NewtonGate

Target GATE

MECHANICAL ENGINEERING

- ◆ WEEKEND CLASSES.
- ◆ 4 PART TEST + 2 FULL TEST (NO EXTRA FEE)
- ◆ MCQs & NUMERICAL QUESTIONS.
- ◆ SPECIAL CLASSROOM NOTES.
- ◆ SPECIAL APTITUDE PAPER FOR PSUs.
- ◆ FULL FOCUS ON PSUs.
- ◆ GET IITs & NITs FOR MASTER DEGREE.
- ◆ RANK BOOSTER CLASSES.
- ◆ MONTHLY PAYMENT ONLY.
- ◆ NO ADMISSION FEE.
- ◆ GET TUTORED BY GATE QUALIFIERS!

GATE QUESTION PATTERN		
SECTION	TOTAL MARKS	NO OF QUESTIONS
Subject/ Discipline	70 marks	Total 55 questions (25 questions of 1 mark) (30 questions of 2 marks)
Engineering Mathematics	15 marks	
General Aptitude	15 marks	Total 10 questions (5 questions of 1 mark) (5 questions of 2 marks)
Total	100 marks	65 questions

SL. NO.	TOPICS	NO. OF CLASSES	DAY
I	**ENGINEERING MATHEMATICS**	18	1st to 18th
1	**Linear Algebra**: Matrix algebra, systems of linear equations, eigenvalues and Eigen vectors.	2	1
2	**Calculus**: Functions of single variable, limit, continuity and differentiability, mean value theorems, indeterminate forms; evaluation of definite and improper integrals; double and triple integrals; partial derivatives, total derivative, Taylor series (in one and two variables), maxima and minima, Fourier series; gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume integrals, applications of Gauss, Stokes and Green's theorems.	4	3
3	**Differential equations**: First order equations (linear and nonlinear); higher order linear differential equations with constant coefficients; Euler-Cauchy equation; initial and boundary value problems; Laplace transforms; solutions of heat, wave and Laplace's equations.	3	7
4	**Complex variables**: Analytic functions; Cauchy-Riemann equations; Cauchy's integral theorem and integral formula; Taylor and Laurent series.	2	10
5	**Probability and Statistics**: Definitions of probability, sampling theorems, conditional probability; mean, median, mode and standard deviation; random variables, binomial, Poisson and normal distributions.	3	12
6	**Numerical Methods**: Numerical solutions of linear and non-linear algebraic equations; integration by trapezoidal and Simpson's rules; single and multi-step methods for differential equations.	4	15
II	**APPLIED MECHANICS AND DESIGN**	22	19th to 40th
1	**Engineering Mechanics**: Free-body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations, collisions.	3	19

2	**Mechanics of Materials:** Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns; energy methods; thermal stresses; strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.	5	22
3	**Theory of Machines:** Displacement, velocity and acceleration analysis of plane mechanisms; dynamic analysis of linkages; cams; gears and gear trains; flywheels and governors; balancing of reciprocating and rotating masses; gyroscope.	5	27
4	**Vibrations:** Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.	4	32
5	**Machine Design:** Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as bolted, riveted and welded joints; shafts, gears, rolling and sliding contact bearings, brakes and clutches, springs.	5	36
III	**FLUID MECHANICS AND THERMAL SCIENCES**	22	41st to 62nd
1	**Fluid Mechanics:** Fluid properties; fluid statics, manometry, buoyancy, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; dimensional analysis; viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends and fittings.	5	41
2	**Heat-Transfer:** Modes of heat transfer; one dimensional heat conduction, resistance concept and electrical analogy, heat transfer through fins; unsteady heat conduction, lumped parameter system, Heisler's charts; thermal boundary layer, dimensionless parameters in free and forced convective heat transfer, heat transfer correlations for flow over flat plates and through pipes, effect of turbulence; heat	5	46

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	exchanger performance, LMTD and NTU methods; radiative heat transfer, StefanBoltzmann law, Wien's displacement law, black and grey surfaces, view factors, radiation network analysis.		
3	**Thermodynamics:** Thermodynamic systems and processes; properties of pure substances, behaviour of ideal and real gases; zeroth and first laws of thermodynamics, calculation of work and heat in various processes; second law of thermodynamics; thermodynamic property charts and tables, availability and irreversibility; thermodynamic relations.	5	51
4	**Applications:** Power Engineering: Air and gas compressors; vapour and gas power cycles, concepts of regeneration and reheat. I.C. Engines: Air-standard Otto, Diesel and dual cycles. Refrigeration and air-conditioning: Vapour and gas refrigeration and heat pump cycles; properties of moist air, psychrometric chart, basic psychrometric processes. Turbomachinery: Impulse and reaction principles, velocity diagrams, Pelton-wheel, Francis and Kaplan turbines.	7	56
IV	**MATERIALS, MANUFACTURING AND INDUSTRIAL ENGINEERING**	31	63rd to 94th
1	**Engineering Materials:** Structure and properties of engineering materials, phase diagrams, heat treatment, stress-strain diagrams for engineering materials.	3	63
2	**Casting, Forming and Joining Processes:** Different types of castings, design of patterns, moulds and cores; solidification and cooling; riser and gating design. Plastic deformation and yield criteria; fundamentals of hot and cold working processes; load estimation for bulk (forging, rolling, extrusion, drawing) and sheet (shearing, deep drawing, bending) metal forming processes; principles of powder metallurgy. Principles of welding, brazing, soldering and adhesive bonding.	5	66
3	**Machining and Machine Tool Operations:** Mechanics of machining; basic machine tools; single and multi-point cutting tools, tool geometry and materials, tool life and wear; economics of machining; principles of non-traditional machining processes; principles of work holding, design of jigs and fixtures.	5	71

4	**Metrology and Inspection**: Limits, fits and tolerances; linear and angular measurements; comparators; gauge design; interferometry; form and finish measurement; alignment and testing methods; tolerance analysis in manufacturing and assembly.	5	76
5	**Computer Integrated Manufacturing**: Basic concepts of CAD/CAM and their integration tools.	2	81
6	**Production Planning and Control**: Forecasting models, aggregate production planning, scheduling, materials requirement planning.	4	83
7	**Inventory Control**: Deterministic models; safety stock inventory control systems.	3	87
8	**Operations Research**: Linear programming, simplex method, transportation, assignment, network flow models, simple queuing models, PERT and CPM.	4	90
V	**PART TEST 1**	1	95
VI	**PART TEST 2**	1	96
VII	**PART TEST 3**	1	97
VIII	**PART TEST 4**	1	98
IX	**FULL TEST (1st Half)**	1	99
X	**FULL TEST (2nd Half)**	1	100

*Syllabus Module as per year 2018-2019.

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BOOKS AND REFERNCES FOR GATE 2019-20

Sl. No.	Subjects	Books	Reference
1	Engineering Mathematics	-	Notes
2	Basic Thermodynamics	P. K. Nag	Notes
3	IC Engine	V Ganesan	Notes
4	Heat and Mass Transfer	P. K. Nag/ Cengel & Boles	Notes
5	Refrigeration & Air Conditioning	-	Notes
6	Power Plant & Gas Turbine	-	Notes
7	Fluid Mechanics & Machinery	R. K. Bansal	Notes
8	Theory of Machines & Vibrations	S.S. Rattan	Notes
9	Machine Design	R. S. Khurmi/ V. B. Bhandari	Notes
10	Strength of Materials	R. S. Khurmi	Notes
11	Material Science	D. Callister	Notes
12	Production Engineering	P. N. Rao/ ABC	Notes
13	Industrial Engineering	Hira Gupta	Notes
14	Reasoning & Aptitude	-	Notes

*Notes Provided for Gate and are sufficient for Semester Preparation.

- *Class Notes are provided for each subject.*
- *Regular Revision of important topics.*
- *Concise and Precise Study Material.*
- *MCQ pattern and Use of Online Calculator only.*
- *Time Bound Revision Practice.*
- *Access to Digital Library Drive for each topic, as uploaded by admin.*
- *Practice Set Papers on Reasoning and Aptitude.*

TIPS WHILE PREPARING FOR GATE

(Following are some important points to keep in mind during the GATE journey)

- The initial months will be tough. Don't get disheartened and discouraged at your progress. It will be better after you follow the GATE preparation timetable diligently.

- At no point of time, compare yourself with anyone. Read topper interviews for inspiration. Many of them have battled similar problems and overcome them. So can you.

- Don't stress. Attack each segment, topic with dedication and determination. The mountain of things to do for GATE preparation will slowly reduce with time.

- Revise and analyse each time you complete a topic or a subject. Know your strengths and build on them. Convert your weaknesses to your strength.

- Practice and practice till you are perfect. Also, notice what you may be doing wrong and rectify.

- Ensure you stay healthy by choice.

- Try to cover the complete GATE syllabus but if it's not, then it's ok. Concentrate on what you have done and try to master that.

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MECHANICAL ENGINEERING
GATE Topic-wise expected marks

Topic	Expected marks
Engg Mechanics	2.50
SOM	7.75
Theory of Mechanics	9
Machine Design	3.75
FM	7.50
Heat Transfer	6
Thermodynamics	12.75
RAC	1.25
Manufacturing Engg	14.25
Industrial Engg	8
Engg Maths	12.25
General Aptitude	15

Section 1: Engineering Mathematics

Linear Algebra: Matrix algebra, systems of linear equations, eigenvalues and eigenvectors.

Calculus: Functions of single variable, limit, continuity and differentiability, mean value theorems, indeterminate forms; evaluation of definite and improper integrals; double and triple integrals; partial derivatives, total derivative, Taylor series (in one and two variables), maxima and minima, Fourier series; gradient, divergence and curl, vector identities, directional derivatives, line, surface and volume integrals, applications of Gauss, Stokes and Green's theorems.

Differential equations: First order equations (linear and nonlinear); higher order linear differential equations with constant coefficients; Euler-Cauchy equation; initial and boundary value problems; Laplace transforms; solutions of heat, wave and Laplace's equations.

Complex variables: Analytic functions; Cauchy-Riemann equations; Cauchy's integral theorem and integral formula; Taylor and Laurent series.

Probability and Statistics: Definitions of probability, sampling theorems, conditional probability; mean, median, mode and standard deviation; random variables, binomial, Poisson and normal distributions.

Numerical Methods: Numerical solutions of linear and non-linear algebraic equations; integration by trapezoidal and Simpson's rules; single and multi-step methods for differential equations.

Section 2: Applied Mechanics and Design

Engineering Mechanics: Free-body diagrams and equilibrium; trusses and frames; virtual work; kinematics and dynamics of particles and of rigid bodies in plane motion; impulse and momentum (linear and angular) and energy formulations, collisions.

Mechanics of Materials: Stress and strain, elastic constants, Poisson's ratio; Mohr's circle for plane stress and plane strain; thin cylinders; shear force and bending moment diagrams; bending and shear stresses; deflection of beams; torsion of circular shafts; Euler's theory of columns; energy methods; thermal stresses; strain gauges and rosettes; testing of materials with universal testing machine; testing of hardness and impact strength.

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Vibrations: Free and forced vibration of single degree of freedom systems, effect of damping; vibration isolation; resonance; critical speeds of shafts.

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Section 3: Fluid Mechanics and Thermal Sciences

Fluid Mechanics: Fluid properties; fluid statics, manometry, buoyancy, forces on submerged bodies, stability of floating bodies; control-volume analysis of mass, momentum and energy; fluid acceleration; differential equations of continuity and momentum; Bernoulli's equation; dimensional analysis; viscous flow of incompressible fluids, boundary layer, elementary turbulent flow, flow through pipes, head losses in pipes, bends and fittings.

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Applications: *Power Engineering*: Air and gas compressors; vapour and gas power cycles, concepts of regeneration and reheat. *I.C. Engines*: Air-standard Otto, Diesel and dual cycles. *Refrigeration and air-conditioning*: Vapour and gas refrigeration and heat pump cycles; properties of moist air, psychrometric chart, basic psychrometric processes. *Turbomachinery*: Impulse and reaction principles, velocity diagrams, Pelton-wheel, Francis and Kaplan turbines.

Section 4: Materials, Manufacturing and Industrial Engineering

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