






**ACE**  
Engineering Academy  
(Leading institute for ESE/GATE/PSUs)

# ESE - 2019 PRELIMS

## Online Test Series

## MECHANICAL ENGINEERING (ME)

**No. of Tests : 44 + *Free* 30 Practice Tests of ESE - 2018 Online Test Series**

|   | ESE- 19<br>Test Series | Practice Tests<br>ESE - 18<br>Test Series |
|---|------------------------|---|
|  Subject Wise Grand Tests  | 22                     | 22  |
|  Multi Subject Grand Tests | 10                     | -   |
|  Full Length Mock Tests    | 12                     | 8   |

All tests will be available till ESE -2019 (Prelims) Examination.

### TEST SERIES HIGHLIGHTS

- ★ All India Rank will be given for each test.
- ★ Test wise and overall statistics.
- ★ Comparison with toppers.
- ★ Question wise and test wise time analysis & comparison with toppers on time management.

## Subject-wise Tests

**Tests will be activated at 06:00 pm on scheduled day**

| Test No | Subject Name   | No. of Questions | Max Marks | Duration | Date of Activation |
|---------|--|------------------|-----------|----------|--------------------|
| ME-01   | Engineering Mechanics + Strength of Materials  | 50               | 100       | 60 Min   | 15-05-2018         |
| ME-02   | Basic Thermodynamics + Heat transfer   | 50               | 100       | 60 Min   |                    |
| ME-03   | Fluid Mechanics + Turbo Machinery  | 50               | 100       | 60 Min   | 22-05-2018         |
| ME-04   | Engineering Mathematics and Numerical Analysis   | 33               | 66        | 40 Min   |                    |
| ME-05   | Mechanisms and Machines  | 50               | 100       | 60 Min   | 29-05-2018         |
| ME-06   | Basics of Energy and Environment   | 33               | 66        | 40 Min   |                    |
| ME-07   | Power Plant Engineering  | 50               | 100       | 60 Min   | 05-06-2018         |
| ME-08   | General Principles of Design, Drawing, Importance of Safety  | 33               | 66        | 40 Min   |                    |
| ME-09   | IC Engines   | 50               | 100       | 60 Min   | 12-06-2018         |
| ME-10   | Ethics and values in Engineering profession  | 33               | 66        | 40 Min   |                    |
| ME-11   | Design of Machine Elements   | 50               | 100       | 60 Min   | 19-06-2018         |
| ME-12   | Information and Communication Technologies (ICT)   | 33               | 66        | 40 Min   |                    |
| ME-13   | Refrigeration and Air conditioning   | 50               | 100       | 60 Min   | 26-06-2018         |
| ME-14   | Engineering Aptitude covering Logical reasoning and Analytical ability   | 33               | 66        | 40 Min   |                    |
| ME-15   | Manufacturing + Engineering Materials  | 50               | 100       | 60 Min   | 03-07-2018         |
| ME-16   | Basics of Material Science and Engineering   | 33               | 66        | 40 Min   |                    |
| ME-17   | Renewable Sources of Energy  | 50               | 100       | 60 Min   | 10-07-2018         |
| ME-18   | Standards and Quality practices in production, construction, maintenance and services                          | 33               | 66        | 40 Min   |                    |
| ME-19   | Industrial and Maintenance Engineering   | 50               | 100       | 60 Min   | 17-07-2018         |
| ME-20   | Basics of Project Management   | 33               | 66        | 40 Min   |                    |
| ME-21   | Mechatronics and Robotics  | 50               | 100       | 60 Min   | 24-07-2018         |
| ME-22   | Current Issues of National and International importance related to social, Economic and Industrial Development | 33               | 66        | 40 Min   |                    |

## Full Length Mock Tests -1<sup>st</sup> Series

| Test No | Mock codes     | No. of Questions | Max Marks | Duration | Date of Activation |
|---------|----------------|------------------|-----------|----------|--------------------|
| ME-23   | Mock-1 PAPER-1 | 100              | 200       | 2 Hours  | 07-08-2018         |
| ME-24   | Mock-1 PAPER-2 | 150              | 300       | 3 Hours  |                    |
| ME-25   | Mock-2 PAPER-1 | 100              | 200       | 2 Hours  | 14-08-2018         |
| ME-26   | Mock-2 PAPER-2 | 150              | 300       | 3 Hours  |                    |

## Multi Subject Grand Tests

| Test No | Subjects codes  | No. of Questions | Max Marks | Duration | Date of Activation |
|---------|---|------------------|-----------|----------|--------------------|
| ME-27   | Fluid Mechanics + Turbo Machinery + Renewable Sources of Energy   | 50               | 100       | 60 Min   | 21-08-2018         |
| ME-28   | Basics of Energy and Environment + Engineering Aptitude covering Logical reasoning and Analytical ability   | 33               | 66        | 40 Min   |                    |
| ME-29   | Engineering Mechanics + Strength of Materials + Design of Machine Elements  | 50               | 100       | 60 Min   | 28-08-2018         |
| ME-30   | Engineering Mathematics and Numerical Analysis + Current Issues of National and International importance related to social, Economic and Industrial Development | 33               | 66        | 40 Min   |                    |
| ME-31   | Basic Thermodynamics + Heat transfer + IC Engines + Refrigeration and Air conditioning  | 50               | 100       | 60 Min   | 04-09-2018         |
| ME-32   | Basics of Project Management + Basics of Material Science and Engineering   | 33               | 66        | 40 Min   |                    |
| ME-33   | Power Plant Engineering + Mechanisms and Machines   | 50               | 100       | 60 Min   | 11-09-2018         |
| ME-34   | Information and Communication Technologies (ICT) + General Principles of Design, Drawing, Importance of Safety  | 33               | 66        | 40 Min   |                    |
| ME-35   | Manufacturing + Engineering Materials + Industrial and Maintenance Engineering+ Mechatronics and Robotics   | 50               | 100       | 60 Min   | 18-09-2018         |
| ME-36   | Ethics and values in Engineering profession + Standards and Quality practices in production, construction, maintenance and services                             | 33               | 66        | 40 Min   |                    |

## Full Length Mock Tests -2<sup>nd</sup> Series

| Test No | Mock codes     | No. of Questions | Max Marks | Duration | Date of Activation |
|---------|----------------|------------------|-----------|----------|--------------------|
| ME-37   | Mock-3 PAPER-1 | 100              | 200       | 2 Hours  | 02-10-2018         |
| ME-38   | Mock-3 PAPER-2 | 150              | 300       | 3 Hours  |                    |
| ME-39   | Mock-4 PAPER-1 | 100              | 200       | 2 Hours  | 16-10-2018         |
| ME-40   | Mock-4 PAPER-2 | 150              | 300       | 3 Hours  |                    |
| ME-41   | Mock-5 PAPER-1 | 100              | 200       | 2 Hours  | 20-12-2018         |
| ME-42   | Mock-5 PAPER-2 | 150              | 300       | 3 Hours  |                    |
| ME-43   | Mock-6 PAPER-1 | 100              | 200       | 2 Hours  | 27-12-2018         |
| ME-44   | Mock-6 PAPER-2 | 150              | 300       | 3 Hours  |                    |

**NOTE: The Dates of above MOCK Tests may Change according to the ESE – 2019(Prelims) Exam schedule.**

## Free Practice Tests of ESE (Prelims)-2018 Online Test Series

### Subject-wise Tests

| Test No | Subject Name   | No. of Questions | Max Marks | Duration | Date of Activation |
|---------|--|------------------|-----------|----------|--------------------|
| ME-P1   | Fluid Mechanics + Hydraulic Machines   | 50               | 100       | 60 Min   | 15-05-2018         |
| ME-P2   | Engineering Mechanics + Strength of Materials  | 50               | 100       | 60 Min   |                    |
| ME-P3   | Basic Thermodynamics + Heat transfer   | 50               | 100       | 60 Min   |                    |
| ME-P4   | Mechanisms and Machines  | 50               | 100       | 60 Min   |                    |
| ME-P5   | Power Plant Engineering  | 50               | 100       | 60 Min   |                    |
| ME-P6   | IC Engines   | 50               | 100       | 60 Min   |                    |
| ME-P7   | Design of Machine Elements   | 50               | 100       | 60 Min   |                    |
| ME-P8   | Refrigeration and Air conditioning   | 50               | 100       | 60 Min   |                    |
| ME-P9   | Manufacturing + Engineering Materials  | 50               | 100       | 60 Min   |                    |
| ME-P10  | Renewable Sources of Energy  | 50               | 100       | 60 Min   |                    |
| ME-P11  | Industrial and Maintenance Engineering   | 50               | 100       | 60 Min   |                    |
| ME-P12  | Mechatronics and Robotics  | 50               | 100       | 60 Min   |                    |
| ME-P13  | Basics of Energy and Environment   | 33               | 66        | 40 Min   | 30-05-2018         |
| ME-P14  | Standards and Quality practices in production, construction, maintenance and services                          | 33               | 66        | 40 Min   |                    |
| ME-P15  | Basics of Project Management   | 33               | 66        | 40 Min   |                    |
| ME-P16  | Information and Communication Technologies (ICT)   | 33               | 66        | 40 Min   |                    |
| ME-P17  | Ethics and values in Engineering profession  | 33               | 66        | 40 Min   |                    |
| ME-P18  | Engineering Aptitude covering Logical reasoning and Analytical ability   | 33               | 66        | 40 Min   |                    |
| ME-P19  | Basics of Material Science and Engineering   | 33               | 66        | 40 Min   |                    |
| ME-P20  | General Principles of Design, Drawing, Importance of Safety  | 33               | 66        | 40 Min   |                    |
| ME-P21  | Engineering Mathematics and Numerical Analysis   | 33               | 66        | 40 Min   |                    |
| ME-P22  | Current Issues of National and International importance related to social, Economic and Industrial Development | 33               | 66        | 40 Min   |                    |

## Free Practice Tests of ESE (Prelims)-2018 Online Test Series

### Full Length Mock Tests

| Test No | Mock codes     | No. of Questions | Max Marks | Duration | Date of Activation |
|---------|----------------|------------------|-----------|----------|--------------------|
| ME-P23  | Mock-1 PAPER-1 | 100              | 200       | 2 Hours  | 05-07-2018         |
| ME-P24  | Mock-1 PAPER-2 | 150              | 300       | 3 Hours  |                    |
| ME-P25  | Mock-2 PAPER-1 | 100              | 200       | 2 Hours  |                    |
| ME-P26  | Mock-2 PAPER-2 | 150              | 300       | 3 Hours  |                    |
| ME-P27  | Mock-3 PAPER-1 | 100              | 200       | 2 Hours  |                    |
| ME-P28  | Mock-3 PAPER-2 | 150              | 300       | 3 Hours  |                    |
| ME-P29  | Mock-4 PAPER-1 | 100              | 200       | 2 Hours  |                    |
| ME-P30  | Mock-4 PAPER-2 | 150              | 300       | 3 Hours  |                    |

## Syllabus for ESE (Prelims), Paper-2

| Subject Name                      | Syllabus   |
|-----------------------------------|--|
| <b>Fluid Mechanics</b>            | Basic Concepts and Properties of Fluids, Manometry, Fluid Statics, Buoyancy, Equations of Motion, Bernoulli's equation and applications, Viscous flow of incompressible fluids, Laminar and Turbulent flows, Flow through pipes and head losses in pipes.  |
| <b>Turbo Machinery</b>            | Reciprocating and Rotary pumps, Pelton wheel, Kaplan and Francis Turbines, velocity diagrams   |
| <b>Engineering Mechanics</b>      | Analysis of System of Forces, Friction, Centroid and Centre of Gravity, Dynamics;  |
| <b>Strength of Materials</b>      | Stresses and Strains-Compound Stresses and Strains, Bending Moment and Shear Force Diagrams, Theory of Bending Stresses-Slope and deflection-Torsion, Thin and thick Cylinders, Spheres.   |
| <b>Basic Thermodynamics</b>       | Thermodynamic systems and processes; properties of pure substance; Zeroth, First and Second Laws of Thermodynamics; Entropy, Irreversibility and availability; ideal and real gases; compressibility factor; Gas mixtures.   |
| <b>Heat transfer</b>              | Modes of heat transfer, Steady and unsteady heat conduction, Thermal resistance, Fins, Free and forced convection, Correlations for convective heat transfer, Radiative heat transfer – Radiation heat transfer coefficient; boiling and condensation, Heat exchanger performance analysis   |
| <b>Mechanisms and Machines</b>    | Types of Kinematics Pair, Mobility, Inversions, Kinematic Analysis, Velocity and Acceleration Analysis of Planar Mechanisms, CAMs with uniform acceleration and retardation, cycloidal motion, oscillating followers; Vibrations –Free and forced vibration of undamped and damped SDOF systems, Transmissibility Ratio, Vibration Isolation, Critical Speed of Shafts. Gears – Geometry of tooth profiles, Law of gearing, Involute profile, Interference, Helical, Spiral and Worm Gears, Gear Trains- Simple, compound and Epicyclic; Dynamic Analysis – Slider – crank mechanisms, turning moment computations, balancing of Revolving & Reciprocating masses, Gyroscopes –Effect of Gyroscopic couple on automobiles, ships and aircrafts, Governors. |
| <b>Power Plant Engineering</b>    | Rankine and Brayton cycles with regeneration and reheat, Fuels and their properties, Flue gas analysis, Boilers, steam turbines and other power plant components like condensers, air ejectors, electrostatic precipitators and cooling towers – their theory and design, types and applications; Impulse and Reaction principles, Steam and Gas Turbines, Theory of Jet Propulsion – Pulse jet and Ram Jet Engines, Reciprocating and Rotary Compressors – Theory and Applications  |
| <b>IC Engines</b>                 | Otto, Diesel and Dual Cycles. SI and CI Engines, Engine Systems and Components, Performance characteristics and testing of IC Engines; Fuels; Emissions and Emission Control.  |
| <b>Design of Machine Elements</b> | Design for static and dynamic loading; failure theories; fatigue strength and the S-N diagram; principles of the design of machine elements such as riveted, welded and bolted joints. Shafts, Spur gears, rolling and sliding contact bearings, Brakes and clutches, flywheels.   |

| Subject Name                                  | Syllabus   |
|---|--|
| <b>Refrigeration and Air conditioning</b>     | Vapour compression refrigeration, Refrigerants and Working cycles, Compressors, Condensers, Evaporators and Expansion devices, Other types of refrigeration systems like Vapour Absorption, Vapour jet, thermo electric and Vortex tube refrigeration. Psychometric properties and processes, Comfort chart, Comfort and industrial air conditioning, Load calculations and Heat pumps.  |
| <b>Manufacturing</b>                          | Metal casting-Metal forming, Metal Joining, Machining and machine tool operations, Limits, fits and tolerances, Metrology and inspection, computer Integrated manufacturing, FMS.  |
| <b>Engineering Materials</b>                  | Basic Crystallography, Alloys and Phase diagrams, Heat Treatment, Ferrous and Non Ferrous Metals, Non metallic materials, Basics of Nano-materials, Mechanical Properties and Testing, Corrosion prevention and control  |
| <b>Renewable Sources of Energy</b>            | Solar Radiation, Solar Thermal Energy collection - Flat Plate and focusing collectors their materials and performance. Solar Thermal Energy Storage, Applications – heating, cooling and Power Generation; Solar Photovoltaic Conversion; Harnessing of Wind Energy, Bio-mass and Tidal Energy – Methods and Applications, Working principles of Fuel Cells.   |
| <b>Industrial and Maintenance Engineering</b> | Production planning and Control, Inventory control and operations research - CPM-PERT. Failure concepts and characteristics-Reliability, Failure analysis, Machine Vibration, Data acquisition, Fault Detection, Vibration Monitoring, Field Balancing of Rotors, Noise Monitoring, Wear and Debris Analysis, Signature Analysis, NDT Techniques in Condition Monitoring.  |
| <b>Mechatronics and Robotics</b>              | Microprocessors and Microcontrollers: Architecture, programming, I/O, Computer interfacing, Programmable logic controller. Sensors and actuators, Piezoelectric accelerometer, Hall effect sensor, OpticalEncoder, Resolver, Inductosyn, Pneumatic and Hydraulic actuators, stepper motor, Control Systems- Mathematical modeling of Physical systems, control signals, controllability and observability. Robotics, Robot Classification, Robot Specification, notation; Direct and Inverse Kinematics; Homogeneous Coordinates and Arm Equation of four Axis SCARA Robot |