

# **GATE 2014 syllabus for Mining Engineering**

## **General Aptitude (GA)**-Multiple Choice Test

- **This Paper Consists of Verbal Ability:** English grammar, verbal analogies, instructions, critical reasoning and verbal deduction, Sentence completion, Word groups.

## **ENGINEERING MATHEMATICS**-Mathematical branch that includes mathematical methods and techniques that are generally employed in Industry and engineering

- **Linear Algebra: Mathematics branch consists of vector spaces as well as linear mappings.** It include topics- Matrix Algebra, Eigen values and eigen vectors, System of Linear Equations.
- **Calculus: Mathematical study of change.** It include topics- continuity, limit and differentiability; maxima & minima; partial derivatives, test for convergence, sequence & series, Fourier series.
- **Vector calculus:** -It include topics- Divergence, curl and gradient, surface, line & volume integrals, gauss, stokes and greens theorem.
- **Differential equations: Deals with rate of change and slope of curves.** It include topics- First order equation (linear and nonlinear), Cauchy's and Euler's equations, Method of Variation of parameters, Initial and boundary value problems, Partial Differential Equations and variable separable method, Higher order linear differential equations with constant coefficients.
- **Probability and Statistics: Probability is the way to roughly judge the occurrence of a thing or to what extent a statement is true.** It includes topics- Sampling theorems, Mean, median, Conditional probability, mode and standard deviation, Random variables, Discrete and continuous distributions, Correlation and regression analysis, Poisson, Normal and Binomial distribution.
- **Numerical Methods: It consists of set of rules which uses numerical approximation to find an answer to the problems of mathematical analysis.** It include topics- Single and multi-step methods for differential equations, Solutions of non-linear algebraic equations.

## **MINING ENGINEERING**

- **Mechanics: It deals with the reaction of physical bodies when subjected to forces or displacements.** It include topics- Equivalent force systems; Two dimensional frames, Equations of equilibrium and trusses; Friction forces; Free body diagrams; Particle kinematics and dynamics.

- Mine Development, Geomechanics and Ground Control: Mine development refers to digging of entirely waste rocks to reach the ore body. Geomechanics deals with geologic analysis of reaction of soil & rock.** It include topics-Methods of access to deposits; Underground drivages; Drilling methods and machines; Blasting devices, Explosives and practices. Geo-technical properties of rocks; Ground control, Rock mass classification, instrumentation and stress measurement techniques; Ground vibrations; Stress distribution around mine openings; Theories of rock failure ;Design of supports in roadways and workings; Rock bursts and coal bumps; Slope stability; Subsidence
- Mining Methods and Machinery: Different techniques and machines that are used for the purpose of Mining.** It include topics- Surface mining: layout, loading, development, continuous surface mining systems; transportation and mechanization, Underground coal mining: Pillar systems and board , room and pillar mining, thick seam mining methods; longwall mining ;Underground metal mining : open, supported and caved stopping methods, ore handling systems, stope mechanization ;mine filling. Generation and transmission of mechanical, pneumatic and hydraulic power; Materials handling: conveyors, haulages, face and development machinery, hoisting systems, pumps.
- Ventilation, Underground Hazards and Surface Environment: Ventilation is an important factor to maintain indoor air quality in buildings. Different health hazards can be caused while mining which refers to underground hazards.** It include topics- Underground atmosphere; Heat load sources and thermal environment, Mechanics of air flow, air cooling distribution, mechanical and natural ventilation; Mine fans and their usage; Ventilation planning; Auxiliary ventilation.Subsurface hazards from fires, explosions, dust, gases and inundation; Rescue apparatus and practices, accident analysis, Safety in mines; noise, mine lighting, occupational health and risk.
- Water, Air and soil pollution: Mixing of unwanted things in air,water and soil causes its pollution.** It includes- causes, quality standards, dispersion, reclamation and control.
- Surveying, Mine Planning and Systems Engineering: Surveying is the method to exactly determine the terrestrial or 3D position of points. Planning is required before mining is done. System engineering focus on how to plan & regulate complex engineering projects over their life cycles.**It include topics-Fundamentals of engineering surveying; levelling and levels, theodolite, triangulation, tachometry, contouring, errors and adjustments, correlation; Curves; Photogrammetry; Underground surveying ; EDM, Field astronomy ;total station and GPS fundamentals.
- Principles of planning: Mining planning is based on certain Principles.** It include topics- Sampling methods and practices, basics of geostatistics, reserve estimation techniques, and quality control, cash flow concepts, optimization of facility location and mine valuation, open pit design; GIS fundamentals. Work-study; Concepts of reliability, parallel systems and reliability of series

- Linear programming, transportation problems and assignments, queuing, network analysis, basics of simulation.

