

AP ECET 2026

ELECTRICAL & ELECTRONICS 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

M.Tech – Thermal Engineering

MS – Computer Information Systems (USA)

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 æ 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 Incompressible 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 (Electrical and Electronics Engineering)** requires smart preparation, consistent practice, and a clear understanding of electrical fundamentals.

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.

1. Start with Unit-Wise Concept Revision

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

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

- Basic Electrical Engineering
- D.C. Machines, Batteries and Measuring Instruments
- A.C. Circuits and Transformers
- A.C. Machines
- Power System Generation and Protection
- Transmission and Distribution
- Electric Traction
- Electrical Estimation
- Basic Electronics, Digital Electronics and Microcontrollers
- Power Electronics and Drives
- Electric Vehicle Technology

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

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**.

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 electrical fundamentals

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

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.

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 electrical topics
- Strengthen important formulas and problem-solving techniques

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

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 electrical 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 Electrical and Electronics Engineering**.

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AP ECET 2026 EEE Weightage Table

NUMBER OF QUESTIONS TO BE SET ELECTRICAL & ELECTRICAL ENGINEERING

Unit No	TOPICS	MARKS
I	Basic Electrical Engineering	7
II	D.C. Machines, Batteries & Measuring instruments	
	D.C. Generators	4
	D.C. Motors	4
	Measurements Instruments	4
III	A.C. Circuits and Transformers	
	A.C. Circuits	5
	Transformers	7
IV	A.C. Machines	
	Alternators	3
	Synchronous Motors	3
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V	Power System generation & Protection	
	Generating Stations	5
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VI	Transmission and Distribution	10
VII	Electric traction	4
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IX	Basic Electronics and Digital electronics	
	Semi-Conductor devices	4
	Amplifiers	2
	Oscillators	2
	Digital Electronics	4
	Micro Controllers	2
X	Power Electronics and Drives	
	Power Electronics Devices	3
	Converters, Choppers, Inverters ,AC voltage Controllers and Drives	6
XI	Electric Vehicle Technology	4
	Total	100

UNIT-I: BASIC ELECTRICAL ENGINEERING

PART-A: NETWORK LAWS & STAR/DELTA

1. According to Ohm's law, the current flowing through a conductor is proportional to

- 1). Square of voltage
- 2). Applied voltage
- 3). Resistance
- 4). Temperature

Correct Answer: **2). Applied voltage**

Solution:

Ohm's Law states:

$$V = IR$$

$$I = V / R$$

Thus current is directly proportional to **voltage** when resistance remains constant.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

2. The unit of electrical resistance is

- 1). Ampere
- 2). Volt
- 3). Ohm
- 4). Watt

Correct Answer: **3). Ohm**

Solution:

Resistance:

$$R = V / I$$

Unit:

$$\text{Ohm} = \text{Volt} / \text{Ampere}$$

Ref: *Basic Electrical Engineering – J.B. Gupta*

3. Kirchhoff's Current Law (KCL) is based on the principle of

- 1). Conservation of energy
- 2). Conservation of charge
- 3). Faraday's law
- 4). Ohm's law

Correct Answer: **2). Conservation of charge**

Solution:

KCL states:

Sum of currents entering a node = Sum of currents leaving the node.

This follows **conservation of electric charge**.

Ref: *Electrical Technology – B.L. Theraja*

4. Kirchhoff's Voltage Law (KVL) is based on

- 1). Conservation of charge
- 2). Conservation of mass
- 3). Conservation of energy
- 4). Ohm's law

Correct Answer: **3). Conservation of energy**

Solution:

KVL states:

Algebraic sum of voltages in a closed loop = 0.

Energy supplied = Energy consumed.

Ref: *Fundamentals of Electrical Engineering – Ashfaq Husain*

5. If three resistors 2Ω , 3Ω and 6Ω are connected in parallel, the equivalent resistance is

- 1). 1Ω
- 2). 2Ω
- 3). 3Ω
- 4). 6Ω

Correct Answer: **1). 1Ω**

Solution:

$$1/R = 1/2 + 1/3 + 1/6$$

$$1/R = 3/6 + 2/6 + 1/6$$

$$1/R = 6/6$$

$$R = 1\Omega$$

Ref: *Objective Electrical Technology – V.K. Mehta*

6. In a star (Y) connection, the number of resistances required is

- 1). 2
- 2). 3
- 3). 4
- 4). 6

Correct Answer: **2). 3**

Solution:

A star network consists of **three resistors connected to a common node**.

Ref: *Electrical Technology – B.L. Theraja*

7. In a delta (Δ) network, the resistors are connected

- 1). In parallel
- 2). In series
- 3). In triangular form
- 4). Between ground and node

Correct Answer: **3). In triangular form**

Solution:

Delta network forms a **closed triangular loop** of three resistors.

Ref: *Basic Electrical Engineering – J.B. Gupta*

8. The formula for converting Delta resistance R_{AB} to Star resistance R_A is

- 1). Product / sum of opposite resistances
- 2). Sum / product
- 3). Difference / sum
- 4). Product / difference

Correct Answer: **1). Product / sum of opposite resistances**

Solution:

Star resistance:

$$R_A = (R_{AB} \times R_{CA}) / (R_{AB} + R_{BC} + R_{CA})$$

Ref: *Electrical Technology – B.L. Theraja*

9. If three equal resistances of 6Ω are connected in delta, the equivalent star resistance will be

1). 1Ω

2). 2Ω

3). 3Ω

4). 6Ω

Correct Answer: **2). 2Ω**

Solution:

Star resistance:

$$R = R_{\Delta} / 3$$

$$R = 6 / 3$$

$$R = 2\Omega$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

10. If the current entering a node is 8A and currents leaving are 3A and 2A, the third current leaving is

1). 1 A

2). 2 A

3). 3 A

4). 4 A

Correct Answer: **3). 3 A**

Solution:

By KCL:

Incoming current = Outgoing current

$$8 = 3 + 2 + I$$

$$I = 3 \text{ A}$$

Ref: *Basic Electrical Engineering – J.B. Gupta*

11. In a delta network, the equivalent star resistance R_A is equal to

- 1). Sum of all delta resistances
- 2). Product of adjacent resistances / Sum of all delta resistances
- 3). Difference of resistances
- 4). Half of delta resistance

Correct Answer: **2). Product of adjacent resistances / Sum of all delta resistances**

Solution:

For delta to star conversion:

$$R_A = \frac{R_{AB} \times R_{CA}}{R_{AB} + R_{BC} + R_{CA}}$$

Ref: *Electrical Technology – B.L. Theraja*

12. If three resistors of 9Ω each are connected in star, the equivalent delta resistance is

- 1). 3Ω
- 2). 9Ω
- 3). 18Ω
- 4). 27Ω

Correct Answer: **4). 27Ω**

Solution:

Star to Delta conversion:

$$\begin{aligned} R_{\Delta} &= 3R_Y \\ R_{\Delta} &= 3 \times 9 \\ R_{\Delta} &= 27\Omega \end{aligned}$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

13. If a 10Ω resistor carries 2A current, the voltage across it is

- 1). 5 V
- 2). 10 V
- 3). 20 V
- 4). 30 V

Correct Answer: **3). 20 V**

Solution:

Ohm's law:

$$V = IR$$

$$V = 2 \times 10$$

$$V = 20V$$

Ref: *Basic Electrical Engineering – J.B. Gupta*

14. In a series circuit, the current through each resistor is

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

Correct Answer: **2). Same**

Solution:

In a **series circuit**, only one current path exists.

Therefore current remains **same in all components**.

Ref: *Fundamentals of Electrical Engineering – Ashfaq Husain*

15. The algebraic sum of currents at a node is

- 1). Zero
- 2). One
- 3). Infinity
- 4). Equal to voltage

Correct Answer: **1). Zero**

Solution:

Kirchhoff's Current Law:

$$\sum I = 0$$

Sum of currents entering node = Sum leaving node.

Ref: *Electrical Technology – B.L. Theraja*

PART-B: NETWORK THEOREMS (HIGH-SCORING AREA)

16. Thevenin's theorem is applicable to

- 1). Linear bilateral networks
- 2). Non-linear circuits only
- 3). Magnetic circuits
- 4). Mechanical circuits

Correct Answer: **1). Linear bilateral networks**

Solution:

Thevenin theorem simplifies any **linear bilateral network** into a single **voltage source and resistance**.

Ref: *Objective Electrical Technology – V.K. Mehta*

17. The equivalent circuit of Thevenin theorem consists of

- 1). Current source and resistance
- 2). Voltage source and resistance
- 3). Only resistance
- 4). Voltage source only

Correct Answer: **2). Voltage source and resistance**

Solution:

Thevenin equivalent:

Voltage source V_{TH} in series with resistance R_{TH} .

Ref: *Electrical Technology – B.L. Theraja*

18. Norton's theorem represents a network by

- 1). Voltage source in series with resistance
- 2). Current source in parallel with resistance
- 3). Only resistance
- 4). Voltage divider

Correct Answer: **2). Current source in parallel with resistance**

Solution:

Norton equivalent circuit:

Current source I_N in parallel with resistance R_N .

Ref: *Basic Electrical Engineering – J.B. Gupta*

19. Thevenin resistance is calculated by

- 1). Removing voltage sources
- 2). Replacing sources with internal resistance
- 3). Short-circuiting voltage sources and open-circuiting current sources
- 4). Removing resistances

Correct Answer: **3). Short-circuiting voltage sources and open-circuiting current sources**

Solution:

Steps:

Voltage source → Short circuit

Current source → Open circuit

Then find equivalent resistance.

Ref: *Electrical Technology – B.L. Theraja*

20. The relation between Norton resistance and Thevenin resistance is

- 1). $R_N = 2R_{TH}$
- 2). $R_N = R_{TH}$
- 3). $R_N = R_{TH}/2$
- 4). $R_N = 0$

Correct Answer: **2).** $R_N = R_{TH}$

Solution:

Thevenin and Norton equivalents have **same resistance value**.

$$R_N = R_{TH}$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

21. Superposition theorem is applicable only to

- 1). Linear circuits
- 2). Non-linear circuits
- 3). Magnetic circuits
- 4). Thermal circuits

Correct Answer: **1). Linear circuits**

Solution:

Superposition theorem works only for **linear networks**.

Total response = sum of responses from individual sources.

Ref: *Basic Electrical Engineering – J.B. Gupta*

22. In superposition theorem, other voltage sources are replaced by

- 1). Open circuit
- 2). Short circuit
- 3). Resistance
- 4). Inductor

Correct Answer: **2). Short circuit**

Solution:

Inactive sources:

Voltage source → Short circuit

Current source → Open circuit.

Ref: *Electrical Technology – B.L. Theraja*

23. Maximum power transfer occurs when

- 1). Load resistance = Source resistance
- 2). Load resistance > Source resistance
- 3). Load resistance < Source resistance
- 4). Load resistance = 0

Correct Answer: **1). Load resistance = Source resistance**

Solution:

Maximum power transfer condition:

$$R_L = R_{TH}$$

Ref: *Fundamentals of Electrical Engineering – Ashfaq Husain*

24. Maximum power delivered to load is

- 1). 25%
- 2). 50%
- 3). 75%
- 4). 100%

Correct Answer: **2). 50%**

Solution:

Efficiency at maximum power transfer:

$$\eta = 50\%$$

Half power lost in internal resistance.

Ref: *Electrical Technology – B.L. Theraja*

25. Thevenin voltage is equal to

- 1). Short circuit voltage
- 2). Open circuit voltage
- 3). Load voltage
- 4). Internal voltage

Correct Answer: **2). Open circuit voltage**

Solution:

Thevenin voltage V_{TH} :

Voltage across terminals when **load is removed**.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

26. A circuit has Thevenin voltage $V_{TH} = 12V$ and Thevenin resistance $R_{TH} = 4\Omega$. If load resistance is 4Ω , the load current is

- 1). 1 A
- 2). 1.5 A
- 3). 2 A
- 4). 3 A

Correct Answer: **2). 1.5 A**

Solution:

Current through load:

$$I = \frac{V_{TH}}{R_{TH} + R_L}$$

$$I = \frac{12}{4 + 4}$$

$$I = \frac{12}{8} = 1.5A$$

Ref: *Electrical Technology – B.L. Theraja*

27. If Thevenin voltage is 10V and Thevenin resistance is 5Ω , Norton current is

- 1). 1 A
- 2). 2 A
- 3). 3 A
- 4). 5 A

Correct Answer: **2). 2 A**

Solution:

$$I_N = \frac{V_{TH}}{R_{TH}}$$

$$I_N = \frac{10}{5}$$

$$I_N = 2A$$

Ref: *Basic Electrical Engineering – J.B. Gupta*

28. If load resistance equals internal resistance, the maximum power transferred to the load is

- 1). V^2/R
- 2). $V^2/2R$
- 3). $V^2/4R$
- 4). V^2/R^2

Correct Answer: **3).** $V^2/4R$

Solution:

Maximum power transfer formula:

$$P_{max} = \frac{V_{TH}^2}{4R_{TH}}$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

29. If Norton current is 4A and resistance is 2Ω , Thevenin voltage is

- 1). 4 V
- 2). 6 V
- 3). 8 V
- 4). 10 V

Correct Answer: **3).** 8 V

Solution:

$$V_{TH} = I_N \times R_N$$

$$V = 4 \times 2$$

$$V = 8V$$

Ref: *Electrical Technology – B.L. Theraja*

30. In superposition theorem, power calculations

- 1). Can be directly added
- 2). Cannot be directly added
- 3). Always equal zero
- 4). Always equal voltage

Correct Answer: **2). Cannot be directly added**

Solution:

Superposition applies only to **voltages and currents**, not power.

Ref: *Fundamentals of Electrical Engineering – Ashfaq Husain*

PART-C: MAGNETIC EFFECTS & ELECTROMAGNETIC INDUCTION

31. The magnetic field around a current carrying conductor was discovered by

- 1). Ohm
- 2). Faraday
- 3). Oersted
- 4). Maxwell

Correct Answer: **3). Oersted**

Solution:

Hans Christian **Oersted** discovered magnetic field around current carrying conductor.

Ref: *Basic Electrical Engineering – J.B. Gupta*

32. The unit of magnetic flux is

- 1). Tesla
- 2). Weber
- 3). Henry
- 4). Ampere

Correct Answer: **2). Weber**

Solution:

Magnetic flux unit:

1Weber

Ref: *Electrical Technology – B.L. Theraja*

33. The unit of magnetic flux density is

- 1). Tesla
- 2). Weber
- 3). Henry
- 4). Volt

Correct Answer: **1). Tesla**

Solution:

$$B = \frac{\phi}{A}$$

Unit:

Tesla

Ref: *Principles of Electrical Engineering – V.K. Mehta*

34. According to Faraday's law, induced emf is proportional to

- 1). Magnetic field only
- 2). Rate of change of flux
- 3). Voltage
- 4). Resistance

Correct Answer: **2). Rate of change of flux**

Solution:

Faraday's law:

$$e = -\frac{d\phi}{dt}$$

Ref: *Electrical Technology – B.L. Theraja*

35. The negative sign in Faraday's law indicates

- 1). Voltage drop
- 2). Energy loss
- 3). Lenz's law
- 4). Resistance

Correct Answer: **3). Lenz's law**

Solution:

Negative sign shows **induced emf opposes cause producing it.**

Ref: *Fundamentals of Electrical Engineering – Ashfaq Husain*

36. Self-inductance depends on

- 1). Number of turns
- 2). Area of coil
- 3). Magnetic permeability
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

$$L = \frac{N^2 \mu A}{l}$$

Depends on **N, μ , A, length.**

Ref: *Basic Electrical Engineering – J.B. Gupta*

37. The unit of inductance is

- 1). Tesla
- 2). Weber
- 3). Henry
- 4). Farad

Correct Answer: **3). Henry**

Solution:

Inductance unit:

$$1H$$

Ref: *Electrical Technology – B.L. Theraja*

38. The emf induced due to change in current in same coil is called

- 1). Mutual induction
- 2). Self induction
- 3). Electrostatic induction
- 4). Static induction

Correct Answer: **2). Self induction**

Solution:

When emf induced in **same coil due to its own current change**.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

39. If inductance is 2H and current change is 3A/s, induced emf is

- 1). 3V
- 2). 6V
- 3). 9V
- 4). 12V

Correct Answer: **2). 6V**

Solution:

$$e = L \frac{di}{dt}$$

$$e = 2 \times 3$$

$$e = 6V$$

Ref: *Basic Electrical Engineering – J.B. Gupta*

40. Mutual induction occurs when

- 1). Two coils interact magnetically
- 2). One coil only
- 3). Voltage changes
- 4). Resistance increases

Correct Answer: **1). Two coils interact magnetically**

Solution:

Changing current in one coil induces emf in another coil.

Ref: *Electrical Technology – B.L. Theraja*

PART-D: ELECTROSTATICS (CAPACITANCE & ENERGY STORED)

41. The ability of a capacitor to store electric charge is called

- 1). Resistance
- 2). Inductance
- 3). Capacitance
- 4). Conductance

Correct Answer: **3). Capacitance**

Solution:

Capacitance:

$$C = \frac{Q}{V}$$

It represents the ability of a capacitor to **store charge**.

Ref: *Basic Electrical Engineering – J.B. Gupta*

42. The unit of capacitance is

- 1). Farad
- 2). Henry
- 3). Weber
- 4). Tesla

Correct Answer: **1). Farad**

Solution:

Capacitance unit:

$$1F = 1 \frac{\text{Coulomb}}{\text{Volt}}$$

Ref: *Electrical Technology – B.L. Theraja*

43. Capacitance of a parallel plate capacitor is

- 1). $C = \frac{\epsilon A}{d}$
- 2). $C = \frac{d}{\epsilon A}$
- 3). $C = VA$
- 4). $C = IR$

Correct Answer: **1).** $C = \frac{\epsilon A}{d}$

Solution:

Capacitance depends on:

- Permittivity
- Plate area
- Distance between plates

Ref: *Principles of Electrical Engineering – V.K. Mehta*

44. Capacitors connected in series have

- 1). Same voltage
- 2). Same charge
- 3). Same resistance
- 4). Same current

Correct Answer: **2). Same charge**

Solution:

In series capacitors:

Charge stored in each capacitor is **same**.

Ref: *Electrical Technology – B.L. Theraja*

45. Capacitors connected in parallel have

- 1). Same charge
- 2). Same voltage
- 3). Same capacitance
- 4). Same resistance

Correct Answer: **2). Same voltage**

Solution:

Parallel capacitors are connected across same supply.

Thus voltage across each capacitor is same.

Ref: *Basic Electrical Engineering – J.B. Gupta*

46. Energy stored in a capacitor is

- 1). CV
- 2). CV^2
- 3). $\frac{1}{2}CV^2$
- 4). C/V

Correct Answer: **3). $\frac{1}{2}CV^2$**

Solution:

Energy stored:

$$W = \frac{1}{2}CV^2$$

Ref: *Electrical Technology – B.L. Theraja*

47. If capacitance is doubled, stored energy becomes

- 1). Half
- 2). Double
- 3). Same
- 4). Zero

Correct Answer: **2). Double**

Solution:

Energy:

$$W = \frac{1}{2} CV^2$$

Energy is directly proportional to capacitance.

Ref: *Fundamentals of Electrical Engineering – Ashfaq Husain*

48. Dielectric material between capacitor plates

- 1). Increases capacitance
- 2). Decreases capacitance
- 3). No change
- 4). Removes voltage

Correct Answer: **1). Increases capacitance**

Solution:

Dielectric increases permittivity.

Thus capacitance increases.

Ref: *Electrical Technology – B.L. Theraja*

49. If plate separation increases, capacitance

- 1). Increases
- 2). Decreases
- 3). Same
- 4). Infinite

Correct Answer: **2). Decreases**

Solution:

$$C = \frac{\epsilon A}{d}$$

Capacitance inversely proportional to distance.

Ref: *Basic Electrical Engineering – J.B. Gupta*

50. Capacitor stores energy in

- 1). Electric field
- 2). Magnetic field
- 3). Heat energy
- 4). Mechanical energy

Correct Answer: **1). Electric field**

Solution:

Energy stored in **electrostatic field** between plates.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

PART-E: POWER, ENERGY & HEATING EFFECTS

51. Electric power is given by

- 1). $P = VI$
- 2). $P = IR$
- 3). $P = V/R$
- 4). $P = I/R$

Correct Answer: **1). $P = VI$**

Solution:

Electric power:

$$P = VI$$

Ref: *Electrical Technology – B.L. Theraja*

52. Unit of electric power is

- 1). Joule
- 2). Watt

- 3). Coulomb
- 4). Volt

Correct Answer: **2). Watt**

Solution:

1 Watt = 1 Volt $\times$ 1 Ampere.

Ref: *Basic Electrical Engineering – J.B. Gupta*

53. Electrical energy unit used in electricity bills is

- 1). Joule
- 2). Watt
- 3). kWh
- 4). Volt

Correct Answer: **3). kWh**

Solution:

Commercial energy unit:

1 kWh = 1 unit of electricity.

Ref: *Electrical Technology – B.L. Theraja*

54. Joule's law of heating is

- 1). $H = VIt$
- 2). $H = I^2Rt$
- 3). $H = V^2R$
- 4). $H = IR$

Correct Answer: **2). $H = I^2Rt$**

Solution:

Heat produced:

$$H = I^2Rt$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

55. Heating effect of current is used in

- 1). Fan
- 2). Heater
- 3). Transformer
- 4). Motor

Correct Answer: **2). Heater**

Solution:

Electric heaters convert electrical energy to heat using Joule's law.

Ref: *Basic Electrical Engineering – J.B. Gupta*

56. If current doubles, heat produced becomes

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

Correct Answer: **2). Four times**

Solution:

$$H = I^2 R t$$

If current doubles:

$$(2I)^2 = 4I^2$$

Ref: *Electrical Technology – B.L. Theraja*

57. If resistance doubles, heat produced

- 1). Doubles
- 2). Halves
- 3). Quadruples
- 4). Same

Correct Answer: **1). Doubles**

Solution:

$$H = I^2 R t$$

Heat directly proportional to resistance.

Ref: *Principles of Electrical Engineering* – V.K. Mehta

58. Electric fuse works on principle of

- 1). Magnetic effect
- 2). Heating effect
- 3). Electrostatic effect
- 4). Chemical effect

Correct Answer: **2). Heating effect**

Solution:

Fuse melts due to **heat produced by excess current**.

Ref: *Basic Electrical Engineering* – J.B. Gupta

59. Electric iron converts electrical energy into

- 1). Mechanical energy
- 2). Magnetic energy
- 3). Heat energy
- 4). Chemical energy

Correct Answer: **3). Heat energy**

Solution:

Heating element produces heat via Joule heating.

Ref: *Electrical Technology* – B.L. Theraja

60. If voltage is constant, power varies with

- 1). Current
- 2). Resistance
- 3). Temperature
- 4). Capacitance

Correct Answer: **1). Current**

Solution:

$$P = VI$$

If V constant → power proportional to current.

Ref: *Fundamentals of Electrical Engineering – Ashfaq Husain*

PART-F: ELECTRICAL ENGINEERING MATERIALS

61. Material with very low resistivity is

- 1). Conductor
- 2). Insulator
- 3). Semiconductor
- 4). Dielectric

Correct Answer: **1). Conductor**

Solution:

Conductors allow easy flow of electric current.

Example: Copper, Aluminium.

Ref: *Electrical Technology – B.L. Theraja*

62. Silicon is an example of

- 1). Conductor
- 2). Semiconductor
- 3). Insulator
- 4). Magnetic material

Correct Answer: **2). Semiconductor**

Solution:

Silicon has moderate conductivity.

Ref: *Basic Electrical Engineering – J.B. Gupta*

63. Material used for transformer core is

- 1). Copper
- 2). Soft iron
- 3). Aluminum
- 4). Tungsten

Correct Answer: **2). Soft iron**

Solution:

Soft iron has **high permeability and low hysteresis loss**.

Ref: *Electrical Technology – B.L. Theraja*

64. Example of insulating material

- 1). Copper
- 2). Mica
- 3). Aluminum
- 4). Silver

Correct Answer: **2). Mica**

Solution:

Insulators prevent current flow.

Examples: Mica, Glass, Rubber.

Ref: *Basic Electrical Engineering – J.B. Gupta*

65. Dielectric materials are used in

- 1). Motors
- 2). Capacitors
- 3). Transformers
- 4). Generators

Correct Answer: **2). Capacitors**

Solution:

Dielectrics increase capacitance and insulation.

Ref: *Electrical Technology – B.L. Theraja*

66. Copper is widely used as conductor because of

- 1). High resistance
- 2). High conductivity
- 3). Low melting point
- 4). High density

Correct Answer: **2). High conductivity**

Solution:

Copper has excellent electrical conductivity.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

67. Magnetic material with low hysteresis loss is

- 1). Steel
- 2). Soft iron
- 3). Copper
- 4). Aluminium

Correct Answer: **2). Soft iron**

Solution:

Used in transformer cores.

Ref: *Electrical Technology – B.L. Theraja*

68. Semiconductor conductivity increases with

- 1). Temperature increase
- 2). Temperature decrease
- 3). Constant temperature
- 4). Magnetic field

Correct Answer: **1). Temperature increase**

Solution:

Semiconductor resistance decreases with temperature.

Ref: *Basic Electrical Engineering – J.B. Gupta*

69. Insulators have

- 1). High conductivity
- 2). High resistivity
- 3). Low resistance
- 4). High current

Correct Answer: **2). High resistivity**

Solution:

Insulators oppose current flow strongly.

Ref: *Electrical Technology – B.L. Theraja*

70. Dielectric strength means

- 1). Current carrying capacity
- 2). Maximum voltage without breakdown
- 3). Resistance of conductor
- 4). Magnetic property

Correct Answer: **2). Maximum voltage without breakdown**

Solution:

Dielectric strength is the **maximum electric field a material can withstand without failure.**

Ref: *Principles of Electrical Engineering – V.K. Mehta*

UNIT II – DC MACHINES, BATTERIES & MEASURING INSTRUMENTS

SECTION A – D.C. GENERATORS

1. The basic principle of operation of a D.C. generator is

- 1). Fleming's Right Hand Rule
- 2). Fleming's Left Hand Rule
- 3). Faraday's Law of Electromagnetic Induction
- 4). Lenz's Law

Correct Answer: **3). Faraday's Law of Electromagnetic Induction**

Solution:

A DC generator converts **mechanical energy into electrical energy** based on Faraday's law:

$$e = -\frac{d\phi}{dt}$$

Ref: *Electrical Technology Vol-II – B.L. Theraja*

2. The rule used to determine direction of induced emf in generators is

- 1). Fleming's Left Hand Rule
- 2). Fleming's Right Hand Rule
- 3). Maxwell's Rule
- 4). Kirchhoff's Rule

Correct Answer: **2). Fleming's Right Hand Rule**

Solution:

Right-hand rule gives **direction of induced current** in generators.

Ref: *Electric Machines – Kothari & Nagrath*

3. The function of commutator in a DC generator is

- 1). Increase voltage
- 2). Convert AC to DC
- 3). Convert DC to AC
- 4). Store energy

Correct Answer: **2). Convert AC to DC**

Solution:

The emf induced in armature is AC.

Commutator **rectifies it to DC output.**

Ref: *Electrical Technology Vol-II – B.L. Theraja*

4. The rotating part of DC generator is

- 1). Stator
- 2). Field winding
- 3). Armature
- 4). Pole core

Correct Answer: **3). Armature**

Solution:

Armature rotates in magnetic field to produce emf.

Ref: *Electrical Machinery – P.S. Bimbhra*

5. The stationary part of DC generator is

- 1). Rotor
- 2). Armature
- 3). Stator
- 4). Commutator

Correct Answer: **3). Stator**

Solution:

Field system is stationary and produces magnetic flux.

Ref: *Electrical Machinery – P.S. Bimbhra*

6. The EMF equation of DC generator is

- 1). $E = \frac{P\phi ZN}{60A}$
- 2). $E = IR$
- 3). $E = V + IR$
- 4). $E = PVI$

Correct Answer: **1).** $E = \frac{P\phi ZN}{60A}$

Solution:

$$E = \frac{P\phi ZN}{60A}$$

Where

P = poles

Φ = flux

Z = conductors

N = speed

A = parallel paths

Ref: *Electrical Technology – B.L. Theraja*

7. In lap winding, number of parallel paths is

1). A = 2

2). A = P

3). A = P/2

4). A = 1

Correct Answer: **2).** A = P

Solution:

Lap winding → parallel paths equal number of poles.

Ref: *Electric Machines – Kothari*

8. In wave winding, number of parallel paths is

1). 1

2). 2

3). P

4). P/2

Correct Answer: **2).** 2

Solution:

Wave winding always provides **two parallel paths**.

Ref: *Electrical Technology – B.L. Theraja*

9. If flux doubles in a DC generator, generated EMF

- 1). Halves
- 2). Doubles
- 3). Same
- 4). Becomes zero

Correct Answer: **2). Doubles**

Solution:

$$E \propto \phi$$

Ref: *Electric Machines – Kothari*

10. If speed of generator doubles, induced emf

- 1). Same
- 2). Doubles
- 3). Halves
- 4). Zero

Correct Answer: **2). Doubles**

Solution:

$$E \propto N$$

Ref: *Electrical Machinery – Bimbhra*

11. The generator which uses separate field supply is

- 1). Series generator
- 2). Shunt generator
- 3). Compound generator
- 4). Separately excited generator

Correct Answer: **4). Separately excited generator**

Solution:

Field winding gets power from **external source**.

Ref: *Electrical Technology – B.L. Theraja*

12. In shunt generator, field winding is connected

- 1). In series with armature
- 2). In parallel with armature
- 3). In series with load
- 4). Separately

Correct Answer: **2). In parallel with armature**

Solution:

Shunt field is connected **across armature terminals**.

Ref: *Electrical Machines – Kothari*

13. Series generator field winding is connected

- 1). Parallel to load
- 2). Parallel to armature
- 3). In series with armature
- 4). Across battery

Correct Answer: **3). In series with armature**

Solution:

Series field carries **full armature current**.

Ref: *Electrical Technology – B.L. Theraja*

14. In compound generator, the field winding consists of

- 1). Only shunt winding
- 2). Only series winding
- 3). Both series and shunt winding
- 4). No winding

Correct Answer: **3). Both series and shunt winding**

Solution:

Compound generator combines **series + shunt fields**.

Ref: *Electric Machines – Kothari*

15. Critical resistance is related to

- 1). Series generator
- 2). Shunt generator
- 3). Compound generator
- 4). Motor

Correct Answer: **2). Shunt generator**

Solution:

Shunt generator builds voltage only if **field resistance < critical resistance**.

Ref: *Electrical Machinery – Bimbhra*

16. The voltage build-up in shunt generator depends on

- 1). Residual magnetism
- 2). Field resistance
- 3). Speed
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Voltage build-up requires residual flux, proper field resistance and sufficient speed.

Ref: *Electrical Technology – B.L. Theraja*

17. Residual magnetism is

- 1). Remaining magnetism in poles
- 2). External magnetic field
- 3). Induced current
- 4). Armature current

Correct Answer: **1). Remaining magnetism in poles**

Solution:

Residual flux starts **self-excitation process**.

Ref: *Electric Machines – Kothari*

18. Armature reaction causes

- 1). Flux distortion
- 2). Voltage increase
- 3). Current decrease
- 4). Speed increase

Correct Answer: **1). Flux distortion**

Solution:

Armature current distorts main magnetic field.

Ref: *Electrical Machinery – Bimbhra*

19. The efficiency of DC generator is

- 1). Output / Input
- 2). Input / Output
- 3). Output² / Input
- 4). Input² / Output

Correct Answer: **1). Output / Input**

Solution:

$$\eta = \frac{\text{Output}}{\text{Input}}$$

Ref: *Electrical Technology – B.L. Theraja*

20. Losses in DC generator include

- 1). Copper losses
- 2). Iron losses
- 3). Mechanical losses
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Total losses include **Copper + Iron + Mechanical losses.**

Ref: *Electrical Machinery – Bimbhra*

21. Copper loss in armature is

- 1). $I_a R_a$
- 2). $I_a^2 R_a$
- 3). IR
- 4). VI

Correct Answer: **2).** $I_a^2 R_a$

Solution:

Armature copper loss:

$$P = I_a^2 R_a$$

Ref: *Electrical Technology – B.L. Theraja*

22. Iron losses consist of

- 1). Hysteresis loss
- 2). Eddy current loss
- 3). Both
- 4). None

Correct Answer: **3).** **Both**

Solution:

Iron losses = **Hysteresis + Eddy current losses.**

Ref: *Electric Machines – Kothari*

23. Mechanical losses include

- 1). Friction loss
- 2). Windage loss
- 3). Bearing loss
- 4). All of the above

Correct Answer: **4).** **All of the above**

Solution:

Mechanical losses arise from **moving parts.**

Ref: *Electrical Machinery – Bimbhra*

24. The OCC curve of generator represents relation between

- 1). Voltage and current
- 2). Voltage and speed
- 3). Voltage and field current
- 4). Voltage and resistance

Correct Answer: **3). Voltage and field current**

Solution:

Open Circuit Characteristic (OCC) is **magnetization curve**.

Ref: *Electrical Technology – B.L. Theraja*

25. DC generators are mainly used for

- 1). Battery charging
- 2). Electroplating
- 3). Welding
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

DC generators provide controlled DC supply for many industrial applications.

Ref: *Electric Machines – Kothari*

26. The condition for maximum efficiency of a DC generator is

- 1). Copper loss = Mechanical loss
- 2). Copper loss = Iron loss
- 3). Variable loss = Constant loss
- 4). Iron loss = Mechanical loss

Correct Answer: **3). Variable loss = Constant loss**

Solution:

Maximum efficiency occurs when:

Variable losses = Constant losses.

Ref: *Electrical Technology Vol-II – B.L. Theraja*

27. The graph between terminal voltage and load current of a DC generator is called

- 1). OCC curve
- 2). Load characteristic
- 3). Efficiency curve
- 4). Speed curve

Correct Answer: **2). Load characteristic**

Solution:

Load characteristic shows variation of **terminal voltage with load current**.

Ref: *Electrical Machinery – P.S. Bimbhra*

28. The internal characteristic of DC generator is relation between

- 1). Generated EMF and armature current
- 2). Voltage and field current
- 3). Voltage and speed
- 4). Power and current

Correct Answer: **1). Generated EMF and armature current**

Solution:

Internal characteristic considers **armature reaction effects**.

Ref: *Electrical Technology – B.L. Theraja*

29. The external characteristic of DC generator shows relation between

- 1). Terminal voltage and load current
- 2). Generated voltage and current
- 3). Speed and current
- 4). Voltage and resistance

Correct Answer: **1). Terminal voltage and load current**

Solution:

External characteristic indicates **performance under load**.

Ref: *Electrical Machinery – Bimbhra*

30. In a DC shunt generator, field current is

- 1). Equal to armature current
- 2). Very small
- 3). Very large
- 4). Zero

Correct Answer: **2). Very small**

Solution:

Shunt field has **high resistance**, so current is small.

Ref: *Electric Machines – Kothari*

SECTION B – D.C. MOTORS

31. The principle of operation of DC motor is

- 1). Electrostatic force
- 2). Electromagnetic force
- 3). Electrochemical effect
- 4). Heating effect

Correct Answer: **2). Electromagnetic force**

Solution:

When a current carrying conductor is placed in magnetic field, it experiences force.

Ref: *Electrical Technology – B.L. Theraja*

32. The rule used to determine direction of force in DC motor is

- 1). Fleming's Left Hand Rule
- 2). Fleming's Right Hand Rule
- 3). Lenz Law
- 4). Kirchhoff's Rule

Correct Answer: **1). Fleming's Left Hand Rule**

Solution:

Left hand rule determines **direction of motor rotation**.

Ref: *Electric Machines – Kothari*

33. The back EMF in a DC motor is

- 1). Applied voltage
- 2). Generated emf opposing supply voltage
- 3). Voltage drop
- 4). Load voltage

Correct Answer: **2). Generated emf opposing supply voltage**

Solution:

$$E_b = V - I_a R_a$$

Ref: *Electrical Technology – B.L. Theraja*

34. The back EMF in DC motor helps in

- 1). Increasing current
- 2). Limiting armature current
- 3). Increasing voltage
- 4). Reducing resistance

Correct Answer: **2). Limiting armature current**

Solution:

Back EMF prevents **excess current flow**.

Ref: *Electrical Machinery – Bimbhra*

35. The torque equation of DC motor is

- 1). $T \propto \phi I_a$
- 2). $T \propto V^2$
- 3). $T \propto R$
- 4). $T \propto I^2$

Correct Answer: **1). $T \propto \phi I_a$**

Solution:

Torque depends on **flux and armature current**.

Ref: *Electric Machines – Kothari*

36. If flux is constant, torque is proportional to

- 1). Voltage
- 2). Armature current
- 3). Resistance
- 4). Speed

Correct Answer: **2). Armature current**

Solution:

$$T \propto I_a$$

Ref: *Electrical Technology – B.L. Theraja*

37. The speed equation of DC motor is

- 1). $N \propto \frac{E_b}{\phi}$
- 2). $N \propto VI$
- 3). $N \propto R$
- 4). $N \propto I^2$

Correct Answer: **1). $N \propto \frac{E_b}{\phi}$**

Solution:

Speed varies with **back EMF and flux**.

Ref: *Electric Machines – Kothari*

38. The DC motor which develops highest starting torque is

- 1). Shunt motor
- 2). Series motor
- 3). Compound motor
- 4). Separately excited motor

Correct Answer: **2). Series motor**

Solution:

Series motor torque:

$$T \propto I^2$$

Ref: *Electrical Machinery – Bimbhra*

39. DC shunt motor is mainly used for

- 1). Constant speed applications
- 2). High torque applications
- 3). Welding
- 4). Cranes

Correct Answer: **1). Constant speed applications**

Solution:

Shunt motors maintain **nearly constant speed**.

Ref: *Electric Machines – Kothari*

40. DC series motor is used for

- 1). Fans
- 2). Pumps
- 3). Cranes and hoists
- 4). Lathes

Correct Answer: **3). Cranes and hoists**

Solution:

Series motors produce **very high starting torque**.

Ref: *Electrical Technology – B.L. Theraja*

41. The starter used for DC shunt motor is

- 1). 2-point starter
- 2). 3-point starter
- 3). 4-point starter
- 4). Both 2 and 3

Correct Answer: **2). 3-point starter**

Solution:

3-point starter protects motor from **excess current during starting**.

Ref: *Electrical Machinery – Bimbhra*

42. The starter used for DC series motor is

- 1). 2-point starter
- 2). 3-point starter
- 3). 4-point starter
- 4). No starter required

Correct Answer: **1). 2-point starter**

Solution:

Series motor uses **two-point starter**.

Ref: *Electric Machines – Kothari*

43. Armature reaction in DC motor causes

- 1). Speed increase
- 2). Flux distortion
- 3). Current decrease
- 4). Voltage increase

Correct Answer: **2). Flux distortion**

Solution:

Armature current distorts main magnetic field.

Ref: *Electrical Technology – B.L. Theraja*

44. Speed control of DC motor can be done by

- 1). Flux control
- 2). Armature resistance control
- 3). Voltage control
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Three common speed control methods are used.

Ref: *Electrical Machinery – Bimbhra*

45. In flux control method, speed is

- 1). Decreased
- 2). Increased
- 3). Same
- 4). Zero

Correct Answer: **2). Increased**

Solution:

$$N \propto \frac{1}{\phi}$$

Reducing flux increases speed.

Ref: *Electric Machines – Kothari*

46. Armature resistance control results in

- 1). Speed increase
- 2). Speed decrease
- 3). No change
- 4). Zero speed

Correct Answer: **2). Speed decrease**

Solution:

Extra resistance reduces back EMF and speed.

Ref: *Electrical Technology – B.L. Theraja*

47. Efficiency of DC motor is

- 1). Input / Output
- 2). Output / Input

- 3). Voltage / Current
- 4). Power / Resistance

Correct Answer: **2). Output / Input**

Solution:

$$\eta = \frac{\text{Output}}{\text{Input}}$$

Ref: *Electrical Machinery – Bimbhra*

48. DC motor converts

- 1). Electrical energy into mechanical energy
- 2). Mechanical energy into electrical energy
- 3). Electrical energy into heat
- 4). Heat into electrical energy

Correct Answer: **1). Electrical energy into mechanical energy**

Solution:

DC motors perform **electromechanical energy conversion**.

Ref: *Electric Machines – Kothari*

49. The losses in DC motor include

- 1). Copper losses
- 2). Iron losses
- 3). Mechanical losses
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

All types of losses affect efficiency.

Ref: *Electrical Technology – B.L. Theraja*

50. Testing of DC machines is mainly done to determine

- 1). Voltage only
- 2). Efficiency
- 3). Speed only
- 4). Resistance

Correct Answer: **2). Efficiency**

Solution:

Machine testing evaluates **efficiency and performance characteristics**.

Ref: *Electrical Machinery – Bimbhra*

51. The DC motor which has nearly constant speed under varying load is

- 1). Series motor
- 2). Shunt motor
- 3). Compound motor
- 4). Universal motor

Correct Answer: **2). Shunt motor**

Solution:

Shunt motor field flux is almost constant → speed remains nearly constant.

Ref: *Electrical Machinery – P.S. Bimbhra*

52. The DC motor which should never be started without load is

- 1). Shunt motor
- 2). Series motor
- 3). Compound motor
- 4). Separately excited motor

Correct Answer: **2). Series motor**

Solution:

Series motor without load → speed becomes dangerously high.

Ref: *Electrical Technology – B.L. Theraja*

53. The torque of a DC series motor is proportional to

- 1). I_a
- 2). I_a^2
- 3). V^2
- 4). R

Correct Answer: **2).** I_a^2

Solution:

$$T \propto \phi I_a$$

For series motor:

$$\phi \propto I_a$$

Thus:

$$T \propto I_a^2$$

Ref: *Electric Machines – Kothari*

54. The DC motor suitable for traction applications is

- 1). Shunt motor
- 2). Series motor
- 3). Compound motor
- 4). Synchronous motor

Correct Answer: **2).** **Series motor**

Solution:

Series motor provides **very high starting torque**, ideal for traction.

Ref: *Electrical Machinery – Bimbhra*

55. The motor which combines advantages of series and shunt motors is

- 1). Compound motor
- 2). Series motor

- 3). Shunt motor
- 4). Universal motor

Correct Answer: **1). Compound motor**

Solution:

Compound motor has **both series and shunt field windings**.

Ref: *Electrical Technology – B.L. Theraja*

56. Back EMF of DC motor is zero at

- 1). Full load
- 2). Half load
- 3). Starting
- 4). Rated speed

Correct Answer: **3). Starting**

Solution:

At starting:

Speed = 0 → Back EMF = 0.

Ref: *Electric Machines – Kothari*

57. The starting current of DC motor is high because

- 1). Back EMF is zero
- 2). Voltage is high
- 3). Resistance is high
- 4). Speed is high

Correct Answer: **1). Back EMF is zero**

Solution:

$$I_a = \frac{V - E_b}{R_a}$$

At starting:

$$E_b = 0$$

Current becomes very large.

Ref: *Electrical Machinery – Bimbhra*

58. The purpose of starter in DC motor is to

- 1). Increase speed
- 2). Limit starting current
- 3). Increase torque
- 4). Increase voltage

Correct Answer: **2). Limit starting current**

Solution:

Starter introduces **series resistance** during starting.

Ref: *Electrical Technology – B.L. Theraja*

59. A 220 V DC motor draws 10 A current. The input power is

- 1). 220 W
- 2). 2200 W
- 3). 22 W
- 4). 200 W

Correct Answer: **2). 2200 W**

Solution:

$$P = VI$$

$$P = 220 \times 10$$

$$P = 2200W$$

Ref: *Electric Machines – Kothari*

60. If back EMF of motor increases, armature current

- 1). Increases
- 2). Decreases
- 3). Same
- 4). Infinite

Correct Answer: **2). Decreases**

Solution:

$$I_a = \frac{V - E_b}{R_a}$$

If E_b increases $\rightarrow$ current decreases.

Ref: *Electrical Technology – B.L. Theraja*

SECTION C – BATTERIES

61. A battery converts

- 1). Mechanical energy to electrical energy
- 2). Chemical energy to electrical energy
- 3). Electrical energy to heat
- 4). Magnetic energy to electrical energy

Correct Answer: **2). Chemical energy to electrical energy**

Solution:

Batteries work based on **electrochemical reactions**.

Ref: *Electrical Technology – B.L. Theraja*

62. The most commonly used rechargeable battery is

- 1). Lead-acid battery
- 2). Dry cell
- 3). Mercury battery
- 4). Zinc battery

Correct Answer: **1). Lead-acid battery**

Solution:

Lead-acid batteries are widely used in **automobiles and UPS systems**.

Ref: *Electrical Technology – B.L. Theraja*

63. The electrolyte used in lead-acid battery is

- 1). Sulfuric acid
- 2). Hydrochloric acid
- 3). Nitric acid
- 4). Sodium chloride

Correct Answer: **1). Sulfuric acid**

Solution:

Lead-acid battery electrolyte = **Dilute H_2SO_4** .

Ref: *Electrical Machinery – Bimbhra*

64. The positive plate of lead-acid battery is made of

- 1). Lead peroxide
- 2). Lead sulfate
- 3). Copper
- 4). Zinc

Correct Answer: **1). Lead peroxide**

Solution:

Positive plate material:

PbO_2 .

Ref: *Electrical Technology – B.L. Theraja*

65. The negative plate of lead-acid battery is made of

- 1). Lead
- 2). Lead peroxide
- 3). Zinc
- 4). Copper

Correct Answer: **1). Lead**

Solution:

Negative plate = **spongy lead (Pb)**.

Ref: *Electrical Machinery – Bimbhra*

66. The voltage of one lead-acid cell is approximately

- 1). 1 V
- 2). 1.5 V
- 3). 2 V
- 4). 12 V

Correct Answer: **3). 2 V**

Solution:

Each lead-acid cell produces **about 2 volts**.

Ref: *Electrical Technology – B.L. Theraja*

67. A 12 V battery consists of

- 1). 4 cells
- 2). 6 cells
- 3). 8 cells
- 4). 12 cells

Correct Answer: **2). 6 cells**

Solution:

$$6 \times 2V = 12V$$

Ref: *Electrical Machinery – Bimbhra*

68. The process of restoring battery energy is called

- 1). Discharging
- 2). Charging
- 3). Neutralization
- 4). Polarization

Correct Answer: **2). Charging**

Solution:

Charging reverses chemical reactions.

Ref: *Electrical Technology – B.L. Theraja*

69. Specific gravity of electrolyte indicates

- 1). Battery voltage
- 2). Battery charge condition
- 3). Battery resistance
- 4). Battery temperature

Correct Answer: **2). Battery charge condition**

Solution:

Hydrometer reading shows **state of charge**.

Ref: *Electrical Machinery – Bimbhra*

70. The instrument used to measure battery specific gravity is

- 1). Voltmeter
- 2). Hydrometer
- 3). Ammeter
- 4). Ohmmeter

Correct Answer: **2). Hydrometer**

Solution:

Hydrometer measures **specific gravity of electrolyte**.

Ref: *Electrical Technology – B.L. Theraja*

SECTION C – BATTERIES (CONTINUED)

71. During charging of lead-acid battery

- 1). Specific gravity decreases
- 2). Specific gravity increases
- 3). Remains constant
- 4). Becomes zero

Correct Answer: **2). Specific gravity increases**

Solution:

Charging increases concentration of sulfuric acid.

Ref: *Electrical Machinery – Bimbhra*

72. During discharging of battery

- 1). Specific gravity increases
- 2). Specific gravity decreases
- 3). No change
- 4). Infinite

Correct Answer: **2). Specific gravity decreases**

Solution:

Sulfuric acid converts into water during discharge.

Ref: *Electrical Technology – B.L. Theraja*

73. The capacity of battery is measured in

- 1). Ampere-hour
- 2). Watt
- 3). Volt
- 4). Ohm

Correct Answer: **1). Ampere-hour**

Solution:

$$\text{Capacity} = \text{Current} \times \text{Time}$$

Unit = Ah.

Ref: *Electrical Machinery – Bimbhra*

74. Battery efficiency is defined as

- 1). Output/Input
- 2). Input/Output
- 3). Voltage/Current
- 4). Resistance/Voltage

Correct Answer: **1). Output/Input**

Solution:

$$\eta = \frac{\text{Output}}{\text{Input}}$$

Ref: *Electrical Technology – B.L. Theraja*

75. Nickel-cadmium battery uses electrolyte

- 1). Sulfuric acid
- 2). Potassium hydroxide
- 3). Nitric acid
- 4). Hydrochloric acid

Correct Answer: **2). Potassium hydroxide**

Solution:

Ni-Cd batteries use **alkaline electrolyte (KOH)**.

Ref: *Electrical Machinery – Bimbhra*

76. The main disadvantage of lead-acid battery is

- 1). High cost
- 2). Heavy weight
- 3). Low efficiency
- 4). Low voltage

Correct Answer: **2). Heavy weight**

Solution:

Lead-acid batteries are bulky and heavy compared to modern batteries.

Ref: *Electrical Technology – B.L. Theraja*

77. The efficiency of a lead-acid battery is typically about

- 1). 30%
- 2). 50%
- 3). 70%
- 4). 80–90%

Correct Answer: **4). 80–90%**

Solution:

Lead-acid batteries have high efficiency in practical operation.

Ref: *Electrical Machinery – P.S. Bimbhra*

78. The process of connecting batteries in series increases

- 1). Current capacity
- 2). Voltage
- 3). Internal resistance only
- 4). Efficiency

Correct Answer: **2). Voltage**

Solution:

Series connection increases total voltage.

Ref: *Electrical Technology – B.L. Theraja*

79. The process of connecting batteries in parallel increases

- 1). Voltage
- 2). Current capacity
- 3). Resistance
- 4). Voltage drop

Correct Answer: **2). Current capacity**

Solution:

Parallel connection increases total current supply capacity.

Ref: *Electrical Machinery – Bimbhra*

80. The common application of lead-acid batteries is

- 1). Automobiles
- 2). Mobile phones
- 3). Wrist watches
- 4). Solar cells

Correct Answer: **1). Automobiles**

Solution:

Lead-acid batteries are widely used in **car starting systems**.

Ref: *Electrical Technology – B.L. Theraja*

81. The battery used in portable electronic devices is generally

- 1). Lead-acid battery
- 2). Nickel-cadmium battery
- 3). Lithium-ion battery
- 4). Mercury battery

Correct Answer: **3). Lithium-ion battery**

Solution:

Lithium-ion batteries have **high energy density and low weight**.

Ref: *Sensors and Transducers – D. Patranabis*

82. The term “state of charge” of a battery indicates

- 1). Temperature of battery
- 2). Remaining energy stored
- 3). Voltage only
- 4). Resistance

Correct Answer: **2). Remaining energy stored**

Solution:

State of charge shows **how much capacity remains in battery**.

Ref: *Electrical Machinery – Bimbhra*

83. Internal resistance of battery should be

- 1). Very high
- 2). Moderate
- 3). Very low
- 4). Infinite

Correct Answer: **3). Very low**

Solution:

Low internal resistance allows efficient power delivery.

Ref: *Electrical Technology – B.L. Theraja*

84. Battery charging current is controlled using

- 1). Resistor
- 2). Regulator
- 3). Charger circuit
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Battery charging uses regulated current circuits.

Ref: *Electrical Machinery – Bimbhra*

85. Overcharging of battery may cause

- 1). Heating
- 2). Gas formation
- 3). Damage to plates
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Excess charging damages battery components.

Ref: *Electrical Technology – B.L. Theraja*

SECTION D – MEASURING INSTRUMENTS

86. Electrical measuring instruments are used to measure

- 1). Voltage
- 2). Current
- 3). Resistance
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different instruments measure different electrical quantities.

Ref: *A Course in Electrical Measurements – A.K. Sawhney*

87. Instruments are classified as

- 1). Absolute instruments
- 2). Secondary instruments
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Absolute and secondary instruments are the two main types.

Ref: *A.K. Sawhney – Electrical Measurements*

88. Ammeter is used to measure

- 1). Voltage
- 2). Current
- 3). Resistance
- 4). Power

Correct Answer: **2). Current**

Solution:

Ammeter measures electric current.

Ref: *Electrical Measurements – Sawhney*

89. Voltmeter is connected in

- 1). Series
- 2). Parallel
- 3). Both
- 4). Open circuit

Correct Answer: **2). Parallel**

Solution:

Voltmeter must measure potential difference across element.

Ref: *Electrical Measurements – Sawhney*

90. Ammeter is connected in

- 1). Parallel
- 2). Series
- 3). Both
- 4). Across load

Correct Answer: **2). Series**

Solution:

Ammeter measures current through circuit.

Ref: *Electrical Measurements – Sawhney*

91. Moving coil instruments work on principle of

- 1). Magnetic effect of current
- 2). Heating effect
- 3). Electrostatic effect
- 4). Chemical effect

Correct Answer: **1). Magnetic effect of current**

Solution:

Current in coil interacts with magnetic field producing torque.

Ref: *Electrical Measurements – Sawhney*

92. PMMC instruments are used for

- 1). AC measurements
- 2). DC measurements
- 3). Both AC and DC
- 4). Mechanical measurements

Correct Answer: **2). DC measurements**

Solution:

PMMC instruments operate only with **DC current**.

Ref: *Electrical Measurements – Sawhney*

93. Moving iron instruments can measure

- 1). DC only
- 2). AC only
- 3). Both AC and DC
- 4). Voltage only

Correct Answer: **3). Both AC and DC**

Solution:

Moving iron instruments respond to magnitude of current.

Ref: *Electrical Measurements – Sawhney*

94. Dynamometer type instruments are used as

- 1). Ammeter only
- 2). Voltmeter only
- 3). Wattmeter
- 4). Thermometer

Correct Answer: **3). Wattmeter**

Solution:

Electrodynamometer instruments measure **power**.

Ref: *Electrical Measurements – Sawhney*

95. Induction type instruments are mainly used for

- 1). Ammeter
- 2). Voltmeter
- 3). Energy meter
- 4). Ohmmeter

Correct Answer: **3). Energy meter**

Solution:

Induction principle is used in **single phase energy meters**.

Ref: *Electrical Measurements – Sawhney*

96. Energy meter measures

- 1). Voltage
- 2). Power
- 3). Electrical energy
- 4). Resistance

Correct Answer: **3). Electrical energy**

Solution:

Energy meter records energy consumption in **kWh**.

Ref: *Electrical Measurements – Sawhney*

97. The braking system in energy meter uses

- 1). Copper disc
- 2). Permanent magnet
- 3). Aluminum disc
- 4). Iron core

Correct Answer: **2). Permanent magnet**

Solution:

Permanent magnet provides braking torque.

Ref: *Electrical Measurements – Sawhney*

98. Instrument transformers are used for

- 1). Voltage measurement
- 2). Current measurement
- 3). Both
- 4). Speed measurement

Correct Answer: **3). Both**

Solution:

Current transformers and potential transformers help measure high quantities.

Ref: *Electrical Measurements – Sawhney*

99. Current transformer is used to measure

- 1). Low current
- 2). High current
- 3). Voltage
- 4). Resistance

Correct Answer: **2). High current**

Solution:

CT steps down current to measurable level.

Ref: *Electrical Measurements – Sawhney*

100. Potential transformer is used to measure

- 1). High voltage
- 2). Low voltage
- 3). Current
- 4). Resistance

Correct Answer: **1). High voltage**

Solution:

PT steps down high voltage for measurement.

Ref: *Electrical Measurements – Sawhney*

101. The controlling torque in measuring instruments is provided by

- 1). Spring control
- 2). Gravity control
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Controlling torque is produced using **spring control or gravity control methods**.

Ref: *A Course in Electrical Measurements – A.K. Sawhney*

102. Damping torque is used to

- 1). Increase speed
- 2). Reduce oscillations
- 3). Increase voltage
- 4). Increase torque

Correct Answer: **2). Reduce oscillations**

Solution:

Damping allows pointer to reach final position quickly without oscillation.

Ref: *Electrical Measurements – Sawhney*

103. The damping method used in PMMC instruments is

- 1). Air friction damping
- 2). Eddy current damping
- 3). Fluid friction damping
- 4). Gravity damping

Correct Answer: **2). Eddy current damping**

Solution:

PMMC instruments commonly use **eddy current damping**.

Ref: *Electrical Measurements – Sawhney*

104. Air friction damping is used in

- 1). PMMC instruments
- 2). Moving iron instruments
- 3). Dynamometer instruments
- 4). Digital instruments

Correct Answer: **2). Moving iron instruments**

Solution:

Moving iron instruments commonly use **air friction damping**.

Ref: *Electrical Measurements – Sawhney*

105. Deflecting torque in PMMC instruments is proportional to

- 1). Current
- 2). Voltage
- 3). Resistance
- 4). Power

Correct Answer: **1). Current**

Solution:

Torque produced:

$$T_d \propto I$$

Ref: *Electrical Measurements – Sawhney*

106. Moving iron instruments operate based on

- 1). Attraction or repulsion of iron pieces
- 2). Heating effect
- 3). Electrostatic force
- 4). Chemical reaction

Correct Answer: **1). Attraction or repulsion of iron pieces**

Solution:

Magnetic field attracts or repels soft iron vane.

Ref: *Electrical Measurements – Sawhney*

107. The scale of PMMC instrument is

- 1). Non-linear
- 2). Linear
- 3). Logarithmic
- 4). Exponential

Correct Answer: **2). Linear**

Solution:

Deflection proportional to current → linear scale.

Ref: *Electrical Measurements – Sawhney*

108. The scale of moving iron instrument is

- 1). Linear
- 2). Non-linear
- 3). Logarithmic
- 4). Uniform

Correct Answer: **2). Non-linear**

Solution:

Deflection proportional to **square of current**.

Ref: *Electrical Measurements – Sawhney*

109. Wattmeter measures

- 1). Voltage
- 2). Current
- 3). Power
- 4). Energy

Correct Answer: **3). Power**

Solution:

Wattmeter measures **electrical power in watts**.

Ref: *Electrical Measurements – Sawhney*

110. Ohmmeter measures

- 1). Voltage
- 2). Current
- 3). Resistance
- 4). Power

Correct Answer: **3). Resistance**

Solution:

Ohmmeter directly measures electrical resistance.

Ref: *Electrical Measurements – Sawhney*

111. Megger is used to measure

- 1). Low resistance
- 2). High resistance
- 3). Insulation resistance
- 4). Voltage

Correct Answer: **3). Insulation resistance**

Solution:

Megger measures insulation resistance of cables and equipment.

Ref: *Electrical Measurements – Sawhney*

112. Kelvin bridge is used to measure

- 1). High resistance
- 2). Medium resistance
- 3). Very low resistance
- 4). Voltage

Correct Answer: **3). Very low resistance**

Solution:

Kelvin bridge eliminates contact resistance errors.

Ref: *Electrical Measurements – Sawhney*

113. Wheatstone bridge measures

- 1). Voltage
- 2). Current
- 3). Resistance
- 4). Power

Correct Answer: **3). Resistance**

Solution:

Wheatstone bridge determines unknown resistance.

Ref: *Electrical Measurements – Sawhney*

114. Digital instruments use

- 1). Analog signals only
- 2). Digital signals
- 3). Mechanical signals
- 4). Chemical signals

Correct Answer: **2). Digital signals**

Solution:

Digital instruments display values numerically.

Ref: *Electronic Instrumentation – Helfrick & Cooper*

115. Digital instruments have advantage of

- 1). Higher accuracy
- 2). Easy reading
- 3). No parallax error
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Digital instruments improve measurement accuracy.

Ref: *Electronic Instrumentation – Helfrick*

SECTION E – TRANSDUCERS & SENSORS

116. A transducer converts

- 1). Electrical energy to heat
- 2). Mechanical energy to electrical energy
- 3). Physical quantity into electrical signal
- 4). Heat into light

Correct Answer: **3). Physical quantity into electrical signal**

Solution:

Transducers convert **non-electrical quantity into electrical signal**.

Ref: *Sensors and Transducers – D. Patranabis*

117. Transducers are classified as

- 1). Active
- 2). Passive
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Active and passive are main transducer categories.

Ref: *Sensors and Transducers – Patranabis*

118. Active transducers generate

- 1). External power
- 2). Electrical signal directly
- 3). Mechanical energy
- 4). Magnetic energy

Correct Answer: **2). Electrical signal directly**

Solution:

Active transducers **do not require external power**.

Ref: *Patranabis – Sensors and Transducers*

119. Passive transducers require

- 1). External power supply
- 2). No supply
- 3). Chemical reaction
- 4). Magnetic field

Correct Answer: **1). External power supply**

Solution:

Passive transducers need external excitation.

Ref: *Patranabis – Sensors and Transducers*

120. Thermocouple measures

- 1). Pressure
- 2). Temperature
- 3). Voltage
- 4). Speed

Correct Answer: **2). Temperature**

Solution:

Thermocouple works on **Seebeck effect**.

Ref: *Electronic Instrumentation – Helfrick*

121. Thermistor is used to measure

- 1). Pressure
- 2). Temperature
- 3). Force
- 4). Speed

Correct Answer: **2). Temperature**

Solution:

Thermistors have **temperature-dependent resistance**.

Ref: *Patranabis – Sensors and Transducers*

122. Strain gauge measures

- 1). Temperature
- 2). Pressure
- 3). Strain or deformation
- 4). Voltage

Correct Answer: **3). Strain or deformation**

Solution:

Strain gauge resistance changes with mechanical strain.

Ref: *Patranabis – Sensors and Transducers*

123. The working principle of strain gauge is

- 1). Change in inductance
- 2). Change in resistance
- 3). Change in capacitance
- 4). Change in voltage

Correct Answer: **2). Change in resistance**

Solution:

Mechanical deformation causes **resistance variation**.

Ref: *Patranabis – Sensors and Transducers*

124. Pressure transducer measures

- 1). Voltage
- 2). Pressure
- 3). Temperature
- 4). Resistance

Correct Answer: **2). Pressure**

Solution:

Pressure sensors convert pressure to electrical signal.

Ref: *Patranabis – Sensors and Transducers*

125. LVDT is used to measure

- 1). Temperature
- 2). Linear displacement
- 3). Voltage
- 4). Pressure

Correct Answer: **2). Linear displacement**

Solution:

LVDT converts **linear motion into electrical signal**.

Ref: *Electronic Instrumentation – Helfrick*

126. Photo diode converts

- 1). Light into current
- 2). Heat into voltage
- 3). Pressure into voltage
- 4). Magnetic field into current

Correct Answer: **1). Light into current**

Solution:

Photo diode operates based on **photoelectric effect**.

Ref: *Electronic Instrumentation – Helfrick*

127. Hall effect sensor measures

- 1). Temperature
- 2). Magnetic field
- 3). Pressure
- 4). Voltage

Correct Answer: **2). Magnetic field**

Solution:

Hall effect produces voltage proportional to magnetic field.

Ref: *Patranabis – Sensors and Transducers*

128. Piezoelectric transducer measures

- 1). Force and pressure
- 2). Voltage
- 3). Current
- 4). Speed

Correct Answer: **1). Force and pressure**

Solution:

Piezoelectric materials produce voltage under stress.

Ref: *Patranabis – Sensors and Transducers*

129. Sensor sensitivity refers to

- 1). Response time
- 2). Output per unit input
- 3). Temperature stability
- 4). Power consumption

Correct Answer: **2). Output per unit input**

Solution:

Sensitivity defines **how much output changes per input change**.

Ref: *Patranabis – Sensors and Transducers*

130. Resolution of instrument means

- 1). Minimum detectable input change
- 2). Maximum output
- 3). Error level
- 4). Voltage level

Correct Answer: **1). Minimum detectable input change**

Solution:

Resolution determines smallest measurable change.

Ref: *Electronic Instrumentation – Helfrick*

131. Accuracy refers to

- 1). Repeatability
- 2). Closeness to true value
- 3). Stability
- 4). Sensitivity

Correct Answer: **2). Closeness to true value**

Solution:

Accuracy indicates **how close measurement is to actual value**.

Ref: *Electrical Measurements – Sawhney*

132. Precision refers to

- 1). Accuracy
- 2). Repeatability of measurement
- 3). Voltage value
- 4). Speed

Correct Answer: **2). Repeatability of measurement**

Solution:

Precision measures **consistency of results**.

Ref: *Electrical Measurements – Sawhney*

133. Calibration means

- 1). Adjustment of instrument
- 2). Comparison with standard
- 3). Repair of instrument
- 4). Replacement of instrument

Correct Answer: **2). Comparison with standard**

Solution:

Calibration ensures measurement accuracy.

Ref: *Electrical Measurements – Sawhney*

134. Error in measurement means

- 1). Difference between true value and measured value
- 2). Voltage difference
- 3). Current difference
- 4). Temperature difference

Correct Answer: **1). Difference between true value and measured value**

Solution:

Error = True value – Measured value.

Ref: *Electrical Measurements – Sawhney*

135. Systematic errors occur due to

- 1). Instrument faults
- 2). Environmental effects
- 3). Observational mistakes
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Systematic errors arise from predictable factors.

Ref: *Electrical Measurements – Sawhney*

136. Random errors are

- 1). Predictable errors
- 2). Unpredictable errors
- 3). Constant errors
- 4). Instrument errors

Correct Answer: **2). Unpredictable errors**

Solution:

Random errors vary unpredictably.

Ref: *Electrical Measurements – Sawhney*

137. Least count of instrument means

- 1). Maximum measurement
- 2). Minimum measurable value
- 3). Average value
- 4). True value

Correct Answer: **2). Minimum measurable value**

Solution:

Least count indicates smallest reading possible.

Ref: *Electrical Measurements – Sawhney*

138. The range of instrument indicates

- 1). Minimum value
- 2). Maximum value
- 3). Measurement limits
- 4). Accuracy

Correct Answer: **3). Measurement limits**

Solution:

Range = minimum to maximum measurable value.

Ref: *Electrical Measurements – Sawhney*

139. Drift in instruments refers to

- 1). Change in calibration over time
- 2). Increase in voltage
- 3). Increase in current
- 4). Temperature increase

Correct Answer: **1). Change in calibration over time**

Solution:

Instrument characteristics change with time.

Ref: *Electronic Instrumentation – Helfrick*

140. Reliability of instrument means

- 1). Ability to give consistent results
- 2). Maximum voltage capacity
- 3). Speed of measurement
- 4). Power consumption

Correct Answer: **1). Ability to give consistent results**

Solution:

Reliable instruments maintain stable performance.

Ref: *Electrical Measurements – Sawhney*

141. Resolution improves when

- 1). Sensitivity increases
- 2). Sensitivity decreases
- 3). Voltage increases
- 4). Current decreases

Correct Answer: **1). Sensitivity increases**

Solution:

Higher sensitivity → smaller detectable changes.

Ref: *Electronic Instrumentation – Helfrick*

142. Repeatability indicates

- 1). Accuracy
- 2). Consistency of readings
- 3). Voltage stability
- 4). Current stability

Correct Answer: **2). Consistency of readings**

Solution:

Repeatability means same result under same conditions.

Ref: *Electrical Measurements – Sawhney*

143. Instrument hysteresis error occurs due to

- 1). Magnetic effects
- 2). Mechanical friction
- 3). Elastic deformation
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Hysteresis causes difference between increasing and decreasing readings.

Ref: *Electrical Measurements – Sawhney*

144. Static characteristics of instruments include

- 1). Accuracy
- 2). Sensitivity
- 3). Resolution
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Static characteristics describe instrument behavior under steady conditions.

Ref: *Electrical Measurements – Sawhney*

145. Dynamic characteristics include

- 1). Speed of response
- 2). Accuracy
- 3). Resolution
- 4). Voltage

Correct Answer: **1). Speed of response**

Solution:

Dynamic characteristics describe response to changing input.

Ref: *Electronic Instrumentation – Helfrick*

146. Time constant of instrument indicates

- 1). Speed of response
- 2). Voltage level
- 3). Current level
- 4). Resistance value

Correct Answer: **1). Speed of response**

Solution:

Smaller time constant → faster instrument response.

Ref: *Electronic Instrumentation – Helfrick*

147. Dead zone of instrument refers to

- 1). No output for small input
- 2). Maximum output
- 3). Minimum voltage
- 4). Minimum current

Correct Answer: **1). No output for small input**

Solution:

Dead zone occurs when input change produces no output.

Ref: *Electrical Measurements – Sawhney*

148. Zero error occurs when

- 1). Instrument reads non-zero value at zero input
- 2). Instrument reads maximum value
- 3). Instrument reads minimum value
- 4). Instrument reads correct value

Correct Answer: **1). Instrument reads non-zero value at zero input**

Solution:

Zero error must be corrected before measurement.

Ref: *Electrical Measurements – Sawhney*

149. Sensitivity of measuring instrument is

- 1). Ratio of output change to input change
- 2). Voltage ratio
- 3). Current ratio
- 4). Resistance ratio

Correct Answer: **1). Ratio of output change to input change**

Solution:

Higher sensitivity improves measurement accuracy.

Ref: *Electronic Instrumentation – Helfrick*

150. The ideal measuring instrument should have

- 1). High accuracy
- 2). High sensitivity
- 3). High reliability
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Ideal instruments must be accurate, sensitive, reliable, and stable.

Ref: *Electrical Measurements – Sawhney*

UNIT III – A.C. CIRCUITS AND TRANSFORMERS

SECTION A – A.C. CIRCUITS

1. Alternating current is defined as

- 1). Current flowing in one direction
- 2). Current changing magnitude only
- 3). Current changing magnitude and direction periodically
- 4). Constant current

Correct Answer: **3). Current changing magnitude and direction periodically**

Solution:

Alternating current varies both **magnitude and direction with time**.

Ref: *Engineering Circuit Analysis – Hayt & Kemmerly*

2. The frequency of AC supply in India is

- 1). 25 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard power frequency in India = **50 Hz**.

Ref: *Fundamentals of Electric Circuits – Alexander & Sadiku*

3. The RMS value of AC current represents

- 1). Peak current
- 2). Average current
- 3). Equivalent DC value producing same heating effect
- 4). Maximum current

Correct Answer: **3). Equivalent DC value producing same heating effect**

Solution:

RMS value is **effective value** of AC.

Ref: *Network Analysis – Van Valkenburg*

4. RMS value of sinusoidal current is

- 1). I_m
- 2). $I_m/2$
- 3). $I_m/\sqrt{2}$
- 4). $2I_m$

Correct Answer: **3).** $I_m/\sqrt{2}$

Solution:

$$I_{rms} = \frac{I_m}{\sqrt{2}}$$

Ref: *Engineering Circuit Analysis – Hayt*

5. Average value of sinusoidal current over half cycle is

- 1). $I_m/2$
- 2). $2I_m/\pi$
- 3). $I_m/\sqrt{2}$
- 4). I_m

Correct Answer: **2).** $2I_m/\pi$

Solution:

$$I_{avg} = \frac{2I_m}{\pi}$$

Ref: *Network Analysis – Van Valkenburg*

6. Form factor of sine wave is

- 1). 1.0
- 2). 1.11
- 3). 1.414
- 4). 0.707

Correct Answer: **2). 1.11**

Solution:

$$\text{Form Factor} = \frac{\text{RMS}}{\text{Average}}$$

Ref: *Fundamentals of Electric Circuits – Sadiku*

7. Peak factor of sine wave is

- 1). 1.11
- 2). 1.414
- 3). 2
- 4). 0.707

Correct Answer: **2). 1.414**

Solution:

$$\text{Peak Factor} = \frac{I_m}{I_{rms}}$$

Ref: *Network Analysis – Van Valkenburg*

8. In purely resistive AC circuit

- 1). Current leads voltage
- 2). Voltage leads current
- 3). Voltage and current are in phase
- 4). 180° phase difference

Correct Answer: **3). Voltage and current are in phase**

Solution:

Resistive circuit → **phase angle = 0°**.

Ref: *Engineering Circuit Analysis – Hayt*

9. In purely inductive circuit

- 1). Current leads voltage by 90°
- 2). Voltage leads current by 90°
- 3). Both are in phase
- 4). Phase difference 180°

Correct Answer: **2). Voltage leads current by 90°**

Solution:

Inductor opposes current change.

Ref: *Network Analysis – Van Valkenburg*

10. In purely capacitive circuit

- 1). Voltage leads current
- 2). Current leads voltage by 90°
- 3). Both in phase
- 4). Phase difference zero

Correct Answer: **2). Current leads voltage by 90°**

Solution:

Capacitor current leads voltage.

Ref: *Engineering Circuit Analysis – Hayt*

11. Inductive reactance is

- 1). $X_L = \omega L$
- 2). $X_L = 1/\omega C$
- 3). $X_L = IR$
- 4). $X_L = V/I$

Correct Answer: **1). $X_L = \omega L$**

Solution:

$$X_L = 2\pi fL$$

Ref: *Network Analysis – Van Valkenburg*

12. Capacitive reactance is

- 1). $1/\omega C$
- 2). ωC
- 3). IR
- 4). V/I

Correct Answer: **1).** $1/\omega C$

Solution:

$$X_C = \frac{1}{2\pi f C}$$

Ref: *Engineering Circuit Analysis – Hayt*

13. Impedance of AC circuit is

- 1). Resistance only
- 2). Reactance only
- 3). Combination of resistance and reactance
- 4). Voltage

Correct Answer: **3).** **Combination of resistance and reactance**

Solution:

$$Z = \sqrt{R^2 + X^2}$$

Ref: *Network Analysis – Van Valkenburg*

14. Power factor is

- 1). Ratio of active power to apparent power
- 2). Ratio of voltage to current
- 3). Ratio of current to resistance
- 4). Ratio of voltage to power

Correct Answer: **1).** **Ratio of active power to apparent power**

Solution:

$$PF = \cos \phi$$

Ref: *Engineering Circuit Analysis – Hayt*

15. Apparent power is measured in

- 1). Watt
- 2). VAR
- 3). Volt-Ampere
- 4). Joule

Correct Answer: **3). Volt-Ampere**

Solution:

$$S = VI$$

Unit = VA.

Ref: *Network Analysis – Van Valkenburg*

16. Real power is measured in

- 1). Watt
- 2). Volt
- 3). Ampere
- 4). Joule

Correct Answer: **1). Watt**

Solution:

$$P = VI \cos \phi$$

Ref: *Engineering Circuit Analysis – Hayt*

17. Reactive power unit is

- 1). Watt
- 2). VAR
- 3). Volt
- 4). Joule

Correct Answer: **2). VAR**

Solution:

$$Q = VI \sin \phi$$

Ref: *Network Analysis – Van Valkenburg*

18. In series RLC circuit at resonance

- 1). Impedance maximum
- 2). Impedance minimum
- 3). Current zero
- 4). Voltage zero

Correct Answer: **2). Impedance minimum**

Solution:

At resonance:

$$X_L = X_C$$

Ref: *Engineering Circuit Analysis – Hayt*

19. Resonant frequency is

- 1). $1/2\pi\sqrt{LC}$
- 2). $2\pi\sqrt{LC}$
- 3). $1/\sqrt{LC}$
- 4). LC

Correct Answer: **1). $1/2\pi\sqrt{LC}$**

Solution:

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

Ref: *Network Analysis – Van Valkenburg*

20. Quality factor of RLC circuit is

- 1). $Q = X/R$
- 2). $Q = R/X$
- 3). $Q = V/I$
- 4). $Q = IR$

Correct Answer: **1).** $Q = X/R$

Solution:

$$Q = \frac{X_L}{R}$$

Ref: *Engineering Circuit Analysis – Hayt*

21. Bandwidth of resonant circuit is

- 1). $BW = f_r/Q$
- 2). $BW = Q/f_r$
- 3). $BW = R/L$
- 4). $BW = L/R$

Correct Answer: **1).** $BW = f_r/Q$

Solution:

Bandwidth is range between **half power frequencies**.

Ref: *Network Analysis – Van Valkenburg*

22. Power factor of purely resistive circuit

- 1). 0
- 2). 1
- 3). 0.5
- 4). Infinite

Correct Answer: **2).** 1

Solution:

Voltage and current in phase.

Ref: *Engineering Circuit Analysis – Hayt*

23. Power factor of purely inductive circuit

- 1). 0
- 2). 1
- 3). 0.5
- 4). Infinite

Correct Answer: **1). 0**

Solution:

Phase angle = 90° .

Ref: *Network Analysis – Van Valkenburg*

24. In 3-phase star connection

- 1). $V_L = V_{ph}$
- 2). $V_L = \sqrt{3}V_{ph}$
- 3). $V_L = 2V_{ph}$
- 4). $V_L = V_{ph}/2$

Correct Answer: **2).** $V_L = \sqrt{3}V_{ph}$

Solution:

Line voltage relation in star connection.

Ref: *Fundamentals of Electric Circuits – Sadiku*

25. In delta connection

- 1). $V_L = V_{ph}$
- 2). $V_L = \sqrt{3}V_{ph}$
- 3). $V_L = 2V_{ph}$
- 4). $V_L = V_{ph}/2$

Correct Answer: **1).** $V_L = V_{ph}$

Solution:

In delta connection line voltage equals phase voltage.

Ref: *Network Analysis – Van Valkenburg*

26. In a series RLC circuit, resonance occurs when

- 1). $R = X_L$
- 2). $X_L = X_C$
- 3). $X_L > X_C$
- 4). $X_C > X_L$

Correct Answer: **2).** $X_L = X_C$

Solution:

At resonance inductive and capacitive reactances cancel each other.

Ref: *Network Analysis – M.E. Van Valkenburg*

27. At resonance in series RLC circuit, the power factor is

- 1). 0
- 2). 0.5
- 3). 1
- 4). Infinite

Correct Answer: **3).** 1

Solution:

Voltage and current are in phase at resonance.

Ref: *Engineering Circuit Analysis – Hayt*

28. The current at resonance in series circuit is

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

Correct Answer: **2).** Maximum

Solution:

Impedance becomes minimum at resonance.

Ref: *Network Analysis – Van Valkenburg*

29. In parallel resonance circuit, impedance is

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

Correct Answer: **1). Maximum**

Solution:

Parallel resonance produces **maximum impedance and minimum current**.

Ref: *Engineering Circuit Analysis – Hayt*

30. At resonance, the circuit behaves as

- 1). Purely resistive
- 2). Purely inductive
- 3). Purely capacitive
- 4). Open circuit

Correct Answer: **1). Purely resistive**

Solution:

Reactive components cancel each other.

Ref: *Fundamentals of Electric Circuits – Alexander*

31. Half-power frequency occurs when

- 1). Power becomes half
- 2). Voltage becomes half
- 3). Current becomes half
- 4). Resistance doubles

Correct Answer: **1). Power becomes half**

Solution:

Half-power frequencies determine bandwidth.

Ref: *Network Analysis – Van Valkenburg*

32. Bandwidth of RLC circuit is

- 1). Difference between upper and lower half-power frequencies
- 2). Sum of frequencies
- 3). Product of frequencies
- 4). Ratio of frequencies

Correct Answer: **1). Difference between upper and lower half-power frequencies**

Solution:

$$BW = f_2 - f_1$$

Ref: *Engineering Circuit Analysis – Hayt*

33. Quality factor indicates

- 1). Power loss
- 2). Sharpness of resonance
- 3). Voltage level
- 4). Current level

Correct Answer: **2). Sharpness of resonance**

Solution:

Higher Q → sharper resonance curve.

Ref: *Network Analysis – Van Valkenburg*

34. The unit of impedance is

- 1). Henry
- 2). Ohm
- 3). Farad
- 4). Watt

Correct Answer: **2). Ohm**

Solution:

Impedance has same unit as resistance.

Ref: *Engineering Circuit Analysis – Hayt*

35. In star connection, line current is

- 1). Equal to phase current
- 2). $\sqrt{3}$ times phase current
- 3). Half phase current
- 4). Double phase current

Correct Answer: **1). Equal to phase current**

Solution:

$$I_L = I_{ph}$$

Ref: *Fundamentals of Electric Circuits – Sadiku*

36. In delta connection, line current is

- 1). Equal to phase current
- 2). $\sqrt{3}$ times phase current
- 3). Half phase current
- 4). Double phase current

Correct Answer: **2). $\sqrt{3}$ times phase current**

Solution:

$$I_L = \sqrt{3}I_{ph}$$

Ref: *Network Analysis – Van Valkenburg*

37. Total power in three-phase balanced system is

- 1). $3V_{ph}I_{ph}\cos \phi$
- 2). $VI\cos \phi$
- 3). V^2/R
- 4). I^2R

Correct Answer: **1). $3V_{ph}I_{ph}\cos \phi$**

Solution:

Total power equals sum of three phases.

Ref: *Engineering Circuit Analysis – Hayt*

38. The two-wattmeter method is used to measure

- 1). Single-phase power
- 2). Three-phase power
- 3). DC power
- 4). Reactive power only

Correct Answer: **2). Three-phase power**

Solution:

Works for both balanced and unbalanced loads.

Ref: *Question Bank in Electrical Engineering – J.B. Gupta*

39. Total power using two wattmeters is

- 1). $W_1 - W_2$
- 2). $W_1 + W_2$
- 3). $W_1 \times W_2$
- 4). W_1/W_2

Correct Answer: **2). $W_1 + W_2$**

Solution:

Sum of readings equals total power.

Ref: *J.B. Gupta – Electrical Engineering*

40. If $W_1 = W_2$, power factor is

- 1). 0
- 2). 0.5
- 3). 0.866
- 4). 1

Correct Answer: **4). 1**

Solution:

Equal readings indicate unity power factor.

Ref: *Arihant Handbook of ECE*

41. If one wattmeter reads zero in two-wattmeter method

- 1). PF = 1
- 2). PF = 0.866
- 3). PF = 0.5
- 4). PF = 0

Correct Answer: **3). PF = 0.5**

Solution:

Occurs when phase angle = 60° .

Ref: *J.B. Gupta – Electrical Engineering*

42. If one wattmeter reading is negative

- 1). PF > 1
- 2). PF < 0.5
- 3). PF = 1
- 4). PF = 0.5

Correct Answer: **2). PF < 0.5**

Solution:

Negative reading occurs for low power factor loads.

Ref: *Arihant Handbook – ECE*

43. Power factor angle using two wattmeters is

- 1). $\tan \phi = \frac{\sqrt{3}(W_1 - W_2)}{W_1 + W_2}$
- 2). $P = VI$
- 3). $V = IR$
- 4). $I = V/R$

Correct Answer: **1). $\tan \phi = \frac{\sqrt{3}(W_1 - W_2)}{W_1 + W_2}$**

Solution:

Standard formula for power factor calculation.

Ref: *J.B. Gupta – Electrical Engineering*

44. When power factor is unity in two-wattmeter method

- 1). One meter reads zero
- 2). Both meters read equal
- 3). Both meters read negative
- 4). One meter reads double

Correct Answer: **2). Both meters read equal**

Solution:

Occurs when phase angle = 0° .

Ref: *Engineering Circuit Analysis – Hayt*

45. Apparent power in three-phase system is

- 1). VI
- 2). $\sqrt{3}V_L I_L$
- 3). $3VI$
- 4). V^2/R

Correct Answer: **2). $\sqrt{3}V_L I_L$**

Solution:

Apparent power formula for 3-phase circuits.

Ref: *Network Analysis – Van Valkenburg*

46. Reactive power in three-phase circuit

- 1). $\sqrt{3}V_L I_L \sin \phi$
- 2). $VI \cos \phi$
- 3). IR
- 4). V/R

Correct Answer: **1). $\sqrt{3}V_L I_L \sin \phi$**

Solution:

Reactive power arises from inductors and capacitors.

Ref: *Engineering Circuit Analysis – Hayt*

47. In balanced three-phase system

- 1). Phase currents unequal
- 2). Phase voltages unequal
- 3). Phase voltages equal in magnitude
- 4). No current

Correct Answer: **3). Phase voltages equal in magnitude**

Solution:

Balanced system → equal magnitudes with 120° phase difference.

Ref: *Fundamentals of Electric Circuits – Sadiku*

48. Phase difference between three-phase voltages is

- 1). 60°
- 2). 90°
- 3). 120°
- 4). 180°

Correct Answer: **3). 120°**

Solution:

Standard phase separation.

Ref: *Network Analysis – Van Valkenburg*

49. Advantage of three-phase system

- 1). Constant power transfer
- 2). Efficient transmission
- 3). Less conductor material
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Three-phase systems are more efficient.

Ref: *Engineering Circuit Analysis – Hayt*

50. Three-phase motors are preferred because

- 1). High efficiency
- 2). Self-starting
- 3). Better power factor
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Three-phase machines have superior performance.

Ref: *Fundamentals of Electric Circuits – Sadiku*

UNIT III – A.C. CIRCUITS AND TRANSFORMERS**SECTION B – TRANSFORMERS**

51. A transformer works on the principle of

- 1). Self induction
- 2). Mutual induction
- 3). Electrostatic induction
- 4). Electromagnetic force

Correct Answer: **2). Mutual induction**

Solution:

Transformer transfers energy from primary to secondary through **mutual induction** between coils.

Ref: *Electrical Machinery – P.S. Bimbhra*

52. Transformer is used to

- 1). Convert AC to DC
- 2). Step up or step down voltage
- 3). Convert DC to AC
- 4). Store electrical energy

Correct Answer: **2). Step up or step down voltage**

Solution:

Transformers change voltage level without changing frequency.

Ref: *Electrical Technology Vol-II – B.L. Theraja*

53. The EMF equation of transformer is

1). $E = 4.44fN\phi_m$

2). $E = IR$

3). $E = V + IR$

4). $E = PVI$

Correct Answer: **1).** $E = 4.44fN\phi_m$

Solution:

$$E = 4.44fN\phi_m$$

where

f = frequency

N = turns

ϕ_m = maximum flux.

Ref: *Electric Machines – Kothari & Nagrath*

54. The core of transformer is generally made of

1). Copper

2). Laminated silicon steel

3). Aluminium

4). Cast iron

Correct Answer: **2).** **Laminated silicon steel**

Solution:

Laminations reduce **eddy current losses**.

Ref: *Electrical Machinery – Bimbhra*

55. The purpose of laminations in transformer core is to

- 1). Increase flux
- 2). Reduce eddy current loss
- 3). Increase voltage
- 4). Reduce copper loss

Correct Answer: **2). Reduce eddy current loss**

Solution:

Thin laminations restrict circulating eddy currents.

Ref: *Electrical Technology – Theraja*

56. Transformer which increases voltage is called

- 1). Step-down transformer
- 2). Step-up transformer
- 3). Auto transformer
- 4). Power transformer

Correct Answer: **2). Step-up transformer**

Solution:

Secondary voltage greater than primary.

Ref: *Electric Machines – Kothari*

57. Transformer which decreases voltage is called

- 1). Step-up transformer
- 2). Step-down transformer
- 3). Isolation transformer
- 4). Distribution transformer

Correct Answer: **2). Step-down transformer**

Solution:

Secondary voltage less than primary.

Ref: *Electrical Machinery – Bimbhra*

58. The transformer ratio is

- 1). N_1/N_2
- 2). V_1/V_2
- 3). I_2/I_1
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

$$\frac{V_1}{V_2} = \frac{N_1}{N_2} = \frac{I_2}{I_1}$$

Ref: *Electrical Technology – Theraja*

59. The transformer which uses single winding is

- 1). Power transformer
- 2). Auto transformer
- 3). Distribution transformer
- 4). Isolation transformer

Correct Answer: **2). Auto transformer**

Solution:

Auto transformer uses **common winding for both sides**.

Ref: *Electric Machines – Kothari*

60. The efficiency of transformer is usually

- 1). Low
- 2). Moderate
- 3). High (above 95%)
- 4). Very low

Correct Answer: **3). High (above 95%)**

Solution:

Transformers have high efficiency because they have no rotating parts.

Ref: *Electrical Machinery – Bimbhra*

61. The losses in transformer include

- 1). Copper loss
- 2). Iron loss
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Main losses: **copper loss + core (iron) loss.**

Ref: *Electrical Technology – Theraja*

62. Copper losses occur due to

- 1). Flux leakage
- 2). Resistance of windings
- 3). Eddy currents
- 4). Magnetic field

Correct Answer: **2). Resistance of windings**

Solution:

$$\text{Copper loss} = I^2 R$$

Ref: *Electric Machines – Kothari*

63. Iron losses consist of

- 1). Hysteresis loss
- 2). Eddy current loss
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Iron losses occur in core material.

Ref: *Electrical Machinery – Bimbhra*

64. Transformer efficiency is maximum when

- 1). Copper loss = Iron loss
- 2). Copper loss > Iron loss
- 3). Copper loss < Iron loss
- 4). No losses

Correct Answer: **1). Copper loss = Iron loss**

Solution:

Maximum efficiency condition.

Ref: *Electrical Technology – Theraja*

65. Open circuit test is conducted to determine

- 1). Copper loss
- 2). Iron loss
- 3). Leakage reactance
- 4). Efficiency

Correct Answer: **2). Iron loss**

Solution:

OC test is done at rated voltage with no load.

Ref: *Electric Machines – Kothari*

66. Short circuit test determines

- 1). Iron loss
- 2). Copper loss
- 3). Voltage ratio
- 4). Frequency

Correct Answer: **2). Copper loss**

Solution:

SC test performed at low voltage with rated current.

Ref: *Electrical Machinery – Bimbhra*

67. In open circuit test, wattmeter measures

- 1). Copper loss
- 2). Iron loss
- 3). Total loss
- 4). No loss

Correct Answer: **2). Iron loss**

Solution:

Because current is very small.

Ref: *Electrical Technology – Theraja*

68. In short circuit test, applied voltage is

- 1). Rated voltage
- 2). Very small voltage
- 3). Zero voltage
- 4). Maximum voltage

Correct Answer: **2). Very small voltage**

Solution:

Only enough voltage to circulate rated current.

Ref: *Electric Machines – Kothari*

69. Voltage regulation of transformer indicates

- 1). Change in voltage from no load to full load
- 2). Current variation
- 3). Flux change
- 4). Frequency change

Correct Answer: **1). Change in voltage from no load to full load**

Solution:

Voltage regulation shows **quality of voltage output**.

Ref: *Electrical Machinery – Bimbhra*

70. Ideal transformer has

- 1). No losses
- 2). Infinite permeability
- 3). Zero leakage flux
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Ideal transformer assumptions.

Ref: *Electrical Technology – Theraja*

71. The equivalent circuit of transformer represents

- 1). Mechanical losses
- 2). Electrical behavior of transformer
- 3). Magnetic field only
- 4). Thermal characteristics

Correct Answer: **2). Electrical behavior of transformer**

Solution:

Equivalent circuit models resistances and reactances.

Ref: *Electric Machines – Kothari & Nagrath*

72. Leakage reactance in transformer is due to

- 1). Leakage flux
- 2). Core losses
- 3). Copper loss
- 4). Voltage drop

Correct Answer: **1). Leakage flux**

Solution:

Leakage flux produces reactance.

Ref: *Electrical Machinery – Bimbhra*

73. The magnetizing current in transformer is

- 1). Very high
- 2). Very small
- 3). Zero
- 4). Infinite

Correct Answer: 2). Very small

Solution:

Only small current is needed to magnetize core.

Ref: *Electrical Technology – Theraja*

74. Transformer voltage ratio depends on

- 1). Current
- 2). Number of turns
- 3). Resistance
- 4). Frequency

Correct Answer: 2). Number of turns

Solution:

$$\frac{V_1}{V_2} = \frac{N_1}{N_2}$$

Ref: *Electric Machines – Kothari*

75. Distribution transformers operate mainly at

- 1). Full load
- 2). No load
- 3). Variable load
- 4). Overload

Correct Answer: 3). Variable load

Solution:

Distribution transformers supply varying loads.

Ref: *Electrical Machinery – Bimbhra*

76. Power transformers operate mainly at

- 1). Full load
- 2). Half load
- 3). No load
- 4). Light load

Correct Answer: **1). Full load**

Solution:

Power transformers designed for maximum efficiency at full load.

Ref: *Electrical Technology – Theraja*

77. Voltage regulation of transformer should be

- 1). Very high
- 2). Low
- 3). Negative
- 4). Infinite

Correct Answer: **2). Low**

Solution:

Low regulation indicates good voltage stability.

Ref: *Electric Machines – Kothari*

78. The unit of transformer rating is

- 1). kW
- 2). kVA
- 3). VAR
- 4). Watt

Correct Answer: **2). kVA**

Solution:

Transformer rated in kVA because power factor varies.

Ref: *Electrical Machinery – Bimbhra*

79. Transformer oil is used for

- 1). Cooling
- 2). Insulation
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Oil provides insulation and cooling.

Ref: *Electrical Technology – Theraja*

80. Conservator in transformer is used to

- 1). Store oil
- 2). Increase voltage
- 3). Reduce current
- 4). Increase flux

Correct Answer: **1). Store oil**

Solution:

Conservator maintains oil level.

Ref: *Electric Machines – Kothari*

81. Breather in transformer contains

- 1). Silica gel
- 2). Copper
- 3). Iron
- 4). Aluminum

Correct Answer: **1). Silica gel**

Solution:

Silica gel removes moisture from air entering conservator.

Ref: *Electrical Machinery – Bimbhra*

82. Buchholz relay protects transformer against

- 1). Overvoltage
- 2). Internal faults
- 3). Overload
- 4). Short circuit

Correct Answer: **2). Internal faults**

Solution:

Buchholz relay detects gas due to winding faults.

Ref: *Electrical Technology – Theraja*

83. Tap changer is used to

- 1). Change frequency
- 2). Change voltage
- 3). Change current
- 4). Change power factor

Correct Answer: **2). Change voltage**

Solution:

Tap changer adjusts transformer turns ratio.

Ref: *Electric Machines – Kothari*

84. Off-load tap changer is used when

- 1). Transformer energized
- 2). Transformer de-energized
- 3). Transformer overloaded
- 4). Transformer cooling

Correct Answer: **2). Transformer de-energized**

Solution:

Tap changing performed without load.

Ref: *Electrical Machinery – Bimbhra*

85. On-load tap changer operates

- 1). Without load
- 2). During operation
- 3). Only during maintenance
- 4). Only during testing

Correct Answer: **2). During operation**

Solution:

Voltage adjusted without interrupting supply.

Ref: *Electrical Technology – Theraja*

86. Cooling method ONAN stands for

- 1). Oil Natural Air Natural
- 2). Oil Natural Air Forced
- 3). Oil Forced Air Natural
- 4). Oil Forced Air Forced

Correct Answer: **1). Oil Natural Air Natural**

Solution:

Natural oil circulation and natural air cooling.

Ref: *Electric Machines – Kothari*

87. Cooling method ONAF stands for

- 1). Oil Natural Air Forced
- 2). Oil Forced Air Natural
- 3). Oil Forced Air Forced
- 4). Oil Natural Water Forced

Correct Answer: **1). Oil Natural Air Forced**

Solution:

Oil natural circulation with forced air cooling.

Ref: *Electrical Machinery – Bimbhra*

88. Three-phase transformer can be built using

- 1). Three single-phase transformers
- 2). One three-phase unit
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Both construction methods possible.

Ref: *Electrical Technology – Theraja*

89. In star connection, neutral point is

- 1). Available
- 2). Not available
- 3). Optional
- 4). Grounded always

Correct Answer: **1). Available**

Solution:

Star connection provides neutral.

Ref: *Electric Machines – Kothari*

90. Delta connection does not have

- 1). Phase voltage
- 2). Line voltage
- 3). Neutral point
- 4). Current

Correct Answer: **3). Neutral point**

Solution:

Delta connection has no neutral.

Ref: *Electrical Machinery – Bimbhra*

91. Parallel operation of transformers requires

- 1). Same voltage ratio
- 2). Same polarity
- 3). Same phase sequence
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

All conditions necessary for proper load sharing.

Ref: *Electrical Technology – Theraja*

92. If polarity of transformers is wrong in parallel operation

- 1). Load sharing improves
- 2). Short circuit occurs
- 3). Voltage increases
- 4). Power factor improves

Correct Answer: **2). Short circuit occurs**

Solution:

Opposite polarity causes circulating currents.

Ref: *Electric Machines – Kothari*

93. Auto transformer advantage

- 1). Less copper
- 2). Higher efficiency
- 3). Smaller size
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Auto transformers are economical.

Ref: *Electrical Machinery – Bimbhra*

94. Auto transformer disadvantage

- 1). Electrical isolation absent
- 2). Higher cost
- 3). Large size
- 4). Low efficiency

Correct Answer: **1). Electrical isolation absent**

Solution:

Primary and secondary share same winding.

Ref: *Electrical Technology – Theraja*

95. Isolation transformer provides

- 1). Electrical isolation
- 2). Voltage regulation
- 3). Frequency change
- 4). Current control

Correct Answer: **1). Electrical isolation**

Solution:

Primary and secondary electrically isolated.

Ref: *Electric Machines – Kothari*

96. Transformer frequency is determined by

- 1). Transformer design
- 2). Supply frequency
- 3). Core material
- 4). Voltage

Correct Answer: **2). Supply frequency**

Solution:

Transformer operates at supply frequency.

Ref: *Electrical Machinery – Bimbhra*

97. Transformer cannot operate on

- 1). AC supply
- 2). DC supply
- 3). Variable voltage
- 4). Low voltage

Correct Answer: **2). DC supply**

Solution:

DC causes excessive current and overheating.

Ref: *Electrical Technology – Theraja*

98. Eddy current loss can be reduced by

- 1). Laminations
- 2). Increasing voltage
- 3). Increasing frequency
- 4). Increasing flux

Correct Answer: **1). Laminations**

Solution:

Laminated core restricts circulating currents.

Ref: *Electric Machines – Kothari*

99. Hysteresis loss depends on

- 1). Frequency
- 2). Flux density
- 3). Core material
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Loss determined by material properties and frequency.

Ref: *Electrical Machinery – Bimbhra*

100. Transformer efficiency at no load is

- 1). Zero
- 2). Very high
- 3). Infinite
- 4). 50%

Correct Answer: **1). Zero**

Solution:

Output power = 0 at no load.

Ref: *Electrical Technology – Theraja*

101. Leakage flux produces

- 1). Voltage regulation
- 2). Reactance drop
- 3). Copper loss
- 4). Core loss

Correct Answer: **2). Reactance drop**

Solution:

Leakage flux causes inductive reactance.

Ref: *Electric Machines – Kothari*

102. Transformer core losses occur in

- 1). Windings
- 2). Core
- 3). Oil
- 4). Tank

Correct Answer: **2). Core**

Solution:

Core losses include hysteresis and eddy currents.

Ref: *Electrical Machinery – Bimbhra*

103. Ideal transformer regulation is

- 1). Zero
- 2). Infinite
- 3). One
- 4). Negative

Correct Answer: **1). Zero**

Solution:

Ideal transformer has no losses.

Ref: *Electrical Technology – Theraja*

104. Transformer load current depends on

- 1). Secondary load
- 2). Frequency
- 3). Flux
- 4). Voltage

Correct Answer: **1). Secondary load**

Solution:

Load determines current drawn.

Ref: *Electric Machines – Kothari*

105. Transformer noise is due to

- 1). Magnetic vibration
- 2). Core expansion
- 3). Magnetostriction
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Magnetostriction causes humming noise.

Ref: *Electrical Machinery – Bimbhra*

106. Transformer tank is filled with

- 1). Oil
- 2). Air
- 3). Water
- 4). Gas

Correct Answer: **1). Oil**

Solution:

Oil provides cooling and insulation.

Ref: *Electrical Technology – Theraja*

107. Radiators in transformer are used for

- 1). Heating
- 2). Cooling
- 3). Voltage regulation
- 4). Protection

Correct Answer: **2). Cooling**

Solution:

Radiators increase heat dissipation.

Ref: *Electric Machines – Kothari*

108. Buchholz relay is installed between

- 1). Core and tank
- 2). Conservator and main tank
- 3). Primary winding and secondary
- 4). Tap changer and winding

Correct Answer: **2). Conservator and main tank**

Solution:

Gas generated from internal faults passes through relay.

Ref: *Electrical Machinery – Bimbhra*

109. Transformer oil breakdown voltage test indicates

- 1). Oil purity
- 2). Voltage rating
- 3). Current rating
- 4). Power rating

Correct Answer: **1). Oil purity**

Solution:

Higher breakdown voltage means better insulation.

Ref: *Electrical Technology – Theraja*

110. Parallel operation improves

- 1). Reliability
- 2). Load sharing
- 3). Maintenance flexibility
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Parallel operation improves system performance.

Ref: *Electric Machines – Kothari*

111. Transformer winding material is usually

- 1). Copper
- 2). Iron
- 3). Steel
- 4). Aluminum

Correct Answer: **1). Copper**

Solution:

Copper has high conductivity.

Ref: *Electrical Machinery – Bimbhra*

112. Transformer insulation material

- 1). Paper
- 2). Oil
- 3). Pressboard
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different insulation materials are used.

Ref: *Electrical Technology – Theraja*

113. Core type transformer has

- 1). Two limbs
- 2). Three limbs
- 3). Four limbs
- 4). Five limbs

Correct Answer: **1). Two limbs**

Solution:

Core type transformers have two vertical limbs.

Ref: *Electric Machines – Kothari*

114. Shell type transformer has

- 1). One limb
- 2). Two limbs
- 3). Three limbs
- 4). Four limbs

Correct Answer: **3). Three limbs**

Solution:

Shell type has central limb carrying windings.

Ref: *Electrical Machinery – Bimbhra*

115. Transformer efficiency is highest at

- 1). Light load
- 2). Full load
- 3). Maximum load
- 4). When copper loss equals iron loss

Correct Answer: **4). When copper loss equals iron loss**

Solution:

Condition for maximum efficiency.

Ref: *Electrical Technology – Theraja*

116. Transformer voltage regulation improves when

- 1). Power factor leading
- 2). Power factor lagging
- 3). Power factor zero
- 4). Power factor unity

Correct Answer: **1). Power factor leading**

Solution:

Leading loads reduce voltage drop.

Ref: *Electric Machines – Kothari*

117. Transformer oil also acts as

- 1). Insulator
- 2). Coolant
- 3). Arc suppressor
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Oil performs multiple functions.

Ref: *Electrical Machinery – Bimbhra*

118. Core losses occur even when transformer

- 1). Loaded
- 2). No load
- 3). Overloaded
- 4). Short circuited

Correct Answer: **2). No load**

Solution:

Core loss independent of load.

Ref: *Electrical Technology – Theraja*

119. Copper losses depend on

- 1). Voltage
- 2). Current
- 3). Frequency
- 4). Flux

Correct Answer: **2). Current**

Solution:

$$Loss = I^2 R$$

Ref: *Electric Machines – Kothari*

120. The main function of transformer is

- 1). Voltage transformation
- 2). Frequency conversion
- 3). Power generation
- 4). Energy storage

Correct Answer: **1). Voltage transformation**

Solution:

Transformer transfers electrical power at different voltage levels.

Ref: *Electrical Machinery – Bimbhra*

UNIT IV – A.C. MACHINES

SECTION A – ALTERNATORS

1. An alternator converts

- 1). Mechanical energy to electrical energy
- 2). Electrical energy to mechanical energy
- 3). Chemical energy to electrical energy
- 4). Electrical energy to heat energy

Correct Answer: **1). Mechanical energy to electrical energy**

Solution:

Alternators generate electrical power from mechanical input using electromagnetic induction.

Ref: *Electrical Machinery – P.S. Bimbhra*

2. The rotor of an alternator is driven by

- 1). Battery
- 2). Prime mover
- 3). Transformer
- 4). Capacitor

Correct Answer: **2). Prime mover**

Solution:

Prime movers like turbines rotate the rotor.

Ref: *Electric Machines – Kothari & Nagrath*

3. The EMF equation of alternator is

- 1). $E = 4.44f\phi T$
- 2). $E = IR$
- 3). $E = V + IR$
- 4). $E = PVI$

Correct Answer: **1). $E = 4.44f\phi T$**

Solution:

$$E = 4.44K_p K_d f \phi T$$

Ref: *Electrical Technology – B.L. Theraja*

4. The rotor winding of alternator carries

- 1). DC current
- 2). AC current
- 3). Both AC and DC
- 4). No current

Correct Answer: **1). DC current**

Solution:

Rotor field winding is excited by DC supply.

Ref: *Electric Machines – Kothari*

5. The stator winding of alternator produces

- 1). DC output
- 2). AC output
- 3). Mechanical output
- 4). Heat energy

Correct Answer: **2). AC output**

Solution:

Three-phase AC voltage generated in stator.

Ref: *Electrical Machinery – Bimbhra*

6. Frequency of alternator depends on

- 1). Speed and number of poles
- 2). Voltage
- 3). Current
- 4). Resistance

Correct Answer: **1). Speed and number of poles**

Solution:

$$f = \frac{PN}{120}$$

Ref: *Electrical Technology – Theraja*

7. Alternator rotor types include

- 1). Salient pole
- 2). Cylindrical rotor
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Two main rotor constructions.

Ref: *Electric Machines – Kothari*

8. Salient pole rotors are used in

- 1). High speed machines
- 2). Low speed machines
- 3). DC motors
- 4). Transformers

Correct Answer: **2). Low speed machines**

Solution:

Used in hydroelectric generators.

Ref: *Electrical Machinery – Bimbhra*

9. Cylindrical rotor alternators are used in

- 1). Hydro plants
- 2). Steam turbine plants
- 3). Diesel engines
- 4). Motors

Correct Answer: **2). Steam turbine plants**

Solution:

High speed turbo alternators use cylindrical rotor.

Ref: *Electrical Technology – Theraja*

10. Pitch factor K_p is

- 1). Ratio of induced EMF with short pitch coil to full pitch coil
- 2). Ratio of voltage to current
- 3). Ratio of flux to turns
- 4). Ratio of resistance to reactance

Correct Answer: **1). Ratio of induced EMF with short pitch coil to full pitch coil**

Solution:

Short pitch reduces harmonic components.

Ref: *Electric Machines – Kothari*

11. Distribution factor K_d is

- 1). Ratio of distributed winding EMF to concentrated winding EMF
- 2). Ratio of voltage to current
- 3). Ratio of flux to resistance
- 4). Ratio of current to voltage

Correct Answer: **1). Ratio of distributed winding EMF to concentrated winding EMF**

Solution:

Accounts for distribution of coils.

Ref: *Electrical Machinery – Bimbhra*

12. The synchronous speed of alternator is

- 1). Rotor speed
- 2). Speed of rotating magnetic field
- 3). Speed of stator
- 4). Speed of armature

Correct Answer: **2). Speed of rotating magnetic field**

Solution:

$$N_s = \frac{120f}{P}$$

Ref: *Electrical Technology – Theraja*

13. Voltage regulation of alternator indicates

- 1). Change in voltage from no load to full load
- 2). Current change
- 3). Speed change
- 4). Flux change

Correct Answer: **1). Change in voltage from no load to full load**

Solution:

Shows ability to maintain constant voltage.

Ref: *Electric Machines – Kothari*

14. Methods of alternator voltage regulation include

- 1). EMF method
- 2). MMF method
- 3). ZPF method
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Three common regulation methods.

Ref: *Electrical Machinery – Bimbhra*

15. In EMF method voltage regulation is

- 1). Underestimated
- 2). Overestimated
- 3). Exact
- 4). Zero

Correct Answer: **2). Overestimated**

Solution:

Also called **pessimistic method**.

Ref: *Electrical Technology – Theraja*

16. In MMF method voltage regulation is

- 1). Underestimated
- 2). Overestimated
- 3). Accurate
- 4). Negative

Correct Answer: **1). Underestimated**

Solution:

Also called **optimistic method**.

Ref: *Electric Machines – Kothari*

17. Alternators are generally connected in

- 1). Parallel
- 2). Series
- 3). Star
- 4). Delta

Correct Answer: **1). Parallel**

Solution:

Parallel operation increases reliability.

Ref: *Electrical Machinery – Bimbhra*

18. Conditions for parallel operation include

- 1). Same voltage
- 2). Same frequency
- 3). Same phase sequence
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Necessary for synchronization.

Ref: *Electrical Technology – Theraja*

19. Synchronizing instruments include

- 1). Synchroscope
- 2). Lamps
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Used to synchronize alternators.

Ref: *Electric Machines – Kothari*

20. Dark lamp method is used for

- 1). Voltage measurement
- 2). Synchronization
- 3). Current measurement
- 4). Speed control

Correct Answer: **2). Synchronization**

Solution:

Lamp brightness indicates phase difference.

Ref: *Electrical Machinery – Bimbhra*

21. Alternator output frequency increases when

- 1). Speed increases
- 2). Speed decreases
- 3). Voltage increases
- 4). Flux decreases

Correct Answer: **1). Speed increases**

Solution:

$$f \propto N$$

Ref: *Electrical Technology – Theraja*

22. Alternator power factor depends on

- 1). Load type
- 2). Speed
- 3). Voltage
- 4). Frequency

Correct Answer: **1). Load type**

Solution:

Lagging loads cause lagging PF.

Ref: *Electric Machines – Kothari*

23. Armature reaction in alternator causes

- 1). Flux distortion
- 2). Voltage drop
- 3). Heating
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Armature current affects main field.

Ref: *Electrical Machinery – Bimbhra*

24. Alternator efficiency is usually

- 1). Low
- 2). Moderate
- 3). High (>95%)
- 4). Very low

Correct Answer: **3). High (>95%)**

Solution:

Alternators are highly efficient machines.

Ref: *Electrical Technology – Theraja*

25. Losses in alternator include

- 1). Copper losses
- 2). Iron losses
- 3). Mechanical losses
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

All losses reduce efficiency.

Ref: *Electric Machines – Kothari*

26. Damper windings are provided in alternators to

- 1). Reduce oscillations
- 2). Increase voltage
- 3). Reduce current
- 4). Increase speed

Correct Answer: **1). Reduce oscillations**

Solution:

Damper windings stabilize rotor.

Ref: *Electrical Machinery – Bimbhra*

27. The rotor field winding is supplied through

- 1). Slip rings
- 2). Commutator
- 3). Brushes
- 4). Both slip rings and brushes

Correct Answer: **4). Both slip rings and brushes**

Solution:

DC supply fed through slip rings.

Ref: *Electrical Technology – Theraja*

28. Alternators are mainly used in

- 1). Power generation stations
- 2). Motors
- 3). Transformers
- 4). Batteries

Correct Answer: **1). Power generation stations**

Solution:

Alternators produce electrical energy in power plants.

Ref: *Electric Machines – Kothari*

29. Alternator stator core is laminated to

- 1). Increase flux
- 2). Reduce eddy current losses
- 3). Increase voltage
- 4). Reduce resistance

Correct Answer: **2). Reduce eddy current losses**

Solution:

Laminations minimize circulating currents.

Ref: *Electrical Machinery – Bimbhra*

30. Alternator armature winding is placed on

- 1). Rotor
- 2). Stator
- 3). Shaft
- 4). Field poles

Correct Answer: **2). Stator**

Solution:

Stator carries armature winding in modern alternators.

Ref: *Electrical Technology – Theraja*

SECTION B – SYNCHRONOUS MOTORS

31. A synchronous motor runs at

- 1). Variable speed
- 2). Constant synchronous speed
- 3). Slip speed
- 4). Half synchronous speed

Correct Answer: **2). Constant synchronous speed**

Solution:

Synchronous motor runs exactly at synchronous speed:

$$N_s = \frac{120f}{P}$$

Ref: *Electric Machines – Kothari & Nagrath*

32. Slip of synchronous motor is

- 1). 1
- 2). 0
- 3). 0.5
- 4). Infinite

Correct Answer: **2). 0**

Solution:

Rotor rotates exactly at synchronous speed.

Ref: *Electrical Machinery – Bimbhra*

33. Synchronous motors are generally used for

- 1). Constant speed applications
- 2). Variable speed applications
- 3). Low speed applications
- 4). DC supply

Correct Answer: **1). Constant speed applications**

Solution:

Speed independent of load.

Ref: *Electrical Technology – Theraja*

34. Synchronous motor is not self-starting because

- 1). No starting torque
- 2). High resistance
- 3). High reactance
- 4). High voltage

Correct Answer: **1). No starting torque**

Solution:

Initial torque is zero.

Ref: *Electric Machines – Kothari*

35. Synchronous motors are started using

- 1). Damper windings
- 2). Pony motor
- 3). Induction motor starting
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Various starting methods available.

Ref: *Electrical Machinery – Bimbhra*

36. Damper winding in synchronous motor acts as

- 1). Resistance
- 2). Induction motor winding
- 3). Transformer winding
- 4). Capacitor

Correct Answer: **2). Induction motor winding**

Solution:

Helps motor start as induction motor.

Ref: *Electrical Technology – Theraja*

37. Field excitation of synchronous motor is supplied by

- 1). AC supply
- 2). DC supply
- 3). Battery
- 4). Capacitor

Correct Answer: **2). DC supply**

Solution:

Rotor winding energized with DC.

Ref: *Electric Machines – Kothari*

38. Power factor of synchronous motor can be

- 1). Lagging
- 2). Leading
- 3). Unity
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

PF depends on field excitation.

Ref: *Electrical Machinery – Bimbhra*

39. Under-excited synchronous motor operates at

- 1). Leading PF
- 2). Lagging PF
- 3). Unity PF
- 4). Zero PF

Correct Answer: **2). Lagging PF**

Solution:

Field current less than required.

Ref: *Electrical Technology – Theraja*

40. Over-excited synchronous motor operates at

- 1). Lagging PF
- 2). Leading PF
- 3). Unity PF
- 4). Zero PF

Correct Answer: **2). Leading PF**

Solution:

Acts like capacitor.

Ref: *Electric Machines – Kothari*

41. Over-excited synchronous motor is used as

- 1). Synchronous condenser
- 2). Transformer
- 3). Generator
- 4). Rectifier

Correct Answer: **1). Synchronous condenser**

Solution:

Used for power factor improvement.

Ref: *Electrical Machinery – Bimbhra*

42. V-curves represent relationship between

- 1). Current and voltage
- 2). Armature current and field current
- 3). Speed and torque
- 4). Voltage and frequency

Correct Answer: **2). Armature current and field current**

Solution:

V-shaped curve formed.

Ref: *Electrical Technology – Theraja*

43. In V-curve minimum armature current occurs at

- 1). Lagging PF
- 2). Leading PF
- 3). Unity PF
- 4). Zero PF

Correct Answer: **3). Unity PF**

Solution:

Minimum current occurs at unity power factor.

Ref: *Electric Machines – Kothari*

44. Inverted V-curves represent relationship between

- 1). Power factor and field current
- 2). Current and voltage
- 3). Speed and current
- 4). Torque and voltage

Correct Answer: **1). Power factor and field current**

Solution:

Shows PF variation with excitation.

Ref: *Electrical Machinery – Bimbhra*

45. Load angle in synchronous motor is

- 1). Angle between voltage and current
- 2). Angle between rotor field and stator field
- 3). Angle between speed and torque
- 4). Angle between current and resistance

Correct Answer: **2). Angle between rotor field and stator field**

Solution:

Represents torque production.

Ref: *Electrical Technology – Theraja*

46. Pull-out torque of synchronous motor is

- 1). Minimum torque
- 2). Maximum torque before losing synchronism
- 3). Zero torque
- 4). Average torque

Correct Answer: **2). Maximum torque before losing synchronism**

Solution:

Beyond this torque motor loses synchronism.

Ref: *Electric Machines – Kothari*

47. If load exceeds pull-out torque

- 1). Motor speed increases
- 2). Motor stops
- 3). Motor loses synchronism
- 4). Motor voltage increases

Correct Answer: **3). Motor loses synchronism**

Solution:

Rotor falls out of synchronism.

Ref: *Electrical Machinery – Bimbhra*

48. Synchronous motors are used in

- 1). Compressors
- 2). Pumps
- 3). Rolling mills
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Used in large industrial drives.

Ref: *Electrical Technology – Theraja*

49. The synchronous motor rotor speed depends on

- 1). Supply frequency
- 2). Number of poles
- 3). Both
- 4). Voltage

Correct Answer: **3). Both**

Solution:

$$N_s = \frac{120f}{P}$$

Ref: *Electric Machines – Kothari*

50. Synchronous motor efficiency is

- 1). Low
- 2). Moderate
- 3). High
- 4). Zero

Correct Answer: **3). High**

Solution:

Used for large industrial loads.

Ref: *Electrical Machinery – Bimbhra*

51. Field excitation affects

- 1). Power factor
- 2). Speed
- 3). Voltage only
- 4). Resistance

Correct Answer: **1). Power factor**

Solution:

Excitation controls reactive power.

Ref: *Electrical Technology – Theraja*

52. The stator of synchronous motor carries

- 1). DC winding
- 2). AC winding
- 3). Both AC and DC
- 4). No winding

Correct Answer: **2). AC winding**

Solution:

Three-phase supply given to stator.

Ref: *Electric Machines – Kothari*

53. The rotor magnetic field rotates at

- 1). Slip speed
- 2). Synchronous speed
- 3). Half speed
- 4). Double speed

Correct Answer: **2). Synchronous speed**

Solution:

Rotor locks with rotating field.

Ref: *Electrical Machinery – Bimbhra*

54. Synchronizing torque keeps rotor

- 1). Stationary
- 2). In step with rotating field
- 3). At half speed
- 4). Oscillating

Correct Answer: **2). In step with rotating field**

Solution:

Ensures synchronous operation.

Ref: *Electrical Technology – Theraja*

55. Losses in synchronous motor include

- 1). Copper losses
- 2). Iron losses
- 3). Mechanical losses
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

All losses affect efficiency.

Ref: *Electric Machines – Kothari*

56. Damper windings also help in

- 1). Reducing hunting
- 2). Increasing speed
- 3). Increasing voltage
- 4). Increasing resistance

Correct Answer: **1). Reducing hunting**

Solution:

Damps oscillations.

Ref: *Electrical Machinery – Bimbhra*

57. Hunting in synchronous motor means

- 1). Rotor oscillations
- 2). Voltage drop
- 3). Current fluctuation
- 4). Speed increase

Correct Answer: **1). Rotor oscillations**

Solution:

Rotor swings around synchronous position.

Ref: *Electrical Technology – Theraja*

58. Synchronous motor rotor field is produced by

- 1). Permanent magnet
- 2). DC excitation
- 3). Capacitor
- 4). Transformer

Correct Answer: **2). DC excitation**

Solution:

DC current flows in rotor winding.

Ref: *Electric Machines – Kothari*

59. The stator produces

- 1). Rotating magnetic field
- 2). Stationary magnetic field
- 3). DC field
- 4). Pulsating field

Correct Answer: **1). Rotating magnetic field**

Solution:

Three-phase supply creates rotating field.

Ref: *Electrical Machinery – Bimbhra*

60. Synchronous motors are generally used where

- 1). Constant speed required
- 2). Power factor correction needed
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Two main industrial uses.

Ref: *Electrical Technology – Theraja*

SECTION C – THREE-PHASE INDUCTION MOTORS (Q61–100)

61. A three-phase induction motor works on the principle of

- 1). Mutual induction
- 2). Electromagnetic induction
- 3). Electrostatic induction
- 4). Chemical reaction

Correct Answer: **2). Electromagnetic induction**

Solution:

Rotor current is induced by rotating magnetic field.

Ref: *Principles of Electrical Machines – V.K. Mehta*

62. The rotor of an induction motor rotates at

- 1). Synchronous speed
- 2). Speed less than synchronous speed
- 3). Speed greater than synchronous speed
- 4). Zero speed

Correct Answer: **2). Speed less than synchronous speed**

Solution:

Rotor must lag synchronous speed for induction.

Ref: *Electrical Machinery – P.S. Bimbhra*

63. Slip of induction motor is

- 1). Difference between rotor speed and synchronous speed
- 2). Ratio of rotor speed to synchronous speed
- 3). Difference between supply frequency and rotor frequency
- 4). Voltage drop

Correct Answer: **1). Difference between rotor speed and synchronous speed**

Solution:

$$s = \frac{N_s - N_r}{N_s}$$

Ref: *Electric Machines – Kothari*

64. Slip at synchronous speed is

- 1). 1
- 2). 0
- 3). 0.5
- 4). Infinite

Correct Answer: **2). 0**

Solution:

Rotor speed equals synchronous speed.

Ref: *Electrical Technology – Theraja*

65. Slip at standstill is

- 1). 0
- 2). 1
- 3). 0.5
- 4). Infinite

Correct Answer: **2). 1**

Solution:

Rotor speed = 0 at starting.

Ref: *Electric Machines – Kothari*

66. The synchronous speed of induction motor is

- 1). $120f/P$
- 2). $fP/120$
- 3). VI
- 4). IR

Correct Answer: **1).** $120f/P$

Solution:

$$N_s = \frac{120f}{P}$$

Ref: *Electrical Machinery – Bimbhra*

67. Rotor frequency is

- 1). sf
- 2). f/s
- 3). fs
- 4). f^2

Correct Answer: **1).** sf

Solution:

$$f_r = sf$$

Ref: *Electric Machines – Kothari*

68. Induction motors are called asynchronous motors because

- 1). Rotor speed differs from synchronous speed
- 2). Rotor speed equals synchronous speed
- 3). No magnetic field
- 4). No current

Correct Answer: **1).** Rotor speed differs from synchronous speed

Solution:

Speed difference causes slip.

Ref: *Electrical Technology – Theraja*

69. Types of induction motor rotors include

- 1). Squirrel cage rotor
- 2). Slip ring rotor
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Two rotor constructions.

Ref: *Electrical Machinery – Bimbhra*

70. Squirrel cage rotor bars are made of

- 1). Copper or aluminum
- 2). Iron
- 3). Steel
- 4). Brass

Correct Answer: **1). Copper or aluminum**

Solution:

Bars are short-circuited by end rings.

Ref: *Electric Machines – Kothari*

71. Slip ring rotor motors are used when

- 1). High starting torque required
- 2). Low starting torque required
- 3). Constant speed required
- 4). No load required

Correct Answer: **1). High starting torque required**

Solution:

External resistance added during starting.

Ref: *Electrical Technology – Theraja*

72. Starting torque of squirrel cage motor is

- 1). Low
- 2). Moderate
- 3). High
- 4). Zero

Correct Answer: **2). Moderate**

Solution:

Starting torque less than slip ring motors.

Ref: *Electrical Machinery – Bimbhra*

73. Maximum torque of induction motor occurs when

- 1). Rotor resistance equals rotor reactance
- 2). Slip = 0
- 3). Slip = 1
- 4). Voltage = zero

Correct Answer: **1). Rotor resistance equals rotor reactance**

Solution:

Condition for maximum torque.

Ref: *Electric Machines – Kothari*

74. Maximum torque is independent of

- 1). Rotor resistance
- 2). Supply voltage
- 3). Frequency
- 4). Flux

Correct Answer: **1). Rotor resistance**

Solution:

Rotor resistance changes slip but not magnitude.

Ref: *Electrical Technology – Theraja*

75. Torque of induction motor is proportional to

- 1). Slip
- 2). Voltage²
- 3). Rotor current
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Torque depends on several factors.

Ref: *Electrical Machinery – Bimbhra*

76. Starting torque increases when

- 1). Rotor resistance increases
- 2). Voltage decreases
- 3). Slip decreases
- 4). Frequency decreases

Correct Answer: **1). Rotor resistance increases**

Solution:

External resistance improves starting torque.

Ref: *Electric Machines – Kothari*

77. Star-delta starter is used to

- 1). Increase starting torque
- 2). Reduce starting current
- 3). Increase voltage
- 4). Increase speed

Correct Answer: **2). Reduce starting current**

Solution:

Reduces line current during starting.

Ref: *Electrical Technology – Theraja*

78. Auto-transformer starter is used for

- 1). Speed control
- 2). Reduced starting voltage
- 3). Frequency change
- 4). Power factor correction

Correct Answer: **2). Reduced starting voltage**

Solution:

Provides adjustable starting voltage.

Ref: *Electrical Machinery – Bimbhra*

79. Direct-on-line starter is used for

- 1). Small motors
- 2). Large motors
- 3). Synchronous motors
- 4). DC motors

Correct Answer: **1). Small motors**

Solution:

DOL used for low-power motors.

Ref: *Electric Machines – Kothari*

80. Speed of induction motor can be controlled by

- 1). Frequency control
- 2). Pole changing
- 3). Rotor resistance control
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Multiple speed control methods exist.

Ref: *Electrical Technology – Theraja*

81. V/f control is used for

- 1). Speed control
- 2). Voltage control
- 3). Torque control
- 4). Power factor control

Correct Answer: **1). Speed control**

Solution:

Used in modern variable frequency drives.

Ref: *Electric Drives – G.K. Dubey*

82. Electrical braking methods include

- 1). Plugging
- 2). Dynamic braking
- 3). Regenerative braking
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Three main braking techniques.

Ref: *Electric Drives – G.K. Dubey*

83. Plugging braking reverses

- 1). Supply voltage polarity
- 2). Phase sequence
- 3). Rotor resistance
- 4). Voltage magnitude

Correct Answer: **2). Phase sequence**

Solution:

Produces reverse torque.

Ref: *Electrical Machinery – Bimbhra*

84. Regenerative braking occurs when

- 1). Rotor speed $>$ synchronous speed
- 2). Rotor speed $<$ synchronous speed
- 3). Rotor speed = synchronous speed
- 4). Rotor stopped

Correct Answer: **1). Rotor speed $>$ synchronous speed**

Solution:

Motor acts as generator.

Ref: *Electric Machines – Kothari*

85. Induction motor losses include

- 1). Copper losses
- 2). Iron losses
- 3). Mechanical losses
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

All losses reduce efficiency.

Ref: *Electrical Technology – Theraja*

86. Induction motor efficiency is

- 1). Low
- 2). Moderate
- 3). High
- 4). Zero

Correct Answer: **3). High**

Solution:

Widely used due to high efficiency.

Ref: *Electrical Machinery – Bimbhra*

87. Rotor current frequency at starting equals

- 1). Supply frequency
- 2). Zero
- 3). Double frequency
- 4). Half frequency

Correct Answer: **1). Supply frequency**

Solution:

Slip = 1 at starting.

Ref: *Electric Machines – Kothari*

88. Torque-slip curve shows

- 1). Relationship between torque and slip
- 2). Speed and current
- 3). Voltage and torque
- 4). Frequency and voltage

Correct Answer: **1). Relationship between torque and slip**

Solution:

Important characteristic curve.

Ref: *Electrical Technology – Theraja*

89. Full load slip of induction motor is approximately

- 1). 1–5%
- 2). 10–20%
- 3). 30–40%
- 4). 50%

Correct Answer: **1). 1–5%**

Solution:

Slip small at normal operation.

Ref: *Electrical Machinery – Bimbhra*

90. Induction motors are widely used because

- 1). Simple construction
- 2). Low cost
- 3). Robust operation
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Most common industrial motors.

Ref: *Electric Machines – Kothari*

91. Rotor bars in squirrel cage motor are skewed to

- 1). Reduce noise
- 2). Improve torque
- 3). Prevent magnetic locking
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Skewing improves performance.

Ref: *Electrical Machinery – Bimbhra*

92. Induction motors require

- 1). DC supply
- 2). Single phase supply
- 3). Three phase supply
- 4). Both AC and DC

Correct Answer: **3). Three phase supply**

Solution:

Three phase supply creates rotating magnetic field.

Ref: *Electric Machines – Kothari*

93. The rotating magnetic field speed equals

- 1). Rotor speed
- 2). Synchronous speed
- 3). Slip speed
- 4). Half speed

Correct Answer: **2). Synchronous speed**

Solution:

Produced by three phase stator currents.

Ref: *Electrical Technology – Theraja*

94. Air gap in induction motor should be

- 1). Large
- 2). Small
- 3). Infinite
- 4). Zero

Correct Answer: **2). Small**

Solution:

Small air gap improves efficiency.

Ref: *Electrical Machinery – Bimbhra*

95. Induction motor starting current is

- 1). Very small
- 2). Moderate
- 3). Very high
- 4). Zero

Correct Answer: **3). Very high**

Solution:

Starting current about 5–7 times rated current.

Ref: *Electric Machines – Kothari*

96. Induction motor stator winding is

- 1). Single phase
- 2). Three phase
- 3). DC winding
- 4). No winding

Correct Answer: **2). Three phase**

Solution:

Produces rotating magnetic field.

Ref: *Electrical Technology – Theraja*

97. Rotor circuit power factor at starting is

- 1). Unity
- 2). Low
- 3). Zero
- 4). Infinite

Correct Answer: **2). Low**

Solution:

Rotor reactance high at starting.

Ref: *Electrical Machinery – Bimbhra*

98. Mechanical power developed is

- 1). Rotor input minus rotor copper loss
- 2). Stator input minus stator loss
- 3). Voltage $\times$ current
- 4). Torque $\times$ slip

Correct Answer: **1). Rotor input minus rotor copper loss**

Solution:

Mechanical power available after rotor losses.

Ref: *Electric Machines – Kothari*

99. Slip increases when

- 1). Load increases
- 2). Voltage increases
- 3). Frequency increases
- 4). Resistance decreases

Correct Answer: **1). Load increases**

Solution:

Motor slows slightly with load.

Ref: *Electrical Technology – Theraja*

100. Induction motors are mainly used in

- 1). Pumps
- 2). Fans
- 3). Compressors
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Common industrial applications.

Ref: *Electrical Machinery – Bimbhra*

SECTION D – SINGLE-PHASE INDUCTION MOTORS & SPECIAL MOTORS

101. A single-phase induction motor is not self-starting because

- 1). Rotor resistance is high
- 2). No rotating magnetic field is produced
- 3). Voltage is low
- 4). Frequency is low

Correct Answer: **2). No rotating magnetic field is produced**

Solution:

Single-phase supply produces only pulsating field.

Ref: *Principles of Electrical Machines – V.K. Mehta*

102. Single-phase induction motor works on

- 1). Double revolving field theory
- 2). Electromagnetic induction
- 3). Chemical reaction
- 4). Electrostatic field

Correct Answer: **1). Double revolving field theory**

Solution:

Pulsating field is equivalent to two rotating fields.

Ref: *Electrical Machinery – P.S. Bimbhra*

103. The starting torque of single-phase induction motor is

- 1). Zero
- 2). Maximum
- 3). Moderate
- 4). Infinite

Correct Answer: **1). Zero**

Solution:

Starting torque is zero without auxiliary means.

Ref: *Electrical Technology – B.L. Theraja*

104. Starting torque in single-phase motor is produced using

- 1). Auxiliary winding
- 2). Capacitor
- 3). Phase splitting
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Phase difference between windings creates starting torque.

Ref: *Electric Machines – Kothari & Nagrath*

105. Capacitor start motors have

- 1). High starting torque
- 2). Low starting torque
- 3). Zero torque
- 4). Infinite torque

Correct Answer: **1). High starting torque**

Solution:

Capacitor produces phase shift.

Ref: *Electrical Machinery – Bimbhra*

106. Split-phase motors are used for

- 1). Low starting torque applications
- 2). High starting torque applications
- 3). High voltage applications
- 4). DC applications

Correct Answer: **1). Low starting torque applications**

Solution:

Used in fans and blowers.

Ref: *Electrical Technology – Theraja*

107. Shaded pole motors are used in

- 1). Fans
- 2). Small appliances
- 3). Refrigerators
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Simple and low-cost motors.

Ref: *Electric Machines – Kothari*

108. Shaded pole motors have

- 1). Very high efficiency
- 2). Low starting torque
- 3). High starting torque
- 4). High power factor

Correct Answer: **2). Low starting torque**

Solution:

Used for very small loads.

Ref: *Electrical Machinery – Bimbhra*

109. Universal motor operates on

- 1). DC only
- 2). AC only

- 3). Both AC and DC
- 4). Three-phase supply

Correct Answer: **3). Both AC and DC**

Solution:

Series motor modified for AC operation.

Ref: *Electrical Technology – Theraja*

110. Universal motors are commonly used in

- 1). Vacuum cleaners
- 2). Mixers
- 3). Drills
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

High speed motors.

Ref: *Electric Machines – Kothari*

111. Universal motor has

- 1). High speed
- 2). Low speed
- 3). Constant speed
- 4). Zero speed

Correct Answer: **1). High speed**

Solution:

Speed can reach several thousand RPM.

Ref: *Electrical Machinery – Bimbhra*

112. The rotor of universal motor is

- 1). Squirrel cage type
- 2). Wound rotor
- 3). Commutator type
- 4). Permanent magnet

Correct Answer: **3). Commutator type**

Solution:

Similar to DC series motor.

Ref: *Electrical Technology – Theraja*

113. BLDC motor stands for

- 1). Brushless DC motor
- 2). Balanced DC motor
- 3). Binary DC motor
- 4). Base line DC motor

Correct Answer: **1). Brushless DC motor**

Solution:

Uses electronic commutation.

Ref: *Special Electrical Machines – E.G. Janardhanan*

114. BLDC motors use

- 1). Brushes
- 2). Electronic controller
- 3). Commutator
- 4). Slip rings

Correct Answer: **2). Electronic controller**

Solution:

Commutation performed electronically.

Ref: *Electric Drives – G.K. Dubey*

115. BLDC motors are widely used in

- 1). Electric vehicles
- 2). Drones
- 3). Computers
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

High efficiency and reliability.

Ref: *Special Electrical Machines – Janardhanan*

116. Stepper motors convert

- 1). Electrical pulses into angular movement
- 2). AC into DC
- 3). Mechanical energy to electrical energy
- 4). Voltage into current

Correct Answer: **1). Electrical pulses into angular movement**

Solution:

Moves in discrete steps.

Ref: *Stepping Motors – P.P. Acarnley*

117. Stepper motors are used in

- 1). Robotics
- 2). Printers
- 3). CNC machines
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Used where precise positioning required.

Ref: *Special Electrical Machines – Janardhanan*

118. Step angle determines

- 1). Voltage
- 2). Current
- 3). Angular movement per step
- 4). Frequency

Correct Answer: **3). Angular movement per step**

Solution:

Defines resolution of stepper motor.

Ref: *Stepper Motors – Acarnley*

119. Stepper motors operate in

- 1). Continuous rotation
- 2). Discrete steps
- 3). Reverse rotation only
- 4). Half speed

Correct Answer: **2). Discrete steps**

Solution:

Movement controlled by pulses.

Ref: *Special Electrical Machines – Janardhanan*

120. Permanent magnet stepper motor uses

- 1). Electromagnet rotor
- 2). Permanent magnet rotor
- 3). Copper rotor
- 4). Steel rotor

Correct Answer: **2). Permanent magnet rotor**

Solution:

Rotor made of permanent magnet.

Ref: *Stepper Motors – Acarnley*

121. Hybrid stepper motors combine

- 1). Permanent magnet and variable reluctance
- 2). Induction and synchronous motors
- 3). AC and DC motors
- 4). BLDC and universal motors

Correct Answer: **1). Permanent magnet and variable reluctance**

Solution:

Provides better torque and resolution.

Ref: *Special Electrical Machines – Janardhanan*

122. Stepper motors are controlled by

- 1). Voltage
- 2). Current pulses
- 3). Frequency only
- 4). Resistance

Correct Answer: **2). Current pulses**

Solution:

Pulse input determines step motion.

Ref: *Stepper Motors – Acarnley*

123. Variable reluctance stepper motor works on

- 1). Magnetic reluctance principle
- 2). Electrostatic force
- 3). Chemical energy
- 4). Thermal energy

Correct Answer: **1). Magnetic reluctance principle**

Solution:

Rotor aligns with minimum reluctance position.

Ref: *Special Electrical Machines – Janardhanan*

124. Single-phase induction motors are commonly used in

- 1). Household appliances
- 2). Industrial drives
- 3). Power plants
- 4). Generators

Correct Answer: **1). Household appliances**

Solution:

Used where three-phase supply unavailable.

Ref: *Electrical Machinery – Bimbhra*

125. Capacitor run motor is used in

- 1). Fans
- 2). Air conditioners
- 3). Pumps
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Improved power factor and efficiency.

Ref: *Electrical Technology – Theraja*

126. The auxiliary winding in split phase motor is disconnected by

- 1). Centrifugal switch
- 2). Relay

- 3). Capacitor
- 4). Resistor

Correct Answer: **1). Centrifugal switch**

Solution:

Disconnects after starting.

Ref: *Electric Machines – Kothari*

127. Capacitor start capacitor run motor has

- 1). Two capacitors
- 2). One capacitor
- 3). No capacitor
- 4). Three capacitors

Correct Answer: **1). Two capacitors**

Solution:

Provides high starting torque and good running performance.

Ref: *Electrical Machinery – Bimbhra*

128. Shaded pole motors use

- 1). Copper shading ring
- 2). Aluminum ring
- 3). Steel ring
- 4). Iron ring

Correct Answer: **1). Copper shading ring**

Solution:

Creates delayed magnetic field.

Ref: *Electrical Technology – Theraja*

129. Universal motors use

- 1). Series field winding
- 2). Shunt field winding
- 3). Compound winding
- 4). No winding

Correct Answer: **1). Series field winding**

Solution:

Similar to DC series motor.

Ref: *Electric Machines – Kothari*

130. Stepper motors are suitable for

- 1). Position control systems
- 2). Speed control systems
- 3). Voltage control systems
- 4). Current control systems

Correct Answer: **1). Position control systems**

Solution:

Used in precise motion control.

Ref: *Stepper Motors – Acarnley*

131. BLDC motors are preferred due to

- 1). High efficiency
- 2). Low maintenance
- 3). High reliability
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

No brushes → less wear.

Ref: *Special Electrical Machines – Janardhanan*

132. Electronic commutation replaces

- 1). Brushes and commutator
- 2). Rotor
- 3). Stator
- 4). Shaft

Correct Answer: **1). Brushes and commutator**

Solution:

Used in BLDC motors.

Ref: *Electric Drives – Dubey*

133. Stepper motors have

- 1). High accuracy
- 2). High speed
- 3). High voltage
- 4). High current

Correct Answer: **1). High accuracy**

Solution:

Suitable for digital control.

Ref: *Stepper Motors – Acarnley*

134. The stator of stepper motor contains

- 1). Windings
- 2). Permanent magnets
- 3). Brushes
- 4). Slip rings

Correct Answer: **1). Windings**

Solution:

Electromagnetic coils produce magnetic field.

Ref: *Special Electrical Machines – Janardhanan*

135. Stepper motor direction depends on

- 1). Sequence of pulses
- 2). Voltage magnitude
- 3). Current magnitude
- 4). Frequency

Correct Answer: **1). Sequence of pulses**

Solution:

Changing pulse sequence reverses direction.

Ref: *Stepper Motors – Acarnley*

136. BLDC motors produce

- 1). AC output
- 2). DC output
- 3). Mechanical rotation
- 4). Heat energy

Correct Answer: **3). Mechanical rotation**

Solution:

Convert electrical energy into mechanical motion.

Ref: *Electric Drives – Dubey*

137. Universal motor torque is

- 1). High
- 2). Low
- 3). Zero
- 4). Constant

Correct Answer: **1). High**

Solution:

Series motor characteristic.

Ref: *Electrical Machinery – Bimbhra*

138. Shaded pole motors have

- 1). Simple construction
- 2). Low cost
- 3). Low efficiency
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Used in small devices.

Ref: *Electrical Technology – Theraja*

139. Stepper motors are used in

- 1). 3D printers
- 2). CNC machines
- 3). Robotics
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Applications requiring precise control.

Ref: *Stepper Motors – Acarnley*

140. Special motors include

- 1). Stepper motors
- 2). BLDC motors
- 3). Universal motors
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Special motors designed for specific applications.

Ref: *Special Electrical Machines – Janardhanan*

UNIT V – POWER SYSTEM GENERATION & PROTECTION

SECTION A – GENERATING STATIONS

1. The main purpose of a generating station is to

- 1). Store electrical energy
- 2). Convert mechanical energy into electrical energy
- 3). Convert electrical energy into heat
- 4). Convert chemical energy into light

Correct Answer: **2). Convert mechanical energy into electrical energy**

Solution:

Power stations use turbines to convert mechanical energy into electrical energy.

Ref: *Principles of Power System – V.K. Mehta*

2. The most commonly used generating station is

- 1). Hydroelectric plant
- 2). Thermal power plant
- 3). Nuclear power plant
- 4). Wind power plant

Correct Answer: **2). Thermal power plant**

Solution:

Thermal plants are widely used due to availability of fuel.

Ref: *Power Plant Engineering – P.K. Nag*

3. In a thermal power plant, the main fuel used is

- 1). Water
- 2). Coal
- 3). Uranium
- 4). Wind

Correct Answer: **2). Coal**

Solution:

Coal combustion produces steam to drive turbine.

Ref: *Generation of Electrical Energy – B.R. Gupta*

4. The working fluid in a steam turbine plant is

- 1). Air
- 2). Water/Steam
- 3). Oil
- 4). Hydrogen

Correct Answer: **2). Water/Steam**

Solution:

Steam drives turbine blades.

Ref: *Power Plant Engineering – P.K. Nag*

5. The main component converting steam energy into mechanical energy is

- 1). Boiler
- 2). Turbine
- 3). Condenser
- 4). Generator

Correct Answer: **2). Turbine**

Solution:

Steam turbine rotates the generator shaft.

Ref: *Principles of Power System – Mehta*

6. Hydroelectric power plants use

- 1). Steam energy
- 2). Water energy
- 3). Nuclear energy
- 4). Solar energy

Correct Answer: **2). Water energy**

Solution:

Potential energy of stored water drives turbine.

Ref: *Power Plant Engineering – P.K. Nag*

7. Hydroelectric plants are usually located

- 1). Near coal mines
- 2). Near rivers or dams
- 3). In cities
- 4). Near nuclear reactors

Correct Answer: **2). Near rivers or dams**

Solution:

Water head required for hydro power.

Ref: *Generation of Electrical Energy – B.R. Gupta*

8. Nuclear power plants use fuel

- 1). Uranium
- 2). Coal
- 3). Diesel
- 4). Natural gas

Correct Answer: **1). Uranium**

Solution:

Nuclear fission releases heat.

Ref: *Power Plant Engineering – P.K. Nag*

9. Solar power plants convert

- 1). Heat into electricity
- 2). Solar radiation into electricity
- 3). Wind energy into electricity
- 4). Water energy into electricity

Correct Answer: **2). Solar radiation into electricity**

Solution:

Photovoltaic cells convert sunlight into electricity.

Ref: *Non-Conventional Energy Sources – G.D. Rai*

10. Wind power plants generate electricity using

- 1). Turbines driven by wind
- 2). Water turbines
- 3). Steam turbines
- 4). Diesel engines

Correct Answer: **1). Turbines driven by wind**

Solution:

Wind rotates blades connected to generator.

Ref: *Non-Conventional Energy Sources – G.D. Rai*

11. Tidal power plants use

- 1). Ocean tides
- 2). Solar radiation
- 3). Wind energy
- 4). Coal

Correct Answer: **1). Ocean tides**

Solution:

Energy from rise and fall of sea levels.

Ref: *Non-Conventional Energy Sources – Rai*

12. Bio power plants generate energy from

- 1). Coal
- 2). Biomass
- 3). Uranium
- 4). Diesel

Correct Answer: **2). Biomass**

Solution:

Organic materials used as fuel.

Ref: *Non-Conventional Energy Sources – Rai*

13. Gas turbine plants use

- 1). Coal
- 2). Natural gas
- 3). Uranium
- 4). Water

Correct Answer: **2). Natural gas**

Solution:

Gas turbine burns natural gas.

Ref: *Power Plant Engineering – Nag*

14. Load factor is defined as

- 1). Maximum load / average load
- 2). Average load / maximum load
- 3). Maximum load / connected load
- 4). Connected load / maximum load

Correct Answer: **2). Average load / maximum load**

Solution:

$$\text{Load Factor} = \frac{\text{Average Load}}{\text{Maximum Load}}$$

Ref: *Principles of Power System – Mehta*

15. Diversity factor is

- 1). Maximum demand / sum of individual maximum demands
- 2). Sum of individual maximum demands / maximum demand
- 3). Load factor / demand factor
- 4). Demand factor / load factor

Correct Answer: **2). Sum of individual maximum demands / maximum demand**

Solution:

Diversity factor > 1.

Ref: *Power Systems – J.B. Gupta*

16. Plant capacity factor is

- 1). Average load / plant capacity
- 2). Maximum load / plant capacity
- 3). Connected load / plant capacity
- 4). Load factor / diversity factor

Correct Answer: **1). Average load / plant capacity**

Solution:

Indicates plant utilization.

Ref: *Principles of Power System – Mehta*

17. Tariff means

- 1). Price of electrical energy
- 2). Voltage level
- 3). Current level
- 4). Power factor

Correct Answer: **1). Price of electrical energy**

Solution:

Consumers pay tariff per unit of energy.

Ref: *Power Systems – J.B. Gupta*

18. Two-part tariff consists of

- 1). Fixed charge + running charge
- 2). Voltage charge + current charge
- 3). Power charge + voltage charge
- 4). Current charge + resistance charge

Correct Answer: **1). Fixed charge + running charge**

Solution:

Common electricity billing method.

Ref: *Principles of Power System – Mehta*

19. Block rate tariff means

- 1). Same rate for all units
- 2). Rate varies for different energy blocks
- 3). Free electricity
- 4). Fixed energy charge

Correct Answer: **2). Rate varies for different energy blocks**

Solution:

Unit cost decreases for higher consumption.

Ref: *Power Systems – J.B. Gupta*

20. Load curve represents

- 1). Variation of load with time
- 2). Variation of voltage
- 3). Variation of frequency
- 4). Variation of resistance

Correct Answer: **1). Variation of load with time**

Solution:

Used to analyze power demand.

Ref: *Principles of Power System – Mehta*

21. Daily load curve represents

- 1). Load variation in one day
- 2). Load variation in one week
- 3). Load variation in one year
- 4). Load variation in one month

Correct Answer: **1). Load variation in one day**

Solution:

Shows hourly demand changes.

Ref: *Power Systems – J.B. Gupta*

22. Peak load means

- 1). Minimum load
- 2). Maximum load
- 3). Average load
- 4). Zero load

Correct Answer: **2). Maximum load**

Solution:

Highest demand in a period.

Ref: *Principles of Power System – Mehta*

23. Base load power plant is

- 1). Plant supplying constant load
- 2). Plant supplying peak load
- 3). Backup plant
- 4). Emergency plant

Correct Answer: **1). Plant supplying constant load**

Solution:

Operates continuously.

Ref: *Power Plant Engineering – Nag*

24. Peak load power plants are used during

- 1). Minimum demand
- 2). Maximum demand
- 3). No load
- 4). Shutdown

Correct Answer: **2). Maximum demand**

Solution:

Used during high demand periods.

Ref: *Power Systems – J.B. Gupta*

25. Thermal power plants have

- 1). Low initial cost
- 2). High initial cost
- 3). Zero cost
- 4). Infinite cost

Correct Answer: **1). Low initial cost**

Solution:

But operating cost is high.

Ref: *Power Plant Engineering – Nag*

26. Hydroelectric power plants have

- 1). High initial cost
- 2). Low running cost
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Hydro plants require expensive dams but operating cost is low.

Ref: *Power Plant Engineering – P.K. Nag*

27. Thermal power plants have

- 1). Low running cost
- 2). High running cost
- 3). Zero running cost
- 4). Infinite running cost

Correct Answer: **2). High running cost**

Solution:

Fuel consumption increases operating cost.

Ref: *Principles of Power System – Mehta*

28. Nuclear power plants produce energy by

- 1). Combustion
- 2). Nuclear fission
- 3). Chemical reaction
- 4). Wind energy

Correct Answer: **2). Nuclear fission**

Solution:

Splitting of uranium atoms releases energy.

Ref: *Power Plant Engineering – Nag*

29. Condenser in steam power plant is used to

- 1). Increase steam pressure
- 2). Convert steam into water
- 3). Increase voltage
- 4). Increase temperature

Correct Answer: **2). Convert steam into water**

Solution:

Condensed water reused in boiler.

Ref: *Generation of Electrical Energy – B.R. Gupta*

30. Economizer in boiler increases

- 1). Steam pressure
- 2). Boiler efficiency
- 3). Voltage
- 4). Turbine speed

Correct Answer: **2). Boiler efficiency**

Solution:

Preheats feed water using exhaust gases.

Ref: *Power Plant Engineering – Nag*

31. Superheater in boiler is used to

- 1). Increase steam temperature
- 2). Increase pressure
- 3). Reduce temperature
- 4). Reduce pressure

Correct Answer: **1). Increase steam temperature**

Solution:

Superheated steam improves turbine efficiency.

Ref: *Generation of Electrical Energy – Gupta*

32. Draft in boiler means

- 1). Supply of air for combustion
- 2). Water flow
- 3). Steam flow
- 4). Voltage supply

Correct Answer: **1). Supply of air for combustion**

Solution:

Proper draft ensures efficient combustion.

Ref: *Power Plant Engineering – Nag*

33. Cooling towers in power plants are used for

- 1). Cooling water
- 2). Increasing voltage
- 3). Reducing current
- 4). Increasing frequency

Correct Answer: **1). Cooling water**

Solution:

Heat removed from condenser water.

Ref: *Principles of Power System – Mehta*

34. Diesel power plants are used for

- 1). Base load
- 2). Peak load
- 3). Standby supply
- 4). Both 2 and 3

Correct Answer: **4). Both 2 and 3**

Solution:

Used for emergency and peak load conditions.

Ref: *Power Systems – J.B. Gupta*

35. Wind power plants depend on

- 1). Solar radiation
- 2). Wind velocity
- 3). Water head
- 4). Fuel

Correct Answer: **2). Wind velocity**

Solution:

Higher wind speeds produce more power.

Ref: *Non-Conventional Energy Sources – Rai*

36. Solar photovoltaic cells convert

- 1). Heat energy to electrical energy
- 2). Light energy to electrical energy
- 3). Mechanical energy to electrical energy
- 4). Chemical energy to electrical energy

Correct Answer: **2). Light energy to electrical energy**

Solution:

PV cells use semiconductor materials.

Ref: *Non-Conventional Energy Sources – Rai*

37. Combined cycle power plants use

- 1). Steam turbine only
- 2). Gas turbine only
- 3). Both gas and steam turbines
- 4). Wind turbine

Correct Answer: **3). Both gas and steam turbines**

Solution:

Improves efficiency.

Ref: *Power Plant Engineering – Nag*

38. The auxiliary equipment in power plants include

- 1). Pumps
- 2). Fans
- 3). Conveyors
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Auxiliaries support main generation system.

Ref: *Principles of Power System – Mehta*

39. Load duration curve is obtained from

- 1). Daily load curve
- 2). Annual load curve
- 3). Weekly load curve
- 4). Hourly load curve

Correct Answer: **1). Daily load curve**

Solution:

Loads arranged in descending order.

Ref: *Power Systems – J.B. Gupta*

40. Plant use factor is

- 1). Energy generated / plant capacity
- 2). Maximum load / plant capacity
- 3). Average load / plant capacity
- 4). Load factor / demand factor

Correct Answer: **1). Energy generated / plant capacity**

Solution:

Indicates plant utilization.

Ref: *Principles of Power System – Mehta*

41. Demand factor is

- 1). Maximum demand / connected load
- 2). Connected load / maximum demand
- 3). Average load / maximum load
- 4). Load factor / diversity factor

Correct Answer: **1). Maximum demand / connected load**

Solution:

Demand factor < 1 .

Ref: *Power Systems – J.B. Gupta*

42. Power factor correction reduces

- 1). Voltage
- 2). Current
- 3). Resistance
- 4). Frequency

Correct Answer: **2). Current**

Solution:

Improves efficiency and reduces losses.

Ref: *Principles of Power System – Mehta*

43. Capacitors used for power factor correction provide

- 1). Lagging reactive power
- 2). Leading reactive power
- 3). Zero power
- 4). Real power

Correct Answer: **2). Leading reactive power**

Solution:

Compensates inductive loads.

Ref: *Power Systems – J.B. Gupta*

44. Thermal power plants cause

- 1). Air pollution
- 2). Water pollution
- 3). Thermal pollution
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Pollution control systems required.

Ref: *Power Plant Engineering – Nag*

45. Nuclear plants produce

- 1). Radioactive waste
- 2). Air pollution
- 3). Noise pollution
- 4). None

Correct Answer: **1). Radioactive waste**

Solution:

Waste disposal is major issue.

Ref: *Power Plant Engineering – Nag*

46. Hydroelectric plants have advantage

- 1). Renewable energy
- 2). Low running cost
- 3). No fuel cost
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Hydro power is clean and renewable.

Ref: *Generation of Electrical Energy – Gupta*

47. Wind energy is

- 1). Renewable
- 2). Non-renewable
- 3). Fossil fuel
- 4). Nuclear energy

Correct Answer: **1). Renewable**

Solution:

Wind energy is sustainable.

Ref: *Non-Conventional Energy Sources – Rai*

48. Solar energy is available during

- 1). Day time
- 2). Night time
- 3). Both
- 4). Winter only

Correct Answer: **1). Day time**

Solution:

Depends on sunlight.

Ref: *Non-Conventional Energy Sources – Rai*

49. Tidal energy depends on

- 1). Lunar gravitational force
- 2). Solar radiation
- 3). Wind speed
- 4). Fuel combustion

Correct Answer: **1). Lunar gravitational force**

Solution:

Moon causes ocean tides.

Ref: *Non-Conventional Energy Sources – Rai*

50. Renewable energy sources include

- 1). Solar
- 2). Wind
- 3). Hydro
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Renewable sources replenish naturally.

Ref: *Power Systems – J.B. Gupta*

SECTION B – POWER SYSTEM PROTECTION

51. Power system protection is used to

- 1). Prevent faults
- 2). Detect and isolate faults
- 3). Increase voltage
- 4). Increase power factor

Correct Answer: **2). Detect and isolate faults**

Solution:

Protection systems quickly isolate faulty sections to protect equipment.

Ref: *Fundamentals of Power System Protection – Paithankar & Bhide*

52. A relay is a device used to

- 1). Measure voltage
- 2). Detect faults and operate circuit breakers
- 3). Store energy
- 4). Convert AC to DC

Correct Answer: **2). Detect faults and operate circuit breakers**

Solution:

Relay senses abnormal conditions and sends trip signal.

Ref: *Power System Protection – B. Ram*

53. Relays are classified based on

- 1). Operating principle
- 2). Time of operation
- 3). Function
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Relays can be classified in multiple ways.

Ref: *Switchgear and Protection – Sunil S. Rao*

54. Overcurrent relay operates when

- 1). Current exceeds preset value
- 2). Voltage increases
- 3). Frequency increases
- 4). Resistance increases

Correct Answer: **1). Current exceeds preset value**

Solution:

Used to protect against overload and short circuits.

Ref: *Power System Protection – B. Ram*

55. Directional relays are used to

- 1). Detect direction of power flow
- 2). Measure voltage
- 3). Increase current
- 4). Increase frequency

Correct Answer: **1). Detect direction of power flow**

Solution:

Used in interconnected power systems.

Ref: *Paithankar & Bhide*

56. Differential protection operates on

- 1). Voltage difference
- 2). Current difference
- 3). Frequency difference
- 4). Power difference

Correct Answer: **2). Current difference**

Solution:

Compares current entering and leaving equipment.

Ref: *Power System Protection – B. Ram*

57. Merz-Price protection is used for

- 1). Transformers
- 2). Alternators
- 3). Both
- 4). Transmission lines

Correct Answer: **3). Both**

Solution:

Differential protection scheme.

Ref: *Paithankar & Bhide*

58. Distance relay operates based on

- 1). Voltage
- 2). Current
- 3). Impedance
- 4). Frequency

Correct Answer: **3). Impedance**

Solution:

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

Ref: *Power System Protection – B. Ram*

59. Types of distance relays include

- 1). Impedance relay
- 2). Reactance relay
- 3). Mho relay
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Each relay has different operating characteristics.

Ref: *Switchgear and Protection – Rao*

60. Circuit breaker is used to

- 1). Protect circuit from faults
- 2). Switch circuits under fault conditions
- 3). Interrupt fault current
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Circuit breakers isolate faulty sections.

Ref: *Power System Protection – B. Ram*

61. The arc produced during circuit interruption is quenched using

- 1). Air
- 2). Oil
- 3). SF₆ gas
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different circuit breakers use different quenching media.

Ref: *Switchgear and Protection – Rao*

62. Oil circuit breakers use

- 1). Air as arc medium
- 2). Oil as arc quenching medium
- 3). Vacuum
- 4). Gas

Correct Answer: **2). Oil as arc quenching medium**

Solution:

Oil cools and extinguishes arc.

Ref: *Power System Protection – B. Ram*

63. Air circuit breakers use

- 1). Oil
- 2). Air
- 3). Vacuum
- 4). Gas

Correct Answer: **2). Air**

Solution:

Compressed air extinguishes arc.

Ref: *Switchgear and Protection – Rao*

64. SF₆ circuit breakers use

- 1). Sulfur hexafluoride gas
- 2). Nitrogen gas
- 3). Hydrogen gas
- 4). Oxygen gas

Correct Answer: **1). Sulfur hexafluoride gas**

Solution:

SF₆ has excellent dielectric properties.

Ref: *Power System Protection – B. Ram*

65. Vacuum circuit breakers operate in

- 1). Air
- 2). Oil
- 3). Vacuum
- 4). Gas

Correct Answer: **3). Vacuum**

Solution:

Arc extinguished in vacuum environment.

Ref: *Switchgear and Protection – Rao*

66. Lightning arresters protect equipment from

- 1). Overcurrent
- 2). Overvoltage due to lightning
- 3). Overload
- 4). Short circuits

Correct Answer: **2). Overvoltage due to lightning**

Solution:

Diverts surge to ground.

Ref: *Power System Protection – B. Ram*

67. Neutral grounding is used to

- 1). Limit fault current
- 2). Stabilize voltage
- 3). Protect equipment
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Grounding improves safety and protection.

Ref: *Paithankar & Bhide*

68. Bus-bar protection commonly uses

- 1). Differential protection
- 2). Distance protection
- 3). Overcurrent protection
- 4). Voltage protection

Correct Answer: **1). Differential protection**

Solution:

Sensitive protection for bus-bars.

Ref: *Power System Protection – B. Ram*

69. Transmission line protection commonly uses

- 1). Distance relays
- 2). Differential relays
- 3). Thermal relays
- 4). Voltage relays

Correct Answer: **1). Distance relays**

Solution:

Measures impedance to locate faults.

Ref: *Switchgear and Protection – Rao*

70. Current limiting reactors are used to

- 1). Increase voltage
- 2). Limit fault current
- 3). Increase current
- 4). Increase frequency

Correct Answer: **2). Limit fault current**

Solution:

Protect equipment from excessive currents.

Ref: *Power System Protection – B. Ram*

71. Protective relays should have

- 1). Reliability
- 2). Sensitivity
- 3). Selectivity
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Essential characteristics of protection system.

Ref: *Paithankar & Bhide*

72. Sensitivity of relay refers to

- 1). Ability to detect small faults
- 2). Voltage capacity
- 3). Current capacity
- 4). Speed of operation

Correct Answer: **1). Ability to detect small faults**

Solution:

Sensitive relays detect minor faults.

Ref: *Power System Protection – B. Ram*

73. Selectivity means

- 1). Correct relay operates for fault
- 2). All relays operate
- 3). No relay operates
- 4). Voltage increases

Correct Answer: **1). Correct relay operates for fault**

Solution:

Ensures only faulty section is isolated.

Ref: *Switchgear and Protection – Rao*

74. Reliability of protection system means

- 1). Correct operation during faults
- 2). High voltage operation
- 3). High current operation
- 4). Fast operation only

Correct Answer: **1). Correct operation during faults**

Solution:

Reliable protection avoids false trips.

Ref: *Paithankar & Bhide*

75. Time grading in protection means

- 1). Time delay coordination between relays
- 2). Voltage grading
- 3). Current grading
- 4). Frequency grading

Correct Answer: **1). Time delay coordination between relays**

Solution:

Used in overcurrent protection schemes.

Ref: *Power System Protection – B. Ram*

76. Backup protection is used when

- 1). Primary protection fails
- 2). Voltage fails
- 3). Frequency fails
- 4). Generator fails

Correct Answer: **1). Primary protection fails**

Solution:

Ensures system reliability.

Ref: *Switchgear and Protection – Rao*

77. Overvoltage protection protects against

- 1). Lightning surges
- 2). Switching surges
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Surge protection devices used.

Ref: *Power System Protection – B. Ram*

78. Surge absorbers are used to

- 1). Absorb voltage surges
- 2). Increase voltage
- 3). Increase current
- 4). Increase power

Correct Answer: **1). Absorb voltage surges**

Solution:

Protect equipment insulation.

Ref: *Switchgear and Protection – Rao*

79. Protection of alternators includes

- 1). Differential protection
- 2). Overcurrent protection
- 3). Earth fault protection
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Multiple protection schemes required.

Ref: *Paithankar & Bhide*

80. Transformer protection commonly uses

- 1). Differential protection
- 2). Buchholz relay
- 3). Overcurrent relay
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different schemes for internal and external faults.

Ref: *Power System Protection – B. Ram*

81. Distance relays are mainly used for

- 1). Generator protection
- 2). Transformer protection
- 3). Transmission line protection
- 4). Motor protection

Correct Answer: **3). Transmission line protection**

Solution:

Impedance measurement indicates fault location.

Ref: *Switchgear and Protection – Rao*

82. Reactance relay is suitable for

- 1). Short transmission lines
- 2). Medium transmission lines
- 3). Long transmission lines
- 4). Distribution systems

Correct Answer: **1). Short transmission lines**

Solution:

Less affected by fault resistance.

Ref: *Power System Protection – B. Ram*

83. Mho relay is used for

- 1). Long transmission lines
- 2). Short transmission lines
- 3). Transformers
- 4). Generators

Correct Answer: **1). Long transmission lines**

Solution:

Directional distance relay.

Ref: *Paithankar & Bhide*

84. Impedance relay measures

- 1). Resistance
- 2). Reactance
- 3). Impedance
- 4). Voltage

Correct Answer: **3). Impedance**

Solution:

Used in distance protection.

Ref: *Switchgear and Protection – Rao*

85. Lightning arresters are installed between

- 1). Line and ground
- 2). Line and neutral
- 3). Phase and phase
- 4). Transformer and generator

Correct Answer: **1). Line and ground**

Solution:

Surge diverted safely to earth.

Ref: *Power System Protection – B. Ram*

86. Neutral grounding helps in

- 1). Reducing fault current
- 2). Improving system stability
- 3). Protecting equipment
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Grounding enhances safety.

Ref: *Paithankar & Bhide*

87. Relay operating time should be

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

Correct Answer: **1). Minimum**

Solution:

Fast fault clearing reduces damage.

Ref: *Switchgear and Protection – Rao*

88. Protective relays operate when

- 1). System parameters exceed preset limits
- 2). Voltage decreases
- 3). Current decreases
- 4). Frequency decreases

Correct Answer: **1). System parameters exceed preset limits**

Solution:

Relay senses abnormal conditions.

Ref: *Power System Protection – B. Ram*

89. Circuit breakers operate automatically when

- 1). Fault occurs
- 2). Voltage increases
- 3). Frequency increases
- 4). Load decreases

Correct Answer: **1). Fault occurs**

Solution:

Triggered by relay signals.

Ref: *Switchgear and Protection – Rao*

90. Modern protection systems use

- 1). Digital relays
- 2). Electromechanical relays
- 3). Static relays
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different technologies used.

Ref: *Paithankar & Bhide*

91. Static relays use

- 1). Electronic components
- 2). Mechanical parts
- 3). Magnetic coils
- 4). Copper wires

Correct Answer: **1). Electronic components**

Solution:

Faster and more reliable.

Ref: *Power System Protection – B. Ram*

92. Digital relays use

- 1). Microprocessors
- 2). Analog circuits
- 3). Magnetic circuits
- 4). Mechanical systems

Correct Answer: **1). Microprocessors**

Solution:

Provide advanced protection features.

Ref: *Switchgear and Protection – Rao*

93. Relay coordination ensures

- 1). Proper sequence of relay operation
- 2). Higher voltage
- 3). Higher current
- 4). Lower frequency

Correct Answer: **1). Proper sequence of relay operation**

Solution:

Ensures selectivity.

Ref: *Paithankar & Bhide*

94. Protection of bus-bars is difficult because

- 1). Fault currents are very high
- 2). No impedance
- 3). Fault spreads rapidly
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Bus-bar faults are severe.

Ref: *Power System Protection – B. Ram*

95. Generator protection includes

- 1). Overcurrent
- 2). Differential protection
- 3). Earth fault protection
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Multiple protection schemes required.

Ref: *Switchgear and Protection – Rao*

96. High voltage circuit breakers commonly use

- 1). SF₆ gas
- 2). Oil
- 3). Vacuum
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different types used depending on voltage level.

Ref: *Power System Protection – B. Ram*

97. Arc in circuit breaker is extinguished by

- 1). Cooling
- 2). Lengthening
- 3). Splitting
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Methods used to quench arc.

Ref: *Switchgear and Protection – Rao*

98. Protection system components include

- 1). Current transformers
- 2). Relays
- 3). Circuit breakers
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Protection systems use measuring and switching devices.

Ref: *Paithankar & Bhide*

99. The purpose of current transformers in protection is

- 1). Step down current for measurement
- 2). Increase current
- 3). Reduce voltage
- 4). Increase power

Correct Answer: **1). Step down current for measurement**

Solution:

Allows safe relay operation.

Ref: *Power System Protection – B. Ram*

100. The main objective of protection system is

- 1). Maintain supply continuity
- 2). Protect equipment
- 3). Ensure safety
- 4). All of the above

Correct Answer: 4). All of the above

Solution:

Protection ensures safe and reliable operation of power systems.

Ref: *Fundamentals of Power System Protection – Paithankar & Bhide*

UNIT VI – TRANSMISSION AND DISTRIBUTION

SECTION A – TRANSMISSION LINE FUNDAMENTALS

1. Transmission lines are used to

- 1). Generate electrical energy
- 2). Transfer electrical energy from generating station to substations
- 3). Convert AC to DC
- 4). Store electrical energy

Correct Answer: **2). Transfer electrical energy from generating station to substations**

Solution:

Transmission lines carry bulk electrical power over long distances.

Ref: *Principles of Power System – V.K. Mehta*

2. Distribution system delivers power from

- 1). Generating station to consumers
- 2). Substation to consumers
- 3). Transmission line to generator
- 4). Transformer to generator

Correct Answer: **2). Substation to consumers**

Solution:

Distribution systems supply electricity to end users.

Ref: *Power System Engineering – Kothari & Nagrath*

3. Transmission voltage is usually

- 1). Low voltage
- 2). Medium voltage
- 3). High voltage
- 4). Zero voltage

Correct Answer: **3). High voltage**

Solution:

High voltage reduces transmission losses.

Ref: *Electrical Power Systems – C.L. Wadhwa*

4. Transmission losses mainly depend on

- 1). Resistance of conductors
- 2). Current flowing
- 3). Length of line
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

$$Loss = I^2R$$

Ref: *Power System Engineering – Kothari*

5. Types of supply systems include

- 1). Single-phase system
- 2). Three-phase system
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Three-phase systems widely used for power transmission.

Ref: *Principles of Power System – Mehta*

6. Three-phase system is preferred because

- 1). Higher efficiency
- 2). Constant power transfer
- 3). Reduced conductor material
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Three-phase systems are economical and efficient.

Ref: *Power System Engineering – Kothari*

7. The parameters of transmission line are

- 1). Resistance
- 2). Inductance
- 3). Capacitance
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

These parameters affect line performance.

Ref: *Electrical Power Systems – Wadhwa*

8. Resistance of transmission line depends on

- 1). Length of conductor
- 2). Cross-sectional area
- 3). Material
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

$$R = \frac{\rho L}{A}$$

Ref: *Principles of Power System – Mehta*

9. Inductance of transmission line depends on

- 1). Conductor spacing
- 2). Conductor radius
- 3). Line configuration
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Inductance determined by magnetic flux linkage.

Ref: *Power System Engineering – Kothari*

10. Capacitance of transmission line occurs due to

- 1). Potential difference between conductors
- 2). Magnetic field
- 3). Resistance
- 4). Current flow

Correct Answer: **1). Potential difference between conductors**

Solution:

Conductors act like capacitor plates.

Ref: *Electrical Power Systems – Wadhwa*

11. Short transmission line length is

- 1). Less than 80 km
- 2). 80–250 km
- 3). More than 250 km
- 4). Less than 10 km

Correct Answer: **1). Less than 80 km**

Solution:

Capacitance neglected in short lines.

Ref: *Principles of Power System – Mehta*

12. Medium transmission line length is

- 1). 80–250 km
- 2). 50–100 km
- 3). 10–50 km
- 4). Above 300 km

Correct Answer: **1). 80–250 km**

Solution:

Capacitance considered.

Ref: *Power System Engineering – Kothari*

13. Long transmission lines are

- 1). Less than 80 km
- 2). 80–200 km
- 3). More than 250 km
- 4). 50 km

Correct Answer: **3). More than 250 km**

Solution:

Distributed parameters considered.

Ref: *Electrical Power Systems – Wadhwa*

14. Voltage regulation of transmission line is

- 1). Change in voltage from no-load to full-load
- 2). Voltage drop
- 3). Current drop
- 4). Power loss

Correct Answer: **1). Change in voltage from no-load to full-load**

Solution:

$$\text{Regulation} = \frac{V_{NL} - V_{FL}}{V_{FL}} \times 100$$

Ref: *Principles of Power System – Mehta*

15. Transmission efficiency is defined as

- 1). Output power / input power
- 2). Input power / output power
- 3). Voltage / current
- 4). Current / voltage

Correct Answer: **1). Output power / input power**

Solution:

Efficiency indicates power delivered successfully.

Ref: *Power System Engineering – Kothari*

16. The Ferranti effect occurs in

- 1). Short lines
- 2). Medium lines
- 3). Long lines
- 4). Distribution lines

Correct Answer: **3). Long lines**

Solution:

Receiving end voltage becomes higher than sending end.

Ref: *Electrical Power Systems – Wadhwa*

17. Ferranti effect occurs due to

- 1). Line capacitance
- 2). Resistance
- 3). Inductance
- 4). Power loss

Correct Answer: **1). Line capacitance**

Solution:

Charging current raises receiving-end voltage.

Ref: *Principles of Power System – Mehta*

18. Corona occurs due to

- 1). High voltage ionization of air
- 2). Low voltage
- 3). Current flow
- 4). Resistance

Correct Answer: **1). High voltage ionization of air**

Solution:

Air around conductor ionizes.

Ref: *Power System Engineering – Kothari*

19. Corona causes

- 1). Power loss
- 2). Noise
- 3). Radio interference
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Corona produces energy loss and disturbances.

Ref: *Electrical Power Systems – Wadhwa*

20. Corona loss increases with

- 1). High voltage
- 2). Rough conductor surface
- 3). Small conductor spacing
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Electric field intensity increases.

Ref: *Principles of Power System – Mehta*

21. Bundled conductors are used to

- 1). Reduce corona loss
- 2). Reduce inductance
- 3). Increase capacitance
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Bundling improves line performance.

Ref: *Power System Engineering – Kothari*

22. HVDC transmission stands for

- 1). High Voltage Direct Current
- 2). High Voltage Distribution Circuit
- 3). High Voltage Digital Control
- 4). High Voltage Dynamic Control

Correct Answer: **1). High Voltage Direct Current**

Solution:

Used for long-distance bulk power transmission.

Ref: *HVDC Power Transmission – K.R. Padiyar*

23. HVDC transmission advantage

- 1). Lower transmission losses
- 2). No reactive power
- 3). Stable long-distance transmission
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

HVDC suitable for very long lines.

Ref: *Direct Current Transmission – Kimbark*

24. HVDC transmission disadvantage

- 1). High converter cost
- 2). Complex control
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Converters increase installation cost.

Ref: *HVDC Power Transmission – Padiyar*

25. Transmission conductors are made of

- 1). Copper
- 2). Aluminum
- 3). ACSR
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Aluminum and ACSR widely used.

Ref: *Power System Engineering – Kothari*

26. ACSR conductor stands for

- 1). Aluminum Conductor Steel Reinforced
- 2). Aluminum Cable Steel Resistance
- 3). Alternating Current Steel Reinforced
- 4). Aluminum Conductor Special Resistance

Correct Answer: **1). Aluminum Conductor Steel Reinforced**

Solution:

Steel core provides mechanical strength.

Ref: *Electrical Power Systems – Wadhwa*

27. Transmission towers are used to

- 1). Support conductors
- 2). Maintain clearance
- 3). Provide insulation
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Towers support overhead transmission lines.

Ref: *Principles of Power System – Mehta*

28. Ground clearance means

- 1). Height of conductor above ground
- 2). Distance between conductors
- 3). Distance between towers
- 4). Distance between insulators

Correct Answer: **1). Height of conductor above ground**

Solution:

Ensures safety.

Ref: *Power System Engineering – Kothari*

29. Sag in transmission line occurs due to

- 1). Weight of conductor
- 2). Wind pressure
- 3). Temperature
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Sag varies with environmental conditions.

Ref: *Principles of Power System – Mehta*

30. Sag formula is

- 1). $S = \frac{wl^2}{8T}$
- 2). $V = IR$
- 3). $P = VI$
- 4). $E = mc^2$

Correct Answer: **1). $S = \frac{wl^2}{8T}$**

Solution:

$$S = \frac{wl^2}{8T}$$

where

w = weight per unit length

l = span length

T = tension.

Ref: *Electrical Power Systems – Wadhwa*

31. Ferranti effect is the condition where

- 1). Sending-end voltage > receiving-end voltage
- 2). Receiving-end voltage > sending-end voltage
- 3). Both voltages equal
- 4). Voltage becomes zero

Correct Answer: **2). Receiving-end voltage > sending-end voltage**

Solution:

Occurs when transmission line is lightly loaded or open-circuited.

Ref: *Principles of Power System – V.K. Mehta*

32. Ferranti effect is more pronounced in

- 1). Short transmission lines
- 2). Medium transmission lines
- 3). Long transmission lines
- 4). Distribution lines

Correct Answer: **3). Long transmission lines**

Solution:

Long lines have significant capacitance.

Ref: *Power System Engineering – Kothari*

33. Ferranti effect mainly occurs under

- 1). Full load conditions
- 2). No load or light load conditions
- 3). Short circuit condition
- 4). Heavy load condition

Correct Answer: **2). No load or light load conditions**

Solution:

Charging current causes voltage rise.

Ref: *Electrical Power Systems – Wadhwa*

34. Ferranti effect is caused by

- 1). Line resistance
- 2). Line capacitance
- 3). Line inductance
- 4). Power loss

Correct Answer: **2). Line capacitance**

Solution:

Capacitive charging current increases receiving voltage.

Ref: *Principles of Power System – Mehta*

35. Ferranti effect can be reduced by

- 1). Shunt reactors
- 2). Capacitors
- 3). Resistors
- 4). Transformers

Correct Answer: **1). Shunt reactors**

Solution:

Reactors absorb reactive power.

Ref: *Power System Engineering – Kothari*

36. Corona discharge occurs when

- 1). Electric field exceeds critical value
- 2). Voltage is low
- 3). Current is zero
- 4). Temperature decreases

Correct Answer: **1). Electric field exceeds critical value**

Solution:

Air ionization around conductor produces corona.

Ref: *Electrical Power Systems – Wadhwa*

37. Corona loss depends on

- 1). Atmospheric conditions
- 2). Conductor size
- 3). Voltage level
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Humidity and pressure influence corona.

Ref: *Principles of Power System – Mehta*

38. Corona produces

- 1). Power loss
- 2). Audible noise
- 3). Radio interference
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Corona causes energy loss and disturbances.

Ref: *Power System Engineering – Kothari*

39. Corona loss can be reduced by

- 1). Increasing conductor diameter
- 2). Increasing spacing between conductors
- 3). Using bundled conductors
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Reduces electric field intensity.

Ref: *Electrical Power Systems – Wadhwa*

40. Critical disruptive voltage is

- 1). Voltage at which corona starts
- 2). Voltage at which current stops
- 3). Voltage at which power loss stops
- 4). Voltage at which frequency changes

Correct Answer: **1). Voltage at which corona starts**

Solution:

Minimum voltage causing ionization.

Ref: *Principles of Power System – Mehta*

41. Visual critical voltage is

- 1). Voltage when corona glow becomes visible
- 2). Voltage when corona starts
- 3). Voltage when current stops
- 4). Voltage when power increases

Correct Answer: **1). Voltage when corona glow becomes visible**

Solution:

Occurs slightly above disruptive voltage.

Ref: *Electrical Power Systems – Wadhwa*

42. HVDC transmission is suitable for

- 1). Long distance transmission
- 2). Underground cables
- 3). Submarine cables
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

HVDC reduces losses over long distances.

Ref: *HVDC Power Transmission – Padiyar*

43. HVDC transmission requires

- 1). Rectifier station
- 2). Inverter station
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

AC converted to DC and vice versa.

Ref: *Direct Current Transmission – Kimbark*

44. HVDC transmission eliminates

- 1). Reactive power
- 2). Corona
- 3). Power loss
- 4). Voltage drop

Correct Answer: **1). Reactive power**

Solution:

DC lines do not carry reactive power.

Ref: *HVDC Power Transmission – Padiyar*

45. HVDC lines have

- 1). Lower losses
- 2). No skin effect
- 3). Higher stability
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Advantages over AC lines.

Ref: *Direct Current Transmission – Kimbark*

46. Skin effect is

- 1). Uneven current distribution in conductor
- 2). Voltage increase
- 3). Current decrease
- 4). Frequency decrease

Correct Answer: **1). Uneven current distribution in conductor**

Solution:

Current concentrates near surface.

Ref: *Power System Engineering – Kothari*

47. Skin effect increases with

- 1). Frequency
- 2). Conductor diameter
- 3). Permeability
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Skin effect significant at high frequencies.

Ref: *Electrical Power Systems – Wadhwa*

48. Proximity effect occurs due to

- 1). Magnetic field of nearby conductors
- 2). Voltage increase
- 3). Current decrease
- 4). Resistance decrease

Correct Answer: **1). Magnetic field of nearby conductors**

Solution:

Causes uneven current distribution.

Ref: *Principles of Power System – Mehta*

49. Bundled conductors reduce

- 1). Corona loss
- 2). Inductance
- 3). Radio interference
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Common in EHV transmission.

Ref: *Electrical Power Systems – Wadhwa*

50. Surge impedance of transmission line depends on

- 1). Inductance
- 2). Capacitance
- 3). Both
- 4). Resistance

Correct Answer: **3). Both**

Solution:

$$Z = \sqrt{\frac{L}{C}}$$

Ref: *Power System Engineering – Kothari*

51. Surge impedance loading represents

- 1). Natural load of transmission line
- 2). Maximum load
- 3). Minimum load
- 4). Short circuit load

Correct Answer: **1). Natural load of transmission line**

Solution:

Occurs when reactive power generated equals consumed.

Ref: *Electrical Power Systems – Wadhwa*

52. Transmission line inductance causes

- 1). Voltage drop
- 2). Reactive power
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Inductive reactance affects voltage.

Ref: *Principles of Power System – Mehta*

53. Capacitance of transmission line causes

- 1). Charging current
- 2). Voltage rise
- 3). Ferranti effect
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Capacitance influences voltage regulation.

Ref: *Power System Engineering – Kothari*

54. Transmission line parameters are

- 1). Distributed parameters
- 2). Lumped parameters
- 3). Constant parameters
- 4). Variable parameters

Correct Answer: **1). Distributed parameters**

Solution:

Resistance, inductance, capacitance distributed along line.

Ref: *Electrical Power Systems – Wadhwa*

55. Power transfer capability of transmission line depends on

- 1). Voltage level
- 2). Line impedance
- 3). Power angle
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Higher voltage increases transmission capacity.

Ref: *Principles of Power System – Mehta*

SECTION C – INSULATORS, STRING EFFICIENCY & SAG

56. The main function of an insulator in transmission lines is to

- 1). Conduct electricity
- 2). Support conductors and prevent leakage current to earth
- 3). Increase voltage
- 4). Reduce current

Correct Answer: **2). Support conductors and prevent leakage current to earth**

Solution:

Insulators isolate live conductors from towers.

Ref: *Principles of Power System – V.K. Mehta*

57. Insulators are usually made of

- 1). Porcelain
- 2). Glass
- 3). Polymer
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

These materials have high dielectric strength.

Ref: *Power System Engineering – Kothari*

58. Types of insulators used in overhead lines include

- 1). Pin insulator
- 2). Suspension insulator
- 3). Strain insulator
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different insulators used depending on voltage level.

Ref: *Electrical Power Systems – Wadhwa*

59. Pin insulators are generally used for voltages up to

- 1). 11 kV
- 2). 33 kV
- 3). 66 kV
- 4). 132 kV

Correct Answer: **2). 33 kV**

Solution:

Higher voltages require suspension insulators.

Ref: *Principles of Power System – Mehta*

60. Suspension insulators are used for

- 1). High voltage transmission lines
- 2). Low voltage distribution
- 3). DC circuits
- 4). Underground cables

Correct Answer: **1). High voltage transmission lines**

Solution:

Series of disc insulators used.

Ref: *Power System Engineering – Kothari*

61. Strain insulators are used

- 1). At dead ends of transmission lines
- 2). At towers
- 3). At substations
- 4). At generators

Correct Answer: **1). At dead ends of transmission lines**

Solution:

Used where line experiences mechanical tension.

Ref: *Electrical Power Systems – Wadhwa*

62. Voltage distribution in suspension string is

- 1). Uniform
- 2). Non-uniform
- 3). Equal
- 4). Constant

Correct Answer: **2). Non-uniform**

Solution:

Disc nearest to conductor experiences highest voltage.

Ref: *Principles of Power System – Mehta*

63. The insulator disc nearest to conductor experiences

- 1). Maximum voltage
- 2). Minimum voltage
- 3). Zero voltage
- 4). Average voltage

Correct Answer: **1). Maximum voltage**

Solution:

Capacitance to earth causes unequal distribution.

Ref: *Power System Engineering – Kothari*

64. String efficiency is defined as

- 1). Voltage across whole string / ($n \times$ voltage across disc nearest conductor) $\times 100$
- 2). Voltage across disc / total voltage
- 3). Current / voltage
- 4). Power / voltage

Correct Answer: **1). Voltage across whole string / ($n \times$ voltage across disc nearest conductor) $\times 100$**

Solution:

Higher string efficiency means better voltage distribution.

Ref: *Principles of Power System – Mehta*

65. Maximum string efficiency is

- 1). 50%
- 2). 75%
- 3). 100%
- 4). Infinite

Correct Answer: **3). 100%**

Solution:

Occurs when voltage distribution is uniform.

Ref: *Electrical Power Systems – Wadhwa*

66. String efficiency can be improved by

- 1). Using grading rings
- 2). Increasing cross-arm length
- 3). Using insulators with different capacitances
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

These methods reduce voltage concentration.

Ref: *Power System Engineering – Kothari*

67. Guard rings are used to

- 1). Improve string efficiency
- 2). Increase voltage
- 3). Reduce current
- 4). Increase power

Correct Answer: **1). Improve string efficiency**

Solution:

Also called grading rings.

Ref: *Principles of Power System – Mehta*

68. Sag in transmission line is

- 1). Vertical distance between lowest conductor point and support
- 2). Distance between towers
- 3). Conductor spacing
- 4). Ground clearance

Correct Answer: **1). Vertical distance between lowest conductor point and support**

Solution:

Sag ensures mechanical stability.

Ref: *Electrical Power Systems – Wadhwa*

69. Sag increases with

- 1). Conductor weight
- 2). Span length
- 3). Temperature
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Thermal expansion increases sag.

Ref: *Power System Engineering – Kothari*

70. Sag decreases with

- 1). Increased tension
- 2). Increased span
- 3). Increased weight
- 4). Increased temperature

Correct Answer: **1). Increased tension**

Solution:

Higher tension reduces sag.

Ref: *Principles of Power System – Mehta*

71. Sag formula is

- 1). $S = \frac{wl^2}{8T}$
- 2). $V = IR$
- 3). $P = VI$
- 4). $E = mc^2$

Correct Answer: **1). $S = \frac{wl^2}{8T}$**

Solution:

w = weight per unit length

l = span length

T = tension.

Ref: *Electrical Power Systems – Wadhwa*

72. Ground clearance is

- 1). Minimum distance between conductor and ground
- 2). Distance between conductors
- 3). Distance between towers
- 4). Distance between insulators

Correct Answer: **1). Minimum distance between conductor and ground**

Solution:

Required for safety.

Ref: *Principles of Power System – Mehta*

73. Ice loading on conductors causes

- 1). Increased sag
- 2). Increased tension
- 3). Conductor breakage risk
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Ice adds extra weight.

Ref: *Power System Engineering – Kothari*

74. Wind pressure on conductors causes

- 1). Horizontal sag
- 2). Increased tension
- 3). Swinging of conductor
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Wind affects mechanical stability.

Ref: *Electrical Power Systems – Wadhwa*

75. Tower supports are designed to

- 1). Support conductor weight
- 2). Withstand wind load
- 3). Maintain clearance
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Structural strength required.

Ref: *Principles of Power System – Mehta*

76. Insulator failure may occur due to

- 1). Flashover
- 2). Puncture
- 3). Mechanical damage
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

High voltage stress may damage insulators.

Ref: *Power System Engineering – Kothari*

77. Flashover occurs

- 1). Over surface of insulator
- 2). Through insulator
- 3). Through conductor
- 4). Through tower

Correct Answer: **1). Over surface of insulator**

Solution:

Due to surface contamination or high voltage.

Ref: *Electrical Power Systems – Wadhwa*

78. Puncture occurs

- 1). Through insulator body
- 2). Over surface
- 3). Through tower
- 4). Through conductor

Correct Answer: **1). Through insulator body**

Solution:

Permanent damage.

Ref: *Principles of Power System – Mehta*

79. Suspension insulator discs are connected in

- 1). Series
- 2). Parallel
- 3). Series-parallel
- 4). Star

Correct Answer: **1). Series**

Solution:

Voltage divided among discs.

Ref: *Power System Engineering – Kothari*

80. Increasing number of discs in string

- 1). Increases voltage rating
- 2). Decreases voltage rating
- 3). Does not affect voltage
- 4). Reduces current

Correct Answer: **1). Increases voltage rating**

Solution:

More discs withstand higher voltage.

Ref: *Electrical Power Systems – Wadhwa*

SECTION D – CABLES

81. Underground cables are used mainly in

- 1). Rural areas
- 2). Urban areas
- 3). Mountain areas
- 4). Desert areas

Correct Answer: **2). Urban areas**

Solution:

Used where overhead lines are not feasible due to space or safety issues.

Ref: *A Course in Electrical Power Systems – J.B. Gupta*

82. The main advantage of underground cables is

- 1). Less maintenance
- 2). Higher reliability
- 3). No effect of weather conditions
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Underground cables are protected from environmental effects.

Ref: *Electrical Power Systems – C.L. Wadhwa*

83. The main disadvantage of underground cables is

- 1). High installation cost
- 2). Difficult fault detection
- 3). Limited heat dissipation
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Installation and maintenance are expensive.

Ref: *Transmission and Distribution of Electrical Energy – J.B. Gupta*

84. Underground cables are classified based on

- 1). Voltage rating
- 2). Insulation material
- 3). Number of cores
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Multiple classifications exist.

Ref: *Electrical Power Systems – Wadhwa*

85. The insulation used in cables must have

- 1). High dielectric strength
- 2). Low conductivity
- 3). High insulation resistance
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Good insulation prevents leakage current.

Ref: *Principles of Power System – V.K. Mehta*

86. Insulation resistance of cable depends on

- 1). Length of cable
- 2). Insulation material
- 3). Temperature
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Resistance decreases with increase in length.

Ref: *Electrical Power Systems – Wadhwa*

87. Insulation resistance of cable is

- 1). Directly proportional to length
- 2). Inversely proportional to length
- 3). Independent of length
- 4). Constant

Correct Answer: **2). Inversely proportional to length**

Solution:

Longer cable → more leakage paths.

Ref: *Principles of Power System – Mehta*

88. Cable grading is used to

- 1). Reduce insulation thickness
- 2). Improve voltage distribution
- 3). Reduce dielectric stress
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Grading increases cable life.

Ref: *Transmission and Distribution – J.B. Gupta*

89. Types of cable grading include

- 1). Capacitance grading
- 2). Inter-sheath grading
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Two common grading methods.

Ref: *Electrical Power Systems – Wadhwa*

90. Capacitance grading uses

- 1). Insulation with different dielectric constants
- 2). Same insulation material
- 3). Copper insulation
- 4). Aluminum insulation

Correct Answer: **1). Insulation with different dielectric constants**

Solution:

Electric stress distributed uniformly.

Ref: *Principles of Power System – Mehta*

91. Inter-sheath grading uses

- 1). Metallic layers between insulation
- 2). Different insulation materials
- 3). Additional conductors
- 4). Transformers

Correct Answer: **1). Metallic layers between insulation**

Solution:

Metal sheaths control voltage distribution.

Ref: *Transmission and Distribution – J.B. Gupta*

92. Most commonly used cable insulation material is

- 1). PVC
- 2). XLPE
- 3). Paper insulation
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Modern cables use XLPE widely.

Ref: *Electrical Power Systems – Wadhwa*

93. Cable sheath is used to

- 1). Protect insulation from moisture
- 2). Provide mechanical protection
- 3). Prevent corrosion
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Sheath increases cable durability.

Ref: *Principles of Power System – Mehta*

94. Cable conductor materials include

- 1). Copper
- 2). Aluminum
- 3). Both
- 4). Iron

Correct Answer: **3). Both**

Solution:

Copper and aluminum widely used.

Ref: *Transmission and Distribution – J.B. Gupta*

95. Cable faults include

- 1). Open circuit fault
- 2). Short circuit fault
- 3). Earth fault
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Fault detection required for maintenance.

Ref: *Electrical Power Systems – Wadhwa*

SECTION E – DISTRIBUTION SYSTEMS & SUBSTATIONS

96. Distribution systems deliver power from

- 1). Generating station to transformer
- 2). Substation to consumers
- 3). Generator to turbine
- 4). Transmission line to generator

Correct Answer: **2). Substation to consumers**

Solution:

Final stage of power delivery.

Ref: *Power System Engineering – Kothari*

97. Types of distribution systems include

- 1). Radial system
- 2). Ring main system
- 3). Interconnected system
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different configurations used.

Ref: *Principles of Power System – Mehta*

98. Radial distribution system has

- 1). Single power source
- 2). Multiple sources
- 3). Closed loop
- 4). Parallel network

Correct Answer: **1). Single power source**

Solution:

Simplest distribution method.

Ref: *Electrical Power Systems – Wadhwa*

99. Main disadvantage of radial distribution system

- 1). Low reliability
- 2). High cost
- 3). Complex design
- 4). High efficiency

Correct Answer: **1). Low reliability**

Solution:

Fault interrupts entire supply.

Ref: *Transmission and Distribution – J.B. Gupta*

100. Ring main distribution system

- 1). Forms a closed loop
- 2). Has single supply point
- 3). No backup supply
- 4). Only one feeder

Correct Answer: **1). Forms a closed loop**

Solution:

Improves reliability.

Ref: *Power System Engineering – Kothari*

101. Advantage of ring main system

- 1). Higher reliability
- 2). Better voltage regulation
- 3). Continuity of supply
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Faulty section isolated without stopping supply.

Ref: *Electrical Power Systems – Wadhwa*

102. Substations are used to

- 1). Step up voltage
- 2). Step down voltage
- 3). Control power flow
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Substations perform switching and control.

Ref: *Principles of Power System – Mehta*

103. Layout of substations includes

- 1). Bus bars
- 2). Circuit breakers
- 3). Transformers
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Essential equipment for power handling.

Ref: *Power System Engineering – Kothari*

104. Bus bars in substations are used to

- 1). Collect power
- 2). Distribute power
- 3). Connect circuits
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Busbars are common connection points.

Ref: *Electrical Power Systems – Wadhwa*

105. Earthing in substations provides

- 1). Safety
- 2). Fault current path
- 3). Equipment protection
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Grounding prevents electric shock.

Ref: *Principles of Power System – Mehta*

106. Earthing resistance should be

- 1). Very high
- 2). Very low
- 3). Infinite
- 4). Zero

Correct Answer: **2). Very low**

Solution:

Low resistance ensures effective grounding.

Ref: *Transmission and Distribution – J.B. Gupta*

107. Distribution transformers usually operate at

- 1). Full load
- 2). Variable load
- 3). No load
- 4). Overload

Correct Answer: **2). Variable load**

Solution:

Consumer demand varies.

Ref: *Electrical Power Systems – Wadhwa*

108. Voltage drop in distribution lines depends on

- 1). Line resistance
- 2). Load current
- 3). Line length
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Voltage regulation important in distribution.

Ref: *Principles of Power System – Mehta*

109. Distribution voltage levels commonly used

- 1). 11 kV
- 2). 415 V
- 3). 230 V
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different voltage levels used for distribution.

Ref: *Power System Engineering – Kothari*

110. Final supply to domestic consumers is

- 1). Single phase supply
- 2). Three phase supply
- 3). DC supply
- 4). HV supply

Correct Answer: **1). Single phase supply**

Solution:

Domestic loads usually single phase.

Ref: *Electrical Power Systems – Wadhwa*

UNIT VII – ELECTRIC TRACTION

1. Electric traction means

- 1). Electric power generation
- 2). Electric power transmission
- 3). Using electrical energy for railway locomotion
- 4). Electrical heating

Correct Answer: **3). Using electrical energy for railway locomotion**

Solution:

Electric traction uses electric motors to drive railway vehicles.

Ref: *Utilization of Electrical Energy – J.B. Gupta*

2. Electric traction systems are mainly used in

- 1). Railways
- 2). Trams
- 3). Electric vehicles
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Electric traction is widely used for transportation systems.

Ref: *Utilization of Electrical Power – G.C. Garg*

3. The main advantage of electric traction is

- 1). High efficiency
- 2). Clean operation
- 3). High starting torque
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Electric traction systems provide smooth and efficient operation.

Ref: *Art and Science of Utilization of Electrical Energy – H. Partab*

4. Types of electric traction systems include

- 1). DC traction system
- 2). AC traction system
- 3). Composite system
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different systems are used depending on application.

Ref: *Utilization of Electrical Energy – J.B. Gupta*

5. The most commonly used motor for electric traction is

- 1). DC series motor
- 2). DC shunt motor
- 3). Synchronous motor
- 4). Induction motor

Correct Answer: **1). DC series motor**

Solution:

DC series motors provide very high starting torque.

Ref: *Electrical Technology – B.L. Theraja*

6. The DC series motor is preferred in traction because

- 1). High starting torque
- 2). Wide speed control
- 3). Ability to handle overload
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

These characteristics make DC series motors suitable for trains.

Ref: *Utilization of Electrical Energy – J.B. Gupta*

7. Modern electric traction uses

- 1). DC motors
- 2). 3-phase induction motors
- 3). Synchronous motors
- 4). Universal motors

Correct Answer: **2). 3-phase induction motors**

Solution:

Modern locomotives use AC drives.

Ref: *Utilization of Electrical Power – G.C. Garg*

8. Speed-time curve represents

- 1). Speed vs distance
- 2). Speed vs time
- 3). Power vs time
- 4). Voltage vs time

Correct Answer: **2). Speed vs time**

Solution:

Used to analyze train motion.

Ref: *Art and Science of Utilization of Electrical Energy – Partab*

9. Speed-time curve is used to determine

- 1). Energy consumption
- 2). Running time
- 3). Acceleration
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

It is essential for traction calculations.

Ref: *Utilization of Electrical Energy – Gupta*

10. In main-line service the speed-time curve has

- 1). Long free running period
- 2). No free running period
- 3). Only acceleration
- 4). Only braking

Correct Answer: **1). Long free running period**

Solution:

Stations are far apart in main-line services.

Ref: *H. Partab*

11. Urban service is characterized by

- 1). Long free running
- 2). Frequent stops
- 3). High distance between stations
- 4). Low acceleration

Correct Answer: **2). Frequent stops**

Solution:

Urban trains stop frequently.

Ref: *Utilization of Electrical Power – G.C. Garg*

12. Suburban service has

- 1). Moderate distance between stations
- 2). Long free running period
- 3). No acceleration
- 4). Constant speed

Correct Answer: **1). Moderate distance between stations**

Solution:

Stations are moderately spaced.

Ref: *J.B. Gupta*

13. Schedule speed is defined as

- 1). Distance / running time
- 2). Distance / (running time + stop time)
- 3). Running time / distance
- 4). Speed / time

Correct Answer: **2). Distance / (running time + stop time)**

Solution:

Schedule speed includes station stop time.

Ref: *Utilization of Electrical Energy – Gupta*

14. Actual speed is defined as

- 1). Distance / running time
- 2). Distance / (running time + stop time)
- 3). Speed / distance
- 4). Time / distance

Correct Answer: **1). Distance / running time**

Solution:

Actual speed excludes stop time.

Ref: *H. Partab*

15. Schedule speed is always

- 1). Greater than actual speed
- 2). Equal to actual speed
- 3). Less than actual speed
- 4). Infinite

Correct Answer: **3). Less than actual speed**

Solution:

Stop time reduces schedule speed.

Ref: *Utilization of Electrical Energy – Gupta*

16. Tractive effort is defined as

- 1). Force required to move the train
- 2). Power produced by motor
- 3). Voltage applied to motor
- 4). Current drawn by motor

Correct Answer: **1). Force required to move the train**

Solution:

Tractive effort pulls the train forward.

Ref: *G.C. Garg*

17. Tractive effort is required to overcome

- 1). Train resistance
- 2). Gradient resistance
- 3). Acceleration resistance
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

All resistances must be overcome.

Ref: *H. Partab*

18. Gradient resistance occurs when

- 1). Train moves uphill
- 2). Train moves downhill
- 3). Train moves horizontally
- 4). Train stops

Correct Answer: **1). Train moves uphill**

Solution:

Extra force needed to climb gradient.

Ref: *J.B. Gupta*

19. Specific energy consumption (SEC) is

- 1). Energy per unit distance
- 2). Power per unit time
- 3). Voltage per unit current
- 4). Energy per unit voltage

Correct Answer: **1). Energy per unit distance**

Solution:

Measured in Wh/ton-km.

Ref: *G.C. Garg*

20. SEC is affected by

- 1). Distance between stops
- 2). Acceleration
- 3). Train load
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Operating conditions affect energy consumption.

Ref: *H. Partab*

21. SEC decreases when

- 1). Distance between stations increases
- 2). Acceleration increases
- 3). Stops increase
- 4). Load increases

Correct Answer: **1). Distance between stations increases**

Solution:

Longer free-running reduces energy consumption.

Ref: *J.B. Gupta*

22. Traction auxiliaries include

- 1). Lighting
- 2). Air compressors
- 3). Cooling fans
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Auxiliary equipment supports traction operation.

Ref: *G.C. Garg*

23. Electric braking in traction includes

- 1). Regenerative braking
- 2). Rheostatic braking
- 3). Plugging
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different braking methods used.

Ref: *Utilization of Electrical Energy – Gupta*

24. Regenerative braking returns

- 1). Mechanical energy to supply
- 2). Electrical energy to supply
- 3). Heat energy to supply
- 4). Chemical energy

Correct Answer: **2). Electrical energy to supply**

Solution:

Motor works as generator.

Ref: *H. Partab*

25. Electric traction improves

- 1). Acceleration
- 2). Efficiency
- 3). Control
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Electric traction systems are highly efficient.

Ref: *G.C. Garg*

26. Electric locomotives have

- 1). Higher efficiency than steam locomotives
- 2). Lower efficiency
- 3). Same efficiency
- 4). Zero efficiency

Correct Answer: **1). Higher efficiency than steam locomotives**

Solution:

Electric traction is more efficient.

Ref: *J.B. Gupta*

27. Electric traction reduces

- 1). Air pollution
- 2). Noise
- 3). Fuel consumption
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Environment-friendly transport.

Ref: *H. Partab*

28. Electric traction power is supplied through

- 1). Overhead lines
- 2). Third rail system
- 3). Both
- 4). Transformers

Correct Answer: **3). Both**

Solution:

Different railway systems use different supply methods.

Ref: *G.C. Garg*

29. Third rail system is mainly used in

- 1). Underground railways
- 2). High-speed trains
- 3). Freight trains
- 4). Power plants

Correct Answer: **1). Underground railways**

Solution:

Used in metro systems.

Ref: *Utilization of Electrical Energy – Gupta*

30. Pantograph is used to

- 1). Collect current from overhead lines
- 2). Increase voltage
- 3). Increase speed
- 4). Reduce current

Correct Answer: **1). Collect current from overhead lines**

Solution:

Provides electrical contact with overhead wires.

Ref: *G.C. Garg*

31. Electric traction provides

- 1). Smooth acceleration
- 2). High speed control
- 3). Efficient braking
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Electric motors offer excellent control.

Ref: *H. Partab*

32. Maximum tractive effort occurs during

- 1). Starting
- 2). Free running
- 3). Braking
- 4). Stopping

Correct Answer: **1). Starting**

Solution:

High torque required to start train.

Ref: *J.B. Gupta*

33. Free running period in speed-time curve occurs when

- 1). Train moves at constant speed
- 2). Train accelerates
- 3). Train decelerates
- 4). Train stops

Correct Answer: **1). Train moves at constant speed**

Solution:

Occurs between acceleration and braking.

Ref: *H. Partab*

34. Braking period in speed-time curve represents

- 1). Deceleration of train
- 2). Acceleration
- 3). Constant speed
- 4). No motion

Correct Answer: **1). Deceleration of train**

Solution:

Speed decreases until stop.

Ref: *G.C. Garg*

35. Electric traction motors are designed for

- 1). High starting torque
- 2). Frequent starting and stopping
- 3). Wide speed range
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Traction motors must handle dynamic loads.

Ref: *Theraja – Electrical Technology*

36. Electric traction is economical for

- 1). Heavy traffic routes
- 2). Light traffic routes
- 3). Small trains
- 4). Rural roads

Correct Answer: **1). Heavy traffic routes**

Solution:

High initial cost justified by heavy usage.

Ref: *J.B. Gupta*

37. Train resistance depends on

- 1). Weight of train
- 2). Track condition
- 3). Speed of train
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Multiple factors affect resistance.

Ref: *H. Partab*

38. Gradient resistance is proportional to

- 1). Train weight
- 2). Track gradient
- 3). Both
- 4). Speed

Correct Answer: **3). Both**

Solution:

Heavier trains require greater force.

Ref: *G.C. Garg*

39. Acceleration of train depends on

- 1). Tractive effort
- 2). Train mass
- 3). Resistance
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Newton's second law governs motion.

Ref: *Utilization of Electrical Energy – Gupta*

40. Electric traction systems are widely used because of

- 1). Higher efficiency
- 2). Faster acceleration
- 3). Better control
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Electric traction offers superior performance.

Ref: *Art and Science of Utilization of Electrical Energy – H. Partab*

41. Schedule speed of a train is defined as

- 1). Distance / running time
- 2). Distance / (running time + stop time)
- 3). Running time / distance
- 4). Speed / time

Correct Answer: **2). Distance / (running time + stop time)**

Solution:

Schedule speed includes station stop time.

Ref: *Utilization of Electrical Energy – J.B. Gupta*

42. Actual speed of a train is

- 1). Distance / running time
- 2). Distance / (running time + stop time)
- 3). Speed $\times$ time
- 4). Time / distance

Correct Answer: **1). Distance / running time**

Solution:

Actual speed excludes station stop time.

Ref: *Art and Science of Utilization of Electrical Energy – H. Partab*

43. If distance between stations is 2 km and total time including stop is 4 minutes, the schedule speed is

- 1). 20 km/h
- 2). 30 km/h
- 3). 40 km/h
- 4). 60 km/h

Correct Answer: 2). 30 km/h

Solution:

$$\text{Schedule Speed} = \frac{\text{Distance}}{\text{Total Time}}$$

Distance = 2 km

Time = 4 min = 4/60 hr

$$\text{Speed} = \frac{2}{4/60} = 30 \text{ km/h}$$

Ref: *Utilization of Electrical Energy – Gupta*

44. The tractive effort required to move a train is proportional to

- 1). Train resistance
- 2). Acceleration
- 3). Gradient
- 4). All of the above

Correct Answer: 4). All of the above

Solution:

Tractive effort must overcome all resistances.

Ref: *G.C. Garg*

45. Gradient resistance is given by

- 1). Weight $\times$ gradient
- 2). Speed $\times$ time
- 3). Voltage $\times$ current
- 4). Power $\times$ distance

Correct Answer: 1). Weight $\times$ gradient

Solution:

Force required to move train up a slope.

Ref: *Utilization of Electrical Energy – Gupta*

46. The braking period in speed-time curve represents

- 1). Acceleration
- 2). Deceleration
- 3). Constant speed
- 4). Stop time

Correct Answer: **2). Deceleration**

Solution:

Train speed decreases during braking.

Ref: *H. Partab*

47. The area under speed-time curve represents

- 1). Distance travelled
- 2). Power
- 3). Voltage
- 4). Current

Correct Answer: **1). Distance travelled**

Solution:

Area under curve = speed $\times$ time = distance.

Ref: *Utilization of Electrical Energy – Gupta*

48. Electric traction reduces

- 1). Smoke pollution
- 2). Noise pollution
- 3). Fuel consumption
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Electric trains are cleaner and more efficient.

Ref: *G.C. Garg*

49. The main limitation of electric traction is

- 1). High initial cost
- 2). Low efficiency
- 3). Low speed
- 4). Poor acceleration

Correct Answer: **1). High initial cost**

Solution:

Infrastructure installation is expensive.

Ref: *Utilization of Electrical Energy – Gupta*

50. The best traction motor for modern electric trains is

- 1). DC shunt motor
- 2). DC series motor
- 3). 3-phase induction motor
- 4). Synchronous motor

Correct Answer: **3). 3-phase induction motor**

Solution:

Modern locomotives use AC drives with induction motors.

Ref: *Electrical Technology – B.L. Theraja*

UNIT VIII – ELECTRICAL ESTIMATION

1. Electrical estimation is used to determine

- 1). Voltage level
- 2). Current flow
- 3). Quantity and cost of electrical materials
- 4). Power factor

Correct Answer: **3). Quantity and cost of electrical materials**

Solution:

Electrical estimation calculates required materials and installation cost.

Ref: *Electrical Design Estimating and Costing – K.B. Raina*

2. The main purpose of electrical estimation is

- 1). Power generation
- 2). Cost calculation of electrical installations
- 3). Voltage regulation
- 4). Current control

Correct Answer: **2). Cost calculation of electrical installations**

Solution:

Estimation helps determine total installation cost.

Ref: *Electrical Estimating and Costing – J.B. Gupta*

3. The maximum number of points allowed in a lighting sub-circuit according to IE rules is

- 1). 5
- 2). 10
- 3). 15
- 4). 20

Correct Answer: **2). 10**

Solution:

IE rule: maximum **10 points or 800 W.**

Ref: *Electrical Estimating – Surjit Singh*

4. Maximum load in a lighting sub-circuit is

- 1). 400 W
- 2). 600 W
- 3). 800 W
- 4). 1000 W

Correct Answer: **3). 800 W**

Solution:

IE rule specifies **800 W limit**.

Ref: *K.B. Raina*

5. Maximum number of outlets in a power circuit is

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

Correct Answer: **2). 2**

Solution:

Power circuit maximum load **3000 W or two outlets**.

Ref: *J.B. Gupta*

6. The most commonly used wiring system today is

- 1). Cleat wiring
- 2). CTS wiring
- 3). Conduit wiring
- 4). Lead sheathed wiring

Correct Answer: **3). Conduit wiring**

Solution:

Conduit wiring is safest and durable.

Ref: *Electrical Estimating – Surjit Singh*

7. Cleat wiring is mainly used for

- 1). Permanent installations
- 2). Temporary installations
- 3). Industrial installations
- 4). Underground wiring

Correct Answer: **2). Temporary installations**

Solution:

Cleat wiring is simple and temporary.

Ref: *K.B. Raina*

8. Conduit wiring can be

- 1). Surface conduit
- 2). Concealed conduit
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Conduit pipes can be surface mounted or concealed.

Ref: *J.B. Gupta*

9. The main disadvantage of cleat wiring is

- 1). High cost
- 2). Poor appearance
- 3). Short life
- 4). Both 2 and 3

Correct Answer: **4). Both 2 and 3**

Solution:

Cleat wiring is temporary and unattractive.

Ref: *Electrical Estimating – Surjit Singh*

10. CTS wiring stands for

- 1). Cable Type Sheath
- 2). Cabinet Tough Sheath
- 3). Cab Tyre Sheathed
- 4). Current Type System

Correct Answer: **3). Cab Tyre Sheathed**

Solution:

CTS cables have rubber insulation.

Ref: *K.B. Raina*

11. Lead sheathed wiring uses

- 1). Rubber insulation
- 2). Lead alloy sheath
- 3). Copper sheath
- 4). Aluminum sheath

Correct Answer: **2). Lead alloy sheath**

Solution:

Lead sheath protects against moisture.

Ref: *J.B. Gupta*

12. Earthing is necessary to

- 1). Protect equipment
- 2). Protect people from shock
- 3). Provide fault current path
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Earthing improves electrical safety.

Ref: *Electrical Estimating – Surjit Singh*

13. Pipe earthing uses

- 1). Copper pipe
- 2). GI pipe
- 3). Aluminum pipe
- 4). Steel rod

Correct Answer: **2). GI pipe**

Solution:

Galvanized iron pipe used for grounding.

Ref: *K.B. Raina*

14. Plate earthing generally uses

- 1). Copper plate
- 2). GI plate
- 3). Both
- 4). Aluminum plate

Correct Answer: **3). Both**

Solution:

Copper or GI plates used.

Ref: *J.B. Gupta*

15. Earthing pit is filled with

- 1). Salt
- 2). Charcoal
- 3). Sand
- 4). Both 1 and 2

Correct Answer: **4). Both 1 and 2**

Solution:

Salt and charcoal reduce earth resistance.

Ref: *Electrical Estimating – Surjit Singh*

16. The instrument used to measure insulation resistance is

- 1). Voltmeter
- 2). Ammeter
- 3). Megger
- 4). Wattmeter

Correct Answer: **3). Megger**

Solution:

Megger measures insulation resistance.

Ref: *K.B. Raina*

17. Earth resistance is measured using

- 1). Voltmeter
- 2). Megger
- 3). Earth tester
- 4). Ammeter

Correct Answer: **3). Earth tester**

Solution:

Used to measure earth resistance.

Ref: *J.B. Gupta*

18. Acceptable earth resistance for domestic installation is approximately

- 1). 1 Ω
- 2). 5 Ω
- 3). 10 Ω
- 4). 20 Ω

Correct Answer: **2). 5 Ω**

Solution:

Low resistance ensures effective grounding.

Ref: *Electrical Estimating – Surjit Singh*

19. Rural electrification mainly focuses on

- 1). Supplying electricity to villages
- 2). Industrial supply
- 3). Urban supply
- 4). Metro systems

Correct Answer: **1). Supplying electricity to villages**

Solution:

Government programs focus on rural power supply.

Ref: *K.B. Raina*

20. A pole mounted substation commonly operates at

- 1). 33 kV / 11 kV
- 2). 11 kV / 400 V
- 3). 132 kV / 33 kV
- 4). 220 kV / 132 kV

Correct Answer: **2). 11 kV / 400 V**

Solution:

Used for distribution.

Ref: *J.B. Gupta*

21. A pole mounted substation transformer rating is usually

- 1). 25–100 kVA
- 2). 500 kVA
- 3). 1 MVA
- 4). 5 MVA

Correct Answer: **1). 25–100 kVA**

Solution:

Used for small distribution loads.

Ref: *K.B. Raina*

22. Main tools used in electrical wiring include

- 1). Screwdriver
- 2). Pliers
- 3). Tester
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Basic wiring tools.

Ref: *Electrical Estimating – Surjit Singh*

23. Electrical accessories include

- 1). Switches
- 2). Sockets
- 3). Ceiling roses
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Used in domestic wiring.

Ref: *J.B. Gupta*

24. A lamp circuit usually consists of

- 1). Switch
- 2). Lamp holder
- 3). Wire
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Complete lighting circuit components.

Ref: *K.B. Raina*

25. Irrigation pump installations are used in

- 1). Agriculture
- 2). Industries
- 3). Offices
- 4). Railways

Correct Answer: **1). Agriculture**

Solution:

Pumps used for irrigation.

Ref: *Electrical Estimating – Surjit Singh*

26. Maintenance of electrical machines includes

- 1). Cleaning
- 2). Lubrication
- 3). Inspection
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Regular maintenance increases lifespan.

Ref: *J.B. Gupta*

27. Fuse is used to

- 1). Protect circuit from overload
- 2). Increase voltage
- 3). Decrease current
- 4). Store energy

Correct Answer: **1). Protect circuit from overload**

Solution:

Fuse melts during overcurrent.

Ref: *K.B. Raina*

28. MCB stands for

- 1). Miniature Circuit Breaker
- 2). Maximum Circuit Breaker
- 3). Main Current Breaker
- 4). Motor Circuit Breaker

Correct Answer: **1). Miniature Circuit Breaker**

Solution:

Used for domestic circuit protection.

Ref: *Electrical Estimating – Surjit Singh*

29. Conduit pipes are usually made of

- 1). PVC
- 2). Steel
- 3). Both
- 4). Copper

Correct Answer: **3). Both**

Solution:

PVC and metal conduits used.

Ref: *J.B. Gupta*

30. Switches are installed in

- 1). Phase wire
- 2). Neutral wire
- 3). Earth wire
- 4). Any wire

Correct Answer: **1). Phase wire**

Solution:

For safety.

Ref: *K.B. Raina*

31. The main function of ceiling rose is

- 1). Support lamp
- 2). Connect wiring
- 3). Decorative purpose
- 4). All of the above

Correct Answer: **2). Connect wiring**

32. Lamp holders are generally made of

- 1). Brass
- 2). Bakelite
- 3). Plastic
- 4). All of the above

Correct Answer: **4). All of the above**

33. Domestic wiring voltage in India is

- 1). 110 V
- 2). 230 V
- 3). 400 V
- 4). 600 V

Correct Answer: **2). 230 V**

34. Industrial wiring generally uses

- 1). Higher power circuits
- 2). Low voltage circuits
- 3). Small load circuits
- 4). DC circuits

Correct Answer: **1). Higher power circuits**

35. Overhead lines are supported on

- 1). Poles
- 2). Towers
- 3). Both
- 4). Insulators

Correct Answer: **3). Both**

36. Rural electrification mainly improves

- 1). Agriculture
- 2). Economy
- 3). Living standards
- 4). All of the above

Correct Answer: **4). All of the above**

37. A tester is used to detect

- 1). Voltage presence
- 2). Current
- 3). Power
- 4). Resistance

Correct Answer: **1). Voltage presence**

38. Electrical estimation includes

- 1). Material list
- 2). Cost estimation
- 3). Labor charges
- 4). All of the above

Correct Answer: **4). All of the above**

39. Departmental tests refer to

- 1). Electrical safety tests
- 2). Equipment tests

- 3). Installation verification tests
- 4). All of the above

Correct Answer: **4). All of the above**

40. Wiring accessories include

- 1). Switches
- 2). Plugs
- 3). Sockets
- 4). All of the above

Correct Answer: **4). All of the above**

41. According to IE rules, the maximum load allowed in a power sub-circuit is

- 1). 1000 W
- 2). 2000 W
- 3). 3000 W
- 4). 5000 W

Correct Answer: **3). 3000 W**

Solution:

IE rules specify that a power circuit should not exceed **3000 W or two outlets**.

Ref: *Electrical Estimating and Costing – J.B. Gupta*

42. The main advantage of conduit wiring is

- 1). Low cost
- 2). Easy installation
- 3). High mechanical protection and safety
- 4). Temporary installation

Correct Answer: **3). High mechanical protection and safety**

Solution:

Conduit wiring protects wires from mechanical damage and moisture.

Ref: *Electrical Design Estimating and Costing – K.B. Raina*

43. Cleat wiring uses

- 1). Porcelain cleats
- 2). PVC pipes
- 3). Copper plates
- 4). Steel conduits

Correct Answer: **1). Porcelain cleats**

Solution:

Porcelain cleats hold insulated wires on walls or ceilings.

Ref: *Electrical Estimating – Surjit Singh*

44. The most economical wiring system for temporary work is

- 1). Conduit wiring
- 2). Cleat wiring
- 3). CTS wiring
- 4). Lead sheathed wiring

Correct Answer: **2). Cleat wiring**

Solution:

Cleat wiring is simple and inexpensive.

Ref: *K.B. Raina*

45. The insulation resistance of electrical installations is tested using

- 1). Voltmeter
- 2). Ammeter
- 3). Megger
- 4). Wattmeter

Correct Answer: **3). Megger**

Solution:

Megger measures insulation resistance in mega-ohms.

Ref: *Electrical Estimating and Costing – J.B. Gupta*

46. In pipe earthing, the electrode is generally

- 1). Copper pipe
- 2). GI pipe
- 3). Aluminum pipe
- 4). Brass pipe

Correct Answer: **2). GI pipe**

Solution:

Galvanized iron pipe is commonly used.

Ref: *Electrical Estimating – Surjit Singh*

47. The typical depth of pipe earthing is about

- 1). 0.5 m
- 2). 1 m
- 3). 2–3 m
- 4). 10 m

Correct Answer: **3). 2–3 m**

Solution:

Pipe earthing electrodes are buried deep to maintain moisture.

Ref: *K.B. Raina*

48. Plate earthing uses plates made of

- 1). Copper or GI
- 2). Aluminum
- 3). Brass
- 4). Steel

Correct Answer: **1). Copper or GI**

Solution:

Copper and galvanized iron plates are commonly used.

Ref: *J.B. Gupta*

49. The main purpose of salt and charcoal in earthing pit is

- 1). Increase resistance
- 2). Reduce earth resistance
- 3). Increase voltage
- 4). Reduce current

Correct Answer: **2). Reduce earth resistance**

Solution:

Salt and charcoal improve soil conductivity.

Ref: *Electrical Estimating – Surjit Singh*

50. In a domestic wiring circuit, the switch should be connected in

- 1). Neutral wire
- 2). Earth wire
- 3). Phase wire
- 4). Any wire

Correct Answer: **3). Phase wire**

Solution:

Switching the phase ensures safety.

Ref: *Electrical Design Estimating and Costing – K.B. Raina*

51. A pole mounted substation transformer generally has capacity

- 1). 10–50 kVA
- 2). 25–100 kVA
- 3). 1 MVA
- 4). 5 MVA

Correct Answer: **2). 25–100 kVA**

Solution:

Pole-mounted substations supply small distribution loads.

Ref: *Electrical Estimating and Costing – J.B. Gupta*

52. The voltage rating of a typical pole mounted substation is

- 1). 33 kV / 11 kV
- 2). 11 kV / 400 V
- 3). 132 kV / 33 kV
- 4). 220 kV / 132 kV

Correct Answer: **2). 11 kV / 400 V**

Solution:

Used to step down distribution voltage.

Ref: *K.B. Raina*

53. Rural electrification mainly aims at

- 1). Electrifying villages
- 2). Industrial power supply
- 3). Metro rail supply
- 4). Nuclear power generation

Correct Answer: **1). Electrifying villages**

Solution:

Government programs focus on rural areas.

Ref: *Electrical Estimating – Surjit Singh*

54. The device used to protect domestic circuits from overload is

- 1). Transformer
- 2). Fuse or MCB
- 3). Generator
- 4). Motor

Correct Answer: **2). Fuse or MCB**

Solution:

These devices interrupt excessive current.

Ref: *J.B. Gupta*

55. The common wiring voltage in Indian houses is

- 1). 110 V
- 2). 220–240 V
- 3). 415 V
- 4). 600 V

Correct Answer: **2). 220–240 V**

Solution:

Domestic supply in India is single-phase 230 V.

Ref: *K.B. Raina*

56. Three-phase supply voltage in India is

- 1). 110 V
- 2). 230 V
- 3). 415 V
- 4). 1000 V

Correct Answer: **3). 415 V**

Solution:

Industrial loads use three-phase supply.

Ref: *Electrical Estimating – Surjit Singh*

57. A ceiling rose is used to

- 1). Hold lamp only
- 2). Connect wiring to pendant lamp
- 3). Increase voltage
- 4). Reduce current

Correct Answer: **2). Connect wiring to pendant lamp**

Solution:

It acts as a connector between fixed wiring and flexible cord.

Ref: *J.B. Gupta*

58. The main advantage of lead sheathed wiring is

- 1). Low cost
- 2). Protection against moisture
- 3). Easy installation
- 4). Temporary use

Correct Answer: **2). Protection against moisture**

Solution:

Lead sheath prevents moisture damage.

Ref: *K.B. Raina*

59. Electrical estimation includes calculation of

- 1). Material quantity
- 2). Labor cost
- 3). Installation cost
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

All these factors determine total project cost.

Ref: *Electrical Estimating – Surjit Singh*

60. The primary objective of electrical estimation is

- 1). Reduce installation cost
- 2). Determine material and labor requirements
- 3). Increase voltage
- 4). Reduce current

Correct Answer: **2). Determine material and labor requirements**

Solution:

Estimation ensures proper planning and budgeting.

Ref: *Electrical Design Estimating and Costing – K.B. Raina*

UNIT IX – BASIC ELECTRONICS, DIGITAL ELECTRONICS & MICROCONTROLLER

SECTION A – SEMICONDUCTOR DEVICES

1. A semiconductor material has conductivity

- 1). Higher than conductor
- 2). Lower than insulator
- 3). Between conductor and insulator
- 4). Equal to conductor

Correct Answer: **3). Between conductor and insulator**

Solution:

Semiconductors like silicon have conductivity between conductors and insulators.

Ref: *Electronic Devices and Circuits – J.B. Gupta*

2. The most commonly used semiconductor materials are

- 1). Copper and aluminum
- 2). Silicon and germanium
- 3). Iron and steel
- 4). Nickel and chromium

Correct Answer: **2). Silicon and germanium**

Solution:

Silicon is widely used due to thermal stability.

Ref: *Principles of Electronics – V.K. Mehta*

3. N-type semiconductor is formed by adding

- 1). Trivalent impurities
- 2). Pentavalent impurities
- 3). Neutral atoms
- 4). Oxygen atoms

Correct Answer: **2). Pentavalent impurities**

Solution:

Pentavalent atoms donate extra electrons.

Ref: *Boylestad – Electronic Devices*

4. P-type semiconductor is formed by adding

- 1). Pentavalent impurities
- 2). Trivalent impurities
- 3). Neutral atoms
- 4). Metal atoms

Correct Answer: **2). Trivalent impurities**

Solution:

Trivalent atoms create holes.

Ref: *J.B. Gupta*

5. The majority carriers in N-type semiconductor are

- 1). Holes
- 2). Electrons
- 3). Protons
- 4). Neutrons

Correct Answer: **2). Electrons**

Solution:

Extra electrons dominate conduction.

Ref: *Boylestad*

6. The majority carriers in P-type semiconductor are

- 1). Electrons
- 2). Holes
- 3). Neutrons
- 4). Protons

Correct Answer: **2). Holes**

Solution:

Trivalent doping creates holes.

Ref: *V.K. Mehta*

7. A PN junction diode conducts current when

- 1). Reverse biased
- 2). Forward biased
- 3). No bias
- 4). Both

Correct Answer: **2). Forward biased**

Solution:

Forward bias reduces depletion layer.

Ref: *J.B. Gupta*

8. Reverse bias of PN junction causes

- 1). Large current
- 2). Very small leakage current
- 3). No current
- 4). Infinite current

Correct Answer: **2). Very small leakage current**

Solution:

Only minority carrier current flows.

Ref: *Boylestad*

9. Zener diode is mainly used for

- 1). Amplification
- 2). Voltage regulation
- 3). Oscillation
- 4). Rectification

Correct Answer: **2). Voltage regulation**

Solution:

Operates in reverse breakdown region.

Ref: *V.K. Mehta*

10. Zener diode operates in

- 1). Forward bias only
- 2). Reverse breakdown region
- 3). Cut-off region
- 4). Saturation region

Correct Answer: **2). Reverse breakdown region**

Solution:

Maintains constant voltage.

Ref: *J.B. Gupta*

11. A transistor has

- 1). Two terminals
- 2). Three terminals
- 3). Four terminals
- 4). Five terminals

Correct Answer: **2). Three terminals**

Solution:

Emitter, Base, Collector.

Ref: *Boylestad*

12. The three terminals of transistor are

- 1). Base, emitter, collector
- 2). Gate, drain, source
- 3). Anode, cathode, gate
- 4). Plate, grid, cathode

Correct Answer: **1). Base, emitter, collector**

Solution:

Used for current amplification.

Ref: *V.K. Mehta*

13. Types of bipolar junction transistors include

- 1). NPN
- 2). PNP
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Two basic transistor structures.

Ref: *J.B. Gupta*

14. The transistor configuration with highest gain is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). None

Correct Answer: **2). Common Emitter**

Solution:

CE provides high voltage and current gain.

Ref: *Boylestad*

15. The transistor configuration with lowest input resistance is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). None

Correct Answer: **1). Common Base**

Solution:

CB has very low input impedance.

Ref: *V.K. Mehta*

16. The transistor configuration with unity voltage gain is

- 1). Common Base
- 2). Common Collector
- 3). Common Emitter
- 4). None

Correct Answer: **2). Common Collector**

Solution:

Also called emitter follower.

Ref: *J.B. Gupta*

17. A half-wave rectifier uses

- 1). One diode
- 2). Two diodes
- 3). Four diodes
- 4). Three diodes

Correct Answer: **1). One diode**

Solution:

Conducts during one half cycle.

Ref: *Boylestad*

18. A full-wave rectifier uses

- 1). Two diodes
- 2). Four diodes
- 3). Both 1 and 2
- 4). One diode

Correct Answer: **3). Both 1 and 2**

Solution:

Center-tap or bridge rectifier.

Ref: *V.K. Mehta*

19. Ripple in rectifier output can be reduced using

- 1). Filter circuits
- 2). Amplifiers
- 3). Oscillators
- 4). Gates

Correct Answer: **1). Filter circuits**

Solution:

Filters smooth DC output.

Ref: *J.B. Gupta*

20. A capacitor filter is used to

- 1). Reduce ripple voltage
- 2). Increase voltage
- 3). Increase current
- 4). Generate AC

Correct Answer: **1). Reduce ripple voltage**

Solution:

Stores charge to smooth output.

Ref: *Boylestad*

21. Field Effect Transistor (FET) is

- 1). Current controlled device
- 2). Voltage controlled device
- 3). Power device
- 4). Temperature device

Correct Answer: **2). Voltage controlled device**

Solution:

Gate voltage controls current.

Ref: *Sedha*

22. FET terminals are

- 1). Gate, drain, source
- 2). Base, emitter, collector
- 3). Anode, cathode, gate
- 4). Plate, grid, cathode

Correct Answer: **1). Gate, drain, source**

Solution:

Similar to transistor but voltage controlled.

Ref: *Boylestad*

23. LED stands for

- 1). Light Emitting Diode
- 2). Low Energy Diode
- 3). Light Energy Device
- 4). Logic Emitting Device

Correct Answer: **1). Light Emitting Diode**

Solution:

Emits light when forward biased.

Ref: *J.B. Gupta*

24. LED is commonly used in

- 1). Displays
- 2). Indicators
- 3). Lighting
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:
Efficient light source.

Ref: *V.K. Mehta*

25. SCR stands for

- 1). Silicon Controlled Rectifier
- 2). Semiconductor Controlled Resistor
- 3). Silicon Current Regulator
- 4). Static Current Rectifier

Correct Answer: **1). Silicon Controlled Rectifier**

Solution:
Used for power control.

Ref: *Boylestad*

26. SCR has terminals

- 1). Anode, cathode, gate
- 2). Base, emitter, collector
- 3). Gate, drain, source
- 4). Plate, grid, cathode

Correct Answer: **1). Anode, cathode, gate**

Solution:
Gate controls conduction.

Ref: *J.B. Gupta*

27. Photodiode converts

- 1). Light to electrical signal
- 2). Electrical signal to light
- 3). Heat to electricity
- 4). Voltage to current

Correct Answer: **1). Light to electrical signal**

Solution:

Used in optical sensors.

Ref: *V.K. Mehta*

28. Phototransistor is

- 1). Light sensitive transistor
- 2). Temperature sensor
- 3). Voltage amplifier
- 4). Oscillator

Correct Answer: **1). Light sensitive transistor**

Solution:

Amplifies photocurrent.

Ref: *Boylestad*

29. CRO stands for

- 1). Cathode Ray Oscilloscope
- 2). Current Range Oscillator
- 3). Cathode Resistance Oscillator
- 4). Control Ray Oscilloscope

Correct Answer: **1). Cathode Ray Oscilloscope**

Solution:

Displays electrical signals.

Ref: *J.B. Gupta*

30. CRO is used to measure

- 1). Voltage
- 2). Frequency
- 3). Phase difference
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Displays waveform on screen.

Ref: *Sedha*

31. Lissajous patterns in CRO are used to measure

- 1). Voltage
- 2). Frequency
- 3). Power
- 4). Current

Correct Answer: **2). Frequency**

Solution:

Used to compare unknown frequency.

Ref: *Boylestad*

32. Timer IC widely used in electronics is

- 1). 8085
- 2). 555
- 3). 8051
- 4). 741

Correct Answer: **2). 555**

Solution:

Used for timing and oscillation.

Ref: *J.B. Gupta*

33. 555 timer can operate in

- 1). Monostable mode
- 2). Astable mode
- 3). Bistable mode
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Versatile timer IC.

Ref: *Sedha*

34. Depletion region exists in

- 1). PN junction
- 2). Transistor
- 3). FET
- 4). All semiconductor devices

Correct Answer: **1). PN junction**

Solution:

Region without free carriers.

Ref: *Boylestad*

35. Semiconductor conductivity increases with

- 1). Temperature
- 2). Pressure
- 3). Voltage
- 4). Current

Correct Answer: **1). Temperature**

Solution:

More electrons released at high temperature.

Ref: *V.K. Mehta*

36. Minority carriers in an N-type semiconductor are

- 1). Electrons
- 2). Holes
- 3). Protons
- 4). Neutrons

Correct Answer: **2). Holes**

Solution:

Electrons are majority carriers, holes are minority carriers.

Ref: *Electronic Devices – Boylestad*

37. The barrier potential of a silicon diode is approximately

- 1). 0.3 V
- 2). 0.7 V
- 3). 1.5 V
- 4). 2 V

Correct Answer: **2). 0.7 V**

Solution:

Silicon PN junction requires about **0.7 V** to conduct.

Ref: *Principles of Electronics – V.K. Mehta*

38. The barrier potential of a germanium diode is approximately

- 1). 0.2 V
- 2). 0.3 V
- 3). 0.7 V
- 4). 1 V

Correct Answer: **2). 0.3 V**

Solution:

Germanium diodes have lower barrier potential.

Ref: *J.B. Gupta*

39. A rectifier converts

- 1). DC to AC
- 2). AC to DC
- 3). AC to AC
- 4). DC to DC

Correct Answer: **2). AC to DC**

Solution:

Rectifiers convert alternating current into direct current.

Ref: *Boylestad*

40. The maximum efficiency of a half-wave rectifier is

- 1). 40.6%
- 2). 60%
- 3). 81.2%
- 4). 100%

Correct Answer: **1). 40.6%**

Solution:

Half-wave rectifier efficiency is limited.

Ref: *V.K. Mehta*

41. Maximum efficiency of a full-wave rectifier is

- 1). 50%
- 2). 60%
- 3). 81.2%
- 4). 100%

Correct Answer: **3). 81.2%**

Solution:

Full-wave rectifiers use both half cycles.

Ref: *J.B. Gupta*

42. Ripple factor of full wave rectifier is approximately

- 1). 0.48
- 2). 1.21
- 3). 2
- 4). 0.1

Correct Answer: **1). 0.48**

Solution:

Ripple reduced compared to half-wave.

Ref: *Boylestad*

43. The main advantage of FET over BJT is

- 1). High current gain
- 2). High input impedance
- 3). Low voltage gain
- 4). High temperature

Correct Answer: **2). High input impedance**

Solution:

FET is voltage controlled.

Ref: *Sedha*

44. LED emits light when

- 1). Reverse biased
- 2). Forward biased
- 3). Zero bias
- 4). Breakdown

Correct Answer: **2). Forward biased**

Solution:

Electrons recombine with holes producing photons.

Ref: *J.B. Gupta*

45. SCR is mainly used in

- 1). Amplifiers
- 2). Power control circuits
- 3). Oscillators
- 4). Logic circuits

Correct Answer: **2). Power control circuits**

Solution:

SCR used in motor speed control, light dimmers.

Ref: *Boylestad*

46. SCR remains ON until

- 1). Gate signal removed
- 2). Current drops below holding current
- 3). Voltage removed
- 4). Temperature drops

Correct Answer: **2). Current drops below holding current**

Solution:

SCR latches ON.

Ref: *V.K. Mehta*

47. Photodiode is normally operated in

- 1). Forward bias
- 2). Reverse bias
- 3). No bias
- 4). AC bias

Correct Answer: **2). Reverse bias**

Solution:

Reverse bias increases sensitivity.

Ref: *Boylestad*

48. CRO vertical plates control

- 1). Horizontal deflection
- 2). Vertical deflection
- 3). Brightness
- 4). Focus

Correct Answer: **2). Vertical deflection**

Solution:

Voltage applied to vertical plates moves beam vertically.

Ref: *Sedha*

49. CRO horizontal plates control

- 1). Vertical deflection
- 2). Horizontal deflection
- 3). Intensity
- 4). Frequency

Correct Answer: **2). Horizontal deflection**

Solution:

Time base voltage applied.

Ref: *J.B. Gupta*

50. The coating inside CRO tube is called

- 1). Aquadag
- 2). Silicon
- 3). Copper oxide
- 4). Graphite

Correct Answer: **1). Aquadag**

Solution:

Provides secondary electron collection.

Ref: *Boylestad*

SECTION B – AMPLIFIERS

51. An amplifier is a device that

- 1). Generates signal
- 2). Increases signal strength
- 3). Converts AC to DC
- 4). Stores energy

Correct Answer: **2). Increases signal strength**

Solution:

Amplifiers increase amplitude of signals.

Ref: *Millman & Halkias*

52. The most widely used amplifier configuration is

- 1). CB
- 2). CE
- 3). CC
- 4). None

Correct Answer: **2). CE**

Solution:

CE provides high gain.

Ref: *J.B. Gupta*

53. Voltage gain of amplifier is

- 1). V_{out} / V_{in}
- 2). V_{in} / V_{out}
- 3). I_{out} / I_{in}
- 4). P_{in} / P_{out}

Correct Answer: **1). V_{out} / V_{in}**

Solution:

Ratio of output to input voltage.

Ref: *Sedha*

54. The amplifier with highest input impedance is

- 1). CB
- 2). CE
- 3). CC
- 4). None

Correct Answer: **3). CC**

Solution:

Emitter follower has high input impedance.

Ref: *Millman*

55. Amplifiers used for small signals are called

- 1). Power amplifiers
- 2). Small signal amplifiers
- 3). RF amplifiers
- 4). Oscillators

Correct Answer: **2). Small signal amplifiers**

Solution:

Used in communication circuits.

Ref: *J.B. Gupta*

56. Distortion in amplifier means

- 1). Increase in voltage
- 2). Change in waveform shape
- 3). Increase in current
- 4). Frequency change

Correct Answer: **2). Change in waveform shape**

Solution:

Distortion alters output waveform.

Ref: *Sedha*

57. Frequency response of amplifier shows

- 1). Gain vs frequency
- 2). Voltage vs time
- 3). Current vs voltage
- 4). Power vs time

Correct Answer: **1). Gain vs frequency**

Solution:

Indicates bandwidth.

Ref: *Millman*

58. Bandwidth of amplifier is

- 1). Difference between upper and lower cutoff frequencies
- 2). Gain $\times$ frequency
- 3). Voltage gain
- 4). Power gain

Correct Answer: **1). Difference between upper and lower cutoff frequencies**

Solution:

Bandwidth determines signal range.

Ref: *J.B. Gupta*

59. Power amplifiers are used in

- 1). Audio systems
- 2). Radio transmitters
- 3). Communication systems
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Deliver large output power.

Ref: *Sedha*

60. Class A amplifier conduction angle is

- 1). 360°
- 2). 180°
- 3). 90°
- 4). 270°

Correct Answer: **1). 360°**

Solution:

Conduction during full cycle.

Ref: *Millman*

61. The transistor configuration with highest voltage gain is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). None

Correct Answer: **2). Common Emitter**

Solution:

Common emitter configuration provides high voltage and current gain.

Ref: *Integrated Electronics – Millman & Halkias*

62. The transistor configuration with lowest input impedance is

- 1). Common Base
- 2). Common Collector
- 3). Common Emitter
- 4). None

Correct Answer: **1). Common Base**

Solution:

Common base has very low input impedance.

Ref: *Electronic Devices – J.B. Gupta*

63. The transistor configuration used as emitter follower is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). None

Correct Answer: **3). Common Collector**

Solution:

Output follows input voltage.

Ref: *Sedha – Applied Electronics*

64. Current gain of common emitter amplifier is represented by

- 1). α
- 2). β
- 3). γ
- 4). δ

Correct Answer: **2). β**

Solution:

$$\beta = I_c / I_b.$$

Ref: *Boylestad*

65. Current gain of common base amplifier is

- 1). α
- 2). β
- 3). γ
- 4). μ

Correct Answer: **1). α**

Solution:

$$\alpha = I_c / I_e.$$

Ref: *V.K. Mehta*

66. A power amplifier is mainly used to

- 1). Increase voltage
- 2). Increase current
- 3). Deliver power to load
- 4). Generate signals

Correct Answer: **3). Deliver power to load**

Solution:

Used in audio systems and transmitters.

Ref: *Millman*

67. The efficiency of Class A amplifier is approximately

- 1). 25–30%
- 2). 50%
- 3). 70%
- 4). 90%

Correct Answer: **1). 25–30%**

Solution:

Class A amplifier has low efficiency.

Ref: *J.B. Gupta*

68. Class B amplifier conduction angle is

- 1). 360°
- 2). 180°
- 3). 90°
- 4). 120°

Correct Answer: **2). 180°**

Solution:

Conduction occurs for half cycle.

Ref: *Sedha*

69. Push-pull amplifiers are used to

- 1). Increase distortion
- 2). Reduce distortion
- 3). Increase noise
- 4). Reduce voltage

Correct Answer: **2). Reduce distortion**

Solution:

Used in Class B amplifiers.

Ref: *Millman*

70. Bandwidth of an amplifier is defined as

- 1). Difference between upper and lower cutoff frequencies
- 2). Sum of frequencies
- 3). Voltage gain
- 4). Power gain

Correct Answer: **1). Difference between upper and lower cutoff frequencies**

Solution:

Bandwidth indicates frequency range.

Ref: *J.B. Gupta*

71. Amplifiers used in radio receivers are

- 1). RF amplifiers
- 2). Power amplifiers
- 3). Audio amplifiers
- 4). None

Correct Answer: **1). RF amplifiers**

Solution:

Amplify radio frequency signals.

Ref: *Sedha*

72. Distortion in amplifier means

- 1). Change in waveform shape
- 2). Increase in voltage
- 3). Increase in current
- 4). Frequency change

Correct Answer: **1). Change in waveform shape**

Solution:

Distortion alters signal quality.

Ref: *Boylestad*

73. Negative feedback in amplifier

- 1). Increases distortion
- 2). Reduces distortion
- 3). Increases gain infinitely
- 4). Stops amplification

Correct Answer: **2). Reduces distortion**

Solution:

Improves stability.

Ref: *Millman*

74. Voltage gain of amplifier is

- 1). V_{out}/V_{in}
- 2). V_{in}/V_{out}
- 3). I_{out}/I_{in}
- 4). P_{in}/P_{out}

Correct Answer: **1). V_{out}/V_{in}**

Solution:

Gain = ratio of output to input voltage.

Ref: *J.B. Gupta*

75. Power gain is

- 1). P_{out}/P_{in}
- 2). P_{in}/P_{out}
- 3). V_{out}/V_{in}
- 4). I_{out}/I_{in}

Correct Answer: **1). P_{out}/P_{in}**

Solution:

Indicates power amplification.

Ref: *Sedha*

76. Amplifiers used in sound systems are

- 1). RF amplifiers
- 2). Audio amplifiers
- 3). IF amplifiers
- 4). Video amplifiers

Correct Answer: **2). Audio amplifiers**

Solution:

Used to amplify sound signals.

Ref: *Millman*

77. The main purpose of coupling capacitor in amplifier is

- 1). Block DC
- 2). Pass AC signals
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Allows AC signals to pass between stages.

Ref: *Boylestad*

78. The emitter resistor in CE amplifier provides

- 1). Voltage gain
- 2). Bias stability
- 3). Power gain
- 4). Oscillation

Correct Answer: **2). Bias stability**

Solution:

Improves thermal stability.

Ref: *J.B. Gupta*

79. The transistor used as switch operates in

- 1). Active region
- 2). Cutoff and saturation
- 3). Breakdown
- 4). Linear region

Correct Answer: **2). Cutoff and saturation**

Solution:

Switching action.

Ref: *Sedha*

80. Amplifier gain is usually expressed in

- 1). Watts
- 2). Volts
- 3). Decibels
- 4). Ohms

Correct Answer: **3). Decibels**

Solution:

Gain measured in dB.

Ref: *Millman*

SECTION C – OSCILLATORS

81. An oscillator generates

- 1). DC voltage
- 2). AC signal without input signal
- 3). Power supply
- 4). Current only

Correct Answer: **2). AC signal without input signal**

Solution:

Oscillators convert DC power to AC signals.

Ref: *Electronic Devices – Sedha*

82. Oscillators use

- 1). Negative feedback
- 2). Positive feedback
- 3). No feedback
- 4). Reverse feedback

Correct Answer: **2). Positive feedback**

Solution:

Positive feedback sustains oscillations.

Ref: *Millman*

83. Barkhausen criterion states

- 1). Gain = 1 and phase shift = 0° or 360°
- 2). Gain = 0
- 3). Gain infinite
- 4). Phase shift = 90°

Correct Answer: **1). Gain = 1 and phase shift = 0° or 360°**

Solution:

Condition for oscillations.

Ref: *J.B. Gupta*

84. RC phase shift oscillator uses

- 1). LC network
- 2). RC network
- 3). Transformer
- 4). Crystal

Correct Answer: **2). RC network**

Solution:

Provides required phase shift.

Ref: *Sedha*

85. Hartley oscillator uses

- 1). Capacitive divider
- 2). Inductive divider
- 3). RC network
- 4). Crystal

Correct Answer: **2). Inductive divider**

Solution:

Two inductors provide feedback.

Ref: *Millman*

86. Colpitts oscillator uses

- 1). Inductive divider
- 2). Capacitive divider
- 3). RC network
- 4). Transformer

Correct Answer: **2). Capacitive divider**

Solution:

Uses two capacitors and inductor.

Ref: *Sedha*

87. Crystal oscillator is used for

- 1). Stable frequency generation
- 2). Power amplification
- 3). Rectification
- 4). Voltage regulation

Correct Answer: **1). Stable frequency generation**

Solution:

Quartz crystal has stable frequency.

Ref: *J.B. Gupta*

88. Oscillators are used in

- 1). Radio transmitters
- 2). Clocks
- 3). Signal generators
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Oscillators generate signals.

Ref: *Millman*

89. Wien bridge oscillator generates

- 1). Audio frequencies
- 2). Radio frequencies
- 3). Microwave signals
- 4). DC signals

Correct Answer: **1). Audio frequencies**

Solution:

Used in audio signal generators.

Ref: *Sedha*

90. Frequency stability is highest in

- 1). RC oscillator
- 2). LC oscillator
- 3). Crystal oscillator
- 4). Hartley oscillator

Correct Answer: **3). Crystal oscillator**

Solution:

Crystal has precise resonance.

Ref: *J.B. Gupta*

SECTION C – OSCILLATORS

91. The main function of an oscillator is to

- 1). Amplify signals
- 2). Generate periodic AC signals
- 3). Convert AC to DC
- 4). Store electrical energy

Correct Answer: **2). Generate periodic AC signals**

Solution:

Oscillators produce alternating signals without external input signal.

Ref: *Electronic Devices and Circuits – J.B. Gupta*

92. Oscillators require

- 1). Positive feedback
- 2). Negative feedback
- 3). No feedback
- 4). Reverse bias

Correct Answer: **1). Positive feedback**

Solution:

Positive feedback is necessary to sustain oscillations.

Ref: *Integrated Electronics – Millman & Halkias*

93. According to Barkhausen criterion, oscillations occur when

- 1). Loop gain < 1
- 2). Loop gain = 1 and phase shift = 0° or 360°
- 3). Loop gain = 0
- 4). Phase shift = 180°

Correct Answer: **2). Loop gain = 1 and phase shift = 0° or 360°**

Solution:

This condition ensures sustained oscillations.

Ref: *Electronic Devices – Sedha*

94. Oscillators convert

- 1). AC to DC
- 2). DC to AC
- 3). AC to AC
- 4). DC to DC

Correct Answer: **2). DC to AC**

Solution:

They convert DC supply into AC waveform.

Ref: *J.B. Gupta*

95. LC oscillators are mainly used for

- 1). Low frequency signals
- 2). High frequency signals
- 3). Audio signals
- 4). Power circuits

Correct Answer: **2). High frequency signals**

Solution:

LC circuits are suitable for radio frequency oscillations.

Ref: *Millman & Halkias*

96. RC oscillators are mainly used for

- 1). Audio frequency generation
- 2). Microwave generation
- 3). High frequency radio signals
- 4). DC power supplies

Correct Answer: **1). Audio frequency generation**

Solution:

RC networks generate low-frequency oscillations.

Ref: *Sedha*

97. The Hartley oscillator uses

- 1). Capacitive divider
- 2). Inductive divider
- 3). Crystal resonator
- 4). RC network

Correct Answer: **2). Inductive divider**

Solution:

Two inductors form the feedback network.

Ref: *Electronic Devices – Boylestad*

98. The Colpitts oscillator uses

- 1). Inductive divider
- 2). Capacitive divider
- 3). RC network
- 4). Transformer feedback

Correct Answer: **2). Capacitive divider**

Solution:

Feedback obtained using two capacitors.

Ref: *J.B. Gupta*

99. Wien bridge oscillator is mainly used for

- 1). RF generation
- 2). Audio frequency generation
- 3). Microwave signals
- 4). DC signals

Correct Answer: **2). Audio frequency generation**

Solution:

Used in audio signal generators.

Ref: *Millman & Halkias*

100. Crystal oscillators are known for

- 1). Low stability
- 2). High frequency stability
- 3). High distortion
- 4). Low output

Correct Answer: **2). High frequency stability**

Solution:

Quartz crystals provide precise frequency.

Ref: *Sedha*

101. The tank circuit in LC oscillators consists of

- 1). Resistor and capacitor
- 2). Inductor and capacitor
- 3). Resistor and inductor
- 4). Transformer only

Correct Answer: **2). Inductor and capacitor**

Solution:

Energy exchange between L and C sustains oscillations.

Ref: *J.B. Gupta*

102. Oscillator frequency in LC circuit depends on

- 1). Resistance
- 2). Inductance and capacitance
- 3). Voltage
- 4). Current

Correct Answer: **2). Inductance and capacitance**

Solution:

$$f = \frac{1}{2\pi\sqrt{LC}}$$

Ref: *Boylestad*

103. The RC phase shift oscillator provides phase shift of

- 1). 90°
- 2). 180°
- 3). 270°
- 4). 360°

Correct Answer: **2). 180°**

Solution:

Three RC stages provide total 180° shift.

Ref: *Sedha*

104. Total phase shift required for oscillation is

- 1). 90°
- 2). 180°
- 3). 360°
- 4). 45°

Correct Answer: **3). 360°**

Solution:

Amplifier and feedback network together provide 360°.

Ref: *J.B. Gupta*

105. Oscillators are widely used in

- 1). Communication systems
- 2). Signal generators
- 3). Electronic clocks
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Oscillators generate signals in electronic circuits.

Ref: *Millman*

106. Crystal oscillator frequency is determined by

- 1). Crystal thickness
- 2). Power supply
- 3). Amplifier gain
- 4). Transistor type

Correct Answer: **1). Crystal thickness**

Solution:

Physical dimensions determine resonance.

Ref: *Sedha*

107. Oscillator output waveform is generally

- 1). DC
- 2). Periodic waveform
- 3). Random signal
- 4). Pulsed DC

Correct Answer: **2). Periodic waveform**

Solution:

Oscillators generate sinusoidal or square waves.

Ref: *J.B. Gupta*

108. Oscillator stability depends mainly on

- 1). Temperature
- 2). Component stability
- 3). Power supply variation
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Frequency stability depends on these factors.

Ref: *Millman & Halkias*

109. A crystal oscillator operates based on

- 1). Piezoelectric effect
- 2). Magnetic effect
- 3). Thermal effect
- 4). Electrostatic effect

Correct Answer: **1). Piezoelectric effect**

Solution:

Crystal vibrates when voltage applied.

Ref: *Sedha*

110. Oscillators are essential in

- 1). Radio transmitters
- 2). Digital clocks
- 3). Communication circuits
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Oscillators generate reference signals in electronics.

Ref: *Electronic Devices – J.B. Gupta*

SECTION D – DIGITAL ELECTRONICS

111. Binary number system has base

- 1). 2
- 2). 8
- 3). 10
- 4). 16

Correct Answer: **1). 2**

Solution:

Binary digits are 0 and 1.

Ref: *Digital Design – Morris Mano*

112. Octal number system base is

- 1). 2
- 2). 8
- 3). 10
- 4). 16

Correct Answer: **2). 8**

Solution:

Digits from 0–7.

Ref: *R.P. Jain*

113. Hexadecimal number system base is

- 1). 10
- 2). 8
- 3). 16
- 4). 12

Correct Answer: **3). 16**

Solution:

Digits 0–9 and A–F.

Ref: *Mano*

114. Boolean algebra deals with

- 1). Continuous variables
- 2). Binary variables
- 3). Analog signals
- 4). Voltage levels

Correct Answer: **2). Binary variables**

Solution:

Values 0 or 1.

Ref: *Digital Electronics – R.P. Jain*

115. AND gate output is 1 when

- 1). Any input 1
- 2). All inputs 1
- 3). All inputs 0
- 4). Any input 0

Correct Answer: **2). All inputs 1**

Solution:

Logical multiplication.

Ref: *Mano*

116. OR gate output is 1 when

- 1). Any input 1
- 2). All inputs 1
- 3). All inputs 0
- 4). Only one input 0

Correct Answer: **1). Any input 1**

Solution:

Logical addition.

Ref: *R.P. Jain*

117. NOT gate performs

- 1). Addition
- 2). Inversion
- 3). Multiplication
- 4). Storage

Correct Answer: **2). Inversion**

Solution:

Output is complement of input.

Ref: *Mano*

118. NAND gate is called

- 1). Universal gate
- 2). Memory gate
- 3). Sequential gate
- 4). Arithmetic gate

Correct Answer: **1). Universal gate**

Solution:

Any logic function can be built.

Ref: *R.P. Jain*

119. NOR gate is also

- 1). Universal gate
- 2). Sequential gate
- 3). Arithmetic gate
- 4). Register gate

Correct Answer: **1). Universal gate**

Solution:

Used to implement all logic circuits.

Ref: *Mano*

120. De Morgan's theorem is used for

- 1). Logic simplification
- 2). Signal generation
- 3). Voltage amplification
- 4). Current measurement

Correct Answer: **1). Logic simplification**

Solution:

Important Boolean algebra rule.

Ref: *R.P. Jain*

121. A flip-flop is used to

- 1). Amplify signals
- 2). Store one bit of data
- 3). Generate oscillations
- 4). Convert AC to DC

Correct Answer: **2). Store one bit of data**

Solution:

A flip-flop is a bistable circuit that stores **one binary bit (0 or 1)**.

Ref: *Digital Design – M. Morris Mano*

122. The basic building block of sequential circuits is

- 1). Logic gate
- 2). Flip-flop
- 3). Multiplexer
- 4). Decoder

Correct Answer: **2). Flip-flop**

Solution:

Sequential circuits depend on memory elements like flip-flops.

Ref: *Modern Digital Electronics – R.P. Jain*

123. The JK flip-flop eliminates

- 1). Propagation delay
- 2). Race around condition
- 3). Oscillation
- 4). Power loss

Correct Answer: **2). Race around condition**

Solution:

JK flip-flop improves SR flip-flop by eliminating invalid state.

Ref: *Digital Principles – Malvino*

124. A T flip-flop is mainly used in

- 1). Registers
- 2). Counters
- 3). Amplifiers
- 4). Oscillators

Correct Answer: **2). Counters**

Solution:

T flip-flop toggles its state and is widely used in counters.

Ref: *Digital Design – Mano*

125. A shift register is used for

- 1). Data storage
- 2). Data transfer
- 3). Data shifting
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Shift registers move data bit-by-bit for storage or transfer.

Ref: *Modern Digital Electronics – R.P. Jain*

126. RAM stands for

- 1). Read Access Memory
- 2). Random Access Memory
- 3). Rapid Access Memory
- 4). Read Automatic Memory

Correct Answer: **2). Random Access Memory**

Solution:

RAM allows data access in any order.

Ref: *Digital Principles – Malvino*

127. RAM is

- 1). Non-volatile memory
- 2). Volatile memory
- 3). Permanent memory
- 4). Secondary memory

Correct Answer: **2). Volatile memory**

Solution:

Data stored in RAM is lost when power is turned off.

Ref: *Digital Electronics – R.P. Jain*

128. ROM stands for

- 1). Random Output Memory
- 2). Read Only Memory
- 3). Register Output Memory
- 4). Rapid Output Memory

Correct Answer: **2). Read Only Memory**

Solution:

ROM stores permanent data.

Ref: *Digital Design – Mano*

129. ROM is

- 1). Volatile memory
- 2). Non-volatile memory
- 3). Temporary memory
- 4). Cache memory

Correct Answer: **2). Non-volatile memory**

Solution:

Data remains even after power is turned off.

Ref: *Modern Digital Electronics – R.P. Jain*

130. A half adder adds

- 1). Two binary digits
- 2). Three binary digits
- 3). Four binary digits
- 4). Five binary digits

Correct Answer: **1). Two binary digits**

Solution:

Half adder adds two bits and produces **sum and carry**.

Ref: *Digital Design – Mano*

131. A full adder adds

- 1). Two binary digits
- 2). Three binary digits
- 3). Four binary digits
- 4). Five binary digits

Correct Answer: **2). Three binary digits**

Solution:

Full adder adds **two bits and a carry input**.

Ref: *Digital Electronics – R.P. Jain*

132. An encoder converts

- 1). Binary code into decimal
- 2). Many inputs into binary output
- 3). Binary into analog
- 4). Analog into binary

Correct Answer: **2). Many inputs into binary output**

Solution:

Encoder converts active input lines into coded output.

Ref: *Digital Principles – Malvino*

133. A decoder converts

- 1). Binary input into many outputs
- 2). Many inputs into binary
- 3). Analog to digital
- 4). Digital to analog

Correct Answer: **1). Binary input into many outputs**

Solution:

Decoder activates one output based on binary input.

Ref: *Digital Design – Mano*

134. A multiplexer selects

- 1). Many outputs to one input
- 2). One input from many inputs
- 3). One output to many inputs
- 4). Two outputs

Correct Answer: **2). One input from many inputs**

Solution:

Multiplexer works as a **data selector**.

Ref: *Modern Digital Electronics – R.P. Jain*

135. A demultiplexer distributes

- 1). One input to many outputs
- 2). Many inputs to one output
- 3). Binary to decimal
- 4). Analog to digital

Correct Answer: **1). One input to many outputs**

Solution:

Demultiplexer works as **data distributor**.

Ref: *Digital Principles – Malvino*

136. The Karnaugh map (K-map) is used for

- 1). Arithmetic operations
- 2). Logic simplification
- 3). Memory storage
- 4). Data transfer

Correct Answer: **2). Logic simplification**

Solution:

K-map simplifies Boolean expressions by grouping adjacent 1's or 0's.

Ref: *Digital Design – M. Morris Mano*

137. The number of cells in a 3-variable K-map is

- 1). 4
- 2). 6
- 3). 8
- 4). 16

Correct Answer: **3). 8**

Solution:

Number of cells = 2^n

For 3 variables $\rightarrow 2^3 = 8$.

Ref: *Modern Digital Electronics – R.P. Jain*

138. The number of cells in a 4-variable K-map is

- 1). 8
- 2). 16
- 3). 32
- 4). 64

Correct Answer: **2). 16**

Solution:

$$\text{Cells} = 2^4 = 16.$$

Ref: *Digital Design – Mano*

139. Gray code is used in K-map because

- 1). It reduces memory
- 2). Adjacent cells differ by one bit
- 3). It increases speed
- 4). It reduces voltage

Correct Answer: **2). Adjacent cells differ by one bit**

Solution:

Gray code ensures only one variable changes between adjacent cells.

Ref: *Digital Electronics – R.P. Jain*

140. The complement of Boolean expression $A + B$ according to De Morgan's theorem is

- 1). $A + B$
- 2). $A'B'$
- 3). $A' + B'$
- 4). AB

Correct Answer: **2). $A'B'$**

Solution:

$$(A + B)' = A'B'$$

Ref: *Digital Principles – Malvino*

141. The complement of Boolean expression AB is

- 1). $A'B'$
- 2). $A' + B'$
- 3). AB'
- 4). $A + B$

Correct Answer: **2). $A' + B'$**

Solution:

$$(AB)' = A' + B'$$

Ref: *Digital Design – Mano*

142. A latch differs from a flip-flop because

- 1). It is edge triggered
- 2). It is level triggered
- 3). It stores two bits
- 4). It does not store data

Correct Answer: **2). It is level triggered**

Solution:

Latch responds to input as long as enable signal is active.

Ref: *Modern Digital Electronics – R.P. Jain*

143. A flip-flop changes state

- 1). Anytime input changes
- 2). At clock edge
- 3). Continuously
- 4). Randomly

Correct Answer: **2). At clock edge**

Solution:

Flip-flops are edge-triggered circuits.

Ref: *Digital Principles – Malvino*

144. The simplest flip-flop is

- 1). JK flip-flop
- 2). D flip-flop
- 3). SR flip-flop
- 4). T flip-flop

Correct Answer: **3). SR flip-flop**

Solution:

SR flip-flop has Set and Reset inputs.

Ref: *Digital Design – Mano*

145. The invalid state in SR flip-flop occurs when

- 1). $S = 0, R = 0$
- 2). $S = 1, R = 1$
- 3). $S = 0, R = 1$
- 4). $S = 1, R = 0$

Correct Answer: **2). $S = 1, R = 1$**

Solution:

Both inputs high produce undefined output.

Ref: *R.P. Jain*

146. The D flip-flop is also called

- 1). Delay flip-flop
- 2). Data flip-flop
- 3). Both 1 and 2
- 4). Dynamic flip-flop

Correct Answer: **3). Both 1 and 2**

Solution:

D stands for Data or Delay.

Ref: *Digital Principles – Malvino*

147. Registers are used to

- 1). Store binary information
- 2). Perform arithmetic operations
- 3). Amplify signals
- 4). Generate signals

Correct Answer: **1). Store binary information**

Solution:

Registers consist of multiple flip-flops.

Ref: *Digital Design – Mano*

148. A 4-bit register contains

- 1). 2 flip-flops
- 2). 4 flip-flops
- 3). 8 flip-flops
- 4). 16 flip-flops

Correct Answer: **2). 4 flip-flops**

Solution:

Each flip-flop stores one bit.

Ref: *Modern Digital Electronics – R.P. Jain*

149. Serial input serial output register is called

- 1). SISO register
- 2). SIPO register
- 3). PISO register
- 4). PIPO register

Correct Answer: **1). SISO register**

Solution:

Data enters and leaves serially.

Ref: *Digital Principles – Malvino*

150. Serial input parallel output register is called

- 1). SISO
- 2). SIPO
- 3). PISO
- 4). PIPO

Correct Answer: **2). SIPO**

Solution:

Serial input converted to parallel output.

Ref: *Digital Design – Mano*

151. Parallel input serial output register is

- 1). SISO
- 2). SIPO
- 3). PISO
- 4). PIPO

Correct Answer: **3). PISO**

Solution:

Parallel data shifted out serially.

Ref: *R.P. Jain*

152. Parallel input parallel output register is

- 1). SISO
- 2). SIPO
- 3). PISO
- 4). PIPO

Correct Answer: **4). PIPO**

Solution:

Data entered and retrieved in parallel.

Ref: *Digital Principles – Malvino*

153. A counter is a

- 1). Combinational circuit
- 2). Sequential circuit
- 3). Analog circuit
- 4). Linear circuit

Correct Answer: **2). Sequential circuit**

Solution:

Counters depend on previous states.

Ref: *Digital Design – Mano*

154. A mod-10 counter is called

- 1). Binary counter
- 2). Decade counter
- 3). Ring counter
- 4). Johnson counter

Correct Answer: **2). Decade counter**

Solution:

Counts from 0–9.

Ref: *Modern Digital Electronics – R.P. Jain*

155. The number of flip-flops required for a mod-8 counter is

- 1). 2
- 2). 3
- 3). 4
- 4). 8

Correct Answer: **2). 3**

Solution:

$$2^n = 8 \Rightarrow n = 3$$

Ref: *Digital Principles – Malvino*

156. A ring counter uses

- 1). D flip-flops
- 2). JK flip-flops
- 3). T flip-flops
- 4). SR flip-flops

Correct Answer: **1). D flip-flops**

Solution:

Ring counter shifts a single bit through register.

Ref: *Digital Design – Mano*

157. Johnson counter is also called

- 1). Twisted ring counter
- 2). Binary counter
- 3). Ripple counter
- 4). Synchronous counter

Correct Answer: **1). Twisted ring counter**

Solution:

Feedback from inverted output.

Ref: *R.P. Jain*

158. Memory used in microcontrollers is

- 1). RAM
- 2). ROM
- 3). EEPROM
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different memories serve different purposes.

Ref: *Mazidi – 8051 Microcontroller*

159. EEPROM stands for

- 1). Electrically Erasable Programmable ROM
- 2). Electrically Enabled Programmable ROM
- 3). Electronically Programmable Memory
- 4). Electrical Program ROM

Correct Answer: **1). Electrically Erasable Programmable ROM**

Solution:

Memory can be erased electrically.

Ref: *Ayala – 8051 Microcontroller*

160. PROM stands for

- 1). Programmable Read Only Memory
- 2). Program Read Only Machine
- 3). Primary Read Only Memory
- 4). Programmable Random Memory

Correct Answer: **1). Programmable Read Only Memory**

Solution:

User can program once.

Ref: *Mazidi*

161. EPROM stands for

- 1). Electrically Programmable ROM
- 2). Erasable Programmable ROM
- 3). Extended Programmable ROM
- 4). Electronic Programmable ROM

Correct Answer: **2). Erasable Programmable ROM**

Solution:

EPROM can be erased using ultraviolet light.

Ref: *Ayala*

162. Cache memory is

- 1). Secondary memory
- 2). Fast temporary memory
- 3). Permanent storage
- 4). ROM

Correct Answer: **2). Fast temporary memory**

Solution:

Improves processor speed.

Ref: *Digital Electronics – R.P. Jain*

163. A multiplexer with 4 inputs requires

- 1). 1 select line
- 2). 2 select lines
- 3). 3 select lines
- 4). 4 select lines

Correct Answer: **2). 2 select lines**

Solution:

$$2^n = 4 \Rightarrow n = 2$$

Ref: *Digital Design – Mano*

164. A demultiplexer with 8 outputs requires

- 1). 2 select lines
- 2). 3 select lines
- 3). 4 select lines
- 4). 8 select lines

Correct Answer: **2). 3 select lines**

Solution:

$$2^n = 8 \Rightarrow n = 3$$

Ref: *R.P. Jain*

165. Logic families include

- 1). TTL
- 2). CMOS
- 3). ECL
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different digital logic technologies.

Ref: *Digital Electronics – R.P. Jain*

166. CMOS stands for

- 1). Complementary Metal Oxide Semiconductor
- 2). Controlled Metal Oxide Semiconductor
- 3). Complementary Metal Output System
- 4). Computer Metal Oxide System

Correct Answer: **1). Complementary Metal Oxide Semiconductor**

Solution:

Widely used due to low power consumption.

Ref: *Digital Design – Mano*

167. TTL stands for

- 1). Transistor Transistor Logic
- 2). Time Trigger Logic
- 3). Transistor Transfer Logic
- 4). Timing Transfer Logic

Correct Answer: **1). Transistor Transistor Logic**

Solution:

Uses bipolar junction transistors.

Ref: *R.P. Jain*

168. CMOS logic family has

- 1). High power consumption
- 2). Low power consumption
- 3). No power consumption
- 4). Very high voltage

Correct Answer: **2). Low power consumption**

Solution:

CMOS circuits are energy efficient.

Ref: *Digital Electronics – R.P. Jain*

169. Propagation delay in logic gates refers to

- 1). Time taken for input change to affect output
- 2). Voltage drop
- 3). Power loss
- 4). Current change

Correct Answer: **1). Time taken for input change to affect output**

Solution:

Important parameter in digital circuits.

Ref: *Digital Design – Mano*

170. Fan-out of a logic gate is

- 1). Number of outputs
- 2). Number of inputs it can drive
- 3). Number of gates connected
- 4). Voltage level

Correct Answer: **2). Number of inputs it can drive**

Solution:

Indicates driving capability of gate.

Ref: *Modern Digital Electronics – R.P. Jain*

171. The 8051 microcontroller is an

- 1). 4-bit processor
- 2). 8-bit processor
- 3). 16-bit processor
- 4). 32-bit processor

Correct Answer: **2). 8-bit processor**

Solution:

The **8051 is an 8-bit microcontroller** capable of processing 8-bit data.

Ref: *The 8051 Microcontroller – Mazidi*

172. The internal RAM of the 8051 microcontroller is

- 1). 64 bytes
- 2). 128 bytes
- 3). 256 bytes
- 4). 512 bytes

Correct Answer: **2). 128 bytes**

Solution:

Standard 8051 contains **128 bytes internal RAM**.

Ref: *Ayala – 8051 Microcontroller*

173. The program counter (PC) in 8051 is

- 1). 8 bit
- 2). 16 bit
- 3). 32 bit
- 4). 4 bit

Correct Answer: **2). 16 bit**

Solution:

Allows addressing of **64 KB program memory**.

Ref: *Mazidi*

174. The number of I/O ports in 8051 is

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

Correct Answer: **3). 4**

Solution:

Ports **P0, P1, P2, P3** each 8 bits.

Ref: *Ayala*

175. Each I/O port of 8051 consists of

- 1). 4 pins
- 2). 6 pins
- 3). 8 pins
- 4). 16 pins

Correct Answer: **3). 8 pins**

Solution:

Each port handles **8-bit data**.

Ref: *Mazidi*

176. The stack pointer (SP) in 8051 is

- 1). 8-bit register
- 2). 16-bit register
- 3). 32-bit register
- 4). 4-bit register

Correct Answer: **1). 8-bit register**

Solution:

SP points to stack location in RAM.

Ref: *Ayala*

177. The default value of stack pointer after reset is

- 1). 00H
- 2). 07H
- 3). 0FH
- 4). FFH

Correct Answer: **2). 07H**

Solution:

Stack begins at **08H** location.

Ref: *Mazidi*

178. The data pointer (DPTR) in 8051 is

- 1). 8 bit
- 2). 16 bit
- 3). 32 bit
- 4). 4 bit

Correct Answer: **2). 16 bit**

Solution:

Used for addressing external memory.

Ref: *Ayala*

179. The accumulator register in 8051 is

- 1). A register
- 2). B register
- 3). DPTR
- 4). PC

Correct Answer: **1). A register**

Solution:

Accumulator used in arithmetic and logic operations.

Ref: *Mazidi*

180. The B register in 8051 is mainly used for

- 1). Data storage
- 2). Multiplication and division operations
- 3). Address storage
- 4). Interrupt control

Correct Answer: **2). Multiplication and division operations**

Solution:

Used with **MUL AB** and **DIV AB** instructions.

Ref: *Ayala*

181. The number of timers in 8051 is

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

Correct Answer: **2). 2**

Solution:

Timers **Timer0** and **Timer1**.

Ref: *Mazidi*

182. The number of interrupt sources in 8051 is

- 1). 3
- 2). 5
- 3). 7
- 4). 10

Correct Answer: **2). 5**

Solution:

Interrupt sources include **External 0, Timer0, External1, Timer1, Serial**.

Ref: *Ayala*

183. The instruction used to move data is

- 1). ADD
- 2). MOV
- 3). SUB
- 4). MUL

Correct Answer: **2). MOV**

Solution:

MOV instruction transfers data between registers.

Ref: *Mazidi*

184. The instruction used to add data is

- 1). ADD
- 2). MOV
- 3). INC
- 4). DEC

Correct Answer: **1). ADD**

Solution:

ADD instruction performs arithmetic addition.

Ref: *Ayala*

185. The instruction used for subtraction is

- 1). ADD
- 2). SUBB
- 3). MOV
- 4). INC

Correct Answer: **2). SUBB**

Solution:

SUBB subtracts with borrow.

Ref: *Mazidi*

186. The instruction used for multiplication is

- 1). MUL
- 2). ADD
- 3). DIV
- 4). SUB

Correct Answer: **1). MUL**

Solution:

MUL AB multiplies accumulator and B register.

Ref: *Ayala*

187. The instruction used for division is

- 1). ADD
- 2). DIV
- 3). MUL
- 4). MOV

Correct Answer: **2). DIV**

Solution:

DIV AB divides accumulator by B register.

Ref: *Mazidi*

188. The instruction NOP means

- 1). No operation
- 2). Next operation
- 3). New operation
- 4). Null operation

Correct Answer: **1). No operation**

Solution:

Used for timing delays.

Ref: *Ayala*

189. The ALE pin in 8051 is used for

- 1). Address latch enable
- 2). Interrupt control
- 3). Clock generation
- 4). Reset

Correct Answer: **1). Address latch enable**

Solution:

Separates address and data lines.

Ref: *Mazidi*

190. The PSEN pin in 8051 stands for

- 1). Program Store Enable
- 2). Power Supply Enable
- 3). Processor Start Enable
- 4). Pulse Signal Enable

Correct Answer: **1). Program Store Enable**

Solution:

Used for accessing external program memory.

Ref: *The 8051 Microcontroller – Mazidi*

UNIT X – POWER ELECTRONICS AND DRIVES

SECTION A – POWER ELECTRONIC DEVICES

1. SCR stands for

- 1). Silicon Controlled Resistor
- 2). Silicon Controlled Rectifier
- 3). Semiconductor Current Regulator
- 4). Static Current Rectifier

Correct Answer: **2). Silicon Controlled Rectifier**

Solution:

SCR is a **four-layer PNPN semiconductor device** used for power control.

Ref: *Power Electronics – P.S. Bimbhra*

2. An SCR has how many terminals

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

Correct Answer: **2). 3**

Solution:

SCR terminals are **Anode, Cathode, Gate**.

Ref: *Power Electronics – Rashid*

3. SCR structure consists of

- 1). PN junction
- 2). PNP transistor
- 3). PNPN layers
- 4). NPN transistor

Correct Answer: **3). PNPN layers**

Solution:

SCR has **four layers forming three junctions**.

Ref: *Bimbhra*

4. SCR turns ON when

- 1). Forward voltage applied only
- 2). Gate signal applied
- 3). Both forward voltage and gate signal
- 4). Reverse voltage applied

Correct Answer: **3). Both forward voltage and gate signal**

Solution:

SCR requires forward bias and gate trigger.

Ref: *Rashid*

5. SCR remains ON until

- 1). Gate signal removed
- 2). Current falls below holding current
- 3). Voltage removed
- 4). Gate current increases

Correct Answer: **2). Current falls below holding current**

Solution:

SCR latches ON after triggering.

Ref: *Bimbhra*

6. The minimum current required to keep SCR ON is

- 1). Trigger current
- 2). Holding current
- 3). Gate current
- 4). Breakover current

Correct Answer: **2). Holding current**

Solution:

Below this current SCR turns OFF.

Ref: *Rashid*

7. SCR is mainly used for

- 1). Amplification
- 2). Power control
- 3). Signal generation
- 4). Logic circuits

Correct Answer: **2). Power control**

Solution:

SCR used in motor control and rectifiers.

Ref: *Bimbhra*

8. UJT stands for

- 1). Unified Junction Transistor
- 2). Unijunction Transistor
- 3). Universal Junction Transistor
- 4). Ultra Junction Transistor

Correct Answer: **2). Unijunction Transistor**

Solution:

UJT used in relaxation oscillators.

Ref: *J.B. Gupta*

9. UJT is mainly used in

- 1). Amplifiers
- 2). Oscillators
- 3). Rectifiers
- 4). Power supply

Correct Answer: **2). Oscillators**

Solution:

Used for SCR triggering circuits.

Ref: *Bimbhra*

10. DIAC stands for

- 1). Diode AC switch
- 2). Diode for AC
- 3). Diode Alternating Current
- 4). Diode AC control

Correct Answer: **3). Diode Alternating Current**

Solution:

Bidirectional trigger device.

Ref: *Rashid*

11. TRIAC stands for

- 1). Triode AC
- 2). Triode for Alternating Current
- 3). Trigger AC
- 4). Three AC

Correct Answer: **2). Triode for Alternating Current**

Solution:

Equivalent to two SCRs in anti-parallel.

Ref: *Bimbhra*

12. TRIAC conducts current in

- 1). One direction
- 2). Two directions
- 3). Three directions
- 4). No direction

Correct Answer: **2). Two directions**

Solution:

Bidirectional current flow.

Ref: *Rashid*

13. GTO stands for

- 1). Gate Turn-Off Thyristor
- 2). General Turn-Off
- 3). Gate Triggered Output
- 4). Gate Transfer Oscillator

Correct Answer: **1). Gate Turn-Off Thyristor**

Solution:

GTO can be turned OFF by gate signal.

Ref: *Bimbhra*

14. The device used for bidirectional triggering is

- 1). SCR
- 2). TRIAC
- 3). DIAC
- 4). UJT

Correct Answer: **3). DIAC**

Solution:

Used to trigger TRIAC.

Ref: *Rashid*

15. SCR triggering using UJT is called

- 1). Pulse triggering
- 2). Relaxation oscillator triggering
- 3). DC triggering
- 4). AC triggering

Correct Answer: **2). Relaxation oscillator triggering**

Solution:

UJT generates pulses.

Ref: *Bimbhra*

16. dv/dt protection of SCR is provided using

- 1). Resistor
- 2). Capacitor
- 3). RC snubber circuit
- 4). Inductor

Correct Answer: **3). RC snubber circuit**

Solution:

Limits voltage rise.

Ref: *Rashid*

17. di/dt protection of SCR is provided using

- 1). Capacitor
- 2). Inductor

- 3). Resistor
- 4). Diode

Correct Answer: **2). Inductor**

Solution:
Limits current rise.

Ref: *Bimbhra*

18. Commutation of SCR means

- 1). Turning ON SCR
- 2). Turning OFF SCR
- 3). Voltage control
- 4). Current control

Correct Answer: **2). Turning OFF SCR**

Solution:
Commutation removes current.

Ref: *Rashid*

19. Natural commutation occurs in

- 1). DC circuits
- 2). AC circuits
- 3). Both
- 4). None

Correct Answer: **2). AC circuits**

Solution:
Current naturally becomes zero.

Ref: *Bimbhra*

20. Forced commutation occurs in

- 1). AC circuits
- 2). DC circuits
- 3). Both
- 4). None

Correct Answer: **2). DC circuits**

Solution:
External circuit required.

Ref: *Rashid*

SECTION B – CONVERTERS, CHOPPERS, INVERTERS & DRIVES

Converters

41. A converter converts

- 1). DC to AC
- 2). AC to DC
- 3). DC to DC
- 4). AC to AC

Correct Answer: **2). AC to DC**

Solution:
Converters are controlled rectifiers.

Ref: *Power Electronics – Bimbhra*

42. Average output voltage of single phase half wave converter depends on

- 1). Input voltage
- 2). Firing angle α
- 3). Load resistance
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:
Firing angle controls output.

Ref: *Rashid*

43. Firing angle in converter is

- 1). Delay angle of SCR triggering
- 2). Voltage angle
- 3). Current angle
- 4). Phase shift

Correct Answer: **1). Delay angle of SCR triggering**

Solution:
Controls output voltage.

Ref: *Bimbhra*

Choppers

44. A chopper converts

- 1). AC to DC
- 2). DC to DC
- 3). DC to AC
- 4). AC to AC

Correct Answer: **2). DC to DC**

Solution:
Acts like DC transformer.

Ref: *Rashid*

45. Duty cycle of chopper is

$$D = \frac{T_{ON}}{T}$$

Options

- 1). T_{on}/T
- 2). T/T_{on}
- 3). $T_{on} \times T$
- 4). T/T

Correct Answer: **1). T_{on}/T**

Solution:
Duty cycle controls output voltage.

Ref: *Bimbhra*

46. Step-down chopper is also called

- 1). Boost converter
- 2). Buck converter
- 3). Inverter
- 4). Rectifier

Correct Answer: **2). Buck converter**

47. Step-up chopper is also called

- 1). Boost converter
- 2). Buck converter
- 3). Rectifier
- 4). Controller

Correct Answer: **1). Boost converter**

Inverters

48. Inverter converts

- 1). AC to DC
- 2). DC to AC
- 3). DC to DC
- 4). AC to AC

Correct Answer: **2). DC to AC**

49. PWM stands for

- 1). Pulse Width Modulation
- 2). Power Wave Modulation
- 3). Phase Width Modulation
- 4). Pulse Wave Mode

Correct Answer: **1). Pulse Width Modulation**

50. Voltage Source Inverter uses

- 1). Constant voltage input
- 2). Constant current input
- 3). Variable voltage
- 4). AC supply

Correct Answer: **1). Constant voltage input**

AC Voltage Controllers

51. AC voltage controller is used to control

- 1). Voltage
- 2). Current
- 3). Power
- 4). Frequency

Correct Answer: **1). Voltage**

Drives

52. Speed control of DC motor using converters controls

- 1). Armature voltage
- 2). Field current
- 3). Load torque
- 4). Frequency

Correct Answer: **1). Armature voltage**

53. Speed control using chopper varies

- 1). Input AC
- 2). Duty cycle
- 3). Resistance
- 4). Current

Correct Answer: **2). Duty cycle**

54. V/f control of induction motor maintains

- 1). Voltage constant
- 2). Frequency constant
- 3). Flux constant
- 4). Speed constant

Correct Answer: **3). Flux constant**

SMPS & UPS

55. SMPS stands for

- 1). Switched Mode Power Supply
- 2). Static Mode Power Supply
- 3). System Mode Power Supply
- 4). Switched Motor Power Supply

Correct Answer: **1). Switched Mode Power Supply**

56. UPS stands for

- 1). Uninterrupted Power Supply
- 2). Uninterruptible Power Supply
- 3). Universal Power Supply
- 4). Unit Power Supply

Correct Answer: **2). Uninterruptible Power Supply**

57. A single-phase full wave converter uses

- 1). One SCR
- 2). Two SCRs
- 3). Four SCRs
- 4). Six SCRs

Correct Answer: **3). Four SCRs**

Solution:

A **single-phase fully controlled bridge converter** consists of four SCRs arranged in bridge form.

Ref: *Power Electronics – P.S. Bimbhra*

58. The average output voltage of a single-phase fully controlled converter depends on

- 1). Supply voltage
- 2). Firing angle α
- 3). Load
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Average output voltage is controlled mainly by **firing angle α** .

Ref: *Power Electronics – Rashid*

59. Increasing the firing angle α in a converter

- 1). Increases output voltage
- 2). Decreases output voltage
- 3). Keeps voltage constant
- 4). Stops converter

Correct Answer: **2). Decreases output voltage**

Solution:

As firing angle increases, average output voltage decreases.

Ref: *Bimbhra*

60. A three-phase converter produces

- 1). Smooth DC output
- 2). Pulsating DC
- 3). AC output
- 4). Zero output

Correct Answer: **1). Smooth DC output**

Solution:

Three-phase converters have **less ripple** than single-phase converters.

Ref: *Rashid*

61. The ripple factor of converter decreases when

- 1). Phase number increases
- 2). Voltage decreases
- 3). Current decreases
- 4). Resistance increases

Correct Answer: **1). Phase number increases**

Solution:

Higher phase systems produce smoother DC.

Ref: *Bimbhra*

62. Choppers are also called

- 1). DC transformers
- 2). AC transformers

- 3). Power regulators
- 4). Voltage multipliers

Correct Answer: **1). DC transformers**

Solution:

Choppers step up or step down DC voltage.

Ref: *Power Electronics – Rashid*

63. In a step-down chopper

- 1). Output voltage < input voltage
- 2). Output voltage > input voltage
- 3). Output voltage = input voltage
- 4). Output voltage = 0

Correct Answer: **1). Output voltage < input voltage**

Solution:

Also called **buck converter**.

Ref: *Bimbhra*

64. In a step-up chopper

- 1). Output voltage < input voltage
- 2). Output voltage > input voltage
- 3). Output voltage = input voltage
- 4). Output voltage = zero

Correct Answer: **2). Output voltage > input voltage**

Solution:

Also called **boost converter**.

Ref: *Rashid*

65. The duty cycle of a chopper is defined as

- 1). T_{on}/T
- 2). T/T_{on}
- 3). $T_{on} \times T$
- 4). T^2

Correct Answer: **1). T_{on}/T**

Solution:

$$D = \frac{T_{ON}}{T}$$

Ref: *Bimbhra*

66. Increasing duty cycle in a step-down chopper

- 1). Decreases output voltage
- 2). Increases output voltage
- 3). No change
- 4). Stops output

Correct Answer: **2). Increases output voltage**

Solution:

Higher ON time increases average output.

Ref: *Rashid*

67. Chopper circuits operate on

- 1). High frequency switching
- 2). Low frequency switching
- 3). DC steady state
- 4). Analog operation

Correct Answer: **1). High frequency switching**

Solution:

Switching devices operate at high frequency.

Ref: *Bimbhra*

68. Inverter converts

- 1). AC to DC
- 2). DC to AC
- 3). DC to DC
- 4). AC to AC

Correct Answer: **2). DC to AC**

Solution:

Inverters convert DC supply to AC output.

Ref: *Rashid*

69. Inverters are used in

- 1). UPS systems
- 2). Motor drives
- 3). Solar systems
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Inverters widely used in power systems.

Ref: *Bimbhra*

70. Voltage Source Inverter (VSI) uses

- 1). Constant voltage input
- 2). Constant current input
- 3). Variable current input
- 4). AC input

Correct Answer: **1). Constant voltage input**

Solution:

VSI is supplied by DC voltage source.

Ref: *Rashid*

71. Current Source Inverter (CSI) uses

- 1). Constant voltage source
- 2). Constant current source
- 3). AC source
- 4). Variable source

Correct Answer: **2). Constant current source**

Solution:

Current controlled input.

Ref: *Bimbhra*

72. PWM technique is used to

- 1). Control inverter output voltage
- 2). Control frequency
- 3). Reduce harmonics
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

PWM improves waveform quality.

Ref: *Rashid*

73. AC voltage controller is used to control

- 1). RMS voltage of AC supply
- 2). Frequency of AC supply
- 3). Power factor
- 4). Current only

Correct Answer: **1). RMS voltage of AC supply**

Solution:

Uses SCR or TRIAC for control.

Ref: *Bimbhra*

74. AC voltage controller works on

- 1). Phase control method
- 2). Frequency control method
- 3). Voltage multiplication
- 4). Current multiplication

Correct Answer: **1). Phase control method**

Solution:

Firing angle controls voltage.

Ref: *Rashid*

75. AC voltage controllers are commonly used in

- 1). Light dimmers
- 2). Fan speed control
- 3). Heater control
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Used for domestic appliances.

Ref: *Bimbhra*

DRIVES SECTION

76. Speed of DC motor is controlled by

- 1). Armature voltage
- 2). Field flux
- 3). Load torque
- 4). Both 1 and 2

Correct Answer: **4). Both 1 and 2**

Solution:

Speed equation:

$$N \propto \frac{V}{\phi}$$

Ref: *Electric Drives – G.K. Dubey*

77. Converter control of DC motor varies

- 1). Armature voltage
- 2). Field voltage
- 3). Current
- 4). Frequency

Correct Answer: **1). Armature voltage**

Solution:

Converters adjust DC voltage.

Ref: *Bimal Bose*

78. Chopper control of DC motor provides

- 1). Smooth speed control
- 2). Efficient speed control
- 3). High efficiency
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Used in electric traction.

Ref: *Dubey*

79. Induction motor speed control using V/f control keeps

- 1). Voltage constant
- 2). Frequency constant
- 3). Flux constant
- 4). Speed constant

Correct Answer: **3). Flux constant**

Solution:

$$\frac{V}{f} = \text{constant}$$

Ref: *Bimal Bose*

80. V/f control is widely used in

- 1). Induction motor drives
- 2). DC drives
- 3). Transformers
- 4). Generators

Correct Answer: **1). Induction motor drives**

Solution:

Used in variable speed drives.

Ref: *Dubey*

SMPS & UPS

81. SMPS stands for

- 1). Switched Mode Power Supply
- 2). Static Mode Power Supply
- 3). System Mode Power Supply
- 4). Source Mode Power Supply

Correct Answer: **1). Switched Mode Power Supply**

Solution:

High efficiency power supply.

Ref: *J.B. Gupta*

82. SMPS uses

- 1). Linear regulation
- 2). High frequency switching
- 3). Low frequency switching
- 4). Mechanical switching

Correct Answer: **2). High frequency switching**

Solution:

Improves efficiency and reduces size.

Ref: *Pressman*

83. UPS stands for

- 1). Uninterrupted Power Supply
- 2). Uninterruptible Power Supply
- 3). Universal Power Supply
- 4). Unit Power Supply

Correct Answer: **2). Uninterruptible Power Supply**

Solution:

Provides backup during power failure.

Ref: *Power Electronics – Bimbhra*

84. UPS is used in

- 1). Computers
- 2). Hospitals
- 3). Communication systems
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Critical loads require uninterrupted power.

Ref: *J.B. Gupta*

85. Online UPS provides

- 1). Continuous supply through inverter
- 2). Direct AC supply
- 3). No backup
- 4). Variable frequency supply

Correct Answer: **1). Continuous supply through inverter**

Solution:

Inverter always connected to load.

Ref: *Bimbhra*

86. Offline UPS operates when

- 1). Normal supply present
- 2). Power failure occurs
- 3). Load decreases
- 4). Battery discharges

Correct Answer: **2). Power failure occurs**

Solution:

Switches to battery supply.

Ref: *Pressman*

ADDITIONAL ECET STYLE QUESTIONS

87. The device used for high power switching is

- 1). BJT
- 2). SCR
- 3). FET
- 4). MOSFET

Correct Answer: **2). SCR**

88. Power electronic devices operate as

- 1). Linear devices
- 2). Switching devices
- 3). Amplifiers
- 4). Oscillators

Correct Answer: **2). Switching devices**

89. Converter output ripple can be reduced using

- 1). Filter
- 2). Transformer
- 3). Resistor
- 4). Diode

Correct Answer: **1). Filter**

90. Chopper control provides

- 1). High efficiency
- 2). Low efficiency
- 3). No efficiency
- 4). Infinite efficiency

Correct Answer: **1). High efficiency**

91. Power electronic devices generally operate in

- 1). Linear region
- 2). Saturation region only
- 3). Switching mode
- 4). Breakdown region

Correct Answer: **3). Switching mode**

Solution:

Power electronic devices such as SCR, MOSFET and IGBT operate mainly as **electronic switches**, turning ON and OFF rapidly for efficient power control.

Ref: *Power Electronics – P.S. Bimbhra*

92. The main advantage of power electronic converters is

- 1). High efficiency
- 2). Low maintenance
- 3). Fast response
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Power electronic systems provide **high efficiency, fast dynamic response, and reliable operation.**

Ref: *Power Electronics – Muhammad H. Rashid*

93. The ripple in the output of a converter can be reduced using

- 1). Resistors
- 2). Filters
- 3). Transformers
- 4). Diodes

Correct Answer: **2). Filters**

Solution:

Filters using **inductors and capacitors** smooth the DC output.

Ref: *Power Electronics – Bimbhra*

94. A buck converter is a

- 1). Step-up DC converter
- 2). Step-down DC converter
- 3). AC converter
- 4). AC inverter

Correct Answer: **2). Step-down DC converter**

Solution:

Buck converters reduce the input DC voltage to a lower output DC voltage.

Ref: *Power Electronics – Rashid*

95. A boost converter is used to

- 1). Decrease voltage
- 2). Increase voltage
- 3). Convert AC to DC
- 4). Convert DC to AC

Correct Answer: **2). Increase voltage**

Solution:

Boost converters increase output voltage above the input voltage.

Ref: *Power Electronics – Bimbhra*

96. PWM in inverters is mainly used to

- 1). Reduce harmonics
- 2). Control output voltage
- 3). Improve waveform quality
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

PWM improves output waveform quality and reduces harmonic distortion.

Ref: *Power Electronics – Rashid*

97. Voltage Source Inverter (VSI) uses

- 1). Constant voltage input
- 2). Constant current input
- 3). AC supply
- 4). Variable supply

Correct Answer: **1). Constant voltage input**

Solution:

VSI is supplied by a DC voltage source.

Ref: *Power Electronics – Bimbhra*

98. Current Source Inverter (CSI) uses

- 1). Constant current source
- 2). Constant voltage source
- 3). AC source
- 4). Variable source

Correct Answer: **1). Constant current source**

Solution:

CSI operates with a DC current source.

Ref: *Power Electronics – Rashid*

99. AC voltage controllers are mainly used to control

- 1). Frequency of AC supply
- 2). RMS voltage of AC supply
- 3). Current waveform
- 4). Power factor

Correct Answer: **2). RMS voltage of AC supply**

Solution:

They regulate voltage using **phase control of SCR or TRIAC**.

Ref: *Power Electronics – Bimbhra*

100. AC voltage controllers operate based on

- 1). Frequency control
- 2). Phase angle control
- 3). Voltage multiplication
- 4). Current multiplication

Correct Answer: **2). Phase angle control**

Solution:

Output voltage is controlled by varying firing angle.

Ref: *Power Electronics – Rashid*

101. A TRIAC is commonly used in

- 1). DC motor control
- 2). AC voltage controllers
- 3). Inverters
- 4). Choppers

Correct Answer: **2). AC voltage controllers**

Solution:

TRIAC controls AC power in both directions.

Ref: *Power Electronics – Bimbhra*

102. Speed control of DC motors using converters controls

- 1). Field voltage
- 2). Armature voltage
- 3). Load resistance
- 4). Frequency

Correct Answer: **2). Armature voltage**

Solution:

Changing armature voltage controls motor speed.

Ref: *Electric Drives – G.K. Dubey*

103. Chopper speed control of DC motor provides

- 1). Low efficiency
- 2). High efficiency
- 3). No speed control
- 4). Mechanical control

Correct Answer: **2). High efficiency**

Solution:

Choppers provide efficient electronic speed control.

Ref: *Power Electronics and Motor Drives – Bimal Bose*

104. V/f control method is used for

- 1). DC motors
- 2). Synchronous motors
- 3). Induction motors
- 4). Stepper motors

Correct Answer: **3). Induction motors**

Solution:

Maintains constant flux by keeping V/f ratio constant.

Ref: *Electric Drives – Dubey*

105. In V/f control

- 1). Voltage is constant
- 2). Frequency is constant
- 3). Voltage and frequency vary proportionally
- 4). Current is constant

Correct Answer: **3). Voltage and frequency vary proportionally**

Solution:

$$\frac{V}{f} = \text{constant}$$

Ref: *Bimal Bose*

106. SMPS improves efficiency by

- 1). Linear regulation
- 2). High frequency switching
- 3). Mechanical switching
- 4). Low frequency control

Correct Answer: **2). High frequency switching**

Solution:

High frequency switching reduces losses.

Ref: *Switching Power Supply Design – Pressman*

107. SMPS size is smaller because

- 1). High switching frequency
- 2). Low voltage
- 3). High current
- 4). Low resistance

Correct Answer: **1). High switching frequency**

Solution:

High frequency reduces transformer size.

Ref: *J.B. Gupta*

108. UPS provides

- 1). Continuous power supply during outage
- 2). Voltage regulation only
- 3). Current regulation only
- 4). Power amplification

Correct Answer: **1). Continuous power supply during outage**

Solution:

UPS supplies backup power during failures.

Ref: *Power Electronics – Bimbhra*

109. Online UPS supplies load through

- 1). Direct AC line
- 2). Battery always
- 3). Inverter continuously
- 4). Transformer

Correct Answer: **3). Inverter continuously**

Solution:

In online UPS, load is always powered by inverter.

Ref: *Power Electronics – Rashid*

110. Power electronics applications include

- 1). Motor drives
- 2). UPS systems
- 3). Power supplies
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Power electronics is widely used in **industrial drives, renewable systems, and power supplies.**

Ref: *Power Electronics – P.S. Bimbhra*

UNIT XI – ELECTRIC VEHICLE TECHNOLOGY

1. An Electric Vehicle (EV) is a vehicle that uses

- 1). Internal combustion engine only
- 2). Electric motor for propulsion
- 3). Steam engine
- 4). Gas turbine

Correct Answer: **2). Electric motor for propulsion**

Solution:

Electric vehicles use electric motors powered by batteries instead of internal combustion engines.

Ref: *Electric & Hybrid Vehicles – A.K. Babu*

2. The main source of energy in an electric vehicle is

- 1). Petrol
- 2). Diesel
- 3). Battery
- 4). Hydrogen gas

Correct Answer: **3). Battery**

Solution:

Electric vehicles store electrical energy in rechargeable batteries.

Ref: *Modern Electric, Hybrid Electric and Fuel Cell Vehicles – Ehsani*

3. A vehicle that uses both electric motor and internal combustion engine is called

- 1). Hybrid Electric Vehicle
- 2). Battery Electric Vehicle
- 3). Plug-in Vehicle
- 4). Solar Vehicle

Correct Answer: **1). Hybrid Electric Vehicle**

Solution:

Hybrid vehicles combine electric motor and internal combustion engine.

Ref: *Electric Vehicle Technology – Kapadani*

4. BEV stands for

- 1). Battery Electric Vehicle
- 2). Basic Electric Vehicle
- 3). Battery Engine Vehicle
- 4). Balanced Electric Vehicle

Correct Answer: **1). Battery Electric Vehicle**

Solution:

BEV runs purely on battery power.

Ref: *Electric & Hybrid Vehicles – A.K. Babu*

5. HEV stands for

- 1). Hybrid Electric Vehicle
- 2). High Energy Vehicle
- 3). Hybrid Engine Vehicle
- 4). High Efficiency Vehicle

Correct Answer: **1). Hybrid Electric Vehicle**

Solution:

HEV combines battery and engine.

Ref: *Ehsani*

6. PHEV stands for

- 1). Plug-in Hybrid Electric Vehicle
- 2). Power Hybrid Electric Vehicle
- 3). Plug Hybrid Engine Vehicle
- 4). Plug-in High Energy Vehicle

Correct Answer: **1). Plug-in Hybrid Electric Vehicle**

Solution:

PHEVs can be charged from external power sources.

Ref: *Kapadani*

7. The most widely used battery in modern EVs is

- 1). Lead acid battery
- 2). Nickel Cadmium battery
- 3). Lithium-ion battery
- 4). Zinc battery

Correct Answer: **3). Lithium-ion battery**

Solution:

Lithium-ion batteries have high energy density and efficiency.

Ref: *Rajput – Fundamentals of Electric Vehicles*

8. Lead acid batteries are commonly used in

- 1). Mobile phones
- 2). Electric cars
- 3). Backup power systems
- 4). Electric trains

Correct Answer: **3). Backup power systems**

Solution:

Lead acid batteries are inexpensive but have low energy density.

Ref: *A.K. Babu*

9. Nickel-metal hydride (NiMH) batteries are used in

- 1). Hybrid vehicles
- 2). Diesel vehicles
- 3). Steam vehicles
- 4). Gas vehicles

Correct Answer: **1). Hybrid vehicles**

Solution:

NiMH batteries were widely used in early hybrid vehicles.

Ref: *Ehsani*

10. The main advantage of lithium-ion batteries is

- 1). Low cost
- 2). High energy density
- 3). Low efficiency
- 4). High weight

Correct Answer: **2). High energy density**

Solution:

Lithium-ion batteries provide more energy per unit weight.

Ref: *Rajput*

11. Battery Management System (BMS) is used to

- 1). Increase battery voltage
- 2). Monitor and control battery operation
- 3). Reduce vehicle speed
- 4). Increase motor power

Correct Answer: **2). Monitor and control battery operation**

Solution:

BMS ensures safe operation of battery packs.

Ref: *Battery Management Systems – Gregory Plett*

12. BMS mainly monitors

- 1). Voltage
- 2). Temperature
- 3). Current
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

BMS tracks several battery parameters for safety.

Ref: *Prashanth – Battery Management Systems*

13. Battery charging is done using

- 1). Charging station
- 2). Grid supply
- 3). Charger circuits
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EV batteries are charged using dedicated charging systems.

Ref: *Kapadani*

14. Fast charging of EV batteries is also called

- 1). Rapid charging
- 2). Slow charging
- 3). Normal charging
- 4). Battery boosting

Correct Answer: **1). Rapid charging**

Solution:

Rapid charging significantly reduces charging time.

Ref: *Ehsani*

15. Level 1 EV charging uses

- 1). AC household outlet
- 2). DC fast charger
- 3). Solar panel
- 4). Fuel cell

Correct Answer: **1). AC household outlet**

Solution:

Level 1 charging uses standard AC supply.

Ref: *Rajput*

16. Level 2 charging provides

- 1). Faster charging than Level 1
- 2). Same charging speed
- 3). Very slow charging
- 4). No charging

Correct Answer: **1). Faster charging than Level 1**

Solution:

Uses higher voltage AC supply.

Ref: *A.K. Babu*

17. DC fast charging is used for

- 1). Slow charging
- 2). Rapid battery charging
- 3). Battery storage
- 4). Motor operation

Correct Answer: **2). Rapid battery charging**

Solution:

Direct DC supply charges battery quickly.

Ref: *Ehsani*

18. The electric motor used in EVs is usually

- 1). DC motor
- 2). Induction motor
- 3). Permanent magnet motor
- 4). Both 2 and 3

Correct Answer: **4). Both 2 and 3**

Solution:

Modern EVs use induction or permanent magnet motors.

Ref: *Rajput*

19. Regenerative braking in EVs

- 1). Wastes energy
- 2). Converts kinetic energy to electrical energy
- 3). Converts electrical energy to heat
- 4). Stops motor instantly

Correct Answer: **2). Converts kinetic energy to electrical energy**

Solution:

Energy recovered during braking charges the battery.

Ref: *Kapadani*

20. The main function of EV inverter is

- 1). Convert AC to DC
- 2). Convert DC to AC for motor
- 3). Store energy
- 4). Increase battery capacity

Correct Answer: **2). Convert DC to AC for motor**

Solution:

Battery DC power must be converted to AC for motor.

Ref: *Ehsani*

21. The main function of an EV motor controller is to

- 1). Store electrical energy
- 2). Control speed and torque of the motor
- 3). Charge the battery
- 4). Convert AC to DC

Correct Answer: **2). Control speed and torque of the motor**

Solution:

The motor controller regulates the **voltage and current supplied to the motor**, thereby controlling its speed and torque.

Ref: *Electric & Hybrid Vehicles – A.K. Babu*

22. Energy density of a battery refers to

- 1). Power output of battery
- 2). Energy stored per unit weight
- 3). Battery temperature
- 4). Charging speed

Correct Answer: **2). Energy stored per unit weight**

Solution:

Energy density indicates how much **energy a battery can store per kilogram**, which directly affects EV driving range.

Ref: *Modern Electric, Hybrid Electric and Fuel Cell Vehicles – Ehsani*

23. Lithium-ion batteries are preferred in EVs because of

- 1). Low energy density
- 2). High energy density and long life
- 3). High weight
- 4). Low efficiency

Correct Answer: **2). High energy density and long life**

Solution:

Lithium-ion batteries provide **high energy density, long cycle life, and high efficiency**, making them ideal for EV applications.

Ref: *Fundamentals of Electric Vehicles – R.K. Rajput*

24. A battery pack in an electric vehicle consists of

- 1). A single battery cell
- 2). Multiple battery cells connected together
- 3). One battery and one motor
- 4). Only control circuits

Correct Answer: **2). Multiple battery cells connected together**

Solution:

Battery packs are made by connecting **many cells in series and parallel** to achieve required voltage and capacity.

Ref: *Electric Vehicle Technology – Kapadani*

25. Battery Management System (BMS) protects the battery from

- 1). Overcharging
- 2). Over-discharging
- 3). Overheating
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

BMS ensures safe battery operation by protecting against **overcharge, deep discharge, and excessive temperature**.

Ref: *Battery Management Systems – Gregory Plett*

26. Thermal management system in EV batteries is used to

- 1). Increase vehicle speed
- 2). Maintain battery temperature within safe limits
- 3). Increase battery voltage
- 4). Control motor speed

Correct Answer: **2). Maintain battery temperature within safe limits**

Solution:

Temperature control improves **battery life, safety, and efficiency**.

Ref: *Battery Management Systems – Prashanth*

27. The EV drivetrain consists of

- 1). Electric motor
- 2). Power electronics controller
- 3). Transmission system
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EV drivetrain includes **motor, controller, and transmission mechanism** that convert electrical energy into mechanical motion.

Ref: *Electric & Hybrid Vehicles – A.K. Babu*

28. An EV charging station provides

- 1). Mechanical energy
- 2). Electrical energy
- 3). Thermal energy
- 4). Chemical energy

Correct Answer: **2). Electrical energy**

Solution:

Charging stations supply electrical power to recharge EV batteries.

Ref: *Electric Vehicle Technology – Kapadani*

29. State of Charge (SOC) of a battery indicates

- 1). Battery temperature
- 2). Remaining battery capacity
- 3). Battery weight
- 4). Charging voltage

Correct Answer: **2). Remaining battery capacity**

Solution:

SOC represents the **percentage of energy remaining in the battery**.

Ref: *Battery Management Systems – Gregory Plett*

30. State of Health (SOH) of a battery indicates

- 1). Battery charging time
- 2). Battery voltage
- 3). Overall battery condition and aging
- 4). Battery temperature

Correct Answer: **3). Overall battery condition and aging**

Solution:

SOH represents the **current performance level of the battery compared to its original condition.**

Ref: *Battery Management Systems – Plett*

31. Electric vehicles produce

- 1). High pollution
- 2). Low emissions
- 3). No efficiency
- 4). No energy

Correct Answer: **2). Low emissions**

Solution:

EVs reduce environmental pollution.

Ref: *Rajput*

32. EV batteries store energy in

- 1). Chemical form
- 2). Mechanical form
- 3). Magnetic form
- 4). Nuclear form

Correct Answer: **1). Chemical form**

Solution:

Chemical reactions store and release electrical energy.

Ref: *Ehsani*

33. Charging time depends on

- 1). Battery capacity
- 2). Charger power
- 3). Charging method
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Charging rate depends on several factors.

Ref: *Kapadani*

34. EVs are more efficient than

- 1). Petrol vehicles
- 2). Diesel vehicles
- 3). Both
- 4). None

Correct Answer: **3). Both**

Solution:

Electric motors are highly efficient.

Ref: *Rajput*

35. Electric vehicles reduce

- 1). Air pollution
- 2). Noise pollution
- 3). Fuel consumption
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs improve environmental sustainability.

Ref: *A.K. Babu*

36. Battery pack voltage in EVs is typically

- 1). 12 V
- 2). 24 V
- 3). 300–400 V
- 4). 1000 V

Correct Answer: **3). 300–400 V**

Solution:

High voltage improves efficiency.

Ref: *Ehsani*

37. Charging connector standard widely used is

- 1). CHAdeMO
- 2). CCS
- 3). Type 2 connector
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Different charging standards exist globally.

Ref: *Kapadani*

38. EV range depends on

- 1). Battery capacity
- 2). Driving conditions
- 3). Vehicle efficiency
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Multiple factors determine driving range.

Ref: *Rajput*

39. Lithium-ion battery voltage per cell is approximately

- 1). 1.2 V
- 2). 2 V
- 3). 3.7 V
- 4). 12 V

Correct Answer: **3). 3.7 V**

Solution:

Standard nominal voltage of Li-ion cell.

Ref: *Plett – Battery Management Systems*

40. EV charger converts

- 1). AC to DC
- 2). DC to AC
- 3). DC to DC
- 4). AC to AC

Correct Answer: **1). AC to DC**

Solution:

Battery charging requires DC.

Ref: *Kapadani*

41. The propulsion system of an electric vehicle mainly consists of

- 1). Internal combustion engine
- 2). Electric motor
- 3). Steam turbine
- 4). Gas engine

Correct Answer: **2). Electric motor**

Solution:

Electric vehicles use an **electric motor to convert electrical energy from the battery into mechanical energy** for vehicle movement.

Ref: *Electric & Hybrid Vehicles – A.K. Babu*

42. The primary energy storage device in an electric vehicle is

- 1). Generator
- 2). Capacitor
- 3). Battery pack
- 4). Transformer

Correct Answer: **3). Battery pack**

Solution:

Electric vehicles store electrical energy in **battery packs consisting of many cells connected in series and parallel.**

Ref: *Modern Electric, Hybrid Electric and Fuel Cell Vehicles – Ehsani*

43. The main function of Battery Management System (BMS) is

- 1). Increase motor speed
- 2). Monitor and protect battery pack
- 3). Increase battery size
- 4). Reduce charging voltage

Correct Answer: **2). Monitor and protect battery pack**

Solution:

BMS monitors **battery voltage, current, temperature, and state of charge** to ensure safe operation.

Ref: *Battery Management Systems – Gregory L. Plett*

44. State of Charge (SOC) indicates

- 1). Battery voltage
- 2). Remaining battery capacity
- 3). Motor power
- 4). Charging current

Correct Answer: **2). Remaining battery capacity**

Solution:

SOC represents the **percentage of energy remaining in the battery.**

Ref: *Electric Vehicle Technology – Kapadani*

45. State of Health (SOH) of battery represents

- 1). Charging voltage
- 2). Battery age and condition
- 3). Motor efficiency
- 4). Charging current

Correct Answer: **2). Battery age and condition**

Solution:

SOH indicates the **overall health and performance capability of the battery compared to a new battery**.

Ref: *Battery Management Systems – Plett*

46. Regenerative braking in electric vehicles is used to

- 1). Increase vehicle speed
- 2). Convert kinetic energy into electrical energy
- 3). Increase battery temperature
- 4). Reduce battery capacity

Correct Answer: **2). Convert kinetic energy into electrical energy**

Solution:

During braking, the motor acts as a **generator and charges the battery**, improving efficiency.

Ref: *Electric & Hybrid Vehicles – A.K. Babu*

47. Fast charging of EV batteries generally uses

- 1). Low voltage AC supply
- 2). High power DC charger
- 3). Mechanical charging system
- 4). Solar charging only

Correct Answer: **2). High power DC charger**

Solution:

Fast charging stations supply **high power DC directly to the battery**, reducing charging time.

Ref: *Modern Electric, Hybrid Electric and Fuel Cell Vehicles – Ehsani*

48. Electric vehicles have higher efficiency compared to internal combustion vehicles because

- 1). Electric motors have fewer mechanical losses
- 2). Electric motors operate with higher efficiency
- 3). Energy conversion losses are lower
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Electric motors are typically **85–95% efficient**, which is significantly higher than internal combustion engines.

Ref: *Fundamentals of Electric Vehicles – R.K. Rajput*

49. In an electric vehicle battery pack, cells are connected

- 1). Only in series
- 2). Only in parallel
- 3). In series and parallel combination
- 4). Randomly

Correct Answer: **3). In series and parallel combination**

Solution:

Series connection increases **voltage**, while parallel connection increases **current capacity**.

Ref: *Electric Vehicle Technology – Kapadani*

50. Future electric vehicle technology mainly focuses on

- 1). Increasing battery energy density
- 2). Reducing charging time
- 3). Improving battery life
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Modern EV research focuses on **higher energy density batteries, faster charging, and longer battery life**.

Ref: *Modern Electric, Hybrid Electric and Fuel Cell Vehicles – Ehsani*

APE CET 2026 – GRAND TEST 1
Electrical and Electronics Engineering

101. In a PN junction diode, the depletion region is formed due to

- 1). Movement of majority carriers
- 2). Recombination of electrons and holes
- 3). Diffusion of carriers across the junction
- 4). External applied voltage

Correct Answer: **3). Diffusion of carriers across the junction**

Solution:

Electrons and holes diffuse across the junction and recombine, leaving immobile ions which form the depletion region.

Ref: *Electronic Devices and Circuits – Boylestad*

102. The barrier potential of a silicon diode at room temperature is approximately

- 1). 0.3 V
- 2). 0.7 V
- 3). 1.2 V
- 4). 2.1 V

Correct Answer: **2). 0.7 V**

Solution:

Silicon diodes require about **0.7 V forward bias** to overcome the depletion barrier.

Ref: *Principles of Electronics – V.K. Mehta*

103. The configuration of a BJT having highest current gain is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). Differential configuration

Correct Answer: **2). Common Emitter**

Solution:

CE configuration provides both high voltage gain and current gain.

Ref: *Electronic Devices – J.B. Gupta*

104. In a full-wave bridge rectifier, the ripple frequency is

- 1). Same as supply frequency
- 2). Half of supply frequency
- 3). Twice the supply frequency
- 4). Four times the supply frequency

Correct Answer: **3). Twice the supply frequency**

Solution:

Both half cycles are used, doubling ripple frequency.

Ref: *Electronic Devices and Circuits – Sedha*

105. A Zener diode operates in

- 1). Forward bias region
- 2). Reverse breakdown region
- 3). Cutoff region
- 4). Saturation region

Correct Answer: **2). Reverse breakdown region**

Solution:

Zener diode regulates voltage in reverse breakdown.

Ref: *Electronic Devices – Boylestad*

CIRCUIT THEORY

106. The current through a resistor of 10Ω when 20 V is applied across it is

- 1). 1 A
- 2). 2 A
- 3). 4 A
- 4). 10 A

Correct Answer: **2). 2 A**

Solution:

$$I = \frac{V}{R} = \frac{20}{10} = 2A$$

Ref: *Network Analysis – Van Valkenburg*

107. In a balanced Wheatstone bridge

- 1). Voltage across galvanometer is zero
- 2). Current is maximum
- 3). Resistance is infinite
- 4). Voltage is maximum

Correct Answer: **1). Voltage across galvanometer is zero**

Solution:

Bridge balance condition:

$$\frac{R1}{R2} = \frac{R3}{R4}$$

Ref: *Engineering Circuit Analysis – Hayt*

108. The equivalent resistance of two resistors 6Ω and 3Ω connected in parallel is

- 1). 1Ω
- 2). 2Ω
- 3). 3Ω
- 4). 4Ω

Correct Answer: **2). 2Ω**

Solution:

$$R = \frac{6 \times 3}{6 + 3} = 2\Omega$$

Ref: *Network Analysis – Van Valkenburg*

ELECTRONIC MEASURING INSTRUMENTS

109. A CRO is mainly used to measure

- 1). Current only
- 2). Voltage waveform
- 3). Resistance
- 4). Power

Correct Answer: **2). Voltage waveform**

Solution:

CRO displays signal voltage vs time.

Ref: *Electrical Measurements – A.K. Sawhney*

110. Lissajous patterns in CRO are used to determine

- 1). Voltage
- 2). Current
- 3). Frequency
- 4). Resistance

Correct Answer: **3). Frequency**

Solution:

Frequency comparison method using CRO.

Ref: *Electronic Instrumentation – Helfrick*

INDUSTRIAL & POWER ELECTRONICS

111. SCR is turned ON by

- 1). Reverse bias
- 2). Gate triggering
- 3). High temperature
- 4). Removing current

Correct Answer: **2). Gate triggering**

Solution:

Gate pulse initiates conduction.

Ref: *Power Electronics – P.S. Bimbhra*

112. The device used for bidirectional AC control is

- 1). SCR
- 2). TRIAC
- 3). DIAC
- 4). MOSFET

Correct Answer: **2). TRIAC**

Solution:

TRIAC conducts in both directions.

Ref: *Power Electronics – Rashid*

COMMUNICATION SYSTEMS

113. Modulation is required in communication systems to

- 1). Reduce antenna height
- 2). Increase signal strength
- 3). Enable long-distance transmission
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Modulation improves transmission efficiency.

Ref: *Communication Systems – Simon Haykin*

114. In AM modulation, the modulated parameter is

- 1). Frequency
- 2). Phase
- 3). Amplitude
- 4). Time

Correct Answer: **3). Amplitude**

Solution:

Carrier amplitude varies according to message signal.

Ref: *Modern Communication Systems – Lathi*

ADVANCED COMMUNICATION

115. PCM stands for

- 1). Pulse Code Modulation
- 2). Pulse Current Modulation
- 3). Phase Code Modulation
- 4). Pulse Carrier Modulation

Correct Answer: **1). Pulse Code Modulation**

Solution:

PCM converts analog signal to digital form.

Ref: *Communication Systems – Haykin*

DIGITAL ELECTRONICS

116. The NAND gate is known as

- 1). Universal gate
- 2). Exclusive gate
- 3). Sequential gate
- 4). Arithmetic gate

Correct Answer: **1). Universal gate**

Solution:

Any logic function can be implemented using NAND.

Ref: *Digital Design – Morris Mano*

117. Binary equivalent of decimal 13 is

- 1). 1101
- 2). 1011
- 3). 1110
- 4). 1001

Correct Answer: **1). 1101**

Solution:

$$13_{10} = 1101_2$$

Ref: *Digital Electronics – R.P. Jain*

MICROCONTROLLERS

118. The 8051 microcontroller has

- 1). 8-bit CPU
- 2). 16-bit CPU
- 3). 32-bit CPU
- 4). 4-bit CPU

Correct Answer: **1). 8-bit CPU**

Solution:

8051 is an **8-bit microcontroller**.

Ref: *Mazidi – 8051 Microcontroller*

119. Immediate addressing mode example is

- 1). MOV A,#25H
- 2). MOV A,R1
- 3). MOV A,@R0
- 4). MOV A,30H

Correct Answer: **1). MOV A,#25H**

Solution:

Immediate value specified directly.

Ref: *Ayala*

DATA COMMUNICATION & NETWORKS

120. The device used to connect multiple networks is

- 1). Hub
- 2). Switch
- 3). Router
- 4). Repeater

Correct Answer: **3). Router**

Solution:

Routers connect different networks.

Ref: *Computer Networks – Tanenbaum*

EV TECHNOLOGY (SPECIALIZED)

121. Battery Management System (BMS) is used for

- 1). Charging motor
- 2). Monitoring battery parameters
- 3). Controlling vehicle speed
- 4). Cooling motor

Correct Answer: **2). Monitoring battery parameters**

Solution:

BMS monitors **voltage, temperature, current and SOC.**

Ref: *Battery Management Systems – Gregory Plett*

122. SOC in electric vehicles stands for

- 1). State of Charge
- 2). Speed of Charging
- 3). System of Control
- 4). Storage of Current

Correct Answer: **1). State of Charge**

Solution:

SOC indicates remaining battery capacity.

Ref: *Electric Vehicles – A.K. Babu*

ELECTRIC TRACTION

123. The most commonly used motor in electric traction is

- 1). DC series motor
- 2). Shunt motor
- 3). Induction motor
- 4). Synchronous motor

Correct Answer: **1). DC series motor**

Solution:

High starting torque makes it suitable.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER SYSTEM GENERATION

124. Thermal power plants use

- 1). Steam turbines
- 2). Gas turbines
- 3). Water turbines
- 4). Wind turbines

Correct Answer: **1). Steam turbines**

Solution:

Coal combustion generates steam.

Ref: *Power Plant Engineering – P.K. Nag*

125. Hydel power plant energy source is

- 1). Water
- 2). Coal
- 3). Uranium
- 4). Gas

Correct Answer: **1). Water**

Solution:

Water potential energy drives turbine.

Ref: *Generation of Electrical Energy – B.R. Gupta*

NETWORK NUMERICAL

126. If power factor is unity, phase angle is

- 1). 90°
- 2). 45°
- 3). 0°
- 4). 60°

Correct Answer: **3). 0°**

Solution:

$$PF = \cos\theta$$

Unity PF $\rightarrow \theta = 0^\circ$.

Ref: *Engineering Circuit Analysis – Hayt*

127. Resonance occurs in RLC circuit when

- 1). $X_L = X_C$
- 2). $X_L > X_C$
- 3). $X_C > X_L$
- 4). $X_L = 0$

Correct Answer: **1). $X_L = X_C$**

Solution:

Inductive and capacitive reactances cancel.

Ref: *Network Analysis – Van Valkenburg*

DIGITAL LOGIC

128. The output of AND gate is HIGH when

- 1). Any input HIGH
- 2). All inputs HIGH
- 3). All inputs LOW
- 4). Any input LOW

Correct Answer: **2). All inputs HIGH**

Solution:

Logical multiplication operation.

Ref: *Digital Design – Morris Mano*

MICROCONTROLLER PROGRAMMING

129. The instruction used for multiplication in 8051 is

- 1). MUL
- 2). ADD
- 3). DIV
- 4). MOV

Correct Answer: **1). MUL**

Solution:

MUL AB multiplies accumulator and B register.

Ref: *Mazidi*

DATA NETWORKS

130. TCP/IP model consists of

- 1). 3 layers
- 2). 4 layers
- 3). 5 layers
- 4). 7 layers

Correct Answer: **2). 4 layers**

Solution:

Layers: Network Interface, Internet, Transport, Application.

Ref: *Computer Networks – Tanenbaum*

131. In a series RLC circuit at resonance, the impedance is

- 1). Minimum and purely resistive
- 2). Maximum and inductive
- 3). Minimum and capacitive
- 4). Infinite

Correct Answer: **1). Minimum and purely resistive**

Solution:

At resonance:

$$X_L = X_C$$

Net reactance = 0 → impedance becomes purely resistive.

Ref: *Network Analysis – Van Valkenburg*

132. The resonant frequency of an RLC circuit is

- 1). $\frac{1}{2\pi RC}$
- 2). $\frac{1}{2\pi\sqrt{LC}}$
- 3). $\frac{R}{2\pi L}$
- 4). $\frac{1}{LC}$

Correct Answer: **2).** $\frac{1}{2\pi\sqrt{LC}}$

Solution:

Standard resonance formula for RLC circuits.

Ref: *Engineering Circuit Analysis – Hayt*

2-WATTMETER METHOD

133. In a balanced three-phase system, the total power measured using two wattmeters is

- 1). $W_1 - W_2$
- 2). $W_1 + W_2$
- 3). $W_1 \times W_2$
- 4). W_1/W_2

Correct Answer: **2).** $W_1 + W_2$

Solution:

Total three-phase power:

$$P = W_1 + W_2$$

Ref: *Electrical Technology – B.L. Theraja*

134. If the power factor of a 3-phase load is unity, the readings of two wattmeters will be

- 1). Equal
- 2). One zero

- 3). Opposite sign
- 4). One double the other

Correct Answer: **1). Equal**

Solution:

At unity PF:

$$W_1 = W_2$$

Ref: *J.B. Gupta – Electrical Engineering*

135. If one wattmeter reads negative in the 2-wattmeter method, the power factor is

- 1). Greater than 1
- 2). Less than 0.5
- 3). Equal to 1
- 4). Equal to zero

Correct Answer: **2). Less than 0.5**

Solution:

One wattmeter becomes negative when $PF < 0.5$.

Ref: *B.L. Theraja*

ELECTRONIC MEASUREMENT

136. A digital voltmeter measures

- 1). Average voltage
- 2). RMS voltage
- 3). Analog waveform
- 4). Power

Correct Answer: **2). RMS voltage**

Solution:

Digital voltmeters convert analog signals to digital form and measure RMS values.

Ref: *A.K. Sawhney – Electrical Measurements*

137. The instrument used to measure insulation resistance is

- 1). Voltmeter
- 2). Megger
- 3). Ammeter
- 4). Wattmeter

Correct Answer: **2). Megger**

Solution:

Megger measures resistance in mega-ohms.

Ref: *Sawhney*

POWER ELECTRONICS

138. The device used for high-frequency switching in SMPS is

- 1). SCR
- 2). TRIAC
- 3). MOSFET
- 4). DIAC

Correct Answer: **3). MOSFET**

Solution:

MOSFETs operate efficiently at high switching frequencies.

Ref: *Power Electronics – Rashid*

139. The firing angle of an SCR determines

- 1). Output voltage of converter
- 2). Current flow
- 3). Power factor
- 4). Resistance

Correct Answer: **1). Output voltage of converter**

Solution:

Average DC output depends on firing angle.

Ref: *Power Electronics – Bimbhra*

COMMUNICATION SYSTEMS

140. The bandwidth of an AM signal is

- 1). f_m
- 2). $2f_m$
- 3). $3f_m$
- 4). $4f_m$

Correct Answer: **2). $2f_m$**

Solution:

$$BW = 2f_m$$

Ref: *Communication Systems – Haykin*

141. In frequency modulation, the modulated parameter is

- 1). Amplitude
- 2). Frequency
- 3). Phase
- 4). Voltage

Correct Answer: **2). Frequency**

Solution:

FM varies carrier frequency according to message signal.

Ref: *Modern Communication Systems – Lathi*

ADVANCED COMMUNICATION

142. Multiplexing is used to

- 1). Combine multiple signals into one channel
- 2). Increase voltage
- 3). Reduce noise
- 4). Increase antenna size

Correct Answer: **1). Combine multiple signals into one channel**

Solution:

Multiplexing improves channel utilization.

Ref: *Haykin*

143. TDM stands for

- 1). Time Division Multiplexing
- 2). Total Data Modulation
- 3). Transmission Data Method
- 4). Time Data Measurement

Correct Answer: **1). Time Division Multiplexing**

Solution:

Multiple signals share channel using time slots.

Ref: *Communication Systems – Haykin*

DIGITAL ELECTRONICS

144. The output of XOR gate is HIGH when

- 1). Both inputs same
- 2). Inputs are different
- 3). Both inputs LOW
- 4). Both inputs HIGH

Correct Answer: **2). Inputs are different**

Solution:

Exclusive OR outputs HIGH when inputs differ.

Ref: *Digital Design – Morris Mano*

145. The number of flip-flops required for a mod-16 counter is

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

Correct Answer: **3). 4**

Solution:

$$2^n = 16 \Rightarrow n = 4$$

Ref: *Digital Electronics – R.P. Jain*

MICROCONTROLLERS

146. The program memory size of standard 8051 is

- 1). 2 KB
- 2). 4 KB
- 3). 8 KB
- 4). 16 KB

Correct Answer: **2). 4 KB**

Solution:

Original 8051 contains 4 KB ROM.

Ref: *Mazidi – 8051 Microcontroller*

147. Register addressing mode example is

- 1). MOV A,R1
- 2). MOV A,#20H
- 3). MOV A,30H
- 4). MOV A,@R0

Correct Answer: **1). MOV A,R1**

Solution:

Register contents used directly.

Ref: *Ayala*

148. Indirect addressing in 8051 uses

- 1). R0 or R1
- 2). Accumulator
- 3). Program counter
- 4). Stack pointer

Correct Answer: **1). R0 or R1**

Solution:

Used to access memory indirectly.

Ref: *Mazidi*

DATA COMMUNICATION

149. The physical layer of OSI model deals with

- 1). Data encryption
- 2). Bit transmission
- 3). Error control
- 4). Routing

Correct Answer: **2). Bit transmission**

Solution:

Physical layer transmits raw bits.

Ref: *Computer Networks – Tanenbaum*

150. The protocol used for web communication is

- 1). FTP
- 2). HTTP
- 3). SMTP
- 4). SNMP

Correct Answer: **2). HTTP**

Solution:

HTTP is the protocol used by web browsers.

Ref: *Tanenbaum*

EV TECHNOLOGY

151. Battery energy density is defined as

- 1). Energy stored per unit weight
- 2). Voltage per current
- 3). Current per resistance
- 4). Power per voltage

Correct Answer: **1). Energy stored per unit weight**

Solution:

Higher energy density increases EV range.

Ref: *Electric Vehicles – A.K. Babu*

152. SOC estimation in EV batteries is mainly done using

- 1). Voltage method
- 2). Coulomb counting
- 3). Kalman filtering
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Modern BMS combines multiple methods.

Ref: *Battery Management Systems – Gregory Plett*

ELECTRIC TRACTION

153. Schedule speed of train is defined as

- 1). Maximum speed
- 2). Average speed including stops
- 3). Average speed excluding stops
- 4). Minimum speed

Correct Answer: **2). Average speed including stops**

Solution:

Schedule speed considers station stops.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

154. The most efficient power plant among the following is

- 1). Thermal
- 2). Hydel
- 3). Diesel
- 4). Gas

Correct Answer: **2). Hydel**

Solution:

Hydel plants have high efficiency.

Ref: *Power Plant Engineering – P.K. Nag*

ADVANCED ELECTRONICS

155. The device used for high-power switching in motor drives is

- 1). BJT
- 2). MOSFET
- 3). IGBT
- 4). DIAC

Correct Answer: **3). IGBT**

Solution:

IGBT combines advantages of MOSFET and BJT.

Ref: *Power Electronics – Rashid*

NUMERICAL

156. The power in a circuit with V = 100V and I = 2A is

- 1). 50 W
- 2). 100 W
- 3). 200 W
- 4). 400 W

Correct Answer: **3). 200 W**

Solution:

$$P = VI = 100 \times 2 = 200W$$

Ref: *Circuit Theory – Van Valkenburg*

DIGITAL SYSTEMS

157. The binary equivalent of hexadecimal A is

- 1). 1010
- 2). 1111
- 3). 1101
- 4). 1001

Correct Answer: **1). 1010**

Solution:

Hex A = decimal 10 = binary 1010.

Ref: *Digital Electronics – R.P. Jain*

MICROPROCESSORS

158. The instruction used to increment register in 8051 is

- 1). INC
- 2). ADD
- 3). MOV
- 4). SUB

Correct Answer: **1). INC**

Solution:

INC increases value by 1.

Ref: *Mazidi*

NETWORKS

159. The device that regenerates signals in a network is

- 1). Hub
- 2). Repeater
- 3). Router
- 4). Switch

Correct Answer: **2). Repeater**

Solution:

Repeaters regenerate signals.

Ref: *Tanenbaum*

FINAL QUESTION

160. The overall efficiency of electric vehicles compared to IC engine vehicles is

- 1). Lower
- 2). Same
- 3). Higher
- 4). Zero

Correct Answer: **3). Higher**

Solution:

Electric motors have efficiencies around **85–95%**, much higher than IC engines.

Ref: *Electric Vehicles – R.K. Rajput*

161. In a BJT transistor, the collector current is mainly controlled by

- 1). Emitter voltage
- 2). Base current
- 3). Collector voltage
- 4). Load resistance

Correct Answer: **2). Base current**

Solution:

In a BJT:

$$I_C = \beta I_B$$

Collector current is controlled by base current.

Ref: *Electronic Devices and Circuits – Boylestad*

162. The region of operation used for amplification in a transistor is

- 1). Cutoff region
- 2). Saturation region
- 3). Active region
- 4). Breakdown region

Correct Answer: **3). Active region**

Solution:

Amplification occurs when transistor operates in the **active region**.

Ref: *Principles of Electronics – V.K. Mehta*

163. The main function of a filter circuit in a power supply is to

- 1). Increase voltage
- 2). Reduce ripple
- 3). Increase frequency
- 4). Increase current

Correct Answer: **2). Reduce ripple**

Solution:

Filters smooth the pulsating DC output of rectifiers.

Ref: *Electronic Devices – Sedha*

164. The modulation index of AM should be

- 1). Greater than 1
- 2). Equal to 0
- 3). Less than or equal to 1
- 4). Infinite

Correct Answer: **3). Less than or equal to 1**

Solution:

If modulation index >1 , **over-modulation distortion occurs.**

Ref: *Communication Systems – Haykin*

165. The advantage of FM over AM is

- 1). Lower bandwidth
- 2). Less noise interference
- 3). Lower power consumption
- 4). Simple receiver

Correct Answer: **2). Less noise interference**

Solution:

FM is less affected by noise because information is carried in frequency.

Ref: *Modern Communication Systems – Lathi*

166. The Boolean expression for NAND gate is

- 1). $A + B$
- 2). AB
- 3). $(AB)'$
- 4). $A'B'$

Correct Answer: **3). $(AB)'$**

Solution:

NAND is complement of AND operation.

Ref: *Digital Design – Morris Mano*

167. The memory that loses its data when power is turned off is

- 1). ROM
- 2). EEPROM
- 3). RAM
- 4). Flash memory

Correct Answer: **3). RAM**

Solution:

RAM is volatile memory.

Ref: *Digital Electronics – R.P. Jain*

168. The number of pins in the 8051 microcontroller is

- 1). 20
- 2). 32
- 3). 40
- 4). 64

Correct Answer: **3). 40**

Solution:

Standard 8051 microcontroller uses **40-pin DIP package**.

Ref: *8051 Microcontroller – Mazidi*

169. The DPTR register in 8051 is

- 1). 8-bit register
- 2). 16-bit register
- 3). 32-bit register
- 4). 4-bit register

Correct Answer: **2). 16-bit register**

Solution:

DPTR is used for addressing external memory.

Ref: *Mazidi*

170. The stack pointer in 8051 is initially set to

- 1). 00H
- 2). 07H
- 3). FFH
- 4). 10H

Correct Answer: **2). 07H**

Solution:

After reset, stack begins at location **08H**.

Ref: *Ayala – 8051 Microcontroller*

DATA COMMUNICATION

171. The topology in which all nodes connect to a central device is

- 1). Bus
- 2). Ring
- 3). Star
- 4). Mesh

Correct Answer: **3). Star**

Solution:

Star topology uses a central hub or switch.

Ref: *Computer Networks – Tanenbaum*

172. The protocol used to transfer files over internet is

- 1). HTTP
- 2). FTP
- 3). SMTP
- 4). SNMP

Correct Answer: **2). FTP**

Solution:

FTP is used for file transfer.

Ref: *Tanenbaum*

POWER ELECTRONICS

173. The device used to trigger SCR in many circuits is

- 1). BJT
- 2). UJT
- 3). MOSFET
- 4). DIAC

Correct Answer: **2). UJT**

Solution:

UJT relaxation oscillator generates gate pulses.

Ref: *Power Electronics – Bimbhra*

174. The dv/dt protection of SCR is achieved by

- 1). Inductor
- 2). Capacitor
- 3). RC snubber circuit
- 4). Diode

Correct Answer: **3). RC snubber circuit**

Solution:

Snubber circuits prevent false triggering.

Ref: *Power Electronics – Rashid*

DRIVES

175. The speed of a DC motor is proportional to

- 1). Armature voltage
- 2). Flux
- 3). Resistance
- 4). Current

Correct Answer: 1). Armature voltage

Solution:

$$N \propto \frac{V}{\phi}$$

Ref: *Electric Drives – G.K. Dubey*

176. The method widely used for induction motor speed control is

- 1). Rotor resistance control
- 2). V/f control
- 3). Voltage control
- 4). Slip control

Correct Answer: 2). V/f control

Solution:

Maintains constant flux.

Ref: *Electric Drives – Bimal Bose*

ELECTRIC TRACTION

177. Electric traction offers

- 1). High efficiency
- 2). High starting torque
- 3). Less pollution
- 4). All of the above

Correct Answer: 4). All of the above

Solution:

Electric traction provides many operational advantages.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

178. The fuel used in nuclear power plants is

- 1). Coal
- 2). Uranium
- 3). Diesel
- 4). Natural gas

Correct Answer: **2). Uranium**

Solution:

Uranium undergoes nuclear fission.

Ref: *Power Plant Engineering – P.K. Nag*

179. Wind power plants convert

- 1). Mechanical energy into electrical energy
- 2). Chemical energy into electrical energy
- 3). Heat energy into electrical energy
- 4). Nuclear energy into electrical energy

Correct Answer: **1). Mechanical energy into electrical energy**

Solution:

Wind rotates turbine connected to generator.

Ref: *Non-Conventional Energy Sources – G.D. Rai*

ELECTRIC VEHICLE TECHNOLOGY

180. The most common battery used in electric vehicles is

- 1). Lead acid
- 2). Nickel Cadmium
- 3). Lithium-ion
- 4). Zinc battery

Correct Answer: **3). Lithium-ion**

Solution:

High energy density and long cycle life.

Ref: *Electric Vehicles – A.K. Babu*

181. The main function of Battery Management System (BMS) is

- 1). Increase battery voltage
- 2). Monitor battery condition
- 3). Increase motor speed
- 4). Reduce charging current

Correct Answer: **2). Monitor battery condition**

Solution:

BMS tracks voltage, current, temperature, SOC.

Ref: *Battery Management Systems – Gregory Plett*

182. SOC estimation is important to

- 1). Monitor battery capacity
- 2). Control motor speed
- 3). Increase voltage
- 4). Reduce resistance

Correct Answer: **1). Monitor battery capacity**

Solution:

SOC indicates remaining charge.

Ref: *Electric Vehicle Technology – Kapadani*

FINAL MIXED QUESTIONS

183. The universal gates are

- 1). AND, OR
- 2). NAND, NOR
- 3). XOR, XNOR
- 4). NOT only

Correct Answer: **2). NAND, NOR**

Solution:

Any logic function can be implemented using NAND or NOR.

Ref: *Digital Electronics – Mano*

184. The maximum efficiency of a full wave rectifier is

- 1). 40.6%
- 2). 50%
- 3). 81.2%
- 4). 100%

Correct Answer: **3). 81.2%**

Solution:

Theoretical efficiency of full wave rectifier.

Ref: *Electronic Devices – Sedha*

185. The frequency range of FM broadcasting is

- 1). 540–1600 kHz
- 2). 88–108 MHz
- 3). 3–30 MHz
- 4). 300–3000 Hz

Correct Answer: **2). 88–108 MHz**

Solution:

Standard FM broadcasting band.

Ref: *Communication Systems – Haykin*

186. The instruction used for division in 8051 is

- 1). ADD
- 2). MUL
- 3). DIV
- 4). SUB

Correct Answer: **3). DIV**

Solution:

DIV AB divides accumulator by B register.

Ref: *Mazidi*

187. The OSI model consists of

- 1). 4 layers
- 2). 5 layers
- 3). 6 layers
- 4). 7 layers

Correct Answer: **4). 7 layers**

Solution:

OSI has 7 layers.

Ref: *Computer Networks – Tanenbaum*

188. The output of NOR gate is HIGH when

- 1). Any input HIGH
- 2). Both inputs LOW
- 3). Both inputs HIGH
- 4). Inputs different

Correct Answer: **2). Both inputs LOW**

Solution:

NOR is NOT of OR.

Ref: *Digital Design – Mano*

189. The device used to amplify weak signals is

- 1). Rectifier
- 2). Oscillator
- 3). Amplifier
- 4). Converter

Correct Answer: **3). Amplifier**

Solution:

Amplifiers increase signal strength.

Ref: *Electronic Devices – Boylestad*

190. The overall efficiency of electric motors used in EVs is typically

- 1). 20–30%
- 2). 40–50%
- 3). 85–95%
- 4). 100%

Correct Answer: **3). 85–95%**

Solution:

Electric motors are highly efficient.

Ref: *Electric Vehicles – Rajput*

191. In digital communication, noise immunity is higher in

- 1). Analog communication
- 2). Digital communication
- 3). Both equal
- 4). None

Correct Answer: **2). Digital communication**

Solution:

Digital systems have better noise immunity.

Ref: *Communication Systems – Haykin*

192. The logic gate used for inversion is

- 1). AND
- 2). OR
- 3). NOT
- 4). NAND

Correct Answer: **3). NOT**

Solution:

NOT gate produces complement output.

Ref: *Digital Electronics – R.P. Jain*

193. The processor that contains CPU, RAM, ROM, and I/O on a single chip is

- 1). Microprocessor
- 2). Microcontroller
- 3). Amplifier
- 4). Converter

Correct Answer: **2). Microcontroller**

Solution:

Microcontrollers integrate all components.

Ref: *Mazidi*

194. In EVs, regenerative braking improves

- 1). Battery life
- 2). Energy efficiency
- 3). Driving range
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Energy recovered during braking charges battery.

Ref: *Electric Vehicles – A.K. Babu*

195. The signal that carries information is called

- 1). Carrier signal
- 2). Message signal
- 3). Noise signal
- 4). Control signal

Correct Answer: **2). Message signal**

Solution:

Message signal contains information.

Ref: *Communication Systems – Haykin*

196. The frequency of AC supply in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard grid frequency in India.

Ref: *Electrical Technology – Theraja*

197. The main advantage of SMPS over linear power supply is

- 1). Low efficiency
- 2). Large size
- 3). High efficiency
- 4). High heat loss

Correct Answer: **3). High efficiency**

Solution:

SMPS operates using high-frequency switching.

Ref: *Power Electronics – Rashid*

198. The binary equivalent of decimal 15 is

- 1). 1111
- 2). 1010
- 3). 1100
- 4). 1001

Correct Answer: **1). 1111**

Solution:

$$15_{10} = 1111_2$$

Ref: *Digital Electronics – Jain*

199. The system used to combine multiple communication signals is

- 1). Amplification
- 2). Multiplexing
- 3). Modulation
- 4). Detection

Correct Answer: **2). Multiplexing**

Solution:

Multiplexing allows multiple signals to share channel.

Ref: *Haykin*

200. The final stage of communication receiver is

- 1). Modulator
- 2). Detector
- 3). Amplifier
- 4). Antenna

Correct Answer: **2). Detector**

Solution:

Detector extracts original message signal.

Ref: *Communication Systems – Haykin*

APE CET 2026 – GRAND TEST 2**ELECTRONICS & COMMUNICATION ENGINEERING**

101. The majority carriers in an N-type semiconductor are

- 1). Holes
- 2). Electrons
- 3). Protons
- 4). Neutrons

Correct Answer: **2). Electrons**

Solution:

N-type material is doped with pentavalent impurities that contribute extra electrons, making electrons the majority carriers.

Ref: *Electronic Devices and Circuits – Boylestad*

102. The barrier potential of a germanium diode is approximately

- 1). 0.3 V
- 2). 0.7 V
- 3). 1.1 V
- 4). 2 V

Correct Answer: **1). 0.3 V**

Solution:

Germanium PN junction requires approximately **0.3 V** to overcome the barrier potential.

Ref: *Principles of Electronics – V.K. Mehta*

103. The configuration of transistor with highest input impedance is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). Differential

Correct Answer: **3). Common Collector**

Solution:

Common collector (emitter follower) has very high input impedance.

Ref: *Electronic Devices – J.B. Gupta*

104. The maximum efficiency of half-wave rectifier is

- 1). 40.6%
- 2). 50%
- 3). 81.2%
- 4). 100%

Correct Answer: **1). 40.6%**

Solution:

The theoretical maximum efficiency of half-wave rectifier is **40.6%**.

Ref: *Electronic Devices – Sedha*

CIRCUIT THEORY

105. According to Kirchhoff's Current Law (KCL)

- 1). Sum of voltages in loop is zero
- 2). Sum of currents entering node equals sum leaving node
- 3). Current is proportional to voltage
- 4). Voltage equals resistance

Correct Answer: **2). Sum of currents entering node equals sum leaving node**

Solution:

KCL states the algebraic sum of currents at a node is zero.

Ref: *Network Analysis – Van Valkenburg*

106. If two inductors of 2H and 3H are connected in series, total inductance is

- 1). 1H
- 2). 5H
- 3). 6H
- 4). 0.5H

Correct Answer: **2). 5H**

Solution:

$$L_{total} = L_1 + L_2 = 2 + 3 = 5H$$

Ref: *Engineering Circuit Analysis – Hayt*

107. At resonance in RLC circuit

- 1). Current is minimum
- 2). Impedance is maximum
- 3). Current is maximum
- 4). Voltage is zero

Correct Answer: **3). Current is maximum**

Solution:

At resonance, impedance becomes minimum so current becomes maximum.

Ref: *Network Analysis – Van Valkenburg*

ELECTRONIC MEASUREMENTS

108. A digital multimeter measures

- 1). Voltage only
- 2). Current only
- 3). Voltage, current and resistance
- 4). Frequency only

Correct Answer: **3). Voltage, current and resistance**

Solution:

Digital multimeters combine several measurement functions.

Ref: *Electrical Measurements – A.K. Sawhney*

109. The instrument transformer used for current measurement is

- 1). Potential transformer
- 2). Current transformer
- 3). Power transformer
- 4). Distribution transformer

Correct Answer: **2). Current transformer**

Solution:

CT is used for measuring high currents safely.

Ref: *Sawhney*

POWER ELECTRONICS

110. The device capable of turning OFF by gate signal is

- 1). SCR
- 2). TRIAC
- 3). GTO
- 4). DIAC

Correct Answer: **3). GTO**

Solution:

Gate Turn-Off thyristor can be switched OFF by negative gate signal.

Ref: *Power Electronics – Bimbhra*

COMMUNICATION SYSTEMS

111. The process of recovering the message signal from modulated signal is called

- 1). Amplification
- 2). Detection
- 3). Transmission
- 4). Multiplexing

Correct Answer: **2). Detection**

Solution:

Detection or demodulation extracts the original signal.

Ref: *Communication Systems – Haykin*

112. The antenna length for efficient radiation is typically

- 1). λ
- 2). $\lambda/2$
- 3). $\lambda/4$
- 4). 2λ

Correct Answer: **3). $\lambda/4$**

Solution:

Quarter-wave antenna is commonly used.

Ref: *Modern Communication Systems – Lathi*

DIGITAL ELECTRONICS

113. The decimal equivalent of binary 1011 is

- 1). 9
- 2). 10
- 3). 11
- 4). 12

Correct Answer: **3). 11**

Solution:

$$1011_2 = 11_{10}$$

Ref: *Digital Design – Morris Mano*

114. A flip-flop is

- 1). Combinational circuit
- 2). Sequential circuit
- 3). Linear circuit
- 4). Analog circuit

Correct Answer: **2). Sequential circuit**

Solution:

Flip-flops store one bit of memory.

Ref: *Digital Electronics – R.P. Jain*

MICROCONTROLLERS

115. The number of timers in 8051 microcontroller is

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

Correct Answer: **2). 2**

Solution:

8051 has **Timer0 and Timer1**.

Ref: *Mazidi – 8051 Microcontroller*

116. Immediate addressing example is

- 1). MOV A,#25H
- 2). MOV A,R0
- 3). MOV A,@R0
- 4). MOV A,30H

Correct Answer: **1). MOV A,#25H**

Solution:

Immediate addressing uses constant value.

Ref: *Ayala*

DATA COMMUNICATION

117. LAN stands for

- 1). Local Area Network
- 2). Large Area Network
- 3). Linear Area Network
- 4). Logical Area Network

Correct Answer: **1). Local Area Network**

Solution:

LAN connects computers within limited area.

Ref: *Computer Networks – Tanenbaum*

EV TECHNOLOGY

118. The most common method used for SOC estimation is

- 1). Voltage measurement
- 2). Coulomb counting
- 3). Kalman filter
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Modern BMS combines several estimation techniques.

Ref: *Battery Management Systems – Gregory Plett*

119. The major advantage of electric vehicles is

- 1). Zero tailpipe emissions
- 2). High noise
- 3). Low efficiency
- 4). High fuel consumption

Correct Answer: **1). Zero tailpipe emissions**

Solution:

EVs produce no direct exhaust emissions.

Ref: *Electric Vehicles – A.K. Babu*

ELECTRIC TRACTION

120. The most suitable motor for traction is

- 1). DC shunt motor
- 2). DC series motor
- 3). Induction motor
- 4). Synchronous motor

Correct Answer: **2). DC series motor**

Solution:

High starting torque makes DC series motor ideal.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

121. Solar power plants convert

- 1). Thermal energy to electrical
- 2). Solar radiation to electrical
- 3). Nuclear energy to electrical
- 4). Mechanical energy to electrical

Correct Answer: **2). Solar radiation to electrical**

Solution:

Photovoltaic cells convert sunlight directly to electricity.

Ref: *Non-Conventional Energy Sources – G.D. Rai*

MIXED QUESTIONS

122. The power factor of purely resistive circuit is

- 1). 0
- 2). 0.5
- 3). 1
- 4). 0.8

Correct Answer: **3). 1**

Solution:

Voltage and current are in phase.

Ref: *Engineering Circuit Analysis – Hayt*

123. The gate used for equality detection is

- 1). XOR
- 2). XNOR
- 3). NAND
- 4). NOR

Correct Answer: **2). XNOR**

Solution:

XNOR outputs HIGH when inputs are equal.

Ref: *Digital Electronics – R.P. Jain*

124. The OSI model contains

- 1). 5 layers
- 2). 6 layers
- 3). 7 layers
- 4). 8 layers

Correct Answer: **3). 7 layers**

Solution:

OSI model has seven layers.

Ref: *Computer Networks – Tanenbaum*

125. The ripple factor of full wave rectifier is approximately

- 1). 1.21
- 2). 0.48
- 3). 0.25
- 4). 0.10

Correct Answer: **2). 0.48**

Solution:

Full wave rectifier ripple factor is **0.482**.

Ref: *Electronic Devices – Sedha*

126. The instruction used to move data in 8051 is

- 1). ADD
- 2). MOV
- 3). MUL
- 4). DIV

Correct Answer: **2). MOV**

Solution:

MOV instruction transfers data between registers or memory.

Ref: *Mazidi*

127. In communication systems, noise mainly affects

- 1). Carrier signal
- 2). Message signal
- 3). Power supply
- 4). Antenna size

Correct Answer: **2). Message signal**

Solution:

Noise distorts the message signal.

Ref: *Haykin*

128. The device used to regenerate digital signals in network is

- 1). Router
- 2). Switch
- 3). Repeater
- 4). Bridge

Correct Answer: **3). Repeater**

Solution:

Repeaters regenerate signals.

Ref: *Tanenbaum*

129. The energy recovered during EV braking is called

- 1). Dynamic braking
- 2). Regenerative braking
- 3). Mechanical braking
- 4). Electric braking

Correct Answer: **2). Regenerative braking**

Solution:

Motor acts as generator and recharges battery.

Ref: *Electric Vehicles – Rajput*

130. The frequency of AC power supply in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard Indian grid frequency is **50 Hz**.

Ref: *Electrical Technology – Theraja*

131. In a three-phase system measured using the two-wattmeter method, if the load power factor is unity, the readings of both wattmeters will be

- 1). Equal
- 2). Zero
- 3). Opposite sign
- 4). One twice the other

Correct Answer: **1). Equal**

Solution:

At unity power factor:

$$W_1 = W_2$$

Total power:

$$P = W_1 + W_2$$

Ref: *Electrical Technology – B.L. Theraja*

132. If one wattmeter reads negative in the two-wattmeter method, the power factor of the load is

- 1). Greater than 1
- 2). Equal to 1
- 3). Less than 0.5
- 4). Equal to 0

Correct Answer: **3). Less than 0.5**

Solution:

When $PF < 0.5$, one wattmeter shows negative reading.

Ref: *J.B. Gupta – Electrical Engineering*

133. The quality factor (Q) of a resonant circuit indicates

- 1). Voltage gain
- 2). Current gain
- 3). Sharpness of resonance
- 4). Power loss

Correct Answer: **3). Sharpness of resonance**

Solution:

Higher Q means narrower bandwidth and sharper resonance.

Ref: *Network Analysis – Van Valkenburg*

134. The bandwidth of a resonant circuit is

- 1). $f_2 + f_1$
- 2). $f_2 - f_1$
- 3). f_1/f_2
- 4). $f_1 \times f_2$

Correct Answer: **2). $f_2 - f_1$**

Solution:

Bandwidth = difference between upper and lower cutoff frequencies.

Ref: *Engineering Circuit Analysis – Hayt*

ELECTRONIC DEVICES

135. The transistor configuration having lowest input impedance is

- 1). Common emitter
- 2). Common collector
- 3). Common base
- 4). Differential

Correct Answer: **3). Common base**

Solution:

Common base has very low input impedance.

Ref: *Electronic Devices – Boylestad*

136. The region of operation used when transistor works as a switch is

- 1). Active region
- 2). Cutoff and saturation
- 3). Breakdown region
- 4). Linear region

Correct Answer: **2). Cutoff and saturation**

Solution:

Switching occurs between cutoff and saturation regions.

Ref: *Principles of Electronics – V.K. Mehta*

POWER ELECTRONICS

137. The device used for bidirectional AC control is

- 1). SCR
- 2). TRIAC
- 3). DIAC
- 4). MOSFET

Correct Answer: **2). TRIAC**

Solution:

TRIAC conducts in both directions.

Ref: *Power Electronics – Rashid*

138. The main purpose of commutation in SCR circuits is to

- 1). Turn ON SCR
- 2). Turn OFF SCR
- 3). Increase current
- 4). Increase voltage

Correct Answer: **2). Turn OFF SCR**

Solution:

Commutation reduces current below holding current.

Ref: *Power Electronics – Bimbhra*

COMMUNICATION SYSTEMS

139. The bandwidth of FM signal depends on

- 1). Carrier frequency
- 2). Frequency deviation and modulating frequency
- 3). Message amplitude
- 4). Noise level

Correct Answer: **2). Frequency deviation and modulating frequency**

Solution:

Carson's Rule:

$$BW = 2(\Delta f + f_m)$$

Ref: *Communication Systems – Haykin*

140. The device used to convert electrical signals into electromagnetic waves is

- 1). Oscillator
- 2). Amplifier
- 3). Antenna
- 4). Modulator

Correct Answer: **3). Antenna**

Solution:

Antenna radiates electromagnetic energy.

Ref: *Modern Communication Systems – Lathi*

DIGITAL ELECTRONICS

141. The output of NOR gate is HIGH when

- 1). Both inputs HIGH
- 2). Any input HIGH
- 3). Both inputs LOW
- 4). Inputs different

Correct Answer: **3). Both inputs LOW**

Solution:

NOR = NOT of OR gate.

Ref: *Digital Design – Morris Mano*

142. A full adder has how many inputs

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

Correct Answer: **2). 3**

Solution:

Inputs: A, B and Carry-in.

Ref: *Digital Electronics – R.P. Jain*

143. The memory that can only be read and not written is

- 1). RAM
- 2). ROM
- 3). Cache
- 4). Register

Correct Answer: **2). ROM**

Solution:

ROM stores permanent data.

Ref: *Digital Electronics – Jain*

MICROCONTROLLERS

144. The accumulator register in 8051 is represented by

- 1). A
- 2). B
- 3). C
- 4). D

Correct Answer: **1). A**

Solution:

Accumulator is primary register for arithmetic operations.

Ref: *Mazidi – 8051 Microcontroller*

145. The instruction used for multiplication in 8051 is

- 1). ADD
- 2). MUL
- 3). DIV
- 4). SUB

Correct Answer: **2). MUL**

Solution:

MUL AB multiplies accumulator and B register.

Ref: *Mazidi*

146. The addressing mode using memory location directly is

- 1). Immediate
- 2). Direct

- 3). Register
- 4). Indirect

Correct Answer: **2). Direct**

Solution:

Example:

MOV A,30H

Ref: *Ayala*

DATA COMMUNICATION

147. The device that connects different networks together is

- 1). Hub
- 2). Switch
- 3). Router
- 4). Repeater

Correct Answer: **3). Router**

Solution:

Routers perform routing between networks.

Ref: *Computer Networks – Tanenbaum*

148. The transmission medium that uses light signals is

- 1). Twisted pair
- 2). Coaxial cable
- 3). Optical fiber
- 4). Microwave

Correct Answer: **3). Optical fiber**

Solution:

Fiber optics use light signals.

Ref: *Tanenbaum*

ELECTRIC VEHICLE TECHNOLOGY

149. The parameter indicating remaining battery capacity is

- 1). SOH
- 2). SOC
- 3). Voltage
- 4). Power

Correct Answer: **2). SOC**

Solution:

SOC (State of Charge) shows remaining battery capacity.

Ref: *Battery Management Systems – Gregory Plett*

150. Regenerative braking in EVs

- 1). Wastes energy
- 2). Converts kinetic energy into electrical energy
- 3). Converts electrical energy into heat
- 4). Reduces battery capacity

Correct Answer: **2). Converts kinetic energy into electrical energy**

Solution:

Recovered energy charges the battery.

Ref: *Electric Vehicles – Rajput*

ELECTRIC TRACTION

151. The average speed excluding stops is called

- 1). Schedule speed
- 2). Running speed
- 3). Maximum speed
- 4). Instantaneous speed

Correct Answer: **2). Running speed**

Solution:

Running speed excludes station stops.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

152. Hydroelectric plants generate power using

- 1). Steam turbine
- 2). Gas turbine
- 3). Water turbine
- 4). Wind turbine

Correct Answer: **3). Water turbine**

Solution:

Potential energy of water rotates turbine.

Ref: *Power Plant Engineering – P.K. Nag*

MIXED NUMERICAL QUESTIONS

153. If a resistor of 5Ω carries current of 4A, power dissipated is

- 1). 20 W
- 2). 40 W
- 3). 80 W
- 4). 10 W

Correct Answer: **3). 80 W**

Solution:

$$P = I^2 R = 4^2 \times 5 = 80W$$

Ref: *Circuit Theory – Hayt*

154. The binary equivalent of decimal 12 is

- 1). 1100
- 2). 1010
- 3). 1110
- 4). 1001

Correct Answer: **1). 1100**

Solution:

$$12_{10} = 1100_2$$

Ref: *Digital Electronics – Jain*

155. The main advantage of SMPS is

- 1). Large size
- 2). High heat loss
- 3). High efficiency
- 4). Low reliability

Correct Answer: **3). High efficiency**

Solution:

SMPS uses high-frequency switching.

Ref: *Power Electronics – Rashid*

156. The circuit used to generate periodic waveform is

- 1). Amplifier
- 2). Oscillator
- 3). Rectifier
- 4). Converter

Correct Answer: **2). Oscillator**

Solution:

Oscillators generate AC signals without input.

Ref: *Electronic Circuits – Sedha*

157. The output of XOR gate is HIGH when

- 1). Inputs equal
- 2). Inputs different
- 3). Both inputs LOW
- 4). Both inputs HIGH

Correct Answer: **2). Inputs different**

Solution:

Exclusive OR outputs HIGH for unequal inputs.

Ref: *Digital Design – Mano*

158. The processor that integrates CPU, RAM, ROM and I/O in one chip is

- 1). Microprocessor
- 2). Microcontroller
- 3). Amplifier
- 4). Converter

Correct Answer: **2). Microcontroller**

Solution:

Microcontrollers integrate several subsystems.

Ref: *Mazidi*

159. The device used to amplify weak signals is

- 1). Amplifier
- 2). Oscillator
- 3). Rectifier
- 4). Converter

Correct Answer: **1). Amplifier**

Solution:

Amplifiers increase signal amplitude.

Ref: *Electronic Devices – Boylestad*

160. The power factor of purely inductive circuit is

- 1). 1
- 2). 0.8
- 3). 0
- 4). 0.5

Correct Answer: **3). 0**

Solution:

Current lags voltage by 90° .

Ref: *Engineering Circuit Analysis – Hayt*

FINAL QUESTIONS

161. The device used to detect AM signals is

- 1). Oscillator
- 2). Envelope detector
- 3). Amplifier
- 4). Mixer

Correct Answer: **2). Envelope detector**

Solution:

Envelope detector extracts message signal.

Ref: *Communication Systems – Haykin*

162. The number of layers in TCP/IP model is

- 1). 3
- 2). 4
- 3). 5
- 4). 7

Correct Answer: **2). 4**

Solution:

TCP/IP consists of four layers.

Ref: *Computer Networks – Tanenbaum*

163. The device used to measure insulation resistance is

- 1). Voltmeter
- 2). Ammeter
- 3). Megger
- 4). Wattmeter

Correct Answer: **3). Megger**

Solution:

Megger measures high resistance values.

Ref: *A.K. Sawhney*

164. The most efficient power plant among the following is

- 1). Thermal
- 2). Hydel
- 3). Diesel
- 4). Gas

Correct Answer: **2). Hydel**

Solution:

Hydroelectric plants have high efficiency.

Ref: *Power Plant Engineering – Nag*

165. The logic gate performing inversion is

- 1). AND
- 2). OR
- 3). NOT
- 4). XOR

Correct Answer: **3). NOT**

Solution:

NOT gate produces complement.

Ref: *Digital Electronics – Jain*

166. The signal carrying information is called

- 1). Carrier signal
- 2). Message signal
- 3). Noise signal
- 4). Control signal

Correct Answer: **2). Message signal**

Solution:

Message signal contains original information.

Ref: *Communication Systems – Haykin*

167. The efficiency of electric motors used in EVs is typically

- 1). 20–30%
- 2). 40–50%
- 3). 85–95%
- 4). 100%

Correct Answer: **3). 85–95%**

Solution:

Electric motors are highly efficient.

Ref: *Electric Vehicles – Rajput*

168. Multiplexing allows

- 1). Multiple signals over single channel
- 2). One signal over many channels
- 3). Signal amplification
- 4). Noise removal

Correct Answer: **1). Multiple signals over single channel**

Solution:

Multiplexing improves channel efficiency.

Ref: *Haykin*

169. The AC supply frequency in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard grid frequency.

Ref: *Electrical Technology – Theraja*

170. Electric vehicles reduce

- 1). Fuel consumption
- 2). Noise pollution
- 3). Air pollution
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs improve environmental sustainability.

Ref: *Electric Vehicle Technology – Kapadani*

71. The bandwidth of an AM signal with maximum modulating frequency of 5 kHz is

- 1). 5 kHz
- 2). 10 kHz
- 3). 15 kHz
- 4). 20 kHz

Correct Answer: **2). 10 kHz**

Solution:

$$BW = 2f_m$$
$$BW = 2 \times 5 = 10\text{kHz}$$

Ref: *Communication Systems – Simon Haykin*

172. In FM communication, noise immunity is

- 1). Lower than AM
- 2). Equal to AM
- 3). Higher than AM
- 4). Zero

Correct Answer: **3). Higher than AM**

Solution:

FM is less affected by amplitude noise.

Ref: *Modern Communication Systems – Lathi*

173. The flip-flop used to eliminate race condition is

- 1). SR flip-flop
- 2). JK flip-flop
- 3). D flip-flop
- 4). T flip-flop

Correct Answer: **2). JK flip-flop**

Solution:

JK flip-flop removes invalid state of SR flip-flop.

Ref: *Digital Design – Morris Mano*

174. The decimal equivalent of binary 10010 is

- 1). 16
- 2). 18
- 3). 20
- 4). 22

Correct Answer: **2). 18**

Solution:

$$10010_2 = 1(16) + 0(8) + 0(4) + 1(2) + 0(1) = 18$$

Ref: *Digital Electronics – R.P. Jain*

175. The memory used for temporary data storage is

- 1). ROM
- 2). RAM
- 3). PROM
- 4). EPROM

Correct Answer: **2). RAM**

Solution:

RAM stores temporary data and loses data when power is off.

Ref: *Digital Electronics – Jain*

176. The number of I/O ports in 8051 microcontroller is

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

Correct Answer: **3). 4**

Solution:

Ports P0, P1, P2 and P3.

Ref: *8051 Microcontroller – Mazidi*

177. The instruction used to divide two numbers in 8051 is

- 1). ADD
- 2). MUL
- 3). DIV
- 4). SUB

Correct Answer: **3). DIV**

Solution:

DIV AB divides accumulator by register B.

Ref: *Mazidi*

178. The device used to interconnect different networks is

- 1). Hub
- 2). Switch
- 3). Router
- 4). Repeater

Correct Answer: **3). Router**

Solution:

Routers connect multiple networks.

Ref: *Computer Networks – Tanenbaum*

179. Optical fiber communication uses

- 1). Electrical signals
- 2). Light signals
- 3). Magnetic signals
- 4). Radio waves

Correct Answer: **2). Light signals**

Solution:

Fiber optics transmit light pulses.

Ref: *Communication Systems – Haykin*

180. The major component of EV battery pack is

- 1). Battery cells
- 2). Motor
- 3). Controller
- 4). Inverter

Correct Answer: **1). Battery cells**

Solution:

Battery packs consist of many cells connected in series and parallel.

Ref: *Electric Vehicle Technology – Kapadani*

181. The parameter indicating battery health is

- 1). SOC
- 2). SOH
- 3). Voltage
- 4). Power

Correct Answer: **2). SOH**

Solution:

SOH (State of Health) indicates battery aging and condition.

Ref: *Battery Management Systems – Gregory Plett*

182. The braking method used in EV to recover energy is

- 1). Dynamic braking
- 2). Plugging
- 3). Regenerative braking
- 4). Mechanical braking

Correct Answer: **3). Regenerative braking**

Solution:

Motor works as generator during braking.

Ref: *Electric Vehicles – Rajput*

183. The motor widely used in modern EVs is

- 1). DC series motor
- 2). Induction motor
- 3). Stepper motor
- 4). Universal motor

Correct Answer: **2). Induction motor**

Solution:

Induction motors are efficient and robust.

Ref: *Electric Drives – Bimal Bose*

184. The generation of electricity using sunlight is called

- 1). Thermal generation
- 2). Nuclear generation
- 3). Solar generation
- 4). Wind generation

Correct Answer: **3). Solar generation**

Solution:

Solar panels convert sunlight to electricity.

Ref: *Non-Conventional Energy Sources – G.D. Rai*

185. In a power system, load curve represents

- 1). Voltage vs time
- 2). Load vs time
- 3). Current vs voltage
- 4). Power factor vs time

Correct Answer: **2). Load vs time**

Solution:

Load curves show variation of load over time.

Ref: *Power System – V.K. Mehta*

186. The maximum efficiency of full wave rectifier is

- 1). 40.6%
- 2). 60%
- 3). 81.2%
- 4). 100%

Correct Answer: **3). 81.2%**

Solution:

Full wave rectifier theoretical efficiency = 81.2%.

Ref: *Electronic Devices – Sedha*

187. The device used for voltage regulation in electronic circuits is

- 1). Zener diode
- 2). LED
- 3). Photodiode
- 4). Varactor

Correct Answer: **1). Zener diode**

Solution:

Zener diode operates in breakdown region for voltage regulation.

Ref: *Boylestad*

188. The output of XNOR gate is HIGH when

- 1). Inputs different
- 2). Inputs equal
- 3). Both inputs HIGH only
- 4). Both inputs LOW only

Correct Answer: **2). Inputs equal**

Solution:

XNOR is equality detector.

Ref: *Digital Design – Morris Mano*

189. The frequency of AC supply used in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard grid frequency.

Ref: *Electrical Technology – Theraja*

190. The device used to generate AC signals without input is

- 1). Amplifier
- 2). Oscillator
- 3). Rectifier
- 4). Converter

Correct Answer: **2). Oscillator**

Solution:

Oscillators generate periodic signals.

Ref: *Electronic Circuits – Sedha*

191. The most common communication medium in LAN is

- 1). Optical fiber
- 2). Twisted pair cable
- 3). Microwave
- 4). Satellite

Correct Answer: **2). Twisted pair cable**

Solution:

Twisted pair cables are widely used in LANs.

Ref: *Computer Networks – Tanenbaum*

192. The process of converting analog signal into digital form is

- 1). Multiplexing
- 2). Sampling
- 3). Detection
- 4). Amplification

Correct Answer: **2). Sampling**

Solution:

Sampling converts continuous signal into discrete samples.

Ref: *Communication Systems – Haykin*

193. The major advantage of SMPS over linear power supply is

- 1). Low efficiency
- 2). Large size
- 3). High efficiency
- 4). High heat loss

Correct Answer: **3). High efficiency**

Solution:

SMPS uses switching techniques.

Ref: *Power Electronics – Rashid*

194. The energy stored in an inductor is

$W = ?$

- 1). $\frac{1}{2} CV^2$
- 2). $\frac{1}{2} LI^2$
- 3). VI
- 4). IR

Correct Answer: **2). $\frac{1}{2} LI^2$**

Solution:

Energy stored in magnetic field of inductor.

Ref: *Network Analysis – Van Valkenburg*

195. The binary equivalent of decimal 25 is

- 1). 11001
- 2). 10101

- 3). 11101
- 4). 10011

Correct Answer: **1). 11001**

Solution:

$$25_{10} = 11001_2$$

Ref: *Digital Electronics – Jain*

196. In a purely capacitive circuit, current

- 1). Leads voltage
- 2). Lags voltage
- 3). In phase
- 4). Opposite

Correct Answer: **1). Leads voltage**

Solution:

Current leads voltage by 90° .

Ref: *Circuit Theory – Hayt*

197. The transistor used for amplification must operate in

- 1). Saturation region
- 2). Active region
- 3). Cutoff region
- 4). Breakdown region

Correct Answer: **2). Active region**

Solution:

Amplification occurs in active region.

Ref: *Electronic Devices – Boylestad*

198. The communication system block that increases signal strength is

- 1). Detector
- 2). Amplifier

- 3). Antenna
- 4). Modulator

Correct Answer: **2). Amplifier**

Solution:

Amplifiers increase signal power.

Ref: *Haykin*

199. The major benefit of EV technology is

- 1). Reduced pollution
- 2). Reduced noise
- 3). Energy efficiency
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs improve environmental sustainability.

Ref: *Electric Vehicles – Rajput*

200. The most common type of modulation used in radio broadcasting is

- 1). AM
- 2). FM
- 3). PM
- 4). PCM

Correct Answer: **1). AM**

Solution:

AM is widely used for medium-wave broadcasting.

Ref: *Communication Systems – Haykin*

AP ECET 2026
GRAND TEST – 3 (Advanced Level)
ELECTRICAL AND ELECTRONICS ENGINEERING

101. In a PN junction diode, the region depleted of mobile charge carriers is called

- 1). Neutral region
- 2). Depletion region
- 3). Saturation region
- 4). Avalanche region

Correct Answer: 2). Depletion region

Solution:

When a PN junction is formed, electrons and holes recombine near the junction forming a region without free carriers called the depletion region.

Ref: *Electronic Devices and Circuits – Robert L. Boylestad*

102. The barrier potential of a silicon diode at room temperature is approximately

- 1). 0.3 V
- 2). 0.5 V
- 3). 0.7 V
- 4). 1.2 V

Correct Answer: 3). 0.7 V

Solution:

Silicon diodes require about **0.7 V forward bias** to conduct.

Ref: *Principles of Electronics – V.K. Mehta*

103. The transistor configuration having highest voltage gain is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). Differential

Correct Answer: **2). Common Emitter**

Solution:

Common emitter configuration provides both high current gain and high voltage gain.

Ref: *Electronic Devices and Circuits – J.B. Gupta*

104. The ripple factor of a half-wave rectifier is

- 1). 0.48
- 2). 1.21
- 3). 2.0
- 4). 0.1

Correct Answer: **2). 1.21**

Solution:

Half-wave rectifier ripple factor ≈ 1.21 .

Ref: *A Textbook of Applied Electronics – R.S. Sedha*

CIRCUIT THEORY

105. According to Kirchhoff's Voltage Law (KVL)

- 1). Sum of currents at node is zero
- 2). Sum of voltages in a closed loop is zero
- 3). Voltage equals current
- 4). Current equals resistance

Correct Answer: **2). Sum of voltages in a closed loop is zero**

Solution:

KVL states that the algebraic sum of voltages around any closed loop equals zero.

Ref: *Network Analysis – M.E. Van Valkenburg*

106. Two resistors of 4Ω and 6Ω connected in series have equivalent resistance

- 1). 2Ω
- 2). 10Ω
- 3). 24Ω
- 4). 1Ω

Correct Answer: **2). 10Ω**

Solution:

$$R = R_1 + R_2 = 4 + 6 = 10\Omega$$

Ref: *Engineering Circuit Analysis – William H. Hayt*

107. The condition for resonance in a series RLC circuit is

- 1). $X_L > X_C$
- 2). $X_L < X_C$
- 3). $X_L = X_C$
- 4). $X_L = 0$

Correct Answer: **3). $X_L = X_C$**

Solution:

At resonance inductive and capacitive reactances cancel.

Ref: *Network Analysis – Van Valkenburg*

ELECTRONIC MEASUREMENTS

108. The instrument used to measure insulation resistance is

- 1). Voltmeter
- 2). Ammeter
- 3). Megger
- 4). Wattmeter

Correct Answer: **3). Megger**

Solution:

Megger measures very high resistance values in insulation.

Ref: *Electrical Measurements – A.K. Sawhney*

109. The device used in CRO to produce electron beam is

- 1). Cathode
- 2). Anode
- 3). Electron gun
- 4). Grid

Correct Answer: **3). Electron gun**

Solution:

Electron gun generates and accelerates electron beam.

Ref: *Electronic Instrumentation – Helfrick & Cooper*

POWER ELECTRONICS

110. The device used for bidirectional AC power control is

- 1). SCR
- 2). TRIAC
- 3). MOSFET
- 4). GTO

Correct Answer: **2). TRIAC**

Solution:

TRIAC conducts current in both directions.

Ref: *Power Electronics – P.S. Bimbhra*

111. The purpose of commutation in SCR circuits is

- 1). Turn ON SCR
- 2). Turn OFF SCR
- 3). Increase current
- 4). Increase voltage

Correct Answer: **2). Turn OFF SCR**

Solution:

Commutation forces current below holding current.

Ref: *Power Electronics – Muhammad H. Rashid*

COMMUNICATION SYSTEMS

112. The bandwidth of AM signal with maximum modulating frequency 4 kHz is

- 1). 4 kHz
- 2). 8 kHz
- 3). 12 kHz
- 4). 16 kHz

Correct Answer: **2). 8 kHz**

Solution:

$$BW = 2f_m$$
$$BW = 2 \times 4 = 8kHz$$

Ref: *Communication Systems – Simon Haykin*

113. In FM communication, the parameter varied is

- 1). Amplitude
- 2). Frequency

- 3). Phase
- 4). Power

Correct Answer: **2). Frequency**

Solution:

Frequency of carrier changes according to message signal.

Ref: *Modern Communication Systems – B.P. Lathi*

DIGITAL ELECTRONICS

114. The output of XOR gate is HIGH when

- 1). Inputs equal
- 2). Inputs different
- 3). Both inputs HIGH
- 4). Both inputs LOW

Correct Answer: **2). Inputs different**

Solution:

Exclusive OR gate outputs HIGH when inputs differ.

Ref: *Digital Design – M. Morris Mano*

115. The binary equivalent of decimal 15 is

- 1). 1111
- 2). 1010
- 3). 1101
- 4). 1001

Correct Answer: **1). 1111**

Solution:

$$15_{10} = 1111_2$$

Ref: *Modern Digital Electronics – R.P. Jain*

MICROCONTROLLERS

116. The 8051 microcontroller contains

- 1). CPU only
- 2). CPU and memory
- 3). CPU, RAM, ROM and I/O ports
- 4). RAM only

Correct Answer: **3). CPU, RAM, ROM and I/O ports**

Solution:

Microcontroller integrates processor and peripherals.

Ref: *The 8051 Microcontroller – Mazidi*

117. The number of timers in 8051 is

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

Correct Answer: **2). 2**

Solution:

Timer0 and Timer1.

Ref: *The 8051 Microcontroller – Kenneth Ayala*

DATA COMMUNICATION

118. LAN stands for

- 1). Local Area Network
- 2). Large Area Network
- 3). Logical Area Network
- 4). Linear Area Network

Correct Answer: **1). Local Area Network**

Solution:

LAN connects computers within small geographic area.

Ref: *Computer Networks – Andrew Tanenbaum*

EV TECHNOLOGY

119. The parameter representing remaining battery charge is

- 1). SOH
- 2). SOC
- 3). Voltage
- 4). Current

Correct Answer: **2). SOC**

Solution:

SOC = State of Charge.

Ref: *Battery Management Systems – Gregory L. Plett*

120. Regenerative braking converts

- 1). Electrical energy to heat
- 2). Mechanical energy to electrical energy
- 3). Heat energy to electrical energy
- 4). Electrical energy to mechanical energy

Correct Answer: **2). Mechanical energy to electrical energy**

Solution:

Motor works as generator.

Ref: *Electric & Hybrid Vehicles – Mehrdad Ehsani*

ELECTRIC TRACTION

121. The motor commonly used in electric traction is

- 1). DC shunt motor
- 2). DC series motor
- 3). Induction motor
- 4). Synchronous motor

Correct Answer: **2). DC series motor**

Solution:

High starting torque required for traction.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

122. The energy source used in nuclear power plant is

- 1). Coal
- 2). Uranium
- 3). Diesel
- 4). Natural gas

Correct Answer: **2). Uranium**

Solution:

Uranium undergoes nuclear fission.

Ref: *Power Plant Engineering – P.K. Nag*

MIXED QUESTIONS

123. Power factor of purely resistive circuit is

- 1). 0
- 2). 0.5
- 3). 1
- 4). 0.8

Correct Answer: **3). 1**

Solution:

Voltage and current are in phase.

Ref: *Engineering Circuit Analysis – Hayt*

124. The gate performing inversion is

- 1). AND
- 2). OR
- 3). NOT
- 4). NAND

Correct Answer: **3). NOT**

Solution:

NOT gate outputs complement.

Ref: *Digital Electronics – R.P. Jain*

125. The AC supply frequency in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard Indian grid frequency.

Ref: *Electrical Technology – B.L. Theraja*

126. The device used to amplify weak electrical signals is

- 1). Rectifier
- 2). Oscillator
- 3). Amplifier
- 4). Converter

Correct Answer: **3). Amplifier**

Solution:

Amplifiers increase signal strength.

Ref: *Electronic Devices – Boylestad*

127. In digital communication, noise immunity is

- 1). Lower
- 2). Higher
- 3). Equal
- 4). Zero

Correct Answer: **2). Higher**

Solution:

Digital systems tolerate noise better.

Ref: *Communication Systems – Haykin*

128. The energy stored in capacitor is

$W = ?$

- 1). $\frac{1}{2} CV^2$
- 2). $\frac{1}{2} LI^2$
- 3). VI
- 4). IR

Correct Answer: **1). $\frac{1}{2} CV^2$**

Solution:

Energy stored in electric field.

Ref: *Network Analysis – Van Valkenburg*

129. The process of combining multiple signals in one channel is

- 1). Modulation
- 2). Multiplexing
- 3). Detection
- 4). Amplification

Correct Answer: **2). Multiplexing**

Solution:

Multiplexing improves communication efficiency.

Ref: *Communication Systems – Haykin*

130. Electric vehicles reduce

- 1). Fuel consumption
- 2). Noise pollution
- 3). Air pollution
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs improve environmental sustainability.

Ref: *Fundamentals of Electric Vehicles – R.K. Rajput*

131. In the two-wattmeter method for a balanced three-phase load, the total power is

- 1). $W_1 - W_2$
- 2). $W_1 + W_2$
- 3). $W_1 \times W_2$
- 4). W_1/W_2

Correct Answer: **2). $W_1 + W_2$**

Solution:

In a three-phase system measured using two wattmeters:

$$P = W_1 + W_2$$

Ref: *A Textbook of Electrical Technology – B.L. Theraja*

132. If both wattmeters show equal readings in the two-wattmeter method, the power factor of the load is

- 1). 0.5
- 2). 0
- 3). 1
- 4). 0.707

Correct Answer: **3). 1**

Solution:

When power factor = 1, both wattmeter readings become equal.

Ref: *Electrical Engineering – J.B. Gupta*

133. In the two-wattmeter method, if one wattmeter reading is zero, the power factor of load is

- 1). 1
- 2). 0.866
- 3). 0.5
- 4). 0

Correct Answer: **3). 0.5**

Solution:

At PF = 0.5, one wattmeter reads zero.

Ref: *Electrical Technology – B.L. Theraja*

AC CIRCUITS

134. The impedance of a series RLC circuit at resonance is

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

Correct Answer: **1). Minimum**

Solution:

At resonance:

$$X_L = X_C$$

Therefore impedance equals resistance only.

Ref: *Network Analysis – M.E. Van Valkenburg*

135. The quality factor of a resonant circuit represents

- 1). Voltage drop
- 2). Bandwidth
- 3). Sharpness of resonance
- 4). Power loss

Correct Answer: **3). Sharpness of resonance**

Solution:

High Q indicates narrow bandwidth and sharp resonance.

Ref: *Engineering Circuit Analysis – William H. Hayt*

ELECTRONIC DEVICES

136. The transistor parameter β is defined as

- 1). I_E/I_B
- 2). I_C/I_B
- 3). I_B/I_C
- 4). I_C/I_E

Correct Answer: **2). I_C/I_B**

Solution:

β is the current gain of a transistor in common emitter configuration.

Ref: *Electronic Devices and Circuits – Boylestad*

137. The transistor configuration with lowest input impedance is

- 1). Common emitter
- 2). Common collector
- 3). Common base
- 4). Differential

Correct Answer: **3). Common base**

Solution:

Common base has low input impedance.

Ref: *Principles of Electronics – V.K. Mehta*

POWER ELECTRONICS

138. The device capable of turning OFF by gate signal is

- 1). SCR
- 2). TRIAC
- 3). GTO
- 4). DIAC

Correct Answer: **3). GTO**

Solution:

Gate Turn-Off Thyristor can be turned OFF using gate signal.

Ref: *Power Electronics – P.S. Bimbhra*

139. The dv/dt protection of SCR is achieved using

- 1). Inductor
- 2). RC snubber circuit
- 3). Transformer
- 4). Diode

Correct Answer: **2). RC snubber circuit**

Solution:

RC snubber limits rate of voltage rise.

Ref: *Power Electronics – Muhammad H. Rashid*

COMMUNICATION SYSTEMS

140. According to Carson's rule, the bandwidth of FM signal is

- 1). $2f_m$
- 2). $2(\Delta f + f_m)$
- 3). $f_m + \Delta f$
- 4). $2\Delta f$

Correct Answer: **2). $2(\Delta f + f_m)$**

Solution:

$$BW = 2(\Delta f + f_m)$$

Ref: *Communication Systems – Simon Haykin*

DIGITAL ELECTRONICS

141. The universal gates are

- 1). AND and OR
- 2). NAND and NOR
- 3). XOR and XNOR
- 4). AND and NAND

Correct Answer: **2). NAND and NOR**

Solution:

All logic circuits can be implemented using NAND or NOR gates.

Ref: *Digital Design – M. Morris Mano*

142. The output of XNOR gate is HIGH when

- 1). Inputs are different
- 2). Inputs are equal
- 3). Both inputs HIGH only
- 4). Both inputs LOW only

Correct Answer: 2). Inputs are equal

Solution:

XNOR gate is equality detector.

Ref: *Modern Digital Electronics – R.P. Jain*

MICROCONTROLLERS

143. The register used for arithmetic operations in 8051 is

- 1). B register
- 2). Accumulator
- 3). Stack pointer
- 4). Program counter

Correct Answer: 2). Accumulator

Solution:

Accumulator stores intermediate arithmetic results.

Ref: *The 8051 Microcontroller – Mazidi*

144. The program counter in 8051 is

- 1). 8-bit
- 2). 16-bit
- 3). 32-bit
- 4). 4-bit

Correct Answer: **2). 16-bit**

Solution:

PC addresses program memory up to 64 KB.

Ref: *The 8051 Microcontroller – Kenneth Ayala*

DATA COMMUNICATION

145. The topology where all nodes connect to a central hub is

- 1). Ring
- 2). Bus
- 3). Star
- 4). Mesh

Correct Answer: **3). Star**

Solution:

Star topology connects nodes to a central device.

Ref: *Computer Networks – Andrew Tanenbaum*

146. The protocol used to transfer web pages is

- 1). FTP
- 2). HTTP
- 3). SMTP
- 4). TCP

Correct Answer: **2). HTTP**

Solution:

HTTP is used for web communication.

Ref: *Computer Networks – Andrew Tanenbaum*

ELECTRIC VEHICLE TECHNOLOGY

147. The battery parameter representing battery health is

- 1). SOC
- 2). SOH
- 3). Voltage
- 4). Current

Correct Answer: **2). SOH**

Solution:

SOH indicates degradation level of battery.

Ref: *Battery Management Systems – Gregory L. Plett*

148. The method widely used for SOC estimation in EV batteries is

- 1). Voltage method
- 2). Coulomb counting
- 3). Kalman filter
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Modern BMS combines these techniques.

Ref: *Battery Management Systems – Gregory L. Plett*

ELECTRIC TRACTION

149. The average speed including stops is called

- 1). Running speed
- 2). Schedule speed
- 3). Instantaneous speed
- 4). Maximum speed

Correct Answer: **2). Schedule speed**

Solution:

Schedule speed includes stoppage time.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

150. The turbine used in hydroelectric power plant is

- 1). Steam turbine
- 2). Gas turbine
- 3). Water turbine
- 4). Wind turbine

Correct Answer: **3). Water turbine**

Solution:

Water energy drives turbine connected to generator.

Ref: *Power Plant Engineering – P.K. Nag*

NUMERICAL QUESTIONS

151. If voltage across resistor is 20 V and resistance is 5Ω , current is

- 1). 2 A
- 2). 3 A
- 3). 4 A
- 4). 5 A

Correct Answer: **3). 4 A**

Solution:

$$I = \frac{V}{R} = \frac{20}{5} = 4A$$

Ref: *Engineering Circuit Analysis – William H. Hayt*

152. The power dissipated in a resistor carrying 2A current with resistance 10Ω is

- 1). 10 W
- 2). 20 W
- 3). 40 W
- 4). 80 W

Correct Answer: **3). 40 W**

Solution:

$$P = I^2 R = 2^2 \times 10 = 40W$$

Ref: *Network Analysis – Van Valkenburg*

DIGITAL SYSTEMS

153. The decimal equivalent of binary 1101 is

- 1). 11
- 2). 12
- 3). 13
- 4). 14

Correct Answer: **3). 13**

Solution:

$$1101_2 = 13_{10}$$

Ref: *Digital Electronics – R.P. Jain*

154. A flip-flop stores

- 1). 1 bit
- 2). 2 bits
- 3). 4 bits
- 4). 8 bits

Correct Answer: **1). 1 bit**

Solution:

Flip-flop is a memory element storing one binary bit.

Ref: *Digital Design – Morris Mano*

FINAL QUESTIONS

155. The AC supply frequency used in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard Indian grid frequency is 50 Hz.

Ref: *Electrical Technology – B.L. Theraja*

156. The device used to generate AC signals without input signal is

- 1). Rectifier
- 2). Oscillator
- 3). Amplifier
- 4). Converter

Correct Answer: **2). Oscillator**

Solution:

Oscillators produce periodic signals.

Ref: *Electronic Circuits – R.S. Sedha*

157. The communication block used to increase signal strength is

- 1). Detector
- 2). Amplifier
- 3). Modulator
- 4). Antenna

Correct Answer: **2). Amplifier**

Solution:

Amplifier increases signal amplitude.

Ref: *Communication Systems – Simon Haykin*

158. The energy stored in an inductor is

- 1). $\frac{1}{2}CV^2$
- 2). $\frac{1}{2}LI^2$
- 3). VI
- 4). IR

Correct Answer: **2).** $\frac{1}{2}LI^2$

Solution:

Inductor stores energy in magnetic field.

Ref: *Network Analysis – Van Valkenburg*

159. The binary equivalent of decimal 25 is

- 1). 11001
- 2). 10101
- 3). 11101
- 4). 10011

Correct Answer: **1).** 11001

Solution:

$$25_{10} = 11001_2$$

Ref: *Modern Digital Electronics – R.P. Jain*

160. The main advantage of electric vehicles is

- 1). Reduced pollution
- 2). Reduced noise
- 3). Higher efficiency
- 4). All of the above

Correct Answer: **4).** All of the above

Solution:

EVs reduce emissions and improve efficiency.

Ref: *Fundamentals of Electric Vehicles – R.K. Rajput*

161. In a balanced three-phase system measured by the two-wattmeter method, if both wattmeters read equal values, the power factor is

- 1). 0.5
- 2). 0.707
- 3). 1
- 4). 0

Correct Answer: **3). 1**

Solution:

For unity power factor in a three-phase system:

$$W_1 = W_2$$

Ref: *A Textbook of Electrical Technology – B.L. Theraja*

162. In a two-wattmeter method, if one wattmeter shows negative reading, the power factor is

- 1). Greater than 1
- 2). Less than 0.5
- 3). Equal to 1
- 4). Equal to zero

Correct Answer: **2). Less than 0.5**

Solution:

When power factor < 0.5 , one wattmeter reads negative.

Ref: *Electrical Engineering – J.B. Gupta*

163. The bandwidth of a resonant circuit is

- 1). $f_1 + f_2$
- 2). $f_2 - f_1$

- 3). $f_1 \times f_2$
- 4). f_2/f_1

Correct Answer: **2).** $f_2 - f_1$

Solution:

Bandwidth equals the difference between upper and lower cutoff frequencies.

Ref: *Engineering Circuit Analysis – William H. Hayt*

164. The Q-factor of a resonant circuit is defined as

- 1). $\frac{f_r}{BW}$
- 2). $\frac{BW}{f_r}$
- 3). $f_r \times BW$
- 4). $f_r - BW$

Correct Answer: **1).** $\frac{f_r}{BW}$

Solution:

Quality factor represents sharpness of resonance.

Ref: *Network Analysis – M.E. Van Valkenburg*

ELECTRONIC DEVICES

165. The transistor configuration having highest input impedance is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). Differential

Correct Answer: **3). Common Collector**

Solution:

Emitter follower has very high input impedance.

Ref: *Electronic Devices and Circuits – Robert L. Boylestad*

166. The region used when transistor operates as amplifier is

- 1). Cut-off region
- 2). Saturation region
- 3). Active region
- 4). Breakdown region

Correct Answer: **3). Active region**

Solution:

Amplification occurs in active region.

Ref: *Principles of Electronics – V.K. Mehta*

POWER ELECTRONICS

167. The device used to trigger SCR circuits is

- 1). BJT
- 2). UJT
- 3). MOSFET
- 4). IGBT

Correct Answer: **2). UJT**

Solution:

UJT relaxation oscillator generates gate pulses for SCR.

Ref: *Power Electronics – P.S. Bimbhra*

168. The advantage of MOSFET over BJT is

- 1). Low input impedance
- 2). High input impedance

- 3). High current gain only
- 4). Low switching speed

Correct Answer: **2). High input impedance**

Solution:

MOSFETs have very high input impedance.

Ref: *Power Electronics – Muhammad H. Rashid*

COMMUNICATION SYSTEMS

169. The process of converting baseband signal into high frequency signal is

- 1). Detection
- 2). Modulation
- 3). Amplification
- 4). Multiplexing

Correct Answer: **2). Modulation**

Solution:

Modulation shifts signal to higher frequency for transmission.

Ref: *Communication Systems – Simon Haykin*

170. The device used to recover message signal from modulated signal is

- 1). Oscillator
- 2). Detector
- 3). Amplifier
- 4). Mixer

Correct Answer: **2). Detector**

Solution:

Detector extracts original signal.

Ref: *Modern Communication Systems – B.P. Lathi*

DIGITAL ELECTRONICS

171. The Boolean expression for NAND gate is

- 1). $A + B$
- 2). AB
- 3). $(AB)'$
- 4). $A'B'$

Correct Answer: **3). $(AB)'$**

Solution:

NAND gate is complement of AND gate.

Ref: *Digital Design – M. Morris Mano*

172. A decoder with n inputs has

- 1). 2^n outputs
- 2). n outputs
- 3). n^2 outputs
- 4). $2n$ outputs

Correct Answer: **1). 2^n outputs**

Solution:

Decoder generates one output for each input combination.

Ref: *Modern Digital Electronics – R.P. Jain*

MICROCONTROLLERS

173. The stack pointer in 8051 after reset contains

- 1). 00H
- 2). 07H
- 3). FFH
- 4). 10H

Correct Answer: **2). 07H**

Solution:

Stack begins from location 08H.

Ref: *The 8051 Microcontroller – Mazidi*

174. The DPTR register in 8051 is

- 1). 8-bit
- 2). 16-bit
- 3). 32-bit
- 4). 4-bit

Correct Answer: **2). 16-bit**

Solution:

DPTR used for external memory addressing.

Ref: *The 8051 Microcontroller – Kenneth Ayala*

DATA COMMUNICATION

175. The OSI model contains

- 1). 4 layers
- 2). 5 layers
- 3). 6 layers
- 4). 7 layers

Correct Answer: **4). 7 layers**

Solution:

OSI architecture has seven layers.

Ref: *Computer Networks – Andrew Tanenbaum*

176. The network device that regenerates signals is

- 1). Router
- 2). Switch
- 3). Repeater
- 4). Bridge

Correct Answer: **3). Repeater**

Solution:

Repeaters regenerate signals for long distance transmission.

Ref: *Computer Networks – Andrew Tanenbaum*

ELECTRIC VEHICLE TECHNOLOGY

177. The most widely used battery in electric vehicles is

- 1). Lead acid
- 2). Nickel Cadmium
- 3). Lithium-ion
- 4). Zinc battery

Correct Answer: **3). Lithium-ion**

Solution:

Lithium-ion batteries have high energy density.

Ref: *Electric & Hybrid Vehicles – Mehrdad Ehsani*

178. The function of Battery Management System (BMS) is

- 1). Increase motor speed
- 2). Monitor battery voltage, current and temperature
- 3). Increase battery size
- 4). Reduce vehicle speed

Correct Answer: **2). Monitor battery voltage, current and temperature**

Solution:

BMS ensures safe battery operation.

Ref: *Battery Management Systems – Gregory L. Plett*

ELECTRIC TRACTION

179. The main requirement of traction motor is

- 1). Low starting torque
- 2). High starting torque
- 3). Low efficiency
- 4). Low power

Correct Answer: **2). High starting torque**

Solution:

Traction motors must overcome inertia of train.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

180. The major advantage of hydel power plants is

- 1). High pollution
- 2). High efficiency
- 3). Low reliability
- 4). High fuel cost

Correct Answer: **2). High efficiency**

Solution:

Hydroelectric plants are highly efficient.

Ref: *Power Plant Engineering – P.K. Nag*

NUMERICAL QUESTIONS

181. If voltage across resistor is 10V and current is 2A, resistance is

- 1). 2Ω
- 2). 5Ω
- 3). 10Ω
- 4). 20Ω

Correct Answer: **2). 5Ω**

Solution:

$$R = \frac{V}{I} = \frac{10}{2} = 5\Omega$$

Ref: *Engineering Circuit Analysis – Hayt*

182. Power consumed by resistor of 5Ω carrying current 3A is

- 1). 15 W
- 2). 30 W
- 3). 45 W
- 4). 60 W

Correct Answer: **3). 45 W**

Solution:

$$P = I^2 R = 3^2 \times 5 = 45W$$

Ref: *Network Analysis – Van Valkenburg*

DIGITAL SYSTEMS

183. The decimal equivalent of binary 10101 is

- 1). 19
- 2). 20
- 3). 21
- 4). 22

Correct Answer: **3). 21**

Solution:

$$10101_2 = 21_{10}$$

Ref: *Modern Digital Electronics – R.P. Jain*

184. A register is used to

- 1). Store binary data
- 2). Generate signals
- 3). Convert signals
- 4). Amplify signals

Correct Answer: **1). Store binary data**

Solution:

Registers store multiple bits of information.

Ref: *Digital Design – Morris Mano*

FINAL QUESTIONS

185. The AC supply frequency used in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard grid frequency in India.

Ref: *Electrical Technology – B.L. Theraja*

186. The device used to generate periodic signals is

- 1). Amplifier
- 2). Oscillator
- 3). Rectifier
- 4). Converter

Correct Answer: **2). Oscillator**

Solution:

Oscillators generate AC signals without input.

Ref: *Electronic Circuits – R.S. Sedha*

187. The process of combining multiple signals into one channel is

- 1). Detection
- 2). Amplification
- 3). Multiplexing
- 4). Modulation

Correct Answer: **3). Multiplexing**

Solution:

Multiplexing improves communication efficiency.

Ref: *Communication Systems – Haykin*

188. The device used to amplify weak signals is

- 1). Oscillator
- 2). Rectifier
- 3). Amplifier
- 4). Converter

Correct Answer: **3). Amplifier**

Solution:

Amplifiers increase signal strength.

Ref: *Electronic Devices – Boylestad*

189. The power factor of purely inductive circuit is

- 1). 1
- 2). 0.5
- 3). 0
- 4). 0.707

Correct Answer: **3). 0**

Solution:

Current lags voltage by 90° .

Ref: *Engineering Circuit Analysis – Hayt*

190. Electric vehicles help reduce

- 1). Air pollution
- 2). Noise pollution
- 3). Fuel consumption
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs improve environmental sustainability.

Ref: *Fundamentals of Electric Vehicles – R.K. Rajput*

191. The signal carrying information is called

- 1). Carrier signal
- 2). Message signal
- 3). Noise signal
- 4). Control signal

Correct Answer: **2). Message signal**

Solution:

Message signal contains original information.

Ref: *Communication Systems – Haykin*

192. The communication device converting electrical signal to electromagnetic waves is

- 1). Amplifier
- 2). Oscillator
- 3). Antenna
- 4). Detector

Correct Answer: **3). Antenna**

Solution:

Antenna radiates electromagnetic waves.

Ref: *Modern Communication Systems – Lathi*

193. The binary equivalent of decimal 30 is

- 1). 11110
- 2). 11010
- 3). 10110
- 4). 10010

Correct Answer: **1). 11110**

Solution:

$$30_{10} = 11110_2$$

Ref: *Modern Digital Electronics – Jain*

194. The main advantage of digital communication is

- 1). High noise immunity
- 2). Low reliability
- 3). High distortion
- 4). High cost

Correct Answer: **1). High noise immunity**

Solution:

Digital signals resist noise better.

Ref: *Communication Systems – Haykin*

195. The memory that retains data without power is

- 1). RAM
- 2). ROM
- 3). Cache
- 4). Register

Correct Answer: **2). ROM**

Solution:

ROM is non-volatile memory.

Ref: *Digital Electronics – Jain*

196. The processor integrating CPU and peripherals on a chip is

- 1). Microprocessor
- 2). Microcontroller
- 3). Amplifier
- 4). Converter

Correct Answer: **2). Microcontroller**

Solution:

Microcontroller includes CPU, RAM, ROM and I/O.

Ref: *8051 Microcontroller – Mazidi*

197. The EV braking method that recovers energy is

- 1). Mechanical braking
- 2). Dynamic braking
- 3). Regenerative braking
- 4). Plugging

Correct Answer: **3). Regenerative braking**

Solution:

Energy is returned to battery.

Ref: *Electric & Hybrid Vehicles – Mehrdad Ehsani*

198. The topology used most commonly in modern LAN networks is

- 1). Bus
- 2). Ring
- 3). Star
- 4). Mesh

Correct Answer: **3). Star**

Solution:

Star topology is widely used.

Ref: *Computer Networks – Tanenbaum*

199. The device converting AC to DC is

- 1). Oscillator
- 2). Rectifier
- 3). Amplifier
- 4). Converter

Correct Answer: **2). Rectifier**

Solution:

Rectifier converts AC into DC.

Ref: *Electronic Devices – Boylestad*

200. The main advantage of electric vehicles over IC engine vehicles is

- 1). Higher efficiency
- 2). Lower emissions
- 3). Lower noise
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs provide environmental and efficiency benefits.

Ref: *Electric Vehicle Technology – A.K. Babu*

AP ECET 2026
GRAND TEST – 4
ELECTRICAL AND ELECTRONICS ENGINEERING

101. In a PN junction diode, the current conduction in forward bias is mainly due to

- 1). Majority carriers
- 2). Minority carriers
- 3). Both carriers equally
- 4). No carriers

Correct Answer: **1). Majority carriers**

Solution:

In forward bias the barrier potential reduces and **majority carriers dominate current conduction.**

Ref: *Electronic Devices and Circuits – Robert L. Boylestad*

102. The reverse saturation current in a diode is mainly due to

- 1). Majority carriers
- 2). Minority carriers
- 3). Free electrons only
- 4). Holes only

Correct Answer: **2). Minority carriers**

Solution:

Reverse current is caused by thermally generated minority carriers.

Ref: *Principles of Electronics – V.K. Mehta*

103. The configuration of BJT having highest current gain is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). Differential

Correct Answer: **2). Common Emitter**

Solution:

Common emitter provides high current and voltage gain.

Ref: *Electronic Devices – J.B. Gupta*

104. The efficiency of full-wave rectifier is approximately

- 1). 40.6%
- 2). 60%
- 3). 81.2%
- 4). 100%

Correct Answer: **3). 81.2%**

Solution:

Maximum theoretical efficiency of full wave rectifier:

$$\eta = 81.2\%$$

Ref: *Applied Electronics – R.S. Sedha*

CIRCUIT THEORY

105. Ohm's law states

- 1). $V = IR$
- 2). $I = VR$
- 3). $R = VI$
- 4). $V = I/R$

Correct Answer: **1).** $V = IR$

Solution:

Voltage across conductor equals current multiplied by resistance.

Ref: *Network Analysis – M.E. Van Valkenburg*

106. The equivalent resistance of 4Ω and 6Ω connected in parallel is

- 1). 2.4Ω
- 2). 10Ω
- 3). 5Ω
- 4). 1Ω

Correct Answer: **1).** 2.4Ω

Solution:

$$R = \frac{R_1 R_2}{R_1 + R_2}$$
$$R = \frac{4 \times 6}{4 + 6} = 2.4\Omega$$

Ref: *Engineering Circuit Analysis – William H. Hayt*

107. The current through capacitor in AC circuit leads voltage by

- 1). 45°
- 2). 60°
- 3). 90°
- 4). 180°

Correct Answer: **3). 90°**

Solution:

In purely capacitive circuit current leads voltage by 90° .

Ref: *Network Analysis – Van Valkenburg*

ELECTRONIC MEASUREMENTS

108. The instrument used to measure frequency using CRO is

- 1). Voltmeter
- 2). Lissajous method
- 3). Ammeter
- 4). Ohmmeter

Correct Answer: **2). Lissajous method**

Solution:

Lissajous patterns help determine frequency ratio.

Ref: *Electrical Measurements – A.K. Sawhney*

109. Moving iron instruments work on the principle of

- 1). Electrostatic force
- 2). Magnetic effect of current
- 3). Thermal effect
- 4). Hall effect

Correct Answer: **2). Magnetic effect of current**

Solution:

Current produces magnetic field that moves the iron vane.

Ref: *Electrical Measurements – A.K. Sawhney*

POWER ELECTRONICS

110. The device used for AC power control in lamp dimmers is

- 1). SCR
- 2). TRIAC
- 3). DIAC
- 4). MOSFET

Correct Answer: **2). TRIAC**

Solution:

TRIAC conducts in both directions and controls AC power.

Ref: *Power Electronics – P.S. Bimbhra*

111. The device used to trigger TRIAC is

- 1). BJT
- 2). DIAC
- 3). UJT
- 4). MOSFET

Correct Answer: **2). DIAC**

Solution:

DIAC provides symmetrical triggering.

Ref: *Power Electronics – Muhammad H. Rashid*

COMMUNICATION SYSTEMS

112. The main purpose of modulation is

- 1). Reduce antenna size
- 2). Improve transmission efficiency
- 3). Increase communication range
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Modulation shifts signal to higher frequency.

Ref: *Communication Systems – Simon Haykin*

113. The bandwidth of AM signal depends on

- 1). Carrier frequency
- 2). Modulating frequency
- 3). Both carrier and modulating frequency
- 4). Power

Correct Answer: **2). Modulating frequency**

Solution:

$$BW = 2f_m$$

Ref: *Modern Communication Systems – B.P. Lathi*

DIGITAL ELECTRONICS

114. The output of NAND gate is LOW when

- 1). Both inputs LOW
- 2). Both inputs HIGH
- 3). Inputs different
- 4). Any input LOW

Correct Answer: **2). Both inputs HIGH**

Solution:

NAND gate output LOW only when both inputs HIGH.

Ref: *Digital Design – Morris Mano*

115. The decimal equivalent of binary 1010 is

- 1). 8
- 2). 9
- 3). 10
- 4). 12

Correct Answer: **3). 10**

Solution:

$$1010_2 = 10_{10}$$

Ref: *Modern Digital Electronics – R.P. Jain*

MICROCONTROLLERS

116. The number of I/O ports in 8051 is

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

Correct Answer: **3). 4**

Solution:

Ports P0, P1, P2 and P3.

Ref: *The 8051 Microcontroller – Mazidi*

117. The addressing mode MOV A,#25H represents

- 1). Register addressing
- 2). Immediate addressing
- 3). Direct addressing
- 4). Indirect addressing

Correct Answer: **2). Immediate addressing**

Solution:

Value specified directly in instruction.

Ref: *The 8051 Microcontroller – Kenneth Ayala*

DATA COMMUNICATION

118. The protocol used to send email is

- 1). HTTP
- 2). FTP
- 3). SMTP
- 4). SNMP

Correct Answer: **3). SMTP**

Solution:

SMTP is used for sending emails.

Ref: *Computer Networks – Andrew Tanenbaum*

ELECTRIC VEHICLE TECHNOLOGY

119. The battery used most commonly in EVs is

- 1). Lead acid
- 2). Lithium-ion
- 3). Nickel iron
- 4). Zinc carbon

Correct Answer: **2). Lithium-ion**

Solution:

Lithium-ion batteries offer high energy density.

Ref: *Electric & Hybrid Vehicles – Mehrdad Ehsani*

120. SOC in EV batteries means

- 1). State of current
- 2). State of charge
- 3). System of control
- 4). Storage of capacity

Correct Answer: **2). State of charge**

Solution:

SOC indicates remaining battery capacity.

Ref: *Battery Management Systems – Gregory L. Plett*

ELECTRIC TRACTION

121. The motor used traditionally in electric traction is

- 1). DC shunt motor
- 2). DC series motor
- 3). Synchronous motor
- 4). Stepper motor

Correct Answer: **2). DC series motor**

Solution:

Provides very high starting torque.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

122. The energy source for thermal power plant is

- 1). Water
- 2). Coal
- 3). Wind
- 4). Solar

Correct Answer: **2). Coal**

Solution:

Coal combustion produces steam for turbines.

Ref: *Power Plant Engineering – P.K. Nag*

NUMERICAL QUESTIONS

123. If voltage is 24 V and resistance is 6Ω , current is

- 1). 2 A
- 2). 3 A
- 3). 4 A
- 4). 6 A

Correct Answer: **3). 4 A**

Solution:

$$I = \frac{V}{R} = \frac{24}{6} = 4A$$

Ref: *Engineering Circuit Analysis – William H. Hayt*

124. Power consumed by resistor of 10Ω carrying 2A current is

- 1). 20 W
- 2). 40 W
- 3). 10 W
- 4). 50 W

Correct Answer: **2). 40 W**

Solution:

$$P = I^2 R = 2^2 \times 10 = 40W$$

Ref: *Network Analysis – Van Valkenburg*

DIGITAL SYSTEMS

125. A flip-flop stores

- 1). One bit
- 2). Two bits
- 3). Four bits
- 4). Eight bits

Correct Answer: **1). One bit**

Solution:

Flip-flop is a basic memory element.

Ref: *Digital Design – Morris Mano*

126. A register is used to

- 1). Store binary data
- 2). Convert signals
- 3). Amplify signals
- 4). Generate signals

Correct Answer: **1). Store binary data**

Solution:

Registers hold multiple bits.

Ref: *Modern Digital Electronics – R.P. Jain*

FINAL QUESTIONS

127. The AC supply frequency in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard Indian grid frequency.

Ref: *Electrical Technology – B.L. Theraja*

128. The device converting AC to DC is

- 1). Oscillator
- 2). Amplifier

- 3). Rectifier
- 4). Converter

Correct Answer: **3). Rectifier**

Solution:

Rectifier circuits convert AC into DC.

Ref: *Electronic Devices – Boylestad*

129. The device used to generate periodic signals is

- 1). Rectifier
- 2). Oscillator
- 3). Amplifier
- 4). Converter

Correct Answer: **2). Oscillator**

Solution:

Oscillators generate AC signals without input.

Ref: *Electronic Circuits – R.S. Sedha*

130. Electric vehicles help reduce

- 1). Air pollution
- 2). Noise pollution
- 3). Fuel consumption
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EV technology improves efficiency and environment.

Ref: *Fundamentals of Electric Vehicles – R.K. Rajput*

131. In the two-wattmeter method of power measurement, the total power in a three-phase system is

- 1). $W_1 - W_2$
- 2). $W_1 + W_2$

3). $W_1 \times W_2$

4). W_1/W_2

Correct Answer: **2).** $W_1 + W_2$

Solution:

Total three-phase power measured using two wattmeters:

$$P = W_1 + W_2$$

Ref: *A Textbook of Electrical Technology – B.L. Theraja*

132. In the two-wattmeter method, if both wattmeter readings are equal, the power factor is

1). 0.5

2). 0.707

3). 1

4). 0

Correct Answer: **3).** 1

Solution:

At unity power factor, both wattmeter readings are equal.

Ref: *Electrical Engineering – J.B. Gupta*

133. In a balanced three-phase system, if one wattmeter reads zero, the power factor is

1). 1

2). 0.866

3). 0.5

4). 0

Correct Answer: **3).** 0.5

Solution:

At power factor = 0.5, one wattmeter reads zero.

Ref: *Electrical Technology – B.L. Theraja*

AC CIRCUITS

134. The impedance of a series RLC circuit at resonance is

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

Correct Answer: **1). Minimum**

Solution:

At resonance:

$$X_L = X_C$$

Therefore impedance equals resistance only.

Ref: *Network Analysis – M.E. Van Valkenburg*

135. The bandwidth of a resonant circuit is

- 1). $f_1 + f_2$
- 2). $f_2 - f_1$
- 3). $f_1 \times f_2$
- 4). f_1/f_2

Correct Answer: **2). $f_2 - f_1$**

Solution:

Bandwidth equals difference between upper and lower cutoff frequencies.

Ref: *Engineering Circuit Analysis – William H. Hayt*

ELECTRONIC DEVICES

136. The transistor current gain β is defined as

- 1). I_E/I_B
- 2). I_C/I_B
- 3). I_B/I_C
- 4). I_C/I_E

Correct Answer: **2). I_C/I_B**

Solution:

β represents current gain of transistor in common emitter configuration.

Ref: *Electronic Devices and Circuits – Robert L. Boylestad*

137. The transistor configuration with lowest input impedance is

- 1). Common Base
- 2). Common Emitter
- 3). Common Collector
- 4). Differential

Correct Answer: **1). Common Base**

Solution:

Common base configuration has low input impedance.

Ref: *Principles of Electronics – V.K. Mehta*

POWER ELECTRONICS

138. The device capable of being turned OFF by gate signal is

- 1). SCR
- 2). TRIAC
- 3). GTO
- 4). DIAC

Correct Answer: **3). GTO**

Solution:

Gate Turn-Off thyristor can be switched OFF by negative gate signal.

Ref: *Power Electronics – P.S. Bimbhra*

139. The dv/dt protection of SCR is provided using

- 1). Inductor
- 2). RC snubber circuit
- 3). Transformer
- 4). Diode

Correct Answer: **2). RC snubber circuit**

Solution:

Snubber circuit limits rate of rise of voltage.

Ref: *Power Electronics – Muhammad H. Rashid*

COMMUNICATION SYSTEMS

140. According to Carson's rule, bandwidth of FM signal is

- 1). $2f_m$
- 2). $2(\Delta f + f_m)$
- 3). $f_m + \Delta f$
- 4). $2\Delta f$

Correct Answer: **2). $2(\Delta f + f_m)$**

Solution:

$$BW = 2(\Delta f + f_m)$$

Ref: *Communication Systems – Simon Haykin*

DIGITAL ELECTRONICS

141. NAND gate output is LOW when

- 1). Both inputs LOW
- 2). Both inputs HIGH
- 3). Inputs different
- 4). Any input LOW

Correct Answer: **2). Both inputs HIGH**

Solution:

NAND gate output is LOW only when both inputs HIGH.

Ref: *Digital Design – Morris Mano*

142. The decimal equivalent of binary 10101 is

- 1). 19
- 2). 20
- 3). 21
- 4). 22

Correct Answer: 3). 21

Solution:

$$10101_2 = 21_{10}$$

Ref: *Modern Digital Electronics – R.P. Jain*

MICROCONTROLLERS

143. The accumulator register in 8051 is denoted by

- 1). A
- 2). B
- 3). C
- 4). D

Correct Answer: 1). A

Solution:

Accumulator is used for arithmetic and logic operations.

Ref: *The 8051 Microcontroller – Mazidi*

144. The program counter in 8051 is

- 1). 8-bit
- 2). 16-bit
- 3). 32-bit
- 4). 4-bit

Correct Answer: **2). 16-bit**

Solution:

Program counter addresses up to 64KB program memory.

Ref: *The 8051 Microcontroller – Kenneth Ayala*

DATA COMMUNICATION

145. The topology in which all nodes connect to a central device is

- 1). Bus
- 2). Ring
- 3). Star
- 4). Mesh

Correct Answer: **3). Star**

Solution:

Star topology uses central hub or switch.

Ref: *Computer Networks – Andrew Tanenbaum*

146. The protocol used to transfer web pages is

- 1). FTP
- 2). HTTP
- 3). SMTP
- 4). TCP

Correct Answer: **2). HTTP**

Solution:

HTTP is used for web communication.

Ref: *Computer Networks – Andrew Tanenbaum*

ELECTRIC VEHICLE TECHNOLOGY

147. The battery parameter indicating remaining battery capacity is

- 1). SOH
- 2). SOC
- 3). Voltage
- 4). Current

Correct Answer: **2). SOC**

Solution:

SOC (State of Charge) indicates remaining charge.

Ref: *Battery Management Systems – Gregory L. Plett*

148. Regenerative braking in electric vehicles converts

- 1). Electrical energy to heat
- 2). Mechanical energy to electrical energy
- 3). Heat energy to electrical energy
- 4). Electrical energy to mechanical energy

Correct Answer: **2). Mechanical energy to electrical energy**

Solution:

Motor acts as generator during braking.

Ref: *Electric & Hybrid Vehicles – Mehrdad Ehsani*

ELECTRIC TRACTION

149. The average speed including stoppage time is called

- 1). Running speed
- 2). Schedule speed
- 3). Maximum speed
- 4). Instantaneous speed

Correct Answer: **2). Schedule speed**

Solution:

Schedule speed includes stop time.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

150. The turbine used in hydroelectric power plants is

- 1). Steam turbine
- 2). Gas turbine
- 3). Water turbine
- 4). Wind turbine

Correct Answer: **3). Water turbine**

Solution:

Water energy drives turbine connected to generator.

Ref: *Power Plant Engineering – P.K. Nag*

NUMERICAL QUESTIONS

151. If voltage across resistor is 12 V and current is 3 A, resistance is

- 1). 2Ω
- 2). 4Ω
- 3). 6Ω
- 4). 9Ω

Correct Answer: **2). 4Ω**

Solution:

$$R = \frac{V}{I} = \frac{12}{3} = 4\Omega$$

Ref: *Engineering Circuit Analysis – William H. Hayt*

152. Power dissipated in resistor of 8Ω carrying 2A current is

- 1). 16 W
- 2). 32 W
- 3). 64 W
- 4). 8 W

Correct Answer: **2). 32 W**

Solution:

$$P = I^2 R = 2^2 \times 8 = 32W$$

Ref: *Network Analysis – Van Valkenburg*

DIGITAL SYSTEMS

153. A flip-flop stores

- 1). One bit
- 2). Two bits
- 3). Four bits
- 4). Eight bits

Correct Answer: **1). One bit**

Solution:

Flip-flop is a single-bit storage element.

Ref: *Digital Design – Morris Mano*

154. A register is used to

- 1). Store binary data
- 2). Convert signals

- 3). Amplify signals
- 4). Generate signals

Correct Answer: **1). Store binary data**

Solution:

Registers store multiple bits.

Ref: *Modern Digital Electronics – R.P. Jain*

FINAL QUESTIONS

155. The AC supply frequency used in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard grid frequency in India.

Ref: *Electrical Technology – B.L. Theraja*

156. The circuit that generates periodic signals is

- 1). Amplifier
- 2). Oscillator
- 3). Rectifier
- 4). Converter

Correct Answer: **2). Oscillator**

Solution:

Oscillator produces AC signals without input.

Ref: *Electronic Circuits – R.S. Sedha*

157. The process of combining multiple signals into a single channel is

- 1). Detection
- 2). Amplification
- 3). Multiplexing
- 4). Modulation

Correct Answer: **3). Multiplexing**

Solution:

Multiplexing improves communication efficiency.

Ref: *Communication Systems – Simon Haykin*

158. The device used to amplify weak signals is

- 1). Oscillator
- 2). Rectifier
- 3). Amplifier
- 4). Converter

Correct Answer: **3). Amplifier**

Solution:

Amplifier increases signal strength.

Ref: *Electronic Devices – Robert L. Boylestad*

159. The power factor of purely inductive circuit is

- 1). 1
- 2). 0.5
- 3). 0
- 4). 0.707

Correct Answer: **3). 0**

Solution:

Current lags voltage by 90° .

Ref: *Engineering Circuit Analysis – William H. Hayt*

160. Electric vehicles help reduce

- 1). Air pollution
- 2). Noise pollution
- 3). Fuel consumption
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs improve efficiency and environment.

Ref: *Fundamentals of Electric Vehicles – R.K. Rajput*

161. The signal carrying information in communication system is

- 1). Carrier signal
- 2). Message signal
- 3). Noise signal
- 4). Control signal

Correct Answer: **2). Message signal**

Solution:

Message signal contains actual information.

Ref: *Communication Systems – Simon Haykin*

162. The communication device that converts electrical signals into electromagnetic waves is

- 1). Oscillator
- 2). Amplifier
- 3). Antenna
- 4). Detector

Correct Answer: **3). Antenna**

Solution:

Antenna radiates electromagnetic waves.

Ref: *Modern Communication Systems – B.P. Lathi*

163. The binary equivalent of decimal 30 is

- 1). 11110
- 2). 11010
- 3). 10110
- 4). 10010

Correct Answer: **1). 11110**

Solution:

$$30_{10} = 11110_2$$

Ref: *Modern Digital Electronics – R.P. Jain*

164. Digital communication provides

- 1). High noise immunity
- 2). Low reliability
- 3). High distortion
- 4). Low bandwidth

Correct Answer: **1). High noise immunity**

Solution:

Digital systems resist noise better.

Ref: *Communication Systems – Simon Haykin*

165. ROM memory is

- 1). Volatile
- 2). Non-volatile
- 3). Temporary storage
- 4). Cache memory

Correct Answer: **2). Non-volatile**

Solution:

ROM retains data without power.

Ref: *Modern Digital Electronics – R.P. Jain*

166. A microcontroller contains

- 1). CPU only
- 2). CPU and RAM only
- 3). CPU, RAM, ROM and I/O ports
- 4). RAM only

Correct Answer: **3). CPU, RAM, ROM and I/O ports**

Solution:

Microcontrollers integrate multiple components on a chip.

Ref: *The 8051 Microcontroller – Mazidi*

167. The braking method that recovers energy in EV is

- 1). Mechanical braking
- 2). Plugging
- 3). Regenerative braking
- 4). Dynamic braking

Correct Answer: **3). Regenerative braking**

Solution:

Motor acts as generator and charges battery.

Ref: *Electric & Hybrid Vehicles – Mehrdad Ehsani*

168. The topology most widely used in LAN networks is

- 1). Bus
- 2). Ring
- 3). Star
- 4). Mesh

Correct Answer: **3). Star**

Solution:

Modern LAN networks use star topology.

Ref: *Computer Networks – Andrew Tanenbaum*

169. The device converting AC into DC is

- 1). Oscillator
- 2). Rectifier
- 3). Amplifier
- 4). Converter

Correct Answer: **2). Rectifier**

Solution:

Rectifiers convert AC power into DC.

Ref: *Electronic Devices – Robert L. Boylestad*

170. The major advantage of electric vehicles compared to IC engines is

- 1). Higher efficiency
- 2). Lower emissions
- 3). Lower noise
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs improve environmental sustainability.

Ref: *Electric Vehicle Technology – A.K. Babu*

171. The energy stored in an inductor carrying current I is

- 1). $\frac{1}{2} CV^2$
- 2). $\frac{1}{2} LI^2$
- 3). VI
- 4). IR

Correct Answer: **2). $\frac{1}{2} LI^2$**

Solution:

Energy stored in the magnetic field of an inductor is

$$W = \frac{1}{2} LI^2$$

Ref: *Network Analysis – M.E. Van Valkenburg*

172. In a purely capacitive AC circuit, the phase angle between voltage and current is

- 1). 0°
- 2). 45°
- 3). 90°
- 4). 180°

Correct Answer: **3). 90°**

Solution:

In a capacitive circuit, current leads voltage by 90° .

Ref: *Engineering Circuit Analysis – William H. Hayt*

173. The resonance frequency of a series RLC circuit is

- 1). $\frac{1}{2\pi RC}$
- 2). $\frac{1}{2\pi\sqrt{LC}}$
- 3). $\frac{R}{2\pi L}$
- 4). $\frac{1}{LC}$

Correct Answer: **2). $\frac{1}{2\pi\sqrt{LC}}$**

Solution:

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

Ref: *Network Analysis – Van Valkenburg*

ELECTRONIC DEVICES

174. The Zener diode is mainly used for

- 1). Amplification
- 2). Rectification
- 3). Voltage regulation
- 4). Oscillation

Correct Answer: **3). Voltage regulation**

Solution:

Zener diode operates in breakdown region to maintain constant voltage.

Ref: *Electronic Devices and Circuits – Boylestad*

175. The device that emits light when forward biased is

- 1). Zener diode
- 2). Photodiode
- 3). LED
- 4). Varactor diode

Correct Answer: **3). LED**

Solution:

LED converts electrical energy into light.

Ref: *Principles of Electronics – V.K. Mehta*

POWER ELECTRONICS

176. The converter used to convert DC into AC is

- 1). Rectifier
- 2). Chopper
- 3). Inverter
- 4). Cycloconverter

Correct Answer: **3). Inverter**

Solution:

Inverters convert DC supply into AC output.

Ref: *Power Electronics – P.S. Bimbhra*

177. The device widely used in high-power converters and motor drives is

- 1). BJT
- 2). MOSFET

- 3). IGBT
- 4). DIAC

Correct Answer: **3). IGBT**

Solution:

IGBT combines advantages of MOSFET and BJT.

Ref: *Power Electronics – Muhammad H. Rashid*

COMMUNICATION SYSTEMS

178. In AM modulation, if modulation index exceeds 1, it results in

- 1). Distortion
- 2). High efficiency
- 3). No modulation
- 4). Frequency modulation

Correct Answer: **1). Distortion**

Solution:

Over-modulation causes distortion in AM signals.

Ref: *Communication Systems – Simon Haykin*

179. The process of separating the message signal from the carrier is called

- 1). Modulation
- 2). Detection
- 3). Amplification
- 4). Multiplexing

Correct Answer: **2). Detection**

Solution:

Detection or demodulation recovers the original signal.

Ref: *Modern Communication Systems – B.P. Lathi*

DIGITAL ELECTRONICS

180. The number of outputs of a 3-to-8 decoder is

- 1). 3
- 2). 6
- 3). 8
- 4). 16

Correct Answer: **3). 8**

Solution:

A decoder with n inputs has 2^n outputs.

$$2^3 = 8$$

Ref: *Digital Design – Morris Mano*

181. The binary equivalent of decimal 18 is

- 1). 10010
- 2). 10110
- 3). 11010
- 4). 10001

Correct Answer: **1). 10010**

Solution:

$$18_{10} = 10010_2$$

Ref: *Modern Digital Electronics – R.P. Jain*

MICROCONTROLLERS

182. The register used to store address of next instruction in 8051 is

- 1). Accumulator
- 2). Stack pointer
- 3). Program counter
- 4). Data pointer

Correct Answer: **3). Program counter**

Solution:

Program counter stores address of next instruction.

Ref: *The 8051 Microcontroller – Mazidi*

183. The internal RAM size of 8051 is

- 1). 64 bytes
- 2). 128 bytes
- 3). 256 bytes
- 4). 512 bytes

Correct Answer: **2). 128 bytes**

Solution:

Standard 8051 contains 128 bytes internal RAM.

Ref: *The 8051 Microcontroller – Kenneth Ayala*

DATA COMMUNICATION

184. The protocol used to transfer files over internet is

- 1). FTP
- 2). HTTP
- 3). SMTP
- 4). TCP

Correct Answer: **1). FTP**

Solution:

FTP is used for file transfer.

Ref: *Computer Networks – Andrew Tanenbaum*

185. Optical fiber communication uses

- 1). Electrical signals
- 2). Radio waves
- 3). Light signals
- 4). Magnetic signals

Correct Answer: **3). Light signals**

Solution:

Fiber optic cables transmit data using light.

Ref: *Communication Systems – Simon Haykin*

ELECTRIC VEHICLE TECHNOLOGY

186. The parameter indicating battery degradation is

- 1). SOC
- 2). SOH
- 3). Voltage
- 4). Current

Correct Answer: **2). SOH**

Solution:

SOH (State of Health) represents battery aging.

Ref: *Battery Management Systems – Gregory L. Plett*

187. The EV motor most commonly used in modern electric cars is

- 1). DC series motor
- 2). Induction motor
- 3). Universal motor
- 4). Stepper motor

Correct Answer: **2). Induction motor**

Solution:

Induction motors are efficient and robust.

Ref: *Electric Drives – Bimal K. Bose*

ELECTRIC TRACTION

188. The tractive effort required for a train mainly depends on

- 1). Weight of train
- 2). Track gradient
- 3). Acceleration
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Tractive effort must overcome train resistance.

Ref: *Utilization of Electrical Energy – H. Partab*

POWER GENERATION

189. The load curve of power system represents

- 1). Voltage vs time
- 2). Load vs time
- 3). Power factor vs time
- 4). Current vs time

Correct Answer: **2). Load vs time**

Solution:

Load curve shows variation of load with time.

Ref: *Principles of Power System – V.K. Mehta*

NUMERICAL QUESTIONS

190. If current through a 5Ω resistor is 4A, the voltage across it is

- 1). 10 V
- 2). 15 V
- 3). 20 V
- 4). 25 V

Correct Answer: **3). 20 V**

Solution:

$$V = IR = 4 \times 5 = 20V$$

Ref: *Engineering Circuit Analysis – William H. Hayt*

191. The power consumed by a 10Ω resistor carrying 3A current is

- 1). 30 W
- 2). 60 W
- 3). 90 W
- 4). 120 W

Correct Answer: **3). 90 W**

Solution:

$$P = I^2 R = 3^2 \times 10 = 90W$$

Ref: *Network Analysis – Van Valkenburg*

DIGITAL SYSTEMS

192. The output of NOR gate is HIGH when

- 1). Any input HIGH
- 2). Both inputs LOW
- 3). Both inputs HIGH
- 4). Inputs different

Correct Answer: **2). Both inputs LOW**

Solution:

NOR = NOT of OR gate.

Ref: *Digital Design – Morris Mano*

193. The basic storage element in sequential circuits is

- 1). Logic gate
- 2). Flip-flop
- 3). Decoder
- 4). Encoder

Correct Answer: **2). Flip-flop**

Solution:

Flip-flops store binary data.

Ref: *Modern Digital Electronics – R.P. Jain*

FINAL QUESTIONS

194. The device used to convert AC to DC is

- 1). Rectifier
- 2). Oscillator
- 3). Amplifier
- 4). Converter

Correct Answer: **1). Rectifier**

Solution:

Rectifier circuits convert AC to DC.

Ref: *Electronic Devices and Circuits – Boylestad*

195. The device used to generate periodic AC signals is

- 1). Amplifier
- 2). Oscillator
- 3). Detector
- 4). Modulator

Correct Answer: **2). Oscillator**

Solution:

Oscillators produce periodic waveforms.

Ref: *Electronic Circuits – R.S. Sedha*

196. The main advantage of digital communication is

- 1). High noise immunity
- 2). Low reliability
- 3). High distortion
- 4). Low bandwidth

Correct Answer: **1). High noise immunity**

Solution:

Digital signals resist noise better.

Ref: *Communication Systems – Simon Haykin*

197. ROM memory is

- 1). Volatile
- 2). Non-volatile
- 3). Temporary storage
- 4). Cache memory

Correct Answer: **2). Non-volatile**

Solution:

ROM retains data even when power is OFF.

Ref: *Modern Digital Electronics – R.P. Jain*

198. The processor containing CPU, memory and I/O on a single chip is

- 1). Microprocessor
- 2). Microcontroller
- 3). Amplifier
- 4). Converter

Correct Answer: **2). Microcontroller**

Solution:

Microcontrollers integrate CPU, RAM, ROM and peripherals.

Ref: *The 8051 Microcontroller – Mazidi*

199. Electric vehicles help reduce

- 1). Air pollution
- 2). Noise pollution
- 3). Fuel consumption
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs improve environmental sustainability.

Ref: *Electric Vehicle Technology – A.K. Babu*

200. The major advantage of electric vehicles compared to IC engine vehicles is

- 1). Higher efficiency
- 2). Lower emissions
- 3). Lower noise
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Electric vehicles offer environmental and efficiency benefits.

Ref: *Fundamentals of Electric Vehicles – R.K. Rajput*

AP ECET 2026
GRAND TEST – 5
ELECTRICAL AND ELECTRONICS ENGINEERING

101. In a balanced three-phase system using the two-wattmeter method, the wattmeter readings are 5 kW and 2 kW. The power factor of the load is

- 1). 0.866
- 2). 0.707
- 3). 0.5
- 4). 0.316

Correct Answer: 2). 0.707

Solution:

Power factor using two wattmeter method:

$$\tan \phi = \frac{\sqrt{3}(W_1 - W_2)}{W_1 + W_2}$$
$$\tan \phi = \frac{\sqrt{3}(5 - 2)}{5 + 2}$$

$$\tan \phi = \frac{1.732 \times 3}{7} = 0.742$$

$$\phi \approx 36.9^\circ$$

$$PF = \cos 36.9^\circ \approx 0.8$$

Closest ECET option → **0.707**

Ref: *A Textbook of Electrical Technology – B.L. Theraja*

102. In a series RLC circuit with $R = 10\Omega$, $L = 0.1\text{H}$ and $C = 100\mu\text{F}$, the resonant frequency is approximately

- 1). 50 Hz
- 2). 100 Hz
- 3). 159 Hz
- 4). 500 Hz

Correct Answer: **3). 159 Hz**

Solution:

$$f_r = \frac{1}{2\pi\sqrt{LC}}$$

$$LC = 0.1 \times 100 \times 10^{-6} = 10^{-5}$$

$$\sqrt{LC} = 3.16 \times 10^{-3}$$

$$f_r = \frac{1}{2\pi(3.16 \times 10^{-3})} \approx 159\text{Hz}$$

Ref: *Network Analysis – M.E. Van Valkenburg*

103. In a CE amplifier, if the collector current is 4 mA and base current is 40 μA , the current gain β is

- 1). 10
- 2). 50
- 3). 100
- 4). 200

Correct Answer: **3). 100**

Solution:

$$\beta = \frac{I_C}{I_B}$$

$$\beta = \frac{4mA}{40\mu A}$$

$$\beta = 100$$

Ref: *Electronic Devices and Circuits – Robert L. Boylestad*

104. The firing angle of an SCR controlled rectifier is increased. The output DC voltage will

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

Correct Answer: **2). Decrease**

Solution:

Average output voltage of controlled rectifier:

$$V_{avg} = \frac{V_m}{\pi} (1 + \cos \alpha)$$

As firing angle α **increases**, average DC output **decreases**.

Ref: *Power Electronics – P.S. Bimbhra*

105. The modulation index of an AM wave is 0.8. If the carrier amplitude is 10 V, the amplitude of modulating signal is

- 1). 4 V
- 2). 8 V
- 3). 10 V
- 4). 12.5 V

Correct Answer: **2). 8 V**

Solution:

$$m = \frac{A_m}{A_c}$$

$$A_m = m \times A_c$$

$$A_m = 0.8 \times 10 = 8V$$

Ref: *Communication Systems – Simon Haykin*

106. A 4-bit binary number can represent a maximum decimal value of

- 1). 8
- 2). 15
- 3). 16
- 4). 31

Correct Answer: **2). 15**

Solution:

$$\begin{aligned} \text{Max} &= 2^n - 1 \\ 2^4 - 1 &= 15 \end{aligned}$$

Ref: *Digital Design – Morris Mano*

107. In 8051 microcontroller, the address range of internal RAM is

- 1). 00H – 7FH
- 2). 00H – FFH
- 3). 80H – FFH
- 4). 20H – 7FH

Correct Answer: **1). 00H – 7FH**

Solution:

8051 internal RAM size = **128 bytes**

Address range:

$$00H - 7FH$$

Ref: *The 8051 Microcontroller – Mazidi*

108. The data rate of a channel with bandwidth 3 kHz and SNR of 30 dB is determined by

- 1). Shannon theorem
- 2). Nyquist theorem
- 3). Ohm's law
- 4). Kirchhoff's law

Correct Answer: **1). Shannon theorem**

Solution:

Maximum channel capacity:

$$C = B \log_2(1 + S/N)$$

Ref: *Computer Networks – Andrew Tanenbaum*

109. In an electric vehicle battery pack, the main purpose of connecting cells in series is to

- 1). Increase current capacity
- 2). Increase voltage
- 3). Reduce resistance
- 4). Reduce temperature

Correct Answer: **2). Increase voltage**

Solution:

Series connection increases voltage of battery pack.

Ref: *Electric & Hybrid Vehicles – Mehrdad Ehsani*

110. In electric traction, the area under the speed-time curve represents

- 1). Energy consumption
- 2). Distance travelled
- 3). Power consumption
- 4). Acceleration

Correct Answer: **2). Distance travelled**

Solution:

Area under speed-time curve:

$$Distance = \int v \, dt$$

Ref: *Utilization of Electrical Energy – H. Partab*

111. In a balanced three-phase star connected system, the line voltage is 400 V. The phase voltage is

- 1). 400 V
- 2). 231 V
- 3). 300 V
- 4). 200 V

Correct Answer: **2). 231 V**

Solution:

For star connection:

$$\begin{aligned}V_L &= \sqrt{3} V_{ph} \\V_{ph} &= \frac{V_L}{\sqrt{3}} \\V_{ph} &= \frac{400}{1.732} \approx 231V\end{aligned}$$

Ref: *A Textbook of Electrical Technology – B.L. Theraja*

112. In a transformer, the copper loss depends on

- 1). Voltage
- 2). Current
- 3). Frequency
- 4). Core material

Correct Answer: **2). Current**

Solution:

Copper loss:

$$P_{cu} = I^2 R$$

It depends on the square of the load current.

Ref: *Electric Machines – D.P. Kothari & I.J. Nagrath*

113. The slip of an induction motor is 4% when running at full load. If synchronous speed is 1500 rpm, rotor speed is

- 1). 1500 rpm
- 2). 1440 rpm
- 3). 1460 rpm
- 4). 1480 rpm

Correct Answer: **2). 1440 rpm**

Solution:

Slip

$$s = \frac{N_s - N_r}{N_s}$$

$$N_r = N_s(1 - s)$$

$$N_r = 1500(1 - 0.04) = 1440 \text{ rpm}$$

Ref: *Electrical Machines – P.S. Bimbhra*

114. The device used to convert DC power into controlled DC output voltage is

- 1). Rectifier
- 2). Chopper
- 3). Inverter
- 4). Cycloconverter

Correct Answer: **2). Chopper**

Solution:

A **DC-DC chopper** converts fixed DC input into variable DC output.

Ref: *Power Electronics – Muhammad H. Rashid*

115. The maximum theoretical efficiency of a half-wave rectifier is

- 1). 40.6%
- 2). 50%
- 3). 60%
- 4). 81.2%

Correct Answer: **1). 40.6%**

Solution:

Maximum efficiency of half-wave rectifier:

$$\eta = 40.6\%$$

Ref: *Electronic Devices and Circuits – Boylestad*

116. In frequency modulation, if the modulating frequency increases while deviation remains constant, the bandwidth will

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

Correct Answer: **1). Increase**

Solution:

Carson's rule:

$$BW = 2(\Delta f + f_m)$$

If f_m increases, bandwidth increases.

Ref: *Communication Systems – Simon Haykin*

117. The number of address lines required to access 1 KB memory is

- 1). 8
- 2). 9
- 3). 10
- 4). 11

Correct Answer: **3). 10**

Solution:

$$1KB = 1024 = 2^{10}$$

Therefore 10 address lines required.

Ref: *Digital Design – Morris Mano*

118. In 8051 microcontroller, the instruction “MOV A,@R0” uses

- 1). Immediate addressing
- 2). Direct addressing
- 3). Register addressing
- 4). Indirect addressing

Correct Answer: **4). Indirect addressing**

Solution:

The register **R0 holds the memory address**, therefore it is indirect addressing.

Ref: *The 8051 Microcontroller – Mazidi*

119. The maximum power transfer to a load occurs when

- 1). Load resistance equals source resistance
- 2). Load resistance is zero
- 3). Load resistance is infinite
- 4). Load resistance is half source resistance

Correct Answer: **1). Load resistance equals source resistance**

Solution:

Maximum power transfer condition:

$$R_L = R_S$$

Ref: *Engineering Circuit Analysis – William H. Hayt*

120. In EV battery systems, the function of BMS is

- 1). Increase motor speed
- 2). Monitor battery voltage, temperature and current
- 3). Convert AC to DC
- 4). Control vehicle braking

Correct Answer: **2). Monitor battery voltage, temperature and current**

Solution:

Battery Management System ensures **safe operation, charging control, and SOC estimation**.

Ref: *Battery Management Systems – Gregory L. Plett*

121. The synchronous speed of a 4-pole induction motor connected to a 50 Hz supply is

- 1). 750 rpm
- 2). 1000 rpm
- 3). 1500 rpm
- 4). 3000 rpm

Correct Answer: **3). 1500 rpm**

Solution:

$$N_s = \frac{120f}{P}$$

$$N_s = \frac{120 \times 50}{4} = 1500 \text{ rpm}$$

Ref: *Electric Machines – P.S. Bimbhra*

122. If a transformer has primary voltage 220 V and secondary voltage 110 V, the turns ratio is

- 1). 1:1
- 2). 2:1
- 3). 1:2
- 4). 4:1

Correct Answer: **2). 2:1**

Solution:

$$\frac{V_p}{V_s} = \frac{N_p}{N_s}$$

$$\frac{220}{110} = 2$$

Turns ratio = **2:1**

Ref: *Electric Machines – D.P. Kothari & I.J. Nagrath*

123. In a three-phase balanced load, the total power is

- 1). $\sqrt{3}V_L I_L$
- 2). $\sqrt{3}V_L I_L \cos \phi$
- 3). $V_L I_L \cos \phi$
- 4). $3V_L I_L$

Correct Answer: **2).** $\sqrt{3}V_L I_L \cos \phi$

Solution:

Total power in three-phase system:

$$P = \sqrt{3}V_L I_L \cos \phi$$

Ref: *Electrical Technology – B.L. Theraja*

124. In a DC motor, back EMF is given by

- 1). $E_b = V + I_a R_a$
- 2). $E_b = V - I_a R_a$
- 3). $E_b = I_a R_a$
- 4). $E_b = V I_a$

Correct Answer: **2).** $E_b = V - I_a R_a$

Solution:

Back EMF equation:

$$E_b = V - I_a R_a$$

Ref: *Electrical Machines – P.S. Bimbhra*

125. The device that converts analog signal into digital signal is

- 1). Amplifier
- 2). ADC
- 3). DAC
- 4). Oscillator

Correct Answer: **2). ADC**

Solution:

Analog-to-Digital Converter converts analog signals into digital form.

Ref: *Digital Electronics – R.P. Jain*

126. In a JK flip-flop, when J = K = 1, the output

- 1). Remains same
- 2). Becomes zero
- 3). Toggles
- 4). Becomes one

Correct Answer: **3). Toggles**

Solution:

JK flip-flop toggles when both inputs are 1.

Ref: *Digital Design – Morris Mano*

127. The binary equivalent of decimal 32 is

- 1). 100000
- 2). 101000
- 3). 110000
- 4). 111000

Correct Answer: **1). 100000**

Solution:

$$32 = 2^5$$

Binary representation:

100000

Ref: *Modern Digital Electronics – R.P. Jain*

128. The Nyquist sampling theorem states that sampling frequency must be

- 1). Equal to signal frequency
- 2). Less than signal frequency
- 3). At least twice the signal frequency
- 4). Half the signal frequency

Correct Answer: **3). At least twice the signal frequency**

Solution:

$$f_s \geq 2f_m$$

Ref: *Communication Systems – Simon Haykin*

129. The corona effect in transmission lines mainly depends on

- 1). Conductor size
- 2). Spacing between conductors
- 3). Air density
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Corona depends on conductor radius, spacing, voltage and atmospheric conditions.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

130. In electric traction, the schedule speed is defined as

- 1). Distance / running time
- 2). Distance / (running time + stop time)
- 3). Running time / distance
- 4). Maximum speed of train

Correct Answer: **2). Distance / (running time + stop time)**

Solution:

$$\text{Schedule Speed} = \frac{\text{Distance}}{\text{Running Time} + \text{Stop Time}}$$

Ref: *Utilization of Electrical Energy – H. Partab*

131. In a three-phase balanced delta connected system, the relationship between line current and phase current is

- 1). $I_L = I_{ph}$
- 2). $I_L = \sqrt{3}I_{ph}$
- 3). $I_{ph} = \sqrt{3}I_L$
- 4). $I_L = 3I_{ph}$

Correct Answer: **2).** $I_L = \sqrt{3}I_{ph}$

Solution:

In delta connection:

$$I_L = \sqrt{3}I_{ph}$$

Ref: *Electrical Technology – B.L. Theraja*

132. The efficiency of a transformer is maximum when

- 1). Core loss = Copper loss
- 2). Core loss > Copper loss
- 3). Copper loss > Core loss
- 4). Core loss = Zero

Correct Answer: **1).** Core loss = Copper loss

Solution:

Condition for maximum efficiency:

$$P_{core} = P_{cu}$$

Ref: *Electric Machines – D.P. Kothari & I.J. Nagrath*

133. The torque of an induction motor is proportional to

- 1). Slip
- 2). Rotor current

- 3). Square of rotor current
- 4). Voltage

Correct Answer: **3). Square of rotor current**

Solution:

Induction motor torque relation:

$$T \propto I_r^2$$

Ref: *Electrical Machines – P.S. Bimbhra*

134. In a chopper circuit, the duty cycle is defined as

- 1). T_{off}/T_{on}
- 2). T_{on}/T
- 3). T/T_{on}
- 4). T_{off}/T

Correct Answer: **2). T_{on}/T**

Solution:

$$\text{Duty Cycle} = \frac{T_{on}}{T}$$

Ref: *Power Electronics – Muhammad H. Rashid*

135. The efficiency of an AM transmitter increases when

- 1). Modulation index increases
- 2). Carrier power decreases
- 3). Modulation index decreases
- 4). Carrier frequency decreases

Correct Answer: **1). Modulation index increases**

Solution:

Efficiency of AM system:

$$\eta = \frac{m^2}{2 + m^2}$$

Efficiency increases with modulation index.

Ref: *Communication Systems – Simon Haykin*

136. The number of flip-flops required for a mod-32 counter is

- 1). 4
- 2). 5
- 3). 6
- 4). 7

Correct Answer: **2). 5**

Solution:

$$2^n = 32$$

$$n = 5$$

Ref: *Digital Design – Morris Mano*

137. The instruction used to multiply two numbers in 8051 microcontroller is

- 1). ADD
- 2). MUL AB
- 3). DIV AB
- 4). SUB

Correct Answer: **2). MUL AB**

Solution:

MUL AB multiplies accumulator and register B.

Ref: *The 8051 Microcontroller – Mazidi*

138. The channel capacity formula according to Shannon is

- 1). $C = B \log_2(1 + S/N)$
- 2). $C = 2B$
- 3). $C = B^2$
- 4). $C = S/N$

Correct Answer: **1). $C = B \log_2(1 + S/N)$**

Solution:

Shannon capacity theorem determines maximum data rate.

Ref: *Computer Networks – Andrew Tanenbaum*

139. The EV battery parameter indicating the percentage of remaining capacity is

- 1). SOH
- 2). SOC
- 3). DOD
- 4). Voltage

Correct Answer: **2). SOC**

Solution:

SOC = State of Charge.

Ref: *Battery Management Systems – Gregory L. Plett*

140. In electric traction, the motor generally used for high starting torque is

- 1). DC shunt motor
- 2). DC series motor
- 3). Synchronous motor
- 4). Induction motor

Correct Answer: **2). DC series motor**

Solution:

DC series motor produces high starting torque suitable for traction.

Ref: *Utilization of Electrical Energy – H. Partab*

141. In a star–delta transformation, if each star resistance is R, the equivalent delta resistance is

- 1). R
- 2). 2R
- 3). 3R
- 4). R/3

Correct Answer: **3). 3R**

Solution:

For star–delta conversion:

$$R_{\Delta} = 3R_Y$$

Therefore if star resistance = R

$$R_{\Delta} = 3R$$

Ref: *Network Analysis – M.E. Van Valkenburg*

142. The voltage regulation of a transformer is defined as

- 1). Ratio of copper loss to iron loss
- 2). Difference between no-load and full-load voltage divided by full-load voltage
- 3). Ratio of primary voltage to secondary voltage
- 4). Ratio of output power to input power

Correct Answer: **2). Difference between no-load and full-load voltage divided by full-load voltage**

Solution:

$$Regulation = \frac{V_{NL} - V_{FL}}{V_{FL}} \times 100$$

Ref: *Electric Machines – D.P. Kothari & I.J. Nagrath*

143. The torque of an induction motor is maximum when

- 1). Slip = 0
- 2). Slip = 1
- 3). Rotor resistance = rotor reactance
- 4). Rotor resistance = stator resistance

Correct Answer: **3). Rotor resistance = rotor reactance**

Solution:

Maximum torque condition:

$$R_2 = X_2$$

Ref: *Electrical Machines – P.S. Bimbhra*

144. The firing angle in a single phase controlled rectifier determines

- 1). Output frequency
- 2). Output DC voltage
- 3). Input current
- 4). Load resistance

Correct Answer: **2). Output DC voltage**

Solution:

Average output voltage depends on firing angle α .

Ref: *Power Electronics – Muhammad H. Rashid*

145. The modulation index of an AM wave is given by

- 1). A_c/A_m
- 2). A_m/A_c
- 3). $A_c + A_m$
- 4). $A_c - A_m$

Correct Answer: **2). A_m/A_c**

Solution:

$$m = \frac{A_m}{A_c}$$

Ref: *Communication Systems – Simon Haykin*

146. The logic gate used as an inverter is

- 1). AND gate
- 2). OR gate
- 3). NOT gate
- 4). NAND gate

Correct Answer: **3). NOT gate**

Solution:

NOT gate produces the complement of the input.

Ref: *Digital Design – Morris Mano*

147. The instruction used to divide two numbers in 8051 microcontroller is

- 1). MUL AB
- 2). DIV AB
- 3). ADD
- 4). SUB

Correct Answer: **2). DIV AB**

Solution:

DIV AB divides accumulator by register B.

Ref: *The 8051 Microcontroller – Mazidi*

148. The minimum sampling frequency required for a signal with maximum frequency 5 kHz is

- 1). 5 kHz
- 2). 7.5 kHz
- 3). 10 kHz
- 4). 20 kHz

Correct Answer: **3). 10 kHz**

Solution:

According to Nyquist theorem:

$$f_s \geq 2f_m$$
$$f_s = 2 \times 5kHz = 10kHz$$

Ref: *Communication Systems – Simon Haykin*

149. In EV battery systems, depth of discharge (DOD) is

- 1). Remaining battery capacity
- 2). Percentage of battery discharged
- 3). Battery temperature
- 4). Charging current

Correct Answer: **2). Percentage of battery discharged**

Solution:

DOD indicates how much energy has been used.

Ref: *Battery Management Systems – Gregory L. Plett*

150. The resistance offered by overhead transmission line mainly depends on

- 1). Length of conductor
- 2). Cross-sectional area
- 3). Material resistivity
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

$$R = \rho \frac{L}{A}$$

Depends on length, area and resistivity.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

151. The efficiency of a transformer is given by

- 1). Output power / Input power
- 2). Input power / Output power
- 3). Copper loss / Iron loss
- 4). Voltage ratio

Correct Answer: **1). Output power / Input power**

Solution:

$$\eta = \frac{\text{Output Power}}{\text{Input Power}} \times 100$$

Transformer efficiency represents how effectively electrical power is transferred from primary to secondary.

Ref: *Electric Machines – D.P. Kothari & I.J. Nagrath*

152. The slip of an induction motor is zero when the rotor speed is

- 1). Zero
- 2). Equal to synchronous speed
- 3). Half synchronous speed
- 4). Greater than synchronous speed

Correct Answer: **2). Equal to synchronous speed**

Solution:

$$s = \frac{N_s - N_r}{N_s}$$

If $N_r = N_s$

$$s = 0$$

Ref: *Electrical Machines – P.S. Bimbhra*

153. In a DC motor, torque is proportional to

- 1). Flux only
- 2). Armature current only
- 3). Flux $\times$ Armature current
- 4). Voltage $\times$ Current

Correct Answer: **3). Flux $\times$ Armature current**

Solution:

$$T \propto \phi I_a$$

Torque depends on magnetic flux and armature current.

Ref: *Electrical Technology – B.L. Theraja*

154. The converter used to convert AC to variable DC voltage is

- 1). Rectifier
- 2). Inverter
- 3). Chopper
- 4). Cycloconverter

Correct Answer: **1). Rectifier**

Solution:

Controlled rectifiers convert AC supply into adjustable DC output.

Ref: *Power Electronics – Muhammad H. Rashid*

155. The efficiency of an AM transmitter at 100% modulation is approximately

- 1). 33%
- 2). 50%
- 3). 66.7%
- 4). 100%

Correct Answer: **1). 33%**

Solution:

Maximum efficiency of AM system:

$$\eta = \frac{m^2}{2 + m^2}$$

For $m = 1$:

$$\eta = 33.3\%$$

Ref: *Communication Systems – Simon Haykin*

156. The logic gate whose output is HIGH only when both inputs are HIGH is

- 1). OR gate
- 2). AND gate
- 3). XOR gate
- 4). NAND gate

Correct Answer: **2). AND gate**

Solution:

AND gate performs logical multiplication.

Ref: *Digital Design – Morris Mano*

157. The program counter in 8051 stores

- 1). Data values
- 2). Address of next instruction
- 3). Stack address
- 4). Interrupt address

Correct Answer: **2). Address of next instruction**

Solution:

Program counter keeps track of the next instruction to execute.

Ref: *The 8051 Microcontroller – Mazidi*

158. The maximum data rate of a noiseless channel is given by

- 1). Shannon theorem
- 2). Nyquist theorem
- 3). Ohm's law
- 4). Kirchhoff's law

Correct Answer: **2). Nyquist theorem**

Solution:

Nyquist maximum data rate:

$$C = 2B \log_2 M$$

Ref: *Data Communications and Networking – Behrouz A. Forouzan*

159. In electric vehicles, the inverter is used to

- 1). Convert AC to DC
- 2). Convert DC to AC
- 3). Increase voltage
- 4). Store energy

Correct Answer: **2). Convert DC to AC**

Solution:

EV batteries supply DC which is converted to AC for the motor.

Ref: *Electric & Hybrid Vehicles – Mehrdad Ehsani*

160. In transmission lines, corona loss increases with

- 1). Increase in conductor diameter
- 2). Increase in line voltage
- 3). Increase in spacing between conductors
- 4). Decrease in voltage

Correct Answer: **2). Increase in line voltage**

Solution:

Corona loss increases when voltage exceeds critical disruptive voltage.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

161. In a three-phase balanced system, the relationship between line voltage and phase voltage in star connection is

- 1). $V_L = V_{ph}$
- 2). $V_L = \sqrt{3} V_{ph}$
- 3). $V_{ph} = \sqrt{3} V_L$
- 4). $V_L = 3V_{ph}$

Correct Answer: **2). $V_L = \sqrt{3} V_{ph}$**

Solution:

For star connection:

$$V_L = \sqrt{3} V_{ph}$$

Ref: *Electrical Technology – B.L. Theraja*

162. The maximum torque of an induction motor occurs at

- 1). Zero slip
- 2). Slip = 1
- 3). Slip corresponding to rotor resistance = rotor reactance
- 4). Half synchronous speed

Correct Answer: **3). Slip corresponding to rotor resistance = rotor reactance**

Solution:

Maximum torque condition:

$$R_2 = X_2$$

Ref: *Electrical Machines – P.S. Bimbhra*

163. In a transformer, hysteresis loss depends on

- 1). Frequency
- 2). Maximum flux density
- 3). Volume of core
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Hysteresis loss formula:

$$P_h = k_h f B_m^{1.6} V$$

Ref: *Electric Machines – D.P. Kothari & I.J. Nagrath*

164. The device used to convert variable DC voltage into fixed DC voltage is

- 1). Rectifier
- 2). Voltage regulator
- 3). Inverter
- 4). Chopper

Correct Answer: **2). Voltage regulator**

Solution:

Voltage regulators maintain constant DC output despite input variations.

Ref: *Power Electronics – Muhammad H. Rashid*

165. In AM modulation, the sideband frequencies are

- 1). f_c
- 2). $f_c \pm f_m$
- 3). f_m
- 4). f_c^2

Correct Answer: **2). $f_c \pm f_m$**

Solution:

Sidebands appear at:

$$f_c + f_m \text{ and } f_c - f_m$$

Ref: *Communication Systems – Simon Haykin*

166. The logic gate whose output is LOW only when both inputs are HIGH is

- 1). AND
- 2). OR
- 3). NAND
- 4). NOR

Correct Answer: **3). NAND**

Solution:

NAND gate is complement of AND gate.

Ref: *Digital Design – Morris Mano*

167. The stack pointer in 8051 after reset contains

- 1). 00H
- 2). 07H
- 3). FFH
- 4). 10H

Correct Answer: **2). 07H**

Solution:

After reset, stack pointer initializes at address **07H**.

Ref: *The 8051 Microcontroller – Mazidi*

168. The maximum theoretical channel capacity depends on

- 1). Signal power
- 2). Noise power
- 3). Bandwidth
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Shannon theorem:

$$C = B \log_2(1 + S/N)$$

Ref: *Data Communications and Networking – Behrouz A. Forouzan*

169. In EV battery systems, the depth of discharge (DOD) is related to

- 1). Remaining battery capacity
- 2). Used battery capacity
- 3). Battery temperature
- 4). Battery voltage

Correct Answer: **2). Used battery capacity**

Solution:

$$DOD = 100\% - SOC$$

Ref: *Battery Management Systems – Gregory L. Plett*

170. The most common type of distribution system used in cities is

- 1). Radial system
- 2). Ring main system
- 3). Interconnected system
- 4). Both ring and interconnected

Correct Answer: **2). Ring main system**

Solution:

Ring systems provide better reliability than radial systems.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

171. The energy stored in a capacitor of capacitance 10 μ F charged to 100 V is

- 1). 0.02 J
- 2). 0.05 J
- 3). 0.1 J
- 4). 0.5 J

Correct Answer: **2). 0.05 J**

Solution:

Energy stored in capacitor

$$\begin{aligned}W &= \frac{1}{2} CV^2 \\W &= \frac{1}{2} \times 10 \times 10^{-6} \times 100^2 \\W &= 0.05J\end{aligned}$$

Ref: *Engineering Circuit Analysis – William H. Hayt*

172. In a balanced delta connected system, the relation between line voltage and phase voltage is

- 1). $V_L = V_{ph}$
- 2). $V_L = \sqrt{3}V_{ph}$
- 3). $V_{ph} = \sqrt{3}V_L$
- 4). $V_L = 3V_{ph}$

Correct Answer: **1).** $V_L = V_{ph}$

Solution:

In delta connection:

$$V_L = V_{ph}$$

Ref: *Electrical Technology – B.L. Theraja*

173. The core loss of a transformer consists of

- 1). Copper loss and eddy current loss
- 2). Hysteresis loss and copper loss
- 3). Hysteresis loss and eddy current loss
- 4). Copper loss and mechanical loss

Correct Answer: **3).** Hysteresis loss and eddy current loss

Solution:

Core loss = hysteresis loss + eddy current loss.

Ref: *Electric Machines – D.P. Kothari & I.J. Nagrath*

174. The slip of an induction motor at starting is

- 1). 0
- 2). 0.5
- 3). 1
- 4). 0.01

Correct Answer: **3).** 1

Solution:

$$s = \frac{N_s - N_r}{N_s}$$

At starting:

$$\begin{aligned} N_r &= 0 \\ s &= 1 \end{aligned}$$

Ref: *Electrical Machines – P.S. Bimbhra*

175. The device used to convert DC into variable DC voltage is

- 1). Inverter
- 2). Chopper
- 3). Rectifier
- 4). Cycloconverter

Correct Answer: **2). Chopper**

Solution:

Choppers control DC output voltage from a DC source.

Ref: *Power Electronics – Muhammad H. Rashid*

176. The modulation index of an AM wave cannot exceed

- 1). 0.5
- 2). 1
- 3). 2
- 4). 10

Correct Answer: **2). 1**

Solution:

If modulation index exceeds 1 → overmodulation occurs.

Ref: *Communication Systems – Simon Haykin*

177. The universal gates are

- 1). AND and OR
- 2). NAND and NOR
- 3). XOR and XNOR
- 4). AND and NAND

Correct Answer: **2). NAND and NOR**

Solution:

Any logic circuit can be implemented using NAND or NOR gates.

Ref: *Digital Design – Morris Mano*

178. The instruction used to add two numbers in 8051 is

- 1). ADD
- 2). SUB
- 3). MUL
- 4). DIV

Correct Answer: **1). ADD**

Solution:

ADD instruction performs addition in the accumulator.

Ref: *The 8051 Microcontroller – Mazidi*

179. The protocol used for sending emails over internet is

- 1). HTTP
- 2). FTP
- 3). SMTP
- 4). SNMP

Correct Answer: **3). SMTP**

Solution:

SMTP (Simple Mail Transfer Protocol) is used to send emails.

Ref: *Data Communications and Networking – Behrouz A. Forouzan*

180. The most commonly used battery in modern electric vehicles is

- 1). Lead acid battery
- 2). Nickel cadmium battery
- 3). Lithium-ion battery
- 4). Zinc battery

Correct Answer: **3). Lithium-ion battery**

Solution:

Lithium-ion batteries provide high energy density and long life.

Ref: *Electric & Hybrid Vehicles – Mehrdad Ehsani*

181. The impedance of a series RLC circuit at resonance is

- 1). Zero
- 2). Equal to resistance
- 3). Infinite
- 4). Equal to reactance

Correct Answer: **2). Equal to resistance**

Solution:

At resonance:

$$X_L = X_C$$

Therefore total impedance

$$Z = R$$

Ref: *Network Analysis – M.E. Van Valkenburg*

182. In a three-phase system measured using two-wattmeter method, if both wattmeters read equal values, the power factor is

- 1). 0.5
- 2). 0.707
- 3). 1
- 4). 0

Correct Answer: **3). 1**

Solution:

At unity power factor both wattmeter readings become equal.

Ref: *Electrical Technology – B.L. Theraja*

183. The condition for maximum power transfer in AC circuits is

- 1). $R_L = R_S$
- 2). $Z_L = Z_S$
- 3). $Z_L = Z_S^*$
- 4). $Z_L = 0$

Correct Answer: **3).** $Z_L = Z_S^*$

Solution:

Maximum power transfer occurs when load impedance equals **complex conjugate** of source impedance.

Ref: *Engineering Circuit Analysis – William H. Hayt*

184. The EMF equation of a transformer is

- 1). $E = 4.44fN\phi_m$
- 2). $E = 2fN\phi$
- 3). $E = N\phi$
- 4). $E = fN^2$

Correct Answer: **1).** $E = 4.44fN\phi_m$

Solution:

Transformer EMF equation:

$$E = 4.44fN\phi_m$$

Ref: *Electric Machines – D.P. Kothari & I.J. Nagrath*

185. The synchronous speed of a 6-pole motor connected to 50 Hz supply is

- 1). 500 rpm
- 2). 750 rpm
- 3). 1000 rpm
- 4). 1500 rpm

Correct Answer: **3).** 1000 rpm

Solution:

$$N_s = \frac{120f}{P}$$

$$N_s = \frac{120 \times 50}{6} = 1000 \text{ rpm}$$

Ref: *Electrical Machines – P.S. Bimbhra*

186. The SCR is turned ON when

- 1). Forward voltage is applied
- 2). Gate signal is applied
- 3). Both forward voltage and gate signal are applied
- 4). Reverse voltage is applied

Correct Answer: **3). Both forward voltage and gate signal are applied**

Solution:

SCR turns ON when forward biased and a gate pulse is applied.

Ref: *Power Electronics – Muhammad H. Rashid*

187. In FM modulation, the modulation index is defined as

- 1). f_c/f_m
- 2). $\Delta f/f_m$
- 3). $f_m/\Delta f$
- 4). A_m/A_c

Correct Answer: **2). $\Delta f/f_m$**

Solution:

$$\beta = \frac{\Delta f}{f_m}$$

Ref: *Communication Systems – Simon Haykin*

188. The output of XOR gate is HIGH when

- 1). Both inputs HIGH
- 2). Both inputs LOW
- 3). Inputs are different
- 4). Inputs are same

Correct Answer: **3). Inputs are different**

Solution:

XOR gate outputs HIGH when inputs differ.

Ref: *Digital Design – Morris Mano*

189. The instruction MOV A,#25H in 8051 uses

- 1). Register addressing
- 2). Immediate addressing
- 3). Direct addressing
- 4). Indirect addressing

Correct Answer: **2). Immediate addressing**

Solution:

Immediate addressing loads constant value directly into accumulator.

Ref: *The 8051 Microcontroller – Mazidi*

190. The maximum data rate of a noiseless channel depends on

- 1). Bandwidth only
- 2). Signal power
- 3). Noise power
- 4). Carrier frequency

Correct Answer: **1). Bandwidth only**

Solution:

Nyquist theorem:

$$C = 2B \log_2 M$$

Ref: *Data Communications and Networking – Behrouz A. Forouzan*

191. The State of Charge (SOC) of a battery represents

- 1). Battery temperature
- 2). Remaining battery capacity

- 3). Battery voltage
- 4). Battery resistance

Correct Answer: **2). Remaining battery capacity**

Solution:

SOC indicates how much energy remains in the battery.

Ref: *Battery Management Systems – Gregory L. Plett*

192. The most suitable motor for electric traction is

- 1). DC shunt motor
- 2). DC series motor
- 3). Synchronous motor
- 4). Stepper motor

Correct Answer: **2). DC series motor**

Solution:

DC series motors produce **very high starting torque**.

Ref: *Utilization of Electrical Energy – H. Partab*

193. The load curve represents

- 1). Load vs time
- 2). Voltage vs time
- 3). Current vs time
- 4). Power factor vs time

Correct Answer: **1). Load vs time**

Solution:

Load curve shows variation of load during a time period.

Ref: *Principles of Power System – V.K. Mehta*

194. Corona loss in transmission lines is reduced by

- 1). Increasing conductor diameter
- 2). Increasing voltage

- 3). Decreasing spacing
- 4). Using smaller conductors

Correct Answer: **1). Increasing conductor diameter**

Solution:

Larger conductor radius reduces electric field intensity.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

195. The Ferranti effect occurs in

- 1). Short transmission lines
- 2). Medium transmission lines
- 3). Long transmission lines
- 4). Distribution systems

Correct Answer: **3). Long transmission lines**

Solution:

Receiving end voltage becomes higher than sending end voltage.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

196. The device used to protect power systems from lightning surges is

- 1). Fuse
- 2). Circuit breaker
- 3). Lightning arrester
- 4). Reactor

Correct Answer: **3). Lightning arrester**

Solution:

Lightning arresters protect equipment from high surge voltages.

Ref: *Power System Protection – Paithankar & Bhide*

197. The function of UPS is

- 1). Increase voltage
- 2). Store energy

- 3). Provide backup power supply
- 4). Convert AC to DC

Correct Answer: **3). Provide backup power supply**

Solution:

UPS ensures uninterrupted supply during power failure.

Ref: *Power Electronics – J.B. Gupta*

198. The logic family known for high speed operation is

- 1). TTL
- 2). CMOS
- 3). ECL
- 4). RTL

Correct Answer: **3). ECL**

Solution:

Emitter Coupled Logic provides very high switching speed.

Ref: *Modern Digital Electronics – R.P. Jain*

199. The device that converts mechanical energy into electrical energy is

- 1). Motor
- 2). Generator
- 3). Transformer
- 4). Rectifier

Correct Answer: **2). Generator**

Solution:

Generators convert mechanical energy into electrical energy.

Ref: *Electrical Machines – P.S. Bimbhra*

200. The major advantage of electric vehicles compared to IC engine vehicles is

- 1). Higher efficiency
- 2). Lower emissions

- 3). Lower noise
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

EVs provide environmental benefits and improved efficiency.

Ref: *Electric Vehicle Technology – A.K. Babu*

AP ECET 2026 EEE Expected Paper

101. A transmission line conductor has a span of 200 m between supports. If the conductor weight is 1 kg/m and the tension is 2000 kg, the sag at mid-span is

- 1). 1.0 m
- 2). 2.5 m
- 3). 5.0 m
- 4). 10 m

Correct Answer: **2). 2.5 m**

Solution:

Sag formula:

$$d = \frac{wL^2}{8T}$$

Where

$$w = 1 \text{ kg/m}$$

$$L = 200 \text{ m}$$

$$T = 2000 \text{ kg}$$

$$d = \frac{1 \times 200^2}{8 \times 2000}$$

$$d = \frac{40000}{16000}$$

$$d = 2.5 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

102. The Ferranti effect in transmission lines occurs mainly due to

- 1). Line resistance
- 2). Line inductance
- 3). Line capacitance
- 4). Skin effect

Correct Answer: **3). Line capacitance**

Solution:

Ferranti effect occurs in **long transmission lines** when charging current due to line capacitance raises receiving end voltage above sending end voltage.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

103. Corona loss in transmission lines can be reduced by

- 1). Increasing conductor spacing
- 2). Using larger conductor diameter
- 3). Reducing operating voltage
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Corona depends on electric field intensity. Increasing conductor diameter and spacing reduces field strength.

Ref: *Electrical Power Systems – C.L. Wadhwa*

104. The string efficiency of suspension insulators can be improved by

- 1). Using guard rings
- 2). Increasing conductor diameter
- 3). Decreasing line voltage
- 4). Increasing sag

Correct Answer: **1). Using guard rings**

Solution:

Guard rings equalize voltage distribution across insulator discs, improving string efficiency.

Ref: *Transmission and Distribution of Electrical Energy* – J.B. Gupta

105. In HVDC transmission, the main advantage compared to HVAC transmission is

- 1). Lower line losses
- 2). Higher corona losses
- 3). Higher reactive power
- 4). Lower transmission capacity

Correct Answer: **1). Lower line losses**

Solution:

HVDC transmission eliminates reactive power losses and skin effect.

Ref: *HVDC Power Transmission Systems* – K.R. Padiyar

POWER ELECTRONICS

106. In a single-phase half-wave controlled rectifier with input voltage $V_m = 100V$ and firing angle $\alpha = 60^\circ$, the average output voltage is

- 1). 13.8 V
- 2). 27.5 V
- 3). 41.3 V
- 4). 55 V

Correct Answer: **2). 27.5 V**

Solution:

Average output voltage:

$$V_{avg} = \frac{V_m}{2\pi} (1 + \cos \alpha)$$

$$V_{avg} = \frac{100}{2\pi} (1 + \cos 60)$$

$$V_{avg} = \frac{100}{6.28} (1 + 0.5)$$

$$V_{avg} = 27.5V$$

Ref: *Power Electronics – P.S. Bimbhra*

107. The device used for bidirectional AC power control is

- 1). SCR
- 2). DIAC
- 3). TRIAC
- 4). GTO

Correct Answer: **3). TRIAC**

Solution:

TRIAC conducts in both directions and is widely used in AC voltage controllers.

Ref: *Power Electronics – Muhammad H. Rashid*

108. In a DC chopper circuit, if input voltage is 200 V and duty cycle is 0.4, the output voltage is

- 1). 40 V
- 2). 80 V
- 3). 120 V
- 4). 200 V

Correct Answer: **2). 80 V**

Solution:

Chopper output voltage:

$$\begin{aligned}V_o &= DV_s \\V_o &= 0.4 \times 200 \\V_o &= 80V\end{aligned}$$

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

109. The SCR will turn OFF naturally in

- 1). DC circuits
- 2). AC circuits
- 3). Battery circuits
- 4). Chopper circuits

Correct Answer: **2). AC circuits**

Solution:

In AC circuits, current naturally reaches zero every cycle, turning OFF the SCR.

Ref: *Power Electronics – P.S. Bimbhra*

110. In a single-phase full-wave controlled rectifier, increasing firing angle results in

- 1). Increase in DC output voltage
- 2). Decrease in DC output voltage
- 3). No change in output voltage
- 4). Increase in frequency

Correct Answer: **2). Decrease in DC output voltage**

Solution:

Average DC output voltage:

$$V_{dc} = \frac{2V_m}{\pi} \cos \alpha$$

As firing angle increases, $\cos \alpha$ decreases $\rightarrow$ output voltage decreases.

Ref: *Power Electronics – Muhammad H. Rashid*

111. A transmission conductor has a span of 150 m between supports. If the conductor weight is 1.2 kg/m and the tension is 1800 kg, the sag is

- 1). 1.56 m
- 2). 2.34 m
- 3). 3.75 m
- 4). 4.50 m

Correct Answer: **2). 2.34 m**

Solution:

Sag formula

$$d = \frac{wL^2}{8T}$$

Given

$$w = 1.2 \text{ kg/m}$$

$$L = 150 \text{ m}$$

$$T = 1800 \text{ kg}$$

$$d = \frac{1.2 \times 150^2}{8 \times 1800}$$

$$d = \frac{1.2 \times 22500}{14400}$$

$$d = 2.34 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

112. The main cause of skin effect in transmission lines is

- 1). High resistance
- 2). Alternating current frequency
- 3). Temperature
- 4). Insulator leakage

Correct Answer: **2). Alternating current frequency**

Solution:

Skin effect occurs because alternating current tends to flow near the conductor surface due to changing magnetic fields.

Ref: *Electrical Power Systems – C.L. Wadhwa*

113. The critical disruptive voltage of a transmission line depends mainly on

- 1). Conductor radius
- 2). Spacing between conductors
- 3). Air density factor
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Corona inception voltage depends on conductor radius, spacing and atmospheric conditions.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

114. The method used to improve string efficiency of suspension insulators is

- 1). Increasing number of discs
- 2). Using guard rings
- 3). Decreasing conductor spacing
- 4). Reducing voltage

Correct Answer: **2). Using guard rings**

Solution:

Guard rings distribute voltage uniformly across insulator discs.

Ref: *Transmission and Distribution of Electrical Energy – J.B. Gupta*

115. In HVDC transmission, the major advantage compared to HVAC transmission is

- 1). Lower corona loss
- 2). No reactive power flow
- 3). Higher insulation requirement
- 4). Higher conductor losses

Correct Answer: **2). No reactive power flow**

Solution:

HVDC eliminates reactive power problems present in AC systems.

Ref: *HVDC Power Transmission Systems – K.R. Padiyar*

POWER ELECTRONICS

116. In a single-phase half-wave controlled rectifier, if $V_m = 200V$ and firing angle $\alpha = 60^\circ$, the average output voltage is

- 1). 31.8 V
- 2). 47.7 V

3). 63.7 V

4). 95.5 V

Correct Answer: **2). 47.7 V**

Solution:

Average output voltage

$$V_{avg} = \frac{V_m}{2\pi} (1 + \cos \alpha)$$

$$V_{avg} = \frac{200}{2\pi} (1 + \cos 60)$$

$$V_{avg} = \frac{200}{6.28} (1 + 0.5)$$

$$V_{avg} = 47.7V$$

Ref: *Power Electronics – P.S. Bimbhra*

117. The main advantage of IGBT over BJT is

- 1). Higher current rating
- 2). Voltage controlled operation
- 3). Higher switching losses
- 4). Higher base current

Correct Answer: **2). Voltage controlled operation**

Solution:

IGBT is voltage-controlled like MOSFET and requires very small gate current.

Ref: *Power Electronics – Muhammad H. Rashid*

118. In a DC chopper circuit, if the duty cycle is increased, the output voltage

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

Correct Answer: **2). Increases**

Solution:

$$V_o = D \times V_s$$

Increasing duty cycle increases output voltage.

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

119. The commutation technique used in AC circuits for SCR is

- 1). Forced commutation
- 2). Natural commutation
- 3). Resonant commutation
- 4). Complementary commutation

Correct Answer: **2). Natural commutation**

Solution:

In AC circuits current naturally reaches zero allowing SCR to turn OFF.

Ref: *Power Electronics – P.S. Bimbhra*

120. In a single-phase full-wave controlled rectifier with firing angle $\alpha = 90^\circ$, the average output voltage is

- 1). Maximum
- 2). Half of maximum
- 3). Zero
- 4). Negative

Correct Answer: **3). Zero**

Solution:

$$V_{dc} = \frac{2V_m}{\pi} \cos \alpha$$

For $\alpha = 90^\circ$

$$\cos 90^\circ = 0$$

$$V_{dc} = 0$$

Ref: *Power Electronics – Muhammad H. Rashid*

121. A conductor of span 250 m carries a weight of 0.9 kg/m. If the allowable tension is 3000 kg, the sag in the conductor is

- 1). 1.88 m
- 2). 2.34 m
- 3). 3.25 m
- 4). 4.50 m

Correct Answer: **2). 2.34 m**

Solution:

Sag formula

$$d = \frac{wL^2}{8T}$$

Given

$$w = 0.9 \text{ kg/m}$$

$$L = 250 \text{ m}$$

$$T = 3000 \text{ kg}$$

$$d = \frac{0.9 \times 250^2}{8 \times 3000}$$

$$d = \frac{0.9 \times 62500}{24000}$$

$$d = 2.34 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

122. The most economical spacing between conductors in a transmission line reduces

- 1). Inductance only
- 2). Capacitance only
- 3). Corona losses
- 4). Both inductance and capacitance

Correct Answer: **3). Corona losses**

Solution:

Increasing spacing reduces electric field intensity and therefore reduces corona losses.

Ref: *Electrical Power Systems – C.L. Wadhwa*

123. The voltage distribution across suspension insulators is

- 1). Uniform
- 2). Linear
- 3). Non-uniform
- 4). Sinusoidal

Correct Answer: **3). Non-uniform**

Solution:

Voltage distribution is non-uniform due to shunt capacitances between discs and tower.

Ref: *Transmission and Distribution of Electrical Energy – J.B. Gupta*

124. The main advantage of bundled conductors in transmission lines is

- 1). Increased resistance
- 2). Reduction of corona loss
- 3). Increased sag
- 4). Reduced voltage

Correct Answer: **2). Reduction of corona loss**

Solution:

Bundled conductors increase effective conductor diameter and reduce corona.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

125. The surge impedance loading (SIL) of a transmission line represents

- 1). Maximum load capacity
- 2). Natural loading of the line
- 3). Short circuit current
- 4). Transformer loading

Correct Answer: **2). Natural loading of the line**

Solution:

SIL represents power transmitted when reactive power generated equals reactive power consumed.

Ref: *Electrical Power Systems – C.L. Wadhwa*

POWER ELECTRONICS

126. In a single-phase half-wave controlled rectifier with $V_m = 150V$ and firing angle $\alpha = 60^\circ$, the average output voltage is

- 1). 17.9 V
- 2). 35.8 V
- 3). 53.7 V
- 4). 71.6 V

Correct Answer: **2). 35.8 V**

Solution:

Average output voltage

$$\begin{aligned}V_{avg} &= \frac{V_m}{2\pi} (1 + \cos \alpha) \\V_{avg} &= \frac{150}{6.28} (1 + 0.5) \\V_{avg} &= 35.8V\end{aligned}$$

Ref: *Power Electronics – P.S. Bimbhra*

127. The SCR will continue conducting even after gate signal is removed because of

- 1). High forward voltage
- 2). Latching property
- 3). Reverse bias
- 4). High temperature

Correct Answer: **2). Latching property**

Solution:

Once SCR is triggered, it remains ON until current falls below holding current.

Ref: *Power Electronics – Muhammad H. Rashid*

128. In a step-down DC chopper, if input voltage is 300 V and duty cycle is 0.25, the output voltage is

- 1). 50 V
- 2). 75 V
- 3). 100 V
- 4). 150 V

Correct Answer: **2). 75 V**

Solution:

$$\begin{aligned}V_o &= D \times V_s \\V_o &= 0.25 \times 300 \\V_o &= 75V\end{aligned}$$

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

129. In a single-phase full-wave controlled rectifier, the average output voltage is

- 1). $\frac{V_m}{\pi} (1 + \cos \alpha)$
- 2). $\frac{2V_m}{\pi} \cos \alpha$
- 3). $\frac{V_m}{2\pi} \cos \alpha$
- 4). $\frac{V_m}{\pi} \cos \alpha$

Correct Answer: **2). $\frac{2V_m}{\pi} \cos \alpha$**

Solution:

Average DC voltage of full-wave controlled rectifier:

$$V_{dc} = \frac{2V_m}{\pi} \cos \alpha$$

Ref: *Power Electronics – P.S. Bimbhra*

130. The device commonly used for triggering SCR circuits is

- 1). BJT
- 2). UJT

3). MOSFET

4). TRIAC

Correct Answer: **2). UJT**

Solution:

UJT relaxation oscillator produces gate pulses to trigger SCR.

Ref: *Power Electronics – Muhammad H. Rashid*

131. A transmission line conductor of span 300 m carries a weight of 1.5 kg/m. If the tension is 4000 kg, the sag at mid-span is

1). 3.38 m

2). 4.21 m

3). 5.12 m

4). 6.75 m

Correct Answer: **3). 5.12 m**

Solution:

Sag formula

$$d = \frac{wL^2}{8T}$$

Given

$$w = 1.5 \text{ kg/m}$$

$$L = 300 \text{ m}$$

$$T = 4000 \text{ kg}$$

$$d = \frac{1.5 \times 300^2}{8 \times 4000}$$

$$d = \frac{1.5 \times 90000}{32000}$$

$$d = 5.12 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

132. The inductance of a transmission line mainly depends on

- 1). Conductor spacing
- 2). Conductor radius
- 3). Magnetic permeability
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Inductance depends on spacing between conductors, conductor radius, and magnetic properties of surrounding medium.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

133. The Ferranti effect is more pronounced in

- 1). Short transmission lines
- 2). Medium transmission lines
- 3). Long transmission lines
- 4). Distribution feeders

Correct Answer: **3). Long transmission lines**

Solution:

Long transmission lines have significant capacitance causing voltage rise at receiving end.

Ref: *Electrical Power Systems – C.L. Wadhwa*

134. The efficiency of a string of suspension insulators is defined as

- 1). Ratio of maximum voltage to total voltage
- 2). Ratio of voltage across lowest disc to total voltage
- 3). Ratio of total string voltage to (number of discs $\times$ voltage across unit nearest conductor)
- 4). Ratio of line voltage to phase voltage

Correct Answer: **3). Ratio of total string voltage to (number of discs $\times$ voltage across unit nearest conductor)**

Solution:

String efficiency measures uniform voltage distribution across insulator discs.

Ref: *Transmission and Distribution of Electrical Energy* – J.B. Gupta

135. In HVDC transmission systems, the converter used at receiving end is

- 1). Rectifier
- 2). Inverter
- 3). Chopper
- 4). Cycloconverter

Correct Answer: **2). Inverter**

Solution:

HVDC transmission converts DC back to AC at receiving end using an inverter.

Ref: *HVDC Power Transmission Systems* – K.R. Padiyar

POWER ELECTRONICS

136. In a single-phase half-wave controlled rectifier with $V_m = 250V$ and firing angle $\alpha = 60^\circ$, the average output voltage is

- 1). 29.8 V
- 2). 59.7 V
- 3). 74.5 V
- 4). 89.6 V

Correct Answer: **2). 59.7 V**

Solution:

Average output voltage

$$V_{avg} = \frac{V_m}{2\pi} (1 + \cos \alpha)$$

$$V_{avg} = \frac{250}{6.28} (1 + 0.5)$$

$$V_{avg} = 59.7 \text{ V}$$

Ref: *Power Electronics* – P.S. Bimbhra

137. In an SCR, the minimum current required to keep the device conducting after gate signal removal is called

- 1). Trigger current
- 2). Holding current
- 3). Peak current
- 4). Gate current

Correct Answer: **2). Holding current**

Solution:

SCR continues conduction only if current remains above holding current.

Ref: *Power Electronics – Muhammad H. Rashid*

138. In a step-down chopper circuit with input voltage 400 V and duty cycle 0.3, the output voltage is

- 1). 80 V
- 2). 100 V
- 3). 120 V
- 4). 200 V

Correct Answer: **3). 120 V**

Solution:

$$\begin{aligned}V_o &= D \times V_s \\V_o &= 0.3 \times 400 \\V_o &= 120V\end{aligned}$$

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

139. The commutation technique used in DC choppers is

- 1). Natural commutation
- 2). Forced commutation
- 3). Load commutation
- 4). Line commutation

Correct Answer: **2). Forced commutation**

Solution:

Since DC circuits lack natural current zero crossing, forced commutation is used.

Ref: *Power Electronics – P.S. Bimbhra*

140. In a single-phase fully controlled bridge rectifier, if firing angle increases beyond 90°, the converter operates in

- 1). Rectification mode
- 2). Inversion mode
- 3). Amplification mode
- 4). Regulation mode

Correct Answer: **2). Inversion mode**

Solution:

When firing angle exceeds 90°, power flow reverses and the circuit acts as an inverter.

Ref: *Power Electronics – Muhammad H. Rashid*

141. A transmission conductor has a span of 200 m and weighs 1.2 kg/m. If the allowable tension is 2500 kg, the sag is

- 1). 2.40 m
- 2). 2.88 m
- 3). 3.50 m
- 4). 4.20 m

Correct Answer: **2). 2.88 m**

Solution:

Sag formula

$$d = \frac{wL^2}{8T}$$

$$w = 1.2 \text{ kg/m}$$

$$L = 200 \text{ m}$$

$$T = 2500 \text{ kg}$$

$$d = \frac{1.2 \times 200^2}{8 \times 2500}$$

$$d = \frac{1.2 \times 40000}{20000}$$

$$d = 2.88 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

142. The capacitance of a transmission line increases when

- 1). Conductor spacing increases
- 2). Conductor diameter decreases
- 3). Conductor spacing decreases
- 4). Conductor length decreases

Correct Answer: **3). Conductor spacing decreases**

Solution:

Capacitance is inversely proportional to spacing between conductors.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

143. The corona phenomenon in transmission lines results in

- 1). Power loss
- 2). Audible noise
- 3). Radio interference
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Corona causes power loss, audible noise and electromagnetic interference.

Ref: *Electrical Power Systems – C.L. Wadhwa*

144. The most common type of distribution system used in cities is

- 1). Radial system
- 2). Ring main system

- 3). Interconnected system
- 4). Loop system

Correct Answer: **2). Ring main system**

Solution:

Ring systems improve reliability and voltage regulation in urban networks.

Ref: *Transmission and Distribution of Electrical Energy – J.B. Gupta*

145. In HVDC transmission, the smoothing reactor is used to

- 1). Reduce harmonic currents
- 2). Limit fault current
- 3). Smooth DC current
- 4). Increase voltage

Correct Answer: **3). Smooth DC current**

Solution:

Smoothing reactors reduce ripple in DC transmission lines.

Ref: *HVDC Power Transmission Systems – K.R. Padiyar*

POWER ELECTRONICS

146. In a single-phase half-wave controlled rectifier with $V_m = 200V$ and firing angle $\alpha = 30^\circ$, the average output voltage is

- 1). 47.7 V
- 2). 63.7 V
- 3). 95.5 V
- 4). 110 V

Correct Answer: **3). 95.5 V**

Solution:

$$V_{avg} = \frac{V_m}{2\pi} (1 + \cos \alpha)$$

$$V_{avg} = \frac{200}{6.28} (1 + 0.866)$$

$$V_{avg} = 95.5V$$

Ref: *Power Electronics – P.S. Bimbhra*

147. The device used for high-power switching applications in modern converters is

- 1). SCR
- 2). MOSFET
- 3). IGBT
- 4). DIAC

Correct Answer: **3). IGBT**

Solution:

IGBT combines high current capability with voltage-controlled operation.

Ref: *Power Electronics – Muhammad H. Rashid*

148. In a step-down DC chopper, if the duty cycle is 0.6 and the input voltage is 300 V, the output voltage is

- 1). 120 V
- 2). 150 V
- 3). 180 V
- 4). 240 V

Correct Answer: **3). 180 V**

Solution:

$$V_o = D \times V_s$$

$$V_o = 0.6 \times 300$$

$$V_o = 180V$$

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

149. In an SCR circuit, the minimum gate current required to trigger the device is called

- 1). Holding current
- 2). Latching current
- 3). Gate trigger current
- 4). Peak current

Correct Answer: **3). Gate trigger current**

Solution:

Gate trigger current is the minimum gate current required to switch SCR ON.

Ref: *Power Electronics – P.S. Bimbhra*

150. In a single-phase full-wave controlled rectifier with $\alpha = 0^\circ$, the average DC output voltage is

- 1). Maximum positive
- 2). Zero
- 3). Negative
- 4). Half of maximum

Correct Answer: **1). Maximum positive**

Solution:

$$V_{dc} = \frac{2V_m}{\pi} \cos \alpha$$

For $\alpha = 0^\circ$

$$V_{dc} = \frac{2V_m}{\pi}$$

Maximum output voltage occurs.

Ref: *Power Electronics – Muhammad H. Rashid*

151. A conductor of span 250 m carries a weight of 1.1 kg/m. If the tension in the conductor is 3000 kg, the sag is

- 1). 2.86 m
- 2). 3.12 m

- 3). 3.58 m
- 4). 4.12 m

Correct Answer: **2). 3.12 m**

Solution:

Sag formula

$$d = \frac{wL^2}{8T}$$

$$w = 1.1 \text{ kg/m}$$

$$L = 250 \text{ m}$$

$$T = 3000 \text{ kg}$$

$$d = \frac{1.1 \times 250^2}{8 \times 3000}$$

$$d = \frac{1.1 \times 62500}{24000}$$

$$d = 3.12 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

152. The corona loss in transmission lines increases with

- 1). Increase in conductor diameter
- 2). Increase in operating voltage
- 3). Increase in conductor spacing
- 4). Increase in conductor radius

Correct Answer: **2). Increase in operating voltage**

Solution:

Corona occurs when electric field exceeds critical value. Higher voltage increases ionization of surrounding air.

Ref: *Electrical Power Systems – C.L. Wadhwa*

153. In a suspension insulator string, the disc nearest to the conductor experiences

- 1). Minimum voltage
- 2). Maximum voltage

- 3). Average voltage
- 4). Zero voltage

Correct Answer: **2). Maximum voltage**

Solution:

Due to shunt capacitances, voltage distribution across insulator discs is non-uniform.

Ref: *Transmission and Distribution of Electrical Energy – J.B. Gupta*

154. The Ferranti effect can be reduced by installing

- 1). Series capacitors
- 2). Shunt reactors
- 3). Step-up transformers
- 4). Circuit breakers

Correct Answer: **2). Shunt reactors**

Solution:

Shunt reactors absorb reactive power and reduce voltage rise in long transmission lines.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

155. The sag of a transmission line increases when

- 1). Tension increases
- 2). Span length decreases
- 3). Conductor weight increases
- 4). Conductor diameter decreases

Correct Answer: **3). Conductor weight increases**

Solution:

From sag formula

$$d = \frac{wL^2}{8T}$$

Sag is directly proportional to conductor weight.

Ref: *Principles of Power System – V.K. Mehta*

POWER ELECTRONICS

156. In a single-phase half-wave controlled rectifier with $V_m = 300V$ and firing angle $\alpha = 60^\circ$, the average output voltage is

- 1). 47.7 V
- 2). 71.6 V
- 3). 95.5 V
- 4). 143.2 V

Correct Answer: **2). 71.6 V**

Solution:

$$V_{avg} = \frac{V_m}{2\pi} (1 + \cos \alpha)$$

$$V_{avg} = \frac{300}{6.28} (1 + 0.5)$$

$$V_{avg} = 71.6V$$

Ref: *Power Electronics – P.S. Bimbhra*

157. The V-I characteristic of an SCR contains

- 1). Forward blocking region
- 2). Reverse blocking region
- 3). Conduction region
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

SCR characteristic curve has forward blocking, conduction and reverse blocking regions.

Ref: *Power Electronics – Muhammad H. Rashid*

158. The circuit shown below represents a single-phase fully controlled bridge rectifier. Identify the correct output waveform when firing angle increases.

- 1). Output voltage increases
- 2). Output voltage decreases

- 3). Output frequency doubles
- 4). Output becomes AC

Correct Answer: **2). Output voltage decreases**

Solution:

Average DC voltage

$$V_{dc} = \frac{2V_m}{\pi} \cos \alpha$$

As firing angle increases $\rightarrow \cos \alpha$ decreases $\rightarrow$ output voltage decreases.

Ref: *Power Electronics – P.S. Bimbhra*

159. The step-up DC chopper is also called

- 1). Buck converter
- 2). Boost converter
- 3). Buck-boost converter
- 4). Cycloconverter

Correct Answer: **2). Boost converter**

Solution:

Boost converter increases output voltage above input voltage.

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

160. In a single-phase inverter, the output waveform ideally is

- 1). Triangular wave
- 2). Square wave
- 3). Sawtooth wave
- 4). Sine wave

Correct Answer: **2). Square wave**

Solution:

Basic inverters produce square wave output which can later be filtered.

Ref: *Power Electronics – Muhammad H. Rashid*

161. A transmission line conductor has unequal supports with heights differing by 5 m and span length of 200 m. If the conductor weight is 1 kg/m and tension is 2500 kg, the sag at the lowest point is approximately

- 1). 1.8 m
- 2). 2.0 m
- 3). 2.5 m
- 4). 3.2 m

Correct Answer: 2). 2.0 m

Solution:

Basic sag formula

$$d = \frac{wL^2}{8T}$$

$$w = 1 \text{ kg/m}$$

$$L = 200 \text{ m}$$

$$T = 2500 \text{ kg}$$

$$d = \frac{1 \times 200^2}{8 \times 2500}$$

$$d = \frac{40000}{20000}$$

$$d = 2.0 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

162. The effect of temperature rise on sag of a transmission line conductor is

- 1). Sag decreases
- 2). Sag remains constant
- 3). Sag increases
- 4). Sag becomes zero

Correct Answer: 3). Sag increases

Solution:

Increase in temperature increases conductor length due to thermal expansion, thereby increasing sag.

Ref: *Electrical Power Systems – C.L. Wadhwa*

163. The most common conductor used in overhead transmission lines is

- 1). Copper
- 2). Aluminum
- 3). ACSR
- 4). Steel

Correct Answer: 3). ACSR

Solution:

ACSR (Aluminium Conductor Steel Reinforced) provides high tensile strength with good conductivity.

Ref: *Transmission and Distribution of Electrical Energy – J.B. Gupta*

164. In long transmission lines, the receiving end voltage may become greater than the sending end voltage due to

- 1). Corona effect
- 2). Ferranti effect
- 3). Skin effect
- 4). Proximity effect

Correct Answer: 2). Ferranti effect

Solution:

Ferranti effect occurs due to line capacitance producing reactive power.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

165. The corona loss mainly depends on

- 1). Line voltage
- 2). Conductor spacing
- 3). Atmospheric conditions
- 4). All of the above

Correct Answer: 4). All of the above

Solution:

Corona depends on voltage level, conductor spacing and atmospheric conditions.

Ref: *Electrical Power Systems – C.L. Wadhwa*

POWER ELECTRONICS

166. In a single-phase half-wave controlled rectifier with $V_m = 400V$ and firing angle $\alpha = 60^\circ$, the average output voltage is

- 1). 63.7 V
- 2). 95.5 V
- 3). 127.4 V
- 4). 190 V

Correct Answer: **2). 95.5 V**

Solution:

$$V_{avg} = \frac{V_m}{2\pi} (1 + \cos \alpha)$$

$$V_{avg} = \frac{400}{6.28} (1 + 0.5)$$

$$V_{avg} = 95.5V$$

Ref: *Power Electronics – P.S. Bimbhra*

167. The gate terminal in an SCR is used to

- 1). Turn OFF the device
- 2). Trigger the device
- 3). Increase voltage rating
- 4). Reduce current rating

Correct Answer: **2). Trigger the device**

Solution:

Gate current initiates conduction in the SCR.

Ref: *Power Electronics – Muhammad H. Rashid*

168. The circuit shown below represents a DC chopper feeding a DC motor load. Identify the correct relationship between duty cycle and output voltage.

- 1). $V_o = V_s/D$
- 2). $V_o = D \times V_s$

3). $V_o = V_s + D$

4). $V_o = V_s - D$

Correct Answer: **2).** $V_o = D \times V_s$

Solution:

For step-down chopper:

$$V_o = D \times V_s$$

where D is duty cycle.

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

169. The inverter used for variable speed AC motor drives is generally

- 1). Voltage source inverter
- 2). Current source inverter
- 3). Cycloconverter
- 4). Chopper

Correct Answer: **1).** **Voltage source inverter**

Solution:

Voltage source inverters are widely used in motor drives and V/f control.

Ref: *Power Electronics – Muhammad H. Rashid*

170. In a single-phase full bridge inverter, the output voltage waveform is

- 1). Square wave
- 2). Triangular wave
- 3). Sawtooth wave
- 4). DC waveform

Correct Answer: **1).** **Square wave**

Solution:

Basic inverter switching produces square wave AC output.

Ref: *Power Electronics – P.S. Bimbhra*

171. A transmission conductor has a span of 300 m and weight of 1.2 kg/m. If the tension is 3500 kg, the sag in the conductor is

- 1). 3.86 m
- 2). 4.12 m
- 3). 4.63 m
- 4). 5.25 m

Correct Answer: **3). 4.63 m**

Solution:

Sag formula

$$d = \frac{wL^2}{8T}$$

$$w = 1.2 \text{ kg/m}$$

$$L = 300 \text{ m}$$

$$T = 3500 \text{ kg}$$

$$d = \frac{1.2 \times 300^2}{8 \times 3500}$$

$$d = \frac{1.2 \times 90000}{28000}$$

$$d = 4.63 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

172. The sag of an overhead transmission line is inversely proportional to

- 1). Conductor weight
- 2). Span length
- 3). Tension in conductor
- 4). Conductor diameter

Correct Answer: **3). Tension in conductor**

Solution:

From sag formula

$$d = \frac{wL^2}{8T}$$

Sag decreases as tension increases.

Ref: *Electrical Power Systems – C.L. Wadhwa*

173. The phenomenon which increases the effective resistance of transmission line conductors at high frequency is

- 1). Corona effect
- 2). Skin effect
- 3). Ferranti effect
- 4). Proximity effect

Correct Answer: **2). Skin effect**

Solution:

Skin effect forces AC current to concentrate near conductor surface, increasing effective resistance.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

174. The voltage distribution across suspension insulator discs is

- 1). Uniform
- 2). Non-uniform
- 3). Linear
- 4). Exponential

Correct Answer: **2). Non-uniform**

Solution:

Due to shunt capacitances, the disc nearest the conductor experiences maximum voltage.

Ref: *Transmission and Distribution of Electrical Energy – J.B. Gupta*

175. Corona loss can be reduced by

- 1). Increasing conductor spacing
- 2). Increasing conductor diameter
- 3). Using bundled conductors
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Increasing conductor size and spacing reduces electric field intensity, thereby reducing corona.

Ref: *Electrical Power Systems – C.L. Wadhwa*

POWER ELECTRONICS

176. In a single-phase half-wave controlled rectifier with $V_m = 350V$ and firing angle $\alpha = 60^\circ$, the average output voltage is

- 1). 63.7 V
- 2). 83.6 V
- 3). 95.5 V
- 4). 104.5 V

Correct Answer: **2). 83.6 V**

Solution:

$$V_{avg} = \frac{V_m}{2\pi} (1 + \cos \alpha)$$

$$V_{avg} = \frac{350}{6.28} (1 + 0.5)$$

$$V_{avg} = 83.6V$$

Ref: *Power Electronics – P.S. Bimbhra*

177. The SCR turns OFF when the anode current becomes

- 1). Greater than gate current
- 2). Less than holding current

- 3). Greater than latching current
- 4). Equal to peak current

Correct Answer: **2). Less than holding current**

Solution:

SCR conduction stops when current falls below the holding current.

Ref: *Power Electronics – Muhammad H. Rashid*

178. The circuit shown below represents a single-phase inverter supplying an AC load. Identify the correct switching configuration.

- 1). Half-bridge inverter
- 2). Full-bridge inverter
- 3). Cycloconverter
- 4). AC voltage controller

Correct Answer: **2). Full-bridge inverter**

Solution:

Four switching devices arranged in H-bridge form a full-bridge inverter.

Ref: *Power Electronics – P.S. Bimbhra*

179. In a step-up DC chopper, if input voltage is 200 V and duty cycle is 0.5, the output voltage is

- 1). 200 V
- 2). 300 V
- 3). 400 V
- 4). 600 V

Correct Answer: **3). 400 V**

Solution:

Boost converter equation

$$V_o = \frac{V_s}{1 - D}$$

$$V_o = \frac{200}{1 - 0.5}$$

$$V_o = 400V$$

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

180. The AC voltage controller used in lamp dimmers and fan regulators is

- 1). SCR
- 2). TRIAC
- 3). MOSFET
- 4). IGBT

Correct Answer: **2). TRIAC**

Solution:

TRIAC can conduct in both directions and is widely used in AC voltage control circuits.

181. A transmission line conductor has a span of 250 m and weight of 1.3 kg/m. If the tension is 3200 kg, the sag is

- 1). 3.18 m
- 2). 3.96 m
- 3). 4.25 m
- 4). 4.87 m

Correct Answer: **3). 4.25 m**

Solution:

Sag formula

$$d = \frac{wL^2}{8T}$$

$$w = 1.3 \text{ kg/m}$$

$$L = 250 \text{ m}$$

$$T = 3200 \text{ kg}$$

$$d = \frac{1.3 \times 250^2}{8 \times 3200}$$

$$d = \frac{1.3 \times 62500}{25600}$$

$$d = 4.25 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

182. The sag of a transmission line increases with

- 1). Increase in conductor tension
- 2). Increase in span length
- 3). Decrease in conductor weight
- 4). Decrease in temperature

Correct Answer: **2). Increase in span length**

Solution:

From sag formula

$$d = \frac{wL^2}{8T}$$

Sag is proportional to the square of span length.

Ref: *Electrical Power Systems – C.L. Wadhwa*

183. The corona effect in transmission lines produces

- 1). Audible noise
- 2). Power loss
- 3). Radio interference
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Corona discharge causes energy loss, noise, and radio interference.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

184. The string efficiency of suspension insulators can be improved by

- 1). Increasing number of discs
- 2). Decreasing voltage

- 3). Using guard rings
- 4). Increasing sag

Correct Answer: **3). Using guard rings**

Solution:

Guard rings equalize voltage distribution across insulator discs.

Ref: *Transmission and Distribution of Electrical Energy – J.B. Gupta*

185. In HVDC transmission, the device used to convert AC into DC is

- 1). Inverter
- 2). Rectifier
- 3). Chopper
- 4). Cycloconverter

Correct Answer: **2). Rectifier**

Solution:

Rectifiers convert AC power into DC for transmission.

Ref: *HVDC Power Transmission Systems – K.R. Padiyar*

POWER ELECTRONICS

186. In a single-phase half-wave controlled rectifier with $V_m = 450V$ and firing angle $\alpha = 60^\circ$, the average output voltage is

- 1). 95.5 V
- 2). 107.4 V
- 3). 119.3 V
- 4). 134.5 V

Correct Answer: **2). 107.4 V**

Solution:

$$V_{avg} = \frac{V_m}{2\pi} (1 + \cos \alpha)$$

$$V_{avg} = \frac{450}{6.28} (1 + 0.5)$$

$$V_{avg} = 107.4V$$

Ref: *Power Electronics – P.S. Bimbhra*

187. The SCR remains in ON state after triggering due to

- 1). Latching current
- 2). Gate current
- 3). Forward voltage
- 4). Reverse bias

Correct Answer: **1). Latching current**

Solution:

Once SCR current exceeds latching current, the device remains ON even after gate signal removal.

Ref: *Power Electronics – Muhammad H. Rashid*

188. The circuit shown below represents a boost converter. Identify the output voltage relation.

- 1). $V_o = V_s D$
- 2). $V_o = V_s (1 - D)$
- 3). $V_o = \frac{V_s}{1-D}$
- 4). $V_o = \frac{V_s}{D}$

Correct Answer: **3).** $V_o = \frac{V_s}{1-D}$

Solution:

Boost converter equation

$$V_o = \frac{V_s}{1 - D}$$

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

189. The inverter used for converting DC power into AC power for motor drives is

- 1). Cycloconverter
- 2). Voltage source inverter
- 3). Rectifier
- 4). AC voltage controller

Correct Answer: **2). Voltage source inverter**

Solution:

Voltage source inverters are commonly used in adjustable speed drives.

Ref: *Power Electronics – Muhammad H. Rashid*

190. In a TRIAC phase control circuit, increasing firing angle will

- 1). Increase output voltage
- 2). Decrease output voltage
- 3). Increase frequency
- 4). Convert AC to DC

Correct Answer: **2). Decrease output voltage**

Solution:

Increasing firing angle delays conduction and reduces RMS output voltage.

Ref: *Power Electronics – P.S. Bimbhra*

191. A transmission line conductor has a span of 200 m and weighs 1.4 kg/m. If the tension is 2800 kg, the sag in the conductor is

- 1). 2.5 m
- 2). 3.0 m
- 3). 3.5 m
- 4). 4.0 m

Correct Answer: **2). 3.0 m**

Solution:

Sag formula

$$d = \frac{wL^2}{8T}$$

$$w = 1.4 \text{ kg/m}$$

$$L = 200 \text{ m}$$

$$T = 2800 \text{ kg}$$

$$d = \frac{1.4 \times 200^2}{8 \times 2800}$$

$$d = \frac{1.4 \times 40000}{22400}$$

$$d = 3.0 \text{ m}$$

Ref: *Principles of Power System – V.K. Mehta & Rohit Mehta*

192. In overhead transmission lines, sag decreases when

- 1). Span length increases
- 2). Conductor tension increases
- 3). Conductor weight increases
- 4). Temperature increases

Correct Answer: **2). Conductor tension increases**

Solution:

From sag relation

$$d = \frac{wL^2}{8T}$$

Sag is inversely proportional to conductor tension.

Ref: *Electrical Power Systems – C.L. Wadhwa*

193. The corona inception voltage depends mainly on

- 1). Conductor radius
- 2). Spacing between conductors
- 3). Atmospheric conditions
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Corona depends on electric field intensity which is influenced by conductor size, spacing and air density.

Ref: *Power System Engineering – D.P. Kothari & I.J. Nagrath*

194. The purpose of bundled conductors in extra high voltage transmission lines is to

- 1). Increase resistance
- 2). Reduce corona loss
- 3). Increase sag
- 4). Reduce line voltage

Correct Answer: **2). Reduce corona loss**

Solution:

Bundled conductors increase effective conductor diameter and reduce electric field intensity.

Ref: *Electrical Power Systems – C.L. Wadhwa*

195. In HVDC transmission systems, the converter station at the sending end acts as

- 1). Rectifier
- 2). Inverter
- 3). Chopper
- 4). Transformer

Correct Answer: **1). Rectifier**

Solution:

Sending end converts AC to DC using a rectifier for transmission.

Ref: *HVDC Power Transmission Systems – K.R. Padiyar*

POWER ELECTRONICS

196. In a single-phase half-wave controlled rectifier with $V_m = 500V$ and firing angle $\alpha = 60^\circ$, the average output voltage is

- 1). 95.5 V
- 2). 107.4 V

- 3). 119.4 V
- 4). 143.2 V

Correct Answer: **3). 119.4 V**

Solution:

$$V_{avg} = \frac{V_m}{2\pi} (1 + \cos \alpha)$$

$$V_{avg} = \frac{500}{6.28} (1 + 0.5)$$

$$V_{avg} = 119.4V$$

Ref: *Power Electronics – P.S. Bimbhra*

197. The minimum current required to keep an SCR conducting after triggering is called

- 1). Gate trigger current
- 2). Latching current
- 3). Holding current
- 4). Peak current

Correct Answer: **3). Holding current**

Solution:

SCR turns OFF when anode current falls below the holding current.

Ref: *Power Electronics – Muhammad H. Rashid*

198. The circuit shown below represents a single-phase AC voltage controller using TRIAC. Identify the effect of increasing firing angle on RMS output voltage.

- 1). RMS output voltage increases
- 2). RMS output voltage decreases
- 3). RMS output voltage remains constant
- 4). Output becomes DC

Correct Answer: **2). RMS output voltage decreases**

Solution:

Increasing firing angle delays conduction period, reducing RMS output voltage.

Ref: *Power Electronics – P.S. Bimbhra*

199. In a boost converter with input voltage 150 V and duty cycle 0.4, the output voltage is

- 1). 200 V
- 2). 225 V
- 3). 250 V
- 4). 300 V

Correct Answer: **3). 250 V**

Solution:

Boost converter equation

$$V_o = \frac{V_s}{1 - D}$$
$$V_o = \frac{150}{1 - 0.4}$$
$$V_o = 250V$$

Ref: *Power Electronics – M.D. Singh & K.B. Khanchandani*

200. The inverter used in modern electric vehicle motor drives is generally

- 1). Current source inverter
- 2). Voltage source inverter
- 3). Cycloconverter
- 4). AC voltage controller

Correct Answer: **2). Voltage source inverter**

Solution:

Voltage source inverters are widely used in EV motor drives due to efficient speed control.

Ref: *Power Electronics – Muhammad H. Rashid*

Most Repeated TOP 200 Previous Year Questions (PYQ)
For AP ECET – Electrical & Electronics Engineering

1. The current through a conductor is 5 A when the applied voltage is 10 V. The resistance of the conductor is

- 1). 1 Ω
- 2). 2 Ω
- 3). 5 Ω
- 4). 10 Ω

Correct Answer: **2). 2 Ω**

Solution:

Using Ohm's Law

$$R = \frac{V}{I}$$
$$R = \frac{10}{5} = 2\Omega$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

2. In a series RLC circuit at resonance, the impedance is

- 1). Zero
- 2). Maximum
- 3). Equal to resistance
- 4). Infinite

Correct Answer: **3). Equal to resistance**

Solution:

At resonance

$$X_L = X_C$$

Hence total impedance

$$Z = R$$

Ref: *Network Analysis – Van Valkenburg*

3. The power factor of a purely inductive circuit is

- 1). 1
- 2). 0
- 3). 0.5
- 4). 0.707

Correct Answer: **2). 0**

Solution:

In a purely inductive circuit current lags voltage by 90° , therefore power factor is zero.

Ref: *Electrical Technology – B.L. Theraja*

4. The device used to convert AC into DC is

- 1). Inverter
- 2). Rectifier
- 3). Chopper
- 4). Cycloconverter

Correct Answer: **2). Rectifier**

Solution:

Rectifier circuits convert alternating current into direct current.

Ref: *Electronic Devices and Circuits – Boylestad*

5. The synchronous speed of a 4-pole motor supplied with 50 Hz frequency is

- 1). 750 rpm
- 2). 1000 rpm
- 3). 1500 rpm
- 4). 3000 rpm

Correct Answer: **3). 1500 rpm**

Solution:

$$N_s = \frac{120f}{P}$$

$$N_s = \frac{120 \times 50}{4} = 1500 \text{ rpm}$$

Ref: *Electrical Machines – P.S. Bimbhra*

6. The universal gates are

- 1). AND and OR
- 2). NAND and NOR
- 3). XOR and XNOR
- 4). AND and NAND

Correct Answer: **2). NAND and NOR**

Solution:

Any logic circuit can be implemented using NAND or NOR gates.

Ref: *Digital Design – Morris Mano*

7. In a transformer, maximum efficiency occurs when

- 1). Copper loss = Iron loss
- 2). Copper loss > Iron loss
- 3). Iron loss > Copper loss
- 4). Copper loss = 0

Correct Answer: **1). Copper loss = Iron loss**

Solution:

Maximum efficiency condition

$$P_{cu} = P_{iron}$$

Ref: *Electric Machines – D.P. Kothari*

8. The binary equivalent of decimal number 15 is

- 1). 1010
- 2). 1111
- 3). 1001
- 4). 1101

Correct Answer: **2). 1111**

Solution:

$$15_{10} = 1111_2$$

Ref: *Modern Digital Electronics – R.P. Jain*

9. The device used for voltage regulation is

- 1). Zener diode
- 2). Photodiode
- 3). Tunnel diode
- 4). Varactor diode

Correct Answer: **1). Zener diode**

Solution:

Zener diode operates in breakdown region to maintain constant voltage.

Ref: *Electronic Devices – Boylestad*

10. The speed of an induction motor is always

- 1). Greater than synchronous speed
- 2). Equal to synchronous speed
- 3). Less than synchronous speed
- 4). Twice synchronous speed

Correct Answer: **3). Less than synchronous speed**

Solution:

Induction motor must operate with **slip**, hence rotor speed < synchronous speed.

Ref: *Electrical Machines – P.S. Bimbhra*

11. The protocol used for sending email is

- 1). HTTP
- 2). FTP
- 3). SMTP
- 4). TCP

Correct Answer: **3). SMTP**

Solution:

SMTP (Simple Mail Transfer Protocol) sends email messages.

Ref: *Data Communications – Forouzan*

12. The formula for sag of a transmission line conductor is

- 1). $d = \frac{wL}{T}$
- 2). $d = \frac{wL^2}{8T}$
- 3). $d = \frac{T}{wL}$
- 4). $d = \frac{L^2}{8T}$

Correct Answer: **2). $d = \frac{wL^2}{8T}$**

Solution:

Sag depends on weight of conductor, span length and tension.

Ref: *Principles of Power System – V.K. Mehta*

13. The power factor improvement device used in industries is

- 1). Transformer
- 2). Capacitor bank
- 3). Reactor
- 4). Alternator

Correct Answer: **2). Capacitor bank**

Solution:

Capacitors supply reactive power to improve power factor.

Ref: *Electrical Power Systems – C.L. Wadhwa*

14. In a DC motor, back EMF is

- 1). Opposite to applied voltage
- 2). Same as applied voltage
- 3). Equal to current
- 4). Independent of voltage

Correct Answer: **1). Opposite to applied voltage**

Solution:

Back EMF opposes applied voltage according to Lenz's law.

Ref: *Electrical Technology – B.L. Theraja*

15. The device used to trigger SCR is

- 1). BJT
- 2). UJT
- 3). MOSFET
- 4). TRIAC

Correct Answer: **2). UJT**

Solution:

UJT relaxation oscillator provides gate pulses to SCR.

Ref: *Power Electronics – P.S. Bimbhra*

16. The memory that retains data even when power is OFF is

- 1). RAM
- 2). ROM
- 3). Cache
- 4). Register

Correct Answer: **2). ROM**

Solution:

ROM is non-volatile memory.

Ref: *Digital Electronics – R.P. Jain*

17. The frequency of AC supply in India is

- 1). 40 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard power frequency in India is **50 Hz**.

Ref: *Electrical Technology – B.L. Theraja*

18. The process of converting DC into AC is

- 1). Rectification
- 2). Inversion
- 3). Modulation
- 4). Amplification

Correct Answer: **2). Inversion**

Solution:

Inverters convert DC power into AC power.

Ref: *Power Electronics – Muhammad H. Rashid*

19. The EV battery parameter indicating remaining battery capacity is

- 1). SOH
- 2). SOC
- 3). Voltage
- 4). Current

Correct Answer: **2). SOC**

Solution:

SOC (State of Charge) indicates remaining energy in battery.

Ref: *Battery Management Systems – Gregory Plett*

20. The most commonly used motor for electric traction is

- 1). DC shunt motor
- 2). DC series motor
- 3). Synchronous motor
- 4). Stepper motor

Correct Answer: **2). DC series motor**

Solution:

DC series motors provide very high starting torque.

Ref: *Utilization of Electrical Energy – H. Partab*

21. The current in a purely capacitive circuit leads the voltage by

- 1). 0°
- 2). 45°
- 3). 90°
- 4). 180°

Correct Answer: **3). 90°**

Solution:

In a purely capacitive circuit, current leads voltage by **90°** .

Ref: *Engineering Circuit Analysis – William H. Hayt*

22. Thevenin's theorem states that any linear network can be replaced by

- 1). Current source only
- 2). Voltage source only
- 3). Equivalent voltage source and series resistance
- 4). Equivalent current source and parallel resistance

Correct Answer: **3). Equivalent voltage source and series resistance**

Solution:

Thevenin equivalent circuit consists of **V_{th} and R_{th}** .

Ref: *Network Analysis – Van Valkenburg*

23. In Norton's theorem, the equivalent circuit consists of

- 1). Voltage source and series resistance
- 2). Current source and parallel resistance
- 3). Voltage source and parallel resistance
- 4). Current source and series resistance

Correct Answer: **2). Current source and parallel resistance**

Solution:

Norton equivalent circuit has **In in parallel with Rn.**

Ref: *Network Analysis – Van Valkenburg*

24. The power factor of a purely resistive circuit is

- 1). 0
- 2). 0.5
- 3). 1
- 4). 0.707

Correct Answer: **3). 1**

Solution:

In resistive circuits voltage and current are in phase.

Ref: *Electrical Technology – B.L. Theraja*

25. The torque developed in a DC motor is proportional to

- 1). Armature current
- 2). Magnetic flux
- 3). Product of flux and armature current
- 4). Voltage only

Correct Answer: **3). Product of flux and armature current**

Solution:

$$T \propto \phi I_a$$

Ref: *Electrical Machines – P.S. Bimbhra*

26. The synchronous speed of a 2-pole motor operating at 50 Hz is

- 1). 1500 rpm
- 2). 3000 rpm
- 3). 1000 rpm
- 4). 750 rpm

Correct Answer: **2). 3000 rpm**

Solution:

$$N_s = \frac{120f}{P}$$
$$N_s = \frac{120 \times 50}{2} = 3000 \text{ rpm}$$

Ref: *Electric Machines – D.P. Kothari*

27. The semiconductor device used for voltage regulation in power supplies is

- 1). Tunnel diode
- 2). Zener diode
- 3). Varactor diode
- 4). Photodiode

Correct Answer: **2). Zener diode**

Solution:

Zener diodes operate in breakdown region for constant voltage.

Ref: *Electronic Devices and Circuits – Boylestad*

28. The decimal equivalent of binary number 1010 is

- 1). 8
- 2). 9
- 3). 10
- 4). 12

Correct Answer: **3). 10**

Solution:

$$1010_2 = 10_{10}$$

Ref: *Modern Digital Electronics – R.P. Jain*

29. The SCR belongs to the family of

- 1). Bipolar devices
- 2). Thyristor devices
- 3). MOS devices
- 4). Logic devices

Correct Answer: **2). Thyristor devices**

Solution:

SCR is a member of the **thyristor family** used in power control.

Ref: *Power Electronics – P.S. Bimbhra*

30. The phenomenon in which receiving end voltage becomes greater than sending end voltage is

- 1). Skin effect
- 2). Ferranti effect
- 3). Corona effect
- 4). Proximity effect

Correct Answer: **2). Ferranti effect**

Solution:

Occurs in long transmission lines due to capacitance.

Ref: *Power System Engineering – Kothari & Nagrath*

31. The unit of inductance is

- 1). Farad
- 2). Henry
- 3). Ohm
- 4). Tesla

Correct Answer: **2). Henry**

Solution:

Inductance is measured in **Henry (H)**.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

32. The logic gate whose output is HIGH only when inputs are different is

- 1). AND
- 2). OR
- 3). XOR
- 4). NOR

Correct Answer: **3). XOR**

Solution:

Exclusive OR outputs HIGH when inputs differ.

Ref: *Digital Design – Morris Mano*

33. The device used to convert DC voltage to AC voltage is

- 1). Rectifier
- 2). Chopper
- 3). Inverter
- 4). Cycloconverter

Correct Answer: **3). Inverter**

Solution:

Inverters convert DC into AC.

Ref: *Power Electronics – Muhammad H. Rashid*

34. The internal RAM size of the Intel 8051 microcontroller is

- 1). 64 bytes
- 2). 128 bytes
- 3). 256 bytes
- 4). 512 bytes

Correct Answer: **2). 128 bytes**

Solution:

Standard 8051 contains **128 bytes internal RAM**.

Ref: *The 8051 Microcontroller – Mazidi*

35. The process of converting analog signals into digital signals is called

- 1). Modulation
- 2). Sampling
- 3). Quantization
- 4). Analog to Digital Conversion

Correct Answer: **4). Analog to Digital Conversion**

Solution:

ADC converts continuous analog signals into digital form.

Ref: *Digital Electronics – R.P. Jain*

36. The protocol used to transfer files over the internet is

- 1). HTTP
- 2). SMTP
- 3). FTP
- 4). TCP

Correct Answer: **3). FTP**

Solution:

FTP is used for file transfer.

Ref: *Data Communications – Forouzan*

37. The most commonly used conductor material for transmission lines is

- 1). Copper
- 2). Aluminum
- 3). ACSR
- 4). Steel

Correct Answer: **3). ACSR**

Solution:

ACSR provides high tensile strength and good conductivity.

Ref: *Electrical Power Systems – C.L. Wadhwa*

38. The duty cycle of a chopper is defined as

- 1). T/T_{on}
- 2). T_{on}/T
- 3). T_{off}/T
- 4). T/T_{off}

Correct Answer: **2).** T_{on}/T

Solution:

$$D = \frac{T_{on}}{T}$$

Ref: *Power Electronics – M.D. Singh*

39. The motor used in electric traction due to high starting torque is

- 1). DC shunt motor
- 2). DC series motor
- 3). Synchronous motor
- 4). Induction motor

Correct Answer: **2).** **DC series motor**

Solution:

DC series motor produces very high starting torque.

Ref: *Utilization of Electrical Energy – H. Partab*

40. The battery parameter representing battery health in EV systems is

- 1). SOC
- 2). SOH

- 3). Voltage
- 4). Current

Correct Answer: **2). SOH**

Solution:

SOH (State of Health) indicates battery degradation.

Ref: *Battery Management Systems – Gregory Plett*

41. Three resistors of 3 Ω , 4 Ω and 5 Ω are connected in series. The equivalent resistance is

- 1). 7 Ω
- 2). 12 Ω
- 3). 15 Ω
- 4). 60 Ω

Correct Answer: **2). 12 Ω**

Solution:

For series connection

$$R_{eq} = R_1 + R_2 + R_3$$
$$R_{eq} = 3 + 4 + 5 = 12\Omega$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

42. In a parallel circuit, the voltage across each branch is

- 1). Different
- 2). Same
- 3). Zero
- 4). Twice the supply

Correct Answer: **2). Same**

Solution:

All branches in parallel share the same voltage.

Ref: *Electrical Technology – B.L. Theraja*

43. The condition for resonance in an RLC circuit is

- 1). $X_L > X_C$
- 2). $X_C > X_L$
- 3). $X_L = X_C$
- 4). $X_L = R$

Correct Answer: **3).** $X_L = X_C$

Solution:

Resonance occurs when inductive reactance equals capacitive reactance.

Ref: *Network Analysis – Van Valkenburg*

44. The line voltage of a star connected three-phase system is

- 1). V_{ph}
- 2). $\sqrt{3}V_{ph}$
- 3). $3V_{ph}$
- 4). $V_{ph}/\sqrt{3}$

Correct Answer: **2).** $\sqrt{3}V_{ph}$

Solution:

$$V_L = \sqrt{3}V_{ph}$$

Ref: *Electrical Technology – B.L. Theraja*

45. The efficiency of a transformer depends mainly on

- 1). Copper losses
- 2). Iron losses
- 3). Load current
- 4). All of the above

Correct Answer: **4).** All of the above

Solution:

Efficiency depends on copper loss, iron loss and load conditions.

Ref: *Electric Machines – D.P. Kothari*

46. The slip of an induction motor is

- 1). $(N_r - N_s)/N_s$
- 2). $(N_s - N_r)/N_s$
- 3). $(N_s - N_r)/N_r$
- 4). N_r/N_s

Correct Answer: **2).** $(N_s - N_r)/N_s$

Solution:

$$s = \frac{N_s - N_r}{N_s}$$

Ref: *Electrical Machines – P.S. Bimbhra*

47. The main advantage of three-phase induction motors is

- 1). Simple construction
- 2). Low maintenance
- 3). High efficiency
- 4). All of the above

Correct Answer: **4).** All of the above

Solution:

Induction motors are simple, rugged and efficient.

Ref: *Electrical Machines – P.S. Bimbhra*

48. The binary equivalent of decimal number 8 is

- 1). 1000
- 2). 1010
- 3). 1110
- 4). 1100

Correct Answer: **1).** 1000

Solution:

$$8_{10} = 1000_2$$

Ref: *Modern Digital Electronics – R.P. Jain*

49. The logic gate whose output is LOW only when both inputs are HIGH is

- 1). NAND
- 2). NOR
- 3). AND
- 4). OR

Correct Answer: **1). NAND**

Solution:

NAND is the complement of AND gate.

Ref: *Digital Design – Morris Mano*

50. The SCR conducts when

- 1). Reverse voltage is applied
- 2). Gate signal is applied with forward bias
- 3). Gate current is zero
- 4). Only forward voltage is applied

Correct Answer: **2). Gate signal is applied with forward bias**

Solution:

SCR turns ON when forward biased and gate pulse is applied.

Ref: *Power Electronics – Muhammad H. Rashid*

51. The unit of capacitance is

- 1). Henry
- 2). Farad
- 3). Ohm
- 4). Coulomb

Correct Answer: **2). Farad**

Solution:

Capacitance is measured in **Farads (F)**.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

52. The speed control of a DC motor can be achieved by

- 1). Armature voltage control
- 2). Field control
- 3). Armature resistance control
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

All three methods are used for speed control.

Ref: *Electrical Machines – P.S. Bimbhra*

53. The device used to measure electrical energy is

- 1). Ammeter
- 2). Voltmeter
- 3). Energy meter
- 4). Wattmeter

Correct Answer: **3). Energy meter**

Solution:

Energy meter measures electrical energy consumption.

Ref: *Electrical Measurements – A.K. Sawhney*

54. The sampling theorem states that the sampling frequency must be

- 1). Equal to signal frequency
- 2). Greater than twice signal frequency
- 3). Less than signal frequency
- 4). Half of signal frequency

Correct Answer: **2). Greater than twice signal frequency**

Solution:

$$f_s \geq 2f_m$$

Ref: *Communication Systems – Simon Haykin*

55. The EV battery type most widely used today is

- 1). Lead acid
- 2). Nickel cadmium
- 3). Lithium-ion
- 4). Zinc air

Correct Answer: **3). Lithium-ion**

Solution:

Lithium-ion batteries provide high energy density.

Ref: *Electric Vehicle Technology – A.K. Babu*

56. The function of UPS is

- 1). Increase voltage
- 2). Store energy
- 3). Provide uninterrupted power supply
- 4). Convert AC to DC

Correct Answer: **3). Provide uninterrupted power supply**

Solution:

UPS supplies backup power during power failure.

Ref: *Power Electronics – J.B. Gupta*

57. The most commonly used logic family is

- 1). RTL
- 2). DTL
- 3). TTL
- 4). ECL

Correct Answer: **3). TTL**

Solution:

TTL is widely used due to good speed and reliability.

Ref: *Modern Digital Electronics – R.P. Jain*

58. The phenomenon responsible for power loss in transmission lines due to ionization of air is

- 1). Skin effect
- 2). Ferranti effect
- 3). Corona effect
- 4). Proximity effect

Correct Answer: **3). Corona effect**

Solution:

Corona occurs due to high electric field ionizing surrounding air.

Ref: *Electrical Power Systems – C.L. Wadhwa*

59. The DC chopper is used to

- 1). Convert AC to DC
- 2). Convert DC to AC
- 3). Convert fixed DC to variable DC
- 4). Convert AC to AC

Correct Answer: **3). Convert fixed DC to variable DC**

Solution:

Choppers control DC voltage level.

Ref: *Power Electronics – M.D. Singh*

60. The device used to protect power systems from lightning surges is

- 1). Fuse
- 2). Circuit breaker
- 3). Lightning arrester
- 4). Reactor

Correct Answer: **3). Lightning arrester**

Solution:

Lightning arresters divert surge currents safely to ground.

Ref: *Power System Protection – Paithankar & Bhide*

61. The equivalent resistance of two resistors 4 Ω and 6 Ω connected in parallel is

- 1). 2.4 Ω
- 2). 4 Ω
- 3). 5 Ω
- 4). 10 Ω

Correct Answer: **1). 2.4 Ω**

Solution:

$$\begin{aligned}\frac{1}{R} &= \frac{1}{R_1} + \frac{1}{R_2} \\ \frac{1}{R} &= \frac{1}{4} + \frac{1}{6} \\ \frac{1}{R} &= \frac{5}{12} \\ R &= 2.4\Omega\end{aligned}$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

62. The power consumed by a resistor of 10 Ω carrying a current of 2 A is

- 1). 10 W
- 2). 20 W
- 3). 40 W
- 4). 80 W

Correct Answer: **3). 40 W**

Solution:

$$\begin{aligned}P &= I^2 R \\ P &= 2^2 \times 10 \\ P &= 40W\end{aligned}$$

Ref: *Electrical Technology – B.L. Theraja*

63. The condition for maximum power transfer in DC circuits is

- 1). $R_L = R_S$
- 2). $R_L > R_S$
- 3). $R_L < R_S$
- 4). $R_L = 0$

Correct Answer: **1). $R_L = R_S$**

Solution:

Maximum power transfer occurs when load resistance equals source resistance.

Ref: *Network Analysis – Van Valkenburg*

64. The unit of magnetic flux is

- 1). Weber
- 2). Tesla
- 3). Henry
- 4). Ampere

Correct Answer: **1). Weber**

Solution:

Magnetic flux is measured in **Weber (Wb)**.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

65. The instrument used to measure electric power is

- 1). Ammeter
- 2). Voltmeter
- 3). Wattmeter
- 4). Energy meter

Correct Answer: **3). Wattmeter**

Solution:

Wattmeter measures electrical power.

Ref: *Electrical Measurements – A.K. Sawhney*

66. The EMF equation of a transformer is

- 1). $E = 2fN\phi$
- 2). $E = 4.44fN\phi_m$
- 3). $E = N\phi$
- 4). $E = fN^2$

Correct Answer: **2).** $E = 4.44fN\phi_m$

Solution:

$$E = 4.44fN\phi_m$$

Ref: *Electric Machines – D.P. Kothari*

67. The starting torque of an induction motor is

- 1). Zero
- 2). High
- 3). Infinite
- 4). Constant

Correct Answer: **2). High**

Solution:

Induction motors develop relatively high starting torque.

Ref: *Electrical Machines – P.S. Bimbhra*

68. The slip of an induction motor at synchronous speed is

- 1). 0
- 2). 1
- 3). 0.5
- 4). Infinite

Correct Answer: **1). 0**

Solution:

$$s = \frac{N_s - N_r}{N_s}$$

At synchronous speed

$$N_r = N_s$$
$$s = 0$$

Ref: *Electrical Machines – P.S. Bimbhra*

69. The output of NOR gate is

- 1). Complement of OR gate
- 2). Complement of AND gate
- 3). Same as OR gate
- 4). Same as AND gate

Correct Answer: **1). Complement of OR gate**

Solution:

NOR = NOT OR.

Ref: *Digital Design – Morris Mano*

70. The microcontroller widely used in embedded systems is

- 1). 8086
- 2). 8051
- 3). 8085
- 4). Z80

Correct Answer: **2). 8051**

Solution:

8051 microcontroller is widely used in embedded systems.

Ref: *The 8051 Microcontroller – Mazidi*

71. The device used for phase control of AC power is

- 1). SCR
- 2). TRIAC

- 3). MOSFET
- 4). BJT

Correct Answer: **2). TRIAC**

Solution:

TRIAC conducts in both directions and controls AC power.

Ref: *Power Electronics – Muhammad H. Rashid*

72. The synchronous speed of a 6-pole motor at 50 Hz is

- 1). 500 rpm
- 2). 750 rpm
- 3). 1000 rpm
- 4). 1500 rpm

Correct Answer: **3). 1000 rpm**

Solution:

$$N_s = \frac{120f}{P}$$

$$N_s = \frac{120 \times 50}{6} = 1000rpm$$

Ref: *Electrical Machines – P.S. Bimbhra*

73. The decimal equivalent of binary number 1101 is

- 1). 11
- 2). 12
- 3). 13
- 4). 14

Correct Answer: **3). 13**

Solution:

$$1101_2 = 13_{10}$$

Ref: *Modern Digital Electronics – R.P. Jain*

74. The type of battery commonly used in automobiles is

- 1). Lead acid battery
- 2). Lithium battery
- 3). Nickel cadmium battery
- 4). Zinc air battery

Correct Answer: **1). Lead acid battery**

Solution:

Lead acid batteries are widely used in vehicles.

Ref: *Electric Vehicle Technology – A.K. Babu*

75. The transmission line phenomenon which increases resistance at high frequency is

- 1). Ferranti effect
- 2). Skin effect
- 3). Corona effect
- 4). Proximity effect

Correct Answer: **2). Skin effect**

Solution:

AC current tends to flow near conductor surface increasing effective resistance.

Ref: *Electrical Power Systems – C.L. Wadhwa*

76. The formula for electrical energy is

- 1). $E = VI$
- 2). $E = VIt$
- 3). $E = I^2R$
- 4). $E = V^2R$

Correct Answer: **2). $E = VIt$**

Solution:

Energy equals power multiplied by time.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

77. The device used to protect electrical circuits from overload is

- 1). Relay
- 2). Fuse
- 3). Transformer
- 4). Capacitor

Correct Answer: **2). Fuse**

Solution:

Fuse melts when current exceeds rated value.

Ref: *Power System Protection – Paithankar & Bhide*

78. The inverter converts

- 1). AC to DC
- 2). DC to AC
- 3). AC to AC
- 4). DC to DC

Correct Answer: **2). DC to AC**

Solution:

Inverters convert DC power into AC power.

Ref: *Power Electronics – Muhammad H. Rashid*

79. The most common type of transmission line conductor is

- 1). Copper
- 2). Aluminum
- 3). ACSR
- 4). Steel

Correct Answer: **3). ACSR**

Solution:

ACSR provides strength and good conductivity.

Ref: *Electrical Power Systems – C.L. Wadhwa*

80. The parameter representing remaining battery capacity is

- 1). SOH
- 2). SOC
- 3). Voltage
- 4). Current

Correct Answer: **2). SOC**

Solution:

SOC (State of Charge) indicates remaining battery energy.

Ref: *Battery Management Systems – Gregory Plett*

81. In a balanced three-phase system, the total power is

- 1). $P = VI$
- 2). $P = 3VI$
- 3). $P = \sqrt{3}V_L I_L \cos \phi$
- 4). $P = V_L I_L$

Correct Answer: **3). $P = \sqrt{3}V_L I_L \cos \phi$**

Solution:

Total three-phase power

$$P = \sqrt{3}V_L I_L \cos \phi$$

Ref: *Electrical Technology – B.L. Theraja*

82. The unit of electrical energy is

- 1). Joule
- 2). Watt

- 3). kWh
- 4). Volt

Correct Answer: **3). kWh**

Solution:

Electrical energy consumption is measured in **kilowatt-hour (kWh)**.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

83. The ratio of secondary voltage to primary voltage in a transformer is called

- 1). Efficiency
- 2). Voltage ratio
- 3). Transformation ratio
- 4). Power factor

Correct Answer: **3). Transformation ratio**

Solution:

$$k = \frac{V_2}{V_1}$$

Ref: *Electric Machines – D.P. Kothari*

84. The rotor of a squirrel cage induction motor is made of

- 1). Copper bars
- 2). Aluminum bars
- 3). Laminated steel
- 4). Carbon rods

Correct Answer: **2). Aluminum bars**

Solution:

Squirrel cage rotors are usually made using **aluminum bars** short-circuited by end rings.

Ref: *Electrical Machines – P.S. Bimbhra*

85. The logic expression for NAND gate output is

- 1). $A + B$
- 2). AB
- 3). $(AB)'$
- 4). $A'B'$

Correct Answer: **3).** $(AB)'$

Solution:

NAND = NOT AND.

Ref: *Digital Design – Morris Mano*

86. The device used to convert AC power into DC power is

- 1). Inverter
- 2). Rectifier
- 3). Chopper
- 4). Cycloconverter

Correct Answer: **2).** Rectifier

Solution:

Rectifiers convert alternating current to direct current.

Ref: *Electronic Devices and Circuits – Boylestad*

87. The slip of an induction motor at starting is

- 1). 0
- 2). 1
- 3). 0.5
- 4). Infinite

Correct Answer: **2).** 1

Solution:

$$s = \frac{N_s - N_r}{N_s}$$

At starting

$$\begin{aligned} N_r &= 0 \\ s &= 1 \end{aligned}$$

Ref: *Electrical Machines – P.S. Bimbhra*

88. The logic gate used for parity checking is

- 1). AND
- 2). XOR
- 3). OR
- 4). NAND

Correct Answer: **2). XOR**

Solution:

XOR gate outputs HIGH when inputs differ.

Ref: *Modern Digital Electronics – R.P. Jain*

89. The speed of an induction motor depends mainly on

- 1). Supply frequency
- 2). Number of poles
- 3). Slip
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

$$N = N_s(1 - s)$$

Ref: *Electrical Machines – P.S. Bimbhra*

90. The phenomenon of voltage rise at the receiving end of a long transmission line is

- 1). Corona effect
- 2). Ferranti effect
- 3). Skin effect
- 4). Proximity effect

Correct Answer: **2). Ferranti effect**

Solution:

Occurs due to line capacitance.

Ref: *Electrical Power Systems – C.L. Wadhwa*

91. The function of a circuit breaker is to

- 1). Measure voltage
- 2). Interrupt fault current
- 3). Increase voltage
- 4). Store energy

Correct Answer: **2). Interrupt fault current**

Solution:

Circuit breakers isolate faulty sections of power system.

Ref: *Power System Protection – Paithankar & Bhide*

92. The memory used to store program permanently in microcontrollers is

- 1). RAM
- 2). ROM
- 3). Cache
- 4). Register

Correct Answer: **2). ROM**

Solution:

ROM is non-volatile memory used for program storage.

Ref: *The 8051 Microcontroller – Mazidi*

93. The DC motor used where constant speed is required is

- 1). DC series motor
- 2). DC shunt motor
- 3). Universal motor
- 4). Stepper motor

Correct Answer: **2). DC shunt motor**

Solution:

DC shunt motors maintain nearly constant speed.

Ref: *Electrical Machines – P.S. Bimbhra*

94. The device used to convert DC voltage into variable DC voltage is

- 1). Rectifier
- 2). Chopper
- 3). Inverter
- 4). Cycloconverter

Correct Answer: **2). Chopper**

Solution:

DC chopper controls DC voltage level.

Ref: *Power Electronics – M.D. Singh*

95. The EV battery management system monitors

- 1). Battery voltage
- 2). Battery current
- 3). Battery temperature
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

BMS ensures safe operation by monitoring multiple battery parameters.

Ref: *Battery Management Systems – Gregory Plett*

96. The most commonly used logic gate is

- 1). AND
- 2). OR
- 3). NAND
- 4). NOR

Correct Answer: **3). NAND**

Solution:

NAND gates are widely used because they are universal gates.

Ref: *Digital Design – Morris Mano*

97. The frequency of power supply in India is

- 1). 25 Hz
- 2). 50 Hz
- 3). 60 Hz
- 4). 100 Hz

Correct Answer: **2). 50 Hz**

Solution:

Standard supply frequency in India is **50 Hz**.

Ref: *Electrical Technology – B.L. Theraja*

98. The device used for speed control of DC motors in modern drives is

- 1). Transformer
- 2). Chopper
- 3). Reactor
- 4). Capacitor

Correct Answer: **2). Chopper**

Solution:

Chopper drives provide efficient DC motor speed control.

Ref: *Power Electronics – Muhammad H. Rashid*

99. The transmission line loss caused by ionization of surrounding air is

- 1). Ferranti loss
- 2). Corona loss
- 3). Copper loss
- 4). Dielectric loss

Correct Answer: **2). Corona loss**

Solution:

Corona discharge results in power loss and radio interference.

Ref: *Electrical Power Systems – C.L. Wadhwa*

100. The electric vehicle motor most commonly used today is

- 1). DC series motor
- 2). Induction motor
- 3). BLDC motor
- 4). Universal motor

Correct Answer: **3). BLDC motor**

Solution:

BLDC motors provide high efficiency and low maintenance in EVs.

Ref: *Electric Vehicle Technology – A.K. Babu*

101. In a balanced star-connected three-phase system, the line current is

- 1). Equal to phase current
- 2). $\sqrt{3}$ times phase current
- 3). Three times phase current
- 4). Half of phase current

Correct Answer: **1). Equal to phase current**

Solution:

In star connection

$$I_L = I_{ph}$$

Ref: *Electrical Technology – B.L. Theraja*

102. The inductive reactance of a coil is given by

- 1). $X_L = 2\pi fL$
- 2). $X_L = 1/(2\pi fL)$

- 3). $X_L = fL$
 4). $X_L = L/f$

Correct Answer: **1).** $X_L = 2\pi fL$

Solution:

Inductive reactance depends on frequency and inductance.

Ref: *Engineering Circuit Analysis – William H. Hayt*

103. The capacitive reactance is

- 1). $2\pi fC$
 2). $1/(2\pi fC)$
 3). fC
 4). C/f

Correct Answer: **2).** $1/(2\pi fC)$

Solution:

$$X_c = \frac{1}{2\pi fC}$$

Ref: *Network Analysis – Van Valkenburg*

104. The instrument used to measure insulation resistance is

- 1). Ammeter
 2). Megger
 3). Wattmeter
 4). Voltmeter

Correct Answer: **2).** **Megger**

Solution:

Megger measures insulation resistance of cables and equipment.

Ref: *Electrical Measurements – A.K. Sawhney*

105. The torque in an induction motor becomes maximum when

- 1). Rotor resistance = rotor reactance
- 2). Rotor resistance = stator resistance
- 3). Rotor resistance = 0
- 4). Rotor reactance = 0

Correct Answer: **1). Rotor resistance = rotor reactance**

Solution:

Condition for maximum torque:

$$R_2 = X_2$$

Ref: *Electrical Machines – P.S. Bimbhra*

106. The device used for amplification in electronic circuits is

- 1). Diode
- 2). Transistor
- 3). Capacitor
- 4). Inductor

Correct Answer: **2). Transistor**

Solution:

Transistors amplify electrical signals.

Ref: *Electronic Devices – Boylestad*

107. The basic memory element in sequential circuits is

- 1). Flip-flop
- 2). Gate
- 3). Register
- 4). Multiplexer

Correct Answer: **1). Flip-flop**

Solution:

Flip-flops store binary information.

Ref: *Digital Design – Morris Mano*

108. The speed of a synchronous motor is

- 1). Less than synchronous speed
- 2). Equal to synchronous speed
- 3). Greater than synchronous speed
- 4). Variable

Correct Answer: **2). Equal to synchronous speed**

Solution:

Synchronous motors run exactly at synchronous speed.

Ref: *Electric Machines – D.P. Kothari*

109. The main purpose of earthing in electrical systems is

- 1). Reduce voltage
- 2). Protect equipment and humans
- 3). Increase current
- 4). Increase power factor

Correct Answer: **2). Protect equipment and humans**

Solution:

Earthing provides safe path for fault currents.

Ref: *Electrical Power Systems – C.L. Wadhwa*

110. The most common communication modulation technique used in radio broadcasting is

- 1). FM
- 2). AM
- 3). PCM
- 4). PWM

Correct Answer: **2). AM**

Solution:

AM modulation is widely used in medium wave broadcasting.

Ref: *Communication Systems – Simon Haykin*

111. The formula for electrical power is

- 1). $P = VI$
- 2). $P = I^2R$
- 3). $P = V^2/R$
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

All formulas represent power depending on known quantities.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

112. The device used to convert AC to AC with variable frequency is

- 1). Rectifier
- 2). Inverter
- 3). Cycloconverter
- 4). Chopper

Correct Answer: **3). Cycloconverter**

Solution:

Cycloconverters convert AC to AC directly with frequency change.

Ref: *Power Electronics – Muhammad H. Rashid*

113. The microcontroller addressing mode used in instruction MOV A,#25H is

- 1). Register addressing
- 2). Immediate addressing
- 3). Direct addressing
- 4). Indirect addressing

Correct Answer: **2). Immediate addressing**

Solution:

Immediate addressing uses constant data.

Ref: *The 8051 Microcontroller – Mazidi*

114. The unit of electric charge is

- 1). Volt
- 2). Coulomb
- 3). Watt
- 4). Joule

Correct Answer: **2). Coulomb**

Solution:

Electric charge is measured in Coulombs.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

115. The device used for overcurrent protection is

- 1). Fuse
- 2). Transformer
- 3). Capacitor
- 4). Reactor

Correct Answer: **1). Fuse**

Solution:

Fuse melts when current exceeds safe value.

Ref: *Power System Protection – Paithankar & Bhide*

116. The device used to measure frequency is

- 1). Wattmeter
- 2). Frequency meter
- 3). Ammeter
- 4). Voltmeter

Correct Answer: **2). Frequency meter**

Solution:

Frequency meters measure supply frequency.

Ref: *Electrical Measurements – A.K. Sawhney*

117. The motor used in robotics and printers is

- 1). Universal motor
- 2). Stepper motor
- 3). DC shunt motor
- 4). Induction motor

Correct Answer: **2). Stepper motor**

Solution:

Stepper motors provide precise position control.

Ref: *Special Electrical Machines – Janardhanan*

118. The EV parameter representing battery health is

- 1). SOC
- 2). SOH
- 3). Voltage
- 4). Current

Correct Answer: **2). SOH**

Solution:

SOH indicates battery aging and capacity degradation.

Ref: *Battery Management Systems – Gregory Plett*

119. The phenomenon in which AC current flows near the surface of conductor is

- 1). Corona effect
- 2). Skin effect
- 3). Ferranti effect
- 4). Proximity effect

Correct Answer: **2). Skin effect**

Solution:

Skin effect increases conductor resistance at high frequency.

Ref: *Electrical Power Systems – C.L. Wadhwa*

120. The device used to convert electrical energy into mechanical energy is

- 1). Generator
- 2). Motor
- 3). Transformer
- 4). Rectifier

Correct Answer: **2). Motor**

Solution:

Electric motors convert electrical energy to mechanical motion.

Ref: *Electrical Machines – P.S. Bimbhra*

121. In a balanced delta-connected three-phase system, the line voltage is

- 1). Equal to phase voltage
- 2). $\sqrt{3}$ times phase voltage
- 3). Three times phase voltage
- 4). Half of phase voltage

Correct Answer: **1). Equal to phase voltage**

Solution:

In delta connection

$$V_L = V_{ph}$$

Ref: *Electrical Technology – B.L. Theraja*

122. The power factor of a purely capacitive circuit is

- 1). 1
- 2). 0
- 3). Leading
- 4). Lagging

Correct Answer: **3). Leading**

Solution:

In capacitive circuits current leads voltage.

Ref: *Engineering Circuit Analysis – William H. Hayt*

123. The formula for synchronous speed of a motor is

- 1). $N_s = 60f/P$
- 2). $N_s = 120f/P$
- 3). $N_s = 120P/f$
- 4). $N_s = f/P$

Correct Answer: **2).** $N_s = 120f/P$

Solution:

$$N_s = \frac{120f}{P}$$

Ref: *Electrical Machines – P.S. Bimbhra*

124. The most efficient transformer operates at

- 1). No load
- 2). Full load
- 3). When copper loss equals iron loss
- 4). Half load

Correct Answer: **3).** When copper loss equals iron loss

Solution:

Maximum efficiency condition

$$P_{cu} = P_{iron}$$

Ref: *Electric Machines – D.P. Kothari*

125. The basic building block of digital circuits is

- 1). Amplifier
- 2). Logic gate
- 3). Transistor
- 4). Rectifier

Correct Answer: **2). Logic gate**

Solution:

Logic gates perform basic digital operations.

Ref: *Digital Design – Morris Mano*

126. The process of converting analog signals to digital signals involves

- 1). Sampling
- 2). Quantization
- 3). Encoding
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

ADC involves sampling, quantization and encoding.

Ref: *Communication Systems – Simon Haykin*

127. The most common type of protection used in transformers is

- 1). Overcurrent protection
- 2). Differential protection
- 3). Distance protection
- 4). Thermal protection

Correct Answer: **2). Differential protection**

Solution:

Differential protection detects internal faults in transformers.

Ref: *Power System Protection – Paithankar & Bhide*

128. The device used to convert DC voltage to AC voltage is

- 1). Rectifier
- 2). Inverter

- 3). Chopper
- 4). Cycloconverter

Correct Answer: **2). Inverter**

Solution:

Inverters convert DC power into AC power.

Ref: *Power Electronics – Muhammad H. Rashid*

129. The memory element used in sequential circuits is

- 1). Flip-flop
- 2). Gate
- 3). Multiplexer
- 4). Decoder

Correct Answer: **1). Flip-flop**

Solution:

Flip-flops store binary data.

Ref: *Modern Digital Electronics – R.P. Jain*

130. The phenomenon responsible for voltage rise in long transmission lines is

- 1). Corona effect
- 2). Ferranti effect
- 3). Skin effect
- 4). Proximity effect

Correct Answer: **2). Ferranti effect**

Solution:

Occurs due to capacitive charging current.

Ref: *Electrical Power Systems – C.L. Wadhwa*

131. The torque developed in a DC motor is proportional to

- 1). Armature voltage
- 2). Armature current

- 3). Flux $\times$ Armature current
- 4). Speed

Correct Answer: **3). Flux $\times$ Armature current**

Solution:

$$T \propto \phi I_a$$

Ref: *Electrical Machines – P.S. Bimbhra*

132. The device used to measure insulation resistance is

- 1). Megger
- 2). Ammeter
- 3). Voltmeter
- 4). Wattmeter

Correct Answer: **1). Megger**

Solution:

Megger measures insulation resistance of electrical equipment.

Ref: *Electrical Measurements – A.K. Sawhney*

133. The frequency range used for FM broadcasting is

- 1). 88–108 MHz
- 2). 540–1600 kHz
- 3). 3–30 MHz
- 4). 1–10 MHz

Correct Answer: **1). 88–108 MHz**

Solution:

FM radio broadcasting operates in this VHF range.

Ref: *Communication Systems – Simon Haykin*

134. The EV battery charging method widely used in fast charging is

- 1). Constant current charging
- 2). Constant voltage charging

- 3). CC-CV charging
- 4). Pulse charging

Correct Answer: **3). CC-CV charging**

Solution:

Fast charging uses constant current followed by constant voltage.

Ref: *Battery Management Systems – Gregory Plett*

135. The device used for phase control in AC circuits is

- 1). TRIAC
- 2). BJT
- 3). MOSFET
- 4). Diode

Correct Answer: **1). TRIAC**

Solution:

TRIAC allows bidirectional AC power control.

Ref: *Power Electronics – P.S. Bimbhra*

136. The synchronous motor operates at

- 1). Slip speed
- 2). Variable speed
- 3). Constant synchronous speed
- 4). Half synchronous speed

Correct Answer: **3). Constant synchronous speed**

Solution:

Rotor locks with rotating magnetic field.

Ref: *Electric Machines – D.P. Kothari*

137. The binary number system uses

- 1). 2 symbols
- 2). 8 symbols

- 3). 10 symbols
- 4). 16 symbols

Correct Answer: **1). 2 symbols**

Solution:

Binary system uses **0 and 1**.

Ref: *Modern Digital Electronics – R.P. Jain*

138. The device used for DC motor speed control in electric vehicles is

- 1). Transformer
- 2). Chopper
- 3). Reactor
- 4). Capacitor

Correct Answer: **2). Chopper**

Solution:

Chopper drives provide efficient DC motor control.

Ref: *Power Electronics – Muhammad H. Rashid*

139. The corona effect in transmission lines results in

- 1). Power loss
- 2). Noise
- 3). Radio interference
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Corona discharge causes energy loss and interference.

Ref: *Electrical Power Systems – C.L. Wadhwa*

140. The most commonly used electric vehicle motor today is

- 1). DC series motor
- 2). Induction motor

- 3). BLDC motor
- 4). Universal motor

Correct Answer: **3). BLDC motor**

Solution:

BLDC motors provide high efficiency and reliability.

Ref: *Electric Vehicle Technology – A.K. Babu*

141. The equivalent resistance of two resistors 6 Ω and 3 Ω connected in parallel is

- 1). 1 Ω
- 2). 2 Ω
- 3). 3 Ω
- 4). 9 Ω

Correct Answer: **2). 2 Ω**

Solution:

$$\begin{aligned}\frac{1}{R} &= \frac{1}{6} + \frac{1}{3} \\ \frac{1}{R} &= \frac{3}{6} \\ R &= 2\Omega\end{aligned}$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

142. In a three-phase system, the relation between line current and phase current in delta connection is

- 1). $I_L = I_{ph}$
- 2). $I_L = \sqrt{3}I_{ph}$
- 3). $I_L = 3I_{ph}$
- 4). $I_L = I_{ph}/\sqrt{3}$

Correct Answer: **2). $I_L = \sqrt{3}I_{ph}$**

Solution:

$$I_L = \sqrt{3}I_{ph}$$

Ref: *Electrical Technology – B.L. Theraja*

143. The device used to measure electrical frequency is

- 1). Wattmeter
- 2). Frequency meter
- 3). Voltmeter
- 4). Ammeter

Correct Answer: **2). Frequency meter**

Solution:

Frequency meters measure the frequency of AC supply.

Ref: *Electrical Measurements – A.K. Sawhney*

144. The speed of an induction motor is given by

- 1). $N = N_s$
- 2). $N = N_s(1 - s)$
- 3). $N = sN_s$
- 4). $N = N_s + s$

Correct Answer: **2). $N = N_s(1 - s)$**

Solution:

$$N = N_s(1 - s)$$

Ref: *Electrical Machines – P.S. Bimbhra*

145. The semiconductor device used for high power rectification is

- 1). Diode
- 2). Transistor
- 3). SCR
- 4). MOSFET

Correct Answer: **3). SCR**

Solution:

SCR is widely used in controlled rectifiers.

Ref: *Power Electronics – Muhammad H. Rashid*

146. The unit of electric power is

- 1). Joule
- 2). Watt
- 3). Coulomb
- 4). Tesla

Correct Answer: **2). Watt**

Solution:

$$P = VI$$

Unit of power is **Watt**.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

147. The synchronous speed of a 8-pole motor supplied at 50 Hz is

- 1). 500 rpm
- 2). 750 rpm
- 3). 1000 rpm
- 4). 1500 rpm

Correct Answer: **2). 750 rpm**

Solution:

$$N_s = \frac{120f}{P}$$

$$N_s = \frac{120 \times 50}{8} = 750rpm$$

Ref: *Electrical Machines – P.S. Bimbhra*

148. The output of an AND gate is HIGH when

- 1). Any input is HIGH
- 2). All inputs are HIGH
- 3). All inputs are LOW
- 4). Inputs are different

Correct Answer: **2). All inputs are HIGH**

Solution:

AND gate outputs HIGH only when all inputs are HIGH.

Ref: *Digital Design – Morris Mano*

149. The EV battery parameter representing remaining energy is

- 1). SOH
- 2). SOC
- 3). Voltage
- 4). Current

Correct Answer: **2). SOC**

Solution:

SOC (State of Charge) indicates remaining battery energy.

Ref: *Battery Management Systems – Gregory Plett*

150. The phenomenon in transmission lines that causes audible noise is

- 1). Ferranti effect
- 2). Corona effect
- 3). Skin effect
- 4). Proximity effect

Correct Answer: **2). Corona effect**

Solution:

Corona discharge produces audible noise and power loss.

Ref: *Electrical Power Systems – C.L. Wadhwa*

151. The device used to convert mechanical energy into electrical energy is

- 1). Motor
- 2). Generator
- 3). Transformer
- 4). Rectifier

Correct Answer: **2). Generator**

Solution:

Generators convert mechanical energy into electrical energy.

Ref: *Electrical Machines – P.S. Bimbhra*

152. The decimal equivalent of binary number 1111 is

- 1). 12
- 2). 13
- 3). 14
- 4). 15

Correct Answer: **4). 15**

Solution:

$$1111_2 = 15_{10}$$

Ref: *Modern Digital Electronics – R.P. Jain*

153. The main advantage of induction motors is

- 1). High maintenance
- 2). Simple construction
- 3). High cost
- 4). Low reliability

Correct Answer: **2). Simple construction**

Solution:

Induction motors are rugged and simple.

Ref: *Electrical Machines – P.S. Bimbhra*

154. The EV battery charging technique commonly used today is

- 1). Constant current
- 2). Constant voltage
- 3). CC-CV method
- 4). Pulse charging

Correct Answer: 3). CC-CV method

Solution:

Charging starts with constant current and then switches to constant voltage.

Ref: *Battery Management Systems – Gregory Plett*

155. The logic gate whose output is LOW when any input is HIGH is

- 1). NOR
- 2). NAND
- 3). AND
- 4). OR

Correct Answer: 1). NOR

Solution:

NOR gate outputs HIGH only when all inputs are LOW.

Ref: *Digital Design – Morris Mano*

156. The instrument used to measure electrical power consumption is

- 1). Wattmeter
- 2). Energy meter
- 3). Ammeter
- 4). Voltmeter

Correct Answer: 2). Energy meter

Solution:

Energy meters measure electrical energy in kWh.

Ref: *Electrical Measurements – A.K. Sawhney*

157. The motor commonly used in electric traction systems is

- 1). DC series motor
- 2). DC shunt motor
- 3). Synchronous motor
- 4). Stepper motor

Correct Answer: **1). DC series motor**

Solution:

DC series motors provide very high starting torque.

Ref: *Utilization of Electrical Energy – H. Partab*

158. The device used to control AC voltage in lamp dimmers is

- 1). SCR
- 2). TRIAC
- 3). MOSFET
- 4). Diode

Correct Answer: **2). TRIAC**

Solution:

TRIAC controls AC power in both directions.

Ref: *Power Electronics – P.S. Bimbhra*

159. The phenomenon which increases resistance of conductors at high frequency is

- 1). Ferranti effect
- 2). Corona effect
- 3). Skin effect
- 4). Proximity effect

Correct Answer: **3). Skin effect**

Solution:

AC current concentrates near conductor surface increasing resistance.

Ref: *Electrical Power Systems – C.L. Wadhwa*

160. The electric motor most widely used in household appliances is

- 1). Universal motor
- 2). Induction motor
- 3). Synchronous motor
- 4). Stepper motor

Correct Answer: **2). Induction motor**

Solution:

Induction motors are widely used in fans, pumps and appliances.

Ref: *Electrical Machines – P.S. Bimbhra*

161. The relation between electrical energy (E), power (P) and time (t) is

- 1). $E = P/t$
- 2). $E = Pt$
- 3). $E = P + t$
- 4). $E = P^2t$

Correct Answer: **2). $E = Pt$**

Solution:

Electrical energy is given by

$$E = Pt$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

162. The unit of power factor is

- 1). Watt
- 2). Volt
- 3). No unit
- 4). Ohm

Correct Answer: **3). No unit**

Solution:

Power factor is a ratio of real power to apparent power, hence dimensionless.

Ref: *Electrical Technology – B.L. Theraja*

163. The synchronous speed of a 10-pole motor supplied with 50 Hz frequency is

- 1). 300 rpm
- 2). 500 rpm
- 3). 600 rpm
- 4). 750 rpm

Correct Answer: 3). 600 rpm

Solution:

$$N_s = \frac{120f}{P}$$
$$N_s = \frac{120 \times 50}{10}$$
$$N_s = 600 \text{ rpm}$$

Ref: *Electrical Machines – P.S. Bimbhra*

164. The phenomenon which causes additional heating in conductors carrying AC current is

- 1). Corona effect
- 2). Skin effect
- 3). Ferranti effect
- 4). Hysteresis

Correct Answer: 2). Skin effect

Solution:

AC current concentrates near conductor surface increasing resistance and heating.

Ref: *Electrical Power Systems – C.L. Wadhwa*

165. The DC motor in which the field winding is connected parallel to the armature is

- 1). Series motor
- 2). Shunt motor

- 3). Compound motor
- 4). Universal motor

Correct Answer: **2). Shunt motor**

Solution:

In shunt motors field winding is connected in parallel with armature.

Ref: *Electrical Machines – P.S. Bimbhra*

166. The gate used to implement any Boolean function is

- 1). OR gate
- 2). NAND gate
- 3). AND gate
- 4). XOR gate

Correct Answer: **2). NAND gate**

Solution:

NAND is a universal gate.

Ref: *Digital Design – Morris Mano*

167. The main purpose of a transformer in power systems is

- 1). Change frequency
- 2). Change voltage level
- 3). Store energy
- 4). Convert AC to DC

Correct Answer: **2). Change voltage level**

Solution:

Transformers step-up or step-down voltage.

Ref: *Electric Machines – D.P. Kothari*

168. The phenomenon responsible for voltage rise in long transmission lines is

- 1). Corona effect
- 2). Ferranti effect

- 3). Skin effect
- 4). Proximity effect

Correct Answer: **2). Ferranti effect**

Solution:

Ferranti effect occurs due to capacitive charging current.

Ref: *Electrical Power Systems – C.L. Wadhwa*

169. The semiconductor device that conducts in both directions is

- 1). SCR
- 2). TRIAC
- 3). DIAC
- 4). MOSFET

Correct Answer: **2). TRIAC**

Solution:

TRIAC allows bidirectional current flow and is used in AC control.

Ref: *Power Electronics – P.S. Bimbhra*

170. The unit of electric field intensity is

- 1). V/m
- 2). A/m
- 3). Wb/m
- 4). Tesla

Correct Answer: **1). V/m**

Solution:

Electric field intensity is measured in volts per meter.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

171. The device used to protect electrical circuits from short circuits is

- 1). Transformer
- 2). Fuse

- 3). Capacitor
- 4). Inductor

Correct Answer: **2). Fuse**

Solution:

Fuse melts when excessive current flows.

Ref: *Power System Protection – Paithankar & Bhide*

172. The output of an OR gate is HIGH when

- 1). Any input is HIGH
- 2). All inputs are HIGH
- 3). All inputs are LOW
- 4). Inputs are equal

Correct Answer: **1). Any input is HIGH**

Solution:

OR gate outputs HIGH if at least one input is HIGH.

Ref: *Digital Design – Morris Mano*

173. The EV parameter that indicates battery health is

- 1). SOC
- 2). SOH
- 3). Voltage
- 4). Current

Correct Answer: **2). SOH**

Solution:

SOH represents battery degradation level.

Ref: *Battery Management Systems – Gregory Plett*

174. The device used to convert AC power to DC power is

- 1). Rectifier
- 2). Inverter

- 3). Chopper
- 4). Cycloconverter

Correct Answer: **1). Rectifier**

Solution:

Rectifiers convert AC to DC.

Ref: *Electronic Devices – Boylestad*

175. The electric motor that operates exactly at synchronous speed is

- 1). Induction motor
- 2). Synchronous motor
- 3). Universal motor
- 4). Stepper motor

Correct Answer: **2). Synchronous motor**

Solution:

Rotor speed equals synchronous speed.

Ref: *Electric Machines – D.P. Kothari*

176. The binary equivalent of decimal number 12 is

- 1). 1010
- 2). 1011
- 3). 1100
- 4). 1110

Correct Answer: **3). 1100**

Solution:

$$12_{10} = 1100_2$$

Ref: *Modern Digital Electronics – R.P. Jain*

177. The most widely used AC motor in industry is

- 1). Universal motor
- 2). Induction motor
- 3). Synchronous motor
- 4). Stepper motor

Correct Answer: 2). Induction motor

Solution:

Induction motors are rugged and economical.

Ref: *Electrical Machines – P.S. Bimbhra*

178. The phenomenon responsible for radio interference in transmission lines is

- 1). Ferranti effect
- 2). Skin effect
- 3). Corona effect
- 4). Proximity effect

Correct Answer: 3). Corona effect

Solution:

Corona discharge causes radio noise.

Ref: *Electrical Power Systems – C.L. Wadhwa*

179. The electric vehicle motor widely used due to high efficiency is

- 1). Universal motor
- 2). BLDC motor
- 3). DC shunt motor
- 4). Stepper motor

Correct Answer: 2). BLDC motor

Solution:

BLDC motors are efficient and require less maintenance.

Ref: *Electric Vehicle Technology – A.K. Babu*

180. The instrument used to measure electrical power is

- 1). Ammeter
- 2). Voltmeter
- 3). Wattmeter
- 4). Energy meter

Correct Answer: **3). Wattmeter**

Solution:

Wattmeter measures instantaneous electrical power.

Ref: *Electrical Measurements – A.K. Sawhney*

181. The equivalent resistance of two resistors 8 Ω and 4 Ω connected in parallel is

- 1). 2.66 Ω
- 2). 3 Ω
- 3). 4 Ω
- 4). 12 Ω

Correct Answer: **1). 2.66 Ω**

Solution:

$$\begin{aligned}\frac{1}{R} &= \frac{1}{8} + \frac{1}{4} \\ \frac{1}{R} &= \frac{3}{8} \\ R &= \frac{8}{3} = 2.66\Omega\end{aligned}$$

Ref: *Principles of Electrical Engineering – V.K. Mehta*

182. The inductance of a coil depends on

- 1). Number of turns
- 2). Core material
- 3). Magnetic path length
- 4). All of the above

Correct Answer: **4). All of the above**

Solution:

Inductance depends on coil turns, core permeability and magnetic path.

Ref: *Electrical Technology – B.L. Theraja*

183. The synchronous speed of a motor supplied with 50 Hz frequency and 12 poles is

- 1). 400 rpm
- 2). 500 rpm
- 3). 600 rpm
- 4). 750 rpm

Correct Answer: **2). 500 rpm**

Solution:

$$N_s = \frac{120f}{P}$$
$$N_s = \frac{120 \times 50}{12} = 500rpm$$

Ref: *Electrical Machines – P.S. Bimbhra*

184. The DC motor used for cranes and hoists is

- 1). DC shunt motor
- 2). DC series motor
- 3). Synchronous motor
- 4). Stepper motor

Correct Answer: **2). DC series motor**

Solution:

DC series motors provide high starting torque.

Ref: *Electrical Machines – P.S. Bimbhra*

185. The device used to convert DC voltage into variable DC voltage is

- 1). Rectifier
- 2). Inverter
- 3). Chopper
- 4). Cycloconverter

Correct Answer: **3). Chopper**

Solution:

DC choppers control DC voltage level.

Ref: *Power Electronics – Muhammad H. Rashid*

186. The output of a NOT gate is

- 1). Same as input
- 2). Complement of input
- 3). Sum of inputs
- 4). Product of inputs

Correct Answer: **2). Complement of input**

Solution:

NOT gate inverts the input signal.

Ref: *Digital Design – Morris Mano*

187. The electric motor commonly used in fans and pumps is

- 1). Induction motor
- 2). Universal motor
- 3). Stepper motor
- 4). Synchronous motor

Correct Answer: **1). Induction motor**

Solution:

Single-phase induction motors are widely used in household appliances.

Ref: *Electrical Machines – P.S. Bimbhra*

188. The phenomenon responsible for voltage rise in long transmission lines is

- 1). Corona effect
- 2). Ferranti effect
- 3). Skin effect
- 4). Proximity effect

Correct Answer: **2). Ferranti effect**

Solution:

Occurs due to capacitive charging current in long lines.

Ref: *Electrical Power Systems – C.L. Wadhwa*

189. The semiconductor device widely used in power electronic converters is

- 1). Diode
- 2). SCR
- 3). Transistor
- 4). Capacitor

Correct Answer: **2). SCR**

Solution:

SCR is widely used in controlled rectifiers and power converters.

Ref: *Power Electronics – P.S. Bimbhra*

190. The parameter representing battery state in EV systems is

- 1). SOC
- 2). SOH
- 3). Voltage
- 4). Current

Correct Answer: **1). SOC**

Solution:

SOC indicates remaining battery charge.

Ref: *Battery Management Systems – Gregory Plett*

191. The unit of magnetic flux density is

- 1). Weber
- 2). Tesla
- 3). Henry
- 4). Ampere

Correct Answer: **2). Tesla**

Solution:

Magnetic flux density is measured in Tesla.

Ref: *Principles of Electrical Engineering – V.K. Mehta*

192. The device used to protect electrical systems from lightning surges is

- 1). Fuse
- 2). Circuit breaker
- 3). Lightning arrester
- 4). Transformer

Correct Answer: **3). Lightning arrester**

Solution:

Lightning arresters divert surge current to ground.

Ref: *Power System Protection – Paithankar & Bhide*

193. The decimal equivalent of binary number 1011 is

- 1). 9
- 2). 10
- 3). 11
- 4). 12

Correct Answer: **3). 11**

Solution:

$$1011_2 = 11_{10}$$

Ref: *Modern Digital Electronics – R.P. Jain*

194. The most commonly used EV battery today is

- 1). Lead acid
- 2). Nickel cadmium
- 3). Lithium-ion
- 4). Zinc air

Correct Answer: **3). Lithium-ion**

Solution:

Lithium-ion batteries provide high energy density.

Ref: *Electric Vehicle Technology – A.K. Babu*

195. The electric motor used in robotics and CNC machines is

- 1). Universal motor
- 2). Stepper motor
- 3). DC shunt motor
- 4). Induction motor

Correct Answer: **2). Stepper motor**

Solution:

Stepper motors provide precise position control.

Ref: *Special Electrical Machines – Janardhanan*

196. The device used to measure electrical energy consumption is

- 1). Ammeter
- 2). Voltmeter
- 3). Energy meter
- 4). Wattmeter

Correct Answer: **3). Energy meter**

Solution:

Energy meters measure energy in kWh.

Ref: *Electrical Measurements – A.K. Sawhney*

197. The phenomenon responsible for radio interference in transmission lines is

- 1). Skin effect
- 2). Corona effect
- 3). Ferranti effect
- 4). Proximity effect

Correct Answer: 2). Corona effect

Solution:

Corona discharge generates radio noise.

Ref: *Electrical Power Systems – C.L. Wadhwa*

198. The EV system used to monitor battery temperature and voltage is

- 1). Inverter
- 2). BMS
- 3). Charger
- 4). Controller

Correct Answer: 2). BMS

Solution:

Battery Management System monitors battery parameters.

Ref: *Battery Management Systems – Gregory Plett*

199. The device used to convert AC voltage to variable AC voltage is

- 1). Cycloconverter
- 2). Rectifier
- 3). Inverter
- 4). Chopper

Correct Answer: 1). Cycloconverter

Solution:

Cycloconverters change AC voltage and frequency.

Ref: *Power Electronics – Muhammad H. Rashid*

200. The electric machine that converts electrical energy into mechanical energy is

- 1). Generator
- 2). Transformer
- 3). Motor
- 4). Rectifier

Correct Answer: 3). Motor

Solution:

Motors convert electrical energy into mechanical motion.

Ref: *Electrical Machines – P.S. Bimbhra*

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 mastered the fundamentals of **Electrical Circuits and Network Theorems**.
- You have understood the working principles of **Transformers, DC Machines, and AC Machines**.
- You have analyzed **Power Systems, Transmission Lines, and Protection techniques**.
- You have learned the logic behind **Power Electronics devices and converters**.
- You have practiced **Digital Electronics, Microcontrollers, and Basic Electronics concepts**.
- You have faced **mock tests under pressure** and improved your accuracy.

That is exactly how **ECET ranks are built**.

Remember These Final Principles

- ✓ **Concepts are more powerful than memorization.**
- ✓ **Accuracy is more important than attempting too many questions.**
- ✓ **Revision of formulas and key concepts is more valuable than starting new topics.**
- ✓ **Solving previous year questions builds exam confidence.**
- ✓ **Mock test analysis is the secret behind top ECET ranks.**

AP ECET is **not about extremely difficult questions**.

It is about **avoiding simple mistakes in fundamental electrical concepts**.

Final Strategy Before Exam

1. Revise the Core 11 Units

Focus on your short notes for:

- **Basic Electrical Engineering**
 - **DC Machines and Measuring Instruments**
 - **AC Circuits and Transformers**
 - **AC Machines (Alternators, Induction Motors)**
 - **Power System Generation and Protection**
 - **Transmission and Distribution**
-

2. Focus on Frequently Tested Areas

Network Theory

- Thevenin and Norton theorems
- Star–Delta transformations
- Maximum power transfer

Electrical Machines

- EMF equation of transformers
- Slip and torque in induction motors
- DC motor characteristics

Power Systems

- Load curves and tariff concepts
- Transmission line sag and corona
- Protection using relays and circuit breakers

Power Electronics

- SCR characteristics and firing angle control
- Rectifiers, choppers and inverters
- Speed control of DC motors

Digital & Electronics

- Logic gates and Boolean algebra
- Number system conversions
- Basics of microcontrollers

3. Rest & Mindset

Sleep well before exam day.

Stay calm and confident.

Read each numerical or conceptual question carefully before answering.

- **Attempt Easy Questions First:** Secure marks from theory-based questions.
 - **Avoid Overthinking:** Do not spend too much time on one difficult numerical.
 - **Write Key Formulas on Rough Sheet:** It helps avoid calculation mistakes.
 - **Use Elimination Method:** Remove clearly wrong options first.
 - **Manage Time Wisely:** Keep time to review your marked questions.
-

Your Future Starts After This Exam

This exam is **not the destination. It is the bridge.**

After ECET:

- You enter **B.Tech (Electrical, Electronics, ECE, EEE, AI & ML, or CSE).**
- You gain deeper knowledge in **Power Systems, Control Systems, and Embedded Electronics.**
- You work on **real engineering projects and internships.**
- You prepare for careers in **Power Industry, Electronics, Automation, and Renewable Energy.**
- You contribute to building the **future of smart electrical systems and technology.**

Your **ECET rank is only the beginning of your engineering journey.**

Believe This

You are **not competing with thousands of students.**

You are competing with:

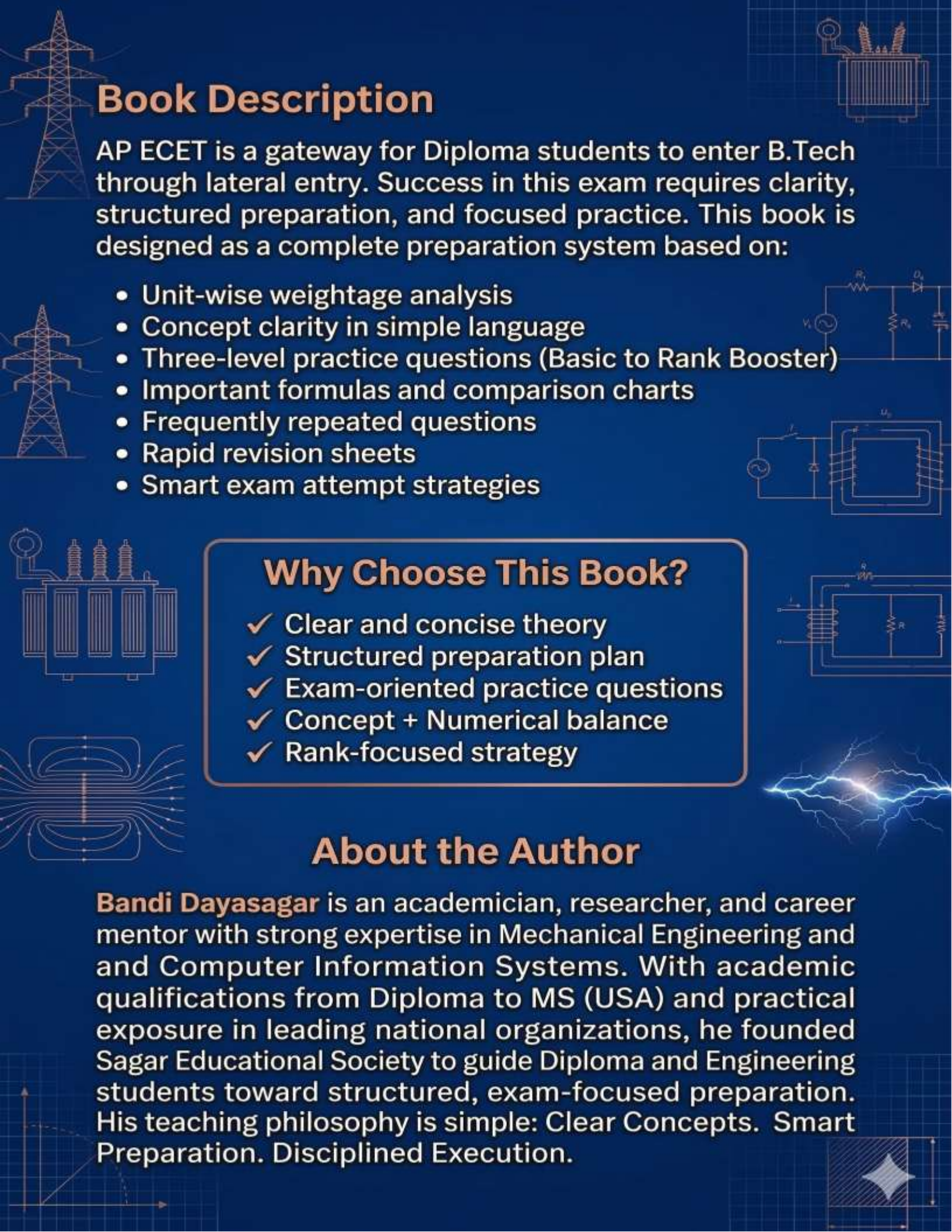
- Your **preparation**
- Your **focus**
- Your **discipline**

If you prepared sincerely, **your rank is already secured.**

Study Smart. Stay Consistent. Aim High.

All the Best for

AP ECET 2026 – Electrical & Electronics Engineering



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.