

COURSE STRUCTURE

&

SYLLABUS (3rd – 8th SEMESTER)

FOR B.TECH PROGRAMME IN MINING ENGINEERING

**BIJU PATNAIK UNIVERSITY OF TECHNOLOGY ORISSA,
ROURKELA**

2007 - 2008

**COURSE STRUCTURE
SECOND YEAR B.TECH PROGRAMME
MINING ENGINEERING**

3rd Semester			4th Semester		
<i>Theory</i>	<i>ContactHrs.</i>	<i>Credit</i>	<i>Theory</i>	<i>Contact Hrs.</i>	<i>Credit</i>
	L-T-P			L-T-P	
BSCM 2201 Mathematics - III	3-1-0	4	BSCM 2202 Mathematics - IV	3-1-0	4
BENG 1201 Electrical Machines	3-1-0	4	BENG 1105 Basic Electronics	3-1-0	4
or			or		
BENG 1208 Fluid Mechanics & Hydraulic Machines			BENG 1201 Electrical Machines		
BSCP 2201 Physics - II /	2-0-0	2	BSCC 2201 Chemistry - II /	2-0-0	2
BSCP 2202 Physics of Semi- Conductor Devices			BSCC 2202 Material Sciences		
or			or		
BSCC 2201 Chemistry - II /			BSCP 2201 Physics - II /		
BSCC 2202 Material Sciences			BSCP 2202 Physics of Semi- Conductor Devices		
BCSE 3201 Object Oriented Programming Using C++	3-0-0	3	BCSE 3202 Relational Database Management System	3-0-0	3
HSSM 4201 Engineering Economics & Costing	3-0-0	3	HSSM 4201 Engineering Economics & Costing		
or			or		
HSSM 4202 Organisation Behaviour			HSSM 4202 Organisation Behaviour	3-0-0	3
CPMN 8201 Geology	3-1-0	4	PCCI 8201 Surveying - I	3-1-0	4
Total		20	Total		20
<i>Practicals/Sessionals</i>	<i>Contact Hrs.</i>	<i>Credit</i>	<i>Practicals/Sessionals</i>	<i>Contact Hrs.</i>	<i>Credit</i>
BENG 9202 Basic Electronics Laboratory	0-0-3	2	BENG 9201 Basic Electrical Engineering Laboratory	0-0-3	2
or			or		
BENG 9201 Basic Electrical Engineering Laboratory			BENG 9202 Basic Electronics Laboratory		
BCSE 9201 Computer Lab (OOP)	0-0-3	2	BCSE 9202 Computer Lab (RDBMS)	0-0-3	2
BENG 9203 Mechanical Engineering Laboratory	0-0-3	2	BENG 9201 Electrical Machines Laboratory	0-0-3	2
CPMN 9201 Geology Lab.	0-0-3	2	CPCE 9204 Surveying Lab.	0-0-3	2
Total		8	Total		8
Total		28	Total		28

L-Lecture

T-Tutorial

P-Practical

3rd Semester

BSCM 2201 MATHEMATICS - III (3-1-0)

Module - I (9 Lectures)

Partial differential equations : The vibrating string. The wave equation & its solution.

The Heat equation and its solution

Module - II (10 Lectures)

Two - dimensional wave equation and its solution.

Laplace equation in polar, cylindrical and spherical coordinates. Potential.

Module - III (13 Lectures)

Complex analysis : Complex numbers and functions conformal mappings

Complex integration. Cauchy's Theorem Cauchy's integral formulas.

Module - IV (8 Lectures)

Taylor's and Laurent's series, Residue theorem, evaluation of real integrals.

The Course covered by : Advance Mathematics by E. Kreyszig, John Wiley & Son's (P) Ltd. (8th Edition)

Chapter 11 (except 11.6)

Chapter 12, 13, 14, 15

BENG 1201 ELECTRICAL MACHINES (3-1-0)

Module I (10 Lectures)

D.C Mechanics :

D.C Generator – construction and principle of operation, E.M.F. equation ; types of generator; no load and load characteristics; Voltage build-up of shunt

Generator; voltage regulation, Application.

D.C Motor –construction and principle of operation ; back E.M.F; torque and speed equations; characteristics and performance curves; speed control of series and shunt motors; motor starters; industrial application.

Losses and Efficiency of D.C machines.

Module II (10 Lectures)

Transformer :

Single phase – construction and principle of operation; E.M.F. equation; Phasor diagram; actual and approximate equivalent circuits; open and short circuit tests, voltage regulation; losses and efficiency.

Three Phase – Construction and principle of operation; connection of three single –phase units in wye, delta, open delta configurations; Autotransformer; conventional transformer connected as Autotransformer. Special Transformers – induction heating and high impedance and high frequency transformer.

Module III (10 Lectures)

Synchronous Machines :

Three- phase alternators – construction and principle of operation; E.M.F. equation; distribution and pitch factors; Synchronous reactance; performance of alternators on no-load and load; Phasor diagram; voltage regulation, power calculations of turbine and hydro-generators,; synchronization of a generator.

Three-Phase Synchronous Motor- construction and principle operation; V- curves; Phasor diagram; methods of starting; applications.

Module IV (10 Lectures)

Three-Phase induction Motor- construction of slip ring and squirrel cage type induction motors; Phasor diagram and equivalent circuit; torque-slip characteristics; maximum torque calculations; open and short-circuit tests; losses and efficiency; starting of induction motors; speed control; Induction generator.

Single-Phase Induction Motor- construction and principle of operation; capacitor- start and capacitor-run motors; Universal motor; Stepper motors.

Books :

1. Electrical Machines, Drives and Power Systems, 5th edition by Theodore Wildi (Pearson) : Text.
2. Electrical Machinery by A.E. Fitzgerald and Charles Kingsley, Jr., and S.D. Umans, Tata McGraw Hill Publication.
3. Principles of Electric Machines by V.K Meheta and R. Meheta , S. Chand Publication.

BENG 1208 - FLUID MECHANICS AND HYDRAULIC MACHINE (3-1-0)

Module – I

(12 hours)

Introduction : Scope of fluid mechanics and its development as a science

Physical property of Fluid

Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity, compressibility and bulk modulus, Fluid classification.

Fluid static

Pressure, Pascal's Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute pressure, gauge pressure and vacuum pressure, manometer.

Hydrostatic process on submerged surface, force on a horizontal submerged plane surface, force on a vertical submerged plane surface.

Module – II

(12 hours)

Buoyancy and flotation, Archimedes' principle, stability of immersed and floating bodies, determination of metacentric height.

Fluid kinematics : Introduction, description of fluid flow, classification of fluid flow. Acceleration of fluid particles, flow rate and continuity equation, differential equation of continuity.

Fluid dynamics : Introduction, Euler's equation along a streamline, energy equation, Bernoulli's equation, Analysis of finite control volumes and its application to siphon, venturimeter, orifice meter

Module – III

(6 hours)

Turbine : Classification, reaction, Impulse, outward flow, inward flow and mixed flow turbines, Francis & Kaplan turbines, Pelton wheel, Physical description and principle of operation, Governing of Turbine.

Module – IV

(8 hours)

Centrifugal Pump : Principles of classification, Blade angles, Velocity triangle, efficiency, specific speed, characteristics curve.

Reciprocating Pump : Principles of working, slip, work done, effect of acceleration and frictional resistance, separation

Text Books

1. Fluid Mechanics, A.K. Mohanty, PHI
2. Introduction to Fluid Mechanics and Fluid Machines, S.K. Som and G. Biswas, TMH
3. Fluid Mechanics, Modi & Seth

BSCP 2201 PHYSICS - II (2-0-0)

This one semester Physics course is divided into four units. The unit - I deals with some aspects of nuclear physics, unit - II introduces certain features of condensed matter physics, unit - III deals with certain aspects of semiconductors and superconductors and unit - IV introduces Opto-electronic devices and fibre-optic communication system.

Unit - 1

This unit covers the basic principles and applications of different types of accelerators and their important applications.

Detailed constructional features of accelerators are not necessary.

1. Need for nuclear accelerators.
2. D.C. Accelerators : Cockcroft - Walton, Van de Graff, Tandem accelerators.
3. RF accelerators : Linear accelerator, cyclotron, electron accelerator, betatron.
4. Application of nuclear accelerators - production of radioisotopes, radiation processing of materials, medical applications.

Unit - 2

This Unit deals with diffraction in crystals and its role in determining crystal structure.

Study of crystal structure by diffraction methods, Bragg's condition for crystal diffraction, Lau condition, Miller indices, Reciprocal lattice, Geometrical structure factor, Atomic form factor.

Unit - 3

This unit deals with certain features of semiconductors and superconductors.

1. Energy bands in solids: Kronig - Penny model, allowed bands and forbidden gaps, elemental and compound semiconductors.
2. Superconductivity : Superconductors and their properties, Meisner effect, Type - I and Type - II Superconductors, Thermodynamic properties of superconductors, London equation, Application of superconductors.

Unit - 4

This unit introduces some Opto - electronic devices and fibre - optic communication system.

Laser : Principle of lasing, properties of Laser, construction and working of semiconductor laser, Application of laser.

LED : Principle construction of operation and application, Introduction to fibre optics, basic characteristics of optical fibres, optical fibre communication system.

Books Recommended

1. Nuclear Physics, P. R. Roy & B. P. Nigan
2. Particle Accelerators, M. S. Livingston & J. P. Blewett
3. Concepts of Modern Physics, A. Beiser
4. Introduction to Solid State Physics, C. Kittel
5. Introduction to Lasers, A. Avadhnlulu
6. Physics - II, B. B. Swain and P. K. Jena.

BSCP 2202 PHYSICS OF SEMICONDUCTOR DEVICES (2-0-0)

Module I

(9 hours)

An appreciation of Quantum Mechanics in determining electrical properties of semiconductor.

The Semiconductor in Equilibrium :

variation of EF with doping concentration and temperature.

Carrier Diffusion: Diffusion current density. Total current density. The Einstein relation.

Module II

(9 hours)

Non-equilibrium Excess Carrier in Semiconductor

The Pn junction and Diode

Pn junction Diode : Ideal – current voltage relationship, Minority Carrier distribution, Ideal Pn junction currents under forward and reverse bias.

Module III

(9 hours)

Pn junction diode (contd.):

Metal-Oxide- Semiconductor FET (MOSFET)

The basic MOSFET operation, Current –Voltage relation (Concepts)

Frequency limitation : Small signal Equivalent circuit.

The CMOS Technology.

Module IV

(8 hours)

The Bipolar Transistor

Basic Principle of Operation., Simplified Transistor Current Relation. Modes of operation, Amplification with Bipolar transistors, Minority Carrier distribution Forward active mode, other modes of operation. Low Frequency Common Base Current gain,. Non-ideal effects –Base width Modulation, Breakdown Voltage. Equivalent Circuit Models –Eber's –Moll Model, Hybrid- Pi model. Frequency limitation. Large Signal Switching characteristics.

Text Book :

1. Semiconductor Physics and Devices- Basic Principles BY Donald A. Neamen, 3rd Edition, Tata McgrawHill Edition. (Selected portion from chapters 2,4,4,6,7,8,10 &11.)

For additional reading

2. Solid state Electronics Devices – y Ben G. Streetman and Sanjay Benerjee, 5th Edition, Pearson Edu.

BSCC 2201 CHEMISTRY - II (3-0-0)

(Total No. of Lectures = 40)

Module I (10 Lectures)

Water quality parameters and standards. Treatment of water for industrial and domestic purpose.

Hardness of Water : Types of hardness, Units of hardness, Determination of hardness(EDTA method). Disadvantages of hardwater in boiler, Water Softening Techniques (Lime soda, Ion exchange and zeolite). Boiler feed water, Water for Domestic purposes (Municipal / Drinking Water)

Module II (14 Lectures)

(To develop the basic concepts on corrosion and industrially important polymers.

1. Corrosion:

Dry and wet corrosion, Galvanic Corrosion, Stress Corrosion, Factors affecting corrosion, Corrosion Control : (Proper design and fabrication procedure, Cathodic protection, Passivation).

(6 Lectures)

2. Polymers:

Nomenclature and classification, Mechanism of polymerization (free radical and ionic) Thermoplastic and thermosetting resins, Some typical useful polymers: Polyethylene, PVC,

polystyrene, PMMA, Nylon 6 : 6, Nylon 6, Bakelite, Terylene, Silicones, Natural and synthetic rubbers: Neoprene, Butyl and Polyurethane rubber, Vulcanization.

(8 Lectures)

Module III (10 Lectures)

(To introduce the students about the basic concepts of fuels)

1. Fuels:

Classification of fuels, calorific value, Analysis of Coal, Manufacturing process of metallurgical coke, Refining of Crude oil, Fractional distillation, Cracking, Knocking and antiknocking, Octane and Cetane number.

Gaseous Fuel : Producer gas, Water gas, LPG & CNG.

Combustion Calculation.

Module IV (6 Lectures)

1. Environment pollution :

Green house effect, acid rain, depletion of ozone layer; Water pollution- bio chemical effect of lead, arsenic, mercury and fluorides, sewage-B.O.D. and C.O.D.

Books :

1. Engineering Chemistry by P. C. Jain and M. Jain.
2. Engineering Chemistry by R. Gopalan, D. Venkapaya and S. Nagarajan - Vikas Publishing House.
3. Environmental Pollution, A.K. Dey.

BSCC 2202 MATERIAL SCIENCES (2-0-0)

MODULE - I (8 Lectures)

1. Classification of Engineering Materials. Engineering properties of materials. Internal structure and properties.
2. Electron theory of solids : Free electron theory of metals. Electrical conductivity; Thermal conductivity, Quantum theory of free electrons. Band theory of solids, Conductivity of metals
3. Conductors, Insulators, Semiconductors, Intrinsic and extrinsic semiconductors, Band theory of semi conductors Hall effect.

MODULE - II (8 Lectures)

4. **Super Conductors** - Zero resistivity, Critical magnetic field and critical current density. Type I and II super conductors. Applications of Supercoductors.
5. **Dielectric Materials** : Microscopic Displacement of atoms and molecules in an external dc electric field, Polarization and dielectric constant, Dielectric susceptibiity. Temperature dependence, Dielectric Breakdown. Ferro electric material Piezoelectrics, Pyroelectrics, Dielectric Materials as electrical isulators.
6. **Magnetic Properties of Materials** : Dia, Para and Ferro magenetic materials. Theory of magnetism, Ferro magnetic materials or Ferrites, Comparison of magnetic behaviour and magnetic parameters of Dia, Para and Ferro magnetic materials.

MODULE - III (7 Lectures)

7. Optical Properties of Materials : Scattering, Refraction, Theory of Refraction and absorption, Atomic Theory of optical properties. Lasers, Optical fibres - Principle, structure, application of optical fibre.
8. Organic Materials : Polymers - Mechanism of Polymerization : Addition, condensation and co-polymerisation, applications.

Plastics - Types : Thermosetting and thermoplastics.

MODULE - IV (7 Lectures)

9. **Composite Materials** : Agglomerated Materials : Cermets, Reinforced Materials : Reinforced Concrete. Glass fibre reinforced plastics, Carbon fibre reinforced plastics. Whiskers, fibre reinforced plastics, Laminated plastic sheets. Tufnol, Properties of composites.
10. **Ceramics** : Types, Structure, Mechanical properties, applications
11. **Performance of Materials in Service** : Service performance, failure, design considerations, Corrosion - types, (Atmospheric, Pitting, Stress Corrosion), Control & prevention, protective coating, Performance of metals and Ceramics at high temperature.

Text Books :

1. Callister W.D., Materials Science and Engineering, John Wiley & Sons.
2. Vijaya M. S., Rangarajan G, Materials Science, TMH
3. Rajendra V., Marikani A., Materials Science, TMH
4. Van Vlack L. H., Elements of Material Science and Engineering, Addison Wesley

BCSE 3201 OBJECT ORIENTED PROGRAMMING USING C++ (3-0-0)

Module I (10 hours)

Introduction to object oriented programming, user defined types, polymorphism, and encapsulation. Getting started with C++ -syntax, data-type, variables, strings, functions, exceptions and statements, namespaces and exceptions, operators. Flow control, functions, recursion. Arrays and pointers, structures.

Module II (10 hours)

Abstraction mechanisms : Classes, private, public, constructors, member functions, static members, references etc. Class hierarchy, derived classes.

Inheritance: simple inheritance, polymorphism, object slicing, base initialization, virtual functions.

Module III (12 hours)

Prototypes, linkages, operator overloading, ambiguity, friends, member operators, operator function, I/O operators etc.

Memory management: new, delete, object copying, copy constructors, assignment operator, this input/output.

Exception handing: Exceptions and derived classes, function exception declarations, Unexpected exceptions, Exceptions when handling exceptions, resource capture and release etc.

Module IV (8 hours)

Templates and Standard Template library : template classes, declaration, template functions, namespaces, string, iterators, hashes, iostreams and other type.

Design using C++ design and development, design and programming, role of classes.

Text Books :

1. Bhav & Patekar- Object oriented Programming with C++, Pearson Education
2. Ashok N. Kamthane- Object oriented Programming with ANSI & Turbo C++, Pearson Education.

3. Robert Lafore- Object oriented programming in Microsoft C++.
4. Balguru Swamy-C++, TMH publication

HSSM 4201 ENGINEERING ECONOMICS AND COSTING(3-0-0)

Module I (10 hours)

Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

Module II (10 hours)

Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost – effectiveness analysis.

Module III (10 hours)
hours)

1. Horn green, C.T., Cost Accounting, Prentice Hall of India
2. Riggs, J.L ., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996 (Chapter 2,3,4,5,7,8,9,11,12)

HSSM 4202 ORGANIZATIONAL BEHAVIOUR (3-0-0)

Module I (8 hours)

The Study of Organizational Behaviour : Learning objectives, Definition and Meaning, Why Study OB, An OB Model, New Challenges for OB Manager.
Learning – Nature of Learning, How Learning occurs, Learning and OB.
Case Analysis

Module II (10 hours)

Foundations of Individual Behaviour : Personality – Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.
Perception – Meaning and Definition, Perceptual Process, Importance of Perception in OB.
Motivation – Nature and Importance, Herzberg's Two Factor Theory, Maslow's Need Hierarchy Theory, Alderfer's ERG Theory, Evaluations.
Case Analysis

Module III (12 hours)

Organizational Behaviour Process : Communication – Importance, Types, Gateways and Barriers to Communication, Communication as a tool for improving Interpersonal Effectiveness. Groups in Organizations - Nature, Types, Why do people join groups, Group Cohesiveness and Group Decision-making Managerial Implications, Effective Team Building. Leadership – Leadership & Management, Theories of Leadership – Trait theory, Leader Behaviour theory, Contingency Theory, Leadership and Followership, How to be an effective Leader. Conflict – Nature of Conflict and Conflict Resolution.
An Introduction to Transactional Analysis (TA).
Case Analysis

Module IV (10 hours)

Organization : Organizational Culture – Meaning and Definition, Culture and Organizational Effectiveness. Introduction to Human Resource Management – Selection, Orientation, Training and Development, Performance Appraisal, Incentives Organizational Change – Importance of Change, Planned Change and OB techniques. International Organizational Behaviour – Trends in International Business, Cultural Differences and Similarities, Individual and Interpersonal Behaviour in Global Perspective.
Case Analysis

TEXTBOOKS:

Keith Davis, Organizational Behaviour, McGraw – Hill.

K.Aswhathappa, Organizational Behaviour, Himalaya Publishing House.

REFERENCE BOOKS:

Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.

Pradip N. Khandwalla, Organizational Behaviour, McGraw – Hill, New Delhi.

CPMN 8201 GEOLOGY (3-1-0)

Module I (10 Classes)

Introduction: Science of Geology, its scope and application to engineering problems.

Physical Geology : Introduction, weathering, erosion transportation, deposition, geological action of wind, river glacier, underground water and sea; diastrophism, earth quakes and volcanoes.

Module II (10 Classes)

Mineralogy : Crystals, Symmetry elements of normal classes of systems, mineral and their physical properties, determinative properties and occurrence of common rock forming minerals (in India), Quartz orthoclase, labradorite, muscovite, biotite, olivine, augite, hornblende, calcite, dolomite, apatite, barite, fluorite, tourmaline, beryl.

Module III (10 Classes)

Petrology : Micro petrology of igneous, sedimentary and metamorphic rocks, description of rocks with special reference to economic potentialities; granite, syenite, diorite, gabbro, dunite, peridotite, pegmatite, dolerite, basalt, conglomerate, sand stone, shale, lime stone, quartzite, marble, slate, schist and gneiss.

Module IV (12 Classes)

Structural Geology : Elementary knowledge of rock deformation and structural characteristics of deformed rocks, attitude of rock beds-strike, dip-true and apparent; folds and faults, their description, classification, out-crop patterns and recognition, joints, unconformities/ simple forms of igneous rocks, dykes, sills, batholiths, laccoliths, cone-sheets.

Engineering Geology : Geological considerations in connection with (a) Dam and associated reservoirs (b) tunnels (c) bridges (d) landslides and (e) ground

PRACTICALS

BENG 9202 BASIC ELECTRONICS LAB. (0-0-3)

(At least 8 experiments including 1 - 7 and any one from 8 - 10)

1. Familiarity with electronics components and Devices
Testing of a semiconductor Diode and a Transistor. IC pins connection (Digital Multimeter should be used should be used in testing components and devices).
2. Study and use of Oscilloscope to view waveforms and measure its amplitude and frequency.
3. V - I Characteristic of a semiconductor diode. Determining DC and AC resistance.
4. Half wave and Full wave rectifiers without and with capacitor filter. Record of waveforms, Measurement of Average and rms values.
5. V - I Characteristics of npn or pnp transistor. DC Biasing and measurement of dc voltages and currents.

6. Gain - frequency response of JFET common source R-C coupled amplifier/BJT CE RC coupled Amplifier.
7. Op amp in Inverting, non inverting, Integrating and Differentiating configuration, Record of wave forms.
8. Truth Tables of logic gates.
9. Study and experiment using MUX - DEMUX ICs / Shift Register IC.
10. Study on CMOS logic Inverter.

BENG 9201 BASIC ELECTRICAL ENGINEERING LAB. (0-0-3)

List of Experiment (Any 8 of the following)

1. Study and measurement the armature and field resistance of a DC machine.
2. Calibration of ammeter, voltmeter and wattmeter with the help of sub-standard instrument.
3. Verification of circuit theorems. Thevenin's and Superposition theorems (with DC source only).
4. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current, voltages and power in R-L-C series circuit excited by Single Phase AC supply.
6. Connection and starting of a three phase induction motor using direct online (DOL). or star-delta starter.
7. Connection and measurement of power consumption of a fluorescent lamp.
8. Determination of open circuit characteristics (OCC) of DC machine.
9. Starting and speed control of a DC shunt motor.
10. Connection and testing of a single phase energy meter (unity power factor load only)
11. Study of fan motor

BCSE 9201 OOP WITH C++ LAB. (0-0-3)

(10 classes for 10 different programs)

1. Programs on concept of classes and objects.(1 class)
2. Programs using inheritance.(1 class)
3. Programs using polymorphism.(1 class)
4. Programs on use of operator overloading.(1 class)
5. Programs on use of memory management.(1 class)
6. Programs on exception handling and use of templates.(1 class)
7. Programs on File handling in C++.(1 class)
8. Design problem on stock and accounting of a small organization, railway reservation, payroll preparation and optimization problem.(3 classes)

BENG 9203 MECHANICAL ENGINEERING LAB. (0-0-3)

Group A (Mechanics / Material Testing Lab.

1. Determination of equilibrium of coplanar forces.
2. Determination of Moment of Intertia of Flywheel
3. Determination of tensile strength of materials by Universal Testing Machine.

Group B

4. Determination of Metacentric Height and application to stability of floating bodies.
5. Verification of Bernoulli's Theorem and its application to Venturimeter.
6. Determination of Cd and Cd of Orifices.

Group C

7. Calibration of Bourden Type Pressure gauj and measurement pressure using manometers.
8. Study of Cut-Sections of 2 stroke and 4 stroke Diesel Engine.
9. Study of Cut-Sections of 2 stroke and 4 stroke Petrol Engine.

CPMN 9201 GEOLOGY LAB. (0-0-3)

The student will have to go for four weekends for geological tour besides sessional / practicals classes in 3rd semester.

1. Study of Physical properties minerals.
2. Study of important rock types of Igneous rocks, sedimentary rocks and metamorphic rocks.
3. Recognition of folds from maps.
4. Recognition of faults from maps.

4th Semester

BSCM 2202 MATHEMATICS - IV (3-1-0)

Module - I

Solution of equations by iteration, Newton's method, Secant method, Interpolation
Numerical integration and differntiation

Module - II

Gauss Siedel iteration method for solving a system of linear equations, Ruage Kutta Methods,
Introductory Linear Programming, Introductory Programming

Module - III

Probability, Random variables, Probability distribution, mean & variance of distribution
Binomial, Poisson, hyper-geometric and normal distributions

Module - IV

Random sampling, estimation of parameters, confidence intervals, Testing of hypothesis, acceptance
sampling, correlation and regression

Course covered by : Advance Mathematics by E. Kreyszig (8th Edition)

Chapter 17 (17.1 - 17.3, 17.5), Chapter 18 (18.4), Chapter 19 (19.1), Chapter 20, Chapter 21, Chapter
22

BENG 1208 - FLUID MECHANICS AND HYDRAULIC MACHINE (3-1-0)

Module – I

(12 hours)

Introduction : Scope of fluid mechanics and its development as a science

Physical property of Fluid

Density, specific gravity, specific weight, specific volume, surface tension and capillarity, viscosity, compressibility and bulk modulus, Fluid classification.

Fluid static

Pressure, Pascal's Law, Pressure variation for incompressible fluid, atmospheric pressure, absolute pressure, gauge pressure and vacuum pressure, manometer.

Hydrostatic process on submerged surface, force on a horizontal submerged plane surface, force on a vertical submerged plane surface.

Module – II

(12 hours)

Buoyancy and flotation, Archimedes' principle, stability of immersed and floating bodies, determination of metacentric height.

Fluid kinematics : Introduction, description of fluid flow, classification of fluid flow. Acceleration of fluid particles, flow rate and continuity equation, differential equation of continuity.

Fluid dynamics : Introduction, Euler's equation along a streamline, energy equation, Bernoulli's equation, Analysis of finite control volumes and its application to siphon, venturimeter, orifice meter

Module – III

(6 hours)

Turbine : Classification, reaction, Impulse, outward flow, inward flow and mixed flow turbines, Francis & Kaplan turbines, Pelton wheel, Physical description and principle of operation, Governing of Turbine.

Module – IV

(8 hours)

Centrifugal Pump : Principles of classification, Blade angles, Velocity triangle, efficiency, specific speed, characteristics curve.

Reciprocating Pump : Principles of working, slip, work done, effect of acceleration and frictional resistance, separation

Text Books

1. Fluid Mechanics, A.K. Mohanty, PHI
2. Introduction to Fluid Mechanics and Fluid Machines, S.K. Som and G. Biswas, TMH
3. Fluid Mechanics, Modi & Seth

BSCC 2201 CHEMISTRY - II (3-0-0)

(Total No. of Lectures = 40)

Module I (10 Lectures)

Water quality parameters and standards. Treatment of water for industrial and domestic purpose.

Hardness of Water : Types of hardness, Units of hardness, Determination of hardness(EDTA method). Disadvantages of hardwater in boiler, Water Softening Techniques (Lime soda, Ion exchange and zeolite). Boiler feed water, Water for Domestic purposes (Municipal / Drinking Water)

Module II (14 Lectures)

(To develop the basic concepts on corrosion and industrially important polymers.

1. Corrosion:

Dry and wet corrosion, Galvanic Corrosion, Stress Corrosion, Factors affecting corrosion, Corrosion Control : (Proper design and fabrication procedure, Cathodic protection, Passivation).

(6 Lectures)

2. Polymers:

Nomenclature and classification, Mechanism of polymerization (free radical and ionic) Thermoplastic and thermosetting resins, Some typical useful polymers: Polyethylene, PVC, polystyrene, PMMA, Nylon 6 : 6, Nylon 6, Bakelite, Terylene, Silicones, Natural and synthetic rubbers: Neoprene, Butyl and Polyurethane rubber, Vulcanization.

Module III (10 Lectures)

(To introduce the students about the basic concepts of fuels)

1. Fuels:
Classification of fuels, calorific value, Analysis of Coal, Manufacturing process of metallurgical coke, Refining of Crude oil, Fractional distillation, Cracking, Knocking and antiknocking, Octane and Cetane number.
Gaseous Fuel : Producer gas, Water gas, LPG & CNG.
Combustion Calculation.

Module IV (6 Lectures)

1. Environment pollution :
Green house effect, acid rain, depletion of ozone layer; Water pollution- bio chemical effect of lead, arsenic, mercury and fluorides, sewage-B.O.D. and C.O.D.

Books :

1. Engineering Chemistry by P. C. Jain and M. Jain.
2. Engineering Chemistry by R. Gopalan, D. Venkapaya and S. Nagarajan - Vikas Publishing House.
3. Environmental Pollution, A.K. Dey.

BSCC 2202 MATERIAL SCIENCES (2-0-0)

MODULE - I (8 Lectures)

1. Classification of Engineering Materials. Engineering properties of materials. Internal structure and properties.
2. Electron theory of solids : Free electron theory of metals. Electrical conductivity; Thermal conductivity, Quantum theory of free electrons. Band theory of solids, Conductivity of metals
3. Conductors, Insulators, Semiconductors, Intrinsic and extrinsic semiconductors, Band theory of semi conductors Hall effect.

MODULE - II (8 Lectures)

4. Super Conductors - Zero resistivity, Critical magnetic field and critical current density. Type I and II super conductors. Applications of Superconductors.
5. Dielectric Materials : Microscopic Displacement of atoms and molecules in an external dc electric field, Polarization and dielectric constant, Dielectric susceptibility. Temperature dependence, Dielectric Breakdown. Ferro electric material Piezoelectrics, Pyroelectrics, Dielectric Materials as electrical insulators.
6. Magnetic Properties of Materials : Dia, Para and Ferro magnetic materials. Theory of magnetism, Ferro magnetic materials or Ferrites, Comparison of magnetic behaviour and magnetic parameters of Dia, Para and Ferro magnetic materials.

MODULE - III (7 Lectures)

7. Optical Properties of Materials : Scattering, Refraction, Theory of Refraction and absorption, Atomic Theory of optical properties. Lasers, Optical fibres - Principle, structure, application of optical fibre.
8. Organic Materials : Polymers - Mechanism of Polymerization : Addition, condensation and co-polymerisation, applications.
Plastics - Types : Thermosetting and thermoplastics.

MODULE - IV (7 Lectures)

9. Composite Materials : Agglomerated Materials : Cermets, Reinforced Materials : Reinforced Concrete. Glass fibre reinforced plastics, Carbon fibre reinforced plastics. Whiskers, fibre reinforced plastics, Laminated plastic sheets. Tufnol, Properties of composites.
10. Ceramics : Types, Structure, Mechanical properties, applications
11. Performance of Materials in Service : Service performance, failure, design considerations, Corrosion - types, (Atmospheric, Pitting, Stress Corrosion), Control & prevention, protective coating, Performance of metals and Ceramics at high temperature.

Text Books :

1. Callister W.D., Materials Science and Engineering, John Wiley & Sons.
2. Vijaya M. S., Rangarajan G, Materials Science, TMH
3. Rajendra V., Marikani A., Materials Science, TMH
4. Van Vlack L. H., Elements of Material Science and Engineering, Addison Wesley

BSCP 2201 PHYSICS - II (2-0-0)

This one semester Physics course is divided into four units. The unit - I deals with some aspects of nuclear physics, unit - II introduces certain features of condensed matter physics, unit - III deals with certain aspects of semiconductors and superconductors and unit - IV introduces Opto-electronic devices and fibre-optic communication system.

Unit - 1

This unit covers the basic principles and applications of different types of accelerators and their important applications.

Detailed constructional features of accelerators are not necessary.

1. Need for nuclear accelerators.
2. **D.C. Accelerators** : Cockcroft - Walton, Van de Graff, Tandem accelerators.
3. **RF accelerators** : Linear accelerator, cyclotron, electron accelerator, betatron.
4. **Application of nuclear accelerators** - production of radioisotopes, radiation processing of materials, medical applications.

Unit - 2

This Unit deals with diffraction in crystals and its role in determining crystal structure.

Study of crystal structure by diffraction methods, Bragg's condition for crystal diffraction, Lau condition, Miller indices, Reciprocal lattice, Geometrical structure factor, Atomic form factor.

Unit - 3

This unit deals with certain features of semiconductors and superconductors.

1. **Energy bands in solids: Kronig - Penny** model, allowed bands and forbidden gaps, elemental and compound semiconductors.

2. **Superconductivity** : Superconductors and their properties, Meisner effect, Type - I and Type - II Superconductors, Thermodynamic properties of superconductors, London equation, Application of superconductors.

Unit - 4

This unit introduces some Opto - electronic devices and fibre - optic communication system.

Laser : Principle of lasing, properties of Laser, construction and working of semiconductor laser, Application of laser.

LED : Principle construction of operation and application, Introduction to fibre optics, basic characteristics of optical fibres, optical fibre communication system.

Books Recommended

1. Nuclear Physics, P. R. Roy & B. P. Nigan
2. Particle Accelerators, M. S. Livingston & J. P. Blewett
3. Concepts of Modern Physics, A. Beiser
4. Introduction to Solid State Physics, C. Kittel
5. Introduction to Lasers, A. Avadhnulu
6. Physics - II, B. B. Swain and P. K. Jena.

BSCP 2202 PHYSICS OF SEMICONDUCTOR DEVICES (2-0-0)

Module I

(9 hours)

An appreciation of Quantum Mechanics in determining electrical properties of semiconductor.

The Semiconductor in Equilibrium :

variation of EF with doping concentration and temperature.

Carrier Diffusion: Diffusion current density. Total current density. The Einstein relation.

Module II

(9 hours)

Non-equilibrium Excess Carrier in Semiconductor

The Pn junction and Diode

Pn junction Diode : Ideal – current voltage relationship, Minority Carrier distribution, Ideal Pn junction currents under forward and reverse bias.

Module III

(9 hours)

Pn junction diode (contd.):

Metal-Oxide- Semiconductor FET (MOSFET)

operation, Current –Voltage relation (Concepts)

Frequency limitation : Small signal Equivalent circuit.

The CMOS Technology.

Module IV

(8 hours)

The Bipolar Transistor

Current gain,. Non-ideal effects –Base width Modulation, Breakdown Voltage. Equivalent Circuit Models –Eber's –Moll Model, Hybrid- Pi model. Frequency limitation. Large Signal Switching characteristics.

Text Book :

1. Semiconductor Physics and Devices- Basic Principles BY Donald A. Neamen, 3rd Edition, Tata McgrawHill Edition. (Selected portion from chapters 2,4,4,6,7,8,10 &11.)

For additional reading

2. Solid state Electronics Devices – y Ben G. Strectman and Sanjay Benerjee, 5th Edition, Pearson Edu.

BCSE 3202 RELATIONAL DATABASE MANAGEMENT SYSTEMS (3-0-0)

Module I (10 hours)

Database System Architecture - Data Abstraction, Data Independence, Data Definitions and Data Manipulation Languages.

Data models - Entity Relationship(ER), Mapping ER Model to Relational Model, Network .Relational and Object Oriented Data Models, Integrity Constraints and Data Manipulation Operations.

Module II (10 hours)

Relation Query Languages, Relational Algebra, Tuple and Domain Relational Calculus, SQL and QBE.

Relational Database Design: Domain and Data dependency, Armstrong's Axioms, Normal Forms, Dependency Preservation, Lossless design, Comparison of Oracle & DB2

Module III (8 hours)

Query Processing and Optimization : Evaluation of Relational Algebra Expressions, Query Equivalence, Join strategies, Query Optimization Algorithms.

Module IV (12 hours)

Storage Strategies : Indices, B-Trees, Hashing, Transaction processing: Recovery and Concurrency Control, Locking and Timestamp based Schedulers, Multiversion and Optimistic Concurrency Control Schemes.

Advanced topics : Object-Oriented and Object Relational databases. Logical Databases, Web Databases, Distributed Databases, Data Warehouse and Data Mining.

Text Books:-

1. **Elmaski & Navathe** -Fundamentals of Database Systems, 4th Edition, Pearson Education
2. **C.J.Date** - An introduction to Database Systems, Pearson Education
3. **Bipin Desai** -An introduction to Database System, Galgotia Publication.

HSSM 4202 ORGANIZATIONAL BEHAVIOUR (3-0-0)

Module I (8 hours)

The Study of Organizational Behaviour : Learning objectives, Definition and Meaning, Why Study OB, An OB Model, New Challenges for OB Manager.

Learning – Nature of Learning, How Learning occurs, Learning and OB.

Case Analysis

Module II (10 hours)

Foundations of Individual Behaviour : Personality – Meaning and Definition, Determinants of Personality, Personality Traits, Personality and OB.

Perception – Meaning and Definition, Perceptual Process, Importance of Perception in OB.

Motivation – Nature and Importance, Hertzberg's Two Factor Theory, Maslow's Need Hierarchy Theory, Alderfer's ERG Theory, Evaluations.

Case Analysis

Module III (12 hours)

Organizational Behaviour Process : Communication – Importance, Types, Gateways and Barriers to Communication, Communication as a tool for improving Interpersonal Effectiveness. Groups in Organizations - Nature, Types, Why do people join groups, Group Cohesiveness and Group Decision-making Managerial Implications, Effective Team Building. **Leadership** – Leadership & Management,

Theories of Leadership – Trait theory, Leader Behaviour theory, Contingency Theory, Leadership and Followership, How to be an effective Leader. Conflict – Nature of Conflict and Conflict Resolution. An Introduction to Transactional Analysis (TA).
Case Analysis

Module IV (10 hours)

Organization : Organizational Culture – Meaning and Definition, Culture and Organizational Effectiveness. Introduction to Human Resource Management – Selection, Orientation, Training and Development, Performance Appraisal, Incentives **Organizational Change** – Importance of Change, Planned Change and OB techniques. International Organizational **Behaviour** – Trends in International Business, Cultural Differences and Similarities, Individual and Interpersonal Behaviour in Global Perspective.

Case Analysis

TEXTBOOKS:

Keith Davis, Organizational Behaviour, McGraw – Hill.

K.Aswhathappa, Organizational Behaviour, Himalaya Publishing House.

REFERENCE BOOKS:

Stephen P. Robbins, Organizational Behaviour, Prentice Hall of India.

Pradip N. Khandwalla, Organizational Behaviour, McGraw – Hill, New Delhi.

HSSM 4201 ENGINEERING ECONOMICS AND COSTING(3-0-0)

Module I (10 hours)

Present worth comparisons, Comparisons of assets with equal, unequal and infinite lives, comparison of deferred investments, Future worth comparison, pay back period comparison.

Module II (10 hours)

Projects : Benefit/ Cost analysis, quantification of project, cost and benefits, benefit/ cost applications, Cost –effectiveness analysis.

Module III (10 hours)

(12 hours)

1. Horn green, C.T., Cost Accounting, Prentice Hall of India
2. Riggs, J.L ., Dedworth, Bedworth, D.B, Randhawa, S.U. Engineering Economics, McGraw Hill International Edition, 1996 (Chapter 2,3,4,5,7,8,9,11,12)

PCCI 8201 SURVEYING - I (3-1-0)

Module I (8 hours)

1. Linear measurement and chain survey : Use of various types of chains and tapes measurement of correct length of line, Direct and indirect ranging, chaining along sloping ground. Obstacle in chaining, errors and their elimination.

Module II (12 hours)

2. **Compass surveying** : Use of prismatic compass, temporary adjustment, bearing of a line, local attractions, correction of bearing.
3. **Plane table surveying** : Methods of plane table, radiations. intersection, traversing and resection. 2-point and 3-point problem. Adjustment and common error in plane table survey.

Module III (10 hours)

4. **Levelling** : Use of dumpy level and levelling staff. Temporary and Permanent adjustments of dumpy level. Reduction of levels by H.I and rise and fall method. Curvature and refraction error, sensitiveness of level tube, reciprocal levelling, levelling difficulties and common errors.

Module - IV

(12 hours)

5. **Contouring** : Contour interval and horizontal equivalent. Characteristics of contours, methods of contouring - different and indirect method, contour gradient.
6. **Theodolite Survey** : Use of theodolite, temporary adjustment, measuring horizontal and vertical angles, theodolite traversing

Books :

1. Surveying & levelling Vol - 1, T. P. Kanetkar & S. V. Kulkarni
2. Surveying - Vol - I, B. C. Purnia
3. Surveying, Husain & Nagnas

PRACTICALS

BENG 9201 BASIC ELECTRICAL ENGINEERING LAB. (0-0-3)

List of Experiment (Any 8 of the following)

1. Study and measurement the armature and field resistance of a DC machine.
2. Calibration of ammeter, voltmeter and wattmeter with the help of sub-standard instrument.
3. Verification of circuit theorems. Thevenin's and Superposition theorems (with DC source only).
4. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current, voltages and power in R-L-C series circuit excited by Single Phase AC supply.
6. Connection and starting of a three phase induction motor using direct online (DOL). or star-delta starter.
7. Connection and measurement of power consumption of a fluorescent lamp.
8. Determination of open circuit characteristics (OCC) of DC machine.
9. Starting and speed control of a DC shunt motor.
10. Connection and testing of a single phase energy meter (unity power factor load only)
11. Study of fan motor

BENG 9202 BASIC ELECTRONICS LABAROTARY (0-0-3)

(At least 8 experiments including 1 - 7 and any one from 8 - 10)

1. Familiarity with electronics components and Devices
Testing of a semiconductor Diode and a Transistor. IC pins connection (Digital Multimeter should be used should be used in testing components and devices).
2. Study and use of Oscilloscope to view waveforms and measure its amplitude and frequency.
3. V - I Characteristic of a semiconductor diode. Determining DC and AC resistance.
4. Half wave and Full wave rectifiers without and with capacitor filter. Record of waveforms, Measurement of Average and rms values.
5. V - I Characteristics of anpn or pnp transistor. DC Biasing and measurement of dc voltages and currents.

6. Gain - frequency response of JFET common source R-C coupled amplifier/BJT CE RC coupled Amplifier.
7. Op amp in Inverting, non inverting, Integrating and Differentiating configuration, Record of wave forms.
8. Truth Tables of logic gates.
9. Study and experiment using MUX - DEMUX ICs / Shift Register IC.
10. Study on CMOS logic Inverter.

BCSE 9202 RDBMS LAB. (0-0-3)
(10 Classes for 10 Different Programs)

1. Use of SQL syntax : Insertion, Deletion, Join), Updation using SQL. (1 class)
2. Program segments in embedded SQL using C as host language to find average grade point of a student, etc.. (1 class)
3. Program for Log based data recovery technique. (1 class)
4. Program on data recovery using check point technique. (1 class)
5. Concurrency control problem using lock operations. (1 class)
6. Use of package (ORACLE) for programming approaches(2 classes)
7. Use of package (DB2) for programming approaches(2 classes)
8. Programs on JDBC/ODBC to print employee's / student's information of a particular department. (1 class)

BENG 9201 BASIC ELECTRICAL ENGINEERING LAB. (0-0-3)

List of Experiment (Any 8 of the following)

1. Study and measurement the armature and field resistance of a DC machine.
2. Calibration of ammeter, voltmeter and wattmeter with the help of sub-standard instrument.
3. Verification of circuit theorems. Thevenin's and Superposition theorems (with DC source only).
4. Voltage-current characteristics of incandescent lamps and fusing time-current characteristics of fuse wire.
5. Measurement of current, voltages and power in R-L-C series circuit excited by Single Phase AC supply.
6. Connection and starting of a three phase induction motor using direct online (DOL). or star-delta starter.
7. Connection and measurement of power consumption of a fluorescent lamp.
8. Determination of open circuit characteristics (OCC) of DC machine.
9. Starting and speed control of a DC shunt motor.
10. Connection and testing of a single phase energy meter (unity power factor load only)
11. Study of fan motor

CPCE 9204 SURVEYING LAB. (0-0-3)

1. Testing of chain and measurement of correct length of the line.
2. Traversing by chain survey.
3. Traversing by Compass survey.
4. Intersection method of plane table survey.
5. Traversing by plane table.

6. Use of dumpy level and fly levelling.
7. Longitudinal Section and Cross Section of Road.
8. Contouring
9. Measurement of horizontal and vertical angle of theodolite.
10. Traversing by theodolite.

**COURSE STRUCTURE
THIRD YEAR B.TECH PROGRAMME
MINING ENGINEERING**

5th Semester				6th Semester			
<i>Theory</i>		<i>ContactHrs.</i>	<i>Credit</i>	<i>Theory</i>		<i>ContactHrs.</i>	<i>Credit</i>
			L-T-P				L-T-P
HSSM 4301	Optimisation Eng.	3-0-0	3	HSSM 4302	Production and Operation management	3-0-0	3
CPMN 6301	Surface Mining	3-1-0	4	CPMN 6306	Mineral Engineering and fuel Technology	3-1-0	4
CPMN 6303	Mining Geology	3-1-0	4	CPMN 6307	Mine Environmental and Safety Engg.	3-1-0	4
CPMN 6304	Mine Development	3-0-0	3	CPMN 6308	Mining Method (Coal & Metal)	3-0-0	3
CPMN 6302	Mining Machinery	3-0-0	3	CPEE 5361	Electrical equipment in Mines	3-0-0	3
CPME 6302	Machine Dynamics	3-0-0	3	CPME 6305	Mechanics of material	3-0-0	3
Total			20	Total			20
<i>Practicals/Sessionals</i>		<i>Contact Hrs.</i>	<i>Credit</i>	<i>Practicals/Sessionals</i>		<i>ContactHrs.</i>	<i>Credit</i>
CPME 9301	Hydraulics & Prod. Lab.	0-0-3	2	CPMN 9304	Mineral Engineering & Fuel Tech. Lab.	0-0-3	2
CPME 9302	Material Testing & Heat Power Lab.	0-0-3	2	CPMN 9305	Mine Environmental & Safety Engg. Lab.	0-0-3	2
CPME 9303	Design project	0-0-3	2	CPME 9306	Design Project	0-0-3	2
			6				6
Total			26	Total			26

L-Lecture

T-Tutorial

P-Practical

5th Semester

HSSM 4301 OPTIMIZATION IN ENGINEERING (3-0-0)

Course Objective : The course aims at acquainting the students to mathematical modeling of engineering design, operation and maintenance problems and their optimization algorithms.

Module – I (10 hours)

Formulation of engineering optimization problems : Decision variables, objective function and constraints. Example of typical design, operation and maintenance problems in engineering : Design of a water tank, design of a truss, design of a network (electrical, communication sewerage and water supply networks), product mix problem, transportation and assignment problems, shift scheduling of employees, design of reliable devices, design of reactors, shortest route problem, set covering problem, traveling salesman problems. Only physical problems and their mathematical models to be discussed.

Linear Programming Problem : Formulation, Graphical solution, Simplex method, Duality theory, Dual simplex method, Formulation and solution of engineering problems of planning and scheduling.

Module – II (10 hours)

Sensitivity Analysis, Transportation Problem, Assignment Problem, Network Models : Minimal Spanning Tree Problem, Maximal Flow Problem, Shortest Route Problem, Minimum Cost Flow Problem. Algorithms and applications to be covered.

Module – III (10 hours)

Integer Linear Programming Problem. Branch and Bound and Cutting Plane Methods. Zero-one Programming Problem, Knapsack Problem, Set covering Problem, Set Partitioning Problem, Traveling Salesman Problem. Deterministic Dynamic Programming Problems. Applications and algorithms to be discussed.

Module – IV (12 hours)

Queueing theory, Game theory, Simulation, Decision theory & Sequencing Problem

REFERENCES :

1. H. A. Taha – Operations Research, Prentice Hall of India, 2004.
2. D. T. Phillips, A Ravindran and J.J. Solaberg, Principles of Operation Research, John Wiley and Sons
3. S. Kalavathi, Operations research, Vikash Publication.
4. B.E Gillett, Introduction to operations research, TMH

CPMN 6301 SURFACE MINING (3-1-0)

Module - I :

Development of Mineral deposit by open cast method, factors affecting for choice of open cast method, advantages and disadvantages.

Module-II:

Drilling, blasting, loading and transportation in open cast mines, methods of stripping, bench parameters. Equipment used for different operations, choice and application .

Module-III:

Planning and design of surface mining operations with single bucket excavators, shovel and dragline, ultimate pit configuration, Development of face geometry for B.W.E. continuous surface miners, Simulation of surface mining operations & transportation, productivity calculation .

Module-IV:

Placer mining and sea-bed mining. Environmental problems in surface mining.

Book recommended :

1. Surface Mining by G.B. Mishra
2. Mining of Mineral Deposit by L.Shevyakov
3. Surface Mining by S.K.Das
4. EMT Vol.I by D.J.Deshmukh
5. Winning Coal & iron Ore by Deshkukh & Deshmukh .

CPMN 6303 MINING GEOLOGY (3 -1-0)

Module-I:

Process of formation of mineral deposits. Controls of mineral deposition. Principles and methods of geological, geophysical and geochemical Prospecting .

Module-II

Mine sampling. Estimation of ore reserves and grades, tenor, impurities and quality control .

Module-III

Mineralogy, mode of occurrence, distribution and commercial uses of important Mineral deposits of India i.e. Iron, Chromite, Buxite, Manganise, Copper, Lead-zinc, Industrial minerals-Mica, Gypsum, Kyanite, Limestone.

Module-IV

Principles of stratigraphy, stratigraph scale, Indian stratigraphy with reference to Geology of pre-cambrian and Gondwanas and their economic importance .

Books recommended :

1. Economic mineral deposit by Betman
2. Mineral deposits by Sinha & Sharma
3. Surface Mining by Dr.G.B.Mishra
4. Stratigraphy – Rabindra Kumar
5. Mining Geology- Mackinstrey
6. Mining Geology- Arogoswamy
7. Stratigraphy- M.S.Krishnan

CPMN 6304 MINE DEVELOPMENT (3-1-0)

Module-I:

Exploratory Drilling and production drilling .

Module-II:

Classification and properties of explosive, detonators. Detonating cords, and detonating fuse and nonel detonator. Mechanics of Rock blasting. Blasting practices in underground and surface mines, using modern initiation system.

Module-III:

Access to the Mineral deposit. Selection, location, size and shape, conventional and special method of shaft shrinking, shaft lining, Deepening and widening of shafts, raising and winzing.

Books Recommended :

1. Surface Mining by Dr. G.B.Mishra,
2. EMT Volume-I
3. SME Hand Book
4. Blasting Manual- Sandhu & Pradhan .

CPMN 6302 MINING MACHINERY (3-0-0)

Module-I :

Prime mover for mining machinery, I.C. Engine, Hydraulic power, pneumatic power, Element of mechanical power transmission gears, coupling, clutch and brake .

Module-II :

Belt conveyors, rope haulage and locomotive their constructional features, power calculation and safety appliances.

Module-III:

Wire rope and winding system. Mine hoist : Different types of winders, their constructional features, kinematics, torque and power calculation, speed control, safety devices, cage, skip, headgear structure, cage guide, shaft fittings. Man riding system in mine .

Module-IV :

application of compressor in mine, mine pump and drainage.

Books recommended :

1. Mine transport by N.T. Kerelin,
2. EMT Vol-III by Deshmukh .

CPME 6302 MACHINE DYNAMICS (3-0-0)

Module – I

(8 Hours)

1. Mechanism : Motor Vehicle Steering Gears : The Davis Steering Gear, The Ackermann Steering Gear, Hooke's Joint.
2. Gyroscope : Gyroscopic Couple –Plane Disc, Two Bladed air Screw, Analysis of the Force on bearings due to the Forced Processing of Rotating Disc mounted on Shafts, Gyroscopic Stabilisation.

Module II

(8 Hours)

3. Toothed gears : Theory of shape and action of tooth properties and methods of generation of standard Tooth profiles, Standard proportions, Interference and Under –Cutting, method for Eliminating Interference, minimum Number of teeth to avoid interference.
4. Cams : Simple Harmonic, Constant –Velocity and Constant Acceleration, Types, Displacement, velocity and Acceleration of Follower, Cams with specified Contours.

Module III

(10 Hours)

5. Governors : Centrifugal Governors-watt and Porter Governors, Spring Loaded Governor-Hartnell Governor, sensitiveness, Stability, Isochronism, Hunting, Governor Effort and Power, Curves of Controlling Force, effect of Friction.

6. Dynamics of Machine : Inertia Force, Inertia Torque, Inertia Force in the Reciprocating Engines, Turning Moment Diagrams, Flywheel.

Module IV

(12 Hours)

7. Balancing : Balancing of revolving masses in one plane and different planes, partial balance of single cylindrical engine.
8. Free and forced vibration of a spring-mass system with damping, Vibration isolation and transmissibility, transverse vibration of shafts carrying a point load, Uniformity distributed load and several loads, Dunkerly's method and energy method, Whirling of shafts, Two rotor systems, three rotor system, Geared system.

Textbooks :

1. Theory of Mechanics, S.S. Ratan, Tata McGraw Hill
2. Mechanism and Machine Theory, Rao & Duggipati, Wiley Eastern Ltd
3. Theory of Machines, Thomas Beven

PRACTICALS

CPME 9301 HYDROLICS & PROD. LAB. (0-0-3)

CPME 9302 MATERIAL TESTING & HEAT POWER LAB : (0-0-3) (Any eight experiments)

CPME 9303 DESIGN PROJECT – I (0-0-3)

1. Assembly drawing of tail-stock of lathe with bill of materials
2. Assembly drawing of screw jack with bill of materials
3. Design & drawing of Riveted joint
4. Design and drawing of cotter joint
5. Design and drawing of knuckle joint
6. Design of shafts subjected to combined loading
7. Design and drawing of flange coupling
8. Design of lever

Total number of Design : 6 nos.

Total No. of Drawing : 4 sheets (Two sheets for assembly drawing as per Sl no. 1 and 2 and two sheets for design, under Sl. No. 3, 4, 5 and 7)

6TH SEMESTER

HSSM 4302 PRODUCTION AND OPERATIONS MANAGEMENT (3-0-0)

Objective : The course aims at acquainting all engineering graduates irrespective of their specializations the basic issues and tools of managing production and operation functions of an organization.

Module I

1. Operation Function in an Organization, Manufacturing Vrs Service Operation, System view of Operations, Strategic Role of Operations, Operations Strategies for Competitive Advantages,

Operations Quality and Productivity Focus, Meeting Global Challenges of Production and Operations Imperatives.

(3 Hours)

2. Designing Products, Services and Processes New Product Design : Product Life Cycle, Product Development Process, Product Quality and Reliability Design, Process Technology : Project, Jobshop, Batch, Assembly Line, Continuous Manufacturing, Process Technology Life Cycle, Process Technology Trends, FMS, CIM, CAD, CAM, GT, Design for Services, Services Process Technology, Services Automation, Value Engineering, Standardization, Make or buy Decision.

(4 Hours)

3. Job Design and Work Measurement, Method Study : Techniques of Analysis, recording, improvement and standardization, Work Measurement : Work Measurement Principles using Stopwatch Time Study, Predetermined Motion Time Standards and Work Sampling, Standard Time Estimation.

(4 Hours)

Module II

4. Location and Layout Planning : Factor Influencing Plant and Warehouse Locations, Impact of Location on cost and revenues. Facility Location Procedure and Models : Qualitative Models, Breakeven Analysis, Single Facility, Location Model, Multi-facility Location Model, Mini max Location, Total and Partial Covering Model.

Layout Planning : Layout Types : Process Layout, Product Layout, Fixed Position Layout Planning, Systematic Layout Planning, CRAFT.

Group Technology and Cell Formation, Rank Order Clustering Method for Machine – Component Assignment, Line Balancing : Basic concepts, General Procedure, Rank Positional Weight Method.

(7 Hours)

5. Forecasting : Principles and Method, Moving Average, Double Moving Average, Exponential Smoothing, Double Exponential Smoothing, Winter's Method for Seasonal Demand, Forecasting Error Analysis.

(4 Hours)

Module III

6. Manufacturing Planning and Control : The Framework and Components : Aggregate Planning, Master Production Scheduling, Rough-cut-Capacity Planning, Material Requirements Planning, Capacity Requirements Planning, Shop Order System and Purchase Order System, Transportation Method for Aggregate Production Planning, Material Requirement Planning, Scheduling and Dispatching Functions, Progress Monitoring and Control.

(4 Hours)

7. Sequencing and Scheduling : Single Machine Sequencing : Basics and Performance Evaluation Criteria, Methods for Minimizing Mean Flow Time, Parallel Machines : Minimization of Makespan, Flowshop sequencing : 2 and 3 machines cases : Johnson's Rule and CDS heuristic. Jobshop Scheduling : Priority dispatching Rules.

8. Inventory Control : Relevant Costs, Basic EOQ Model, Model with Quantity discount, Economic Batch Quantity, Periodic and Continuous Review Systems for Stochastic Systems, Safety Stock, Reorder Point and Order Quantity Calculations. ABC Analysis.

(4 Hours)

Module IV

9. Project Management : Project Management through PERT / CPM. Network Construction, CPM, Network Calculation, Crashing of Project Network, Project Scheduling with Limited Resources. Line of Balance.

(5 Hours)

10. Modern Trends in Manufacturing : Just in Time (JIT) System : Shop Floor Control By Kanbans, Total Quality Management, Total Productive Maintenance, ISO 9000, Quality Circle, Kaizen, Poke Yoke, Supply Chain Management.

(6 Hours)

Reference

1. J.L.Riggs : Production Systems : Planning Analysis and Control, John Wiley.
2. E.E. Adam and R.J. Ebert "Production and Operation Management", Prentice Hall of India,2004.
3. S.N.Chary, "Production and Operations Management", Tata McGraw Hill.
4. R.Paneerselvam, "Production and Operation Management, Prentice Hall of India,2005.

CPMN 6306 MINERAL ENGINEERING & FUEL TECHNOLOGY (3-1-0)

Module-I :

Introduction to the subject . Principle of communiton and liberation. Theory and practice of crushing and grinding. Conventional units and their performance and choice.

Module-II:

Particle size determination . Laboratory sizing, interpretation and plotting of data. Industrial screening and its capacity and efficiency.

Module-III:

Movement of solids in fluids. F.S.R. and H.S.R. classifiers, their performance and choice. Heavy media separation, jigging, principle & application . Flowing film concentration and tabling, methods and equipment used. Froth floatation-physico-chemical principles, floatation reagents, floatation equipment and circuits. Application to common sulphides, oxides and oxidised minerals.

Electrostatic and magnetic separation . flow charts of mineral beneficiation plants for common minerals. Coal washing and washability curve.

Module-IV: ____

Classification of fuels. Solid fuels :

Properties and test of coal, manufacturing methods of coke, tests.

Liquid fuels : Properties and tests, Gaseous fuel- classification, production, properties and uses.

Books recommended :

1. Fundamental of mineral dressing- Chinmaya Mohapatra
2. Mineral Dressing by Guddin
3. Hand book of mineral dressing-by Taggart
4. Mineral processing- B.A. Wills
5. Fuels- J.D. Gilchrist .

CPMN 6307 MINE ENVIRONMENT & SAFETY ENGG. (3-1-0)

Module-I:

Mine Gases- properties, physiological effects, occurrence, detection and monitoring.

De-Gassification of coal seam. Sampling and analysis of mine atmosphere.

Module-II:

Mine Fire. Explosions from fire damp, coal dust and water gas.

Module-III:

Rescue apparatus, rescue station and rescue operation, Re-opening of sealed off area- recovery operation.

Module-IV:

Inundation of mines: preventive measures against inundation, precaution while approaching old water logged area and dewatering. Mine illumination, noise control.

Books recommended :

1. EMT Volume-IIA by Deshmukh
2. M.V.F.I. by M.A. Ramlu
3. Mine fire and spontaneous heating- S.P. Banarjee
4. Mine Ventilation – Dr. G.B. Mishra
5. Mine Ventilation – Penman

CPMN 6308 MINING METHODS (3-0-0) (COAL AND METAL)

Module-I:

Coal Mining: Selection of mining methods, in seam and horizon mining systems., Pillar mining method: Application, development and extraction by conventional and continuous method .

Module-II:

Longwall Mining Method : Application and Development, extraction by partially and fully mechanised mining method, stowing of goaf .

Module-III:

Non-coal Mining: Classification and choice of stoping methods.

Method of stoping : Open stoping, supported stoping-brest, underhand and overhand stoping, shrinkage stoping, cut and fill stoping method, sub-level stoping.

Module-IV:

Introduction to caving Method : Top slicing, sub-level caving, block caving, stope mechanization and level interval .

Books recommended :

1. EMT Volume-2B by Deshmukh
2. Mining of mineral deposits by D.H.Young
3. Metal Mining by H.Higam
4. Metal Mining by L.Saviako
5. Senior Mining Engineers handbook

CPEE 5361 ELECTRICAL EQUIPMENT IN MINES (3-0-0)

Module-I :

Mine power supply: Choice of voltage, surface and underground supply : Tariff

Computation : Mine Cables- Construction, installation, fault location, Gate-end boxes and switch gears, Earthing Methods, protective devices, overload, under-voltage earth leakage, D.C. Supply-rectifiers, storage batteries .

Module-II:

Electrical Equipment: Mining transformer, lighting transformer, A.C. and D.C.Motors speed-torque characteristics, starting, braking, speed control, drives for haulage, ventilation fans, pumps,

compressors, electrical locomotives, winders, Introduction to thyristor device, flame proof and intrinsic safety .

Module-III:

Control and instrumentation: Open and closed loop system, remote control, sequence control, winder control of open cast mine equipment, sensor for measurement of various operational, environmental and safety parameters in underground and open cast mines.

Module-IV:

Communication and data transmission : Mine telephone system, signaling system, LAN.

Books recommended :

1. Electrical equipment in Mines by H.Cotton .

CPME 6305 MECHANICS OF MATERIAL (3-0-0)

Module – I

(8 hours)

1. **Energy Method based on strain energy due to bending :** strain energy due to axial load, bending moment and twisting moment, principle of virtual work, Castigliano's theorem, Maxwell's theorem of reciprocal relations, Unit load and couple method for determining deflection and slope, Rayleigh-Ritz method.

Module II

(10 hours)

2. **Thick Walled cylinders :**

Thick cylinders subjected to internal and external pressures compound cylinders, Application of computer in analyzing stresses in thick cylinders.

3. **Unsymmetrical bending :**

Properties of beam cross section, slope of neutral axis, stresses and deflection in unsymmetrical bending, shear centre.

Module III

(10 Hours)

4. Curved Beam :

Bending of beam with large initial curvature, Stress distribution in beam with rectangular, circular and trapezoidal cross section, stresses in crane hooks, ring and chain links.

5. Elementary concept of elasticity, stresses in three dimensional, equation of equilibrium and compatibility, plane stress, computer analysis of two dimensional state of stress or strain at a point.

Module – IV

(12 Hours)

Advanced topics in strength of materials

6. Repeated stresses and fatigue in metals, concept of stress, Concentration, notch and stress concentration factors.
7. Experimental stress analysis :
Resistance strain gauges, strain Rosettes, Two dimensional photoelastic methods of stress analysis, stress optic law, light and dark field in a polariscope, Isoclinic and Isochromatic fringe patterns, Computer Analysis of strain from strain rosette measurement.

Textbook :

- 1 Advanced Mechanics of Solids, L.S. Srinath, TMG,
2. Advanced Mechanics of Materials, Kumar & Ghai, Khanna Publisher
3. Advanced Mechanics of Materials : Seely and Smith, John Willey, New York

PRACTICALS

CPMN 9304 MINERAL ENGINEERING & FUEL TECH. LAB. (0-0-3)

1. Crushing of Ore and finding the R.R. of the Jaws.
2. Determination R.R. of the ball mill , Critical speed & grindability index.
3. Laboratory screen Analysis for finding the average particle size .(Sieve Analysis)
4. Roll Crusher
5. Jigging
6. Electro Magnetic Separation .
7. Proximate Analysis of Coal .
8. Flash & Fire point of liquid fuel .
9. Viscosity measurement of liquid fuels.
10. Determination of Calorific value of fuels .

CPMN 9305 MINE ENVIRONMENTAL & SAFETY ENGINEERING LAB. (0-0-3)

1. Determination of Co, CH₄, H₂S, SO₂, O₂, CO₂, Nitrous fumes by corresponding detectors.
2. Study and application of infrared gas analyser.
3. Detection of different gases by Gas – Chromatograph
4. Detection of methane by different types of methano meters & flame safety lamp.
5. Determination index of flammability of coal dust.
6. Study and uses of proto – IV, Proto – V. Dragger – BG – 174 self contained breathing apparatus
7. Study and uses of self rescuer Gas mask, smoke helmet.
8. Study and use of reviving apparatus
9. Study of Born-Side safety boning apparatus.

CPME 9306 DESIGN PROJECT (0-0-3)

1. Design of shaft on the basis of theories of failure
2. Design of machine components under dynamic stress
3. Design of thin/ thick cylindrical shells under internal fluid pressure
4. Design of clutch
5. Design of Brake
6. Design of Journal Bearing
7. Design of straight/ helical gears
8. Design of piston
9. Design of connecting rod
10. Design of crank shaft
11. Design of fly wheel

Note : At least 7 to 8 designs with relevant drawings should be carried out. Rest of the design problem be given as assignments.

Rest of the design

**COURSE STRUCTURE
FOURTH YEAR B.TECH PROGRAMME
MINING ENGINEERING**

7th Semester				8th Semester			
<i>Theory</i>		<i>ContactHrs.</i>	<i>Credit</i>	<i>Theory</i>		<i>ContactHrs.</i>	<i>Credit</i>
			L-T-P				L-T-P
HSSM 4403	Environmental Engineering	3-0-0	3	HSSM 4404	Marketing Management	3-0-0	3
CPMN 6401	Mine Surveying	3-1-0	4	CPMN 6404	Mine Legislation & General Safety	3-1-0	4
CPMN 6402	Rock Mechanics & Ground Control	3-1-0	4	CPMN 6405	Mine Planning & Economics	3-1-0	4
CPMN 6403	Mine Ventilation & Air Cooling	3-1-0	4	Elective - 2 (any one)			
			Elective - I (any one)	PEMN 6411	a. Environmental pollution & Control in Mines	3-1-0	4
PEMN 6406	(a) Advanced U/G Mining			PEMN 6412	b. Advanced Safety Engineering	3-1-0	4
PEMN 6407	(b) Advanced U/G Metal Mining			PEMN 6413	c. Geomechanics in Mine Design	3-1-0	4
PEMN 6408	(c) Surface Mining Machinery			Elective - 3 (any one)			
PEMN 6409	(d) Surface Mining Environment			PEMN 6414	a. Geostatics		4
			Total	PEMN 6415	b. Material Handling & Transport In Mines		4
			18	PEMN 6416	c. Geostatics & Remote Sensing	3-0-0	4
							Total
							35
<i>Practicals/Sessionals</i>		<i>Contact Hrs.</i>	<i>Credit</i>	<i>Practicals/Sessionals</i>		<i>Contact Hrs.</i>	<i>Credit</i>
CPMN 9401	Project	0-0-3	2	CPMN 9405	Projects		5
CPMN 9402	Rock Mechanics Lab.	0-0-3	3	CPMN 9406	Seminar		1
CPMN 9403	Seminar		1	CPMN 9407	Entrepreneurship Project		2
CPMN 9404	Mining Surveying	0-0-3	2	CPMN 9408	Comprehensive Viva/Voice		2
			8				10
			Total				45
			26				Total
							45

L-Lecture

T-Tutorial

P-Practical

7th Semester

HSSM 4403 ENVIRONMENTAL ENGINEERING (3-0-0)

Objective : This course introduces the students to the environmental consequences of Industries, development actions etc. and the methods of minimizing their impact through technology and legal systems.

Module – I

(10 hours)

Ecological Concepts and Natural Resources : Ecological perspective and value of environment. Environmental auditing, Biotic components, Ecosystem Process : Energy, Food Chain, Water cycle, Air cycle etc., Environmental gradients, Tolerance levels of environment factor, EU, US and Indian Environmental Law, Global Perspective.

Chemistry and Microbiology in Environmental Engineering : Physical and chemical properties of water, Atmospheric chemistry, Soil chemistry, Microbiology, Chemical and biochemical reactions, Material balances and Reactor configurations.

Concept in Hydrology : Hydrological cycle, Water balance, Energy budget, Precipitation, Infiltration, evaporation and evapotranspiration, Rainfall-runoff relationships, Urban hydrology, Ground water, Ground water chemistry, Water contamination and pollution prevention.

Module – II

(9 hours)

Water Pollution : water quality standards and parameters, Assessment of water quality, Aquatic pollution, Freshwater pollution, Estuarine water quality, Marine pollution, Organic content parameters, DO and BOD demand in streams, Transformation process in water bodies, Oxygen transfer by water bodies, Turbulent mixing, Water quality in lakes and preservers , Ground water quality.

Air Pollution : Air pollution and pollutants, criteria pollutants, Acid deposition, Global climate change – green house gases, non-criteria pollutants, emission standard form industrial sources, air pollution metereology, Atmospheric dispersion.

Noise Pollution : Physical Properties of sound, Noise criteria, Noise Standards, Noise measurement, Noise control.

Module – III

(15 hours)

Water Treatment : Water quality standards, Water sources and their quality, Water treatment processes, Pre-treatment of water, Conventional process, Advanced water treatment process.

Waste Water Treatment : Water flow rate and characteristics, Design of waste water network, Waste water treatment process, pretreatment, primary and secondary treatment of waste water, Activated sludge treatment : Anaerobic digestion and its microbiology, Reactor configurations and methane production. Application of anaerobic digestion. Bio-solids regulations, Characteristics and processing of bio-solids, first and second stage processing of sludge. Sludge disposal,. Integrated sewage and sludge management.

Solid Waste Management :

Source classification and composition of MSW : properties and separation, storage and transportation, MSW Management, Waste minimization of MSW, Reuse and recycling, Biological treatment, Thermal treatment, Landfill, Integrated waste management.

Hazardous Waste Management, Hazardous waste and their generation, Medical hazardous waste, Household waste, Transportation and treatment of hazardous waste : Incinerators, Inorganic waste treatment, Treatment systems for hazardous waste, handling of treatment plant residue.

Industrial Air Emission Control :

Characterization of air stream, Equipment selection, Equipment design, Special Methods : Flue gas desulphurization, NOx removal, Fugitive emissions.

Module – IV

(8 hours)

Waste Minimization : Concept, Life Cycle Assessment, Elements of waste minimization strategy, Benefits of waste minimization, Elements of waste minimization programme, Waste reduction techniques.

Environment impact Assessment, Origin and procedure of EIA, Project Screening for EIA, Scope studies, Preparation and review of EIS.

REFERENCE :

1. Environmental Engineering Irwin/ McGraw Hill International Edition, 1997, G. Kiely,
2. Principles of Environmental Engineering and Science, M. L. Davis and S. J. Masen, McGraw Hill International Edition, 2004
3. Environmental Science, Curringham & Saigo, TMH,
4. Principles of Environmental Science, Curringhum
5. Introduction to Environmental Science, Y. Anjaneyalu, B. S. Publication.

CPMN 6401 MINE SURVEYING

Module - I:

Triangulation correlation of surface & U/G Surveys, verticality of shafts. Measurement of Depth of Shaft. Setting out of curves for surface & U/G, Stope surveying, Open-PIT surveying, mine plans, sections, projections & their statutory requirements, Mine Models.

Module-II:

Special Mine surveys-survey of installations of Mine, EDM & ITS Application, Gps or total station, surveys for connecting National Grid.

Module-III:

Elements of Photogrammetry, field astronomy : Principles & Definitions, Determination of true Meridian, Latitude & Longitude & Time.

Books Recommended :

1. Mine Surveying by Mason
2. Surveying by B.C. Punimia
3. Plane & Geodetic surveying by David Clarke
4. Metalliferous Mine Surveying by Winberg

CPMN 6402 ROCK MECHANICS & GROUND CONTROL

Module - I :

Physio Mechanical properties of rocks, elastic & time dependent behavior' Rock mass classic failure, stress analysis, insitu stresses & stress distribution around mine openings; ground failure & pressure on supports, stability of wide openings; design of supports in mine openings.

Module - II :

Subsidence : Causes & impact of subsidence, mechanics of surface subsidence, discontinuous & continuous subsidence, monitoring prediction, control & management of subsidence.

Module - III :

Stability of slopes & Monitoring.

Module - IV :

Mechanics of rock burst & bumps. Instrument & Measurement of Institutstress & rock strength. Photo Elasticity & Scale Model Studies Basics of Numerical Methods in Geo-Mechanics with application.

Books Recommended :

1. Rock Mechanics & Ground control by Dr. B.S. Verma
2. Rock Mechanics by overl & Dual
3. S. M. E.
4. Coal Mine & ground control by s. Peng

CPMN 6403 MINE VENTILATION & AIR COOLING

Module - I :

Thermal Environment & Psychrometry. Heat stress estimation, Mine heat load source & analysis, geo-thermal heat sources Design of Air cooling system. Assessment, control & Psychological effects of Mine Dust.

Module - II :

Mechanic's of air flow, distribution & control, natural ventilation, theory of fans, fan types, characteristics, selection of Mine fans, fan laws, installation of mine fans.

Module - III :

Tunnel ventilation, auxiliary ventilation, control recirculation, booster fan & It's installation & location.

Module - IV :

Mechanics of rock burst & bumps. Instrument & Measurement of Institutstress & rock strength. Photo Elasticity & Scale Model Studies Basics of Numerical Methods in Geo-Mechanics with application.

Books Recommended :

1. Rock Mechanics & Ground control by Dr. B.S. Verma
2. Rock Mechanics by overl & Dual
3. S. M. E.
4. Coal Mine & ground control by s. Peng

PEMN 6406 ADVANCED U/G COAL MINING

Module - I :

Advanced treatment of mine methods & face mechanisation in B & P & long wall mining.

Module - II :

Layout of faces, face equipment including winning, conveying & support system, their selection & organisation.

Module - III :

Techniques of Mining - Steeply inclined & thick seams, Hydraulic mining of coal seams.

Books Recommended :

1. Advanced Coal Mining by vorbjev & Desmukh

PEMN 6407 ADVANCED U/G METAL MINING**Module - I :**

Techno-Economic analysis on choice of stopping methods, high productivity methods, Blast hole stopping, vertical retreat methods of mining, block caving, raise stooping, u/g bench blasting.

Module - II :

Special u/g excavation, shaft pockets, ore bins, ore transfer, ramp, decline, step mining, stope fills : preferation, transportation & filling operation.

Module - III :

Stope design & production Planning methods of pillar extraction, solution mining, insitu leaching, u/g retorting, undersea mining, introduction to nvel mining methods.

PEMN 6408 SURFACE MINING MACHINERY**Module - I :**

Classification of surface mining systems, machinery deployment, functional units of heavy earth moving machinery- design aspects, power circulation, kinematics.

Module - II :

Hydraulics in surface mining equipments.

Module - III :

Rock & cutting tools for drills, Dozers, BWE, shovels & Draglines.

PRACTICALS**CPMN 9402 ROCK MECHANICS LAB**

1. Preparation of rock sample.
2. Determination of uniaxial tensile strength by braillian method.
3. Determination of point load index of given sample.
4. To determination of point load index of given sample
5. To determine the strength index of supplied specimen by impact strength index (ISI) Appartus.
6. Determination of uniaxial compressive strength by uniaxial compressive testing machine.
7. Determination of slake-durability index of coal & rock.
8. Determination of Triaxial compressive strength by universal testing Machine & plotting of Moh'r circle.
9. Determination of Angle of Internal Friction.
10. Determination of Shear strength of Rock Sample or Soil.

CPMN 9404 MINE SURVEYING - II LAB

1. Triangulation survey.
2. Testing of verticality of shaft.

3. Curve setting.
4. Application of EDM, GPS & Total station.
5. Determination of True North.
6. Determination of latitude, Longitude & time of a place.
7. Survey camp for 2 weeks duration.

8th Semester

HSSM 4404 MARKETING MANAGEMENT (3-0-0)

Objective of the Course :The course aims at introducing the basic concepts of marketing to the undergraduate students in engineering. The learning shall help the students in better designing, manufacturing and selling product/ service packages keeping competitive market, customers and cost in view.

Module – I

(9 hours)

Marketing Management : Concept, Process, Functions and relevance in the current context.

Marketing Environment : Socio-economic forces. Competition : national and global, Technology, Government Policy, Suppliers, Buyers, Consumer Resistance considerations. Environment scanning tools and techniques

Competition Analysis : Factors contributing to competition, Competition analysis tools, Competitive arena mapping, Segmentation matrix.

Market Planning : Exploring Opportunity, Product –market selection, Approaches to Market Planning, Market Planning Process.

Module II (10 hours)

Market Research and Information Systems : Research Process, The Internet and World Wide Web based Information collection and processing, Database, Data Warehouses and Data Mining, Global Market Research, Competitive Intelligence.

Consumer Behaviour : Importance of buyer and his/ her role in purchasing. Influence of buyer behaviour, Buyer behaviour study tools. Organizational buying behaviour.

Market Segmentation, Targeting and Positioning : Definition, Bases and Methods of segmenting consumer and Industrial markets. Target Market strategies: Domestic and global perspective. Market Positioning.

Market Demand Forecasting : Key Terms, Forecasting Tools : Short term tools : Moving average and Exponential smoothing methods, Long-term forecasting Tools : Time series analysis, Econometrics methods, Qualitative tools : Buying Intention Survey, Sales Force Opinion and Delphi Techniques.

Module – III (11 hours)

Product Planning : Product Life Cycle, Locating products in PLC, New Product Development Process, Branding Strategy, Positioning a Brand, Brand Equity, Packaging and Labeling, Product-mix and Product Line, Product-Mix strategies, Planned Obsolescence.

Pricing Decision : Objectives and Factors influencing pricing, Cost-Plus Pricing, Breakeven Analysis, Price Based on Marginal Analysis, Price Elasticity of Demand, Operating statement, Markups Analysis Ratios, Pricing Strategies : Market-Entry, Discounts and allowances, Geographic Pricing, Special Pricing.

Promotion Decisions : Marketing Communication and Promotion Process, Promotion Mix, Advertising : Media and Media selection process. Organising for advertising, sales promotion.

Module -IV (10 hours)

Channels of Distributions : Designing Distribution Channels, Wholesaling and Physical Distribution, Retailing. Supply Chain Management (Basic only). Personal selling, Direct Marketing, Managing Sales Force.

Trends in Marketing : Global Marketing, Customer Services, Customer Relationship Management, Rural Marketing and Service Marketing.

REFERENCES :

1. M. J. Etazel , B. J. Walker and W. J. Stanton, Marketing, Tata McGraw Hill, 13th Edition, 2004.
2. R. Saxena, "Marketing Management" Tata McGraw Hill, second Edition, 2003.

CPMN 6404 MINE LEGISLATION & GENERAL SAFETY

Module - I:

General principles of mining laws, mines & Minerals (Regulation & Development), Act.

Module - II:

Mineral concession rules, principle provision of mine act, rules & regulation framed there under (CMR - 1957, MMR - 1961)

Module - III:

Indian Electricity rule, Mine rescue rule, industrial dispute Act, V-T rules, Pit Head Bath Rules, DGMS circular.

Module - IV:

Causes & Classification of Accidents, Accidents investigation & Reports.

Book Recommended

1. Mine Act - 52 by B. K. Kejriwal
2. DGMS Circulars
3. Mines Act, Mine regulations, Mine rules Govt. of India Publication
4. Legislation In Indian Mines - Critical Appraisal by Prasad & Rakesh

CPMN 6405 MINE PLANNING & ECONOMICS

Module - I:

Principle of Mine Planning, technical consideration in opening up & development of Mineral deposits, linear programming in mine planning.

Module - II:

Location of entries (Shaft, incline, Adit) & Lateral development, planning of mine workings & systems.

Module - III:

Production planning, Economic consideration, estimation of Mine cost & project.

Module - IV:

Mine valuation, Mineral policies, conservation, Taxation, trading, company law, capital formation.

Book Recommended

1. Text Book of Mineral Economics by R. T. Desmukh
2. Mineral Economics

ELECTIVE - 2

PEMN 6411 A. ENVIRONMENTAL POLLUTION & CONTROL IN MINES

Module - I:

General Environment & IT's impact on mining, environmental effects of mining operations, environmental pollution in mines.

Module - II :

Air pollution, water pollution, landscape pollution, pollution due to noise.

Module - III:

Environmental effects of flood in mines, ground vibration, Air blast, fly rocks, waste disposal & utilisation, tailing Dams.

Module - IV :

Environmental Impact statements, Environmental Management Plan (EMP), Environmental Protection and control Through Legislation.

Books Recommended :

1. Water pollution By V.P. Kudasik (Prayati Prakashan, Meerut)
2. Environmental pollution control engg. By C.S. Rao
3. Environmental pollution & control by P.A. Versilirid
4. Introduction to engironmental Management by B.D. Nagchoudhury
5. Envrionmental protection Act, 1986, DOE, Govt. of India.

PEMN 6412 B. ADVANCED SAFETY ENGG.

Module - I:

Mine Accidents, Classification of Accidents, causes of accidents, accidents investigation, enquiry & report.

Module - II:

Accident statistics, Rates of accidents, relation between accidents & efficiency, Cost of accidents.

Module - III:

Preventive measures Against accidents, ZAP, MAP Safety education & training to miners.

Module - IV :

Outburst of coal, causes & prevention of air blast, miners diseases, causes & preventive measures.

PEMN 6413 C. GEOMECHANICS IN MINE DESIGN

Module - I:

Theories of rock failure, stress around mine excavations, their estimation by analytical and mathematical methods & field Measurement.

Module - II :

Mine Model Analysis using equivalent Material Models, Design of Mine Excavation like Drifts, Shafts & stopes, pillar design.

Module - III:

Theories of rock failure of small & large excavations, mining subsidence & rock bursts, slope stability analysis.

ELECTIVE - 3

PEMN 6414 A. GEOSTATSTICS

Module - I:

Review of classical statistics concepts, basics of 3-D Mineral inventory development, regionallised variables.

Module - II :

Variogram modeling regularisation, Auxillary functions, linear kringing methodology & application, variance volume relationship.

Module - III :

Geostatistics for quality control, Basics of Nonparametric Geostatistics & Indicator kringing, introduction to geoeas software.

PEMN 6415 B. MATERIAL HANDLING & TRANSPORT IN MINES

Module - I:

Property of bulk material vis-a-vis different bulk handling operation. classification of bulk material transportation systems.

Module - II :

Design, operation & maintenance aspect of belt conveyor & chain conveyor special conveyor : Their selection & application. Hydraulic & Pneumatic conveying.

Module - III :

Stacking, blending & reclaiming of bulk materials. Automation & on-line monitoring of bulk material handling system.

Module - IV :

Design of storage system : Silos, bins & Bunkers, Rapid loading system., Merry-go-round systems.

PEMN 6416 C. GEOMATICS & REMOTE SENSING**Module - I:**

Real property boundary determination, areal & Digital Mapping, Geodesy & Geodetic surveying, GPS, Basis of Photogrammetry.

Module - II :

Introduction to remote sensing, sensors, present status of remote sensing satellites, digital image processing techniques, introduction to digital terrain Modeling, Environmental resource mapping, geomatics application programming.

Module - III :

Introduction to land & geographic information systems, different coordinate systems. Working principle of GIS, Application of GIS In land development, surface mining & road construction etc.

Module - IV :

Hands on exercise on image processing & GIS packages, Geo-media software, photogrammetry & Image Analysis.

PRACTICALS**CPMR 9406 ENTREPRENEURSHIP PROJECT (0-0-3)**

1. The project will be for 2 credits and 3 periods per week is to be devoted for the project.
2. The teacher has to give elementary idea about entrepreneurship through classroom teaching before a project report is prepared by the student.
3. The teacher will first cover the following topics through lecturer and exercises on motivation and games.
 - Entrepreneurship concept, EDP in India, Indian middle class value.
 - Entrepreneurial qualities, motivation perception, risk taking etc.
 - Market survey, Business opportunity guidance
 - Role of DIC, SFC, Bank etc.
 - Working capital assessment, Balance Sheet, Costing, Book keeping.
 - Decision making, Leadership, Communication skill
 - Preliminary Project Report, preparation for a specific product and submission of the report.
4. Evaluation
 - (a) The teacher has to conduct tests/ motivational exercises to assess entrepreneurial capability of the student (20%)

- (b) The teacher has to test the knowledge of the student on the above topic through a written test. (20%)
- (c) The teacher has to evaluate the report submitted by the student (i.e. Project report within 50 pages) (60%).

Reference Books

1. Entrepreneurship of Small Industries, M. V. Deshpande, Deep and Deep Publication
2. Management of Small Scale Industry, Vasant Desai, Himalaya Pub. House