Mining Engineering Syllabus for GATE 2015 Examinations:

(a)Engineering Mathematics:

Linear Algebra: Matrices and Determinants, systems of linear equations, Eigen Values and Eigen Vectors.

Calculus: Limit, continuity and differentiability, partial derivatives, maxima and minima, Sequences and series, test for convergence, Fourier series.

Vector Calculus: gradient, divergence and Curl, line, surface and volume integrals, stokes, gauss and green's theorems.

Differential Equations: linear and non linear first order ODEs, higher order linear ODEs with constant coefficients, Cauchy's and Euler's equations, Laplace transforms, PDEs Laplace, heat and wave equations.

Probability and Statistics: mean, median and standard deviation, random variable, Poisson, normal and binomial distribution, correlation and regression analysis.

Numerical methods: solutions of linear and non-linear algebraic equations, integration of trapezoidal and Simpsons rule: single and multi- step methods for differential equations.

(b)Mining Engineering:

Mechanics: Equivalent force systems, equations of equilibrium, two dimensional frames and trusses, free body diagrams, friction forces, particle kinematics and dynamics.

Mine development, Geomechanics and Ground Control: methods to access to deposits, underground drivages, drilling methods and machines, explosives, blasting devices and practices.

Geo- technical properties of rocks, Rock mass classification, ground control, instrumentation and stress measurement techniques, theories of rock failure, ground vibrations, stress distribution around mine opening, subsidence, design of supports in roadways and working, rock bursts and coal bumps, slope stability.

Mining Methods and Machinery: surface mining, layout, development, loading, transportation and mechanization, continuous surface mining systems, underground coal mining, bord and pillar systems, room and pillar mining, long wall mining, thick seam mining methods, underground metal mining, open supported and caved stoping methods, stope mechanization, ore handling systems, mine filling.

Generation and transmission of mechanical, hydraulic and pneumatic power, materials handling, haulages, conveyors, face and development machinery, hoisting systems, pumps.

Ventilation, Underground Hazards and Surface Environment: underground atmosphere, load sources, and thermal environment, air cooling, mechanics of air flow, distribution, natural and mechanical ventilation, mine fans and their usage, auxiliary ventilation, ventilation planning.

Environment: underground atmosphere, heat load sources and thermal environment, air cooling, mechanics of air flow, distribution, natural and mechanical ventilation, mine fans and their usages, auxiliary ventilation, ventilation planning.

Subsurface hazards from fires, explosion, gases, dust and inundation, rescue apparatus and practices, safety in mines, accident analysis, noise mine lighting, occupational health and risk.

Air, water and soil pollution: causes, dispersion, quality standards, reclamation and control.

Surveying, mine planning and systems engineering: fundamental of engineering surveying, levels and leveling, theodolite, tacheometry, triangulation, contouring, errors and adjustments, correlation, underground surveying, curves, photogrammetry, field astronomy, EDM, total station and GPS fundamentals.

Principles of Planning: Sampling methods and practices, reserve estimation techniques, basics of geostatistics and quality control, optimization of facility location, cash flow concepts and mine valuation, open pit design, GIS fundamentals.

Work-study: concepts of reliability, reliability of series and parallel systems.

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