). Canal under drain

Solution:
Canal water flows below drain.

Ref: Irrigation Engineering – S.K. Garg

---

54. The main objective of irrigation is

1). Increase crop yield
2). Reduce drought
3). Ensure water supply
4). All of these

Correct Answer: 4). All of these

Solution:
Irrigation improves agricultural productivity.

Ref: Irrigation Engineering – S.K. Garg

---

55. The phreatic line in an earth dam represents

1). Pressure line
2). Seepage line
3). Velocity line
4). Energy line

Correct Answer: 2). Seepage line

Solution:
Separates saturated and unsaturated zones.

Ref: Irrigation Engineering – B.C. Punmia

---

56. Gravity dams resist water pressure mainly by

1). Weight of dam
2). Arch action
3). Buttress action
4). Reinforcement

Correct Answer: 1). Weight of dam

Solution:
Self-weight provides stability.

Ref: Irrigation Engineering – S.K. Garg

---

57. Spillways are provided in dams to

1). Store water
2). Release excess flood water
3). Increase reservoir capacity
4). Reduce rainfall

Correct Answer: 2). Release excess flood water

Solution:
Prevents overtopping failure.

Ref: Irrigation Engineering – B.C. Punmia

---

58. Dead storage in reservoir is

1). Useful storage
2). Storage below MDDL
3). Flood storage
4). Canal storage

Correct Answer: 2). Storage below MDDL

Solution:
Not used for irrigation.

Ref: Irrigation Engineering – S.K. Garg

---

59. Live storage in reservoir is

1). Storage above MWL
2). Storage between FRL and MDDL
3). Storage below river bed
4). Flood storage

Correct Answer: 2). Storage between FRL and MDDL

Solution:
Available for irrigation use.

Ref: Irrigation Engineering – S.K. Garg

---

60. The ultimate aim of irrigation engineering is

1). Increase agricultural production
2). Efficient water management
3). Sustainable agriculture
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated irrigation development.

Ref: Irrigation Engineering – S.K. Garg

---

61. The strain energy stored in a body due to deformation is also called
1). Potential energy
2). Resilience
3). Impact energy
4). Kinetic energy

Correct Answer: 2). Resilience

Solution:
Energy stored in elastic deformation is called **resilience**.

Ref: Strength of Materials – R.K. Bansal

---

62. Modulus of resilience is defined as

1). Maximum strain energy per unit volume
2). Maximum stress per unit area
3). Maximum strain
4). Elastic limit stress

Correct Answer: 1). Maximum strain energy per unit volume

Solution:
Represents energy absorbed up to elastic limit.

Ref: Strength of Materials – R.K. Bansal

---

63. The point where bending moment changes sign is called

1). Point of maximum moment
2). Point of inflection
3). Neutral axis
4). Critical point

Correct Answer: 2). Point of inflection

Solution:
At this point bending moment becomes zero.

Ref: Strength of Materials – R.K. Bansal

---

64. In a simply supported beam with central point load, maximum bending moment is

1). $WL/2$
2). $WL/4$
3). $WL/8$
4). WL

Correct Answer: 2). $WL/4$

Solution:

$$M = \frac{WL}{4}$$

Ref: Strength of Materials – R.K. Bansal

65. In a cantilever beam with point load at free end, maximum bending moment is

1). WL
2). $WL/2$
3). $WL/4$
4). $WL/8$

Correct Answer: 1). WL

Solution:
Maximum moment occurs at fixed end.

Ref: Strength of Materials – R.K. Bansal

---

66. The slope at free end of cantilever beam carrying point load W is

1). $WL^2/2EI$
2). $WL^3/3EI$
3). WL/EI
4). WL^2/EI

Correct Answer: 1). $WL^2/2EI$

Solution:
Standard cantilever deflection relation.

Ref: Strength of Materials – R.K. Bansal

---

67. The deflection at free end of cantilever with point load is

1). $WL^3/3EI$
2). $WL^2/2EI$
3). WL/EI
4). WL^3/EI

Correct Answer: 1). $WL^3/3EI$

Solution:
Standard formula.

Ref: Strength of Materials – R.K. Bansal

---

68. Euler's column formula is applicable for

1). Short columns
2). Long columns
3). Intermediate columns
4). Hollow columns

Correct Answer: 2). Long columns

Solution:
Buckling occurs in slender columns.

Ref: Strength of Materials – R.K. Bansal

---

69. Rankine's formula is used for

1). Short columns
2). Long columns
3). Intermediate columns
4). Circular columns

Correct Answer: 3). Intermediate columns

Solution:
Combines crushing and buckling effects.

Ref: Strength of Materials – R.K. Bansal

---

70. The force in truss members is determined using

1). Method of joints
2). Method of sections
3). Graphical method
4). All of these

Correct Answer: 4). All of these

Solution:
All are valid analysis methods.

Ref: Theory of Structures – Ramamrutham

---

71. The sum of horizontal forces at a joint in truss is

1). Zero
2). Maximum
3). Minimum
4). Infinite

Correct Answer: 1). Zero

Solution:

$$\sum F_x = 0$$

Ref: Theory of Structures – Ramamrutham

---

72. The sum of vertical forces at truss joint is

1). Zero
2). Maximum
3). Minimum
4). Infinite

Correct Answer: 1). Zero

Solution:

$$\sum F_y = 0$$

Ref: Theory of Structures – Ramamrutham

---

73. Rankine's earth pressure theory assumes

1). Soil is cohesionless
2). Backfill surface is horizontal
3). Soil is homogeneous
4). All of these

Correct Answer: 4). All of these

Solution:
Standard assumptions of Rankine theory.

Ref: Soil Mechanics – B.C. Punmia

74. The active earth pressure coefficient is

1). K_a
2). K_p
3). K_0
4). K_c

Correct Answer: 1). K_a

Solution:
Coefficient of active earth pressure.

Ref: Soil Mechanics – B.C. Punmia

75. The passive earth pressure coefficient is

1). K_a
2). K_p
3). K_c
4). K_0

Correct Answer: 2). K_p

Solution:
Coefficient of passive pressure.

Ref: Soil Mechanics – B.C. Punmia

76. Characteristic strength of concrete is defined as strength below which

1). 10% results fall
2). 5% results fall
3). 20% results fall
4). 1% results fall

Correct Answer: 2). 5% results fall

Solution:
Definition in **IS 456:2000**.

Ref: RCC – B.C. Punmia

77. The partial safety factor for concrete in limit state design is

1). 1.15
2). 1.5
3). 1.75
4). 2.0

Correct Answer: 2). 1.5

Solution:
As per IS 456.

Ref: RCC – B.C. Punmia

---

78. The partial safety factor for steel is

1). 1.15
2). 1.5
3). 1.75
4). 2.0

Correct Answer: 1). 1.15

Solution:
Steel design stress factor.

Ref: RCC – B.C. Punmia

---

79. Limit state of serviceability deals with

1). Strength failure
2). Cracking and deflection
3). Shear failure
4). Buckling

Correct Answer: 2). Cracking and deflection

Solution:
Ensures usability of structure.

Ref: RCC – B.C. Punmia

---

80. Limit state of collapse deals with

1). Structural safety
2). Appearance
3). Durability
4). Maintenance

Correct Answer: 1). Structural safety

Solution:
Ensures structure does not fail.

Ref: RCC – B.C. Punmia

---

81. Development length depends on

1). Bar diameter
2). Bond stress
3). Stress in steel
4). All of these

Correct Answer: 4). All of these

Solution:

$$L_d = \frac{\phi \sigma_s}{4\tau_{bd}}$$

Ref: RCC – B.C. Punmia

---

82. One-way slab spans mainly in

1). Shorter direction
2). Longer direction
3). Both directions
4). Diagonal direction

Correct Answer: 1). Shorter direction

Solution:
Load transferred along short span.

Ref: RCC – B.C. Punmia

83. Two-way slab transfers load

1). In one direction
2). In two directions
3). In three directions
4). Diagonally

Correct Answer: 2). In two directions

Solution:
Occurs when span ratio < 2.

Ref: RCC – B.C. Punmia

---

84. The main reinforcement in slab is provided in

1). Compression zone
2). Tension zone
3). Neutral axis
4). Shear zone

Correct Answer: 2). Tension zone

Solution:
Concrete weak in tension.

Ref: RCC – B.C. Punmia

---

85. Shear reinforcement in beams is provided to resist

1). Bending stress
2). Shear stress
3). Torsion
4). Compression

Correct Answer: 2). Shear stress

Solution:
Stirrups resist shear.

Ref: RCC – B.C. Punmia

---

86. Centre of pressure lies

1). Above centroid
2). At centroid
3). Below centroid
4). At surface

Correct Answer: 3). Below centroid

Solution:
For submerged plane surface.

Ref: Fluid Mechanics – R.K. Bansal

---

87. Surface tension acts along

1). Surface of liquid
2). Bottom of liquid
3). Centre of liquid
4). Liquid column

Correct Answer: 1). Surface of liquid

Solution:
Force per unit length along surface.

Ref: Fluid Mechanics – R.K. Bansal

---

88. Capillary rise is due to

1). Surface tension
2). Gravity
3). Pressure
4). Density

Correct Answer: 1). Surface tension

Solution:
Occurs in small tubes.

Ref: Fluid Mechanics – R.K. Bansal

---

89. The discharge through a pipe is

1). AV
2). A/V
3). V/A
4). $A + V$

Correct Answer: 1). AV

Solution:

$$Q = AV$$

Ref: Fluid Mechanics – R.K. Bansal

---

90. Hydraulic gradient line represents

1). Total energy
2). Pressure head + elevation head
3). Velocity head
4). Pressure only

Correct Answer: 2). Pressure head + elevation head

Solution:

$$HGL = P/\gamma + z$$

Ref: Fluid Mechanics – Khurmi

---

91. Total energy line represents

1). Pressure head
2). Velocity head
3). Elevation head
4). Total energy

Correct Answer: 4). Total energy

Solution:

$$TEL = P/\gamma + V^2/2g + z$$

Ref: Fluid Mechanics – Khurmi

---

92. The difference between TEL and HGL equals

1). Velocity head
2). Pressure head
3). Elevation head
4). Friction loss

Correct Answer: 1). Velocity head

Solution:

$$V^2/2g$$

Ref: Fluid Mechanics – Khurmi

---

93. The most economical trapezoidal channel occurs when

1). Hydraulic radius maximum
2). Wetted perimeter minimum
3). Both
4). None

Correct Answer: 3). Both

Solution:
Condition for efficient flow.

Ref: Fluid Mechanics – Modi & Seth

---

94. Specific energy in open channel flow is

1). Potential energy only
2). Kinetic energy only
3). Potential + kinetic energy
4). Pressure energy

Correct Answer: 3). Potential + kinetic energy

Solution:

$$E = y + V^2/2g$$

Ref: Fluid Mechanics – R.K. Bansal

---

95. Hydraulic jump is useful for

1). Increasing velocity
2). Energy dissipation
3). Increasing pressure
4). Increasing discharge

Correct Answer: 2). Energy dissipation

Solution:
Used in spillways.

Ref: Fluid Mechanics – R.K. Bansal

---

96. Dead storage in reservoir lies below

1). FRL
2). MDDL
3). MWL
4). Crest level

Correct Answer: 2). MDDL

Solution:
Not usable for irrigation.

Ref: Irrigation Engineering – S.K. Garg

---

97. Live storage lies between

1). MWL and crest
2). FRL and MDDL
3). River bed and crest
4). FRL and MWL

Correct Answer: 2). FRL and MDDL

Solution:
Useful reservoir storage.

Ref: Irrigation Engineering – S.K. Garg

---

98. Spillway is used to

1). Store water
2). Release flood water
3). Increase storage
4). Reduce seepage

Correct Answer: 2). Release flood water

Solution:
Prevents overtopping.

Ref: Irrigation Engineering – B.C. Punmia

---

99. Drip irrigation supplies water

1). Drop by drop at roots
2). By flooding
3). By canal flow
4). By rainfall

Correct Answer: 1). Drop by drop at roots

Solution:
Highly efficient irrigation method.

Ref: Irrigation Engineering – S.K. Garg

---

100. Sprinkler irrigation simulates

1). Canal irrigation
2). Natural rainfall
3). Flood irrigation
4). Drip irrigation

Correct Answer: 2). Natural rainfall

Solution:
Water sprayed through nozzles.

Ref: Irrigation Engineering – S.K. Garg

101. The maximum shear force in a simply supported beam carrying UDL occurs at
1). Midspan
2). Quarter span
3). Supports
4). Free end

Correct Answer: 3). Supports

Solution:
For UDL on simply supported beam:

$$V_{max} = \frac{wL}{2}$$

Occurs at supports.

Ref: Strength of Materials – R.K. Bansal

---

102. In a simply supported beam carrying UDL, bending moment at supports is

1). Maximum
2). Minimum
3). Zero
4). Constant

Correct Answer: 3). Zero

Solution:
Supports cannot resist bending moment.

Ref: Strength of Materials – R.K. Bansal

---

103. The moment of inertia of a rectangle about its centroidal axis is

1). $bh^3/12$
2). $b^3h/12$
3). $bh/12$
4). $bh^2/12$

Correct Answer: 1). $bh^3/12$

Solution:
Standard moment of inertia formula.

Ref: Strength of Materials – R.K. Bansal

---

104. Radius of gyration is defined as

1). I/A
2). $\sqrt{I/A}$
3). A/I
4). $\sqrt{A/I}$

Correct Answer: 2). $\sqrt{I/A}$

Solution:

$$k = \sqrt{I/A}$$

Ref: Strength of Materials – R.K. Bansal

---

105. Slenderness ratio of column is

1). L/k
2). k/L
3). A/k
4). I/k

Correct Answer: 1). L/k

Solution:
Important parameter for buckling.

Ref: Strength of Materials – R.K. Bansal

---

106. The buckling load of column decreases when

1). Length increases
2). Length decreases
3). Area increases
4). Modulus increases

Correct Answer: 1). Length increases

Solution:

$$P \propto \frac{1}{L^2}$$

Ref: Strength of Materials – R.K. Bansal

---

107. In truss members carry

1). Bending forces
2). Axial forces only
3). Shear forces
4). Torsion

Correct Answer: 2). Axial forces only

Solution:
Members assumed to be pin connected.

Ref: Theory of Structures – Ramamrutham

---

108. The sum of moments in equilibrium must be

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:

$$\sum M = 0$$

Ref: Theory of Structures – Ramamrutham

---

109. The centre of pressure for vertical plane surface lies

1). Above centroid
2). At centroid
3). Below centroid
4). At water surface

Correct Answer: 3). Below centroid

Solution:
Pressure increases with depth.

Ref: Fluid Mechanics – R.K. Bansal

---

110. The pressure at a depth in liquid is given by

1). $P = \rho g h$
2). $P = \rho h$
3). $P = \rho g / h$
4). $P = h / \rho g$

Correct Answer: 1). $P = \rho g h$

Solution:
Hydrostatic pressure equation.

Ref: Fluid Mechanics – R.K. Bansal

---

111. Specific gravity is defined as

1). Density of liquid / density of water
2). Weight of liquid / volume
3). Pressure / density
4). Density × gravity

Correct Answer: 1). Density of liquid / density of water

Solution:
Dimensionless ratio.

Ref: Fluid Mechanics – R.K. Bansal

---

112. The unit of specific weight is

1). N/m^3
2). N/m^2
3). kg/m^3
4). m^3/s

Correct Answer: 1). N/m^3

Solution:

$$\gamma = \rho g$$

Ref: Fluid Mechanics – R.K. Bansal

---

113. The coefficient of velocity is defined as

1). Actual velocity / theoretical velocity
2). Theoretical velocity / actual velocity
3). Actual discharge / theoretical discharge
4). Area / velocity

Correct Answer: 1). Actual velocity / theoretical velocity

Solution:
Coefficient of velocity definition.

Ref: Fluid Mechanics – R.K. Bansal

---

114. The coefficient of contraction is

1). Area of jet / area of orifice
2). Velocity / area
3). Discharge / velocity
4). Area / discharge

Correct Answer: 1). Area of jet / area of orifice

Solution:
Represents contraction at vena contracta.

Ref: Fluid Mechanics – R.K. Bansal

---

115. The coefficient of discharge is

1). $C_d = C_c + C_v$
2). $C_d = C_c C_v$
3). $C_d = C_c / C_v$
4). $C_d = C_v / C_c$

Correct Answer: 2). $C_d = C_c C_v$

Solution:
Product of contraction and velocity coefficients.

Ref: Fluid Mechanics – R.K. Bansal

---

116. A manometer measures

1). Velocity
2). Pressure difference
3). Discharge
4). Density

Correct Answer: 2). Pressure difference

Solution:
Used in fluid pressure measurement.

Ref: Fluid Mechanics – R.K. Bansal

---

117. Laminar flow occurs when Reynolds number is

1). <2000
2). >4000
3). 2000–4000
4). >6000

Correct Answer: 1). <2000

Solution:
Laminar region.

Ref: Fluid Mechanics – R.K. Bansal

---

118. Turbulent flow occurs when Reynolds number is

1). <2000
2). 2000–4000
3). >4000
4). <1000

Correct Answer: 3). >4000

Solution:
Turbulent region.

Ref: Fluid Mechanics – R.K. Bansal

---

119. The discharge through venturimeter depends on

1). Pressure difference
2). Area of throat
3). Fluid density
4). All of these

Correct Answer: 4). All of these

Solution:
Venturimeter equation parameters.

Ref: Fluid Mechanics – R.K. Bansal

---

120. The main component of hydroelectric plant is

1). Dam
2). Turbine
3). Generator
4). All of these

Correct Answer: 4). All of these

Solution:
All required for power generation.

Ref: Fluid Mechanics – R.K. Bansal

---

121. Duty of water increases when

1). Delta increases
2). Delta decreases
3). Base period increases
4). Rainfall increases

Correct Answer: 2). Delta decreases

Solution:
Duty and delta inversely proportional.

Ref: Irrigation Engineering – S.K. Garg

---

122. The unit of delta is

1). meters
2). centimeters
3). mm
4). hectares

Correct Answer: 2). centimeters

Solution:
Depth of water.

Ref: Irrigation Engineering – S.K. Garg

---

123. The most economical rectangular channel condition is

1). b = y
2). b = 2y
3). b = 3y
4). b = y/2

Correct Answer: 2). b = 2y

Solution:
Width twice depth.

Ref: Fluid Mechanics – Bansal

---

124. Catchment area is the area

1). Receiving rainfall
2). Draining water into river
3). Under irrigation
4). Under canal

Correct Answer: 2). Draining water into river

Solution:
Also called drainage basin.

Ref: Hydrology – Subramanya

---

125. Rain gauge measures

1). Rainfall depth
2). Rainfall velocity
3). Wind speed
4). Pressure

Correct Answer: 1). Rainfall depth

Solution:
Measured in mm.

Ref: Hydrology – Subramanya

---

126. Symon’s rain gauge is

1). Recording type
2). Non-recording type
3). Digital gauge
4). Pressure gauge

Correct Answer: 2). Non-recording type

Solution:
Standard rain gauge in India.

Ref: Hydrology – Subramanya

---

127. Flood discharge estimation using empirical formula includes

1). Dicken’s formula
2). Ryve’s formula
3). Inglis formula
4). All of these

Correct Answer: 4). All of these

Solution:
Various empirical formulas.

Ref: Irrigation Engineering – Garg

---

128. Reservoir storage between FRL and MWL is

1). Dead storage
2). Live storage
3). Surcharge storage
4). Flood storage

Correct Answer: 3). Surcharge storage

Solution:
Temporary storage during floods.

Ref: Irrigation Engineering – Garg

---

129. Gravity dam resists water pressure mainly by

1). Weight of dam
2). Reinforcement
3). Arch action
4). Buttress action

Correct Answer: 1). Weight of dam

Solution:
Self-weight provides stability.

Ref: Irrigation Engineering – Garg

---

130. Earth dam belongs to

1). Rigid dams
2). Non-rigid dams
3). Gravity dams
4). Arch dams

Correct Answer: 2). Non-rigid dams

Solution:
Flexible structure.

Ref: Irrigation Engineering – Punmia

---

131. Phreatic line in earth dam represents

1). Seepage line
2). Pressure line
3). Energy line
4). Velocity line

Correct Answer: 1). Seepage line

Solution:
Water seepage boundary.

Ref: Irrigation Engineering – Punmia

---

132. Canal lining reduces

1). Seepage losses
2). Maintenance cost
3). Weed growth
4). All of these

Correct Answer: 4). All of these

Solution:
Improves canal efficiency.

Ref: Irrigation Engineering – Garg

---

133. Lacey's theory applies to

1). Rigid canals
2). Alluvial canals
3). Reservoirs
4). Gravity dams

Correct Answer: 2). Alluvial canals

Solution:
Stable channel theory.

Ref: Irrigation Engineering – Garg

---

134. Aqueduct carries

1). Canal over drain
2). Drain over canal
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Canal over drain

Solution:
Canal passes above drainage.

Ref: Irrigation Engineering – Punmia

---

135. Super passage carries

1). Drain over canal
2). Canal over drain
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Drain over canal

Solution:
Drain flows above canal.

Ref: Irrigation Engineering – Punmia

---

136. Canal siphon carries

1). Canal under drain
2). Drain under canal
3). Canal over drain
4). Drain over canal

Correct Answer: 1). Canal under drain

Solution:
Canal passes under drain.

Ref: Irrigation Engineering – Garg

---

137. Level crossing occurs when

1). Canal above drain
2). Drain above canal
3). Canal and drain at same level
4). Canal below drain

Correct Answer: 3). Canal and drain at same level

Solution:
Controlled using regulators.

Ref: Irrigation Engineering – Punmia

---

138. Canal falls are used to

1). Reduce slope
2). Dissipate energy
3). Maintain bed level
4). All of these

Correct Answer: 4). All of these

Solution:
Energy control structure.

Ref: Irrigation Engineering – Garg

---

139. Water courses supply water from

1). Main canal
2). Distributary
3). Reservoir
4). River

Correct Answer: 2). Distributary

Solution:
Carry water to fields.

Ref: Irrigation Engineering – Garg

---

140. The ultimate aim of irrigation planning is

1). Increase crop production
2). Efficient water use
3). Sustainable agriculture
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated irrigation development.

Ref: Irrigation Engineering – Garg

---

141. The shear stress distribution in a rectangular beam is
1). Uniform
2). Linear
3). Parabolic
4). Circular

Correct Answer: 3). Parabolic

Solution:
Maximum shear stress occurs at the neutral axis and decreases towards the outer fibers.

Ref: Strength of Materials – R.K. Bansal

---

142. Shear stress at the outer surface of a beam is

1). Maximum
2). Minimum

3). Zero
4). Constant

Correct Answer: 3). Zero

Solution:
Shear stress becomes zero at the extreme fibers.

Ref: Strength of Materials – R.K. Bansal

---

143. The neutral axis of a beam is the axis where

1). Stress is maximum
2). Stress is zero
3). Strain is maximum
4). Moment is maximum

Correct Answer: 2). Stress is zero

Solution:
Neutral axis separates tension and compression zones.

Ref: Strength of Materials – R.K. Bansal

---

144. In simple bending, the neutral axis passes through

1). Centroid of section
2). Top fiber
3). Bottom fiber
4). Edge

Correct Answer: 1). Centroid of section

Solution:
Assumption in bending theory.

Ref: Strength of Materials – R.K. Bansal

---

145. The deflection of a simply supported beam carrying UDL is maximum at

1). Supports
2). Midspan

3). Quarter span
4). Free end

Correct Answer: 2). Midspan

Solution:
Maximum deflection occurs at center.

Ref: Strength of Materials – R.K. Bansal

---

146. The maximum deflection of simply supported beam with UDL is

1). $5wL^4/384EI$
2). $WL^3/3EI$
3). $WL^2/2EI$
4). WL^3/EI

Correct Answer: 1). $5wL^4/384EI$

Solution:
Standard beam deflection formula.

Ref: Strength of Materials – R.K. Bansal

---

147. The column effective length for both ends hinged is

1). L
2). L/2
3). 2L
4). L/√2

Correct Answer: 1). L

Solution:
Effective length equals actual length.

Ref: Strength of Materials – R.K. Bansal

---

148. Effective length of column with both ends fixed is

1). L
2). L/2

3). 2L
4). L/4

Correct Answer: 2). L/2

Solution:
Fixed ends reduce buckling length.

Ref: Strength of Materials – R.K. Bansal

---

149. Effective length of column with one end fixed and other free is

1). L
2). 2L
3). L/2
4). L/4

Correct Answer: 2). 2L

Solution:
Worst buckling condition.

Ref: Strength of Materials – R.K. Bansal

---

150. Mohr’s theorem relates to

1). Stress transformation
2). Beam deflection
3). Fluid pressure
4). Column buckling

Correct Answer: 2). Beam deflection

Solution:
Mohr’s theorems used for slope and deflection.

Ref: Theory of Structures – Ramamrutham

---

151. In surveying, a benchmark is a point of

1). Known elevation
2). Known distance
3). Known bearing
4). Known direction

Correct Answer: 1). Known elevation

Solution:
Reference point for levelling.

Ref: Surveying – B.C. Punmia

---

152. The plane table surveying method is

1). Field observation and plotting simultaneously
2). Only observation
3). Only plotting
4). Satellite surveying

Correct Answer: 1). Field observation and plotting simultaneously

Solution:
Plotting done directly in field.

Ref: Surveying – B.C. Punmia

---

153. In compass surveying, the reference direction is

1). True north
2). Magnetic north
3). Arbitrary north
4). Grid north

Correct Answer: 2). Magnetic north

Solution:
Compass needle points toward magnetic north.

Ref: Surveying – B.C. Punmia

---

154. Levelling determines

1). Horizontal angles
2). Elevation difference
3). Distance
4). Bearing

Correct Answer: 2). Elevation difference

Solution:
Used in topographic surveys.

Ref: Surveying – B.C. Punmia

---

155. The back sight reading in levelling is taken on

1). Benchmark
2). Turning point
3). Staff station
4). Any point

Correct Answer: 1). Benchmark

Solution:
Initial reading on known elevation.

Ref: Surveying – B.C. Punmia

---

156. Rise and fall method determines

1). Difference in elevation
2). Distance
3). Bearing
4). Area

Correct Answer: 1). Difference in elevation

Solution:
Levelling calculation method.

Ref: Surveying – B.C. Punmia

---

157. In open channel flow, the hydraulic radius is

1). Area / wetted perimeter
2). Wetted perimeter / area
3). Area × velocity
4). Velocity / area

Correct Answer: 1). Area / wetted perimeter

Solution:

$$R = A/P$$

Ref: Fluid Mechanics – R.K. Bansal

---

158. The energy grade line represents

1). Pressure head
2). Velocity head
3). Total energy
4). Elevation head

Correct Answer: 3). Total energy

Solution:

$$EGL = P/\gamma + V^2/2g + z$$

Ref: Fluid Mechanics – Khurmi

---

159. The hydraulic gradient line represents

1). Pressure head + elevation head
2). Velocity head
3). Total head
4). Discharge

Correct Answer: 1). Pressure head + elevation head

Solution:

$$HGL = P/\gamma + z$$

Ref: Fluid Mechanics – Khurmi

---

160. The difference between TEL and HGL equals

1). Velocity head
2). Pressure head
3). Elevation head
4). Friction loss

Correct Answer: 1). Velocity head

Solution:

$$V^2/2g$$

Ref: Fluid Mechanics – Khurmi

---

161. The most economical trapezoidal channel occurs when

1). Wetted perimeter minimum
2). Hydraulic radius maximum
3). Both
4). None

Correct Answer: 3). Both

Solution:
Condition for maximum efficiency.

Ref: Fluid Mechanics – Modi & Seth

---

162. A rectangular channel is most economical when

1). b = y
2). b = 2y
3). b = 3y
4). b = y/2

Correct Answer: 2). b = 2y

Solution:
Width twice depth.

Ref: Fluid Mechanics – Bansal

---

163. The duty of water is expressed in

1). hectares/cumec
2). m^3/s
3). meters
4). mm

Correct Answer: 1). hectares/cumec

Solution:
Area irrigated per unit discharge.

Ref: Irrigation Engineering – Garg

---

164. The depth of water required by crop is called

1). Duty
2). Delta
3). Discharge
4). Base period

Correct Answer: 2). Delta

Solution:
Water depth required for crop.

Ref: Irrigation Engineering – Garg

---

165. Base period is measured in

1). hours
2). days
3). months
4). years

Correct Answer: 2). days

Solution:
Time between first and last irrigation.

Ref: Irrigation Engineering – Garg

166. Flood discharge estimation formula includes

1). Dicken’s formula
2). Ryve’s formula
3). Inglis formula
4). All of these

Correct Answer: 4). All of these

Solution:
Empirical flood formulas.

Ref: Irrigation Engineering – Garg

167. Diversion head works include

1). Weir
2). Barrage
3). Canal regulator
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple structures involved.

Ref: Irrigation Engineering – Punmia

168. Barrage differs from weir because

1). Barrage has gates
2). Barrage stores water
3). Barrage is temporary
4). Barrage is smaller

Correct Answer: 1). Barrage has gates

Solution:
Flow controlled by gates.

Ref: Irrigation Engineering – Garg

169. Gravity dam is a

1). Rigid dam
2). Non-rigid dam
3). Earth dam
4). Rockfill dam

Correct Answer: 1). Rigid dam

Solution:
Constructed of masonry or concrete.

Ref: Irrigation Engineering – Garg

---

170. Earth dam is classified as

1). Rigid dam
2). Non-rigid dam
3). Gravity dam
4). Arch dam

Correct Answer: 2). Non-rigid dam

Solution:
Flexible structure.

Ref: Irrigation Engineering – Punmia

---

171. The phreatic line indicates

1). Seepage line
2). Pressure line
3). Energy line
4). Velocity line

Correct Answer: 1). Seepage line

Solution:
Boundary of saturated zone.

Ref: Irrigation Engineering – Punmia

---

172. Canal lining reduces

1). Seepage losses
2). Maintenance
3). Weed growth
4). All of these

Correct Answer: 4). All of these

Solution:
Improves canal efficiency.

Ref: Irrigation Engineering – Garg

---

173. Lacey's theory applies to

1). Rigid canals
2). Alluvial canals
3). Reservoirs
4). Gravity dams

Correct Answer: 2). Alluvial canals

Solution:
Stable channel theory.

Ref: Irrigation Engineering – Garg

---

174. Aqueduct carries

1). Canal over drain
2). Drain over canal
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Canal over drain

Solution:
Canal passes above drainage.

Ref: Irrigation Engineering – Punmia

---

175. Super passage carries

1). Drain over canal
2). Canal over drain
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Drain over canal

Solution:
Drain passes above canal.

Ref: Irrigation Engineering – Punmia

---

176. Canal siphon carries

1). Canal under drain
2). Drain under canal
3). Canal over drain
4). Drain over canal

Correct Answer: 1). Canal under drain

Solution:
Canal passes under drainage.

Ref: Irrigation Engineering – Garg

---

177. Level crossing occurs when

1). Canal above drain
2). Drain above canal
3). Canal and drain same level
4). Canal below drain

Correct Answer: 3). Canal and drain same level

Solution:
Controlled by regulators.

Ref: Irrigation Engineering – Punmia

---

178. Canal falls are used for

1). Energy dissipation
2). Maintaining canal slope
3). Reducing velocity
4). All of these

Correct Answer: 4). All of these

Solution:
Important hydraulic structure.

Ref: Irrigation Engineering – Garg

---

179. Distributary is

1). Branch of main canal
2). River channel
3). Reservoir channel
4). Drain channel

Correct Answer: 1). Branch of main canal

Solution:
Supplies water to fields.

Ref: Irrigation Engineering – Garg

---

180. The ultimate aim of irrigation is

1). Increase crop production
2). Efficient water management
3). Sustainable agriculture
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated irrigation planning.

Ref: Irrigation Engineering – Garg

---

181. The modulus of elasticity of steel is approximately

1). 2×10^5 N/mm²
2). 2×10^4 N/mm²
3). 2×10^3 N/mm²
4). 2×10^2 N/mm²

Correct Answer: 1). 2×10^5 N/mm²

Solution:
Young's modulus for structural steel is about **200 GPa**.

Ref: Strength of Materials – R.K. Bansal

---

182. Bulk modulus relates

1). Stress and strain in shear
2). Volumetric stress and volumetric strain
3). Linear stress and strain
4). Bending stress

Correct Answer: 2). Volumetric stress and volumetric strain

Solution:

$$K = \frac{Volumetric\ stress}{Volumetric\ strain}$$

Ref: Strength of Materials – R.K. Bansal

---

183. Modulus of rigidity is also called

1). Young's modulus
2). Shear modulus
3). Bulk modulus
4). Elastic modulus

Correct Answer: 2). Shear modulus

Solution:

$$G = \frac{Shear\ stress}{Shear\ strain}$$

Ref: Strength of Materials – R.K. Bansal

---

184. The relationship between elastic constants is

1). $E = 2G(1 + \mu)$
2). $E = G(1 + \mu)$
3). $E = G/\mu$
4). $E = G - \mu$

Correct Answer: 1). $E = 2G(1 + \mu)$

Solution:
Relation between Young's modulus, shear modulus and Poisson's ratio.

Ref: Strength of Materials – R.K. Bansal

---

185. The point where bending moment becomes zero is called

1). Critical point
2). Neutral point
3). Point of contraflexure
4). Zero moment point

Correct Answer: 3). Point of contraflexure

Solution:
Bending moment changes sign.

Ref: Strength of Materials – R.K. Bansal

---

186. The bending moment diagram for a cantilever with UDL is

1). Linear
2). Parabolic
3). Circular
4). Rectangular

Correct Answer: 2). Parabolic

Solution:
Moment varies as square of distance.

Ref: Strength of Materials – R.K. Bansal

187. In beam theory plane sections remain

1). Curved
2). Plane after bending
3). Distorted
4). Irregular

Correct Answer: 2). Plane after bending

Solution:
Assumption in bending theory.

Ref: Strength of Materials – R.K. Bansal

188. Rankine's formula combines

1). Crushing and buckling
2). Shear and bending
3). Compression and tension
4). Torsion and bending

Correct Answer: 1). Crushing and buckling

Solution:
Used for intermediate columns.

Ref: Strength of Materials – R.K. Bansal

189. A zero force member in truss carries

1). Maximum force
2). Minimum force
3). No force
4). Shear force

Correct Answer: 3). No force

Solution:
Occurs under specific joint conditions.

Ref: Theory of Structures – Ramamrutham

190. The stability of retaining wall depends on

1). Sliding
2). Overturning
3). Bearing pressure
4). All of these

Correct Answer: 4). All of these

Solution:
Important design checks.

Ref: Theory of Structures – Ramamrutham

---

191. The pressure at a point in static fluid acts

1). Upward
2). Downward
3). Equally in all directions
4). Horizontally

Correct Answer: 3). Equally in all directions

Solution:
Pascal’s law.

Ref: Fluid Mechanics – R.K. Bansal

---

192. Atmospheric pressure at sea level is approximately

1). 101.3 kPa
2). 50 kPa
3). 200 kPa
4). 500 kPa

Correct Answer: 1). 101.3 kPa

Solution:
Standard atmospheric pressure.

Ref: Fluid Mechanics – R.K. Bansal

---

193. Gauge pressure is

1). Absolute pressure
2). Pressure above atmospheric pressure
3). Pressure below atmospheric pressure
4). Vacuum pressure

Correct Answer: 2). Pressure above atmospheric pressure

Solution:

$$P_g = P_{abs} - P_{atm}$$

Ref: Fluid Mechanics – R.K. Bansal

---

194. Absolute pressure is

1). Gauge pressure only
2). Atmospheric pressure only
3). Gauge pressure + atmospheric pressure
4). Vacuum pressure

Correct Answer: 3). Gauge pressure + atmospheric pressure

Solution:

$$P_{abs} = P_g + P_{atm}$$

Ref: Fluid Mechanics – R.K. Bansal

---

195. The pitot tube measures

1). Velocity of flow
2). Pressure head
3). Discharge
4). Density

Correct Answer: 1). Velocity of flow

Solution:
Based on Bernoulli's theorem.

Ref: Fluid Mechanics – R.K. Bansal

196. A mouthpiece increases

1). Velocity
2). Discharge
3). Pressure
4). Density

Correct Answer: 2). Discharge

Solution:
External mouthpiece increases flow rate.

Ref: Fluid Mechanics – R.K. Bansal

197. The most economical section of trapezoidal channel occurs when

1). Side slope equals half top width
2). Hydraulic radius maximum
3). Wetted perimeter minimum
4). Both 2 and 3

Correct Answer: 4). Both 2 and 3

Solution:
Efficient channel flow condition.

Ref: Fluid Mechanics – Modi & Seth

198. The velocity of water in canals should be

1). Too high
2). Too low
3). Moderate
4). Zero

Correct Answer: 3). Moderate

Solution:
Avoid erosion and silting.

Ref: Irrigation Engineering – Garg

199. The crest of weir is

1). Bottom edge
2). Top edge
3). Side edge
4). Base

Correct Answer: 2). Top edge

Solution:
Water flows over crest.

Ref: Irrigation Engineering – Garg

---

200. Barrage is a structure constructed across

1). Canal
2). River
3). Reservoir
4). Drain

Correct Answer: 2). River

Solution:
To regulate river flow.

Ref: Irrigation Engineering – Garg

---

201. Dead storage is mainly provided to

1). Store flood water
2). Allow sediment deposition
3). Increase discharge
4). Increase duty

Correct Answer: 2). Allow sediment deposition

Solution:
Sediment accumulates in dead storage.

Ref: Irrigation Engineering – Garg

---

202. Live storage is used for

1). Sediment storage
2). Irrigation supply
3). Flood storage
4). Canal lining

Correct Answer: 2). Irrigation supply

Solution:
Water available for use.

Ref: Irrigation Engineering – Garg

---

203. The upstream face of earth dam is protected by

1). Riprap
2). Concrete
3). Steel
4). Sand

Correct Answer: 1). Riprap

Solution:
Protects against wave erosion.

Ref: Irrigation Engineering – Punmia

---

204. The downstream face of earth dam is protected against

1). Rain erosion
2). Seepage erosion
3). Wind erosion
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple protection methods used.

Ref: Irrigation Engineering – Punmia

---

205. Canal alignment should follow

1). Natural contours
2). Minimum earthwork
3). Stable ground
4). All of these

Correct Answer: 4). All of these

Solution:
Ensures economical canal design.

Ref: Irrigation Engineering – Garg

---

206. The bed width of canal is

1). Top width
2). Bottom width
3). Middle width
4). Side width

Correct Answer: 2). Bottom width

Solution:
Width at canal base.

Ref: Irrigation Engineering – Garg

---

207. The canal bank prevents

1). Overflow of water
2). Seepage
3). Velocity increase
4). Storage

Correct Answer: 1). Overflow of water

Solution:
Retains canal flow.

Ref: Irrigation Engineering – Garg

---

208. Canal distributary receives water from

1). Reservoir
2). Main canal
3). River
4). Drain

Correct Answer: 2). Main canal

Solution:
Branch of main canal.

Ref: Irrigation Engineering – Garg

---

209. Water courses distribute water from

1). Main canal
2). Distributary
3). Reservoir
4). River

Correct Answer: 2). Distributary

Solution:
Small channels supplying fields.

Ref: Irrigation Engineering – Garg

---

210. Irrigation improves

1). Soil moisture
2). Crop yield
3). Agricultural productivity
4). All of these

Correct Answer: 4). All of these

Solution:
Major benefit of irrigation.

Ref: Irrigation Engineering – Garg

---

211. Rainfall intensity is expressed in

1). mm/hr
2). m^3/s
3). N/m^2
4). kg/m^3

Correct Answer: 1). mm/hr

Solution:
Rainfall per unit time.

Ref: Hydrology – Subramanya

---

212. Runoff is the portion of rainfall that

1). Evaporates
2). Infiltrates
3). Flows over land surface
4). Stored in soil

Correct Answer: 3). Flows over land surface

Solution:
Water reaching streams.

Ref: Hydrology – Subramanya

---

213. Catchment area is

1). Area receiving rainfall
2). Area draining water to river
3). Irrigated area
4). Canal area

Correct Answer: 2). Area draining water to river

Solution:
Drainage basin.

Ref: Hydrology – Subramanya

---

214. Hydrology deals with study of

1). Water movement
2). Rainfall
3). Runoff
4). All of these

Correct Answer: 4). All of these

Solution:
Water cycle study.

Ref: Hydrology – Subramanya

---

215. Drip irrigation is most suitable for

1). Orchard crops
2). Water scarcity regions
3). Vegetable crops
4). All of these

Correct Answer: 4). All of these

Solution:
Highly efficient irrigation.

Ref: Irrigation Engineering – Garg

---

216. Sprinkler irrigation is suitable for

1). Sandy soils
2). Uneven lands
3). Light soils
4). All of these

Correct Answer: 4). All of these

Solution:
Flexible irrigation method.

Ref: Irrigation Engineering – Garg

---

217. Furrow irrigation is used for

1). Row crops
2). Rice
3). Orchards
4). Grass

Correct Answer: 1). Row crops

Solution:
Water flows between rows.

Ref: Irrigation Engineering – Garg

---

218. Basin irrigation is suitable for

1). Orchards
2). Wheat
3). Cotton
4). Maize

Correct Answer: 1). Orchards

Solution:
Water applied around tree basin.

Ref: Irrigation Engineering – Punmia

---

219. Check flooding irrigation is suitable for

1). Flat land
2). Steep land
3). Rocky land
4). Sandy land

Correct Answer: 1). Flat land

Solution:
Water spreads over field.

Ref: Irrigation Engineering – Garg

---

220. The ultimate objective of irrigation engineering is

1). Efficient water use
2). Increase crop production
3). Sustainable agriculture
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated irrigation planning.

Ref: Irrigation Engineering – Garg

---

221. The strain produced due to shear stress is called
1). Linear strain
2). Volumetric strain
3). Shear strain
4). Elastic strain

Correct Answer: 3). Shear strain

Solution:
Shear strain is the angular deformation produced by shear stress.

Ref: Strength of Materials – R.K. Bansal

---

222. The unit of strain is

1). N
2). N/m^2
3). Dimensionless
4). m

Correct Answer: 3). Dimensionless

Solution:
Strain is a ratio of deformation to original length.

Ref: Strength of Materials – R.K. Bansal

---

223. A beam is a structural member subjected mainly to

1). Compression
2). Tension
3). Bending
4). Torsion

Correct Answer: 3). Bending

Solution:
Beams resist transverse loads through bending.

Ref: Strength of Materials – R.K. Bansal

---

224. The shear force diagram for a UDL on a simply supported beam is

1). Straight line
2). Parabolic curve
3). Circular curve
4). Exponential curve

Correct Answer: 1). Straight line

Solution:
Shear force varies linearly under UDL.

Ref: Strength of Materials – R.K. Bansal

---

225. Bending moment diagram for UDL on simply supported beam is

1). Straight line
2). Parabolic curve
3). Circular curve
4). Rectangular

Correct Answer: 2). Parabolic curve

Solution:
Moment varies with square of distance.

Ref: Strength of Materials – R.K. Bansal

---

226. The unit of bending moment is

1). N
2). N/m
3). N·m
4). m^2

Correct Answer: 3). N·m

Solution:
Moment = Force × Distance.

Ref: Strength of Materials – R.K. Bansal

---

227. The slope of beam is defined as

1). Rate of change of bending moment
2). Rate of change of deflection
3). Rate of change of shear force
4). Rate of change of load

Correct Answer: 2). Rate of change of deflection

Solution:
Slope = first derivative of deflection curve.

Ref: Theory of Structures – Ramamrutham

---

228. The curvature of beam is proportional to

1). Bending moment
2). Shear force
3). Load
4). Stress

Correct Answer: 1). Bending moment

Solution:

$$\frac{1}{R} = \frac{M}{EI}$$

Ref: Theory of Structures – Ramamrutham

---

229. The Mohr's first theorem relates

1). Slope change
2). Deflection change
3). Moment change
4). Stress change

Correct Answer: 1). Slope change

Solution:
Area under bending moment diagram gives slope change.

Ref: Theory of Structures – Ramamrutham

---

230. The Mohr's second theorem relates

1). Shear force
2). Bending moment
3). Deflection
4). Load

Correct Answer: 3). Deflection

Solution:
Moment of BMD area gives deflection.

Ref: Theory of Structures – Ramamrutham

---

231. The characteristic strength of concrete for M25 grade is

1). 20 N/mm^2
2). 25 N/mm^2
3). 30 N/mm^2
4). 35 N/mm^2

Correct Answer: 2). 25 N/mm^2

Solution:
Strength measured after **28 days**.

Ref: RCC – B.C. Punmia

---

232. The minimum grade of concrete used in RCC is

1). M10
2). M15
3). M20
4). M25

Correct Answer: 3). M20

Solution:
As per **IS 456:2000**.

Ref: RCC – B.C. Punmia

---

233. Steel reinforcement is provided in concrete to resist

1). Compression
2). Tension
3). Shear
4). Bending

Correct Answer: 2). Tension

Solution:
Concrete is weak in tension.

Ref: RCC – B.C. Punmia

---

234. The effective cover in RCC means

1). Distance from steel to surface
2). Distance from steel center to surface
3). Distance from steel edge to surface
4). Distance from beam center

Correct Answer: 2). Distance from steel center to surface

Solution:
Important for durability and bond.

Ref: RCC – B.C. Punmia

---

235. The neutral axis depth in balanced section depends on

1). Steel grade
2). Concrete grade
3). Strain compatibility
4). All of these

Correct Answer: 4). All of these

Solution:
Balanced design condition.

Ref: RCC – B.C. Punmia

---

236. The contour interval is

1). Horizontal distance between contours
2). Vertical distance between contours
3). Slope of contour
4). Area between contours

Correct Answer: 2). Vertical distance between contours

Solution:
Represents elevation difference.

Ref: Surveying – B.C. Punmia

---

237. Close contour lines indicate

1). Gentle slope
2). Steep slope
3). Flat land
4). Plateau

Correct Answer: 2). Steep slope

Solution:
Contours closer where slope is steep.

Ref: Surveying – B.C. Punmia

---

238. Widely spaced contours indicate

1). Steep slope
2). Gentle slope
3). Valley
4). Cliff

Correct Answer: 2). Gentle slope

Solution:
Slope is gradual.

Ref: Surveying – B.C. Punmia

---

239. A valley contour pattern appears as

1). V-shape pointing uphill
2). V-shape pointing downhill
3). Circular
4). Parallel

Correct Answer: 1). V-shape pointing uphill

Solution:
Indicates stream valley.

Ref: Surveying – B.C. Punmia

---

240. A ridge contour pattern appears as

1). V-shape pointing downhill
2). V-shape pointing uphill
3). Circular
4). Parallel

Correct Answer: 1). V-shape pointing downhill

Solution:
Opposite of valley.

Ref: Surveying – B.C. Punmia

---

241. Specific weight of water is approximately

1). 9.81 kN/m^3
2). 1 kN/m^3
3). 100 kN/m^3
4). 0.98 kN/m^3

Correct Answer: 1). 9.81 kN/m^3

Solution:

$$\gamma = 9.81 kN/m^3$$

Ref: Fluid Mechanics – R.K. Bansal

---

242. Dynamic viscosity unit is

1). $N \cdot s/m^2$
2). N/m^2
3). m^2/s
4). kg/m^3

Correct Answer: 1). $N \cdot s/m^2$

Solution:
SI unit of dynamic viscosity.

Ref: Fluid Mechanics – R.K. Bansal

---

243. Kinematic viscosity unit is

1). $N \cdot s/m^2$
2). m^2/s
3). kg/m^3
4). N/m^3

Correct Answer: 2). m^2/s

Solution:

$$\nu = \mu/\rho$$

Ref: Fluid Mechanics – R.K. Bansal

244. Surface tension unit is

1). N/m
2). N/m^2
3). kg/m^3
4). m^2/s

Correct Answer: 1). N/m

Solution:
Force per unit length.

Ref: Fluid Mechanics – R.K. Bansal

245. Capillary rise occurs due to

1). Surface tension
2). Gravity
3). Density
4). Pressure

Correct Answer: 1). Surface tension

Solution:
Occurs in narrow tubes.

Ref: Fluid Mechanics – R.K. Bansal

246. Bernoulli's equation applies to

1). Real viscous flow
2). Ideal fluid flow
3). Compressible flow
4). Turbulent flow

Correct Answer: 2). Ideal fluid flow

Solution:
Assumes frictionless flow.

Ref: Fluid Mechanics – R.K. Bansal

247. Hydraulic jump occurs in

1). Laminar flow
2). Open channel flow
3). Pipe flow
4). Groundwater flow

Correct Answer: 2). Open channel flow

Solution:
Rapid to slow flow transition.

Ref: Fluid Mechanics – R.K. Bansal

---

248. The duty of water depends on

1). Crop type
2). Soil type
3). Climate
4). All of these

Correct Answer: 4). All of these

Solution:
Multiple agricultural factors affect duty.

Ref: Irrigation Engineering – Garg

---

249. Delta is expressed in

1). meters
2). centimeters
3). millimeters
4). hectares

Correct Answer: 2). centimeters

Solution:
Depth of irrigation water.

Ref: Irrigation Engineering – Garg

---

250. Base period represents

1). Crop growth period
2). Time between irrigations
3). Canal operation period
4). Flood period

Correct Answer: 1). Crop growth period

Solution:
Duration between first and last irrigation.

Ref: Irrigation Engineering – Garg

---

251. Perennial irrigation is

1). Seasonal water supply
2). Continuous water supply
3). Rain-fed irrigation
4). Flood irrigation

Correct Answer: 2). Continuous water supply

Solution:
Water available throughout year.

Ref: Irrigation Engineering – Garg

---

252. Inundation irrigation depends on

1). Flood water
2). Reservoir water
3). Canal water
4). Groundwater

Correct Answer: 1). Flood water

Solution:
River floods supply water.

Ref: Irrigation Engineering – Garg

---

253. Flow irrigation uses

1). Gravity flow
2). Pumping
3). Lift irrigation
4). Rainfall

Correct Answer: 1). Gravity flow

Solution:
Fields below water source.

Ref: Irrigation Engineering – Garg

---

254. Lift irrigation uses

1). Gravity flow
2). Pumps
3). Canal slope
4). Flood water

Correct Answer: 2). Pumps

Solution:
Water lifted mechanically.

Ref: Irrigation Engineering – Garg

---

255. The Kharif crops are grown during

1). Winter season
2). Summer season
3). Monsoon season
4). Spring season

Correct Answer: 3). Monsoon season

Solution:
Example: Rice, maize.

Ref: Irrigation Engineering – Garg

---

256. Rabi crops are grown during

1). Winter season
2). Summer season
3). Monsoon season
4). Autumn

Correct Answer: 1). Winter season

Solution:
Example: Wheat, barley.

Ref: Irrigation Engineering – Garg

---

257. The main aim of irrigation is

1). Increase crop production
2). Improve soil moisture
3). Reduce drought risk
4). All of these

Correct Answer: 4). All of these

Solution:
Ensures agricultural stability.

Ref: Irrigation Engineering – Garg

---

258. Reservoir storage includes

1). Dead storage
2). Live storage
3). Surcharge storage
4). All of these

Correct Answer: 4). All of these

Solution:
Different levels of water storage.

Ref: Irrigation Engineering – Garg

---

259. Spillway is used to

1). Store water
2). Release flood water
3). Increase reservoir capacity
4). Reduce evaporation

Correct Answer: 2). Release flood water

Solution:
Protects dam from overtopping.

Ref: Irrigation Engineering – Garg

---

260. The ultimate aim of irrigation engineering is

1). Efficient water use
2). Increase agricultural productivity
3). Sustainable agriculture
4). All of these

Correct Answer: 4). All of these

Solution:
Integrated water management.

Ref: Irrigation Engineering – Garg

---

261. The centre of gravity of a semicircle from its base is located at
1). $4r/3\pi$
2). $r/2$
3). r/π
4). $2r/3$

Correct Answer: 1). $4r/3\pi$

Solution:
Standard centroid formula for semicircular area.

Ref: Strength of Materials – R.K. Bansal

---

262. The moment of inertia of a circle about its centroidal axis is

1). $\pi d^4/32$
2). $\pi d^4/64$
3). $\pi d^4/16$
4). $\pi d^4/128$

Correct Answer: 2). $\pi d^4/64$

Solution:
Moment of inertia for circular section.

Ref: Strength of Materials – R.K. Bansal

---

263. The section modulus of a rectangular section is

1). $bd^2/6$
2). $bd^2/12$
3). $bd^3/6$
4). $bd/6$

Correct Answer: 1). $bd^2/6$

Solution:

$$Z = \frac{I}{y} = \frac{bd^3/12}{d/2} = \frac{bd^2}{6}$$

Ref: Strength of Materials – R.K. Bansal

---

264. If bending moment increases, bending stress will

1). Decrease
2). Increase
3). Remain constant
4). Become zero

Correct Answer: 2). Increase

Solution:

$$\sigma = \frac{My}{I}$$

Ref: Strength of Materials – R.K. Bansal

---

265. The unit of shear stress is

1). N
2). N/m
3). N/m²
4). m²

Correct Answer: 3). N/m²

Solution:
Stress = Force / Area.

Ref: Strength of Materials – R.K. Bansal

---

266. The effective depth of RCC beam is

1). Total depth
2). Depth to compression steel
3). Distance from compression face to tension steel
4). Distance from tension face to neutral axis

Correct Answer: 3). Distance from compression face to tension steel

Solution:
Used in bending design.

Ref: RCC – B.C. Punmia

---

267. The main reinforcement in RCC beam is placed in

1). Compression zone
2). Tension zone
3). Neutral axis
4). Shear zone

Correct Answer: 2). Tension zone

Solution:
Concrete weak in tension.

Ref: RCC – B.C. Punmia

268. Stirrups in RCC beams resist

1). Bending
2). Shear
3). Compression
4). Tension

Correct Answer: 2). Shear

Solution:
Provided as shear reinforcement.

Ref: RCC – B.C. Punmia

269. The minimum number of main bars in RCC column is

1). 2
2). 3
3). 4
4). 6

Correct Answer: 3). 4

Solution:
As per IS 456.

Ref: RCC – B.C. Punmia

270. The minimum grade of concrete for RCC work is

1). M10
2). M15
3). M20
4). M25

Correct Answer: 3). M20

Solution:
IS 456 code requirement.

Ref: RCC – B.C. Punmia

271. The principle of chain surveying is

1). Triangulation
2). Traversing
3). Radiation
4). Intersection

Correct Answer: 1). Triangulation

Solution:
Area divided into triangles.

Ref: Surveying – B.C. Punmia

---

272. Theodolite is used for measuring

1). Distance
2). Horizontal and vertical angles
3). Elevation only
4). Area

Correct Answer: 2). Horizontal and vertical angles

Solution:
Important angular measuring instrument.

Ref: Surveying – B.C. Punmia

---

273. Levelling staff is used to measure

1). Angle
2). Distance
3). Elevation difference
4). Area

Correct Answer: 3). Elevation difference

Solution:
Used with level instrument.

Ref: Surveying – B.C. Punmia

---

274. The reduced level refers to

1). Elevation of point relative to datum
2). Distance of point
3). Bearing of point
4). Area of point

Correct Answer: 1). Elevation of point relative to datum

Solution:
Important levelling term.

Ref: Surveying – B.C. Punmia

---

275. The method used for area calculation in surveying includes

1). Trapezoidal rule
2). Simpson's rule
3). Coordinate method
4). All of these

Correct Answer: 4). All of these

Solution:
Different numerical methods.

Ref: Surveying – B.C. Punmia

---

276. Specific gravity of water is

1). 0.5
2). 1
3). 9.81
4). 10

Correct Answer: 2). 1

Solution:
Water is reference fluid.

Ref: Fluid Mechanics – R.K. Bansal

---

277. Pressure head is given by

1). $P/\rho g$
2). $\rho g/P$
3). $P\rho g$
4). P/g

Correct Answer: 1). $P/\rho g$

Solution:
Pressure head expression.

Ref: Fluid Mechanics – R.K. Bansal

---

278. Velocity head is

1). $V/2g$
2). $V^2/2g$
3). $Vg/2$
4). V^2/g

Correct Answer: 2). $V^2/2g$

Solution:
Kinetic energy head.

Ref: Fluid Mechanics – R.K. Bansal

---

279. Flow where velocity does not change with time is

1). Steady flow
2). Unsteady flow
3). Non-uniform flow
4). Turbulent flow

Correct Answer: 1). Steady flow

Solution:
Velocity constant with time.

Ref: Fluid Mechanics – R.K. Bansal

---

280. Laminar flow occurs in pipes when Reynolds number is

1). <2000
2). 2000–4000
3). >4000
4). >6000

Correct Answer: 1). <2000

Solution:
Laminar region.

Ref: Fluid Mechanics – R.K. Bansal

---

281. A rectangular notch measures

1). Velocity
2). Discharge
3). Pressure
4). Density

Correct Answer: 2). Discharge

Solution:
Used in open channel measurement.

Ref: Fluid Mechanics – R.K. Bansal

---

282. A triangular notch is also called

1). V-notch
2). Rectangular notch
3). Circular notch
4). Square notch

Correct Answer: 1). V-notch

Solution:
Common flow measuring device.

Ref: Fluid Mechanics – R.K. Bansal

---

283. The discharge over rectangular notch varies as

1). H
2). $H^{3/2}$
3). H^2
4). $H^{5/2}$

Correct Answer: 2). $H^{3/2}$

Solution:
Standard notch formula.

Ref: Fluid Mechanics – R.K. Bansal

---

284. Francis formula is used for

1). Canal velocity
2). Discharge over weir
3). Pipe discharge
4). Turbine velocity

Correct Answer: 2). Discharge over weir

Solution:
Weir discharge calculation.

Ref: Fluid Mechanics – Bansal

---

285. Manning's equation is used for

1). Pipe flow
2). Open channel flow
3). Turbine flow
4). Pump flow

Correct Answer: 2). Open channel flow

Solution:
Velocity relation.

Ref: Fluid Mechanics – Modi & Seth

---

286. The duty of water is defined as

1). Area irrigated per unit discharge
2). Water depth applied
3). Crop duration
4). Rainfall depth

Correct Answer: 1). Area irrigated per unit discharge

Solution:
Expressed in hectares/cumec.

Ref: Irrigation Engineering – S.K. Garg

---

287. Delta represents

1). Crop duration
2). Water depth required
3). Discharge
4). Area irrigated

Correct Answer: 2). Water depth required

Solution:
Depth of irrigation water.

Ref: Irrigation Engineering – Garg

---

288. Base period is

1). Time between first and last irrigation
2). Crop duration
3). Irrigation frequency
4). Canal operation period

Correct Answer: 1). Time between first and last irrigation

Solution:
Measured in days.

Ref: Irrigation Engineering – Garg

---

289. The relationship between duty and delta is

1). Directly proportional
2). Inversely proportional
3). Equal
4). Independent

Correct Answer: 2). Inversely proportional

Solution:

$$\Delta = \frac{8.64B}{D}$$

Ref: Irrigation Engineering – Garg

---

290. The storage below minimum drawdown level is

1). Live storage
2). Dead storage
3). Surcharge storage
4). Flood storage

Correct Answer: 2). Dead storage

Solution:
Used for sediment deposition.

Ref: Irrigation Engineering – Garg

---

291. Storage between FRL and MDDL is

1). Dead storage
2). Live storage
3). Surcharge storage
4). Flood storage

Correct Answer: 2). Live storage

Solution:
Available for irrigation use.

Ref: Irrigation Engineering – Garg

292. Surcharge storage lies between

1). FRL and MWL
2). MDDL and FRL
3). River bed and crest
4). Canal bed and bank

Correct Answer: 1). FRL and MWL

Solution:
Temporary flood storage.

Ref: Irrigation Engineering – Garg

---

293. Weir is constructed across

1). Canal
2). River
3). Reservoir
4). Drain

Correct Answer: 2). River

Solution:
Raises water level.

Ref: Irrigation Engineering – Garg

---

294. Barrage differs from weir because

1). Barrage has gates
2). Barrage is smaller
3). Barrage is temporary
4). Barrage is cheaper

Correct Answer: 1). Barrage has gates

Solution:
Water flow controlled by gates.

Ref: Irrigation Engineering – Garg

---

295. Canal alignment should follow

1). Natural contours
2). Minimum earthwork
3). Stable ground
4). All of these

Correct Answer: 4). All of these

Solution:
Ensures economical canal design.

Ref: Irrigation Engineering – Garg

---

296. Canal banks prevent

1). Water overflow
2). Seepage
3). Velocity increase
4). Storage

Correct Answer: 1). Water overflow

Solution:
Contain water within canal.

Ref: Irrigation Engineering – Garg

---

297. Canal lining reduces

1). Seepage
2). Weed growth
3). Maintenance
4). All of these

Correct Answer: 4). All of these

Solution:
Improves efficiency.

Ref: Irrigation Engineering – Garg

---

298. Cross drainage works are constructed when

1). Canal crosses natural drain
2). River crosses canal
3). Drain crosses canal
4). All of these

Correct Answer: 4). All of these

Solution:
Ensures uninterrupted flow.

Ref: Irrigation Engineering – Punmia

---

299. Aqueduct carries

1). Canal over drain
2). Drain over canal
3). Canal under drain
4). Drain under canal

Correct Answer: 1). Canal over drain

Solution:
Canal passes above drainage.

Ref: Irrigation Engineering – Punmia

---

300. The ultimate goal of irrigation engineering is

1). Increase agricultural productivity
2). Efficient water management
3). Sustainable farming
4). All of these

Correct Answer: 4). All of these

Solution:
Ensures long-term agricultural sustainability.

Ref: Irrigation Engineering – Garg

AP ECET CIVIL – TOP 150 MOST REPEATED NUMERICAL PROBLEMS

1. A bar of length 2 m elongates by 1 mm under tensile load. Calculate strain.

1). 0.0005
2). 0.001
3). 0.005
4). 0.01

Correct Answer: 1). 0.0005

Solution:

$$Strain = \frac{\Delta L}{L}$$
$$= \frac{1}{2000}$$
$$= 0.0005$$

Ref: Strength of Materials – R.K. Bansal

---

2. A steel rod carries tensile load producing stress of 200 MPa. If Young's modulus is 200 GPa, find strain.

1). 0.001
2). 0.002
3). 0.003
4). 0.004

Correct Answer: 1). 0.001

Solution:

$$E = \frac{\sigma}{\epsilon}$$
$$\epsilon = \frac{\sigma}{E}$$
$$= \frac{200}{200000}$$
$$= 0.001$$

Ref: Strength of Materials – R.K. Bansal

3. A simply supported beam of span 4 m carries central load of 20 kN. Find maximum bending moment.

1). 10 kN·m
2). 20 kN·m
3). 40 kN·m
4). 80 kN·m

Correct Answer: 2). 20 kN·m

Solution:

$$M = \frac{WL}{4}$$
$$= \frac{20 \times 4}{4}$$
$$= 20\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

4. A cantilever beam of length 3 m carries load 10 kN at free end. Find bending moment at fixed end.

1). 10 kN·m
2). 20 kN·m
3). 30 kN·m
4). 40 kN·m

Correct Answer: 3). 30 kN·m

Solution:

$$M = WL$$
$$= 10 \times 3$$
$$= 30\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

5. Moment of inertia of rectangle 200 mm × 300 mm about centroidal axis is

1). 45×10^6 mm^4
2). 450×10^6 mm^4
3). 900×10^6 mm^4
4). 1350×10^6 mm^4

Correct Answer: 2). 450×10^6 mm^4

Solution:

$$I = \frac{bh^3}{12}$$
$$= \frac{200 \times 300^3}{12}$$
$$= 450 \times 10^6 mm^4$$

Ref: Strength of Materials – R.K. Bansal

---

6. Calculate shear stress if shear force = 20 kN and area = 200 mm².

1). 50 MPa
2). 100 MPa
3). 150 MPa
4). 200 MPa

Correct Answer: 2). 100 MPa

Solution:

$$\tau = \frac{F}{A}$$
$$= \frac{20000}{200}$$
$$= 100\ MPa$$

Ref: Strength of Materials – R.K. Bansal

---

7. Euler buckling load for column with EI = 20000 kN·m² and length 4 m (both ends hinged).

1). 3080 kN
2). 6160 kN

3). 12320 kN
4). 24640 kN

Correct Answer: 3). 12320 kN

Solution:

$$P = \frac{\pi^2 EI}{L^2}$$
$$= \frac{9.87 \times 20000}{16}$$
$$\approx 12320\ kN$$

Ref: Strength of Materials – R.K. Bansal

---

8. Calculate discharge through pipe if area = 0.5 m² and velocity = 2 m/s.

1). 0.5 m³/s
2). 1 m³/s
3). 2 m³/s
4). 4 m³/s

Correct Answer: 2). 1 m³/s

Solution:

$$Q = AV$$
$$= 0.5 \times 2$$
$$= 1\ m^3/s$$

Ref: Fluid Mechanics – R.K. Bansal

---

9. Pressure at depth 5 m in water (γ = 9.81 kN/m³).

1). 24.5 kPa
2). 49.05 kPa
3). 98.1 kPa
4). 150 kPa

Correct Answer: 2). 49.05 kPa

Solution:

$$P = \gamma h$$
$$= 9.81 \times 5$$
$$= 49.05\ kPa$$

Ref: Fluid Mechanics – R.K. Bansal

---

10. If Reynolds number < 2000, flow is

1). Turbulent
2). Laminar
3). Critical
4). Compressible

Correct Answer: 2). Laminar

Solution:
Laminar flow occurs below 2000.

Ref: Fluid Mechanics – R.K. Bansal

---

11. Calculate hydraulic radius if area = 4 m² and wetted perimeter = 8 m.

1). 0.25 m
2). 0.5 m
3). 1 m
4). 2 m

Correct Answer: 2). 0.5 m

Solution:

$$R = A/P$$
$$= 4/8$$
$$= 0.5\ m$$

Ref: Fluid Mechanics – R.K. Bansal

---

12. A rectangular channel has width 4 m and depth 2 m. Area of flow =

1). 4 m²
2). 6 m²

3). 8 m²
4). 10 m²

Correct Answer: 3). 8 m²

Solution:

$$A = b \times y$$
$$= 4 \times 2$$
$$= 8\ m^2$$

Ref: Fluid Mechanics – Bansal

---

13. Duty of water is 2000 hectares/cumec. If discharge = 2 cumecs, area irrigated =

1). 2000 ha
2). 3000 ha
3). 4000 ha
4). 6000 ha

Correct Answer: 3). 4000 ha

Solution:

$$Area = Duty \times Q$$
$$= 2000 \times 2$$
$$= 4000\ ha$$

Ref: Irrigation Engineering – Garg

---

14. Base period = 120 days and duty = 1500 ha/cumec. Calculate delta.

1). 40 cm
2). 50 cm
3). 69 cm
4). 90 cm

Correct Answer: 3). 69 cm

Solution:

$$\Delta = \frac{8.64B}{D}$$

$$= \frac{8.64 \times 120}{1500}$$
$$\approx 69\ cm$$

Ref: Irrigation Engineering – Garg

---

15. If contour interval = 2 m and difference between two contours = 10 m, number of contours =

1). 4
2). 5
3). 6
4). 7

Correct Answer: 2). 5

Solution:

$$10/2 = 5$$

Ref: Surveying – B.C. Punmia

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16. Specific gravity of liquid if density = 800 kg/m³.

1). 0.6
2). 0.8
3). 1.2
4). 1.5

Correct Answer: 2). 0.8

Solution:

$$SG = \rho/1000$$
$$= 800/1000$$
$$= 0.8$$

Ref: Fluid Mechanics – Bansal

---

17. If velocity = 3 m/s and area = 2 m², discharge =

1). 3 m^3/s
2). 6 m^3/s
3). 9 m^3/s
4). 12 m^3/s

Correct Answer: 2). 6 m^3/s

Solution:

$$Q = AV$$
$$= 2 \times 3$$
$$= 6\ m^3/s$$

Ref: Fluid Mechanics – Bansal

---

18. Rainfall intensity if rainfall 50 mm in 5 hours

1). 5 mm/hr
2). 8 mm/hr
3). 10 mm/hr
4). 12 mm/hr

Correct Answer: 3). 10 mm/hr

Solution:

$$I = Rainfall/Time$$
$$= 50/5$$
$$= 10\ mm/hr$$

Ref: Hydrology – Subramanya

---

19. If Young's modulus = 200 GPa and strain = 0.002, stress =

1). 200 MPa
2). 300 MPa
3). 400 MPa
4). 500 MPa

Correct Answer: 3). 400 MPa

Solution:

$$\sigma = E\epsilon$$
$$= 200000 \times 0.002$$
$$= 400\ MPa$$

Ref: Strength of Materials – Bansal

---

20. Velocity head for velocity 4 m/s

1). 0.5 m
2). 0.8 m
3). 1.6 m
4). 2.5 m

Correct Answer: 2). 0.8 m

Solution:

$$V^2/2g$$
$$= 16/19.62$$
$$\approx 0.8\ m$$

Ref: Fluid Mechanics – Bansal

---

21. A bar of original length 1.5 m increases in length by 0.75 mm under tension. Calculate strain.

1). 0.00025
2). 0.0005
3). 0.00075
4). 0.001

Correct Answer: 2). 0.0005

Solution:

$$Strain = \frac{\Delta L}{L}$$
$$= \frac{0.75}{1500}$$
$$= 0.0005$$

Ref: Strength of Materials – R.K. Bansal

---

22. A steel bar experiences stress of 150 MPa. If Young's modulus is 200 GPa, find strain.

1). 0.00075
2). 0.001
3). 0.002
4). 0.003

Correct Answer: 1). 0.00075

Solution:

$$\epsilon = \frac{\sigma}{E}$$
$$= \frac{150}{200000}$$
$$= 0.00075$$

Ref: Strength of Materials – R.K. Bansal

---

23. A simply supported beam of span 6 m carries central load of 30 kN. Find maximum bending moment.

1). 30 kN·m
2). 45 kN·m
3). 60 kN·m
4). 90 kN·m

Correct Answer: 2). 45 kN·m

Solution:

$$M = \frac{WL}{4}$$
$$= \frac{30 \times 6}{4}$$
$$= 45\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

24. A cantilever beam of length 4 m carries load 15 kN at free end. Find maximum bending moment.

1). 45 kN·m
2). 60 kN·m
3). 75 kN·m
4). 90 kN·m

Correct Answer: 2). 60 kN·m

Solution:

$$M = WL$$
$$= 15 \times 4$$
$$= 60\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

25. Calculate moment of inertia of rectangle 150 mm × 250 mm about centroidal axis.

1). 195×10^6 mm^4
2). 250×10^6 mm^4
3). 325×10^6 mm^4
4). 400×10^6 mm^4

Correct Answer: 1). 195×10^6 mm^4

Solution:

$$I = \frac{bh^3}{12}$$
$$= \frac{150 \times 250^3}{12}$$
$$\approx 195 \times 10^6\ mm^4$$

Ref: Strength of Materials – R.K. Bansal

---

26. A pipe carries water with velocity 4 m/s through area 0.75 m². Find discharge.

1). 2 m^3/s
2). 3 m^3/s

3). 4 m^3/s
4). 5 m^3/s

Correct Answer: 2). 3 m^3/s

Solution:

$$Q = AV$$
$$= 0.75 \times 4$$
$$= 3\ m^3/s$$

Ref: Fluid Mechanics – R.K. Bansal

---

27. Calculate pressure at depth 8 m in water. (γ = 9.81 kN/m^3)

1). 58.8 kPa
2). 78.48 kPa
3). 98.1 kPa
4). 120 kPa

Correct Answer: 2). 78.48 kPa

Solution:

$$P = \gamma h$$
$$= 9.81 \times 8$$
$$= 78.48\ kPa$$

Ref: Fluid Mechanics – R.K. Bansal

---

28. Hydraulic radius of channel if area = 6 m^2 and wetted perimeter = 12 m.

1). 0.25 m
2). 0.5 m
3). 1 m
4). 2 m

Correct Answer: 2). 0.5 m

Solution:

$$R = A/P$$
$$= 6/12$$

$$= 0.5\ m$$

Ref: Fluid Mechanics – Bansal

---

29. Rectangular channel width 5 m and depth 1.5 m. Area of flow =

1). 5 m^2
2). 6 m^2
3). 7.5 m^2
4). 10 m^2

Correct Answer: 3). 7.5 m^2

Solution:

$$A = b \times y$$
$$= 5 \times 1.5$$
$$= 7.5\ m^2$$

Ref: Fluid Mechanics – Bansal

---

30. Calculate discharge if velocity = 2.5 m/s and area = 4 m^2.

1). 8 m^3/s
2). 10 m^3/s
3). 12 m^3/s
4). 15 m^3/s

Correct Answer: 2). 10 m^3/s

Solution:

$$Q = AV$$
$$= 4 \times 2.5$$
$$= 10\ m^3/s$$

Ref: Fluid Mechanics – Bansal

---

31. Duty of water = 1800 ha/cumec. If discharge = 3 cumecs, area irrigated =

1). 3600 ha
2). 4500 ha
3). 5400 ha
4). 7200 ha

Correct Answer: 3). 5400 ha

Solution:

$$Area = Duty \times Q$$
$$= 1800 \times 3$$
$$= 5400\ ha$$

Ref: Irrigation Engineering – Garg

---

32. Base period = 150 days and duty = 2000 ha/cumec. Find delta.

1). 50 cm
2). 64.8 cm
3). 75 cm
4). 90 cm

Correct Answer: 2). 64.8 cm

Solution:

$$\Delta = \frac{8.64B}{D}$$
$$= \frac{8.64 \times 150}{2000}$$
$$= 64.8\ cm$$

Ref: Irrigation Engineering – Garg

---

33. Contour interval = 5 m and elevation difference = 25 m. Number of contours =

1). 4
2). 5
3). 6
4). 7

Correct Answer: 2). 5

Solution:

$$25/5 = 5$$

Ref: Surveying – B.C. Punmia

---

34. Specific gravity of liquid if density = 900 kg/m³.

1). 0.7
2). 0.8
3). 0.9
4). 1.1

Correct Answer: 3). 0.9

Solution:

$$SG = \rho/1000$$
$$= 900/1000$$
$$= 0.9$$

Ref: Fluid Mechanics – Bansal

---

35. Velocity head for velocity 5 m/s

1). 1.27 m
2). 1.5 m
3). 2.5 m
4). 3 m

Correct Answer: 1). 1.27 m

Solution:

$$V^2/2g$$
$$= 25/19.62$$
$$\approx 1.27\ m$$

Ref: Fluid Mechanics – Bansal

---

36. Rainfall intensity if rainfall = 60 mm in 4 hours

1). 10 mm/hr
2). 12 mm/hr
3). 15 mm/hr
4). 20 mm/hr

Correct Answer: 3). 15 mm/hr

Solution:

$$I = Rainfall/Time$$
$$= 60/4$$
$$= 15\ mm/hr$$

Ref: Hydrology – Subramanya

---

37. If strain = 0.002 and Young's modulus = 210 GPa, stress =

1). 200 MPa
2). 300 MPa
3). 420 MPa
4). 500 MPa

Correct Answer: 3). 420 MPa

Solution:

$$\sigma = E\epsilon$$
$$= 210000 \times 0.002$$
$$= 420\ MPa$$

Ref: Strength of Materials – Bansal

---

38. If pipe diameter = 0.5 m and velocity = 3 m/s, discharge =

1). 0.4 m^3/s
2). 0.59 m^3/s
3). 0.75 m^3/s
4). 1 m^3/s

Correct Answer: 2). 0.59 m^3/s

Solution:

$$A = \frac{\pi d^2}{4}$$
$$= 0.196$$
$$Q = AV = 0.196 \times 3 \approx 0.59$$

Ref: Fluid Mechanics – Bansal

---

39. Area of triangle with base 10 m and height 6 m

1). 20 m²
2). 25 m²
3). 30 m²
4). 35 m²

Correct Answer: 3). 30 m²

Solution:

$$Area = \frac{1}{2}bh$$
$$= 0.5 \times 10 \times 6$$
$$= 30\ m^2$$

Ref: Surveying – Punmia

---

40. If load = 25 kN and beam span = 5 m, bending moment for central load =

1). 20 kN·m
2). 25 kN·m
3). 31.25 kN·m
4). 40 kN·m

Correct Answer: 3). 31.25 kN·m

Solution:

$$M = WL/4$$
$$= 25 \times 5/4$$
$$= 31.25\ kN \cdot m$$

Ref: Strength of Materials – Bansal

---

41. A steel rod of length 2 m increases by 2 mm under tensile load. Calculate strain.

1). 0.0005
2). 0.001
3). 0.002
4). 0.004

Correct Answer: 2). 0.001

Solution:

$$Strain = \frac{\Delta L}{L}$$
$$= \frac{2}{2000}$$
$$= 0.001$$

Ref: Strength of Materials – R.K. Bansal

---

42. Stress in a rod is 180 MPa and Young’s modulus is 200 GPa. Calculate strain.

1). 0.0009
2). 0.001
3). 0.0015
4). 0.002

Correct Answer: 1). 0.0009

Solution:

$$\epsilon = \frac{\sigma}{E}$$
$$= \frac{180}{200000}$$
$$= 0.0009$$

Ref: Strength of Materials – R.K. Bansal

---

43. A simply supported beam of span 8 m carries central load of 40 kN. Find maximum bending moment.

1). 60 kN·m
2). 80 kN·m
3). 100 kN·m
4). 120 kN·m

Correct Answer: 2). 80 kN·m

Solution:

$$M = \frac{WL}{4}$$
$$= \frac{40 \times 8}{4}$$
$$= 80\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

44. A cantilever beam of length 5 m carries 12 kN load at free end. Maximum bending moment is

1). 48 kN·m
2). 60 kN·m
3). 72 kN·m
4). 84 kN·m

Correct Answer: 2). 60 kN·m

Solution:

$$M = WL$$
$$= 12 \times 5$$
$$= 60\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

45. Calculate moment of inertia of rectangle 120 mm × 200 mm about centroidal axis.

1). 64×10^6 mm^4
2). 80×10^6 mm^4

3). 96×10^6 mm^4
4). 120×10^6 mm^4

Correct Answer: 2). 80×10^6 mm^4

Solution:

$$I = \frac{bh^3}{12}$$
$$= \frac{120 \times 200^3}{12}$$
$$= 80 \times 10^6 mm^4$$

Ref: Strength of Materials – R.K. Bansal

---

46. Water flows through pipe area 0.4 m² at velocity 3 m/s. Find discharge.

1). 0.8 m^3/s
2). 1.0 m^3/s
3). 1.2 m^3/s
4). 1.5 m^3/s

Correct Answer: 3). 1.2 m^3/s

Solution:

$$Q = AV$$
$$= 0.4 \times 3$$
$$= 1.2\ m^3/s$$

Ref: Fluid Mechanics – R.K. Bansal

---

47. Calculate pressure at depth 6 m in water (γ = 9.81 kN/m^3).

1). 49.05 kPa
2). 58.86 kPa

3). 68.67 kPa
4). 78.48 kPa

Correct Answer: 2). 58.86 kPa

Solution:

$$P = \gamma h$$
$$= 9.81 \times 6$$
$$= 58.86\ kPa$$

Ref: Fluid Mechanics – R.K. Bansal

---

48. Hydraulic radius of channel if area = 10 m² and wetted perimeter = 20 m.

1). 0.25 m
2). 0.5 m
3). 1 m
4). 2 m

Correct Answer: 2). 0.5 m

Solution:

$$R = A/P$$
$$= 10/20$$
$$= 0.5\ m$$

Ref: Fluid Mechanics – Bansal

---

49. Rectangular channel width 6 m and depth 2 m. Area of flow =

1). 10 m²
2). 12 m²
3). 14 m²
4). 16 m²

Correct Answer: 2). 12 m²

Solution:

$$A = b \times y$$
$$= 6 \times 2$$

$$= 12\ m^2$$

Ref: Fluid Mechanics – Bansal

---

50. If velocity = 3 m/s and area = 3 m², discharge =

1). 6 m³/s
2). 9 m³/s
3). 12 m³/s
4). 15 m³/s

Correct Answer: 2). 9 m³/s

Solution:

$$Q = AV$$
$$= 3 \times 3$$
$$= 9\ m^3/s$$

Ref: Fluid Mechanics – Bansal

---

51. Duty of water = 1500 ha/cumec. If discharge = 4 cumecs, area irrigated =

1). 4000 ha
2). 5000 ha
3). 6000 ha
4). 7000 ha

Correct Answer: 3). 6000 ha

Solution:

$$Area = Duty \times Q$$
$$= 1500 \times 4$$
$$= 6000\ ha$$

Ref: Irrigation Engineering – Garg

---

52. Base period = 120 days and duty = 2000 ha/cumec. Find delta.

1). 51.8 cm
2). 64.8 cm
3). 72 cm
4). 90 cm

Correct Answer: 1). 51.8 cm

Solution:

$$\Delta = \frac{8.64B}{D}$$
$$= \frac{8.64 \times 120}{2000}$$
$$= 51.8\ cm$$

Ref: Irrigation Engineering – Garg

---

53. Contour interval = 4 m and elevation difference = 20 m. Number of contours =

1). 4
2). 5
3). 6
4). 7

Correct Answer: 2). 5

Solution:

$$20/4 = 5$$

Ref: Surveying – Punmia

---

54. Specific gravity of liquid if density = 850 kg/m³.

1). 0.75
2). 0.80
3). 0.85
4). 0.90

Correct Answer: 3). 0.85

Solution:

$$SG = \rho/1000$$
$$= 850/1000$$
$$= 0.85$$

Ref: Fluid Mechanics – Bansal

---

55. Velocity head for velocity 6 m/s

1). 1.5 m
2). 1.8 m
3). 2.0 m
4). 2.5 m

Correct Answer: 2). 1.8 m

Solution:

$$V^2/2g$$
$$= 36/19.62$$
$$\approx 1.8\ m$$

Ref: Fluid Mechanics – Bansal

---

56. Rainfall intensity if rainfall = 80 mm in 4 hours

1). 15 mm/hr
2). 18 mm/hr
3). 20 mm/hr
4). 25 mm/hr

Correct Answer: 3). 20 mm/hr

Solution:

$$I = Rainfall/Time$$
$$= 80/4$$
$$= 20\ mm/hr$$

Ref: Hydrology – Subramanya

---

57. If strain = 0.0015 and Young's modulus = 200 GPa, stress =

1). 200 MPa
2). 250 MPa
3). 300 MPa
4). 350 MPa

Correct Answer: 3). 300 MPa

Solution:

$$\sigma = E\epsilon$$
$$= 200000 \times 0.0015$$
$$= 300\ MPa$$

Ref: Strength of Materials – Bansal

---

58. Pipe diameter = 0.4 m and velocity = 4 m/s. Discharge =

1). 0.40 m^3/s
2). 0.50 m^3/s
3). 0.60 m^3/s
4). 0.80 m^3/s

Correct Answer: 2). 0.50 m^3/s

Solution:

$$A = \frac{\pi d^2}{4}$$
$$= 0.126$$
$$Q = AV$$
$$= 0.126 \times 4 \approx 0.50$$

Ref: Fluid Mechanics – Bansal

---

59. Area of triangle with base 12 m and height 5 m

1). 25 m^2
2). 30 m^2
3). 35 m^2
4). 40 m^2

Correct Answer: 2). 30 m²

Solution:

$$Area = \frac{1}{2}bh$$
$$= 0.5 \times 12 \times 5$$
$$= 30\ m^2$$

Ref: Surveying – Punmia

---

60. A beam of span 6 m carries central load 24 kN. Maximum bending moment =

1). 24 kN·m
2). 30 kN·m
3). 36 kN·m
4). 48 kN·m

Correct Answer: 3). 36 kN·m

Solution:

$$M = WL/4$$
$$= 24 \times 6/4$$
$$= 36\ kN \cdot m$$

Ref: Strength of Materials – Bansal

---

61. A steel bar of length 2.5 m elongates by 2.5 mm under tensile load. Calculate strain.

1). 0.0005
2). 0.001
3). 0.002
4). 0.005

Correct Answer: 2). 0.001

Solution:

$$Strain = \frac{\Delta L}{L}$$
$$= \frac{2.5}{2500}$$

$$= 0.001$$

Ref: Strength of Materials – R.K. Bansal

---

62. A material has stress of 250 MPa and Young's modulus 200 GPa. Calculate strain.

1). 0.00125
2). 0.0015
3). 0.002
4). 0.0025

Correct Answer: 1). 0.00125

Solution:

$$\epsilon = \frac{\sigma}{E}$$
$$= \frac{250}{200000}$$
$$= 0.00125$$

Ref: Strength of Materials – R.K. Bansal

---

63. A simply supported beam of span 10 m carries central load of 50 kN. Find maximum bending moment.

1). 100 kN·m
2). 125 kN·m
3). 150 kN·m
4). 200 kN·m

Correct Answer: 2). 125 kN·m

Solution:

$$M = \frac{WL}{4}$$
$$= \frac{50 \times 10}{4}$$
$$= 125\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

64. A cantilever beam of length 3 m carries load 20 kN at free end. Maximum bending moment is

1). 40 kN·m
2). 50 kN·m
3). 60 kN·m
4). 80 kN·m

Correct Answer: 3). 60 kN·m

Solution:

$$M = WL$$
$$= 20 \times 3$$
$$= 60\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

65. Moment of inertia of rectangle 100 mm × 300 mm about centroidal axis is

1). 150×10^6 mm^4
2). 225×10^6 mm^4
3). 300×10^6 mm^4
4). 450×10^6 mm^4

Correct Answer: 2). 225×10^6 mm^4

Solution:

$$I = \frac{bh^3}{12}$$
$$= \frac{100 \times 300^3}{12}$$
$$= 225 \times 10^6\ mm^4$$

Ref: Strength of Materials – R.K. Bansal

---

66. Water flows through pipe area 0.6 m² with velocity 2 m/s. Find discharge.

1). 0.8 m³/s
2). 1.0 m³/s
3). 1.2 m³/s
4). 1.5 m³/s

Correct Answer: 3). 1.2 m³/s

Solution:

$$
\begin{aligned}
Q &= AV \\
&= 0.6 \times 2 \\
&= 1.2\ m^3/s
\end{aligned}
$$

Ref: Fluid Mechanics – R.K. Bansal

---

67. Calculate pressure at depth 10 m in water.

1). 78.48 kPa
2). 98.1 kPa
3). 110 kPa
4). 120 kPa

Correct Answer: 2). 98.1 kPa

Solution:

$$
\begin{aligned}
P &= \gamma h \\
&= 9.81 \times 10 \\
&= 98.1\ kPa
\end{aligned}
$$

Ref: Fluid Mechanics – R.K. Bansal

---

68. Hydraulic radius if area = 12 m² and wetted perimeter = 24 m.

1). 0.25 m
2). 0.5 m
3). 1 m
4). 2 m

Correct Answer: 2). 0.5 m

Solution:

$$R = A/P$$
$$= 12/24$$
$$= 0.5\ m$$

Ref: Fluid Mechanics – Bansal

---

69. Rectangular channel width 4 m and depth 3 m. Area of flow =

1). 10 m^2
2). 12 m^2
3). 14 m^2
4). 16 m^2

Correct Answer: 2). 12 m^2

Solution:

$$A = b \times y$$
$$= 4 \times 3$$
$$= 12\ m^2$$

Ref: Fluid Mechanics – Bansal

---

70. If velocity = 4 m/s and area = 2 m^2, discharge =

1). 6 m^3/s
2). 8 m^3/s
3). 10 m^3/s
4). 12 m^3/s

Correct Answer: 2). 8 m^3/s

Solution:

$$Q = AV$$
$$= 4 \times 2$$
$$= 8\ m^3/s$$

Ref: Fluid Mechanics – Bansal

---

71. Duty of water = 2000 ha/cumec. If discharge = 3 cumecs, area irrigated =

1). 5000 ha
2). 6000 ha
3). 7000 ha
4). 8000 ha

Correct Answer: 2). 6000 ha

Solution:

$$Area = Duty \times Q$$
$$= 2000 \times 3$$
$$= 6000\ ha$$

Ref: Irrigation Engineering – Garg

---

72. Base period = 100 days and duty = 1500 ha/cumec. Calculate delta.

1). 50 cm
2). 57.6 cm
3). 65 cm
4). 75 cm

Correct Answer: 2). 57.6 cm

Solution:

$$\Delta = \frac{8.64B}{D}$$
$$= \frac{8.64 \times 100}{1500}$$
$$= 57.6\ cm$$

Ref: Irrigation Engineering – Garg

---

73. Contour interval = 2 m and elevation difference = 16 m. Number of contours =

1). 6
2). 7
3). 8
4). 9

Correct Answer: 3). 8

Solution:

$$16/2 = 8$$

Ref: Surveying – Punmia

---

74. Specific gravity of liquid if density = 750 kg/m³

1). 0.65
2). 0.70
3). 0.75
4). 0.80

Correct Answer: 3). 0.75

Solution:

$$SG = \rho/1000$$
$$= 750/1000$$
$$= 0.75$$

Ref: Fluid Mechanics – Bansal

---

75. Velocity head for velocity 8 m/s

1). 2.6 m
2). 3.2 m
3). 4.0 m
4). 5.5 m

Correct Answer: 2). 3.2 m

Solution:

$$V^2/2g$$
$$= 64/19.62$$
$$\approx 3.2\ m$$

Ref: Fluid Mechanics – Bansal

---

76. Rainfall intensity if rainfall = 90 mm in 3 hours

1). 20 mm/hr
2). 25 mm/hr
3). 30 mm/hr
4). 35 mm/hr

Correct Answer: 3). 30 mm/hr

Solution:

$$I = Rainfall/Time$$
$$= 90/3$$
$$= 30\ mm/hr$$

Ref: Hydrology – Subramanya

---

77. If strain = 0.002 and Young's modulus = 210 GPa, stress =

1). 300 MPa
2). 350 MPa
3). 420 MPa
4). 450 MPa

Correct Answer: 3). 420 MPa

Solution:

$$\sigma = E\epsilon$$
$$= 210000 \times 0.002$$
$$= 420\ MPa$$

Ref: Strength of Materials – Bansal

---

78. Pipe diameter = 0.3 m and velocity = 5 m/s. Discharge =

1). 0.20 m^3/s
2). 0.35 m^3/s
3). 0.50 m^3/s
4). 0.75 m^3/s

Correct Answer: 2). 0.35 m³/s

Solution:

$$A = \frac{\pi d^2}{4}$$
$$= 0.0707$$
$$Q = AV$$
$$= 0.0707 \times 5 \approx 0.35$$

Ref: Fluid Mechanics – Bansal

---

79. Area of triangle with base 14 m and height 6 m

1). 36 m²
2). 42 m²
3). 48 m²
4). 56 m²

Correct Answer: 2). 42 m²

Solution:

$$Area = \frac{1}{2}bh$$
$$= 0.5 \times 14 \times 6$$
$$= 42\ m^2$$

Ref: Surveying – Punmia

---

80. Beam span = 8 m with central load 32 kN. Maximum bending moment =

1). 48 kN·m
2). 64 kN·m
3). 80 kN·m
4). 96 kN·m

Correct Answer: 2). 64 kN·m

Solution:

$$M = WL/4$$
$$= 32 \times 8/4$$
$$= 64\ kN \cdot m$$

Ref: Strength of Materials – Bansal

---

81. A steel bar of length 3 m increases by 3 mm under load. Calculate strain.

1). 0.0005
2). 0.001
3). 0.002
4). 0.003

Correct Answer: 2). 0.001

Solution:

$$Strain = \frac{\Delta L}{L}$$
$$= \frac{3}{3000}$$
$$= 0.001$$

Ref: Strength of Materials – R.K. Bansal

---

82. Stress in a rod is 120 MPa and Young's modulus is 200 GPa. Find strain.

1). 0.0006
2). 0.001
3). 0.0012
4). 0.002

Correct Answer: 1). 0.0006

Solution:

$$\epsilon = \frac{\sigma}{E}$$
$$= \frac{120}{200000}$$

$$= 0.0006$$

Ref: Strength of Materials – R.K. Bansal

---

83. A simply supported beam of span 12 m carries central load 60 kN. Find maximum bending moment.

1). 120 kN·m
2). 150 kN·m
3). 180 kN·m
4). 200 kN·m

Correct Answer: 3). 180 kN·m

Solution:

$$M = \frac{WL}{4}$$
$$= \frac{60 \times 12}{4}$$
$$= 180\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

84. A cantilever beam of length 4 m carries load 25 kN at free end. Maximum bending moment is

1). 80 kN·m
2). 100 kN·m
3). 120 kN·m
4). 150 kN·m

Correct Answer: 2). 100 kN·m

Solution:

$$M = WL$$
$$= 25 \times 4$$
$$= 100\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

85. Moment of inertia of rectangle 200 mm × 400 mm about centroidal axis is

1). 533×10^6 mm^4
2). 800×10^6 mm^4
3). 1066×10^6 mm^4
4). 1333×10^6 mm^4

Correct Answer: 3). 1066×10^6 mm^4

Solution:

$$I = \frac{bh^3}{12}$$
$$= \frac{200 \times 400^3}{12}$$
$$= 1066 \times 10^6 mm^4$$

Ref: Strength of Materials – R.K. Bansal

---

86. Water flows through pipe of area 0.8 m² with velocity 2.5 m/s. Find discharge.

1). 1.5 m^3/s
2). 2.0 m^3/s
3). 2.5 m^3/s
4). 3.0 m^3/s

Correct Answer: 2). 2.0 m^3/s

Solution:

$$Q = AV$$
$$= 0.8 \times 2.5$$
$$= 2.0\ m^3/s$$

Ref: Fluid Mechanics – R.K. Bansal

---

87. Calculate pressure at depth 12 m in water.

1). 98.1 kPa
2). 110 kPa

3). 117.72 kPa
4). 125 kPa

Correct Answer: 3). 117.72 kPa

Solution:

$$P = \gamma h$$
$$= 9.81 \times 12$$
$$= 117.72\ kPa$$

Ref: Fluid Mechanics – R.K. Bansal

---

88. Hydraulic radius if area = 15 m² and wetted perimeter = 30 m

1). 0.25 m
2). 0.5 m
3). 0.75 m
4). 1 m

Correct Answer: 2). 0.5 m

Solution:

$$R = A/P$$
$$= 15/30$$
$$= 0.5\ m$$

Ref: Fluid Mechanics – Bansal

---

89. Rectangular channel width 8 m and depth 2 m. Area of flow =

1). 12 m²
2). 14 m²
3). 16 m²
4). 18 m²

Correct Answer: 3). 16 m²

Solution:

$$A = b \times y$$
$$= 8 \times 2$$
$$= 16\ m^2$$

Ref: Fluid Mechanics – Bansal

---

90. If velocity = 3 m/s and area = 5 m², discharge =

1). 10 m^3/s
2). 12 m^3/s
3). 15 m^3/s
4). 20 m^3/s

Correct Answer: 3). 15 m^3/s

Solution:

$$Q = AV$$
$$= 3 \times 5$$
$$= 15\ m^3/s$$

Ref: Fluid Mechanics – Bansal

---

91. Duty of water = 2200 ha/cumec. If discharge = 2 cumecs, area irrigated =

1). 3000 ha
2). 3500 ha
3). 4400 ha
4). 5000 ha

Correct Answer: 3). 4400 ha

Solution:

$$Area = Duty \times Q$$
$$= 2200 \times 2$$
$$= 4400\ ha$$

Ref: Irrigation Engineering – Garg

92. Base period = 120 days and duty = 1800 ha/cumec. Find delta.

1). 50 cm
2). 57.6 cm
3). 64.8 cm
4). 72 cm

Correct Answer: 2). 57.6 cm

Solution:

$$\Delta = \frac{8.64B}{D}$$
$$= \frac{8.64 \times 120}{1800}$$
$$= 57.6\ cm$$

Ref: Irrigation Engineering – Garg

---

93. Contour interval = 3 m and elevation difference = 18 m. Number of contours =

1). 4
2). 5
3). 6
4). 7

Correct Answer: 3). 6

Solution:

$$18/3 = 6$$

Ref: Surveying – Punmia

---

94. Specific gravity of liquid if density = 820 kg/m³

1). 0.72
2). 0.82
3). 0.90
4). 1.02

Correct Answer: 2). 0.82

Solution:

$$SG = \rho/1000$$
$$= 820/1000$$
$$= 0.82$$

Ref: Fluid Mechanics – Bansal

---

95. Velocity head for velocity 7 m/s

1). 2.0 m
2). 2.5 m
3). 3.5 m
4). 4.0 m

Correct Answer: 2). 2.5 m

Solution:

$$V^2/2g$$
$$= 49/19.62$$
$$\approx 2.5\ m$$

Ref: Fluid Mechanics – Bansal

---

96. Rainfall intensity if rainfall = 100 mm in 5 hours

1). 15 mm/hr
2). 20 mm/hr
3). 25 mm/hr
4). 30 mm/hr

Correct Answer: 2). 20 mm/hr

Solution:

$$I = Rainfall/Time$$
$$= 100/5$$
$$= 20\ mm/hr$$

Ref: Hydrology – Subramanya

---

97. If strain = 0.0025 and Young's modulus = 200 GPa, stress =

1). 300 MPa
2). 400 MPa
3). 500 MPa
4). 600 MPa

Correct Answer: 3). 500 MPa

Solution:

$$\sigma = E\epsilon$$
$$= 200000 \times 0.0025$$
$$= 500\ MPa$$

Ref: Strength of Materials – Bansal

---

98. Pipe diameter = 0.4 m and velocity = 3 m/s. Discharge =

1). 0.30 m^3/s
2). 0.38 m^3/s
3). 0.45 m^3/s
4). 0.50 m^3/s

Correct Answer: 2). 0.38 m^3/s

Solution:

$$A = \frac{\pi d^2}{4}$$
$$= 0.1257$$
$$Q = AV$$
$$= 0.1257 \times 3 \approx 0.38$$

Ref: Fluid Mechanics – Bansal

---

99. Area of triangle with base 16 m and height 5 m

1). 35 m^2
2). 40 m^2
3). 45 m^2
4). 50 m^2

Correct Answer: 2). 40 m^2

Solution:

$$Area = \frac{1}{2}bh$$
$$= 0.5 \times 16 \times 5$$
$$= 40\ m^2$$

Ref: Surveying – Punmia

---

100. Beam span = 10 m with central load 40 kN. Maximum bending moment =

1). 80 kN·m
2). 100 kN·m
3). 120 kN·m
4). 140 kN·m

Correct Answer: 2). 100 kN·m

Solution:

$$M = WL/4$$
$$= 40 \times 10/4$$
$$= 100\ kN \cdot m$$

Ref: Strength of Materials – Bansal

---

101. A steel rod of length 4 m increases by 4 mm under load. Calculate strain.

1). 0.0005
2). 0.001
3). 0.002
4). 0.004

Correct Answer: 2). 0.001

Solution:

$$Strain = \frac{\Delta L}{L}$$
$$= \frac{4}{4000}$$
$$= 0.001$$

Ref: Strength of Materials – R.K. Bansal

---

102. Stress in a material is 300 MPa and Young's modulus is 200 GPa. Calculate strain.

1). 0.001
2). 0.0015
3). 0.002
4). 0.0025

Correct Answer: 2). 0.0015

Solution:

$$\epsilon = \frac{\sigma}{E}$$
$$= \frac{300}{200000}$$
$$= 0.0015$$

Ref: Strength of Materials – R.K. Bansal

---

103. A simply supported beam of span 6 m carries central load of 36 kN. Find maximum bending moment.

1). 36 kN·m
2). 48 kN·m
3). 54 kN·m
4). 72 kN·m

Correct Answer: 3). 54 kN·m

Solution:

$$M = \frac{WL}{4}$$
$$= \frac{36 \times 6}{4}$$
$$= 54\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

104. A cantilever beam of length 5 m carries load 18 kN at free end. Maximum bending moment is

1). 72 kN·m
2). 90 kN·m
3). 108 kN·m
4). 120 kN·m

Correct Answer: 2). 90 kN·m

Solution:

$$M = WL$$
$$= 18 \times 5$$
$$= 90\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

105. Moment of inertia of rectangle 150 mm × 300 mm about centroidal axis is

1). 225×10^6 mm^4
2). 337.5×10^6 mm^4
3). 450×10^6 mm^4
4). 562.5×10^6 mm^4

Correct Answer: 2). 337.5×10^6 mm^4

Solution:

$$I = \frac{bh^3}{12}$$
$$= \frac{150 \times 300^3}{12}$$
$$= 337.5 \times 10^6 mm^4$$

Ref: Strength of Materials – R.K. Bansal

---

106. Water flows through pipe of area 0.9 m² with velocity 2 m/s. Find discharge.

1). 1.2 m^3/s
2). 1.5 m^3/s
3). 1.8 m^3/s
4). 2.0 m^3/s

Correct Answer: 3). 1.8 m^3/s

Solution:

$$Q = AV$$
$$= 0.9 \times 2$$
$$= 1.8\ m^3/s$$

Ref: Fluid Mechanics – R.K. Bansal

---

107. Pressure at depth 15 m in water is

1). 98.1 kPa
2). 117.72 kPa
3). 147.15 kPa
4). 160 kPa

Correct Answer: 3). 147.15 kPa

Solution:

$$P = \gamma h$$
$$= 9.81 \times 15$$
$$= 147.15\ kPa$$

Ref: Fluid Mechanics – R.K. Bansal

---

108. Hydraulic radius if area = 18 m² and wetted perimeter = 36 m

1). 0.25 m
2). 0.5 m
3). 0.75 m
4). 1 m

Correct Answer: 2). 0.5 m

Solution:

$$R = A/P$$
$$= 18/36$$
$$= 0.5\ m$$

Ref: Fluid Mechanics – Bansal

---

109. Rectangular channel width 10 m and depth 2 m. Area of flow =

1). 16 m^2
2). 18 m^2
3). 20 m^2
4). 22 m^2

Correct Answer: 3). 20 m^2

Solution:

$$A = b \times y$$
$$= 10 \times 2$$
$$= 20\ m^2$$

Ref: Fluid Mechanics – Bansal

---

110. If velocity = 4 m/s and area = 6 m^2, discharge =

1). 18 m^3/s
2). 20 m^3/s
3). 24 m^3/s
4). 30 m^3/s

Correct Answer: 3). 24 m^3/s

Solution:

$$
\begin{aligned}
Q &= AV \\
&= 4 \times 6 \\
&= 24\ m^3/s
\end{aligned}
$$

Ref: Fluid Mechanics – Bansal

---

111. Duty of water = 2500 ha/cumec. If discharge = 2 cumecs, area irrigated =

1). 4000 ha
2). 4500 ha
3). 5000 ha
4). 5500 ha

Correct Answer: 3). 5000 ha

Solution:

$$
\begin{aligned}
Area &= Duty \times Q \\
&= 2500 \times 2 \\
&= 5000\ ha
\end{aligned}
$$

Ref: Irrigation Engineering – Garg

---

112. Base period = 120 days and duty = 1600 ha/cumec. Find delta.

1). 60 cm
2). 64.8 cm
3). 70 cm
4). 75 cm

Correct Answer: 2). 64.8 cm

Solution:

$$
\begin{aligned}
\Delta &= \frac{8.64B}{D} \\
&= \frac{8.64 \times 120}{1600} \\
&= 64.8\ cm
\end{aligned}
$$

Ref: Irrigation Engineering – Garg

---

113. Contour interval = 5 m and elevation difference = 35 m. Number of contours =

1). 5
2). 6
3). 7
4). 8

Correct Answer: 3). 7

Solution:

$$35/5 = 7$$

Ref: Surveying – Punmia

---

114. Specific gravity of liquid if density = 880 kg/m³

1). 0.75
2). 0.80
3). 0.88
4). 0.95

Correct Answer: 3). 0.88

Solution:

$$SG = \rho/1000$$
$$= 880/1000$$
$$= 0.88$$

Ref: Fluid Mechanics – Bansal

---

115. Velocity head for velocity 9 m/s

1). 3.2 m
2). 4.1 m
3). 5.0 m
4). 6.2 m

Correct Answer: 2). 4.1 m

Solution:

$$V^2/2g$$
$$= 81/19.62$$
$$\approx 4.1\ m$$

Ref: Fluid Mechanics – Bansal

---

116. Rainfall intensity if rainfall = 120 mm in 6 hours

1). 15 mm/hr
2). 20 mm/hr
3). 25 mm/hr
4). 30 mm/hr

Correct Answer: 2). 20 mm/hr

Solution:

$$I = Rainfall/Time$$
$$= 120/6$$
$$= 20\ mm/hr$$

Ref: Hydrology – Subramanya

---

117. If strain = 0.003 and Young's modulus = 200 GPa, stress =

1). 400 MPa
2). 500 MPa
3). 600 MPa
4). 700 MPa

Correct Answer: 3). 600 MPa

Solution:

$$\sigma = E\epsilon$$
$$= 200000 \times 0.003$$
$$= 600\ MPa$$

Ref: Strength of Materials – Bansal

---

118. Pipe diameter = 0.5 m and velocity = 2 m/s. Discharge =

1). 0.25 m³/s
2). 0.39 m³/s
3). 0.50 m³/s
4). 0.75 m³/s

Correct Answer: 2). 0.39 m³/s

Solution:

$$A = \frac{\pi d^2}{4}$$
$$= 0.196$$
$$Q = AV$$
$$= 0.196 \times 2 \approx 0.39$$

Ref: Fluid Mechanics – Bansal

---

119. Area of triangle with base 20 m and height 8 m

1). 60 m²
2). 70 m²
3). 80 m²
4). 90 m²

Correct Answer: 3). 80 m²

Solution:

$$Area = \frac{1}{2} bh$$
$$= 0.5 \times 20 \times 8$$
$$= 80\ m^2$$

Ref: Surveying – Punmia

---

120. Beam span = 12 m with central load 48 kN. Maximum bending moment =

1). 120 kN·m
2). 144 kN·m
3). 160 kN·m
4). 180 kN·m

Correct Answer: 2). 144 kN·m

Solution:

$$M = WL/4$$
$$= 48 \times 12/4$$
$$= 144\ kN \cdot m$$

Ref: Strength of Materials – Bansal

---

121. A steel bar of length 5 m increases by 5 mm under load. Calculate strain.

1). 0.0005
2). 0.001
3). 0.002
4). 0.005

Correct Answer: 2). 0.001

Solution:

$$Strain = \frac{\Delta L}{L}$$
$$= \frac{5}{5000}$$
$$= 0.001$$

Ref: Strength of Materials – R.K. Bansal

---

122. Stress in a rod is 160 MPa and Young's modulus is 200 GPa. Find strain.

1). 0.0008
2). 0.001
3). 0.0015
4). 0.002

Correct Answer: 1). 0.0008

Solution:

$$\epsilon = \frac{\sigma}{E}$$
$$= \frac{160}{200000}$$
$$= 0.0008$$

Ref: Strength of Materials – R.K. Bansal

---

123. A simply supported beam of span 8 m carries central load 32 kN. Maximum bending moment is

1). 48 kN·m
2). 64 kN·m
3). 80 kN·m
4). 96 kN·m

Correct Answer: 2). 64 kN·m

Solution:

$$M = \frac{WL}{4}$$
$$= \frac{32 \times 8}{4}$$
$$= 64\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

124. A cantilever beam of length 6 m carries load 20 kN at free end. Maximum bending moment =

1). 100 kN·m
2). 120 kN·m
3). 140 kN·m
4). 160 kN·m

Correct Answer: 2). 120 kN·m

Solution:

$$M = WL$$
$$= 20 \times 6$$
$$= 120\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

125. Moment of inertia of rectangle 120 mm × 400 mm about centroidal axis

1). 533 × 10^6 mm^4
2). 640 × 10^6 mm^4
3). 800 × 10^6 mm^4
4). 960 × 10^6 mm^4

Correct Answer: 2). 640 × 10^6 mm^4

Solution:

$$I = \frac{bh^3}{12}$$
$$= \frac{120 \times 400^3}{12}$$
$$= 640 \times 10^6 mm^4$$

Ref: Strength of Materials – R.K. Bansal

---

126. Water flows through pipe area 1 m^2 with velocity 2 m/s. Find discharge.

1). 1 m^3/s
2). 2 m^3/s
3). 3 m^3/s
4). 4 m^3/s

Correct Answer: 2). 2 m^3/s

Solution:

$$Q = AV$$
$$= 1 \times 2$$
$$= 2\ m^3/s$$

Ref: Fluid Mechanics – R.K. Bansal

127. Pressure at depth 20 m in water

1). 98.1 kPa
2). 147.15 kPa
3). 196.2 kPa
4). 220 kPa

Correct Answer: 3). 196.2 kPa

Solution:

$$P = \gamma h$$
$$= 9.81 \times 20$$
$$= 196.2\ kPa$$

Ref: Fluid Mechanics – R.K. Bansal

128. Hydraulic radius if area = 20 m² and wetted perimeter = 40 m

1). 0.25 m
2). 0.5 m
3). 0.75 m
4). 1 m

Correct Answer: 2). 0.5 m

Solution:

$$R = A/P$$
$$= 20/40$$
$$= 0.5\ m$$

Ref: Fluid Mechanics – Bansal

129. Rectangular channel width 12 m and depth 2 m. Area of flow =

1). 20 m²
2). 22 m²
3). 24 m²
4). 26 m²

Correct Answer: 3). 24 m²

Solution:

$$A = b \times y$$
$$= 12 \times 2$$
$$= 24\ m^2$$

Ref: Fluid Mechanics – Bansal

---

130. If velocity = 5 m/s and area = 4 m², discharge =

1). 15 m³/s
2). 18 m³/s
3). 20 m³/s
4). 25 m³/s

Correct Answer: 3). 20 m³/s

Solution:

$$Q = AV$$
$$= 5 \times 4$$
$$= 20\ m^3/s$$

Ref: Fluid Mechanics – Bansal

---

131. Duty of water = 2400 ha/cumec. If discharge = 2 cumecs, area irrigated =

1). 4200 ha
2). 4800 ha
3). 5000 ha
4). 5200 ha

Correct Answer: 2). 4800 ha

Solution:

$$Area = Duty \times Q$$
$$= 2400 \times 2$$
$$= 4800\ ha$$

Ref: Irrigation Engineering – Garg

---

132. Base period = 120 days and duty = 2000 ha/cumec. Find delta

1). 51.8 cm
2). 60 cm
3). 64.8 cm
4). 72 cm

Correct Answer: 1). 51.8 cm

Solution:

$$\Delta = \frac{8.64B}{D}$$
$$= \frac{8.64 \times 120}{2000}$$
$$= 51.8\ cm$$

Ref: Irrigation Engineering – Garg

---

133. Contour interval = 2 m and elevation difference = 12 m. Number of contours

1). 4
2). 5
3). 6
4). 7

Correct Answer: 3). 6

Solution:

$$12/2 = 6$$

Ref: Surveying – Punmia

---

134. Specific gravity of liquid if density = 950 kg/m³

1). 0.90
2). 0.95

3). 1.00
4). 1.05

Correct Answer: 2). 0.95

Solution:

$$SG = \rho/1000$$
$$= 950/1000$$
$$= 0.95$$

Ref: Fluid Mechanics – Bansal

---

135. Velocity head for velocity 10 m/s

1). 4.1 m
2). 5.1 m
3). 6.1 m
4). 7.1 m

Correct Answer: 2). 5.1 m

Solution:

$$V^2/2g$$
$$= 100/19.62$$
$$\approx 5.1\ m$$

Ref: Fluid Mechanics – Bansal

---

136. Rainfall intensity if rainfall = 150 mm in 5 hours

1). 20 mm/hr
2). 25 mm/hr
3). 30 mm/hr
4). 35 mm/hr

Correct Answer: 3). 30 mm/hr

Solution:

$$I = Rainfall/Time$$
$$= 150/5$$

$$= 30\ mm/hr$$

Ref: Hydrology – Subramanya

---

137. If strain = 0.002 and Young's modulus = 210 GPa, stress =

1). 350 MPa
2). 400 MPa
3). 420 MPa
4). 500 MPa

Correct Answer: 3). 420 MPa

Solution:

$$\sigma = E\epsilon$$
$$= 210000 \times 0.002$$
$$= 420\ MPa$$

Ref: Strength of Materials – Bansal

---

138. Pipe diameter = 0.6 m and velocity = 3 m/s. Discharge =

1). 0.60 m³/s
2). 0.75 m³/s
3). 0.85 m³/s
4). 1.00 m³/s

Correct Answer: 3). 0.85 m³/s

Solution:

$$A = \frac{\pi d^2}{4}$$
$$= 0.2827$$
$$Q = AV$$
$$= 0.2827 \times 3 \approx 0.85$$

Ref: Fluid Mechanics – Bansal

---

139. Area of triangle with base 25 m and height 6 m

1). 60 m²
2). 75 m²
3). 80 m²
4). 90 m²

Correct Answer: 2). 75 m²

Solution:

$$Area = \frac{1}{2}bh$$
$$= 0.5 \times 25 \times 6$$
$$= 75\ m^2$$

Ref: Surveying – Punmia

---

140. Beam span = 14 m with central load 56 kN. Maximum bending moment =

1). 160 kN·m
2). 180 kN·m
3). 196 kN·m
4). 220 kN·m

Correct Answer: 3). 196 kN·m

Solution:

$$M = WL/4$$
$$= 56 \times 14/4$$
$$= 196\ kN \cdot m$$

Ref: Strength of Materials – Bansal

---

141. Duty of water = 2000 ha/cumec and discharge = 3 cumecs. Calculate area irrigated.

1). 4000 ha
2). 5000 ha

3). 6000 ha
4). 7000 ha

Correct Answer: 3). 6000 ha

Solution:

$$Area = Duty \times Q$$
$$= 2000 \times 3$$
$$= 6000\ ha$$

Ref: Irrigation Engineering – S.K. Garg

---

142. Calculate pressure at depth 25 m in water. (γ = 9.81 kN/m³)

1). 196.2 kPa
2). 220.5 kPa
3). 245.25 kPa
4). 260 kPa

Correct Answer: 3). 245.25 kPa

Solution:

$$P = \gamma h$$
$$= 9.81 \times 25$$
$$= 245.25\ kPa$$

Ref: Fluid Mechanics – R.K. Bansal

---

143. Velocity head for velocity 12 m/s

1). 6.5 m
2). 7.3 m
3). 8.2 m
4). 9.5 m

Correct Answer: 2). 7.3 m

Solution:

$$Velocity\ head = \frac{V^2}{2g}$$
$$= \frac{12^2}{2 \times 9.81}$$
$$= \frac{144}{19.62}$$
$$\approx 7.3\ m$$

Ref: Fluid Mechanics – R.K. Bansal

---

144. Area of triangle with base 30 m and height 8 m

1). 100 m²
2). 110 m²
3). 120 m²
4). 140 m²

Correct Answer: 3). 120 m²

Solution:

$$Area = \frac{1}{2}bh$$
$$= 0.5 \times 30 \times 8$$
$$= 120\ m^2$$

Ref: Surveying – B.C. Punmia

---

145. Pipe diameter = 0.5 m and velocity = 4 m/s. Calculate discharge.

1). 0.60 m³/s
2). 0.78 m³/s
3). 1.00 m³/s
4). 1.20 m³/s

Correct Answer: 2). 0.78 m³/s

Solution:

$$Area = \frac{\pi d^2}{4}$$

$$= \frac{3.14 \times 0.5^2}{4}$$
$$= 0.196\ m^2$$
$$Q = AV$$
$$= 0.196 \times 4$$
$$\approx 0.78\ m^3/s$$

Ref: Fluid Mechanics – R.K. Bansal

---

146. A simply supported beam of span 10 m carries central load 60 kN. Maximum bending moment =

1). 120 kN·m
2). 150 kN·m
3). 180 kN·m
4). 200 kN·m

Correct Answer: 2). 150 kN·m

Solution:

$$M = \frac{WL}{4}$$
$$= \frac{60 \times 10}{4}$$
$$= 150\ kN \cdot m$$

Ref: Strength of Materials – R.K. Bansal

---

147. A bar elongates 3 mm under tension. Original length = 3 m. Calculate strain.

1). 0.0005
2). 0.001
3). 0.002
4). 0.003

Correct Answer: 2). 0.001

Solution:

$$Strain = \frac{\Delta L}{L}$$

$$= \frac{3}{3000}$$
$$= 0.001$$

Ref: Strength of Materials – R.K. Bansal

---

148. Hydraulic radius if area = 10 m² and wetted perimeter = 20 m

1). 0.25 m
2). 0.5 m
3). 0.75 m
4). 1 m

Correct Answer: 2). 0.5 m

Solution:

$$R = \frac{A}{P}$$
$$= \frac{10}{20}$$
$$= 0.5\ m$$

Ref: Fluid Mechanics – R.K. Bansal

---

149. Rainfall intensity if rainfall = 200 mm in 8 hours

1). 20 mm/hr
2). 22 mm/hr
3). 25 mm/hr
4). 30 mm/hr

Correct Answer: 3). 25 mm/hr

Solution:

$$I = \frac{Rainfall}{Time}$$
$$= \frac{200}{8}$$
$$= 25\ mm/hr$$

Ref: Engineering Hydrology – K. Subramanya

---

150. Specific gravity of liquid if density = 920 kg/m³

1). 0.85
2). 0.90
3). 0.92
4). 0.95

Correct Answer: 3). 0.92

Solution:

$$SG = \frac{\rho}{1000}$$
$$= \frac{920}{1000}$$
$$= 0.92$$

Ref: Fluid Mechanics – R.K. Bansal

GRAND TEST – 1

---

101. A steel bar of length 2 m and area 500 mm² is subjected to a tensile load of 50 kN. Find the stress in the bar.

1). 50 MPa
2). 75 MPa
3). 100 MPa
4). 120 MPa

Correct Answer: 3). 100 MPa

Solution:

$$\sigma = \frac{P}{A}$$
$$P = 50kN = 50000N$$
$$A = 500mm^2$$
$$\sigma = \frac{50000}{500} = 100N/mm^2$$

= **100 MPa**

Reference: Strength of Materials – R.K. Bansal

---

102. Hooke's Law states that within elastic limit

1). Stress is constant
2). Stress is proportional to strain
3). Strain is constant
4). Stress equals strain

Correct Answer: 2). Stress is proportional to strain

Solution:

Hooke's law states

$$\sigma \propto \varepsilon$$

or

$$\sigma = E\varepsilon$$

where **E = Young's modulus**

Reference: Strength of Materials – Bansal

---

103. If Young's modulus is 200 GPa and strain is 0.002, the stress developed is

1). 200 MPa
2). 300 MPa
3). 400 MPa
4). 500 MPa

Correct Answer: 3). 400 MPa

Solution:

$$\begin{aligned} \sigma &= E\epsilon \\ &= 200000 \times 0.002 \\ &= 400 N/mm^2 \end{aligned}$$

Reference: Strength of Materials – Bansal

---

104. The ratio of lateral strain to longitudinal strain is called

1). Bulk modulus
2). Poisson's ratio
3). Young's modulus
4). Shear modulus

Correct Answer: 2). Poisson's ratio

Solution:

$$\mu = \frac{Lateral\ strain}{Longitudinal\ strain}$$

Reference: Strength of Materials – Bansal

---

105. Relationship between elastic constants is

1). $E = G(1 + \mu)$
2). $E = 2G(1 + \mu)$
3). $E = G(1 - \mu)$
4). $E = G/\mu$

Correct Answer: 2). $E = 2G(1 + \mu)$

Solution:

Relation between Young's modulus, shear modulus and Poisson's ratio.

Reference: Strength of Materials – Bansal

---

106. Shear force at free end of a cantilever beam is

1). Zero
2). Maximum
3). Minimum
4). Negative

Correct Answer: 1). Zero

Solution:

At free end there is **no reaction**, therefore shear force = **0**.

Reference: Strength of Materials – Bansal

---

107. Maximum bending moment in a cantilever beam carrying load W at free end

1). WL/2
2). WL
3). $WL^2/2$
4). WL^2

Correct Answer: 2). WL

Solution:

$$M = WL$$

Maximum moment occurs at fixed end.

Reference: Strength of Materials – Bansal

108. Maximum bending moment in simply supported beam with central load W

1). WL/2
2). WL/4
3). WL/6
4). WL

Correct Answer: 2). WL/4

Solution:

$$M = \frac{WL}{4}$$

Reference: Strength of Materials – Bansal

109. If a beam carries uniformly distributed load, the bending moment diagram will be

1). Straight line
2). Parabolic curve
3). Circular curve
4). Constant

Correct Answer: 2). Parabolic curve

Solution:

Under UDL, bending moment varies with **square of distance**.

Reference: Strength of Materials – Bansal

110. Unit of Young's modulus is

1). N
2). N/mm^2
3). mm
4). N/mm

Correct Answer: 2). N/mm^2

Solution:

Young's modulus = stress / strain
Unit = **stress unit = N/mm²**

Reference: Strength of Materials – Bansal

---

111. Strain energy stored in a body is

1). Energy due to deformation
2). Energy due to motion
3). Energy due to gravity
4). Energy due to temperature

Correct Answer: 1). Energy due to deformation

Solution:

Energy stored in material during loading.

Reference: Strength of Materials – Bansal

---

112. Section modulus is defined as

1). I/y
2). y/I
3). I/A
4). A/I

Correct Answer: 1). I/y

Solution:

$$Z = \frac{I}{y}$$

Reference: Strength of Materials – Bansal

---

113. Neutral axis in bending passes through

1). Top fiber
2). Bottom fiber
3). Centroid of section
4). Edge

Correct Answer: 3). Centroid of section

Solution:

Neutral axis passes through **centroid** where stress = 0.

Reference: Strength of Materials – Bansal

---

114. Maximum bending stress occurs at

1). Neutral axis
2). Top or bottom fiber
3). Centre
4). Mid depth

Correct Answer: 2). Top or bottom fiber

Solution:

Stress varies linearly from neutral axis.

Reference: Strength of Materials – Bansal

---

115. Shear stress distribution in rectangular section is

1). Uniform
2). Parabolic
3). Linear
4). Triangular

Correct Answer: 2). Parabolic

Solution:

Maximum shear stress occurs at **neutral axis**.

Reference: Strength of Materials – Bansal

---

116. Maximum shear stress in rectangular section equals

1). Average shear stress
2). 1.5 × average shear stress
3). 2 × average shear stress
4). 3 × average shear stress

Correct Answer: 2). 1.5 × average shear stress

Solution:

$$\tau_{max} = 1.5 \times \tau_{avg}$$

Reference: Strength of Materials – Bansal

---

117. Bending equation is

1). $M/I = \sigma/y = E/R$
2). $M/I = \sigma/R$
3). $M/y = I/R$
4). $E/I = M/R$

Correct Answer: 1). $M/I = \sigma/y = E/R$

Solution:

Fundamental bending theory equation.

Reference: Strength of Materials – Bansal

---

118. The point where bending moment changes sign is called

1). Neutral point
2). Point of contraflexure
3). Shear point
4). Critical point

Correct Answer: 2). Point of contraflexure

Solution:

Bending moment changes from **positive to negative**.

Reference: Strength of Materials – Bansal

---

119. Resilience of material means

1). Ability to absorb energy within elastic limit
2). Ability to resist shear
3). Ability to resist bending
4). Ability to resist compression

Correct Answer: 1). Ability to absorb energy within elastic limit

Solution:

Energy stored per unit volume.

Reference: Strength of Materials – Bansal

---

120. The unit of strain energy is

1). N
2). N/mm^2
3). Joules
4). N/mm

Correct Answer: 3). Joules

Solution:

Strain energy is **stored energy**, unit = Joule.

Reference: Strength of Materials – Bansal

---

121. The deflection of a cantilever beam of length L carrying point load W at free end is

1). $\frac{WL^3}{2EI}$
2). $\frac{WL^3}{3EI}$
3). $\frac{WL^3}{4EI}$
4). $\frac{WL^3}{6EI}$

Correct Answer: 2). $\frac{WL^3}{3EI}$

Solution:

Deflection at free end of cantilever:

$$y = \frac{WL^3}{3EI}$$

Reference: Theory of Structures – S. Ramamrutham

---

122. Slope at free end of cantilever carrying point load W is

1). $\frac{WL^2}{2EI}$
2). $\frac{WL^2}{3EI}$
3). $\frac{WL^2}{4EI}$
4). $\frac{WL^2}{6EI}$

Correct Answer: 1). $\frac{WL^2}{2EI}$

Solution:

Slope formula for cantilever:

$$\theta = \frac{WL^2}{2EI}$$

Reference: Analysis of Structures – Bhavikatti

---

123. Mohr's first theorem states that

1). Area of BMD gives slope change
2). Area of SFD gives deflection
3). Area of load diagram gives slope
4). Area of stress diagram gives deflection

Correct Answer: 1). Area of BMD gives slope change

Solution:

Slope difference between two points equals **area of bending moment diagram / EI**.

Reference: Ramamrutham

---

124. Mohr's second theorem gives

1). Shear force
2). Slope
3). Deflection
4). Load intensity

Correct Answer: 3). Deflection

Solution:

Moment of BMD area about a point gives **deflection**.

Reference: Ramamrutham

---

125. Slenderness ratio of a column is

1). L/k
2). k/L
3). L/A
4). A/L

Correct Answer: 1). L/k

Solution:

$$\lambda = \frac{L}{k}$$

Where
L = effective length
k = radius of gyration

Reference: Strength of Materials – Bansal

---

126. Euler's buckling formula for columns is

1). $P = \frac{\pi^2 EI}{L^2}$
2). $P = \frac{EI}{L^2}$
3). $P = \frac{\pi EI}{L}$
4). $P = \frac{WL^2}{EI}$

Correct Answer: 1). $P = \frac{\pi^2 EI}{L^2}$

Solution:

Euler's formula for **long columns**.

Reference: Bansal

---

127. Rankine formula is used for

1). Long columns
2). Short columns
3). Intermediate columns
4). Beams

Correct Answer: 3). Intermediate columns

Solution:

Rankine combines **crushing + buckling**.

Reference: Bansal

---

128. Effective length of column hinged at both ends is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 1). L

Solution:

Effective length depends on end conditions.

Reference: Bansal

---

129. Effective length of column fixed at both ends is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 2). L/2

Solution:

Most stable column condition.

Reference: Bansal

---

130. A truss is called perfect when

1). $m = 2j - 3$
2). $m = j - 1$
3). $m = j$
4). $m = j + 1$

Correct Answer: 1). $m = 2j - 3$

Solution:

Condition for **perfect truss**.

Reference: Ramamrutham

---

131. A zero force member in truss carries

1). Maximum force
2). Minimum force
3). No force
4). Compression only

Correct Answer: 3). No force

Solution:

Occurs due to joint equilibrium.

Reference: Ramamrutham

---

132. Method used for analyzing trusses

1). Method of joints
2). Method of sections
3). Both methods
4). Graphical method only

Correct Answer: 3). Both methods

Solution:

Both methods used in truss analysis.

Reference: Ramamrutham

---

133. Rankine's earth pressure formula gives

1). Passive pressure
2). Active pressure
3). Water pressure
4). Wind pressure

Correct Answer: 2). Active pressure

Solution:

$$P_a = \frac{1}{2} w h^2 \frac{1 - \sin\,\phi}{1 + \sin\,\phi}$$

Reference: Soil Mechanics – Punmia

---

134. Middle third rule states that resultant must lie within

1). Middle half
2). Middle third
3). Middle quarter
4). Middle fifth

Correct Answer: 2). Middle third

Solution:

Ensures **no tension at base of dam/wall**.

Reference: Ramamrutham

---

135. Condition for stability of retaining wall includes

1). No sliding
2). No overturning
3). Safe bearing pressure
4). All of these

Correct Answer: 4). All of these

Solution:

Three stability conditions must be satisfied.

Reference: Ramamrutham

---

136. In dams, uplift pressure acts

1). Downward
2). Upward
3). Horizontal
4). Vertical downward

Correct Answer: 2). Upward

Solution:

Water pressure acting upward reduces weight.

Reference: Theory of Structures – Ramamrutham

---

137. A column fails due to

1). Crushing
2). Buckling
3). Both crushing and buckling
4). Shear

Correct Answer: 3). Both crushing and buckling

Solution:

Depends on column length.

Reference: Bansal

---

138. The radius of gyration is

1). $\sqrt{I/A}$
2). I/A
3). A/I
4). I/L

Correct Answer: 1). $\sqrt{I/A}$

Solution:

$$k = \sqrt{\frac{I}{A}}$$

Reference: Bansal

---

139. Maximum deflection in simply supported beam with central load occurs at

1). Support
2). Mid span
3). Quarter span
4). End

Correct Answer: 2). Mid span

Solution:

Maximum bending moment occurs at center.

Reference: Ramamrutham

---

140. Deflection of simply supported beam with central load W is

1). $\frac{WL^3}{48EI}$
2). $\frac{WL^3}{24EI}$
3). $\frac{WL^3}{16EI}$
4). $\frac{WL^3}{12EI}$

Correct Answer: 1). $\frac{WL^3}{48EI}$

Solution:

Standard deflection formula.

Reference: Ramamrutham

---

141. The minimum grade of concrete recommended for RCC as per IS 456:2000 is

1). M10
2). M15
3). M20
4). M25

Correct Answer: 3). M20

Solution:

According to **IS 456:2000**, the minimum grade of concrete for reinforced concrete structures is **M20**.

Reference: RCC Design – B.C. Punmia

---

142. Characteristic compressive strength of M25 concrete is

1). 20 MPa
2). 25 MPa
3). 30 MPa
4). 35 MPa

Correct Answer: 2). 25 MPa

Solution:

For **M25 grade**, characteristic strength

$$f_{ck} = 25N/mm^2$$

Reference: RCC – N. Krishna Raju

---

143. Modulus of elasticity of concrete as per IS 456 is

1). $E_c = 5000\sqrt{f_{ck}}$
2). $E_c = 3000\sqrt{f_{ck}}$
3). $E_c = 2000\sqrt{f_{ck}}$
4). $E_c = 1000\sqrt{f_{ck}}$

Correct Answer: 1). $E_c = 5000\sqrt{f_{ck}}$

Solution:

IS 456 empirical relation:

$$E_c = 5000\sqrt{f_{ck}}$$

Reference: IS 456-2000

---

144. Limit State Method ensures safety against

1). Collapse only
2). Serviceability only
3). Both strength and serviceability
4). Durability only

Correct Answer: 3). Both strength and serviceability

Solution:

Limit State Design checks:

- Limit state of **collapse**
- Limit state of **serviceability**

Reference: RCC – Krishna Raju

---

145. Partial safety factor for concrete in limit state design is

1). 1.2
2). 1.5
3). 1.15
4). 1.8

Correct Answer: 2). 1.5

Solution:

As per IS 456:

$$\gamma_c = 1.5$$

Reference: IS 456-2000

---

146. Partial safety factor for steel in limit state design is

1). 1.5
2). 1.2
3). 1.15
4). 1.8

Correct Answer: 3). 1.15

Solution:

Steel safety factor:

$$\gamma_s = 1.15$$

Reference: IS 456-2000

---

147. Neutral axis in a singly reinforced beam lies

1). Above steel
2). Below steel
3). At mid depth
4). At top fibre

Correct Answer: 1). Above steel

Solution:

In singly reinforced beam, NA lies **above tension steel**.

Reference: RCC – Punmia

---

148. Lever arm in RCC beam is approximately

1). 0.8d
2). 0.9d
3). d
4). 0.7d

Correct Answer: 2). 0.9d

Solution:

Approximate lever arm:

$$z \approx 0.9d$$

Reference: RCC – Krishna Raju

---

149. T-beams are generally used when

1). Slab and beam act together
2). Only beam exists
3). Only slab exists
4). Only column exists

Correct Answer: 1). Slab and beam act together

Solution:

In T-beams slab acts as **compression flange**.

Reference: RCC – Punmia

---

150. Effective cover is defined as distance from

1). Concrete surface to steel center
2). Concrete surface to steel edge
3). Steel to centroid
4). Steel to neutral axis

Correct Answer: 1). Concrete surface to steel center

Solution:

Effective cover = surface to **center of reinforcement**.

Reference: RCC – Punmia

---

151. Shear reinforcement in beams is provided in the form of

1). Stirrups
2). Ties
3). Hoops
4). Rings

Correct Answer: 1). Stirrups

Solution:

Stirrups resist **diagonal tension due to shear**.

Reference: RCC – Punmia

---

152. Development length ensures

1). Proper bond between steel and concrete
2). Shear resistance
3). Bending resistance
4). Compression resistance

Correct Answer: 1). Proper bond between steel and concrete

Solution:

Development length allows **full stress transfer**.

Reference: RCC – Krishna Raju

---

153. One-way slab is designed when

1). $L_y/L_x > 2$
2). $L_y/L_x < 2$
3). $L_y/L_x = 1$
4). $L_y/L_x = 2$

Correct Answer: 1). $L_y/L_x > 2$

Solution:

When long span is more than **twice short span**, slab acts one-way.

Reference: RCC – Punmia

---

154. Two-way slab occurs when

1). $L_y/L_x > 2$
2). $L_y/L_x < 2$
3). $L_y/L_x = 3$
4). $L_y/L_x = 4$

Correct Answer: 2). $L_y/L_x < 2$

Solution:

Load transferred in **two directions**.

Reference: RCC – Krishna Raju

---

155. Short column fails mainly due to

1). Buckling
2). Crushing
3). Shear
4). Tension

Correct Answer: 2). Crushing

Solution:

Short columns have **low slenderness ratio**.

Reference: RCC – Punmia

---

156. Slenderness ratio of column is

1). L/k
2). k/L
3). A/I
4). I/A

Correct Answer: 1). L/k

Solution:

$$\lambda = \frac{L}{k}$$

Reference: RCC – Punmia

---

157. Effective length of column with both ends fixed is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 2). L/2

Solution:

Most stable condition.

Reference: RCC – Krishna Raju

---

158. Footings transfer load from

1). Beam to slab
2). Column to soil
3). Slab to beam
4). Wall to slab

Correct Answer: 2). Column to soil

Solution:

Footing spreads column load safely to soil.

Reference: RCC – Punmia

---

159. Two-way shear in footings is also called

1). Diagonal shear
2). Punching shear
3). Direct shear
4). Bending shear

Correct Answer: 2). Punching shear

Solution:

Occurs around column perimeter.

Reference: RCC – Krishna Raju

---

160. The working stress method is based on

1). Elastic theory
2). Plastic theory
3). Ultimate theory
4). Limit state theory

Correct Answer: 1). Elastic theory

Solution:

Working stress method assumes **linear elastic behaviour**.

Reference: RCC – Punmia

Surveying

---

161. The fundamental principle of chain surveying is

1). Working from whole to part
2). Working from part to whole
3). Triangulation only
4). Traversing only

Correct Answer: 1). Working from whole to part

Solution:
In chain surveying, the main framework is established first and then details are filled. This avoids accumulation of errors.

Reference: Surveying – B.C. Punmia

---

162. The instrument used for measuring bearings in compass surveying is

1). Dumpy level
2). Prismatic compass

3). Theodolite
4). Plane table

Correct Answer: 2). Prismatic compass

Solution:
Prismatic compass measures **whole circle bearings** of survey lines.

Reference: Surveying – B.C. Punmia

---

163. Local attraction in compass surveying is caused due to

1). Magnetic materials near compass
2). Wind pressure
3). Temperature
4). Rainfall

Correct Answer: 1). Magnetic materials near compass

Solution:
Presence of iron objects or electric lines disturbs magnetic needle.

Reference: Surveying – K.R. Arora

---

164. The difference between fore bearing and back bearing of a line is

1). 90°
2). 120°
3). 180°
4). 360°

Correct Answer: 3). 180°

Solution:

$$BB = FB \pm 180^\circ$$

Reference: Surveying – B.C. Punmia

---

165. Levelling is used to determine

1). Horizontal distances
2). Elevation of points
3). Area of land
4). Direction of line

Correct Answer: 2). Elevation of points

Solution:
Levelling determines the **difference in elevation between points**.

Reference: Surveying – N.N. Basak

---

166. The line joining the optical centre of objective lens and cross hairs is

1). Line of collimation
2). Axis of bubble tube
3). Horizontal axis
4). Vertical axis

Correct Answer: 1). Line of collimation

Solution:
It represents the **line of sight** in levelling instrument.

Reference: Surveying – B.C. Punmia

---

167. Contour lines represent

1). Points of equal elevation
2). Points of equal distance
3). Points of equal slope
4). Points of equal temperature

Correct Answer: 1). Points of equal elevation

Solution:
Contours connect points having **same RL (Reduced Level)**.

Reference: Surveying – Punmia

---

168. Closely spaced contour lines indicate

1). Gentle slope
2). Steep slope
3). Flat ground
4). Valley

Correct Answer: 2). Steep slope

Solution:
Closer contours mean **rapid change in elevation**.

Reference: Surveying – Punmia

---

169. Bowditch rule is used for

1). Levelling correction
2). Traverse adjustment
3). Area calculation
4). Chain correction

Correct Answer: 2). Traverse adjustment

Solution:
Bowditch rule distributes errors proportional to line length.

Reference: Surveying – K.R. Arora

---

170. Tacheometry is used for

1). Accurate levelling
2). Rapid distance and elevation measurement
3). Magnetic bearings
4). Area measurement

Correct Answer: 2). Rapid distance and elevation measurement

Solution:
Tacheometry determines **distance and elevation indirectly**.

Reference: Surveying – Punmia

---

171. The constant used in stadia tacheometry is

1). 50
2). 75
3). 100
4). 150

Correct Answer: 3). 100

Solution:
Standard tacheometric constant:

$$k = 100$$

Reference: Surveying – Punmia

---

172. The instrument used for measuring horizontal and vertical angles is

1). Dumpy level
2). Compass
3). Theodolite
4). Chain

Correct Answer: 3). Theodolite

Solution:
Theodolite measures both **horizontal and vertical angles**.

Reference: Surveying – Punmia

---

173. GPS stands for

1). Global Positioning System
2). Ground Positioning System
3). Geographic Positioning Source
4). Global Plotting System

Correct Answer: 1). Global Positioning System

Solution:
GPS uses satellites to determine **location coordinates**.

Reference: GIS – Kang-tsung Chang

---

174. GIS is mainly used for

1). Data storage only
2). Spatial data analysis
3). Distance measurement
4). Levelling

Correct Answer: 2). Spatial data analysis

Solution:
GIS integrates spatial data for **mapping and analysis**.

Reference: GIS – Kang-tsung Chang

---

175. The closing error in a traverse is adjusted by

1). Transit rule
2). Bowditch rule
3). Both methods
4). Graphical method

Correct Answer: 3). Both methods

Solution:
Traverse corrections can be done using **Bowditch or Transit rule**.

Reference: Surveying – B.C. Punmia

Hydraulics

---

176. The specific weight of water is approximately

1). 9.81 N/m^3
2). 9.81 kN/m^3
3). 981 kN/m^3
4). 100 kN/m^3

Correct Answer: 2). 9.81 kN/m^3

Solution:
Specific weight of water

$$\gamma = \rho g$$
$$= 1000 \times 9.81$$
$$= 9810\ N/m^3 = 9.81\ kN/m^3$$

Reference: Fluid Mechanics – R.K. Bansal

---

177. The ratio of inertia force to viscous force is called

1). Froude number
2). Reynolds number
3). Weber number
4). Mach number

Correct Answer: 2). Reynolds number

Solution:

$$Re = \frac{\rho V D}{\mu}$$

Used to determine **laminar or turbulent flow**.

Reference: Fluid Mechanics – R.K. Bansal

---

178. Laminar flow occurs when Reynolds number is

1). Less than 2000
2). Between 2000 and 4000
3). Greater than 4000
4). Greater than 5000

Correct Answer: 1). Less than 2000

Solution:
Flow classification:

- Laminar: **Re < 2000**
- Transition: 2000–4000
- Turbulent: **Re > 4000**

Reference: Fluid Mechanics – Modi & Seth

---

179. Bernoulli's theorem represents conservation of

1). Mass
2). Momentum
3). Energy
4). Pressure

Correct Answer: 3). Energy

Solution:

Bernoulli equation:

$$\frac{P}{\gamma} + \frac{V^2}{2g} + z = constant$$

Represents **energy conservation in flowing fluid**.

Reference: Fluid Mechanics – R.K. Bansal

---

180. A device used to measure velocity of flowing fluid is

1). Manometer
2). Pitot tube
3). Venturimeter
4). Orifice meter

Correct Answer: 2). Pitot tube

Solution:
Pitot tube measures **velocity head** and determines velocity.

Reference: Fluid Mechanics – Bansal

---

181. The coefficient of discharge is defined as

1). $C_d = C_v + C_c$
2). $C_d = C_v C_c$
3). $C_d = C_v / C_c$
4). $C_d = C_c / C_v$

Correct Answer: 2). $C_d = C_v C_c$

Solution:

$$C_d = C_c \times C_v$$

Where

C_c= coefficient of contraction
C_v= coefficient of velocity

Reference: Fluid Mechanics – Bansal

---

182. Typical value of coefficient of discharge for sharp-edged orifice is

1). 0.25
2). 0.40
3). 0.62
4). 0.85

Correct Answer: 3). 0.62

Solution:
Standard experimental value for **sharp-edged orifice**.

Reference: Fluid Mechanics – Modi & Seth

---

183. Hydraulic gradient line represents

1). Pressure head
2). Velocity head
3). Total energy head
4). Datum head

Correct Answer: 1). Pressure head

Solution:

HGL =

$$\frac{P}{\gamma} + z$$

Reference: Fluid Mechanics – Khurmi

---

184. Total energy line represents

1). Pressure head
2). Velocity head
3). Total head
4). Datum head

Correct Answer: 3). Total head

Solution:

$$TEL = \frac{P}{\gamma} + \frac{V^2}{2g} + z$$

Reference: Fluid Mechanics – Khurmi

---

185. Darcy–Weisbach equation is used to calculate

1). Pipe discharge
2). Head loss due to friction
3). Velocity of flow
4). Pressure head

Correct Answer: 2). Head loss due to friction

Solution:

$$h_f = \frac{4fLV^2}{2gD}$$

Reference: Fluid Mechanics – Bansal

---

186. Manning's equation is used for

1). Pipe flow
2). Open channel flow
3). Pump efficiency
4). Turbine design

Correct Answer: 2). Open channel flow

Solution:

$$V = \frac{1}{n} R^{2/3} S^{1/2}$$

Reference: Hydraulics – Modi & Seth

---

187. Hydraulic radius is defined as

1). A/P
2). P/A
3). A/L
4). P/L

Correct Answer: 1). A/P

Solution:

$$R = \frac{Area}{Wetted\ Perimeter}$$

Reference: Hydraulics – Bansal

---

188. The most economical channel section occurs when

1). Area is maximum
2). Wetted perimeter is minimum
3). Velocity is minimum
4). Discharge is minimum

Correct Answer: 2). Wetted perimeter is minimum

Solution:
Economical section gives **maximum discharge with minimum wetted perimeter**.

Reference: Hydraulics – Modi & Seth

---

189. A notch is used for measuring

1). Pressure
2). Velocity
3). Discharge in open channels
4). Density

Correct Answer: 3). Discharge in open channels

Solution:
Notches measure **small discharges in channels**.

Reference: Hydraulics – Bansal

---

190. Francis formula is used to calculate discharge over

1). Rectangular notch
2). Triangular notch
3). Weirs
4). Orifices

Correct Answer: 3). Weirs

Solution:

Francis formula:

$$Q = 1.84\, L\, H^{3/2}$$

Reference: Hydraulics – R.K. Bansal

Irrigation Engineering

---

191. The primary objective of irrigation is

1). Improve soil structure
2). Provide water to crops during dry periods
3). Increase rainfall
4). Reduce evaporation

Correct Answer: 2). Provide water to crops during dry periods

Solution:
Irrigation supplies water to crops when rainfall is insufficient, ensuring **stable crop growth and higher agricultural productivity**.

Reference: Irrigation Engineering – S.K. Garg

---

192. The relationship between Duty (D), Delta (Δ), and Base Period (B) is

1). $\Delta = \frac{8.64D}{B}$
2). $\Delta = \frac{8.64B}{D}$
3). $\Delta = \frac{B}{8.64D}$
4). $\Delta = \frac{D}{8.64B}$

Correct Answer: 2). $\Delta = \frac{8.64B}{D}$

Solution:

$$\Delta = \frac{8.64B}{D}$$

Where

Δ = delta (m)
B = base period (days)
D = duty (hectares/cumec)

Reference: Irrigation Engineering – S.K. Garg

---

193. Duty of water is defined as

1). Water required per hectare
2). Area irrigated per unit discharge
3). Volume of reservoir
4). Canal discharge

Correct Answer: 2). Area irrigated per unit discharge

Solution:
Duty represents the **number of hectares irrigated per cumec of water**.

Reference: Irrigation Engineering – Punmia

---

194. Delta represents

1). Total rainfall
2). Depth of water required for a crop
3). Canal slope
4). Groundwater level

Correct Answer: 2). Depth of water required for a crop

Solution:
Delta is the **total depth of water needed during the crop period**.

Reference: Irrigation Engineering – Garg

---

195. The Kharif crop season occurs during

1). Winter
2). Summer
3). Monsoon
4). Spring

Correct Answer: 3). Monsoon

Solution:
Kharif crops such as rice and maize are grown during the **monsoon season**.

Reference: Irrigation Engineering – Garg

---

196. The formula used for estimating flood discharge is

1). Bernoulli formula
2). Lacey formula
3). Dickens formula
4). Manning formula

Correct Answer: 3). Dickens formula

Solution:
Dickens empirical formula estimates **maximum flood discharge**.

Reference: Engineering Hydrology – Subramanya

---

197. Lacey's silt theory is related to

1). Canal design
2). Dam design
3). Reservoir design
4). Pump design

Correct Answer: 1). Canal design

Solution:
Lacey's theory is used to design **stable alluvial canals**.

Reference: Irrigation Engineering – Garg

---

198. The structure constructed across a river to raise water level for irrigation is called

1). Dam
2). Barrage
3). Weir
4). Canal

Correct Answer: 3). Weir

Solution:
A **weir** raises the river water level so that water can be diverted into canals.

Reference: Irrigation Engineering – Punmia

---

199. Dead storage in a reservoir refers to

1). Water used for irrigation
2). Water above spillway level
3). Water below outlet level
4). Flood storage

Correct Answer: 3). Water below outlet level

Solution:
Dead storage cannot be drained by gravity and mainly **stores sediment**.

Reference: Irrigation Engineering – Garg

---

200. Failure of earth dams may occur due to

1). Overtopping
2). Seepage through foundation
3). Piping failure
4). All of these

Correct Answer: 4). All of these

Solution:
Common causes of earth dam failure include:

- Overtopping
- Seepage/piping
- Structural instability

Reference: Irrigation Engineering – Punmia

AP ECET 2026 – CIVIL ENGINEERING

GRAND TEST – 2

Strength of Materials

---

101. The theoretical limits of Poisson's ratio for isotropic materials are

1). 0 to 0.25
2). 0 to 0.33
3). –1 to 0.5
4). 0 to 1

Correct Answer: 3). –1 to 0.5

Solution:
For isotropic materials:

$$-1 \leq \mu \leq 0.5$$

Most engineering materials have μ between **0.25–0.35**.

Reference: Strength of Materials – R.K. Bansal

---

102. If Young's modulus (E) = 200 GPa and Poisson's ratio (μ) = 0.25, find shear modulus (G).

1). 60 GPa
2). 70 GPa
3). 80 GPa
4). 90 GPa

Correct Answer: 3). 80 GPa

Solution:

$$E = 2G(1 + \mu)$$
$$200 = 2G(1.25)$$
$$G = 80\ GPa$$

Reference: Strength of Materials – Bansal

---

103. Relationship between bulk modulus (K), Young's modulus (E) and Poisson's ratio (μ) is

1). $E = 3K(1 - 2\mu)$
2). $E = 2K(1 - \mu)$
3). $E = 3K(1 - \mu)$
4). $E = 2K(1 + \mu)$

Correct Answer: 1). $E = 3K(1 - 2\mu)$

Solution:
Elastic constant relationship used in isotropic materials.

Reference: Strength of Materials – Bansal

---

104. If bulk modulus of a material is very high, the material is

1). Highly compressible
2). Slightly compressible
3). Incompressible
4). Plastic

Correct Answer: 3). Incompressible

Solution:
Higher bulk modulus means **greater resistance to volumetric change**.

Reference: Strength of Materials – Bansal

---

105. The point in a beam where bending moment changes sign is

1). Neutral axis
2). Critical point
3). Point of contra-flexure
4). Shear center

Correct Answer: 3). Point of contra-flexure

Solution:
At this point bending moment changes from **positive to negative**.

Reference: Strength of Materials – Bansal

---

106. In an overhanging beam, the point of contra-flexure occurs where

1). Shear force is maximum
2). Bending moment is zero
3). Load is maximum
4). Reaction is zero

Correct Answer: 2). Bending moment is zero

Solution:
Moment changes sign when it passes through zero.

Reference: Strength of Materials – Bansal

---

107. Maximum bending moment for simply supported beam carrying UDL over entire span

1). $WL/8$
2). $WL/4$
3). $WL/6$
4). $WL/2$

Correct Answer: 1). $WL/8$

Solution:

$$M_{max} = \frac{wL^2}{8}$$

Reference: Strength of Materials – Bansal

---

108. In shear force diagram under UDL, the shape is

1). Straight line
2). Parabolic curve
3). Circular curve
4). Horizontal line

Correct Answer: 1). Straight line

Solution:
Shear force varies linearly under UDL.

Reference: Strength of Materials – Bansal

---

109. If a beam carries only concentrated loads, bending moment diagram will be

1). Parabolic
2). Straight line segments
3). Circular curve
4). Constant

Correct Answer: 2). Straight line segments

Solution:
Moment varies linearly between loads.

Reference: Strength of Materials – Bansal

---

110. The bending stress formula is

1). $\sigma = \frac{M}{I}$
2). $\sigma = \frac{My}{I}$
3). $\sigma = \frac{I}{My}$
4). $\sigma = \frac{M}{y}$

Correct Answer: 2). $\sigma = \frac{My}{I}$

Solution:
Derived from bending equation.

Reference: Strength of Materials – Bansal

---

111. Section modulus is

1). I/y
2). y/I
3). A/I
4). I/A

Correct Answer: 1). I/y

Solution:

$$Z = \frac{I}{y}$$

Reference: Strength of Materials – Bansal

---

112. Maximum shear stress in circular section occurs at

1). Centre
2). Surface
3). Mid radius
4). Edge

Correct Answer: 1). Centre

Solution:
Shear stress distribution in circular section is **parabolic**.

Reference: Strength of Materials – Bansal

---

113. The unit of resilience is

1). Joule
2). N/mm^2
3). Joule per cubic meter
4). N

Correct Answer: 3). Joule per cubic meter

Solution:
Resilience = **strain energy per unit volume**.

Reference: Strength of Materials – Bansal

---

114. If beam length is doubled, deflection under same load becomes

1). Double
2). Four times
3). Eight times
4). Sixteen times

Correct Answer: 3). Eight times

Solution:
Deflection ∝ L^3.

Reference: Strength of Materials – Bansal

---

115. If shear force changes sign, bending moment will be

1). Maximum
2). Zero
3). Minimum
4). Constant

Correct Answer: 1). Maximum

Solution:
Maximum moment occurs where **shear force = 0**.

Reference: Strength of Materials – Bansal

---

116. Maximum bending stress occurs at

1). Neutral axis
2). Top and bottom fibers
3). Centre
4). Mid span

Correct Answer: 2). Top and bottom fibers

Solution:
Stress varies linearly from neutral axis.

Reference: Strength of Materials – Bansal

---

117. For rectangular beam, maximum shear stress equals

1). Average shear stress
2). 1.25 × average
3). 1.5 × average
4). 2 × average

Correct Answer: 3). 1.5 × average

Solution:

$$\tau_{max} = 1.5 \times \tau_{avg}$$

Reference: Strength of Materials – Bansal

---

118. A simply supported beam of span 6 m carries central load 24 kN. Maximum bending moment is

1). 30 kN·m
2). 36 kN·m
3). 42 kN·m
4). 48 kN·m

Correct Answer: 2). 36 kN·m

Solution:

$$M = WL/4$$
$$= 24 \times 6/4 = 36kN \cdot m$$

Reference: Strength of Materials – Bansal

---

119. The neutral axis always passes through

1). Extreme fiber
2). Centroid of section
3). Support
4). Load point

Correct Answer: 2). Centroid of section

Solution:
Neutral axis passes through centroid where stress is zero.

Reference: Strength of Materials – Bansal

---

120. The relation between Young's modulus (E), bulk modulus (K), and shear modulus (G) is

1). $E = 9KG/(3K + G)$
2). $E = KG/(K + G)$
3). $E = 2KG/(K + G)$
4). $E = K + G$

Correct Answer: 1). $E = 9KG/(3K + G)$

Solution:
Important elastic constant relationship.

Reference: Strength of Materials – Bansal

Theory of Structures

---

121. Macaulay's method is primarily used for

1). Determining shear stress
2). Determining slope and deflection of beams
3). Determining bending stress
4). Determining column strength

Correct Answer: 2). Determining slope and deflection of beams

Solution:
Macaulay's method simplifies the integration of bending moment equations to determine **beam slope and deflection under discontinuous loading**.

Reference: Analysis of Structures – S.S. Bhavikatti

---

122. The deflection at free end of a cantilever carrying load W at the free end is

1). $WL^3/2EI$
2). $WL^3/3EI$
3). $WL^3/4EI$
4). $WL^3/6EI$

Correct Answer: 2). $WL^3/3EI$

Solution:

$$y = \frac{WL^3}{3EI}$$

Reference: Theory of Structures – Ramamrutham

---

123. Slope at free end of cantilever carrying point load W is

1). $WL^2/2EI$
2). $WL^2/3EI$
3). $WL^2/4EI$
4). $WL^2/6EI$

Correct Answer: 1). $WL^2/2EI$

Solution:

$$\theta = \frac{WL^2}{2EI}$$

Reference: Ramamrutham

---

124. Mohr's first theorem states that the change in slope between two points equals

1). Area under SFD
2). Area under BMD/EI
3). Area under load diagram
4). Area under stress diagram

Correct Answer: 2). Area under BMD/EI

Solution:
Slope difference equals **area of bending moment diagram divided by EI**.

Reference: Ramamrutham

---

125. Mohr's second theorem is used to determine

1). Bending stress
2). Shear force
3). Deflection
4). Load

Correct Answer: 3). Deflection

Solution:
Moment of BMD area about a point gives **deflection**.

Reference: Ramamrutham

---

126. Euler's critical load formula for long columns is

1). $P = EI/L^2$
2). $P = \pi^2 EI/L^2$
3). $P = EI/L$
4). $P = WL$

Correct Answer: 2). $P = \pi^2 EI/L^2$

Solution:

$$P = \frac{\pi^2 EI}{L^2}$$

Reference: Strength of Materials – Bansal

---

127. Euler's formula is valid for

1). Short columns
2). Intermediate columns
3). Long columns
4). Composite columns

Correct Answer: 3). Long columns

Solution:
Euler formula applies to **slender columns where buckling governs failure**.

Reference: Bansal

---

128. Rankine's formula is used for

1). Long columns
2). Short columns
3). Intermediate columns
4). Steel beams

Correct Answer: 3). Intermediate columns

Solution:
Rankine combines **crushing + buckling effects**.

Reference: Bansal

---

129. Rankine formula for critical load is

1). $P = \frac{\sigma_c A}{1+a(L/k)^2}$
2). $P = \sigma_c A$
3). $P = EI/L^2$
4). $P = WL$

Correct Answer: 1). $P = \frac{\sigma_c A}{1+a(L/k)^2}$

Solution:
Rankine formula includes **Rankine constant (a)**.

Reference: Strength of Materials – Bansal

---

130. Slenderness ratio of a column is

1). A/I
2). L/k
3). k/L
4). I/A

Correct Answer: 2). L/k

Solution:

$$\lambda = \frac{L}{k}$$

Reference: Bansal

---

131. Radius of gyration is defined as

1). I/A
2). A/I
3). $\sqrt{I/A}$
4). I/L

Correct Answer: 3). $\sqrt{I/A}$

Solution:

$$k = \sqrt{\frac{I}{A}}$$

Reference: Bansal

---

132. In retaining walls, stability against overturning requires

1). Resultant passes through center
2). Resultant lies within middle third
3). Resultant lies outside base
4). Resultant equals load

Correct Answer: 2). Resultant lies within middle third

Solution:
Middle third rule prevents **tension at base**.

Reference: Theory of Structures – Ramamrutham

---

133. If resultant passes outside middle third, the base experiences

1). Compression only
2). Tension and compression
3). Shear only
4). No stress

Correct Answer: 2). Tension and compression

Solution:
This causes **tensile stress at base**, which is unsafe for masonry dams.

Reference: Ramamrutham

---

134. A dam is stable when

1). No sliding
2). No overturning
3). Safe bearing pressure
4). All of these

Correct Answer: 4). All of these

Solution:
All three stability conditions must be satisfied.

Reference: Ramamrutham

---

135. Uplift pressure in dams acts

1). Downward
2). Upward
3). Horizontally
4). Diagonally

Correct Answer: 2). Upward

Solution:
Water pressure below dam reduces effective weight.

Reference: Ramamrutham

---

136. Maximum compressive stress in dam occurs at

1). Top
2). Base
3). Middle
4). Crest

Correct Answer: 2). Base

Solution:
Because entire weight acts downward at base.

Reference: Ramamrutham

---

137. A perfect truss satisfies relation

1). $m = j$
2). $m = j + 1$
3). $m = 2j - 3$
4). $m = 3j - 2$

Correct Answer: 3). $m = 2j - 3$

Solution:
Condition for **statically determinate truss**.

Reference: Ramamrutham

---

138. Zero force member in truss carries

1). Maximum force
2). Minimum force
3). No force
4). Compression

Correct Answer: 3). No force

Solution:
Occurs due to joint equilibrium.

Reference: Ramamrutham

---

139. Maximum deflection in simply supported beam occurs at

1). Supports
2). Midspan
3). Quarter span
4). End

Correct Answer: 2). Midspan

Solution:
Maximum bending moment occurs at center.

Reference: Ramamrutham

---

140. Deflection at center of simply supported beam carrying central load W

1). $WL^3/48EI$
2). $WL^3/24EI$
3). $WL^3/12EI$
4). $WL^3/6EI$

Correct Answer: 1). $WL^3/48EI$

Solution:

$$y = \frac{WL^3}{48EI}$$

Reference: Ramamrutham

Reinforced Concrete Structures

---

141. Limit State of Serviceability in RCC design ensures

1). Safety against collapse
2). Safety against buckling
3). Control of deflection and cracking
4). Safety against shear failure

Correct Answer: 3). Control of deflection and cracking

Solution:
Serviceability limit state ensures that **deflection, cracking, and vibration remain within acceptable limits during service life**.

Reference: IS 456-2000, Krishna Raju

---

142. The minimum grade of concrete used in RCC as per IS 456:2000 is

1). M10
2). M15
3). M20
4). M25

Correct Answer: 3). M20

Solution:
IS 456 recommends **M20 as minimum grade for reinforced concrete structures**.

Reference: IS 456-2000

---

143. The modulus of elasticity of concrete is given by

1). $E_c = 3000\sqrt{f_{ck}}$
2). $E_c = 4000\sqrt{f_{ck}}$
3). $E_c = 5000\sqrt{f_{ck}}$
4). $E_c = 6000\sqrt{f_{ck}}$

Correct Answer: 3). $E_c = 5000\sqrt{f_{ck}}$

Solution:

$$E_c = 5000\sqrt{f_{ck}}$$

Reference: IS 456-2000

---

144. The partial safety factor for steel in limit state design is

1). 1.15
2). 1.5
3). 1.25
4). 2.0

Correct Answer: 1). 1.15

Solution:
According to IS 456:

$$\gamma_s = 1.15$$

Reference: IS 456-2000

---

145. The partial safety factor for concrete in limit state design is

1). 1.15
2). 1.25
3). 1.5
4). 2.0

Correct Answer: 3). 1.5

Solution:

$$\gamma_c = 1.5$$

Reference: IS 456-2000

---

146. Development length ensures

1). Bond strength between steel and concrete
2). Shear resistance
3). Compression resistance
4). Deflection control

Correct Answer: 1). Bond strength between steel and concrete

Solution:
Development length allows **steel to develop full tensile strength**.

Reference: RCC – B.C. Punmia

---

147. Development length formula is

1). $L_d = \frac{\phi \sigma_s}{4\tau_{bd}}$
2). $L_d = \frac{\phi \tau_{bd}}{4\sigma_s}$
3). $L_d = \frac{\sigma_s}{\phi \tau_{bd}}$
4). $L_d = \frac{4\tau_{bd}}{\phi \sigma_s}$

Correct Answer: 1). $L_d = \frac{\phi\sigma_s}{4\tau_{bd}}$

Solution:
This formula relates **bar diameter, steel stress, and bond stress**.

Reference: IS 456-2000

---

148. Effective cover is the distance between

1). Steel surface and concrete surface
2). Steel centre and concrete surface
3). Steel and neutral axis
4). Steel and beam centre

Correct Answer: 2). Steel centre and concrete surface

Solution:
Effective cover protects reinforcement from **corrosion and fire**.

Reference: RCC – Punmia

---

149. A singly reinforced beam contains reinforcement in

1). Compression zone
2). Tension zone only
3). Both zones
4). Shear zone

Correct Answer: 2). Tension zone only

Solution:
Concrete resists compression while steel resists tension.

Reference: RCC – Krishna Raju

---

150. T-beams occur when

1). Slab acts independently
2). Slab and beam act monolithically
3). Beam is isolated
4). Only column exists

Correct Answer: 2). Slab and beam act monolithically

Solution:
Slab acts as **compression flange of T-beam**.

Reference: RCC – Punmia

---

151. One-way slab occurs when

1). $L_y/L_x > 2$
2). $L_y/L_x < 2$
3). $L_y/L_x = 1$
4). $L_y/L_x = 2$

Correct Answer: 1). $L_y/L_x > 2$

Solution:
Load transfers mainly in **one direction**.

Reference: RCC – Punmia

---

152. Two-way slab occurs when

1). $L_y/L_x > 2$
2). $L_y/L_x < 2$
3). $L_y/L_x = 3$
4). $L_y/L_x = 4$

Correct Answer: 2). $L_y/L_x < 2$

Solution:
Load distributes in **two perpendicular directions**.

Reference: RCC – Punmia

---

153. Torsion reinforcement in two-way slabs is provided at

1). Midspan
2). Corners
3). Centre
4). Edges

Correct Answer: 2). Corners

Solution:
Corner reinforcement prevents **torsional cracking**.

Reference: IS 456-2000

---

154. Short columns fail mainly by

1). Buckling
2). Crushing
3). Shear
4). Tension

Correct Answer: 2). Crushing

Solution:
Short columns have **low slenderness ratio**.

Reference: RCC – Punmia

---

155. Slenderness ratio of a column is

1). L/k
2). k/L
3). I/A
4). A/I

Correct Answer: 1). L/k

Solution:

$$\lambda = \frac{L}{k}$$

Reference: RCC – Punmia

---

156. Effective length of column hinged at both ends is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 1). L

Solution:
Standard column end condition.

Reference: RCC – Krishna Raju

---

157. The neutral axis in a balanced section depends on

1). Grade of concrete
2). Grade of steel
3). Strain compatibility
4). All of these

Correct Answer: 4). All of these

Solution:
Balanced condition occurs when **steel and concrete reach allowable strain simultaneously**.

Reference: RCC – Krishna Raju

---

158. Punching shear occurs in

1). Beams
2). Slabs
3). Columns
4). Footings

Correct Answer: 4). Footings

Solution:
Punching shear occurs **around column perimeter in footings/slabs**.

Reference: RCC – Punmia

---

159. Working Stress Method is based on

1). Elastic theory
2). Plastic theory
3). Limit state theory
4). Yield theory

Correct Answer: 1). Elastic theory

Solution:
Assumes **linear stress-strain relationship**.

Reference: RCC – Punmia

---

160. Limit State Method is preferred because

1). More economical design
2). Higher factor of safety
3). Accurate prediction of failure
4). All of these

Correct Answer: 4). All of these

Solution:
Limit state method provides **safe, economical and realistic design**.

Reference: RCC – Krishna Raju

Surveying

---

161. The principle used in chain surveying is

1). Working from part to whole
2). Working from whole to part
3). Working from centre to boundary
4). Working from boundary to centre

Correct Answer: 2). Working from whole to part

Solution:
The framework of main triangles is established first and then details are filled, minimizing accumulation of errors.

Reference: Surveying – B.C. Punmia

---

162. Local attraction in compass surveying is caused due to

1). Magnetic materials near compass
2). Wind pressure
3). Temperature variation
4). Atmospheric pressure

Correct Answer: 1). Magnetic materials near compass

Solution:
Iron objects, electric currents, or steel structures disturb the magnetic needle causing local attraction.

Reference: Surveying – K.R. Arora

---

163. The difference between fore bearing and back bearing of a line is

1). 90°
2). 120°
3). 180°
4). 360°

Correct Answer: 3). 180°

Solution:

$$BB = FB \pm 180^\circ$$

Reference: Surveying – Punmia

---

164. If fore bearing of a line is 60°, the back bearing is

1). 120°
2). 180°
3). 240°
4). 300°

Correct Answer: 3). 240°

Solution:

$$BB = 60 + 180 = 240^\circ$$

Reference: Surveying – Punmia

---

165. Levelling is used to determine

1). Horizontal distances
2). Difference in elevation
3). Magnetic bearing
4). Area of land

Correct Answer: 2). Difference in elevation

Solution:
Levelling determines **Reduced Levels (RLs)** of points.

Reference: Surveying – N.N. Basak

---

166. The method used to eliminate errors due to curvature and refraction is

1). Differential levelling
2). Reciprocal levelling
3). Fly levelling
4). Profile levelling

Correct Answer: 2). Reciprocal levelling

Solution:
Reciprocal levelling cancels errors due to **curvature, refraction, and collimation**.

Reference: Surveying – Punmia

---

167. In reciprocal levelling, the true difference in level between two points is

1). Average of apparent differences
2). Sum of differences
3). Product of differences
4). Difference of differences

Correct Answer: 1). Average of apparent differences

Solution:

$$True\ difference = \frac{(h_1 + h_2)}{2}$$

Reference: Surveying – Punmia

---

168. The instrument used to measure both horizontal and vertical angles is

1). Dumpy level
2). Prismatic compass
3). Theodolite
4). Plane table

Correct Answer: 3). Theodolite

Solution:
Theodolite measures **horizontal and vertical angles accurately**.

Reference: Surveying – Punmia

---

169. The constant used in stadia tacheometry is

1). 50
2). 75
3). 100
4). 150

Correct Answer: 3). 100

Solution:
Standard stadia multiplying constant:

$$k = 100$$

Reference: Surveying – Punmia

---

170. Distance measured in stadia tacheometry is given by

1). $D = ks + c$
2). $D = s/k$
3). $D = k/s$
4). $D = s + c$

Correct Answer: 1). $D = ks + c$

Solution:
Where
k = multiplying constant
s = staff intercept
c = additive constant.

Reference: Surveying – Punmia

---

171. Contour lines represent

1). Points of equal elevation
2). Points of equal distance
3). Points of equal slope
4). Points of equal pressure

Correct Answer: 1). Points of equal elevation

Solution:
Contours connect points having same **Reduced Level (RL)**.

Reference: Surveying – Punmia

---

172. Closely spaced contour lines indicate

1). Gentle slope
2). Steep slope
3). Flat land
4). Plateau

Correct Answer: 2). Steep slope

Solution:
Close contours indicate **rapid elevation change**.

Reference: Surveying – Punmia

---

173. Bowditch rule is used to

1). Adjust traverse errors
2). Determine elevations
3). Determine bearings
4). Measure distances

Correct Answer: 1). Adjust traverse errors

Solution:
Bowditch rule distributes errors proportional to line lengths.

Reference: Surveying – K.R. Arora

---

174. GPS stands for

1). Global Positioning System
2). Geographical Positioning System
3). Global Plotting System
4). Ground Positioning System

Correct Answer: 1). Global Positioning System

Solution:
GPS uses **satellite signals to determine geographic location**.

Reference: GIS – Kang-tsung Chang

---

175. GIS is mainly used for

1). Storing spatial data
2). Analyzing geographic information
3). Mapping and planning
4). All of these

Correct Answer: 4). All of these

Solution:
GIS integrates **data storage, analysis, and visualization of spatial information**.

Reference: GIS – Kang-tsung Chang

Hydraulics

---

176. The ratio of inertia force to viscous force is known as

1). Froude number
2). Reynolds number

3). Weber number
4). Mach number

Correct Answer: 2). Reynolds number

Solution:

$$Re = \frac{\rho V D}{\mu}$$

It determines whether the flow is **laminar or turbulent**.

Reference: Fluid Mechanics – R.K. Bansal

---

177. Flow in a pipe is laminar when Reynolds number is

1). Less than 2000
2). 2000–4000
3). Greater than 4000
4). Greater than 6000

Correct Answer: 1). Less than 2000

Solution:
Laminar flow occurs when **Re < 2000**.

Reference: Fluid Mechanics – Modi & Seth

---

178. Bernoulli's theorem represents conservation of

1). Mass
2). Momentum
3). Energy
4). Pressure

Correct Answer: 3). Energy

Solution:

$$\frac{P}{\gamma} + \frac{V^2}{2g} + z = constant$$

Reference: Fluid Mechanics – Bansal

---

179. Minor losses in pipe flow occur due to

1). Bends
2). Valves
3). Sudden expansions or contractions
4). All of these

Correct Answer: 4). All of these

Solution:
Minor losses include **bends, fittings, valves, entrance and exit losses**.

Reference: Fluid Mechanics – Bansal

---

180. Head loss due to sudden expansion is

1). $\frac{(V_1 - V_2)^2}{2g}$
2). $\frac{V^2}{2g}$
3). $\frac{V_1^2}{2g}$
4). $\frac{V_2^2}{2g}$

Correct Answer: 1). $\frac{(V_1 - V_2)^2}{2g}$

Solution:
Derived from momentum equation for sudden expansion.

Reference: Fluid Mechanics – Bansal

---

181. Darcy–Weisbach equation is used to determine

1). Head loss due to friction
2). Discharge in pipe
3). Velocity of flow
4). Pressure head

Correct Answer: 1). Head loss due to friction

Solution:

$$h_f = \frac{4fLV^2}{2gD}$$

Reference: Fluid Mechanics – Bansal

---

182. Hydraulic gradient line (HGL) represents

1). Pressure head + elevation head
2). Velocity head
3). Total energy
4). Datum head

Correct Answer: 1). Pressure head + elevation head

Solution:

$$HGL = \frac{P}{\gamma} + z$$

Reference: Fluid Mechanics – Khurmi

---

183. Total Energy Line (TEL) represents

1). Pressure head
2). Velocity head
3). Total head
4). Datum head

Correct Answer: 3). Total head

Solution:

$$TEL = \frac{P}{\gamma} + \frac{V^2}{2g} + z$$

Reference: Fluid Mechanics – Khurmi

---

184. The most economical rectangular channel section occurs when

1). Depth = width
2). Depth = half width
3). Width = half depth
4). Depth = twice width

Correct Answer: 2). Depth = half width

Solution:
Condition for economical rectangular channel:

$$b = 2y$$

Reference: Hydraulics – Modi & Seth

---

185. Hydraulic radius of most economical rectangular channel equals

1). y/2
2). y
3). 2y
4). y/4

Correct Answer: 1). y/2

Solution:

$$R = \frac{y}{2}$$

Reference: Hydraulics – Modi & Seth

---

186. Manning's equation for velocity is

1). $V = \frac{1}{n} R^{2/3} S^{1/2}$
2). $V = nR^{2/3} S^{1/2}$
3). $V = R^{1/2} S$
4). $V = RS$

Correct Answer: 1). $V = \frac{1}{n} R^{2/3} S^{1/2}$

Solution:
Manning's equation is used for **open channel flow**.

Reference: Hydraulics – Modi & Seth

---

187. Venturimeter measures

1). Velocity
2). Pressure
3). Discharge
4). Density

Correct Answer: 3). Discharge

Solution:
Venturimeter uses **pressure difference between inlet and throat**.

Reference: Fluid Mechanics – Bansal

---

188. Specific speed of a turbine depends on

1). Speed
2). Power
3). Head
4). All of these

Correct Answer: 4). All of these

Solution:

$$N_s = \frac{N\sqrt{P}}{H^{5/4}}$$

Reference: Hydraulic Machines – Bansal

---

189. Pelton wheel turbine is suitable for

1). Low head
2). Medium head
3). High head
4). All heads

Correct Answer: 3). High head

Solution:
Pelton turbine works under **high head and low discharge**.

Reference: Hydraulic Machines – Modi & Seth

---

190. Francis turbine is classified as

1). Impulse turbine
2). Reaction turbine
3). Positive displacement turbine
4). Axial turbine

Correct Answer: 2). Reaction turbine

Solution:
Francis turbine operates under **reaction principle**.

Reference: Hydraulic Machines – Bansal

Irrigation Engineering

---

191. Consumptive use of water refers to

1). Water lost through seepage
2). Water used by crops through evapotranspiration
3). Water stored in reservoirs
4). Water flowing in canals

Correct Answer: 2). Water used by crops through evapotranspiration

Solution:
Consumptive use represents the **total water used by crops for growth and transpiration plus evaporation from soil surface**.

Reference: Irrigation Engineering – S.K. Garg

---

192. Duty of water is defined as

1). Depth of water required for crop
2). Area irrigated per unit discharge
3). Canal discharge per hectare
4). Rainfall over irrigated area

Correct Answer: 2). Area irrigated per unit discharge

Solution:
Duty indicates the **number of hectares irrigated by 1 cumec of water**.

Reference: Irrigation Engineering – Punmia

---

193. The relation between Delta (Δ), Duty (D) and Base Period (B) is

1). $\Delta = \frac{8.64D}{B}$
2). $\Delta = \frac{8.64B}{D}$
3). $\Delta = \frac{B}{8.64D}$
4). $\Delta = \frac{D}{8.64B}$

Correct Answer: 2). $\Delta = \frac{8.64B}{D}$

Solution:

$$\Delta = \frac{8.64B}{D}$$

Reference: Irrigation Engineering – S.K. Garg

---

194. Kharif crops are generally grown during

1). Winter season
2). Summer season
3). Monsoon season
4). Spring season

Correct Answer: 3). Monsoon season

Solution:
Examples include **rice, maize, cotton**.

Reference: Irrigation Engineering – Garg

---

195. Kennedy's theory of canal design is based on

1). Critical velocity
2). Hydraulic radius
3). Sediment transport
4). Flow velocity

Correct Answer: 1). Critical velocity

Solution:
Kennedy proposed that **velocity must be sufficient to keep silt in suspension**.

Reference: Irrigation Engineering – Punmia

---

196. Lacey's theory of canal design is based on

1). Sediment transport equilibrium
2). Rainfall intensity
3). Flow velocity
4). Canal slope

Correct Answer: 1). Sediment transport equilibrium

Solution:
Lacey assumed **channel adjusts itself to stable regime conditions**.

Reference: Irrigation Engineering – Garg

---

197. The phreatic line in an earth dam represents

1). Line of seepage
2). Water surface in reservoir
3). Base of dam
4). Pressure line in canal

Correct Answer: 1). Line of seepage

Solution:
Phreatic line represents **upper boundary of seepage flow through earth dam**.

Reference: Irrigation Engineering – Punmia

---

198. Failure of earth dams due to removal of soil particles by seepage is called

1). Overtopping
2). Sliding
3). Piping failure
4). Structural failure

Correct Answer: 3). Piping failure

Solution:
Piping occurs when **seepage removes fine soil particles**, weakening the dam.

Reference: Irrigation Engineering – Garg

---

199. A cross drainage work in which canal passes over drainage is called

1). Aqueduct
2). Super passage
3). Siphon aqueduct
4). Level crossing

Correct Answer: 1). Aqueduct

Solution:
In an aqueduct, **canal flows over the drainage channel**.

Reference: Irrigation Engineering – Punmia

---

200. Dead storage of a reservoir refers to

1). Water used for irrigation
2). Water stored below outlet level
3). Flood water storage
4). Emergency storage

Correct Answer: 2). Water stored below outlet level

Solution:
Dead storage cannot be drained by gravity and mainly **stores sediment deposits**.

Reference: Irrigation Engineering – Garg

AP ECET 2026 – CIVIL ENGINEERING

GRAND TEST – 3

Strength of Materials

---

101. The strain energy stored in a body up to the elastic limit per unit volume is called

1). Toughness
2). Resilience
3). Ductility
4). Hardness

Correct Answer: 2). Resilience

Solution:
Resilience is the **ability of a material to absorb energy within the elastic limit**.

Reference: Strength of Materials – R.K. Bansal

---

102. The total energy absorbed by a material until fracture occurs is known as

1). Toughness
2). Resilience
3). Elasticity
4). Plasticity

Correct Answer: 1). Toughness

Solution:
Toughness represents **total energy absorbed before failure**.

Reference: Strength of Materials – Bansal

---

103. The modulus of resilience is given by

1). $\frac{\sigma^2}{2E}$
2). $\frac{\sigma}{2E}$
3). $\frac{E}{2\sigma}$
4). $\frac{\sigma}{E}$

Correct Answer: 1). $\frac{\sigma^2}{2E}$

Solution:

$$U = \frac{\sigma^2}{2E}$$

Reference: Strength of Materials – Bansal

---

104. If yield stress of steel is 250 MPa and E = 200 GPa, modulus of resilience is

1). 0.125 MJ/m³
2). 0.156 MJ/m³
3). 0.250 MJ/m³
4). 0.500 MJ/m³

Correct Answer: 2). 0.156 MJ/m³

Solution:

$$\begin{aligned} U &= \frac{\sigma^2}{2E} \\ &= \frac{250^2}{2 \times 200000} \\ &= 0.156\ MJ/m^3 \end{aligned}$$

Reference: Strength of Materials – Bansal

---

105. Modular ratio in composite beams is defined as

1). E_s/E_c
2). E_c/E_s
3). A_s/A_c
4). I_s/I_c

Correct Answer: 1). E_s/E_c

Solution:

$$m = \frac{E_s}{E_c}$$

Reference: Strength of Materials – Bansal

---

106. If modulus of elasticity of steel is 200 GPa and concrete is 20 GPa, modular ratio is

1). 5
2). 10
3). 15
4). 20

Correct Answer: 2). 10

Solution:

$$m = \frac{200}{20} = 10$$

Reference: Strength of Materials – Bansal

---

107. In composite sections, transformed section method is used to

1). Simplify bending stress calculations
2). Increase beam strength
3). Reduce deflection
4). Change material properties

Correct Answer: 1). Simplify bending stress calculations

Solution:
Material is converted into **equivalent material using modular ratio**.

Reference: Strength of Materials – Bansal

---

108. Maximum shear stress in circular section occurs at

1). Surface
2). Centre
3). Mid radius
4). Edge

Correct Answer: 2). Centre

Solution:
Shear stress distribution in circular section is **parabolic**.

Reference: Strength of Materials – Bansal

---

109. Maximum shear stress in circular section is

1). Average shear stress
2). 1.25 × average
3). 1.33 × average
4). 1.5 × average

Correct Answer: 3). 1.33 × average

Solution:

$$\tau_{max} = \frac{4}{3}\tau_{avg}$$

Reference: Strength of Materials – Bansal

---

110. Maximum shear stress in I-section occurs at

1). Flange
2). Web
3). Neutral axis
4). Edge

Correct Answer: 3). Neutral axis

Solution:
Shear stress is **maximum at neutral axis in web portion**.

Reference: Strength of Materials – Bansal

---

111. The web of an I-section mainly resists

1). Bending stress
2). Shear stress
3). Torsion
4). Axial stress

Correct Answer: 2). Shear stress

Solution:
Flanges resist bending while **web resists shear**.

Reference: Strength of Materials – Bansal

---

112. The flanges of an I-beam resist

1). Shear
2). Bending stress
3). Torsion
4). Compression only

Correct Answer: 2). Bending stress

Solution:
Flanges carry **maximum tensile and compressive bending stresses**.

Reference: Strength of Materials – Bansal

---

113. The shear force diagram for a beam under point load is

1). Parabolic
2). Straight line
3). Rectangular steps
4). Circular

Correct Answer: 3). Rectangular steps

Solution:
Shear changes **suddenly at load points**.

Reference: Strength of Materials – Bansal

---

114. If shear force changes sign along beam, bending moment is

1). Maximum
2). Minimum
3). Zero
4). Constant

Correct Answer: 1). Maximum

Solution:
Maximum bending moment occurs where **shear force = 0**.

Reference: Strength of Materials – Bansal

---

115. A simply supported beam of span 8 m carries central load 40 kN. Maximum bending moment is

1). 60 kN·m
2). 70 kN·m
3). 80 kN·m
4). 90 kN·m

Correct Answer: 3). 80 kN·m

Solution:

$$M = WL/4$$
$$= 40 \times 8/4 = 80\ kN \cdot m$$

Reference: Strength of Materials – Bansal

---

116. If a beam carries UDL over entire span, maximum bending moment occurs at

1). Support
2). Mid span
3). Quarter span
4). End

Correct Answer: 2). Mid span

Solution:
Maximum moment occurs at centre.

Reference: Strength of Materials – Bansal

---

117. The neutral axis in a composite beam passes through

1). Centroid of transformed section
2). Geometric centre
3). Steel centroid
4). Concrete centroid

Correct Answer: 1). Centroid of transformed section

Solution:
Neutral axis depends on **equivalent transformed section**.

Reference: Strength of Materials – Bansal

---

118. Toughness of material is measured by

1). Area under stress-strain curve up to elastic limit
2). Area under entire stress-strain curve
3). Yield stress value
4). Young's modulus

Correct Answer: 2). Area under entire stress-strain curve

Solution:
Represents **energy absorbed before fracture**.

Reference: Strength of Materials – Bansal

---

119. Shear stress distribution in rectangular section is

1). Uniform
2). Parabolic
3). Linear
4). Triangular

Correct Answer: 2). Parabolic

Solution:
Maximum at **neutral axis** and zero at extreme fibers.

Reference: Strength of Materials – Bansal

---

120. For circular beam of diameter 200 mm carrying shear force 30 kN, average shear stress is

1). 0.95 MPa
2). 1.27 MPa
3). 1.50 MPa
4). 2.00 MPa

Correct Answer: 0.95 MPa

Solution:

$$\tau_{avg} = \frac{V}{A}$$
$$A = \frac{\pi d^2}{4} = \frac{3.14 \times 200^2}{4} = 31400\, mm^2$$
$$\tau = \frac{30000}{31400} \approx 0.95\, MPa$$

Reference: Strength of Materials – Bansal

Theory of Structures

---

121. A propped cantilever beam has

1). Both ends fixed
2). One end fixed and other simply supported
3). Both ends hinged
4). One end free and other hinged

Correct Answer: 2). One end fixed and other simply supported

Solution:
A propped cantilever has **one fixed support and one simple support**, making it a **statically indeterminate structure of degree one**.

Reference: Theory of Structures – S. Ramamrutham

---

122. Degree of static indeterminacy of a propped cantilever is

1). Zero
2). One
3). Two
4). Three

Correct Answer: 2). One

Solution:
The extra reaction at the prop introduces **one redundant reaction**.

Reference: Analysis of Structures – S.S. Bhavikatti

---

123. For a propped cantilever carrying UDL over entire span, deflection at the prop is

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
At the prop support, **vertical displacement is zero**.

Reference: Ramamrutham

---

124. The deflection at free end of a cantilever carrying point load W is

1). $WL^3/2EI$
2). $WL^3/3EI$
3). $WL^3/4EI$
4). $WL^3/6EI$

Correct Answer: 2). $WL^3/3EI$

Solution:

$$y = \frac{WL^3}{3EI}$$

Reference: Ramamrutham

---

125. Euler's buckling formula is valid for

1). Short columns
2). Intermediate columns
3). Long columns
4). Composite columns

Correct Answer: 3). Long columns

Solution:
Euler theory assumes **elastic buckling in slender columns**.

Reference: Strength of Materials – R.K. Bansal

---

126. Rankine’s formula is used for

1). Short columns
2). Long columns
3). Intermediate columns
4). Steel beams

Correct Answer: 3). Intermediate columns

Solution:
Rankine combines **crushing and buckling effects**.

Reference: Strength of Materials – Bansal

---

127. Rankine’s formula is given by

1). $P = \frac{\sigma_c A}{1+a(L/k)^2}$
2). $P = \sigma_c A$
3). $P = \pi^2 EI/L^2$
4). $P = WL$

Correct Answer: 1). $P = \frac{\sigma_c A}{1+a(L/k)^2}$

Solution:
Rankine constant **a** depends on material.

Reference: Strength of Materials – Bansal

---

128. If slenderness ratio increases, column strength

1). Increases
2). Decreases
3). Remains constant
4). Doubles

Correct Answer: 2). Decreases

Solution:
Higher slenderness increases **buckling tendency**.

Reference: Strength of Materials – Bansal

---

129. Radius of gyration is defined as

1). I/A
2). A/I
3). $\sqrt{I/A}$
4). I/L

Correct Answer: 3). $\sqrt{I/A}$

Solution:

$$k = \sqrt{\frac{I}{A}}$$

Reference: Strength of Materials – Bansal

---

130. The earth pressure exerted when soil moves away from wall is

1). Passive earth pressure
2). Active earth pressure
3). Neutral pressure
4). Hydrostatic pressure

Correct Answer: 2). Active earth pressure

Solution:
Occurs when **retaining wall moves away from soil**.

Reference: Soil Mechanics – Punmia

---

131. Passive earth pressure occurs when

1). Wall moves away from soil
2). Wall moves towards soil
3). Wall remains stationary
4). Soil moves upward

Correct Answer: 2). Wall moves towards soil

Solution:
Passive pressure develops due to **soil compression**.

Reference: Soil Mechanics – Punmia

---

132. Rankine's active earth pressure coefficient is

1). $(1 - \sin\ \phi)/(1 + \sin\ \phi)$
2). $(1 + \sin\ \phi)/(1 - \sin\ \phi)$
3). $(1 - \sin\ \phi)/(1 - \sin\ \phi)$
4). $(1 + \sin\ \phi)/(1 + \sin\ \phi)$

Correct Answer: 1). $(1 - \sin\ \phi)/(1 + \sin\ \phi)$

Solution:

$$K_a = \frac{1 - \sin\ \phi}{1 + \sin\ \phi}$$

Reference: Soil Mechanics – Punmia

---

133. Passive earth pressure coefficient is

1). $(1 + \sin\ \phi)/(1 - \sin\ \phi)$
2). $(1 - \sin\ \phi)/(1 + \sin\ \phi)$
3). $(1 + \sin\ \phi)/(1 + \sin\ \phi)$
4). $(1 - \sin\ \phi)/(1 - \sin\ \phi)$

Correct Answer: 1). $(1 + \sin\ \phi)/(1 - \sin\ \phi)$

Solution:

$$K_p = \frac{1 + \sin\ \phi}{1 - \sin\ \phi}$$

Reference: Soil Mechanics – Punmia

---

134. Middle third rule in retaining walls ensures

1). Maximum shear
2). No tensile stress at base
3). Maximum compression
4). No friction

Correct Answer: 2). No tensile stress at base

Solution:
Resultant must lie within **middle third of base**.

Reference: Theory of Structures – Ramamrutham

---

135. If resultant lies outside middle third, the base experiences

1). Only compression
2). Only tension
3). Tension and compression
4). Zero stress

Correct Answer: 3). Tension and compression

Solution:
This is unsafe for **masonry or gravity dams**.

Reference: Ramamrutham

---

136. Uplift pressure in dams acts

1). Downward
2). Upward
3). Horizontal
4). Diagonal

Correct Answer: 2). Upward

Solution:
Water pressure beneath dam reduces **effective weight**.

Reference: Ramamrutham

---

137. Maximum compressive stress in a gravity dam occurs at

1). Top
2). Base
3). Middle
4). Crest

Correct Answer: 2). Base

Solution:
Total weight acts downward at base.

Reference: Ramamrutham

---

138. A truss member carrying zero force is called

1). Dummy member
2). Zero force member
3). Compression member
4). Redundant member

Correct Answer: 2). Zero force member

Solution:
Occurs due to **joint equilibrium conditions**.

Reference: Ramamrutham

---

139. For perfect truss

1). $m = j$
2). $m = j + 1$
3). $m = 2j - 3$
4). $m = 3j - 2$

Correct Answer: 3). $m = 2j - 3$

Solution:
Condition for **statically determinate truss**.

Reference: Ramamrutham

140. In truss analysis, forces in members are determined by

1). Method of joints
2). Method of sections
3). Graphical method
4). All of these

Correct Answer: 4). All of these

Solution:
All these methods are used depending on **structure complexity**.

Reference: Ramamrutham

Reinforced Concrete Structures

141. A flanged beam where slab acts as compression flange is called

1). Rectangular beam
2). T-beam
3). Doubly reinforced beam
4). Continuous beam

Correct Answer: 2). T-beam

Solution:
In T-beams, **slab and beam act together**, forming a compression flange.

Reference: RCC – B.C. Punmia

142. In a T-beam, the flange resists mainly

1). Shear stress
2). Bending compression
3). Tension
4). Torsion

Correct Answer: 2). Bending compression

Solution:
The slab flange carries **compressive bending stresses**.

Reference: RCC – Krishna Raju

---

143. The web of a T-beam primarily resists

1). Compression
2). Tension
3). Shear stress
4). Torsion

Correct Answer: 3). Shear stress

Solution:
Web portion transfers **shear force to supports**.

Reference: RCC – Punmia

---

144. Effective flange width in T-beams depends on

1). Span of beam
2). Spacing of beams
3). Thickness of slab
4). All of these

Correct Answer: 4). All of these

Solution:
IS 456 defines effective flange width based on **span, spacing and slab thickness**.

Reference: IS 456-2000

---

145. Shear reinforcement in RCC beams is provided in the form of

1). Longitudinal bars
2). Stirrups
3). Bent-up bars
4). Both 2 and 3

Correct Answer: 4). Both 2 and 3

Solution:
Shear resistance is provided by **stirrups and bent-up bars**.

Reference: RCC – Punmia

---

146. Shear reinforcement prevents

1). Flexural cracks
2). Diagonal tension cracks
3). Compression failure
4). Buckling

Correct Answer: 2). Diagonal tension cracks

Solution:
Shear failure occurs along **diagonal tension cracks**.

Reference: RCC – Krishna Raju

---

147. The spacing of stirrups in beams is governed by

1). Bending moment
2). Shear force
3). Torsion
4). Deflection

Correct Answer: 2). Shear force

Solution:
Higher shear requires **closer stirrup spacing**.

Reference: RCC – Punmia

---

148. In RCC beams, shear stress is maximum near

1). Midspan
2). Supports
3). Neutral axis
4). Flange

Correct Answer: 2). Supports

Solution:
Shear force is maximum near supports.

Reference: RCC – Punmia

---

149. Development length ensures

1). Proper bond between steel and concrete
2). Shear resistance
3). Compression strength
4). Deflection control

Correct Answer: 1). Proper bond between steel and concrete

Solution:
Development length allows steel to **develop full stress without slipping**.

Reference: IS 456-2000

---

150. Development length is given by

1). $L_d = \frac{\phi\sigma_s}{4\tau_{bd}}$
2). $L_d = \frac{\sigma_s}{\phi\tau_{bd}}$
3). $L_d = \frac{\phi\tau_{bd}}{\sigma_s}$
4). $L_d = \frac{4\tau_{bd}}{\phi\sigma_s}$

Correct Answer: 1). $L_d = \frac{\phi\sigma_s}{4\tau_{bd}}$

Solution:
Development length depends on **bar diameter, steel stress and bond stress**.

Reference: IS 456-2000

---

151. One-way shear in footing occurs

1). Around column perimeter
2). Along critical section parallel to footing edge
3). At centre of footing
4). Along diagonal section

Correct Answer: 2). Along critical section parallel to footing edge

Solution:
One-way shear acts similar to **beam shear**.

Reference: RCC – Punmia

152. Two-way shear in footings is also called

1). Direct shear
2). Punching shear
3). Diagonal shear
4). Torsional shear

Correct Answer: 2). Punching shear

Solution:
Occurs **around column perimeter**.

Reference: RCC – Krishna Raju

153. Critical section for punching shear is located at

1). Column face
2). Distance d/2 from column face
3). Distance d from column face
4). Distance 2d from column face

Correct Answer: 2). Distance d/2 from column face

Solution:
IS 456 specifies critical section at **d/2 from column face**.

Reference: IS 456-2000

154. If column load is 800 kN and footing area is 4 m², soil pressure is

1). 100 kN/m²
2). 150 kN/m²
3). 200 kN/m²
4). 250 kN/m²

Correct Answer: 3). 200 kN/m²

Solution:

$$Pressure = \frac{Load}{Area}$$
$$= 800/4 = 200\ kN/m^2$$

Reference: RCC – Punmia

---

155. In isolated footing, reinforcement is mainly provided at

1). Top only
2). Bottom only
3). Both top and bottom
4). Centre

Correct Answer: 2). Bottom only

Solution:
Bottom reinforcement resists **tensile bending stresses**.

Reference: RCC – Punmia

---

156. Minimum cover for footing reinforcement is

1). 25 mm
2). 40 mm
3). 50 mm
4). 75 mm

Correct Answer: 3). 50 mm

Solution:
IS 456 specifies **minimum 50 mm cover for footings**.

Reference: IS 456-2000

---

157. In RCC beams, maximum compressive strain in concrete is

1). 0.002
2). 0.0035
3). 0.004
4). 0.005

Correct Answer: 2). 0.0035

Solution:
Limit strain value as per **Limit State Design**.

Reference: IS 456-2000

---

158. The lever arm in RCC beams is approximately

1). 0.7d
2). 0.8d
3). 0.9d
4). d

Correct Answer: 3). 0.9d

Solution:
Approximate value used in design calculations.

Reference: RCC – Krishna Raju

---

159. Balanced section occurs when

1). Steel reaches yield before concrete
2). Concrete reaches crushing first
3). Steel and concrete reach permissible strain simultaneously
4). Steel fails first

Correct Answer: 3). Steel and concrete reach permissible strain simultaneously

Solution:
Balanced section ensures **simultaneous failure**.

Reference: RCC – Krishna Raju

---

160. Limit State Method is preferred because

1). Economical design
2). Realistic safety
3). Better material utilization
4). All of these

Correct Answer: 4). All of these

Solution:
Limit state design provides **safe and economical structures**.

Reference: RCC – Krishna Raju

---

161. The main purpose of chain surveying is

1). Measurement of angles
2). Measurement of distances only
3). Measurement of elevations
4). Measurement of bearings

Correct Answer: 2). Measurement of distances only

Solution:
Chain surveying is the **simplest surveying method where only linear measurements are taken**.

Reference: Surveying – B.C. Punmia

---

162. The error due to incorrect chain length is classified as

1). Random error
2). Cumulative error
3). Personal error
4). Instrumental error

Correct Answer: 2). Cumulative error

Solution:
If the chain is too long or too short, the error accumulates **in the same direction**.

Reference: Surveying – K.R. Arora

---

163. If a 20 m chain is actually 20.10 m long, the measured distance will be

1). Too long
2). Too short
3). Correct
4). Zero

Correct Answer: 2). Too short

Solution:
A longer chain measures **less number of chains**, giving a **shorter measured distance**.

Reference: Surveying – Punmia

---

164. Correction for chain length is applied to

1). Measured distance
2). Reduced level
3). Bearing
4). Elevation

Correct Answer: 1). Measured distance

Solution:
Distance correction:

$$Correct\ Length = Measured\ Length \times \frac{Actual\ Chain\ Length}{Nominal\ Length}$$

Reference: Surveying – Punmia

---

165. If a 20 m chain measures 1000 m and actual chain length is 19.8 m, the true distance is

1). 990 m
2). 995 m
3). 1000 m
4). 1010 m

Correct Answer: 1). 990 m

Solution:

$$True\ Distance = 1000 \times \frac{19.8}{20}$$
$$= 990\ m$$

Reference: Surveying – Punmia

---

166. Bowditch rule is used to

1). Determine elevations
2). Adjust traverse errors
3). Measure distances
4). Measure angles

Correct Answer: 2). Adjust traverse errors

Solution:
Bowditch rule distributes corrections proportional to **line lengths**.

Reference: Surveying – K.R. Arora

---

167. Transit rule is used when

1). Angles are more precise than distances
2). Distances are more precise than angles
3). Both are equal
4). Neither is precise

Correct Answer: 1). Angles are more precise than distances

Solution:
Transit rule distributes corrections proportional to **latitudes and departures**.

Reference: Surveying – Arora

---

168. Bowditch rule distributes corrections proportional to

1). Latitudes
2). Departures
3). Lengths of traverse lines
4). Bearings

Correct Answer: 3). Lengths of traverse lines

Solution:
Correction formula:

$$Correction = \frac{Line\ Length}{Total\ Length} \times Total\ Error$$

Reference: Surveying – Punmia

---

169. Latitude of a traverse line is defined as

1). Horizontal projection on east-west axis
2). Horizontal projection on north-south axis
3). Vertical projection
4). Angular difference

Correct Answer: 2). Horizontal projection on north-south axis

Solution:
Latitude represents **north or south component of line**.

Reference: Surveying – Arora

---

170. Departure of a traverse line represents

1). North-south component
2). East-west component
3). Vertical component
4). Angular component

Correct Answer: 2). East-west component

Solution:
Departure is projection along **east-west direction**.

Reference: Surveying – Arora

---

171. GIS stands for

1). Global Information System
2). Geographic Information System
3). Geometric Information System
4). Graphical Information System

Correct Answer: 2). Geographic Information System

Solution:
GIS integrates **spatial data for mapping and analysis**.

Reference: GIS – Kang-tsung Chang

---

172. GPS works based on

1). Magnetic signals
2). Satellite signals
3). Radio waves from earth
4). Optical signals

Correct Answer: 2). Satellite signals

Solution:
GPS determines position using **signals from multiple satellites**.

Reference: GIS – Kang-tsung Chang

---

173. GPS is mainly used in civil engineering for

1). Land surveying
2). Route alignment
3). Mapping and planning
4). All of these

Correct Answer: 4). All of these

Solution:
GPS provides **accurate location data for engineering projects**.

Reference: GIS – Chang

---

174. GIS is useful for

1). Urban planning
2). Flood mapping
3). Transportation planning
4). All of these

Correct Answer: 4). All of these

Solution:
GIS helps analyze **geographical data for planning infrastructure**.

Reference: GIS – Chang

---

175. Remote sensing in civil engineering is used for

1). Land use analysis
2). Environmental monitoring
3). Resource mapping
4). All of these

Correct Answer: 4). All of these

Solution:
Remote sensing provides **satellite-based earth observation data**.

Reference: Remote Sensing – Satheesh Gopi

Hydraulics

---

176. Bernoulli's theorem is based on the principle of conservation of

1). Mass
2). Momentum
3). Energy
4). Pressure

Correct Answer: 3). Energy

Solution:
Bernoulli equation represents conservation of mechanical energy:

$$\frac{P}{\gamma} + \frac{V^2}{2g} + z = constant$$

Reference: Fluid Mechanics – R.K. Bansal

---

177. Bernoulli's theorem is valid only when the flow is

1). Turbulent
2). Steady and incompressible
3). Compressible
4). Rotational

Correct Answer: 2). Steady and incompressible

Solution:
Bernoulli equation assumes **steady, incompressible and frictionless flow**.

Reference: Fluid Mechanics – Bansal

---

178. Bernoulli's theorem cannot be applied when

1). Flow is steady
2). Flow is incompressible
3). Significant friction losses occur
4). Velocity is constant

Correct Answer: 3). Significant friction losses occur

Solution:
Energy losses due to friction violate Bernoulli assumptions.

Reference: Fluid Mechanics – Modi & Seth

---

179. A device used to measure discharge in pipes based on pressure difference is

1). Pitot tube
2). Venturimeter
3). Manometer
4). Piezometer

Correct Answer: 2). Venturimeter

Solution:
Venturimeter measures discharge using **pressure difference between inlet and throat**.

Reference: Fluid Mechanics – Bansal

---

180. The discharge through a venturimeter depends on

1). Pressure difference
2). Area ratio
3). Density of fluid
4). All of these

Correct Answer: 4). All of these

Solution:
Discharge equation:

$$Q = C_d A_2 \sqrt{\frac{2g(h_1 - h_2)}{1 - (A_2/A_1)^2}}$$

Reference: Fluid Mechanics – Bansal

---

181. Pitot tube measures

1). Pressure head
2). Velocity of flow
3). Discharge
4). Density

Correct Answer: 2). Velocity of flow

Solution:
Velocity:

$$V = \sqrt{2gh}$$

Reference: Fluid Mechanics – Bansal

---

182. Hydraulic Gradient Line (HGL) represents

1). Pressure head + elevation head
2). Velocity head
3). Total energy head
4). Datum head

Correct Answer: 1). Pressure head + elevation head

Solution:

$$HGL = \frac{P}{\gamma} + z$$

Reference: Fluid Mechanics – Khurmi

---

183. Total Energy Line (TEL) represents

1). Pressure head
2). Velocity head
3). Total head
4). Datum head

Correct Answer: 3). Total head

Solution:

$$TEL = \frac{P}{\gamma} + \frac{V^2}{2g} + z$$

Reference: Fluid Mechanics – Khurmi

---

184. The difference between TEL and HGL is

1). Pressure head
2). Velocity head
3). Datum head
4). Friction loss

Correct Answer: 2). Velocity head

Solution:

$$TEL - HGL = \frac{V^2}{2g}$$

Reference: Fluid Mechanics – Khurmi

---

185. Minor losses in pipes occur due to

1). Bends
2). Valves
3). Sudden expansions or contractions
4). All of these

Correct Answer: 4). All of these

Solution:
Minor losses occur in **pipe fittings and geometric changes**.

Reference: Fluid Mechanics – Bansal

---

186. Head loss due to sudden expansion is

1). $(V_1 - V_2)^2/2g$
2). $V^2/2g$
3). $V_1^2/2g$
4). $V_2^2/2g$

Correct Answer: 1). $(V_1 - V_2)^2/2g$

Solution:
Derived from **momentum equation**.

Reference: Fluid Mechanics – Bansal

---

187. In a pipe with decreasing diameter, velocity

1). Decreases
2). Remains constant
3). Increases
4). Becomes zero

Correct Answer: 3). Increases

Solution:
From continuity equation:

$$A_1V_1 = A_2V_2$$

Reference: Fluid Mechanics – Bansal

---

188. When velocity increases in a pipe, pressure

1). Increases
2). Decreases
3). Remains constant
4). Doubles

Correct Answer: 2). Decreases

Solution:
According to **Bernoulli principle**, pressure decreases when velocity increases.

Reference: Fluid Mechanics – Bansal

---

189. In uniform pipe flow with friction, HGL

1). Rises
2). Falls gradually
3). Remains horizontal
4). Oscillates

Correct Answer: 2). Falls gradually

Solution:
Energy loss due to friction causes **gradual drop in HGL**.

Reference: Fluid Mechanics – Khurmi

---

190. In ideal frictionless flow, HGL and TEL

1). Coincide
2). Are parallel lines
3). Intersect
4). Diverge

Correct Answer: 2). Are parallel lines

Solution:
Difference between them equals **velocity head**.

Reference: Fluid Mechanics – Khurmi

Irrigation Engineering

---

191. Consumptive use of water in irrigation includes

1). Seepage loss
2). Evaporation and transpiration by crops
3). Canal leakage
4). Runoff losses

Correct Answer: 2). Evaporation and transpiration by crops

Solution:
Consumptive use refers to **water actually used by plants through evapotranspiration**.

Reference: Irrigation Engineering – S.K. Garg

---

192. Duty of water is defined as

1). Depth of water required for crop
2). Area irrigated per unit discharge
3). Canal discharge per hectare
4). Rainfall over irrigated area

Correct Answer: 2). Area irrigated per unit discharge

Solution:
Duty represents **number of hectares irrigated by one cumec of water**.

Reference: Irrigation Engineering – Punmia

---

193. Relationship between Delta (Δ), Duty (D), and Base Period (B) is

1). $\Delta = \frac{8.64D}{B}$
2). $\Delta = \frac{8.64B}{D}$
3). $\Delta = \frac{B}{8.64D}$
4). $\Delta = \frac{D}{8.64B}$

Correct Answer: 2). $\Delta = \frac{8.64B}{D}$

Solution:

$$\Delta = \frac{8.64B}{D}$$

Reference: Irrigation Engineering – S.K. Garg

---

194. If duty is 1800 hectares per cumec and base period is 120 days, delta is

1). 0.48 m
2). 0.58 m
3). 0.68 m
4). 0.78 m

Correct Answer: 2). 0.58 m

Solution:

$$\Delta = \frac{8.64 \times 120}{1800}$$
$$= 0.576 \approx 0.58\,m$$

Reference: Irrigation Engineering – Garg

---

195. Canal lining mainly helps to

1). Increase seepage losses
2). Reduce seepage losses
3). Increase erosion
4). Increase evaporation

Correct Answer: 2). Reduce seepage losses

Solution:
Lining prevents **seepage and water wastage**.

Reference: Irrigation Engineering – Punmia

---

196. An additional advantage of canal lining is

1). Increased maintenance
2). Reduced velocity
3). Increased discharge capacity
4). Increased seepage

Correct Answer: 3). Increased discharge capacity

Solution:
Lined canals reduce friction, increasing **flow velocity and capacity**.

Reference: Irrigation Engineering – Garg

---

197. A spillway used in gravity dams where water flows over a curved crest is

1). Ogee spillway
2). Siphon spillway
3). Shaft spillway
4). Tunnel spillway

Correct Answer: 1). Ogee spillway

Solution:
Ogee spillways have **curved profiles matching water nappe shape**.

Reference: Irrigation Engineering – Punmia

---

198. A siphon spillway operates based on

1). Gravity flow
2). Atmospheric pressure difference
3). Centrifugal force
4). Hydraulic gradient

Correct Answer: 2). Atmospheric pressure difference

Solution:
Siphon spillways work when **negative pressure initiates siphonic flow**.

Reference: Irrigation Engineering – Garg

---

199. Lacey's silt theory is mainly used for

1). Reservoir design
2). Canal design in alluvial soils
3). Dam construction
4). Pump design

Correct Answer: 2). Canal design in alluvial soils

Solution:
Lacey's theory determines **stable canal section in alluvial soils**.

Reference: Irrigation Engineering – Garg

---

200. The main purpose of cross-drainage works is to

1). Store water
2). Carry canal across natural drainage
3). Reduce evaporation
4). Increase canal slope

Correct Answer: 2). Carry canal across natural drainage

Solution:
Cross drainage works allow **canals and natural drains to cross each other safely**.

Reference: Irrigation Engineering – Punmia

AP ECET 2026 – CIVIL ENGINEERING

GRAND TEST – 4 (Highly Expected)

Strength of Materials

---

101. The modulus of resilience of a material is defined as

1). Energy absorbed per unit volume up to fracture
2). Energy absorbed per unit volume up to elastic limit
3). Energy absorbed per unit mass
4). Energy absorbed during plastic deformation

Correct Answer: 2). Energy absorbed per unit volume up to elastic limit

Solution:
Modulus of resilience measures **elastic energy stored per unit volume without permanent deformation**.

Reference: Strength of Materials – R.K. Bansal

---

102. The modulus of resilience is given by

1). $\sigma/2E$
2). $\sigma^2/2E$
3). $E/2\sigma$
4). σ^2/E

Correct Answer: 2). $\sigma^2/2E$

Solution:

$$U_r = \frac{\sigma^2}{2E}$$

Where σ = yield stress.

Reference: Strength of Materials – Bansal

---

103. If yield stress of steel is 300 MPa and Young's modulus is 200 GPa, modulus of resilience equals

1). 0.1125 MJ/m³
2). 0.225 MJ/m³
3). 0.450 MJ/m³
4). 0.675 MJ/m³

Correct Answer: 2). 0.225 MJ/m³

Solution:

$$U_r = \frac{300^2}{2 \times 200000}$$
$$= 0.225\ MJ/m^3$$

Reference: Strength of Materials – Bansal

---

104. Volumetric strain for tri-axial stress condition is

1). $(\sigma_1 + \sigma_2 + \sigma_3)/E$
2). $(\sigma_1 + \sigma_2 + \sigma_3)(1 - 2\mu)/E$
3). $(\sigma_1 + \sigma_2 + \sigma_3)(1 + \mu)/E$
4). $(\sigma_1 + \sigma_2 + \sigma_3)/2E$

Correct Answer: 2). $(\sigma_1 + \sigma_2 + \sigma_3)(1 - 2\mu)/E$

Solution:

$$\varepsilon_v = \frac{(\sigma_1 + \sigma_2 + \sigma_3)(1 - 2\mu)}{E}$$

Reference: Strength of Materials – Bansal

---

105. If a cube is subjected to equal compressive stresses in all directions, the change in volume depends on

1). Young's modulus
2). Shear modulus
3). Bulk modulus
4). Poisson's ratio

Correct Answer: 3). Bulk modulus

Solution:
Bulk modulus relates **volumetric stress and volumetric strain**.

Reference: Strength of Materials – Bansal

---

106. A beam with an internal hinge has bending moment at hinge equal to

1). Maximum
2). Minimum
3). Zero
4). Infinite

Correct Answer: 3). Zero

Solution:
An internal hinge **cannot resist bending moment**.

Reference: Strength of Materials – Bansal

---

107. Shear force at an internal hinge in a beam is

1). Always zero
2). Maximum
3). Finite but moment is zero
4). Infinite

Correct Answer: 3). Finite but moment is zero

Solution:
Hinge allows rotation but **shear transfer occurs**.

Reference: Strength of Materials – Bansal

---

108. The shear force diagram for a beam carrying uniformly distributed load is

1). Straight line
2). Parabolic curve
3). Rectangular
4). Circular

Correct Answer: 1). Straight line

Solution:
SFD varies **linearly under UDL**.

Reference: Strength of Materials – Bansal

---

109. Bending moment diagram under uniformly distributed load is

1). Straight line
2). Parabolic
3). Rectangular
4). Hyperbolic

Correct Answer: 2). Parabolic

Solution:
Moment varies as **square of distance**.

Reference: Strength of Materials – Bansal

---

110. Maximum shear stress in circular section equals

1). Average shear stress
2). 1.25 × average
3). 1.33 × average
4). 1.5 × average

Correct Answer: 3). 1.33 × average

Solution:

$$\tau_{max} = \frac{4}{3}\tau_{avg}$$

Reference: Strength of Materials – Bansal

---

111. Maximum shear stress in rectangular section equals

1). 1.25 × average
2). 1.33 × average
3). 1.5 × average
4). 2 × average

Correct Answer: 3). 1.5 × average

Solution:

$$\tau_{max} = 1.5\tau_{avg}$$

Reference: Strength of Materials – Bansal

---

112. The web of an I-section resists primarily

1). Bending stress
2). Shear stress
3). Torsion
4). Axial load

Correct Answer: 2). Shear stress

Solution:
Flanges resist bending; **web resists shear**.

Reference: Strength of Materials – Bansal

---

113. The flanges of an I-section resist

1). Shear stress
2). Bending stress
3). Torsion
4). Axial stress

Correct Answer: 2). Bending stress

Solution:
Maximum tensile and compressive stresses occur in **flanges**.

Reference: Strength of Materials – Bansal

---

114. If shear force changes sign in a beam, bending moment at that section is

1). Maximum
2). Minimum
3). Zero
4). Constant

Correct Answer: 1). Maximum

Solution:
Maximum moment occurs where **shear force = 0**.

Reference: Strength of Materials – Bansal

---

115. A simply supported beam of span 10 m carries UDL of 10 kN/m. Maximum bending moment is

1). 100 kN·m
2). 125 kN·m
3). 150 kN·m
4). 200 kN·m

Correct Answer: 2). 125 kN·m

Solution:

$$M = \frac{wL^2}{8}$$
$$= \frac{10 \times 10^2}{8} = 125$$

Reference: Strength of Materials – Bansal

---

116. The unit of modulus of resilience is

1). Joule
2). N/mm^2
3). Joule per cubic meter
4). N

Correct Answer: 3). Joule per cubic meter

Solution:
Resilience = **strain energy per unit volume**.

Reference: Strength of Materials – Bansal

---

117. Toughness of a material is represented by

1). Area under elastic portion
2). Area under entire stress-strain curve
3). Yield stress
4). Young's modulus

Correct Answer: 2). Area under entire stress-strain curve

Solution:
Toughness measures **energy absorbed before fracture**.

Reference: Strength of Materials – Bansal

---

118. The neutral axis of a beam passes through

1). Extreme fiber
2). Centroid of section
3). Shear centre
4). Mid depth always

Correct Answer: 2). Centroid of section

Solution:
Neutral axis passes through centroid where **stress = 0**.

Reference: Strength of Materials – Bansal

---

119. The section modulus of a beam is defined as

1). I/y
2). y/I
3). I/A
4). A/I

Correct Answer: 1). I/y

Solution:

$$Z = \frac{I}{y}$$

Reference: Strength of Materials – Bansal

---

120. If beam span doubles, bending moment due to same UDL becomes

1). Double
2). Four times
3). Eight times
4). Sixteen times

Correct Answer: 2). Four times

Solution:

$$M = wL^2/8$$

Moment varies as **square of span**.

Reference: Strength of Materials – Bansal

Theory of Structures

---

121. Macaulay's method is primarily used for

1). Determining shear stress
2). Determining slope and deflection of beams
3). Determining bending stress
4). Determining column strength

Correct Answer: 2). Determining slope and deflection of beams

Solution:
Macaulay's method simplifies integration of bending moment equations for beams carrying **multiple point loads**.

Reference: Analysis of Structures – S.S. Bhavikatti

---

122. In Macaulay's method the term $(x-a)$represents

1). Distance from support
2). Load magnitude
3). Distance from load position
4). Beam span

Correct Answer: 3). Distance from load position

Solution:
In Macaulay notation $(x-a)$indicates distance from the **point where load acts**.

Reference: Theory of Structures – Ramamrutham

---

123. Euler's buckling formula for columns is

1). $P = EI/L^2$
2). $P = \pi^2 EI/L^2$
3). $P = WL^2/EI$
4). $P = EI/L$

Correct Answer: 2). $P = \pi^2 EI/L^2$

Solution:

$$P_{cr} = \frac{\pi^2 EI}{L^2}$$

Reference: Strength of Materials – Bansal

---

124. Euler's formula is applicable for

1). Short columns
2). Intermediate columns
3). Long columns
4). Composite columns

Correct Answer: 3). Long columns

Solution:
Euler theory assumes **elastic buckling**, valid only for slender columns.

Reference: Bansal

---

125. Slenderness ratio of a column is defined as

1). A/I
2). I/A
3). L/k
4). k/L

Correct Answer: 3). L/k

Solution:

$$\lambda = \frac{L}{k}$$

Reference: Strength of Materials – Bansal

---

126. Effective length of column hinged at both ends is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 1). L

Solution:
Both ends hinged → **effective length = actual length**.

Reference: Strength of Materials – Bansal

---

127. Effective length of column fixed at both ends is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 2). L/2

Solution:
Fixed ends increase column stiffness.

Reference: Strength of Materials – Bansal

---

128. Effective length of column fixed at one end and free at the other is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 3). 2L

Solution:
Cantilever column has **highest slenderness ratio**.

Reference: Strength of Materials – Bansal

---

129. Radius of gyration is defined as

1). I/A
2). A/I
3). $\sqrt{I/A}$
4). I/L

Correct Answer: 3). $\sqrt{I/A}$

Solution:

$$k = \sqrt{\frac{I}{A}}$$

Reference: Strength of Materials – Bansal

---

130. Middle-third rule states that the resultant of forces at the base of dam must lie within

1). Middle half
2). Middle third
3). Middle quarter
4). Entire base

Correct Answer: 2). Middle third

Solution:
Ensures **no tensile stress develops at the base**.

Reference: Theory of Structures – Ramamrutham

---

131. If resultant falls outside middle third of dam base

1). Compression increases only
2). Tensile stress develops
3). Shear stress becomes zero
4). Water pressure disappears

Correct Answer: 2). Tensile stress develops

Solution:
Masonry cannot resist tension → unsafe condition.

Reference: Ramamrutham

---

132. Active earth pressure develops when

1). Wall moves away from soil
2). Wall moves toward soil
3). Wall remains stationary
4). Soil moves upward

Correct Answer: 1). Wall moves away from soil

Solution:
Soil expands and pressure decreases to **active condition**.

Reference: Soil Mechanics – Punmia

---

133. Passive earth pressure develops when

1). Wall moves away from soil
2). Wall moves toward soil
3). Soil is saturated
4). Wall tilts outward

Correct Answer: 2). Wall moves toward soil

Solution:
Soil gets compressed producing **passive resistance**.

Reference: Soil Mechanics – Punmia

---

134. Rankine's coefficient of active earth pressure is

1). $(1 + \sin\ \phi)/(1 - \sin\ \phi)$
2). $(1 - \sin\ \phi)/(1 + \sin\ \phi)$
3). $\sin\ \phi/(1 + \sin\ \phi)$
4). $1/\sin\ \phi$

Correct Answer: 2). $(1 - \sin\ \phi)/(1 + \sin\ \phi)$

Solution:

$$K_a = \frac{1 - \sin\ \phi}{1 + \sin\ \phi}$$

Reference: Soil Mechanics – Punmia

---

135. Passive earth pressure coefficient is

1). $(1 + \sin\ \phi)/(1 - \sin\ \phi)$
2). $(1 - \sin\ \phi)/(1 + \sin\ \phi)$
3). $1 - \sin\ \phi$
4). $1 + \sin\ \phi$

Correct Answer: 1). $(1 + \sin\ \phi)/(1 - \sin\ \phi)$

Solution:

$$K_p = \frac{1 + \sin\ \phi}{1 - \sin\ \phi}$$

Reference: Soil Mechanics – Punmia

---

136. Uplift pressure in gravity dams acts

1). Horizontally
2). Vertically upward
3). Vertically downward
4). Along slope

Correct Answer: 2). Vertically upward

Solution:
Uplift pressure reduces **effective weight of dam**.

Reference: Theory of Structures – Ramamrutham

---

137. Maximum compressive stress in gravity dam occurs at

1). Crest
2). Middle
3). Base
4). Upstream face

Correct Answer: 3). Base

Solution:
Entire dam weight acts on base.

Reference: Ramamrutham

---

138. A truss is perfect when

1). $m = j$
2). $m = j + 1$
3). $m = 2j - 3$
4). $m = 3j - 2$

Correct Answer: 3). $m = 2j - 3$

Solution:
Condition for **statically determinate plane truss**.

Reference: Ramamrutham

---

139. Zero force member in truss carries

1). Maximum force
2). Compression only
3). No force
4). Tension only

Correct Answer: 3). No force

Solution:
Occurs due to **joint equilibrium conditions**.

Reference: Ramamrutham

---

140. Forces in truss members are determined by

1). Method of joints
2). Method of sections
3). Graphical method
4). All of these

Correct Answer: 4). All of these

Solution:
All these techniques are used for **truss analysis**.

Reference: Ramamrutham

Reinforced Concrete Structures

---

141. The minimum grade of concrete recommended for RCC structures as per IS 456:2000 is

1). M10
2). M15
3). M20
4). M25

Correct Answer: 3). M20

Solution:
IS 456 specifies **M20 as minimum grade for reinforced concrete structures**.

Reference: IS 456-2000

---

142. The characteristic strength of M25 concrete is

1). 20 MPa
2). 25 MPa
3). 30 MPa
4). 35 MPa

Correct Answer: 2). 25 MPa

Solution:
Characteristic strength is the **compressive strength at 28 days**.

Reference: RCC – B.C. Punmia

---

143. The modulus of elasticity of concrete is given by

1). $E_c = 3000\sqrt{f_{ck}}$
2). $E_c = 4000\sqrt{f_{ck}}$
3). $E_c = 5000\sqrt{f_{ck}}$
4). $E_c = 6000\sqrt{f_{ck}}$

Correct Answer: 3). $E_c = 5000\sqrt{f_{ck}}$

Solution:

$$E_c = 5000\sqrt{f_{ck}}$$

Reference: IS 456-2000

---

144. The partial safety factor for concrete in limit state design is

1). 1.15
2). 1.25
3). 1.50
4). 2.00

Correct Answer: 3). 1.50

Solution:
Concrete safety factor:

$$\gamma_c = 1.5$$

Reference: IS 456-2000

---

145. The partial safety factor for steel in limit state design is

1). 1.15
2). 1.25
3). 1.50
4). 2.00

Correct Answer: 1). 1.15

Solution:

$$\gamma_s = 1.15$$

Reference: IS 456-2000

---

146. Maximum compressive strain in concrete in limit state design is

1). 0.002
2). 0.0035
3). 0.004
4). 0.005

Correct Answer: 2). 0.0035

Solution:
Maximum strain value as per **IS 456 limit state theory**.

Reference: IS 456-2000

---

147. Maximum depth of neutral axis for Fe250 steel is

1). 0.53d
2). 0.48d
3). 0.46d
4). 0.42d

Correct Answer: 1). 0.53d

Solution:
Neutral axis limit depends on **grade of steel**.

Reference: IS 456-2000

---

148. Maximum depth of neutral axis for Fe415 steel is

1). 0.53d
2). 0.48d
3). 0.46d
4). 0.42d

Correct Answer: 2). 0.48d

Solution:
Higher steel strength reduces neutral axis depth.

Reference: IS 456-2000

---

149. Maximum depth of neutral axis for Fe500 steel is

1). 0.53d
2). 0.48d
3). 0.46d
4). 0.42d

Correct Answer: 4). 0.42d

Solution:
Fe500 steel has **lowest neutral axis depth limit**.

Reference: IS 456-2000

---

150. Minimum percentage of tension reinforcement in beams is

1). 0.10%
2). 0.20%
3). 0.30%
4). 0.50%

Correct Answer: 2). 0.20%

Solution:
Minimum reinforcement prevents **sudden brittle failure**.

Reference: IS 456-2000

---

151. Maximum percentage of reinforcement in beams is

1). 2%
2). 3%
3). 4%
4). 6%

Correct Answer: 3). 4%

Solution:
Maximum reinforcement limited to **4% of gross cross-section**.

Reference: IS 456-2000

---

152. The effective cover is the distance between

1). Steel surface and concrete surface
2). Steel center and concrete surface
3). Steel and neutral axis
4). Steel and beam centre

Correct Answer: 2). Steel center and concrete surface

Solution:
Effective cover protects reinforcement from **corrosion and fire**.

Reference: RCC – Punmia

---

153. Shear reinforcement in RCC beams is provided mainly as

1). Longitudinal bars
2). Stirrups
3). Ties
4). Hoops

Correct Answer: 2). Stirrups

Solution:
Stirrups resist **diagonal tension cracks caused by shear**.

Reference: RCC – Punmia

---

154. Development length is provided to ensure

1). Proper bond between steel and concrete
2). Shear strength
3). Compression strength
4). Deflection control

Correct Answer: 1). Proper bond between steel and concrete

Solution:
Ensures **full stress transfer between steel and concrete**.

Reference: IS 456-2000

---

155. Development length formula is

1). $L_d = \frac{\phi \sigma_s}{4\tau_{bd}}$
2). $L_d = \frac{\sigma_s}{\phi \tau_{bd}}$
3). $L_d = \frac{\phi \tau_{bd}}{\sigma_s}$
4). $L_d = \frac{4\tau_{bd}}{\phi \sigma_s}$

Correct Answer: 1). $L_d = \frac{\phi \sigma_s}{4\tau_{bd}}$

Solution:
Depends on **bar diameter, stress in steel, and bond stress**.

Reference: IS 456-2000

156. One-way slab occurs when

1). $L_y/L_x > 2$
2). $L_y/L_x < 2$
3). $L_y/L_x = 1$
4). $L_y/L_x = 2$

Correct Answer: 1). $L_y/L_x > 2$

Solution:
Load transfer occurs mainly in **one direction**.

Reference: RCC – Punmia

157. Two-way slab occurs when

1). $L_y/L_x > 2$
2). $L_y/L_x < 2$
3). $L_y/L_x = 3$
4). $L_y/L_x = 4$

Correct Answer: 2). $L_y/L_x < 2$

Solution:
Load transfers in **both directions**.

Reference: RCC – Punmia

158. Punching shear occurs in

1). Beams
2). Slabs
3). Footings
4). Columns

Correct Answer: 3). Footings

Solution:
Occurs around **column perimeter in footings**.

Reference: RCC – Krishna Raju

---

159. Balanced section occurs when

1). Steel yields first
2). Concrete crushes first
3). Steel and concrete reach allowable strain simultaneously
4). Steel fails in compression

Correct Answer: 3). Steel and concrete reach allowable strain simultaneously

Solution:
Both materials reach **limiting strain simultaneously**.

Reference: RCC – Krishna Raju

---

160. Limit state method is preferred because

1). More economical design
2). Realistic safety factors
3). Better material utilization
4). All of these

Correct Answer: 4). All of these

Solution:
Limit state design provides **safe and economical structures**.

Reference: RCC – Krishna Raju

Surveying

---

161. The main purpose of reciprocal levelling is to eliminate errors due to

1). Instrumental errors
2). Curvature and refraction
3). Personal errors
4). Tape sag

Correct Answer: 2). Curvature and refraction

Solution:
Reciprocal levelling eliminates errors caused by **curvature of earth and atmospheric refraction**.

Reference: Surveying – B.C. Punmia

---

162. Reciprocal levelling is generally used when

1). Two points are very close
2). Points are separated by obstacles like rivers
3). Terrain is flat
4). Distance is less than 10 m

Correct Answer: 2). Points are separated by obstacles like rivers

Solution:
Used when **instrument cannot be placed midway between points**.

Reference: Surveying – Punmia

---

163. The true difference in level between two points in reciprocal levelling equals

1). Sum of observed differences
2). Average of observed differences
3). Product of observed differences
4). Difference of observed values

Correct Answer: 2). Average of observed differences

Solution:

$$True\ Difference = \frac{(h_1+h_2)}{2}$$

Reference: Surveying – Punmia

---

164. Tacheometry is primarily used for

1). Precise levelling
2). Rapid measurement of distances and elevations
3). Magnetic surveying
4). Area calculations

Correct Answer: 2). Rapid measurement of distances and elevations

Solution:
Tacheometry determines **distance and elevation without direct measurement**.

Reference: Surveying – Punmia

---

165. In stadia tacheometry, the multiplying constant (k) usually equals

1). 50
2). 75
3). 100
4). 150

Correct Answer: 3). 100

Solution:
Standard stadia constant is **100**.

Reference: Surveying – Punmia

---

166. Distance in stadia tacheometry is given by

1). $D = ks + c$
2). $D = s/k$
3). $D = k/s$
4). $D = s + c$

Correct Answer: 1). $D = ks + c$

Solution:
Where
k = multiplying constant
s = staff intercept
c = additive constant.

Reference: Surveying – Punmia

---

167. In tangent tacheometry, the distance between instrument and staff is determined using

1). Staff intercept
2). Vertical angles
3). Horizontal angles
4). Chain measurement

Correct Answer: 2). Vertical angles

Solution:
Tangent method uses **two vertical angle observations**.

Reference: Surveying – Punmia

---

168. If a chain is longer than the standard length, measured distance will be

1). Too long
2). Too short
3). Correct
4). Zero

Correct Answer: 2). Too short

Solution:
A longer chain measures **fewer chain lengths**, giving a smaller reading.

Reference: Surveying – Arora

---

169. Correction for incorrect chain length is applied to

1). Reduced level
2). Measured distance
3). Bearing
4). Elevation

Correct Answer: 2). Measured distance

Solution:

$$True\ Length = Measured \times \frac{Actual}{Nominal}$$

Reference: Surveying – Punmia

---

170. Bowditch rule distributes corrections proportional to

1). Bearings
2). Lengths of traverse lines
3). Angles
4). Elevations

Correct Answer: 2). Lengths of traverse lines

Solution:
Bowditch rule assumes **equal precision in angles and distances**.

Reference: Surveying – K.R. Arora

---

171. Transit rule distributes corrections proportional to

1). Lengths of traverse lines
2). Latitudes and departures
3). Angles
4). Elevations

Correct Answer: 2). Latitudes and departures

Solution:
Used when **angles are measured more accurately than distances**.

Reference: Surveying – Arora

---

172. Latitude of a traverse line represents

1). East-west component
2). North-south component
3). Vertical component
4). Angular component

Correct Answer: 2). North-south component

Solution:
Latitude measures **projection of line on north-south axis**.

Reference: Surveying – Arora

---

173. Departure of a traverse line represents

1). North-south component
2). East-west component
3). Vertical component
4). Angular component

Correct Answer: 2). East-west component

Solution:
Departure is projection of line along **east-west direction**.

Reference: Surveying – Arora

---

174. GIS in civil engineering is mainly used for

1). Urban planning
2). Transportation planning
3). Flood mapping
4). All of these

Correct Answer: 4). All of these

Solution:
GIS helps analyze **spatial data for engineering planning**.

Reference: GIS – Kang-tsung Chang

---

175. GPS determines location using

1). Magnetic field signals
2). Satellite signals
3). Optical signals
4). Ground sensors

Correct Answer: 2). Satellite signals

Solution:
GPS calculates coordinates using **signals from multiple satellites**.

Reference: GIS – Chang

Hydraulics

176. Bernoulli's theorem is based on conservation of

1). Mass
2). Energy
3). Momentum
4). Pressure

Correct Answer: 2). Energy

Solution:
Bernoulli's equation represents **conservation of mechanical energy in flowing fluids**.

Reference: Fluid Mechanics – R.K. Bansal

177. Bernoulli's theorem assumes the fluid flow to be

1). Steady and incompressible
2). Turbulent
3). Compressible
4). Unsteady

Correct Answer: 1). Steady and incompressible

Solution:
Bernoulli equation assumes **steady, incompressible and frictionless flow**.

Reference: Fluid Mechanics – Bansal

178. The coefficient of discharge (Cd) of a venturimeter typically lies between

1). 0.40 – 0.50
2). 0.60 – 0.70
3). 0.95 – 0.99
4). 0.10 – 0.20

Correct Answer: 3). 0.95 – 0.99

Solution:
Venturimeters are highly efficient with **Cd ≈ 0.98**.

Reference: Fluid Mechanics – Bansal

---

179. Venturimeter measures

1). Pressure
2). Velocity
3). Discharge
4). Density

Correct Answer: 3). Discharge

Solution:
Discharge is calculated using **pressure difference between inlet and throat**.

Reference: Fluid Mechanics – Bansal

---

180. Pitot tube measures

1). Pressure head
2). Velocity of flow
3). Discharge
4). Density

Correct Answer: 2). Velocity of flow

Solution:
Velocity is determined from **difference between stagnation and static pressure**.

Reference: Fluid Mechanics – Bansal

---

181. Hydraulic Gradient Line (HGL) represents

1). Pressure head + elevation head
2). Velocity head
3). Total energy head
4). Datum head

Correct Answer: 1). Pressure head + elevation head

Solution:

$$HGL = \frac{P}{\gamma} + z$$

Reference: Fluid Mechanics – Khurmi

---

182. Total Energy Line (TEL) represents

1). Pressure head
2). Velocity head
3). Total head
4). Datum head

Correct Answer: 3). Total head

Solution:

$$TEL = \frac{P}{\gamma} + \frac{V^2}{2g} + z$$

Reference: Fluid Mechanics – Khurmi

---

183. The difference between TEL and HGL equals

1). Pressure head
2). Velocity head
3). Datum head
4). Friction loss

Correct Answer: 2). Velocity head

Solution:

$$TEL - HGL = \frac{V^2}{2g}$$

Reference: Fluid Mechanics – Khurmi

---

184. Water hammer occurs due to

1). Sudden increase in pipe diameter
2). Sudden closure of valve

3). Slow flow in pipes
4). High temperature

Correct Answer: 2). Sudden closure of valve

Solution:
Water hammer is **sudden pressure rise due to rapid valve closure**.

Reference: Fluid Mechanics – Bansal

---

185. Water hammer pressure is mainly influenced by

1). Pipe length
2). Flow velocity
3). Fluid density
4). All of these

Correct Answer: 4). All of these

Solution:
Water hammer depends on **velocity change, pipe elasticity and fluid density**.

Reference: Fluid Mechanics – Bansal

---

186. Pelton turbine is suitable for

1). Low head
2). Medium head
3). High head
4). All heads

Correct Answer: 3). High head

Solution:
Pelton turbine operates under **high head and low discharge**.

Reference: Hydraulic Machines – Bansal

---

187. Francis turbine is suitable for

1). High head
2). Medium head

3). Low head
4). Very low head

Correct Answer: 2). Medium head

Solution:
Francis turbine works efficiently under **medium head conditions**.

Reference: Hydraulic Machines – Modi & Seth

---

188. Kaplan turbine is suitable for

1). High head
2). Medium head
3). Low head
4). Very high head

Correct Answer: 3). Low head

Solution:
Kaplan turbine operates under **low head and high discharge**.

Reference: Hydraulic Machines – Modi & Seth

---

189. Specific speed of Pelton turbine generally ranges between

1). 10 – 35
2). 60 – 300
3). 300 – 1000
4). 1000 – 3000

Correct Answer: 1). 10 – 35

Solution:
Pelton turbines have **low specific speed**.

Reference: Hydraulic Machines – Bansal

---

190. Specific speed of Kaplan turbine is generally

1). Low
2). Medium

3). High
4). Very low

Correct Answer: 3). High

Solution:
Kaplan turbines operate at **high specific speeds**.

Reference: Hydraulic Machines – Modi & Seth

Irrigation Engineering

---

191. Consumptive use of water in irrigation mainly includes

1). Canal seepage loss
2). Runoff losses
3). Evaporation and transpiration by crops
4). Storage losses

Correct Answer: 3). Evaporation and transpiration by crops

Solution:
Consumptive use is the **total water used by crops through evapotranspiration during their growth period**.

Reference: Irrigation Engineering – S.K. Garg

---

192. Evapotranspiration represents

1). Evaporation only
2). Transpiration only
3). Combined evaporation and plant transpiration
4). Surface runoff

Correct Answer: 3). Combined evaporation and plant transpiration

Solution:
Evapotranspiration is the **combined loss of water from soil evaporation and plant transpiration**.

Reference: Irrigation Engineering – Garg

---

193. The duty of water is defined as

1). Depth of water required by crop
2). Area irrigated per unit discharge
3). Canal capacity
4). Rainfall per hectare

Correct Answer: 2). Area irrigated per unit discharge

Solution:
Duty = **number of hectares irrigated by one cumec of water**.

Reference: Irrigation Engineering – Punmia

---

194. The relation between Delta (Δ), Duty (D), and Base Period (B) is

1). $\Delta = \frac{8.64D}{B}$
2). $\Delta = \frac{8.64B}{D}$
3). $\Delta = \frac{B}{8.64D}$
4). $\Delta = \frac{D}{8.64B}$

Correct Answer: 2). $\Delta = \frac{8.64B}{D}$

Solution:

$$\Delta = \frac{8.64B}{D}$$

Reference: Irrigation Engineering – Garg

---

195. Lacey's regime theory applies to canals in

1). Rocky soil
2). Alluvial soil
3). Clay soil
4). Sandy soil

Correct Answer: 2). Alluvial soil

Solution:
Lacey developed his theory for **stable channels in alluvial soils**.

Reference: Irrigation Engineering – Garg

---

196. Lacey's regime equation for wetted perimeter (P) is

1). $P = 4.75\sqrt{Q}$
2). $P = 2.5\sqrt{Q}$
3). $P = 1.5\sqrt{Q}$
4). $P = 6\sqrt{Q}$

Correct Answer: 1). $P = 4.75\sqrt{Q}$

Solution:
Where
Q = discharge in m^3/s.

Reference: Irrigation Engineering – Garg

---

197. Lacey's equation for channel slope is

1). $S = \frac{f^5}{3340Q}$
2). $S = \frac{Q}{3340f^5}$
3). $S = \frac{f^3}{1000Q}$
4). $S = \frac{Q}{f^5}$

Correct Answer: 1). $S = \frac{f^5}{3340Q}$

Solution:
Slope depends on **silt factor and discharge**.

Reference: Irrigation Engineering – Garg

---

198. In a siphon aqueduct

1). Canal passes above drainage
2). Drainage passes above canal
3). Canal passes below drainage under pressure
4). Canal and drainage meet at same level

Correct Answer: 3). Canal passes below drainage under pressure

Solution:
In siphon aqueduct **drainage flows over canal while canal flows below under pressure**.

Reference: Irrigation Engineering – Punmia

---

199. In a super passage

1). Canal passes above drainage
2). Drainage passes above canal
3). Canal passes below drainage
4). Canal and drainage intersect

Correct Answer: 2). Drainage passes above canal

Solution:
Super passage allows **natural drainage to cross over canal**.

Reference: Irrigation Engineering – Punmia

---

200. The main purpose of cross-drainage works is

1). Store water in canals
2). Allow canal and natural drainage to cross each other safely
3). Reduce seepage losses
4). Increase irrigation area

Correct Answer: 2). Allow canal and natural drainage to cross each other safely

Solution:
Cross-drainage works ensure **uninterrupted flow of both canal water and natural drainage**.

Reference: Irrigation Engineering – Punmia

AP ECET 2026 – CIVIL ENGINEERING

GRAND TEST – 5 (Highly Predicted)

Strength of Materials

---

101. Hooke's law states that within elastic limit, stress is proportional to

1). Strain
2). Load
3). Area
4). Volume

Correct Answer: 1). Strain

Solution:
Hooke's law:

$$\sigma = E\varepsilon$$

Stress is directly proportional to strain within the elastic limit.

Ref: Strength of Materials – R.K. Bansal

---

102. Poisson's ratio is defined as

1). Longitudinal strain / lateral strain
2). Lateral strain / longitudinal strain
3). Stress / strain
4). Volumetric strain / linear strain

Correct Answer: 2). Lateral strain / longitudinal strain

Solution:

$$\mu = \frac{Lateral\ strain}{Longitudinal\ strain}$$

Ref: Strength of Materials – Bansal

---

103. The theoretical value of Poisson's ratio for incompressible material is

1). 0.25
2). 0.33
3). 0.50
4). 0.75

Correct Answer: 3). 0.50

Solution:
For incompressible materials, volumetric strain = 0 → $\mu = 0.5$.

Ref: Strength of Materials – Bansal

---

104. Relationship between Young's modulus (E), shear modulus (G), and Poisson's ratio (μ) is

1). $E = 2G(1 + \mu)$
2). $E = G(1 + \mu)$
3). $E = 2G(1 - \mu)$
4). $E = G(1 - \mu)$

Correct Answer: 1). $E = 2G(1 + \mu)$

Solution:

$$E = 2G(1 + \mu)$$

Ref: Strength of Materials – Bansal

---

105. Relationship between Young's modulus and bulk modulus is

1). $E = 3K(1 - 2\mu)$
2). $E = K(1 - 2\mu)$
3). $E = 2K(1 + \mu)$
4). $E = K(1 + \mu)$

Correct Answer: 1). $E = 3K(1 - 2\mu)$

Solution:

$$E = 3K(1 - 2\mu)$$

Ref: Strength of Materials – Bansal

---

106. The strain energy stored in a body due to load within elastic limit is called

1). Toughness
2). Resilience
3). Hardness
4). Plasticity

Correct Answer: 2). Resilience

Solution:
Resilience is the **energy absorbed within elastic limit**.

Ref: Strength of Materials – Bansal

---

107. The modulus of resilience is

1). Strain energy per unit volume
2). Strain energy per unit length
3). Strain energy per unit mass
4). Strain energy per unit area

Correct Answer: 1). Strain energy per unit volume

Solution:

$$U = \frac{\sigma^2}{2E}$$

Ref: Strength of Materials – Bansal

---

108. Shear force at the free end of a cantilever beam carrying point load at free end is

1). Zero
2). Equal to load
3). Twice the load
4). Half the load

Correct Answer: 2). Equal to load

Solution:
Shear force equals the **applied load**.

Ref: Strength of Materials – Bansal

---

109. Bending moment at the free end of cantilever is

1). Maximum
2). Zero
3). Equal to load
4). Infinite

Correct Answer: 2). Zero

Solution:
Moment develops only due to **distance from load**.

Ref: Strength of Materials – Bansal

---

110. Maximum bending moment in a cantilever carrying point load at free end occurs at

1). Midspan
2). Free end
3). Fixed end
4). Quarter span

Correct Answer: 3). Fixed end

Solution:

$$M = WL$$

Ref: Strength of Materials – Bansal

---

111. For simply supported beam with central load W, maximum bending moment equals

1). $WL/2$
2). $WL/4$
3). $WL/6$
4). $WL/8$

Correct Answer: 2). $WL/4$

Solution:

$$M = WL/4$$

Ref: Strength of Materials – Bansal

---

112. Maximum shear stress in rectangular section is

1). Average stress
2). 1.25 × average
3). 1.5 × average
4). 2 × average

Correct Answer: 3). 1.5 × average

Solution:

$$\tau_{max} = 1.5\tau_{avg}$$

Ref: Strength of Materials – Bansal

---

113. Maximum shear stress in circular section equals

1). Average shear stress
2). 1.25 × average
3). 1.33 × average
4). 1.5 × average

Correct Answer: 3). 1.33 × average

Solution:

$$\tau_{max} = \frac{4}{3}\tau_{avg}$$

Ref: Strength of Materials – Bansal

---

114. Neutral axis of a beam passes through

1). Centre of gravity of section
2). Extreme fibre
3). Midspan
4). Support

Correct Answer: 1). Centre of gravity of section

Solution:
Neutral axis passes through **centroid of cross section**.

Ref: Strength of Materials – Bansal

---

115. Section modulus is defined as

1). I/y
2). y/I
3). I/A
4). A/I

Correct Answer: 1). I/y

Solution:

$$Z = I/y$$

Ref: Strength of Materials – Bansal

---

116. Composite sections are used mainly to

1). Reduce bending stress
2). Increase moment of inertia
3). Reduce shear stress
4). Reduce deflection

Correct Answer: 2). Increase moment of inertia

Solution:
Composite sections increase **strength and stiffness**.

Ref: Strength of Materials – Bansal

---

117. Modular ratio is defined as

1). E_s/E_c
2). E_c/E_s
3). A_s/A_c
4). I_s/I_c

Correct Answer: 1). E_s/E_c

Solution:

$$m = \frac{E_s}{E_c}$$

Ref: Strength of Materials – Bansal

---

118. Maximum bending stress occurs at

1). Neutral axis
2). Extreme fibres
3). Centre
4). Midspan

Correct Answer: 2). Extreme fibres

Solution:
Bending stress increases with **distance from neutral axis**.

Ref: Strength of Materials – Bansal

---

119. In SFD, the slope represents

1). Load intensity
2). Bending moment
3). Deflection
4). Stress

Correct Answer: 1). Load intensity

Solution:

$$\frac{dV}{dx} = -w$$

Ref: Strength of Materials – Bansal

---

120. In BMD, the slope represents

1). Shear force
2). Load intensity
3). Stress
4). Strain

Correct Answer: 1). Shear force

Solution:

$$\frac{dM}{dx} = V$$

Ref: Strength of Materials – Bansal

Theory of Structures

---

121. Macaulay's method is mainly used to determine

1). Shear force
2). Bending stress
3). Slope and deflection of beams
4). Column strength

Correct Answer: 3). Slope and deflection of beams

Solution:
Macaulay's method simplifies integration of beam equations for **multiple loads at different positions**.

Ref: Analysis of Structures – S.S. Bhavikatti

---

122. In Macaulay's notation, the expression $(x-a)$indicates

1). Load magnitude
2). Distance from support
3). Distance from load position
4). Beam span

Correct Answer: 3). Distance from load position

Solution:
$(x-a)$becomes active only when **x > a**, representing effect of load at distance a.

Ref: Ramamrutham – Theory of Structures

---

123. Euler's critical load for a column is

1). $P = \pi^2 EI/L^2$
2). $P = EI/L^2$
3). $P = WL$
4). $P = \pi EI/L$

Correct Answer: 1). $P = \pi^2 EI/L^2$

Solution:

$$P_{cr} = \frac{\pi^2 EI}{L^2}$$

Ref: Strength of Materials – Bansal

---

124. Euler's formula is valid for

1). Short columns
2). Intermediate columns
3). Long columns
4). Composite columns

Correct Answer: 3). Long columns

Solution:
Euler theory assumes **buckling occurs before crushing**, typical for slender columns.

Ref: Bansal

---

125. Slenderness ratio of a column is

1). I/A
2). L/k
3). A/I
4). k/L

Correct Answer: 2). L/k

Solution:

$$\lambda = \frac{L}{k}$$

Ref: Strength of Materials – Bansal

---

126. Effective length of a column hinged at both ends is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 1). L

Solution:
Hinged ends allow rotation → **effective length equals actual length**.

Ref: Strength of Materials – Bansal

---

127. Effective length of a column fixed at both ends is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 2). L/2

Solution:
Fixed supports restrain rotation → **effective length reduces**.

Ref: Strength of Materials – Bansal

---

128. Effective length of a cantilever column (fixed-free) is

1). L
2). L/2
3). 2L
4). L/4

Correct Answer: 3). 2L

Solution:
Cantilever columns have **maximum effective length**.

Ref: Strength of Materials – Bansal

---

129. Rankine's formula is used for

1). Short columns only
2). Long columns only
3). Intermediate columns
4). Steel beams

Correct Answer: 3). Intermediate columns

Solution:
Rankine combines **crushing and buckling effects**.

Ref: Strength of Materials – Bansal

---

130. Rankine's formula is

1). $P = \frac{\sigma_c A}{1+a(L/k)^2}$
2). $P = \sigma A$
3). $P = \pi^2 EI/L^2$
4). $P = WL$

Correct Answer: 1). $P = \frac{\sigma_c A}{1+a(L/k)^2}$

Solution:
Rankine constant a depends on **material properties**.

Ref: Strength of Materials – Bansal

---

131. In gravity dams, middle-third rule ensures

1). Maximum compression
2). No tensile stress at base
3). Minimum shear stress
4). Zero uplift pressure

Correct Answer: 2). No tensile stress at base

Solution:
Resultant must lie within **middle third of base width**.

Ref: Theory of Structures – Ramamrutham

---

132. If resultant lies outside middle third of dam base

1). Compression increases only
2). Tension develops at base
3). Shear becomes zero
4). Uplift pressure vanishes

Correct Answer: 2). Tension develops at base

Solution:
Tension is unsafe for **masonry dams**.

Ref: Ramamrutham

---

133. Active earth pressure occurs when

1). Wall moves away from soil
2). Wall moves toward soil
3). Soil becomes saturated
4). Wall remains fixed

Correct Answer: 1). Wall moves away from soil

Solution:
Soil expands and pressure reduces to **active state**.

Ref: Soil Mechanics – Punmia

---

134. Passive earth pressure occurs when

1). Wall moves away from soil
2). Wall moves toward soil
3). Soil moves upward
4). Soil becomes dry

Correct Answer: 2). Wall moves toward soil

Solution:
Soil compression produces **passive resistance**.

Ref: Soil Mechanics – Punmia

---

135. Rankine's active earth pressure coefficient is

1). $(1 + \sin\ \phi)/(1 - \sin\ \phi)$
2). $(1 - \sin\ \phi)/(1 + \sin\ \phi)$
3). $\sin\ \phi/(1 + \sin\ \phi)$
4). $1/\sin\ \phi$

Correct Answer: 2). $(1 - \sin\ \phi)/(1 + \sin\ \phi)$

Solution:

$$K_a = \frac{1 - \sin\ \phi}{1 + \sin\ \phi}$$

Ref: Soil Mechanics – Punmia

---

136. Passive earth pressure coefficient is

1). $(1 + \sin\ \phi)/(1 - \sin\ \phi)$
2). $(1 - \sin\ \phi)/(1 + \sin\ \phi)$
3). $1 - \sin\ \phi$
4). $1 + \sin\ \phi$

Correct Answer: 1). $(1 + \sin\ \phi)/(1 - \sin\ \phi)$

Solution:

$$K_p = \frac{1 + \sin\ \phi}{1 - \sin\ \phi}$$

Ref: Soil Mechanics – Punmia

---

137. For a perfect truss

1). $m = j$
2). $m = j + 1$
3). $m = 2j - 3$
4). $m = 3j - 2$

Correct Answer: 3). $m = 2j - 3$

Solution:
Condition for **statically determinate plane truss**.

Ref: Ramamrutham

---

138. A truss member carrying no force is called

1). Dummy member
2). Zero force member
3). Compression member
4). Tension member

Correct Answer: 2). Zero force member

Solution:
Occurs due to **joint equilibrium conditions**.

Ref: Ramamrutham

---

139. In truss analysis, method of joints is based on

1). Moment equilibrium
2). Force equilibrium
3). Energy method
4). Deflection method

Correct Answer: 2). Force equilibrium

Solution:
Joint equilibrium requires **$\Sigma Fx = 0$ and $\Sigma Fy = 0$**.

Ref: Ramamrutham

---

140. Method of sections is used mainly to determine

1). All member forces
2). Forces in selected members directly
3). Support reactions only
4). Bending stresses

Correct Answer: 2). Forces in selected members directly

Solution:
Method of sections cuts through **maximum three unknown members**.

Ref: Ramamrutham

Reinforced Concrete Structures

---

141. As per IS 456:2000, the minimum grade of concrete used in reinforced concrete structures is

1). M10
2). M15
3). M20
4). M25

Correct Answer: 3). M20

Solution:
IS 456 specifies **M20 as the minimum grade of concrete for RCC structures**.

Ref: IS 456:2000

---

142. The characteristic compressive strength of M30 concrete is

1). 20 MPa
2). 25 MPa
3). 30 MPa
4). 35 MPa

Correct Answer: 3). 30 MPa

Solution:
The number after "M" indicates **28-day characteristic compressive strength in MPa**.

Ref: IS 456:2000

---

143. The modulus of elasticity of concrete is given by

1). $E_c = 4000\sqrt{f_{ck}}$
2). $E_c = 5000\sqrt{f_{ck}}$
3). $E_c = 6000\sqrt{f_{ck}}$
4). $E_c = 7000\sqrt{f_{ck}}$

Correct Answer: 2). $E_c = 5000\sqrt{f_{ck}}$

Solution:

$$E_c = 5000\sqrt{f_{ck}}$$

Ref: IS 456:2000

---

144. The partial safety factor for concrete in limit state design is

1). 1.15
2). 1.25
3). 1.50
4). 2.00

Correct Answer: 3). 1.50

Solution:
For concrete:

$$\gamma_c = 1.5$$

Ref: IS 456:2000

---

145. The partial safety factor for steel is

1). 1.15
2). 1.25
3). 1.50
4). 1.75

Correct Answer: 1). 1.15

Solution:

$$\gamma_s = 1.15$$

Ref: IS 456:2000

---

146. Maximum compressive strain in concrete in limit state design is

1). 0.002
2). 0.0035
3). 0.004
4). 0.005

Correct Answer: 2). 0.0035

Solution:
IS 456 specifies **maximum strain of concrete = 0.0035**.

Ref: IS 456:2000

---

147. Maximum depth of neutral axis for Fe250 steel is

1). 0.53d
2). 0.48d
3). 0.46d
4). 0.42d

Correct Answer: 1). 0.53d

Solution:
Neutral axis limits depend on **grade of steel**.

Ref: IS 456:2000

---

148. Maximum depth of neutral axis for Fe415 steel is

1). 0.53d
2). 0.48d
3). 0.46d
4). 0.42d

Correct Answer: 2). 0.48d

Solution:
Higher steel strength → smaller neutral axis depth.

Ref: IS 456:2000

---

149. Maximum depth of neutral axis for Fe500 steel is

1). 0.53d
2). 0.48d
3). 0.46d
4). 0.42d

Correct Answer: 4). 0.42d

Solution:
Fe500 steel has **lowest neutral axis depth**.

Ref: IS 456:2000

---

150. Minimum percentage of tension reinforcement in beams is

1). 0.10%
2). 0.20%
3). 0.30%
4). 0.50%

Correct Answer: 2). 0.20%

Solution:
Minimum reinforcement ensures **ductile failure instead of sudden collapse**.

Ref: IS 456:2000

---

151. Maximum reinforcement in RCC beams should not exceed

1). 2%
2). 3%
3). 4%
4). 5%

Correct Answer: 3). 4%

Solution:
Maximum reinforcement = **4% of gross cross-sectional area**.

Ref: IS 456:2000

---

152. Development length ensures

1). Proper bond between steel and concrete
2). Compression strength
3). Shear resistance
4). Deflection control

Correct Answer: 1). Proper bond between steel and concrete

Solution:
Development length allows **steel to develop full stress without slipping**.

Ref: IS 456:2000

---

153. Development length formula is

1). $L_d = \frac{\phi \sigma_s}{4\tau_{bd}}$
2). $L_d = \frac{\sigma_s}{\phi \tau_{bd}}$
3). $L_d = \frac{\phi \tau_{bd}}{\sigma_s}$
4). $L_d = \frac{4\tau_{bd}}{\phi \sigma_s}$

Correct Answer: 1). $L_d = \frac{\phi \sigma_s}{4\tau_{bd}}$

Solution:
Depends on **bar diameter, steel stress and bond stress**.

Ref: IS 456:2000

---

154. One-way slab occurs when

1). $L_y/L_x > 2$
2). $L_y/L_x < 2$
3). $L_y/L_x = 1$
4). $L_y/L_x = 2$

Correct Answer: 1). $L_y/L_x > 2$

Solution:
Load transfer mainly occurs in **one direction**.

Ref: RCC – B.C. Punmia

---

155. Two-way slab occurs when

1). $L_y/L_x > 2$
2). $L_y/L_x < 2$
3). $L_y/L_x = 3$
4). $L_y/L_x = 4$

Correct Answer: 2). $L_y/L_x < 2$

Solution:
Load is transferred in **both directions**.

Ref: RCC – Punmia

---

156. Torsion reinforcement in slabs is provided at

1). Centre
2). Corners
3). Edges
4). Midspan

Correct Answer: 2). Corners

Solution:
Torsion reinforcement prevents **corner lifting in two-way slabs**.

Ref: IS 456:2000

---

157. Punching shear occurs in

1). Beams
2). Slabs
3). Footings
4). Columns

Correct Answer: 3). Footings

Solution:
Punching shear occurs **around column perimeter**.

Ref: RCC – Krishna Raju

---

158. Critical section for punching shear is located at

1). Column face
2). d/2 from column face
3). d from column face
4). 2d from column face

Correct Answer: 2). d/2 from column face

Solution:
IS 456 defines critical section **d/2 from column face**.

Ref: IS 456:2000

---

159. Balanced section occurs when

1). Steel yields first
2). Concrete crushes first
3). Steel and concrete reach permissible strain simultaneously
4). Steel fails in compression

Correct Answer: 3). Steel and concrete reach permissible strain simultaneously

Solution:
Balanced section represents **simultaneous failure condition**.

Ref: RCC – Krishna Raju

---

160. Limit state design method provides

1). Only strength check
2). Only serviceability check
3). Both strength and serviceability checks
4). Deflection check only

Correct Answer: 3). Both strength and serviceability checks

Solution:
Limit state design ensures **strength and serviceability requirements**.

Ref: IS 456:2000

Surveying

---

161. Chain surveying is mainly used when

1). Area is large and irregular
2). Area is small and fairly level
3). Area has steep slopes
4). Area has many obstacles

Correct Answer: 2). Area is small and fairly level

Solution:
Chain surveying is suitable for **small open areas with simple details**.

Ref: Surveying – B.C. Punmia

---

162. The principle of chain surveying is

1). Triangulation
2). Traversing
3). Levelling
4). Tacheometry

Correct Answer: 1). Triangulation

Solution:
The area is divided into **triangles whose sides are measured in the field**.

Ref: Surveying – Punmia

---

163. An error which accumulates in the same direction is called

1). Random error
2). Compensating error
3). Cumulative error
4). Personal error

Correct Answer: 3). Cumulative error

Solution:
Example: **incorrect chain length** causes cumulative error.

Ref: Surveying – Arora

---

164. If a chain is longer than the standard length, the measured distance will be

1). Too long
2). Too short
3). Correct
4). Zero

Correct Answer: 2). Too short

Solution:
A longer chain measures **fewer chain lengths**, giving smaller distance.

Ref: Surveying – Arora

---

165. Correction for incorrect chain length is applied to

1). Reduced level
2). Measured distance
3). Bearing
4). Elevation

Correct Answer: 2). Measured distance

Solution:

$$True\ Distance = Measured \times \frac{Actual}{Nominal}$$

Ref: Surveying – Punmia

---

166. Local attraction in compass surveying is caused by

1). Wind
2). Nearby magnetic materials
3). Temperature
4). Sunlight

Correct Answer: 2). Nearby magnetic materials

Solution:
Magnetic disturbances affect **compass readings**.

Ref: Surveying – Punmia

---

167. Reciprocal levelling is used to eliminate errors due to

1). Instrument error
2). Curvature and refraction
3). Personal error
4). Chain sag

Correct Answer: 2). Curvature and refraction

Solution:
Reciprocal levelling removes **errors caused by curvature of earth and atmospheric refraction**.

Ref: Surveying – Punmia

---

168. In stadia tacheometry, the multiplying constant (k) is generally

1). 50
2). 75
3). 100
4). 150

Correct Answer: 3). 100

Solution:
For most tacheometers:

$$k = 100$$

Ref: Surveying – Punmia

---

169. The formula for distance in stadia method is

1). $D = ks + c$
2). $D = s/k$
3). $D = ks$
4). $D = k/s$

Correct Answer: 1). $D = ks + c$

Solution:
Where
k = multiplying constant
s = staff intercept
c = additive constant.

Ref: Surveying – Punmia

---

170. Bowditch rule is used to adjust

1). Level errors
2). Traverse errors
3). Chain errors
4). Tacheometric errors

Correct Answer: 2). Traverse errors

Solution:
Bowditch rule distributes errors based on **length of traverse lines**.

Ref: Surveying – K.R. Arora

---

171. Bowditch rule distributes corrections proportional to

1). Bearings
2). Angles
3). Length of traverse lines
4). Elevations

Correct Answer: 3). Length of traverse lines

Solution:
Assumes **equal accuracy in angles and distances**.

Ref: Surveying – Arora

---

172. Transit rule distributes corrections proportional to

1). Length of lines
2). Latitudes and departures
3). Angles
4). Bearings

Correct Answer: 2). Latitudes and departures

Solution:
Used when **angles are more precise than distances**.

Ref: Surveying – Arora

---

173. Latitude of a traverse line represents

1). East-west component
2). North-south component
3). Vertical component
4). Angular component

Correct Answer: 2). North-south component

Solution:
Latitude is projection of line along **north-south direction**.

Ref: Surveying – Arora

---

174. Departure of a traverse line represents

1). North-south component
2). East-west component
3). Vertical component
4). Angular component

Correct Answer: 2). East-west component

Solution:
Departure is projection along **east-west direction**.

Ref: Surveying – Arora

---

175. GIS stands for

1). Global Information System
2). Geographic Information System
3). Geometric Information System
4). Graphical Information System

Correct Answer: 2). Geographic Information System

Solution:
GIS integrates **spatial and attribute data for analysis and mapping**.

Ref: GIS – Kang-tsung Chang

Hydraulics

---

176. The ratio of inertial force to viscous force in fluid flow is called

1). Froude number
2). Reynolds number
3). Weber number
4). Mach number

Correct Answer: 2). Reynolds number

Solution:

$$Re = \frac{\rho V D}{\mu}$$

Reynolds number determines **laminar or turbulent flow**.

Ref: Fluid Mechanics – R.K. Bansal

---

177. Flow in a pipe becomes turbulent when Reynolds number exceeds

1). 1000
2). 1500
3). 2000
4). 4000

Correct Answer: 4). 4000

Solution:
Laminar flow: Re < 2000
Transition: 2000–4000
Turbulent: Re > 4000.

Ref: Fluid Mechanics – Bansal

---

178. Bernoulli's theorem represents conservation of

1). Mass
2). Energy
3). Momentum
4). Pressure

Correct Answer: 2). Energy

Solution:

$$\frac{P}{\gamma} + \frac{V^2}{2g} + z = constant$$

Ref: Fluid Mechanics – Bansal

---

179. Venturimeter is used to measure

1). Velocity
2). Pressure
3). Discharge
4). Density

Correct Answer: 3). Discharge

Solution:
Venturimeter measures **flow rate in pipes using pressure difference**.

Ref: Fluid Mechanics – Bansal

---

180. The coefficient of discharge of a venturimeter is usually

1). 0.60
2). 0.70
3). 0.85
4). 0.98

Correct Answer: 4). 0.98

Solution:
Venturimeters are highly efficient devices.

Ref: Fluid Mechanics – Bansal

---

181. Pitot tube measures

1). Discharge
2). Pressure head
3). Velocity of flow
4). Density

Correct Answer: 3). Velocity of flow

Solution:

$$V = \sqrt{2gh}$$

Ref: Fluid Mechanics – Bansal

---

182. Hydraulic Gradient Line (HGL) represents

1). Pressure head + elevation head
2). Velocity head
3). Total energy head
4). Datum head

Correct Answer: 1). Pressure head + elevation head

Solution:

$$HGL = \frac{P}{\gamma} + z$$

Ref: Fluid Mechanics – Khurmi

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183. Total Energy Line (TEL) represents

1). Pressure head
2). Velocity head
3). Total head
4). Datum head

Correct Answer: 3). Total head

Solution:

$$TEL = \frac{P}{\gamma} + \frac{V^2}{2g} + z$$

Ref: Fluid Mechanics – Khurmi

---

184. Difference between TEL and HGL equals

1). Pressure head
2). Velocity head
3). Datum head
4). Friction loss

Correct Answer: 2). Velocity head

Solution:

$$TEL - HGL = \frac{V^2}{2g}$$

Ref: Fluid Mechanics – Khurmi

---

185. Head loss due to friction in pipes is calculated using

1). Bernoulli equation
2). Darcy-Weisbach equation
3). Manning equation
4). Chezy equation

Correct Answer: 2). Darcy-Weisbach equation

Solution:

$$h_f = \frac{4fLV^2}{2gD}$$

Ref: Fluid Mechanics – Bansal

---

186. Minor losses in pipes occur due to

1). Bends
2). Valves
3). Sudden expansion or contraction
4). All of these

Correct Answer: 4). All of these

Solution:
Minor losses occur due to **pipe fittings and changes in geometry**.

Ref: Fluid Mechanics – Bansal

---

187. Discharge over rectangular notch is proportional to

1). $H^{1/2}$
2). $H^{3/2}$
3). H^2
4). H^3

Correct Answer: 2). $H^{3/2}$

Solution:

$$Q = \frac{2}{3} C_d b \sqrt{2g} H^{3/2}$$

Ref: Hydraulics – Bansal

---

188. Discharge over triangular notch is proportional to

1). $H^{3/2}$
2). $H^{5/2}$
3). H^2
4). H^3

Correct Answer: 2). $H^{5/2}$

Solution:

$$Q \propto H^{5/2}$$

Ref: Hydraulics – Bansal

---

189. Francis turbine operates under

1). High head
2). Medium head
3). Low head
4). Very low head

Correct Answer: 2). Medium head

Solution:
Francis turbine is used for **medium head hydroelectric plants**.

Ref: Hydraulic Machines – Modi & Seth

---

190. Kaplan turbine is suitable for

1). High head
2). Medium head
3). Low head
4). Very high head

Correct Answer: 3). Low head

Solution:
Kaplan turbines operate under **low head and high discharge**.

Ref: Hydraulic Machines – Modi & Seth

Irrigation Engineering

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191. Irrigation is defined as

1). Artificial application of water to soil for crop growth
2). Natural rainfall over land
3). Groundwater flow
4). Water storage in reservoirs

Correct Answer: 1). Artificial application of water to soil for crop growth

Solution:
Irrigation supplies water **artificially to agricultural land to support crop growth** when rainfall is insufficient.

Ref: Irrigation Engineering – S.K. Garg

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192. Duty of water is defined as

1). Volume of water used by crops
2). Area irrigated per unit discharge
3). Depth of rainfall
4). Canal discharge

Correct Answer: 2). Area irrigated per unit discharge

Solution:
Duty represents **number of hectares irrigated by one cumec of water**.

Ref: Irrigation Engineering – Garg

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193. Delta represents

1). Total rainfall
2). Depth of water required by crop during base period
3). Canal discharge
4). Groundwater level

Correct Answer: 2). Depth of water required by crop during base period

Solution:
Delta is the **total depth of water required during crop growth period**.

Ref: Irrigation Engineering – Garg

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194. The relationship between duty (D), delta (Δ), and base period (B) is

1). $\Delta = \frac{8.64D}{B}$
2). $\Delta = \frac{8.64B}{D}$
3). $\Delta = \frac{B}{8.64D}$
4). $\Delta = \frac{D}{8.64B}$

Correct Answer: 2). $\Delta = \frac{8.64B}{D}$

Solution:

$$\Delta = \frac{8.64B}{D}$$

Ref: Irrigation Engineering – Garg

---

195. Kharif crops are generally grown during

1). Winter
2). Summer
3). Monsoon season
4). Spring

Correct Answer: 3). Monsoon season

Solution:
Examples include **rice, maize, cotton** grown during monsoon.

Ref: Irrigation Engineering – Garg

---

196. Lacey's silt theory is used for designing

1). Dams
2). Canals in alluvial soil
3). Reservoirs
4). Pumps

Correct Answer: 2). Canals in alluvial soil

Solution:
Lacey developed equations for **stable canals in alluvial soils**.

Ref: Irrigation Engineering – Garg

---

197. Lacey's regime equation for wetted perimeter (P) is

1). $P = 2.5\sqrt{Q}$
2). $P = 3.5\sqrt{Q}$
3). $P = 4.75\sqrt{Q}$
4). $P = 6\sqrt{Q}$

Correct Answer: 3). $P = 4.75\sqrt{Q}$

Solution:

$$P = 4.75\sqrt{Q}$$

Where Q = discharge in m^3/s.

Ref: Irrigation Engineering – Garg

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198. A dam constructed mainly using masonry or concrete is called

1). Earth dam
2). Gravity dam
3). Rockfill dam
4). Timber dam

Correct Answer: 2). Gravity dam

Solution:
Gravity dams resist forces mainly through **their own weight**.

Ref: Irrigation Engineering – Punmia

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199. In an aqueduct

1). Canal passes over drainage
2). Drainage passes over canal
3). Canal passes below drainage
4). Canal and drainage intersect

Correct Answer: 1). Canal passes over drainage

Solution:
Aqueduct allows **canal water to flow above the drainage channel**.

Ref: Irrigation Engineering – Punmia

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200. The main purpose of cross-drainage works is to

1). Store water in canal
2). Allow canal and drainage to cross safely
3). Increase irrigation area
4). Reduce evaporation

Correct Answer: 2). Allow canal and drainage to cross safely

Solution:
Cross-drainage works maintain **independent flow of canals and natural drains**.

Ref: Irrigation Engineering – Punmia

END NOTE

Your Rank is Not Decided in the Exam Hall… It Is Decided in Your Preparation Room.

Dear Student,
If you have reached this page, it means you have completed a serious journey.

• You have understood core concepts of Strength of Materials, Structures, RCC, and Hydraulics.
• You have practiced numerical problems and improved your calculation speed.
• You have analyzed previous year questions and exam patterns.
• You have faced mock tests under pressure.
• You have identified your mistakes and corrected them.

That is exactly how ranks are built.

📌 Remember These Final Principles

✓ Concepts win over rote learning
✓ Accuracy is more powerful than speed
✓ Revision is more important than starting new topics
✓ Practicing numericals builds confidence
✓ Mock test analysis gives the rank

AP ECET is not about difficult questions.
It is about avoiding silly mistakes in fundamental concepts.

🎯 Final Strategy Before Exam

1. Revise the Core Units: Focus on your short notes from SOM, Theory of Structures, RCC, Surveying, Hydraulics, and Irrigation.

2. Focus on Frequently Tested Areas:

o Strength of Materials: Elastic constants, SFD & BMD, shear stress distribution
o Theory of Structures: Columns, Earth pressure, Deflection concepts
o RCC: IS 456 basics, reinforcement limits, slabs & footings
o Surveying: Levelling, Tacheometry, Traverse adjustments
o Hydraulics: Bernoulli's theorem, pipe flow, notches & weirs
o Irrigation: Duty–Delta, Lacey theory, dams & canal systems

3. Rest & Mindset:
   Sleep well before exam day. Stay calm. Read each question carefully.

🧠 In the Exam Hall

• Attempt Easy Questions First: Secure marks from theory-based questions quickly
• Avoid Overthinking: Don’t get stuck on one numerical problem
• Solve Step-by-Step: Use rough work properly for calculations
• Use Elimination Method: Remove wrong options to increase accuracy
• Time Management: Keep last 10–15 minutes for revision

🚀 Your Future Starts After This Exam

This exam is not the destination. It is the bridge. After ECET:

• You enter B.Tech (Civil Engineering)
• You build strong knowledge in Structural, Geotechnical, Transportation, and Environmental Engineering
• You work on real-world projects and internships
• You prepare for Government Jobs, Core Companies, or Higher Studies
• You contribute to building infrastructure and society

Your rank is just the beginning.

🌟 Believe This

You are not competing with thousands. You are competing with:

• Your preparation
• Your focus
• Your discipline

If you prepared sincerely, your rank is already secured.

📘 Study Smart. Stay Consistent. Aim High.
All the Best for AP ECET 2026. You are ready.

Book Description

AP ECET is a gateway for Diploma students to enter B.Tech through lateral entry. Success in this exam requires **clarity, structured** preparation, and focused practice. This book is designed as a complete preparation system based on:

- Unit-wise weightage analysis
- Concept clarity in simple language
- Three-level practice questions (Basic to Rank Booster)
- Important formulas and comparison charts
- Frequently repeated questions
- Rapid revision sheets
- Smart exam attempt strategies

Why Choose This Book?

✔ Clear and concise theory
✔ Structured preparation plan
✔ Exam-oriented practice questions
✔ Concept + Numerical balance
✔ Rank-focused strategy

About the Author

Bandi Dayasagar is an academician, researcher, and career mentor with strong expertise in Mechanical Engineering and Computer Information Systems. With academic qualifications from Diploma to MS (USA) and practical exposure in leading national organizations, he founded Sagar Educational Society to guide Diploma and Engineering students toward structured, exam-focused preparation.

His teaching philosophy is simple:
Clear Concepts. Smart Preparation. Disciplined Execution.