BE - 401
[ENGINEERING MATHEMATICS – II]

UNIT I-
Concept of Probability
Probability Mass function, Probability density function. Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution, Testing of Hypothesis: Students t-test, Fisher's z-test, Chi-Square Method.

UNIT II-
Functions of Complex Variables
Analytic functions, Harmonic Conjugate, Cauchy-Riemann Equations, Line Integral, Cauchy's Theorem, Cauchy's Integral Formula, Singular Points, Poles & Residues, Residue Theorem, Application of Residues theorem for evaluation of real integrals.

UNIT III-
Introduction of Fourier Series
Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series Fourier Transform: Definition and properties of Fourier. Fourier transform, Sine and Cosine transform.

UNIT IV-
Laplace Transform
Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations.

UNIT V-
Vector Calculus
Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem.

REFERENCES
1. Higher Engineering Mathematics by B.S. Grewal, Khanna Publication.
2. Engineering mathematics volume II & III by D.K. Jain
3. Engineering mathematics volume II by D.C. Agrawal

MI-402
[MINING TECHNOLOGY – II]

UNIT I:
Mining Terminology
Mining, Mine, Mineral, Rock, Ore, Ore body, Mineral deposit, Country rock, Hang wall, Footwall, Overburden, Seam, Vein, Lode, Dip, Strike, Outcrop, Grade of ore, Tenure, Development, Adit, Shaft, Incline, Tunnel, Drift, Crosscut, Level, Raise, Winze, Sump, Stoping/Depillaring, Stope, Goaf, Caving, Subsidence, Stowing.

UNIT II:
Exploratory Drilling and Blast Hole Drilling
Exploratory drilling and blast hole drilling: Different types of exploratory drills and methods of core recovery, Drilling machines used for exploratory drilling viz. Rotary & Percussive, their attachments; Core Barrels; Conditions of applicability of drilling methods; Borehole Survey, Different types drills bits used. Different types of drills machines used for blast holes. Directional drilling, underground methods of exploratory drilling.

UNIT III:
Drivage of Inclines/Drifts/Adits
Types of Openings; Choice of Openings; Location of Openings; Drilling, blasting, loading and transportation of muck during drivage of inclines/adits/drifts, Ventilation, lighting and drainage, Extension of center line; Organization and cycle of operations; Mechanized methods of drivages of inclines/adits/drifts. Special methods through loose, fractured, flowing and water bearing ground. High-speed drivages.

UNIT IV:
Shaft Sinking
Conventional methods of shaft sinking. Drilling, blasting, loading and hoisting of muck. Lining, ventilation, drainage and lighting. Sinking through loose, fractured, flowing and water bearing ground. Shaft boring; Deepening and widening of shafts. Upward drivage; Organization and cycle of operations.

UNIT V:
Explosives and Blasting
General classification and classification as per Indian Explosive Act. Properties of Common explosives. Permitted Explosives. Bulk explosives. Composition and construction of initiators such as Safety fuse and Detonators. Blasting tools. Regulations on storage, transportation and use of explosives. Theory of blasting. Various controlled blasting techniques. Causes of accidents and safety precautions. Substitute of explosives.

REFERENCES:
1. D.J.Deshmukh Elements of Mining Technology-Vol I Central Techno Publications, Nagpur, 7th Ed,
2. V.S.Vutukuri and R.D.Lama, Environmental Engineering in Mines, Trans Tech Publishers.
3. Explosives and Blasting Technology: G.K.Pradhan
4. Mining Engineer's Handbook Vol. 1&2, 2nd Edition: Edited by Harold Hartman
5. Mining: B. V Boki

MI-403
[GEOLOGY ENGINEERING-II]

Unit 1 :
Indian geology: History of geology, major geomorphic division of India, general review of India, stratigraphy, description of important Indian geology formation, Archeans, Vindhyans, Gondwanas and tertiaries.

Unit 2 :
Structural geology: Study of topographic maps, attitude of planar and linear structures, effects of topography on outcrops, Unconformities, folds, faults and joints – their nomenclature, classification and recognition, Forms of igneous intrusion – dyke, sill and batholith, effect of folds and fractures on strata and their importance in mining operations, principles of stereographic projection of linear and planar features of rocks.

Unit 3 :
Petroleum geology and coal: Rank characteristics and important constituents of coal, classification and origin of coals, geology of the principle coal field of India, concept of organic constituents of petroleum origin, migration, accumulation, concept of traps and important petroliferous basins of India.

Unit 4 :
Economic geology: mode of Occurrence, origin, distribution, association and industrial uses of important Metallic (Au, Al, Cu, Fe, Mn, Sn, Pb And Zn) and Non-Metallic(Diamond, mica, Radioactive Minerals, Gypsum, Dolomite, Fire-clay, Magnesite, talc, asbestos, Graphite, Kyanite, Sillimanite, corundum, Fluorite, phosphorite, Precious and Semi-precious stones)

Unit 5 :
Exploration and prospecting geology: their definition and classification of method; elementary method of geology , geophysical ,geochemical prospecting , ringed targets intersection loci.,exploration-minral concept and viz surface and subsurface; exploration strategy and design ; stage exploration ; resource and reserves**.**

Reference books:
1.Engineering geology-Prabin singh
2.Engineering geology- P.k. Mukherjee
3.Mineralogy-Dana
4.Courses in mining geology –Arogyaswamy
5.Geology of india and (vol 1and 2) R.Vaidyanadhan and M.Ramakrishnan

List of Experiment:
1.Study of topography maps
2.Study of sterographic projection
3.Standard tensile test on MS and CI Specimen
4.Identification of rocks.
5.Identification of simple rocks forming minerals and important ores

MI-404
[MECHANICAL ENGINEERING]

UNIT1:
Introduction to Fluid Mechanics
Introduction to Fluid Mechanics; Properties of fluid, classifications, ideal fluid, Newtonian fluid and Non Newtonian fluids, Newton's law of viscosity hydrostatic, manometer pressure on submerged body ; Buoyancy; Fluids in relative equilibrium.

UNIT 2
Fluid Kinematics and Dynamics
Classification of flow. Elementary Explanation of stream function and velocity potential. Bernoulli's equation, applications of Bernoulli's equation, venturimeter. Flow through pipes Darcy Weisbach's equation. Classification, basic construction and applications of different types of pumps and water turbines.

UNIT 3
Concept of Stress and Strain
Stress and strain at a point; hooks law, stress strain diagrams. Ultimate and working stresses; Poisson's Ratio; Two dimensional state of strain, Principle stresses and Principle planes, Mohr's Circle, Determination of Principle strain from strain measurements; thermal stresses in composite bars.

UNIT 4
Bending Stresses and deflection in beams
Pure bending, Bending Stresses, Section Modulus of rolled and built up sections, Composite beams, Distribution of normal and shear stresses across the section of a simple beam with vertical section of symmetry; Deflection of beams integration method and moment area method.

UNIT 5
Introduction to thermodynamics
Introduction to thermodynamics; Analysis of various thermodynamic processes, PV and TS diagrams. Analysis of air standard cycles Otto, Diesel and Dual cycles. Classifications, applications and performance estimation of internal combustion engines

REFERENCES:
1 Fluid Mechanics, RK Bansal
2. Fluid Mechanics,RK rajput
3. Strength of Materials S.S.Rattan
5 engineering thermodynamics, PK Nag

LIST OF EXPERIMENT
1. Study of construction and operation of 4 stroke SI engine model.
2. Study of construction and operation of 4 stroke CI engine model.
3. Performance testing of a 4 stroke Diesel engine.
4. Determination of coefficient of discharge of venturimeter.
5. Verification of Bernoulli's Theorem.
6. Determination of friction factor for pipes
7. Tensile test of a mild steel specimen on Universal Testing Machine (UTM

MI–405
[ELECTRICAL POWER IN MINING]

Unit I:
Protective Devices: Cables, working principle and classification, mining type cable, relays, working principle and classification, mining type earth fault relay, circuit breakers, working principle and classification.

Unit II:
Transmission & Distribution: Transmission lines, their representation as short, medium and long transmission lines, opencast and underground mines substation, automatic control substation, underground distribution scheme, distribution of power in mines, primary and secondary distribution systems, overhead lines versus underground cables.

Unit III:
Introduction to Electrical Measurements: Indicating instruments, voltmeter, ammeter, electrodynamometer types wattmeter, construction & working principal of induction type energy meter, comparison between analog & digital instruments, measuring instruments in mining applications.

Unit IV:
Electrical Safety: Neutral grounding, electrical rules and standards in mines lightning system, electrical safety equipment's, protective measurements during mining operation.

Unit V:
Tariffs & Power Factor: Tariffs, types of tariffs, types of consumers, power factor, methods of power factor improvement, selection of location for mines, selection of electrical motors for mining operation.

References:
1. Electrical Power System,C.L. Wadhwa, New Age International Publishers.
2. Switchgear Protection And Power System, Sunil S Rao,Khanna Publisher.
3. Electrical Equipments In Mines, H. Cotton.
4. A Text Book of Power System Engineering, Soni Gupta Bhatnagar.
5. Electrical & electronic measurements & instrumentation, A.K. Sawhney, DhanpatRai Publications.
6. Deshpande MV; "Electric Power System Design", TMH.
7. Nagrath IJ and Kothari DP; "Power System Engineering", Tata McGraw Hill.
8. Gupta BR; "Power System Analysis and Design".

List of practical:
1. Design of transmission lines.
2. Study and design of mining type electric cable.
3. Study of indicating instruments.
4. Basic Layout design of mines substation.
5. Study of electromagnetic earth fault relay.
6. Study of mining type earth fault relay.

MI- 406
[PROGRAMMING IN C++]

Unit-I

C++ basics, loops and decisions, structures and functions, object and classes, object arrays, constructor and destructor functions.

Unit -II

Operator and function overloading, pointers, pointers to base and derived classes inheritance, public and Private inheritance, multiple inheritance.

Unit -III

Polymorphism, virtual functions, abstract base classes and pure virtual function, friend function, early and late binding.

Unit -IV

C++ I/O system, formatted I/O, creating insertors and extractors, file I/O basis, creating disk files and file manipulations using seekg(), seekp(), tellg() and tellp() functions, exception handling: try, catch and throw.

Unit -V

UML concepts, object-oriented paradigm and visual modeling, UML diagrams, UML specifications, object model, object oriented design, identifying classes and object, object diagrams.

References:
1. Lafore R. "Object Oriented Programming in C++", Galgotia ub.
2. Lee "UML & C++ a practical guide to Object Oriented Development 2 ed, Pearson.
3. Schildt "C++ the complete reference 4ed, 2003.
4. Hans Erit Eriksson "UML 2 toolkit" Wiley.
5. Balagurusawmy "Object Orienter Programming with C++".
6. B.G., Boach "Object Oriented Analysis & Design with Applications", Addision Wesly.