



# GATE 2024 ONLINE TEST SERIES

PI

Detailed Schedule

**PRODUCTION &  
INDUSTRIAL  
ENGINEERING**

## Topicwise Tests

Test No.	Test Syllabus	No. of Ques.	Marks	Time	Activation Date
1	<b>Fluid Mechanics:</b> Fluid statics, Bernoulli's equation, flow through pipes, laminar and turbulent flows, equations of continuity and momentum, capillary action; Dimensional analysis;	17	25	45 min	30-03-2023
2	<b>Thermodynamics:</b> Zeroth, first and second law of thermodynamics, thermodynamic system and processes, calculation of work and heat for systems and control volumes.	17	25	45 min	
3	<b>Manufacturing Process 1:</b> Casting: Types of casting processes and applications; Sand casting: patterns – types, materials and allowances; molds and cores – materials, making, and testing; design of gating system and riser; casting techniques of cast iron, steels, and nonferrous metals and alloys; analysis of solidification and microstructure development; Other casting techniques: Pressure die casting, Centrifugal casting, Investment casting, Shell mold casting; Casting defects and their inspection by non-destructive testing. Joining of Materials: Classification of joining processes; Principles of fusion welding processes using different heat sources (flame, arc, resistance, laser, electron beam), Heat transfer and associated losses; Arc welding processes - SMAW, GMAW, GTAW, plasma arc, submerged arc welding processes; Principles of solid state welding processes - friction welding, friction stir welding, ultrasonic welding; Welding defects - causes and inspection; Principles of adhesive joining, brazing and soldering processes.	17	25	45 min	
4	<b>Manufacturing Process- 2:</b> Metal Forming: Stress-strain relations in elastic and plastic deformation; Von Mises and Tresca yield criteria, Concept of flow stress; Hot, warm and cold working; Bulk forming processes - forging, rolling, extrusion and wire drawing; Sheet metal working processes – blanking, punching, bending, stretch forming, spinning and deep drawing; Ideal work and slab analysis; Defects in metal working and their causes.	17	25	45 min	
5	<b>Manufacturing Process- 3:</b> Machining: Orthogonal and oblique machining, Single point cutting tool and tool signature, Chip formation, cutting forces, Merchant's analysis, Specific cutting energy and power; Machining parameters and material removal rate; tool materials, Tool wear and tool life; Thermal aspects of machining, cutting fluids, machinability; Economics of machining; Machining processes - turning, taper turning, thread cutting, drilling, boring, milling, gear cutting, thread production; Finishing processes – grinding, honing, lapping and super-finishing. Machine Tools: Lathe, milling, drilling and shaping machines – construction and kinematics.	17	25	45 min	
6	<b>Manufacturing Process- 4:</b> Powder Processing: Production of metal/ceramic powders, compaction and sintering of metals and ceramic powders, Cold and hot isostatic pressing. Polymers and Composites: Polymer processing – injection, compression and blow molding, extrusion, calendaring and thermoforming; Molding of composites.	17	25	45 min	
7	<b>Material Science-1:</b> Structure, physical and mechanical properties, and applications of common engineering materials (metals and alloys, semiconductors, ceramics, polymers, and composites – metal, polymer and ceramic based)	17	25	45 min	15-04-2023
8	<b>Material Science-2:</b> Iron-carbon equilibrium phase diagram; Heat treatment of metals and alloys and its influence on mechanical properties; Stress-strain behavior of metals and alloys.	17	25	45 min	
9	<b>Engineering mathematics-1:</b> Linear Algebra, Calculus, Vector Analysis, Numerical Methods.	17	25	45 min	
10	<b>Engineering mathematics-2:</b> Differential Equations, Complex Analysis, Probability and Statistics.	17	25	45 min	
11	<b>General Aptitude (Part-1):</b> Numerical Ability, Numerical computation, numerical estimation, and data interpretation.	17	25	45 min	
12	<b>General Aptitude (Part-2):</b> Verbal Ability: English grammar, sentence completion, verbal analogies, word groups, instructions, critical reasoning, numerical reasoning, verbal deduction and spatial aptitude.	17	25	45 min	
13	<b>Material Science-3:</b> Structure and properties of engineering materials, phase diagrams; Heat treatment, stress-strain diagrams for engineering materials.	17	25	45 min	30-04-2023
14	<b>Applied Mechanics-1:</b> Equivalent force systems, free body concepts, equations of equilibrium; trusses	17	25	45 min	
15	<b>Applied Mechanics-2:</b> Strength of materials – stress, strain and their relationship; Failure theories; Mohr's circle (stress); Deflection of beams, bending and shear stresses; Euler's theory of columns; Thick and thin cylinders; Torsion.	17	25	45 min	
16	<b>Air Standard Cycles &amp; heat transfer:</b> Air standard cycles; Basic applications of conduction, convection and radiation; Dimensional analysis.	17	25	45 min	
17	<b>TOM &amp; Machine Design-1:</b> Analysis of planar mechanisms, cams and followers; governors and flywheels	17	25	45 min	
18	<b>TOM &amp; Machine Design-2:</b> Design of bolted, riveted and welded joints; Interference/shrink fit joints; Friction and lubrication; Design of shafts, keys, couplings, spur gears, belt drives, brakes and clutches; Pressure vessels.	17	25	45 min	



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19	<b>Manufacturing Process- 5:</b> Jigs and fixtures – principles, applications, and design. Metrology and Inspection: Accuracy and precision; Types of errors; Limits, fits and tolerances; Gauge design, Interchangeability, Selective assembly; Linear, angular, and form measurements (straightness, flatness, roundness, runout and cylindricity) by mechanical and optical methods; Inspection of screw threads and gears; Surface roughness measurement by contact and non-contact methods.	17	25	45 min	15-05-2023
20	<b>Manufacturing Process- 6:</b> Advanced Manufacturing: Principles and applications of USM, AJM, WJM, AWJM, EDM and Wire EDM, LBM, EBM, PAM, CHM, ECM; Effect of process parameters on material removal rate, surface roughness and power consumption; Additive manufacturing techniques. Computer Integrated Manufacturing: Basic concepts of CAD and CAM, Geometric modeling, CNC; Automation in Manufacturing; Industrial Robots – configurations, drives and controls; Cellular manufacturing and FMS - Group Technology, CAPP.	17	25	45 min	
21	<b>Industrial Engineering Operations Research and Operations Management 1</b> <b>Industrial Engineering :</b> <b>Work system design:</b> Taylor's scientific management, Gilbreth's contributions; Productivity – concepts and measurements; Method study, Micro-motion study, Principles of motion economy; Work measurement – time study, Work sampling, Standard data, PMTS; Ergonomics; Job evaluation and merit rating. <b>Operations Research and Operations Management Engineering</b> <b>Engineering Economy and Costing:</b> Elementary cost accounting and methods of depreciation; Break-even analysis; Techniques for evaluation of capital investments; Financial statements; Activity based costing. Inventory – functions, costs, classifications, deterministic inventory models, quantity discount; Perpetual and periodic inventory control systems.	17	25	45 min	
22	<b>Industrial Engineering Operations Research and Operations Management 2</b> <b>Industrial Engineering</b> <b>Product Design and Development:</b> Principles of product design, tolerance design; Quality and cost considerations; Product life cycle; Standardization, simplification, diversification; Value engineering and analysis; Concurrent engineering; Design for "X". <b>Operations Research and Operations Management</b> <b>Project Management:</b> Scheduling techniques – Gantt chart, CPM, PERT and GERTPERT/CPM	17	25	45 min	
23	<b>Operations Research and Operations Management Quality and reliability</b> <b>Operations Research and Operations Management</b> <b>Operation Research:</b> Linear programming – problem formulation, simplex method, duality and sensitivity analysis; Transportation and assignment models; Integer programming; Constrained and unconstrained nonlinear optimization; Markovian queuing models; Simulation – manufacturing applications. <b>Quality Management:</b> Quality – concept and costs; Statistical quality control – process capability analysis, control charts for variables and attributes and acceptance sampling; Six sigma; Total quality management; Quality assurance and certification - ISO 9000, ISO14000. <b>Reliability and Maintenance:</b> Reliability, availability and maintainability; Distribution of failure and repair times; Determination of MTBF and MTTR, Reliability models; Determination of system reliability; Preventive and predictive maintenance and replacement, Total productive maintenance.	17	25	45 min	
24	<b>Industrial Engineering Operations Research and Operations Management 3</b> <b>Operations Research and Operations Management</b> <b>Production control:</b> Forecasting techniques – causal and time series models, moving average, exponential smoothing, trend and seasonality; Aggregate production planning; Master production scheduling; MRP, MRP-II and ERP; Routing, scheduling and priority dispatching; Push and pull production systems, concepts of Lean and JIT manufacturing systems; Logistics, distribution, and supply chain management. <b>Industrial Engineering</b> <b>Facility Design:</b> Facility location factors and evaluation of alternate locations; Types of plant layout and their evaluation; Computer aided layout design techniques; Assembly line balancing; Materials handling systems.	17	25	45 min	



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## Single Subject Tests

Test No.	Test Syllabus	No. of Ques.	Marks	Duration	Activation Date
25	Manufacturing Process-I (1+2+4)	33	50	90 min	15-6-2023
26	Fluid Mechanics	33	50	90 min	
27	Thermodynamics	33	50	90 min	
28	Applied Mechanics	33	50	90 min	
29	Engineering Mathematics	33	50	90 min	
30	General Aptitude	33	50	90 min	
31	TOM & Machine Design	33	50	90 min	15-07-2023
32	Manufacturing Process-II (3+5+6)	33	50	90 min	
33	IC Engine + Heat Transfer	33	50	90 min	
34	Material Science	33	50	90 min	
35	Industrial Engineering + Quality Management + Reliability & Maintenance	33	50	90 min	
36	Operation Research	33	50	90 min	

## Full Syllabus Tests

37	Full Syllabus Test-1 (Basic Level)	65	100	180 min	15-08-2023
38	Full Syllabus Test-2 (Basic Level)	65	100	180 min	
39	Full Syllabus Test-3 (Basic Level)	65	100	180 min	
40	Full Syllabus Test-4 (Basic Level)	65	100	180 min	
41	Full Syllabus Test-5 (Advance Level)	65	100	180 min	15-09-2023
42	Full Syllabus Test-6 (Advance Level)	65	100	180 min	
43	Full Syllabus Test-7 (Advance Level)	65	100	180 min	
44	Full Syllabus Test-8 (Advance Level)	65	100	180 min	

**Candidate has to upload GATE-2024 Admit Card to access below mentioned tests**

45	GATE Mock Test 1	65	100	180 min	15-10-2023
46	GATE Mock Test 2	65	100	180 min	
47	GATE Mock Test 3	65	100	180 min	
48	GATE Mock Test 4	65	100	180 min	