



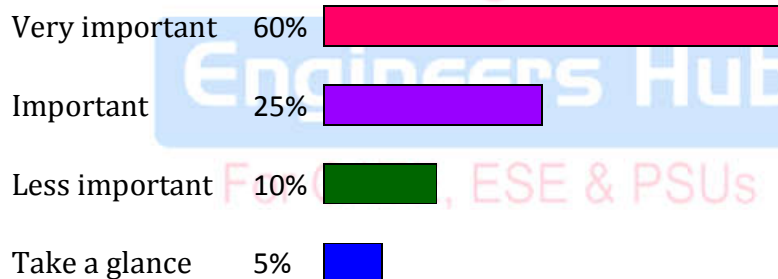
# Engineers Hub

Where Quality Matters...

## ***GATE-2018 MECHANICAL IMPORTANT TOPIC LIST***

Hi guys...! To those of you who applied for GATE-2019, congratulations as you kept your foot forward into a blooming career. And also, it does not matter much how far you walked, but how far you are from your destiny instead. Now you are in a critical phase of preparation which is going to decide your rank. So, be cautious and know what exactly is required. *‘Tune your preparation to the frequency of paper setter’*. Here we are providing you the important topics of **MECHANICAL ENGG.** subjects.

# Topics, based on their chance to come in GATE, are categorized by color coding as follows-



### ***ENGINEERING MECHANICS:***

- *Lami's theorem; Forces in Truss Members*
- *Rectilinear Motion (Constant Acceleration)*
- *Time Derivatives of Displacement*
- *Moment of Inertia-Pure Rotational Motion*

- *Velocity, Acceleration in Polar Coordinate System;*
- *Coriolis Acceleration*
- *Rolling Without Slipping-Instantaneous Centre Of Rotation*
- **Kinetics:** *FBD-Application of Newton & Euler's Equations for Dynamic Equilibrium*
- **Friction:** *Horizontal & Inclined Plane-Limiting Friction conditions (Block on Block)*
- **Work-Energy-Impulse:** *Momentum Conservation-Collisions*
- *Energy Stored in Different Cases, Their Conversions (Conservation).*

### **THEORY OF MACHINES:**

- *Mobility of Planar Mechanisms-Grubler's Criteria, Quick Return Ratio (Witworth & Slotted Lever Mechanisms)*
- *Velocity Analysis of Planar Mechanisms; Mechanical Advantage,*
- *Dynamic Analysis in Slider crank mechanism.*
- **Gears:** *Classification of Gears, Pitch ( $P_d$ ,  $P_c$ ,  $m$ )- Central Distance Relations; Force-Torque Transmitted, Interference in Involute Teeth*
- **Gear Trains:** *Compound & Epicyclic Gear Trains*
- **Flywheels:** *Coefficient of Fluctuation of Speed; Energy Stored in Fly Wheels*
- **Vibrations:** *Natural Frequency Calculations (Springs-Mass System) Equivalent Stiffness.*
- *Damping Factor Expression-Damped Frequency Relation,*
- *Steady State Amplitude-Magnification Factor in Forced Vibration*
- *Transmissibility, Critical Speed*
- *Cams, Balancing, Gyroscope.*

## **STRENGTH OF MATERIALS:**

- **Bars:** Axial Loading; Stress-Strain Relations; Thermal Stresses, Biaxial Loading-Mohr's Circle-Principle Stresses & Strains
- **Beam:** Shear Force-Bending Moment Diagrams, Transverse Loading-Stresses in Beams
- **Shafts:** Torsional Stresses; Shafts in Series; Torsion Formula (St. Venant's)
- Thin Cylindrical Shells, Springs, Deflection of Beams, Columns

## **DESIGN OF MACHINE ELEMENTS:**

- Static Failure Theories, S-N Diagram, Dynamic Failure Theories.
- **Bolted and Riveted Joints:** Tearing, Shearing and Crushing Failures; Eccentric Loading.
- **Brakes:** Band and block brakes
- **Clutches:** Pressure and wear Theories-Torque transmission capacity
- **Rolling contact bearings:** load-life relations
- **Sliding contact bearings:** Sommerfeld Number

## **OPERATIONS RESEARCH:**

- Queuing theory
- PERT & CPM
- Inventory
- Linear programming
- Forecasting
- Sequencing
- Line Balancing
- Break Even Analysis

## **THERMAL ENGINEERING**

- *Ideal Gas Equation*
- *F.L.T*
- *Nozzle & Turbine*
- *Reversible HE/Refrigerator/HP*
- *Clausius Inequality*
- *Entropy Change Calculations*
- *Problems on Diesel, Brayton Cycles*
- *Pure Substance*
- *Rankine, VCRS Cycles*
- *Psychrometric Relations*

## **HEAT TRANSFER**

- *Conduction Through Plane Wall*
- *Critical Thickness/Radius of Insulation*
- *Heat Exchanger*
- *Unsteady State Heat Conduction*
- *Radiation heat Transfer calculations*
- *Shape Factor*

## **FLUID MECHANICS**

- *Pressure Measurement*
- *Hydrostatic & Buoyant Forces Calculations*
- *Acceleration, Continuity Equations*
- *Velocity Potential Function & Stream Functions*
- *Problems on Bernoulli's Equations*
- *Venturimeter & Pitot Tube*
- *Flow Through Pipe*
- *Laminar Flow*
- *Boundary Layer Theory*

## **PRODUCTION**

- *Theory of metal cutting, forces, tool life*
- *Rolling calculations*
- *Wire drawing and Extrusion Calculations*
- *Sheet metal operations, clearance, force, power, shear calculations*
- *Lathe, drilling, milling, shaping cutting time calculations, all numerical*
- *Grinding and finishing*
- *ECM MRR, feed calculations, EDM theory, comparison of all NTMM*
- *NC/CNC Machine, BLU calculations, up to M&G code*
- *Limit, Tolerance, Fit*
- *Jig & Fixture, 3-2-1 principle*
- **Welding:** *V-I Characteristics calculations, Resistance welding calculations, Special welding theory*
- **Casting:** *allowances, Riser Design, Sprue Design, Pouring time calculations, Cooling time calculations, Special Castings, Casting Defects*

**Engineers Hub**

For GATE, ESE & PSUs