COURSE STRUCTURE AND SYLLABUS

For

MINING ENGINEERING

(Applicable for batches admitted from 2016-2017)

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY: KAKINADA
KAKINADA - 533 003, Andhra Pradesh, India

I Year - I Semester

S.No.	Subjects	L	T	P	Credits
1-HS	English – I	4	--	--	3
2-BS	Mathematics – I	4	--	--	3
3-ES	Engineering Chemistry	4	--	--	3
4-BS	Engineering Mechanics	4	--	--	3
5-BS	Computer Programming	4	--	--	3
6-ES	Environmental Studies	4	--	--	3
7-HS	Engineering/Applied Chemistry Laboratory	--	--	3	2
8-BS	English Communication Skills Lab – I	--	--	3	2
9-ES	C Programming Lab	--	--	3	2
	Total Credits				**24**

I Year - II SEMESTER

S.No.	Subjects	L	T	P	Credits
1-HS	English – II	4	--	--	3
2-BS	Mathematics – II (Mathematical Methods)	4	--	--	3
3-BS	Mathematics – III	4	--	--	3
4-ES	Engineering Physics	4	--	--	3
5-HS	Basic Electrical and Electronics Engineering	4	--	--	3
6-ES	Engineering Drawing	4	--	--	3
7-BS	English - Communication Skills Lab – II	--	--	3	2
8-HS	Engineering /Applied Physics Lab	--	--	3	2
9-ES	Engineering /Applied Physics – Virtual Labs – Assignments	--	--	2	--
10	Engg.Workshop & IT Workshop	--	--	3	2
	Total Credits				**24**

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II Year - I Semester

S.No.	Subjects	L	T	P	Credits
1	Development of Mineral Deposits	4	--	--	3
2	Thermal Engineering for Mining	4	--	--	3
3	Fluid Mechanics and Hydraulic Machines	4	--	--	3
4	Computer Aided Engineering Drawing Practice	4	--	--	3
5	Mining Geology – I	4	--	--	3
6	Managerial Economics & Financial Analysis	4	--	--	3
7	Electrical and Electronics Engineering Lab	--	--	3	2
8	Fluid Mechanics and Hydraulic Machines Lab	--	--	3	2
	Total Credits				**22**

II Year - II Semester

S.No.	Subjects	L	T	P	Credits
1	Kinematics of Machinery	4	--	--	3
2	Materials Engineering	4	--	--	3
3	Mining Geology – II	4	--	--	3
4	Mine Surveying – I	4	--	--	3
5	Surface Mining	4	--	--	3
6	Industrial Engineering and Management	4	--	--	3
7	Geology Lab	--	--	3	2
8	Materials Lab	--	--	3	2
MC	Professional Ethics & Human Values	--	3	--	--
	Total Credits				**22**

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III Year - I Semester

S.No.	Subjects	L	T	P	Credits
1	Underground Coal Mining Technology	4	--	--	3
2	Mine Environment Engineering – I	4	--	--	3
3	Electrical Equipment in Mines	4	--	--	3
4	Mine Surveying– II	4	--	--	3
5	Mining Machinery & Mechanization – I	4	--	--	3
6	Advanced English Communication Skills Lab	--	--	3	2
7	Mine Surveying Lab	--	--	3	2
8	Mechanical Engineering Lab	--	--	3	2
9	Mine Field visit(Mandatory)	--	--	--	0
	Total Credits				**21**

III Year - II Semester

S.No.	Subjects	L	T	P	Credits
1	Mine Systems Engineering	4	--	--	3
2	Mineral Engineering and Fuel Technology	4	--	--	3
3	Mine Environmental Engineering – II	4	--	--	3
4	Mining Machinery & Mechanization – I	4	--	--	3
5	**OPEN ELECTIVE** 1. Industrial Robotics 2. Entrepreneurship 3. Quality and Reliability Engineering 4. Waste Water Management 5. Rock Excavation Engineering 6. Mine Safety Engineering	4	--	--	3
6	Mineral Engineering Lab	--	--	3	2
7	Environmental Engineering Lab	--	--	3	2
8	Mine Planning & Design Lab	--	--	3	2
9	Industrial Training (3-4weeks)	--	--	--	0
	Total Credits				**21**

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IV Year - I Semester

S.No.	Subjects	L	T	P	Credits
1	Computer Applications in Mining	4	--	--	3
2	Underground Metal Mining Technology	4	--	--	3
3	Rock Mechanics & Ground Control	4	--	--	3
4	Mine Legislation & General Safety	4	--	--	3
5	**Elective I** 1.Rock Slope Engineering 2. Mine Subsidence Engineering 3.Rock Fragmentation Engineering	4	--	--	3
6	**Elective II** 1.Deep Sea Mining 2. Mine Construction Engineering 3.Tunneling Engineering	4	--	--	3
7	IPR & Patents	--	2	--	--
8	Computer Applications in Mining Lab	--	--	2	2
9	Rock Mechanics & Ground Control Lab	--	--	2	2
10	Short Survey Camp (One Week)	--	--	--	0
	Total Credits				**22**

IV Year - II Semester

S.No.	Subjects	L	T	P	Credits
1	Production Planning and Control	4	--	--	3
2	Mine Economics & Investment	4	--	--	3
3	Mine Health and Safety Engineering	4	--	--	3
4	**Elective III** 1.Planning of Underground Metal Mining Projects 2. Planning of Underground Coal Mining Projects 3.Planning of Surface Mining Projects	4	--	--	3
5	Seminar	--	3	--	2
6	Project	--	--	--	10
	Total Credits				**24**

Total Course Credits = 48+44 + 42 + 46 = 180

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SYLLABUS

I Year - I Semester

L	T	P	C
4	0	0	3

ENGLISH - I

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theoretical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like role plays, discussions and debates.
5. To make the students participate in Just a Minute talks.

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READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparison.
9. To enable the students to write technical reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventions permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the language skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports-- are to be tested along with appropriate language and expressions.
4. Examinations:
   I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

   (80% for the best of two and 20% for the other)

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Assignments= 5%

End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech I Semester (Common for all branches)and I B.Pharma I Sem of JNTU Kakinada from the academic year 2016-17

(R-16 Regulations)

DETAILED TEXTBOOK:

ENGLISH FOR ENGINEERS AND TECHNOLOGISTS, Published by **Orient Blackswan Pvt Ltd**

NON-DETAILED TEXTBOOK:

PANORAMA: A COURSE ON READING, Published by **Oxford University Press India**

The course content along with the study material is divided into six units.

UNIT I:

1. 'Human Resources' from English for Engineers and Technologists.

OBJECTIVE:

To develop human resources to serve the society in different ways.

OUTCOME:

The lesson motivates the readers to develop their knowledge different fields and serve the society accordingly.

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2. 'An Ideal Family' from Panorama: A Course on Reading

OBJECTIVE:

To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:

Acquisition of writing skills

UNIT 2:

1. ' Transport: Problems and Solutions' from English for Engineers and Technologists.

OBJECTIVE:

To highlight road safety measures whatever be the mode of transport.

OUTCOME:

The lesson motivates the public to adopt road safety measures.

2. 'War' from 'Panorama : A Course on Reading'

OBJECTIVE:

To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:

Acquisition of writing skills

UNIT 3:

1. 'Evaluating Technology' from English for Engineers and Technologists.

OBJECTIVE:

To highlight the advantages and disadvantages of technology.

OUTCOME:

The lesson creates an awareness in the readers that mass production is ultimately detrimental to biological survival.

2. 'The Verger' from 'Panorama : A Course on Reading'

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OBJECTIVE:

To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:

Acquisition of writing skills

UNIT 4:

1. 'Alternative Sources of Energy' from English for Engineers and Technologists.

OBJECTIVE:

To bring into focus different sources of energy as alternatives to the depleting sources.

OUTCOME:

The lesson helps to choose a source of energy suitable for rural India.

2. ' The Scarecrow' from Panorama : A Course on Reading

OBJECTIVE:

To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:

Acquisition of writing skills

UNIT 5:

1. 'Our Living Environment' from English for Engineers and Technologists.

OBJECTIVE:

To highlight the fact that animals must be preserved because animal life is precious.

OUTCOME:

The lesson creates an awareness in the reader as to the usefulness of animals for the human society.

2. 'A Village Host to Nation' from Panorama: A Course on Reading

OBJECTIVE:

To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:

Acquisition of writing skills

UNIT 6:

1. ' Safety and Training' from English for Engineers and Technologists.

OBJECTIVE:

To highlight the possibility of accidents in laboratories, industries and other places and to follow safety measures.

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OUTCOME:

The lesson helps in identifying safety measures against different varieties of accidents at home and in the workplace.

2. 'Martin Luther King and Africa' from Panorama : A Course on Reading

OBJECTIVE:

To develop extensive reading skill and comprehension for pleasure and profit.

OUTCOME:

Acquisition of writing skills

NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

OVERALL COURSE OUTCOME:

1. Using English languages, both written and spoken, competently and correctly.
2. Improving comprehension and fluency of speech.
3. Gaining confidence in using English in verbal situations.

MODEL QUESTION PAPER FOR THEORY

PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks

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I Year - I Semester

L	T	P	C
4	0	0	3

MATHEMATICS-I

(Common to ALL branches of First Year B.Tech.)

Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.

Course Outcomes: At the end of the Course, Student will be able to:

1. Solve linear differential equations of first, second and higher order.
2. Determine Laplace transform and inverse Laplace transform of various functions and use Laplace transforms to determine general solution to linear ODE.
3. Calculate total derivative, Jocobian and minima of functions of two variables.

UNIT I: Differential equations of first order and first degree:

Linear-Bernoulli-Exact-Reducible to exact.

Applications: Newton's Law of cooling-Law of natural growth and decay-Orthogonal trajectories- Electrical circuits- Chemical reactions.

UNIT II: Linear differential equations of higher order:

Non-homogeneous equations of higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x)- Method of Variation of parameters.
Applications: LCR circuit, Simple Harmonic motion.

UNIT III: Laplace transforms:

Laplace transforms of standard functions-Shifting theorems - Transforms of derivatives and integrals – Unit step function –Dirac's delta function- Inverse Laplace transforms– Convolution theorem (with out proof).

Applications: Solving ordinary differential equations (initial value problems) using Laplace transforms.

UNIT IV: Partial differentiation:

Introduction- Homogeneous function-Euler's theorem-Total derivative-Chain rule-Generalized Mean value theorem for single variable (without proof)-Taylor's and Mc Laurent's series expansion of functions of two variables– Functional dependence- Jacobian.

Applications: Maxima and Minima of functions of two variables without constraints and Lagrange's method (with constraints).

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UNIT V: First order Partial differential equations:

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions –solutions of first order linear (Lagrange) equation and nonlinear (standard types) equations.

UNIT VI: Higher order Partial differential equations:

Solutions of Linear Partial differential equations with constant coefficients. RHS term of the type $e^{ax+by}, \sin(ax+by), \cos(ax+by), x^m y^n$. Classification of second order partial differential equations.

Text Books:

1. **B.S.Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
2. **Micheael Greenberg,** Advanced Engineering Mathematics, 9th edition, Pearson edn
3. **Dean G. Duffy,** Advanced engineering mathematics with MATLAB, CRC Press
4. **Peter O'neil**, Advanced Engineering Mathematics, Cengage Learning.
5. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
6. **Dass H.K., Rajnish Verma. Er.,** Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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I Year - I Semester

L	T	P	C
4	0	0	3

ENGINEERING CHEMISTRY

(CE, ME, PCE, PE, Met.E, Mining, Automobile, Aeronautical, Chemical, Bio.Tech.)

Knowledge of basic concepts of Chemistry for Engineering students will help them as professional engineers later in design and material selection, as well as utilizing the available resources.

Learning Objectives:

- Plastics are nowadays used in household appliances; also they are used as composites (FRP) in aerospace and automotive industries.
- Fuels as a source of energy are a basic need of any industry, particularly industries like thermal power stations, steel industry, fertilizer industry etc., and hence they are introduced.
- The basics for the construction of galvanic cells are introduced. Also if corrosion is to be controlled, one has to understand the mechanism of corrosion which itself is explained by electrochemical theory.
- With the increase in demand, a wide variety of materials are coming up; some of them have excellent engineering properties and a few of these materials are introduced.
- Water is a basic material in almost all the industries, more so where steam is generated and also where it is supplied for drinking purposes.
- Materials used in major industries like steel industry, metallurgical industries and construction industries and electrical equipment manufacturing industries are introduced. Also lubrication is introduced.

UNIT I: HIGH POLYMERS AND PLASTICS

Polymerisation:- Introduction- Mechanism of polymerization - Stereo regular polymers – methods of polymerization (emulsion and suspension) -Physical and mechanical properties – ***Plastics*** as engineering materials : advantages and limitations – Thermoplastics and Thermosetting plastics – Compounding and fabrication (4/5 techniques)- Preparation, properties and applications of polyethene, PVC, Bakelite Teflon and polycarbonates

Elastomers :- Natural rubber- compounding and vulcanization – Synthetic rubbers : Buna S, Buna N, Thiokol and polyurethanes – Applications of elastomers.

Composite materials & Fiber reinforced plastics – Biodegradable polymers – Conducting polymers.

UNIT II: FUEL TECHNOLOGY

Fuels – Introduction – Classification – Calorific value - HCV and LCV – Dulong's formula – Bomb calorimeter – Numerical problems – Coal — Proximate and ultimate analysis – Significance of the analyses – Liquid fuels – Petroleum- Refining – Cracking – Synthetic petrol –Petrol knocking – Diesel knocking - Octane and Cetane ratings – Anti-knock agents – Power alcohol – Bio-diesel – Gaseous fuels – Natural gas, LPG and CNG – Combustion – Calculation of air for the combustion of a fuel – Flue gas analysis – Orsat apparatus – Numerical problems on combustion.

Explosives:- Rocket fuels

UNIT III: ELECTROCHEMICAL CELLS AND CORROSION

Galvanic cells - Reversible and irreversible cells – Single electrode potential – Electro chemical series and uses of this series- Standard electrodes (Hydrogen and Calomel electrodes) - Concentration Cells – Batteries: Dry Cell - Ni-Cd cells - Ni-Metal hydride cells - Li cells - Zinc – air cells.

Corrosion :- Definition – Theories of Corrosion (chemical & electrochemical) – Formation of galvanic cells by different metals, by concentration cells, by differential aeration and waterline corrosion – Passivity of metals – Pitting corrosion - Galvanic series – Factors

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which influence the rate of corrosion - Protection from corrosion – Design and material selection – Cathodic protection - Protective coatings: – Surface preparation – Metallic (cathodic and anodic) coatings - Methods of application on metals (Galvanizing, Tinning, Electroplating, Electroless plating).

UNIT IV: CHEMISTRY OF ADVANCED MATERIALS

Nano materials:- Introduction – Sol-gel method & chemical reduction method of preparation – Characterization by BET method and TEM methods - Carbon nano tubes and fullerenes: Types, preparation, properties and applications

Liquid crystals:- Introduction – Types – Applications

Super conductors:-Type –I, Type II – Characteristics and applications

Green synthesis:- Principles - 3or 4 methods of synthesis with examples – R_4M_4 principles

UNIT V: WATER TECHNOLOGY

Hard water:- Reasons for hardness – units of hardness - determination of hardness and alkalinity - Water for steam generation - Boiler troubles – Priming and Foaming, Scale formation, Boiler corrosion, Caustic embrittlement - Internal treatments - Softening of Hard water : Lime – Soda process, Zeolite process and numerical problems based on these processes and Ion Exchange process - Water for drinking purposes- Purification – Sterilization and disinfection : Chlorination, Break point chlorination and other methods – Reverse Osmosis and Electro Dialysis.

UNIT VI: CHEMISTRY OF ENGINEERING MATERIALS AND FUEL CELLS

Refractories: - Definition, characteristics, classification, properties, failure of refractories

Lubricants: - Definition, function, Theory and mechanism of lubricants, properties (Definition and importance)

Cement: - Constituents, manufacturing, hardening and setting, deterioration of cement

Insulators: - Thermal and electrical insulators

Fuel cells: - Hydrogen Oxygen fuel cells – Methanol Oxygen fuel cells

Outcome: The advantages and limitations of plastic materials and their use in design would be understood. Fuels which are used commonly and their economics, advantages and limitations are discussed. Reasons for corrosion and some methods of corrosion control would be understood. The students would be now aware of materials like nano materials and fullerenes and their uses. Similarly liquid crystals and superconductors are understood. The importance of green synthesis is well understood and how they are different from conventional methods is also explained. The impurities present in raw water, problems associated with them and how to avoid them are understood. The advantages and limitations of plastic materials and their use in design would be understood. The commonly used industrial materials are introduced.

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Standard Books:

1. Engineering Chemistry by Jain and Jain; Dhanpat Rai Publicating Co.
2. Engineering Chemistry by Shikha Agarwal; Cambridge University Press, 2015 edition.

Reference Books:

1. Engineering Chemistry of Wiley India Pvt. Ltd., Vairam and others, 2014 edition (second).
2. Engineering Chemistry by Prasanth Rath, Cengage Learning, 2015 edition.
3. A text book of engineering Chemistry by S. S. Dara; S. Chand & Co Ltd., Latest Edition
4. Applied Chemistry by H.D. Gesser, Springer Publishers
5. Text book of Nano-science and nanotechnology by B.S. Murthy, P. Shankar and others, University Press, IIM

I Year - I Semester

L	T	P	C
4	0	0	3

ENIGINEERING MECHANICS

Objectives: The students completing this course are expected to understand the concepts of forces and its resolution in different planes, resultant of force system, Forces acting on a body, their free body diagrams using graphical methods. They are required to understand the concepts of centre of gravity and moments of inertia and their application, Analysis of frames and trusses, different types of motion, friction and application of work - energy method.

UNIT – I

Objectives: The students are to be exposed to the concepts of force and friction, direction and its application.

Introduction to Engg. Mechanics – Basic Concepts.

Systems of Forces: Coplanar Concurrent Forces – Components in Space – Resultant – Moment of Force and its Application – Couples and Resultant of Force Systems.

Friction: Introduction, limiting friction and impending motion, coulomb's laws of dry friction, coefficient of friction, cone of friction

UNIT II

Objectives: The students are to be exposed to application of free body diagrams. Solution to problems using graphical methods and law of triangle of forces.

Equilibrium of Systems of Forces: Free Body Diagrams, Equations of Equilibrium of Coplanar Systems, Spatial Systems for concurrent forces. Lamis Theorm, Graphical method for the equilibrium of coplanar forces, Converse of the law of Triangle of forces, converse of the law of polygon of forces condition of equilibrium, analysis of plane trusses.

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UNIT – III

Objectives : The students are to be exposed to concepts of centre of gravity.

Centroid: Centroids of simple figures (from basic principles) – Centroids of Composite Figures

Centre of Gravity: Centre of gravity of simple body (from basic principles), centre of gravity of composite bodies, Pappus theorems.

UNIT IV

Objective: The students are to be exposed to concepts of moment of inertia and polar moment of inertia including transfer methods and their applications.

Area moments of Inertia: Definition – Polar Moment of Inertia, Transfer Theorem, Moments of Inertia of Composite Figures, Products of Inertia, Transfer Formula for Product of Inertia. **Mass Moment of Inertia:** Moment of Inertia of Masses, Transfer Formula for Mass Moments of Inertia, mass moment of inertia of composite bodies.

UNIT – V

Objectives: The students are to be exposed to motion in straight line and in curvilinear paths, its velocity and acceleration computation and methods of representing plane motion.

Kinematics: Rectilinear and Curvelinear motions – Velocity and Acceleration – Motion of Rigid Body – Types and their Analysis in Planar Motion. **Kinetics:** Analysis as a Particle and Analysis as a Rigid Body in Translation – Central Force Motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies.

UNIT – VI

Objectives: The students are to be exposed to concepts of work, energy and particle motion

Work – Energy Method: Equations for Translation, Work-Energy Applications to Particle Motion, Connected System-Fixed Axis Rotation and Plane Motion. Impulse momentum method.

TEXT BOOKS :

1. Engg. Mechanics - S.Timoshenko & D.H.Young., 4th Edn - , Mc Graw Hill publications.

REFERENCES :

1. Engineering Mechanics statics and dynamics – R.C.Hibbeler, 11th Edn – Pearson Publ.
2. Engineering Mechanics, statics – J.L.Meriam, 6th Edn – Wiley India Pvt Ltd.
3. Engineering Mechanics, statics and dynamics – I.H.Shames, – Pearson Publ.
4. Mechanics For Engineers, statics - F.P.Beer & E.R.Johnston – 5th Edn Mc Graw Hill Publ.
5. Mechanics For Engineers, dynamics - F.P.Beer & E.R.Johnston –5th Edn Mc Graw Hill Publ.
6. Theory & Problems of engineering mechanics, statics & dynamics – E.W.Nelson, C.L.Best & W.G. McLean, 5th Edn – Schaum's outline series - Mc Graw Hill Publ.
7. Singer's Engineering Mechanics: Statics And Dynamics, K. Vijay Kumar Reddy, J. Suresh Kumar, Bs Publications
8. Engineering Mechanics, Fedinand . L. Singer, Harper – Collins.
9. Engineering Mechanics statics and dynamics , A Nelson , Mc Graw Hill publications

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I Year - I Semester

L	T	P	C
4	0	0	3

COMPUTER PROGRAMMING

Learning objectives:

Formulating algorithmic solutions to problems and implementing algorithms in C.

- Notion of Operation of a CPU, Notion of an algorithm and computational procedure, editing and executing programs in Linux.
- Understanding branching, iteration and data representation using arrays.
- Modular programming and recursive solution formulation.
- Understanding pointers and dynamic memory allocation.
- Understanding miscellaneous aspects of C.
- Comprehension of file operations.

UNIT-I:

History and Hardware - Computer Hardware, Bits and Bytes, Components, Programming Languages - Machine Language, Assembly Language, Low- and High-Level Languages, Procedural and Object-Oriented Languages, Application and System Software, The Development of C Algorithms The Software Development Process.

UNIT-II:

Introduction to C Programming- Identifiers, The main () Function, The printf () Function

Programming Style - Indentation, Comments, Data Types, Arithmetic Operations, Expression Types, Variables and Declarations, Negation, Operator Precedence and Associativity, Declaration Statements, Initialization.

Assignment - Implicit Type Conversions, Explicit Type Conversions (Casts), Assignment Variations, Mathematical Library Functions, Interactive Input, Formatted Output, Format Modifiers.

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UNIT -III:

Control Flow-Relational Expressions - Logical Operators:

Selection: if-else Statement, nested if, examples, Multi-way selection: switch, else-if, examples.

Repetition: Basic Loop Structures, Pretest and Posttest Loops, Counter-Controlled and Condition-Controlled Loops, The while Statement, The for Statement, Nested Loops, The do-while Statement.

UNIT-IV

Modular Programming: Function and Parameter Declarations, Returning a Value, Functions with Empty Parameter Lists, Variable Scope, Variable Storage Class, Local Variable Storage Classes, Global Variable Storage Classes, Pass by Reference, Passing Addresses to a Function, Storing Addresses, Using Addresses, Declaring and Using Pointers, Passing Addresses to a Function.

Case Study: Swapping Values, Recursion - Mathematical Recursion, Recursion versus Iteration.

UNIT-V:

Arrays & Strings

Arrays: One-Dimensional Arrays, Input and Output of Array Values, Array Initialization, Arrays as Function Arguments, Two-Dimensional Arrays, Larger Dimensional Arrays-Matrices

Strings: String Fundamentals, String Input and Output, String Processing, Library Functions

UNIT-VI:

Pointers, Structures, Files

Pointers: Concept of a Pointer, Initialisation of pointer variables, pointers as function arguments, passing by address, Dangling memory, address arithmetic, character pointers and functions, pointers to pointers, Dynamic memory management functions, command line arguments.

Structures: Derived types, structures declaration, Initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields.

Data Files: Declaring, Opening, and Closing File Streams, Reading from and Writing to Text Files, Random File Access

Outcomes:

- Understand the basic terminology used in computer programming
- Write, compile and debug programs in C language.
- Use different data types in a computer program.
- Design programs involving decision structures, loops and functions.
- Explain the difference between call by value and call by reference
- Understand the dynamics of memory by the use of pointers
- Use different data structures and create/update basic data files.

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Text Books:

1. ANSI C Programming, Gary J. Bronson, Cengage Learning.
2. Programming in C, Bl Juneja Anita Seth, Cengage Learning.
3. The C programming Language, Dennis Richie and Brian Kernighan, Pearson Education.

Reference Books:

1. C Programming-A Problem Solving Approach, Forouzan, Gilberg, Cengage.
2. Programming with C, Bichkar, Universities Press.
3. Programming in C, ReemaThareja, OXFORD.
4. C by Example, Noel Kalicharan, Cambridge.

I Year - I Semester

L	T	P	C
4	0	0	3

ENVIRONMENTAL STUDIES

Course Learning Objectives:

The objectives of the course is to impart

- Overall understanding of the natural resources
- Basic understanding of the ecosystem and its diversity
- Acquaintance on various environmental challenges induced due to unplanned anthropogenic activities
- An understanding of the environmental impact of developmental activities
- Awareness on the social issues, environmental legislation and global treaties

Course Outcomes:

The student should have knowledge on

- The natural resources and their importance for the sustenance of the life and recognize the need to conserve the natural resources
- The concepts of the ecosystem and its function in the environment. The need for protecting the producers and consumers in various ecosystems and their role in the food web
- The biodiversity of India and the threats to biodiversity, and conservation practices to protect the biodiversity
- Various attributes of the pollution and their impacts and measures to reduce or control the pollution along with waste management practices
- Social issues both rural and urban environment and the possible means to combat the challenges
- The environmental legislations of India and the first global initiatives towards sustainable development.
- About environmental assessment and the stages involved in EIA and the environmental audit.
- Self Sustaining Green Campus with Environment Friendly aspect of – Energy, Water and Wastewater reuse Plantation, Rain water Harvesting, Parking Curriculum.

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Syllabus:

UNIT – I Multidisciplinary nature of Environmental Studies: Definition, Scope and Importance –Sustainability: Stockholm and Rio Summit–Global Environmental Challenges: Global warming and climate change, Carbon Credits, acid rains, ozone layer depletion, population growth and explosion, effects. Role of information Technology in Environment and human health.

Ecosystems: Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem - Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of Forest ecosystem, Grassland ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT – II Natural Resources: Natural resources and associated problems

Forest resources – Use and over – exploitation, deforestation – Timber extraction – Mining, dams and other effects on forest and tribal people

Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems

Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, Sustainable mining of Granite, Literate, Coal, Sea and River sands.

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Food resources: World food problems, changes caused by non-agriculture activities-effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity

Energy resources: Growing energy needs, renewable and non-renewable energy sources use of alternate energy sources Vs Oil and Natural Gas Extraction.

Land resources: Land as a resource, land degradation, Wasteland reclamation, man induced landslides, soil erosion and desertification. Role of an individual in conservation of natural resources. Equitable use of resources for sustainable lifestyles.

UNIT – III Biodiversity and its conservation: Definition: genetic, species and ecosystem diversity- classification - Value of biodiversity: consumptive use, productive use, social- Biodiversity at national and local levels. India as a mega-diversity nation - Hot-spots of biodiversity - Threats to biodiversity: habitat loss, man-wildlife conflicts - Endangered and endemic species of India – Conservation of biodiversity: conservation of biodiversity.

UNIT – IV Environmental Pollution: Definition, Cause, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution, Nuclear hazards. Role of an individual in prevention of pollution. - Pollution case studies, Sustainable Life Studies. Impact of Fire Crackers on Men and his well being.

Solid Waste Management: Sources, Classification, effects and control measures of urban and industrial solid wastes. Consumerism and waste products, Biomedical, Hazardous and e – waste management.

UNIT – V Social Issues and the Environment: Urban problems related to energy -Water conservation, rain water harvesting-Resettlement and rehabilitation of people; its problems and concerns. Environmental ethics: Issues and possible solutions. Environmental Protection Act -Air (Prevention and Control of Pollution) Act. –Water (Prevention and control of Pollution) Act -Wildlife Protection Act -Forest Conservation Act-Issues involved in enforcement of environmental legislation. -Public awareness.

UNIT – VI Environmental Management: Impact Assessment and its significance various stages of EIA, preparation of EMP and EIS, Environmental audit. Ecotourism, Green Campus – Green business and Green politics.

The student should Visit an Industry / Ecosystem and submit a report individually on any issues related to Environmental Studies course and make a power point presentation.

TEXT BOOKS:

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1. Environmental Studies, K. V. S. G. Murali Krishna, VGS Publishers, Vijayawada

2. Environmental Studies, R. Rajagopalan, 2nd Edition, 2011, Oxford University Press.

3. Environmental Studies, P. N. Palanisamy, P. Manikandan, A. Geetha, and K. Manjula Rani; Pearson Education, Chennai

REFERENCE:

1. Text Book of Environmental Studies, Deeshita Dave & P. Udaya Bhaskar, Cengage Learning.

2. A Textbook of Environmental Studies, Shaashi Chawla, TMH, New Delhi

3. Environmental Studies, Benny Joseph, Tata McGraw Hill Co, New Delhi

4. Perspectives in Environment Studies, Anubha Kaushik, C P Kaushik, New Age International Publishers, 2014

I Year - I Semester

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ENGINEERING / APPLIED CHEMISTRY LABORATORY

1. Introduction to Chemistry laboratory – Molarity, Normality, Primary, secondary standard solutions, Volumetric titrations, Quantitative analysis, Qualitative analysis, etc.
2. Trial experiment - Determination of HCl using standard Na_2CO_3 solution.
3. Determination of alkalinity of a sample containing Na_2CO_3 and NaOH.
4. Determination of $KMnO_4$ using standard Oxalic acid solution.
5. Determination of Ferrous iron using standard $K_2Cr_2O_7$ solution.
6. Determination of Copper using standard $K_2Cr_2O_7$ solution.
7. Determination of temporary and permanent hardness of water using standard EDTA solution.
8. Determination of Copper using standard EDTA solution.
9. Determination of Iron by a Colorimetric method using thiocynate as reagent.
10. Determination of pH of the given sample solution using pH meter.
11. Conductometric titration between strong acid and strong base.
12. Conductometric titration between strong acid and weak base.
13. Potentiometric titration between strong acid and strong base.
14. Potentiometric titration between strong acid and weak base.
15. Determination of Zinc using standard EDTA solution.
16. Determination of Vitamin – C.

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Outcomes: The students entering into the professional course have practically very little exposure to lab classes. The experiments introduce volumetric analysis; redox titrations with different indicators; EDTA titrations; then they are exposed to a few instrumental methods of chemical analysis. Thus at the end of the lab course, the student is exposed to different methods of chemical analysis and use of some commonly employed instruments. They thus acquire some experimental skills.

Reference Books

1. A Textbook of Quantitative Analysis, Arthur J. Vogel.
2. Dr. Jyotsna Cherukuris (2012) *Laboratory Manual of engineering chemistry-II,* VGS Techno Series
3. Chemistry Practical Manual, Lorven Publications
4. K. Mukkanti (2009) *Practical Engineering Chemistry,* B.S. Publication

I Year - I Semester

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ENGLISH - COMMUNICATION SKILLS LAB- I

PRESCRIBED LAB MANUAL FOR SEMESTER I:

'INTERACT: English Lab Manual for Undergraduate Students' Published by **Orient Blackswan Pvt Ltd.**

OBJECTIVES:

To enable the students to learn through practice the communication skills of listening, speaking, reading and writing.

OUTCOME:

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:

1. WHY study Spoken English?
2. Making Inqueries on the phone, thanking and responding to Thanks
   Practice work.

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UNIT 2:

1. Responding to Requests and asking for Directions
   Practice work.

UNIT 3:

1. Asking for Clarifications, Inviting, Expressing Sympathy, Congratulating
2. Apologising, Advising, Suggesting, Agreeing and Disagreeing
   Practice work.

UNIT 4:

1. Letters and Sounds
   Practice work.

UNIT 5:

1. The Sounds of English
   Practice work.

UNIT 6:

1. Pronunciation

2. Stress and Intonation
   Practice work.

Assessment Procedure: Laboratory

1. Every lab session (150 minutes) should be handled by not less than two teachers (three would be ideal) where each faculty has to conduct a speaking activity for 20/30 students.
2. The teachers are to assess each learner in the class for not less than 10 speaking activities, each one to be assessed for 10 marks or 10%. The average of 10 day-to-day activity assessments is to be calculated for 10 marks for internal assessment.

The rubric given below has to be filled in for all the students for all activities.

The rubric to assess the learners:

	Body language		Fluency & Audibility	Clarity in Speech	Neutralization of accent	Appropriate Language		Total 10 marks	Remarks
	Gestures & Postures	Eye Contact				Grammar	Vocabulary & expressions		

- **Lab Assessment: Internal (25 marks)**
  1. Day-to-Day activities: 10 marks
  2. Completing the exercises in the lab manual: 5 marks
  3. Internal test (5 marks written and 5 marks oral)

- **Lab Assessment: External (50 marks)**
  1. Written test: 20 marks (writing a dialogue, note-taking and answering questions on listening to an audio recording.
  2. Oral: Reading aloud a text or a dialogue- 10 marks
  3. Viva-Voce by the external examiner: 20 marks

Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education

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I Year - I Semester

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COMPUTER PROGRAMMING LAB

OBJECTIVES:

- Understand the basic concept of C Programming, and its different modules that includes conditional and looping expressions, Arrays, Strings, Functions, Pointers, Structures and File programming.

- Acquire knowledge about the basic concept of writing a program.

- Role of constants, variables, identifiers, operators, type conversion and other building blocks of C Language.

- Use of conditional expressions and looping statements to solve problems associated with conditions and repetitions.

- Role of Functions involving the idea of modularity.

Programming

Exercise - 1 Basics

a) What is an OS Command, Familiarization of Editors - vi, Emacs

b) Using commands like mkdir, ls, cp, mv, cat, pwd, and man

c) C Program to Perform Adding, Subtraction, Multiplication and Division of two numbers From Command line

Exercise - 2 Basic Math

a) Write a C Program to Simulate 3 Laws at Motion

b) Write a C Program to convert Celsius to Fahrenheit and vice versa

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Exercise - 3 Control Flow - I

a) Write a C Program to Find Whether the Given Year is a Leap Year or not.

b) Write a C Program to Add Digits & Multiplication of a number

Exercise – 4 Control Flow - II

a) Write a C Program to Find Whether the Given Number is

i) Prime Number

ii) Armstrong Number

b) Write a C program to print Floyd Triangle

c) Write a C Program to print Pascal Triangle

Exercise – 5 Functions

a) Write a C Program demonstrating of parameter passing in Functions and returning values.

b) Write a C Program illustrating Fibonacci, Factorial with Recursion without Recursion

Exercise – 6 Control Flow - III

a) Write a C Program to make a simple Calculator to Add, Subtract, Multiply or Divide Using switch…case

b) Write a C Program to convert decimal to binary and hex (using switch call function the function)

Exercise – 7 Functions - Continued
Write a C Program to compute the values ofsin x and cos x and e^x values using Series expansion. (use factorial function)

Exercise – 8 Arrays
Demonstration of arrays
a) Search-Linear.
b) Sorting-Bubble, Selection.
c) Operations on Matrix.

Exercises - 9 Structures
a)Write a C Program to Store Information of a Movie Using Structure
b)Write a C Program to Store Information Using Structures with Dynamically Memory Allocation
c) Write a C Program to Add Two Complex Numbers by Passing Structure to a Function

Exercise - 10 Arrays and Pointers
a)Write a C Program to Access Elements of an Array Using Pointer
b) Write a C Program to find the sum of numbers with arrays and pointers.

Exercise – 11 Dynamic Memory Allocations
a) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using malloc () function.
b) Write a C program to find sum of n elements entered by user. To perform this program, allocate memory dynamically using calloc () function.

Understand the difference between the above two programs

Exercise – 12 Strings

a) Implementation of string manipulation operations **with** library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare
b) Implementation of string manipulation operations **without** library function.
   i) copy
   ii) concatenate
   iii) length
   iv) compare

Exercise -13 Files
a)Write a C programming code to open a file and to print it contents on screen.
b)Write a C program to copy files

Exercise - 14 Files Continued
a) Write a C program merges two files and stores their contents in another file.
b)Write a C program to delete a file.

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OUTCOMES:

- Apply and practice logical ability to solve the problems.
- Understand C programming development environment, compiling, debugging, and linking and executing a program using the development environment
- Analyzing the complexity of problems, Modularize the problems into small modules and then convert them into programs
- Understand and apply the in-built functions and customized functions for solving the problems.
- Understand and apply the pointers, memory allocation techniques and use of files fordealing with variety of problems.
- Document and present the algorithms, flowcharts and programs in form of user-manuals
- Identification of various computer components, Installation of software

Note:

a) All the Programs must be executed in the Linux Environment. (Mandatory)
b) The Lab record must be a print of the LATEX (.tex) Format.

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I Year - II Semester

L	T	P	C
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ENGLISH -II

Introduction:

In view of the growing importance of English as a tool for global communication and the consequent emphasis on training the students to acquire communicative competence, the syllabus has been designed to develop linguistic and communicative competence of the students of Engineering.

As far as the detailed Textbooks are concerned, the focus should be on the skills of listening, speaking, reading and writing. The nondetailed Textbooks are meant for extensive reading for pleasure and profit.

Thus the stress in the syllabus in primarily on the development of communicative skills and fostering of ideas.

Objectives:

1. To imporve the language proficiency of the students in English with emphasis on LSRW skills.
2. To enable the students to study and comprehend the prescribed lessons and subjects more effectively relating to their theorotical and practical components.
3. To develop the communication skills of the students in both formal and informal situations.

LISTENING SKILLS:

Objectives:

1. To enable the students to appreciate the role of listening skill and improve their pronounciation.
2. To enable the students to comprehend the speech of people belonging to different backgrounds and regions.
3. To enable the students to listen for general content, to fill up information and for specific information.

SPEAKING SKILLS:

Objectives:

1. To make the students aware of the importance of speaking for their personal and professional communication.
2. To enable the students to express themselves fluently and accurately in social and professional success.
3. To help the students describe objects, situations and people.
4. To make the students participate in group activities like roleplays, discussions and debates.
5. To make the students particiapte in Just a Minute talks.

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READING SKILLS:

Objectives:

1. To enable the students to comprehend a text through silent reading.
2. To enable the students to guess the meanings of words, messages and inferences of texts in given contexts.
3. To enable the students to skim and scan a text.
4. To enable the students to identify the topic sentence.
5. To enable the students to identify discourse features.
6. To enable the students to make intensive and extensive reading.

WRITING SKILLS:

Objectives:

1. To make the students understand that writing is an exact formal skills.
2. To enable the students to write sentences and paragraphs.
3. To make the students identify and use appropriate vocabulary.
4. To enable the students to narrate and describe.
5. To enable the students capable of note-making.
6. To enable the students to write coherently and cohesively.
7. To make the students to write formal and informal letters.
8. To enable the students to describe graphs using expressions of comparision.
9. To enable the students to write techincal reports.

Methodology:

1. The class are to be learner-centered where the learners are to read the texts to get a comprehensive idea of those texts on their own with the help of the peer group and the teacher.
2. Integrated skill development methodology has to be adopted with focus on individual language skills as per the tasks/exercise.
3. The tasks/exercises at the end of each unit should be completed by the learners only and the teacher interventions permitted as per the complexity of the task/exercise.
4. The teacher is expected to use supplementary material wherever necessary and also generate activities/tasks as per the requirement.
5. The teacher is permitted to use lecture method when a completely new concept is introduced in the class.

Assessment Procedure: Theory

1. The formative and summative assessment procedures are to be adopted (mid exams and end semester examination).
2. Neither the formative nor summative assessment procedures should test the memory of the content of the texts given in the textbook. The themes and global comprehension of the units in the present day context with application of the langauge skills learnt in the unit are to be tested.
3. Only new unseen passages are to be given to test reading skills of the learners. Written skills are to be tested from sentence level to essay level. The communication formats—emails, letters and reports-- are to be tested along with appropriate langauge and expressions.
4. Examinations:

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I mid exam + II mid exam (15% for descriptive tests+10% for online tests)= 25%

(80% for the best of two and 20% for the other)

Assignments= 5%

End semester exams=70%

5. Three take home assignments are to be given to the learners where they will have to read texts from the reference books list or other sources and write their gist in their own words.

The following text books are recommended for study in I B.Tech II Semester (Common for all branches)and I B.Pharma II Sem of JNTU Kakinada from the academic year 2016-17 **(R-16 Regulations)**

DETAILED TEXTBOOK: ENGLISH ENCOUNTERS Published by **Maruthi Publishers**.

DETAILED NON-DETAIL:THE GREAT INDIAN SCIENTISTS Published by **Cenguage learning**

The course content along with the study material is divided into six units.

UNIT 1:

1. ' The Greatest Resource- Education' from English Encounters

OBJECTIVE:

Schumacher describes the education system by saying that it was mere training, something more than mere knowledge of facts.

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OUTCOME:

The lesson underscores that the ultimate aim of Education is to enhance wisdom.

2. ' A P J Abdul Kalam' from The Great Indian Scientists.

OBJECTIVE:

The lesson highlights Abdul Kalam's contributions to Indian science and the awards he received.

OUTCOME:

Abdul Kalam's simple life and service to the nation inspires the readers to follow in his footsteps.

UNIT 2:

1. ' A Dilemma' from English Encounters

OBJECTIVE: The lesson centres on the pros and cons of the development of science and technology.

OUTCOME: The lesson enables the students to promote peaceful co-existence and universal harmony among people and society.

2. 'C V Raman' from The Great Indian Scientists.

OBJECTIVE:

The lesson highlights the dedicated research work of C V Raman and his achievements in Physics.

OUTCOME:

The Achievements of C V Raman are inspiring and exemplary to the readers and all scientists.

UNIT 3:

1. 'Cultural Shock': Adjustments to new Cultural Environments from English Encounters.

OBJECTIVE: The lesson depicts of the symptoms of Cultural Shock and the aftermath consequences

OUTCOME:

The lesson imparts the students to manage different cultural shocks due to globalization.

2. 'Homi Jehangir Bhabha' from The Great Indian Scientists.

OBJECTIVE:

The lesson highlights Homi Jehangir Bhabha's contributions to Indian nuclear programme as architect.

OUTCOME:

The seminal contributions of Homi Jehangir Bhabha to Indian nuclear programme provide an aspiration to the readers to serve the nation and sterngthen it.

UNIT 4:

1. 'The Lottery' from English Encounters.

OBJECTIVE:

The lesson highlights insightful commentary on cultural traditions.

OUTCOME:

The theme projects society’s need to re examine its traditions when they are outdated.

2. 'Jagadish Chandra Bose' from The Great Indian Scientists.

OBJECTIVE:

The lesson gives an account of the unique discoveries and inventions of Jagadish Chandra Bose in Science.

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OUTCOME: The Scientific discoveries and inventions of Jagadish Chandra Bose provide inspiration to the readers to make their own contributions to science and technology, and strengthen the nation.

UNIT 5:

1. ' The Health Threats of Climate Change' from English Encounters.

OBJECTIVE:

The essay presents several health disorders that spring out due to environmental changes

OUTCOME:

The lesson offers several inputs to protect environment for the sustainability of the future generations.

2. ' Prafulla Chandra Ray' from The Great Indian Scientists.

OBJECTIVE:

The lesson given an account of the experiments and discoveries in Pharmaceuticals of Prafulla Chandra Ray.

OUTCOME:

Prafulla Chandra Ray's scientific achievements and patriotic fervour provide inspiration to the reader.

UNIT 6:

1. ' The Chief Software Architect' from English Encounters

OBJECTIVE:

The lesson supports the developments of technology for the betterment of human life.

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OUTCOME:

Pupil get inspired by eminent personalities who toiled for the present day advancement of software development.

2. ' Srinivasa Ramanujan' from The Great Indian Scientists.

OBJECTIVE:

The lesson highlights the extraordinary achievements of Srinivasa Ramanujan, a great mathematician and the most romantic figure in mathematics.

OUTCOME:

The lesson provides inspiration to the readers to think and tap their innate talents.

NOTE:

All the exercises given in the prescribed lessons in both detailed and non-detailed textbooks relating to the theme and language skills must be covered.

MODEL QUESTION PAPER FOR THEORY

PART- I

Six short answer questions on 6 unit themes

One question on eliciting student's response to any of the themes

PART-II

Each question should be from one unit and the last question can be a combination of two or more units.

Each question should have 3 sub questions: A,B & C

A will be from the main text: 5 marks

B from non-detailed text: 3 marks

C on grammar and Vocabulary: 6 marks

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I Year - II Semester

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MATHEMATICS – II (MATHEMATICAL METHODS)

Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:

1. Calculate a root of algebraic and transcendental equations. Explain relation between the finite difference operators.
2. Compute interpolating polynomial for the given data.
3. Solve ordinary differential equations numerically using Euler's and RK method.
4. Find Fourier series and Fourier transforms for certain functions.
5. Identify/classify and solve the different types of partial differential equations.

UNIT I: Solution of Algebraic and Transcendental Equations:

Introduction- Bisection method – Method of false position – Iteration method – Newton-Raphson method (One variable and simultaneous Equations).

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UNIT II: Interpolation:

Introduction- Errors in polynomial interpolation – Finite differences- Forward differences-Backward differences –Central differences – Symbolic relations and separation of symbols - Differences of a polynomial-Newton's formulae for interpolation – Interpolation with unequal intervals - Lagrange's interpolation formula.

UNIT III: Numerical Integration and solution of Ordinary Differential equations:

Trapezoidal rule- Simpson's $1/3^{rd}$ and $3/8^{th}$ rule-Solution of ordinary differential equations by Taylor's series-Picard's method of successive approximations-Euler's method - Runge-Kutta method (second and fourth order).

UNIT IV: Fourier Series:

Introduction- Periodic functions – Fourier series of -periodic function - Dirichlet's conditions – Even and odd functions –Change of interval– Half-range sine and cosine series.

UNIT V: Applications of PDE:

Method of separation of Variables- Solution of One dimensional Wave, Heat and two-dimensional Laplace equation.

UNIT VI: Fourier Transforms:

Fourier integral theorem (without proof) – Fourier sine and cosine integrals - sine and cosine transforms – properties – inverse transforms – Finite Fourier transforms.

Text Books:

1. **B.S.Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. **Dean G. Duffy,** Advanced engineering mathematics with MATLAB, CRC Press
2. **V.Ravindranath and P.Vijayalakshmi,** Mathematical Methods, Himalaya Publishing House.
3. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
4. **David Kincaid, Ward Cheney**, Numerical Analysis-Mathematics of Scientific Computing, 3rd Edition, Universities Press.
5. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
6. **Dass H.K., Rajnish Verma. Er.,** Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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I Year - II Semester

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MATHEMATICS-III

Course Objectives:

1. The course is designed to equip the students with the necessary mathematical skills and techniques that are essential for an engineering course.
2. The skills derived from the course will help the student from a necessary base to develop analytic and design concepts.
3. Understand the most basic numerical methods to solve simultaneous linear equations.

Course Outcomes: At the end of the Course, Student will be able to:

1. Determine rank, Eigen values and Eigen vectors of a given matrix and solve simultaneous linear equations.
2. Solve simultaneous linear equations numerically using various matrix methods.
3. Determine double integral over a region and triple integral over a volume.
4. Calculate gradient of a scalar function, divergence and curl of a vector function. Determine line, surface and volume integrals. Apply Green, Stokes and Gauss divergence theorems to calculate line, surface and volume integrals.

UNIT I: Linear systems of equations:

Rank-Echelon form-Normal form – Solution of linear systems – Gauss elimination - Gauss Jordon- Gauss Jacobi and Gauss Seidal methods. Applications: Finding the current in electrical circuits.

UNIT II: Eigen values - Eigen vectors and Quadratic forms:

Eigen values - Eigen vectors– Properties – Cayley-Hamilton theorem - Inverse and powers of a matrix by using Cayley-Hamilton theorem- Diagonalization- Quadratic forms- Reduction of quadratic form to canonical form – Rank - Positive, negative and semi definite - Index – Signature.

Applications: Free vibration of a two-mass system.

UNIT III: Multiple integrals:

Curve tracing: Cartesian, Polar and Parametric forms.

Multiple integrals: Double and triple integrals – Change of variables – Change of order of integration.

Applications: Finding Areas and Volumes.

UNIT IV: Special functions:

Beta and Gamma functions- Properties - Relation between Beta and Gamma functions- Evaluation of improper integrals.

Applications: Evaluation of integrals.

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UNIT V: Vector Differentiation:

Gradient- Divergence- Curl - Laplacian and second order operators -Vector identities.

Applications: Equation of continuity, potential surfaces

UNIT VI: Vector Integration:

Line integral – Work done – Potential function – Area- Surface and volume integrals Vector integral theorems: Greens, Stokes and Gauss Divergence theorems (without proof) and related problems.

Applications: Work done, Force.

Text Books:

1. **B.S.Grewal,** Higher Engineering Mathematics, 43rd Edition, Khanna Publishers.
2. **N.P.Bali**, Engineering Mathematics, Lakshmi Publications.

Reference Books:

1. **Greenberg,** Advanced Engineering Mathematics, 2nd edition, Pearson edn
2. **Erwin Kreyszig,** Advanced Engineering Mathematics, 10th Edition, Wiley-India
3. **Peter O'Neil,** Advanced Engineering Mathematics,7th edition, Cengage Learning.
4. **D.W. Jordan and T.Smith,** Mathematical Techniques, Oxford University Press.
5. **Srimanta Pal, Subodh C.Bhunia**, Engineering Mathematics, Oxford University Press.
6. **Dass H.K., Rajnish Verma. Er.,** Higher Engineering Mathematics, S. Chand Co. Pvt. Ltd, Delhi.

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I Year - II Semester

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4	0	0	3

ENGINEERING PHYSICS

(ME, CE, PE, PCE, MET.E, MINING, AUTOMOBILE, CHEMICAL,AERONAUTICAL, BIO.TECH)

OBJECTIVES: *Physics curriculum which is re-oriented to the needs of Circuital branches of graduate engineering courses offered by JNTUniv.Kkd. that serves as a transit to understand the branch specific advanced topics. The courses are designed to:*

- *Impart concepts of Optical Interference, Diffraction and Polarization required to design instruments with higher resolution - Concepts of coherent sources, its realization and utility optical instrumentation.*
- *Study the Structure-property relationship exhibited by solid crystal materials for their utility.*
- *Tap the Simple harmonic motion and its adaptability for improved acoustic quality of concert halls.*
- *To explore the Nuclear Power as a reliable source required to run industries*
- *To impart the knowledge of materials with characteristic utility in appliances.*

UNIT-I

INTERFERENCE: Principle of Superposition – Coherent Sources – Interference in thin films (reflection geometry) – Newton's rings – construction and basic principle of Interferometers.

UNIT-II

DIFFRACTION: Fraunhofer diffraction at single slit cases of double slit, N-slits & Circular Aperture (Qualitative treatment only)-Grating equation - Resolving power of a grating, Telescope and Microscopes.

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UNIT-III

POLARIZATION: Types of Polarization-production - Nicol Prism -Quarter wave plate and Half Wave plate – Working principle of Polarimeter (Sacharimeter)

LASERS: Characteristics– Stimulated emission – Einstein's Transition Probabilities-Pumping schemes - Ruby laser – Helium Neon laser.

UNIT-IV

ACOUSTICS: Reverberation time - Sabine's formula – Acoustics of concert-hall.

ULTRASONICS: Production - Ultrasonic transducers- Non-Destructive Testing – Applications.

UNIT-V

CRYSTALLOGRAPHY & X-RAY DIFFRACTION: Basis and lattice – Bravais systems-Symmetry elements- Unit cell- packing fraction – coordination number- Miller indices – Separation between successive (h k l) planes – Bragg's law.

NUCLEAR ENERGY – SOURCE OF POWER: Mass defect & Binding Energy – Fusion and Fission as sources – Fast breeder Reactors.

UNIT-VI

MAGNETISM: Classification based on Field, Temperature and order/disorder –atomic origin – Ferromagnetism- Hysteresis- applications of magnetic materials (Para &Ferro)..

DIELECTRICS: Electric Polarization – Dielectrics in DC and AC fields – Internal field – Clausius Mossoti Equation - Loss, Breakdown and strength of dielectric materials – Ferroelectric Hysteresis and applications.

***Outcome**: Construction and working details of instruments, ie., Interferometer, Diffractometer and Polarimeter are learnt. Study Acoustics, crystallography magnetic and dielectric materials enhances the utility aspects of materials.*

Text Books:

1. A Text book of Engineering Physics – by Dr. M.N.Avadhanulu and Dr.P.G.Kshirasagar, S.Chand & Company Ltd., (2014)
2. Physics for Engineers by M.R.Srinasan, New Age international publishers (2009)
3. Engineering Physics by D.K.Bhattacharya and Poonam Tandon , Oxford press (2015)

Refference books:

1. Applied Physics by P.K.Palanisamy , Scitech publications (2014)
2. Lasers and Non-Linear optics by B.B.Laud , Newage international publishers (2008)

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I Year - II Semester

L	T	P	C
4	0	0	3

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

Preamble:

This course covers the topics related to analysis of various electrical circuits, operation of various electrical machines, various electronic components to perform well in their respective fields.

Learning Objectives:

- To learn the basic principles of electrical circuital law's and analysis of networks.
- To understand the principle of operation and construction details of DC machines & Transformers.
- To understand the principle of operation and construction details of alternator and 3-Phase induction motor.
- To study the operation of PN junction diode, half wave, full wave rectifiers and OP-AMPs.
- To learn the operation of PNP and NPN transistors and various amplifiers.

UNIT - I

Electrical Circuits:

Basic definitions - Types of network elements - Ohm's Law - Kirchhoff's Laws - Inductive networks - Capacitive networks – Series - Parallel circuits - Star-delta and delta-star transformations.

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UNIT - II

Dc Machines:

Principle of operation of DC generator – EMF equation - Types of DC machine – Torque equation – Applications – Three point starter - Speed control methods of DC motor – Swinburne's Test.

UNIT - III

Transformers:

Principle of operation and construction of single phase transformers – EMF equation – Losses – OC & SC tests - Efficiency and regulation.

UNIT - IV

AC Rotating Machines:

Principle of operation and construction of alternators– Types of alternators – Principle of operation of synchronous motor - Principle of operation of 3-Phase induction motor – Slip-torque characteristics - Efficiency – Applications.

UNIT V

Rectifiers & Linear ICs:

PN junction diodes - Diode applications(Half wave and bridge rectifiers).Characteristics of operation amplifiers (OP-AMP) - application of OP-AMPs (inverting, non-inverting, integrator and differentiator).

UNIT VI

Transistors:

PNP and NPN junction transistor, transistor as an amplifier- Transistor amplifier - Frequency response of CE amplifier - Concepts of feedback amplifier.

Learning Outcomes:

- Able to analyse the various electrical networks.
- Able to understand the operation of DC generators,3-point starter and DC machine testing by Swinburne's Test.
- Able to analyse the performance of single-phase transformer.
- Able to explain the operation of 3-phase alternator and 3-phase induction motors.
- Able to analyse the operation of half wave, full wave bridge rectifiers and OP-AMPs.
- Able to explain the single stage CE amplifier and concept of feedback amplifier.

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Text Books:

1. Electrical Technology by Surinder Pal Bali, Pearson Publications.

2. Electronic Devices and Circuits, R.L. Boylestad and Louis Nashelsky, 9th edition, PEI/PHI 2006.

ReferenceBooks:

1.Electrical Circuit Theory and Technology by John Bird, Routledge Taylor &Francis Group

2. Basic Electrical Engineering by M.S.Naidu and S.Kamakshiah,TMH Publications

3.Fundamentals of Electrical Engineering by Rajendra Prasad, PHI Publications,2nd edition

4.Basic Electrical Engineering by Nagsarkar,Sukhija, Oxford Publications,2nd edition

5.Industrial Electronics by G.K. Mittal, PHI

I Year - II Semester

L	T	P	C
4	0	0	3

ENGINEERING DRAWING

Objective: Engineering drawing being the principle method of communication for engineers, the objective is to introduce the students, the techniques of constructing the various types of polygons, curves and scales. The objective is also to visualize and represent the 3D objects in 2D planes with proper dimensioning, scaling etc.

UNIT I

Objective: To introduce the students to use drawing instruments and to draw polygons, Engg. Curves.

Polygons: Constructing regular polygons by general methods, inscribing and describing polygons on circles.

Curves: Parabola, Ellipse and Hyperbola by general methods, cycloids, involutes, tangents & normals for the curves.

UNIT II

Objective: To introduce the students to use scales and orthographic projections, projections of points & simple lines.

Scales: Plain scales, diagonal scales and vernier scales

Orthographic Projections: Horizontal plane, vertical plane, profile plane, importance of reference lines, projections of points in various quadrants, projections of lines, lines parallel either to of the reference planes (HP,VP or PP)

UNIT III

Objective: The objective is to make the students draw the projections of the lines inclined to both the planes.

Projections of straight lines inclined to both the planes, determination of true lengths, angle of inclination and traces- HT, VT

UNIT IV

Objective: The objective is to make the students draw the projections of the plane inclined to both the planes.

Projections of planes: regular planes perpendicular/parallel to one plane and inclined to the other reference plane; inclined to both the reference planes.

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UNIT V

Objective: The objective is to make the students draw the projections of the various types of solids in different positions inclined to one of the planes.

Projections of Solids – Prisms, Pyramids, Cones and Cylinders with the axis inclined to one of the planes.

UNIT VI

Objective: The objective is to represent the object in 3D view through isometric views. The student will be able to represent and convert the isometric view to orthographic view and vice versa.

Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

TEXT BOOKS:

1. Engineering Drawing by N.D. Butt, Chariot Publications
2. Engineering Drawing by Agarwal & Agarwal, Tata McGraw Hill Publishers

REFERENCE BOOKS:

1. Engineering Drawing by K.L.Narayana & P. Kannaiah, Scitech Publishers
2. Engineering Graphics for Degree by K.C. John, PHI Publishers
3. Engineering Graphics by PI Varghese, McGrawHill Publishers
4. Engineering Drawing + AutoCad – K Venugopal, V. Prabhu Raja, New Age

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I Year - II Semester

L	T	P	C
0	0	3	2

ENGLISH-COMMUNICATIONS SKILLS LAB-II

PRESCRIBED LAB MANUAL FOR SEMESTER II:

'INTERACT: English Lab Manual for Undergraduate Students' Published by **Orient Blackswan Pvt Ltd.**

OBJECTIVES:

To enable the students to learn demonstratively the communication skills of listening, speaking, reading and writing.

OUTCOME:

A study of the communicative items in the laboratory will help the students become successful in the competitive world.

The course content along with the study material is divided into six units.

UNIT 1:

1. Debating
   Practice work

UNIT 2:

1. Group Discussions
   Practice work

UNIT 3:

1. Presentation Skills
   Practice work

UNIT 4:

1. Interview Skills
   Practice work

UNIT 5:

1. Email,
2. Curriculum Vitae
   Practice work

UNIT 6:

1. Idiomatic Expressions
2. Common Errors in English
   Practice work

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Reference Books:

1. Strengthen your communication skills by Dr M Hari Prasad, Dr Salivendra Raju and Dr G Suvarna Lakshmi, Maruti Publications.
2. English for Professionals by Prof Eliah, B.S Publications, Hyderabad.
3. Unlock, Listening and speaking skills 2, Cambridge University Press
4. Spring Board to Success, Orient BlackSwan
5. A Practical Course in effective english speaking skills, PHI
6. Word power made handy, Dr shalini verma, Schand Company
7. Let us hear them speak, Jayashree Mohanraj, Sage texts
8. Professional Communication, Aruna Koneru, Mc Grawhill Education
9. Cornerstone, Developing soft skills, Pearson Education

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I Year - II Semester

L	T	P	C
0	0	3	2

ENGINEERING / APPLIED PHYSICS LAB
(Any 10 of the following listed experiments)

Objective: *Training field oriented Engineering graduates to handle instruments and their design methods to improve the accuracy of measurements.*

LIST OF EXPERIMENTS:

1. Determination of wavelength of a source-Diffraction Grating-Normal incidence.
2. Newton's rings – Radius of Curvature of Plano - Convex Lens.
3. Determination of thickness of a spacer using wedge film and parallel interference fringes.
4. Determination of Rigidity modulus of a material- Torsional Pendulum.
5. Determination of Acceleration due to Gravity and Radius of Gyration- Compound Pendulum.
6. Melde's experiment – Transverse and Longitudinal modes.
7. Verification of laws of vibrations in stretched strings – Sonometer.
8. Determination of velocity of sound – Volume Resonator.
9. L- C- R Series Resonance Circuit.
10. Study of I/V Characteristics of Semiconductor diode.
11. I/V characteristics of Zener diode.
12. Characteristics of Thermistor – Temperature Coefficients.
13. Magnetic field along the axis of a current carrying coil – Stewart and Gee's apparatus.
14. Energy Band gap of a Semiconductor p - n junction.
15. Hall Effect in semiconductors.
16. Time constant of CR circuit.
17. Determination of wavelength of laser source using diffraction grating.
18. Determination of Young's modulus by method of single cantilever oscillations.
19. Determination of lattice constant – lattice dimensions kit.
20. Determination of Planck's constant using photocell.
21. Determination of surface tension of liquid by capillary rise method.

Outcome: *Physics lab curriculum gives fundamental understanding of design of an instrument with targeted accuracy for physical measurements.*

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I Year - II Semester

L	T	P	C
0	0	2	0

ENGINEERING / APPLIED PHYSICS - VIRTUAL LABS – ASSIGNMENTS
(Constitutes5% marks of 30marks of Internal-component)

Objective: *Training Engineering students to prepare a technical document and improving their writing skills.*

LIST OF EXPERIMENTS

1. Hall Effect
2. Crystal Structure
3. Hysteresis
4. Brewster's angle
5. Magnetic Levitation / SQUID
6. Numerical Aperture of Optical fiber
7. Photoelectric Effect
8. Simple Harmonic Motion
9. Damped Harmonic Motion
10. LASER – Beam Divergence and Spot size
11. B-H curve
12. Michelson's interferometer
13. Black body radiation

URL: www.vlab.co.in

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Outcome: *Physics Virtual laboratory curriculum in the form of assignment ensures an engineering graduate to prepare a /technical/mini-project/ experimental report with scientific temper.*

I Year - II Semester

L	T	P	C
0	0	3	2

ENGINEERING WORKSHOP & IT WORKSHOP

ENGINEERING WORKSHOP

Course Objective: To impart hands-on practice on basic engineering trades and skills.

Note: At least two exercises to be done from each trade.

Trade:

Carpentry	1. T-Lap Joint 2. Cross Lap Joint 3. Dovetail Joint 4. Mortise and Tenon Joint
Fitting	1. Vee Fit 2. Square Fit 3. Half Round Fit 4. Dovetail Fit
Black Smithy	1. Round rod to Square 2. S-Hook 3. Round Rod to Flat Ring 4. Round Rod to Square headed bolt
House Wiring	1. Parallel / Series Connection of three bulbs 2. Stair Case wiring 3. Florescent Lamp Fitting 4. Measurement of Earth Resistance
Tin Smithy	1. Taper Tray 2. Square Box without lid 3. Open Scoop 4. Funnel

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IT WORKSHOP

OBJECTIVES:

- Understand the basic components and peripherals of a computer.
- To become familiar in configuring a system.
- Learn the usage of productivity tools.
- Acquire knowledge about the netiquette and cyber hygiene.
- Get hands on experience in trouble shooting a system?

1. System Assembling, Disassembling and identification of Parts / Peripherals

2. **Operating System Installation**-Install Operating Systems like Windows, Linux along with necessary Device

Drivers.

3**. MS-Office / Open Office**

a. **Word** - Formatting, Page Borders, Reviewing, Equations, symbols.
b. **Spread Sheet** - organize data, usage of formula, graphs, charts.
c. **Power point** - features of power point, guidelines for preparing an effective presentation.
d. **Acces**s- creation of database, validate data.

4. **Network Configuration & Software Installation**-Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.

5. **Internet and World Wide Web**-Search Engines, Types of search engines, netiquette, cyber hygiene.

6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

7. **MATLAB-** basic commands, subroutines, graph plotting.

8. **LATEX**-basic formatting, handling equations and images.

OUTCOMES:

- Common understanding of concepts, patterns of decentralization implementation in
  Africa †
- Identified opportunities for coordinated policy responses, capacity building and implementation of best practices †
- Identified instruments for improved decentralization to the local level †
- Identified strategies for overcoming constraints to effective decentralization and sustainable management at different levels

TEXT BOOKS:

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1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition ByGary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).
3. LATEX- User's Guide and Reference manual, Leslie Lamport, Pearson, LPE, 2/e.
4. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Rudraprathap, Oxford University Press, 2002.
5. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
6. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.
7. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
8. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

II Year - I Semester

L	T	P	C
4	0	0	3

DEVELOPMENT OF MINERAL DEPOSITS

Course Objectives:

To impart the knowledge of mineral deposits and to make the student learn and understand the ordinary methods of drilling, blasting and special methods of shaft sinking. Also to make the student understand the detonators and drivage of drifts.

UNIT I:

Objective: The Student can understand what the types of openings to deposits are. When the openings like Raises. Winzes Ore Chutes, Single and multiple levels, Shaft Stations, Pit top and pit bottom layouts are required and how they are being made.

Various types of development openings shape and size, Selection of suitable type for actual situations raises, winzes or passes, ore chutes.

UNIT II:

Objective: The student can understand what are the factors that responsible in location of shafts, shape and Size of the shaft. What are the arrangements for sinking shafts, tools and equipments? What are the ordinary methods of Drilling, Blasting and removal of debris.

Location of shaft shape and size, incline and vertical shafts. Surface arrangements for sinking shafts, tools and equipments ordinary methods of sinking drilling, blasting removal of debris and water.

UNIT III:

Objective: The student can understand what is the system of ventilation, Lighting and What are the Permanent lining, Widening and Deepening of Shafts.

Ventilation and lighting, temporary and permanent lining, widening and deepening of shafts.

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UNIT IV

Objective: Student can understand what are the special methods of Shaft Sinking, and Modern techniques of Shaft sinking.

Special methods of shaft sinking piling, caisson, freezing and cementation method of shaft sinking Modern techniques of shaft sinking. Design of shafts inserts and pit bottoms

UNIT -V:

Objective: The Student can understand what is the classification of Explosives, Detonators and Detonating Fuses and Nonel Detonators. What are blasting Systems, Electrical and Non-Electrical methods, delay blasting techniques, and blasting in open pit mines and U/G coal and metal mines.

Classification and properties of explosives, detonators. Detonating cords, and detonating fuse and nonel detonator. Blasting systems, electrical and non electrical methods, delay blasting techniques. Blasting in open pit mines, blasting in underground coal and metal mines. Mechanics of blasting.

UNIT -VI:

Objective: Student can understand how the Drivage of drifts is being done, what are the cycle of operations, drilling, blasting, loading, transport, support, drainage, ventilation and lighting. Mechanized drifting, road heading and tunnel boring.

Drivage of drifts, organization and cycle of operations, drilling, blasting, blasting patterns, loading, transport, support, drainage, ventilation and lighting. Mechanized drifting, road heading and tunnel boring.

Books Recommended:

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

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II Year - I Semester

L	T	P	C
4	0	0	3

THERMAL ENGINEERING FOR MINING

Course Objectives:

To impart the knowledge of thermodynamic laws and to make the student learn and understand the reasons and affects of various losses that occurs in the actual engine operation. And to make the student understand functioning of various systems of compressors, Boilers, Refrigeration and air conditioning.

UNIT – I

Objectives: This makes the student to learn about Zeroth law and first law of thermodynamics, which is also the energy conservation principle, and should be able to apply to different thermodynamic systems.

Zeroth Law of Thermodynamics – Concept of Temperature, Thermodynamic Equilibrium, First law of Thermodynamics – Corollaries – First law applied to a Process – applied to a flow system – Steady Flow Energy Equation. Throttling and free expansion processes – deviations from perfect gas model – Vander Waals equation of state – compressibility charts – variable specific heats – gas tables.

UNIT – II

Objectives: To understand the second law statements and the associated terms and should be able to apply the principles to heat engines. Should be able to analyze the concepts of Carnot cycle, entropy, availability and irreversibility. Should be able to understand the different types of combustion cycles.

Limitations of the First Law – Thermal Reservoir, Heat Engine, Heat pump, Parameters of performance, Second Law of Thermodynamics, Thermodynamic scale of Temperature, Third Law of Thermodynamics. Otto Combustion cycle, Diesel Combustion cycle & Dual Combustion cycles.

UNIT – III

Objectives: To familiarize the student with the various engine systems along with their function and necessity.

I. C. ENGINES : Classification - Working principles, Valve and Port Timing Diagrams, - Engine systems – Fuel, Carburetor, Fuel Injection System, Ignition, Cooling and Lubrication, principle of wankel engine, principles of supercharging and turbo-charging.

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UNIT – IV

Objectives: To learn about normal combustion phenomenon and knocking in S.I. and C.I. Engines and to find the several engine operating parameters that affect the smooth engine operation.

Combustion in S.I. Engines : Normal Combustion and abnormal combustion – Importance of flame speed and effect of engine variables – Type of Abnormal combustion, pre-ignition and knocking (explanation of) – Fuel requirements and fuel rating, anti knock additives – combustion chamber – requirements, types.

Combustion in C.I. Engines : Four stages of combustion – Delay period and its importance – Effect of engine variables – Diesel Knock– Need for air movement, suction, compression and combustion induced turbulence – open and divided combustion chambers and nozzles used – fuel requirements and fuel rating.

UNIT – V

Objectives: To make students learn about different types of compressors and to calculate power and efficiency of reciprocating compressors.

COMPRESSORS – Classification –positive displacement and roto dynamic machinery – Power producing and power absorbing machines, fan, blower and compressor – positive displacement and dynamic types – reciprocating and rotary types.

Reciprocating : Principle of operation, work required, Isothermal efficiency volumetric efficiency and effect of clearance, stage compression, undercooling, saving of work, minimum work condition for stage compression.

UNIT VI

Objectives: To make students learn about Refrigeration and air conditioning systems and To make students learn about Boilers and its operation.

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Refrigeration Cycles : Vapour compression cycle-performance and its Evaluation. Air conditioning and different types of Air conditioning.

BOILERS : Classification – working principles – with sketches including H.P.Boilers – mountings and accessories – working principles.

TEXT BOOKS:

1. Thermal Engineering/R S Kurmi/J K Gupta, S Chand Publications.
2. Engineering Thermodynamics , PK Nag , TMH, III Edition
3. I.C. Engines / V. GANESAN- TMH
4. Thermal Engineering / Rajput / Lakshmi Publications.

REFERENCES :

1. Engineering Thermodynamics – Jones & Dugan
2. IC Engines – Mathur & Sharma – Dhanpath Rai & Sons.
3. Engineering fundamentals of IC Engines – Pulkrabek / Pearson /PHI
4. I.C. Engines / Haywood/ McGrawHill
5. IC Engines/RK Rajput/Laxmi publications

II Year - I Semester

L	T	P	C
4	0	0	3

FLUID MECHANICS AND HYDRAULIC MACHNES

Objective: ***The students completing this course are expected to understand the properties of fluids, its kinematic and dynamic behavior through various laws of fluids like continuity, Euler's, Bernoulli's equations, energy and momentum equations. Further, the student shall be able to understand the theory of boundary layer, working and performance characteristics of various hydraulic machines like pumps and turbines.***

UNIT I

Objective: After studying this unit student will know the concept of fluid and its properties, manometry, hydrostatic forces acting on different surfaces and also problem solving techniques.

Fluid statics: Dimensions and units: physical properties of fluids- specific gravity, viscosity and its significance, surface tension, capillarity, vapor pressure. Atmospheric gauge and vacuum pressure – measurement of pressure. Manometers- Piezometer, U-tube, inverted and differential manometers. Pascal's law, hydrostatic law.

Buoyancy and floatation: Meta center, stability of floating body. Submerged bodies. Calculation of metacenter height. Stability analysis and applications.

UNIT II

Objective: In this unit student will be exposed to the basic laws of fluids, flow patterns, viscous flow through ducts and their corresponding problems.

Fluid kinematics: Introduction, flow types. Equation of continuity for one dimensional flow.circulation and vorticity. Stream line, path line and streak lines and stream tube. Stream function and velocity potential function, differences and relation between them. Condition for irrotational flow, flow net, source and sink, doublet and vortex flow.

Fluid dynamics: surface and body forces –Euler's and Bernoulli's equations for flow along a stream line, momentum equation and its applications, force on pipe bend.

Closed conduit flow: Reynold's experiment- Darcy Weisbach equation- Minor losses in pipes- pipes in series and pipes in parallel- total energy line-hydraulic gradient line.

UNIT III

Objective: At the end of this unit student will be aware of the concepts related to boundary layer theory, flow separation, basic concepts of velocity profiles, dimensionless numbers and dimensional analysis.

Boundary Layer Theory: Introduction, momentum integral equation, displacement, momentum and energy thickness, separation of boundary layer, control of flow separation, Stream lined body, Bluff body and its applications, basic concepts of velocity profiles.

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Dimensional Analysis: Similitude and modeling – Dimensionless numbers

UNIT IV

Objective: In this unit student will know the hydrodynamic forces acting on vanes and their performance evaluation.

Basics of turbo machinery: hydrodynamic force of jets on stationary and moving flat, inclined, and curved vanes, jet striking centrally and at tip, velocity diagrams, work done and efficiency, flow over radial vanes.

UNIT V

Objective: At the end of this unit student will be aware of the importance, function and performance of hydro machinery.

Centrifugal pumps: classification, working, work done – manometric head- losses and efficiencies- specific speed- pumps in series and parallel-performance characteristic curves, cavitation & NPSH.

Reciprocating pumps: Working, Discharge, slip, indicator diagrams.

UNIT VI

Objective: After studying this unit student will be in a position to evaluate the performance characteristics of hydraulic turbines. Also a little knowledge on hydraulic systems and fluidics is imparted to the student.

Hydraulic Turbines: classification of turbines, impulse and reaction turbines, Pelton wheel, Francis turbine and Kaplan turbine-working proportions, work done, efficiencies, hydraulic design –draft tube- theory- functions and efficiency.

Performance of hydraulic turbines: Geometric similarity, Unit and specific quantities, characteristic curves, governing of turbines, selection of type of turbine, cavitation, surge tank, water hammer. Hydraulic systems- hydraulic ram, hydraulic lift, hydraulic coupling. Fluidics – amplifiers, sensors and oscillators. Advantages, limitations and applications.

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TEXT BOOKS:

1. Hydraulics, fluid mechanics and Hydraulic machinery MODI and SETH.

2. Fluid Mechanics and Hydraulic Machines by Rajput.

3. Fluid Mechanics and Hydraulic Machines/ RK Bansal/Laxmi Publications (P) Ltd.

REFERENCE BOOKS:

1. Fluid Mechanics and Fluid Power Engineering by D.S. Kumar, Kotaria & Sons.

2. Fluid Mechanics and Machinery by D. Rama Durgaiah, New Age International.

3. Hydraulic Machines by Banga & Sharma, Khanna Publishers.

4. Instrumentation for Engineering Measurements by James W. Dally, William E. Riley ,John Wiley & Sons Inc. 2004 (Chapter 12 – Fluid Flow Measurements)

5. Fluid Mechanics and Hydraulic Machines by Domkundwar & Domkundwar, Dhanpatrai & Co.

II Year - I Semester

L	T	P	C
4	0	0	3

COMPUTER AIDED ENGINEERING DRAWING PRACTICE

Course Objective: To enhance the student's knowledge and skills in engineering drawing and to introduce drafting packages and commands for computer aided drawing and modeling.

UNIT-I:

Objective: The knowledge of projections of solids is essential in 3D modeling and animation. The student will be able to draw projections of solids. The objective is to enhance the skills they already acquired in their earlier course in drawing of projection.

PROJECTIONS OF SOLIDS: Projections of Regular Solids inclined to both planes – Auxiliary Views.

UNIT-II:

The knowledge of sections of solids and development of surfaces is required in designing and manufacturing of the objects. Whenever two or more solids combine, a definite curve is seen at their intersection.

SECTIONS OF SOLIDS: Sections and Sectional views of Right Regular Solids – Prism, Cylinder, Pyramid, Cone – Auxiliary views.

DEVELOPMENT AND INTERPENETRATION OF SOLIDS: Development of Surfaces of Right
Regular Solids – Prisms, Cylinder, Pyramid Cone and their parts.

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UNIT-III:

The intersection of solids also plays an important role in designing and manufacturing. The objective is to impart this knowledge through this topic. A perspective view provides a realistic 3D View of an object. The objective is to make the students learn the methods of Iso and Perspective views.

INTERPENETRATION OF RIGHT REGULAR SOLIDS: Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs Cone, Prism Vs Cone.

PERSPECTIVE PROJECTIONS: Perspective View: Points, Lines, Plane Figures and Simple Solids,
Vanishing Point Methods (General Method only).

In part B computer aided drafting is introduced.

UNIT IV:

The objective is to introduce various commands in AutoCAD to draw the geometric entities and to create 2D and 3D wire frame models.

INTRODUCTION TO COMPUTER AIDED DRAFTING: Generation of points, lines, curves, polygons, dimensioning. Types of modeling : object selection commands – edit, zoom, cross hatching, pattern filling, utility commands, 2D wire frame modeling, 3D wire frame modeling,.

UNIT V:

By going through this topic the student will be able to understand the paper-space environment thoroughly.

VIEW POINTS AND VIEW PORTS: view point coordinates and view(s) displayed, examples to exercise different options like save, restore, delete , joint , single option.

UNIT VI:

The objective is to make the students create geometrical model of simple solids and machine parts and display the same as an Isometric, Orthographic or Perspective projection.

COMPUTER AIDED SOLID MODELING: Isometric projections, orthographic projections of isometric projections, Modeling of simple solids, Modeling of Machines & Machine Parts.

TEXT BOOKS :

1. Engineering drawing by N.D Bhatt , Charotar publications.
2. Engineering Graphics, K.C. john, PHI Publications

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REFERENCES:

1. Mastering Auto CAD 2013 and Auto CAD LT 2013 – George Omura, Sybex
2. Auto CAD 2013 fundamentals- Elisemoss, SDC Publ.
3. Engineering Drawing and Graphics using Auto Cad – T Jeyapoovan, vikas
4. Engineering Drawing + AutoCAD – K Venugopal, V. Prabhu Raja, New Age
5. Engineering Drawing – RK Dhawan, S Chand
6. Engineering Drawing – MB Shaw, BC Rana, Pearson
7. Engineering Drawing – KL Narayana, P Kannaiah, Scitech
8. Engineering Drawing – Agarwal and Agarwal, Mc Graw Hill
9. Engineering Graphics – PI Varghese, Mc Graw Hill
10. Text book of Engineering Drawing with auto-CAD , K.venkata reddy/B.S . publications.
11. Engineering Drawing with Auto CAD/ James D Bethune/Pearson Publications
12. Engineering Graphics with Auto CAD/Kulkarni D.M, Rastogi A.P, Sarkar A.K/PHI Publications

End Semester examination shall be conducted for **Four** hours with the following pattern:

a) Two hours-Conventional drawing
b) Two hours – Computer Aided Drawing

II Year - I Semester

L	T	P	C
4	0	0	3

MINING GEOLOGY – I

Course objectives:

`Geo means "earth" and geology means "science". Hence geology is the science of the earth or the study of the earth. Geology is a must for mining engineers as they deal with the material of the earth's crust i.e. rocks and minerals. Truly speaking, all the material (rock, mineral , soil etc) are the outcome of one of the processes viz. igneous, sedimentary and metamorphic. In mining the ore, geology plays an important role. It gives a clear picture about the nature of the material, the attitude of the beds, structures caused by deformed forces, etc. Hence, Geology helps in choosing the method of exploitation, finding the solution for the problems associated.

UNIT – I

Objective: after this unit, students will know, how geology is useful in mining, the different processes operating on and beneath the earth's surface, different crystal systems etc.

Definition of Geology – Branches of Geology – Importance of Geology in Mining – Interior of the earth – Weathering, Erosion, Denudation, Geological processes. Ground water – Origin and occurrence – Hydrological cycle - Sources of water in Mines - Classification of rocks based on porosity and permeability – Water table and types of Ground water – Geological controls on ground water movement in mines. Crystallography: Characteristics of Crystals – Laws of Crystallography – Classification and study of crystal systems.

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UNIT – II

Objective: This unit enables the students to know What is a mineral ,

How the minerals are classified, Different methods of study of materials, How silicates are classified etc.

Mineralogy: Definition of mineral – Classification of minerals – Physical and chemical properties of minerals – Study of Silicate structures individual minerals.

UNIT – III

Objective: by the end of this unit, students will be acquainted with, Different groups of silicate minerals, Their physical properties, composition, occurrence etc.

Mineralogy: Study of individual groups – Quartz – Feldspar – Pyroxenes – Amphiboles – Micas – Aluminum silicates – Garnets – Olivine.

UNIT – IV

Objective: This unit aims at introducing, the concept of light, its behavior, Properties of minerals studied using polarized light etc.

Optical Mineralogy : Ordinary light and Polarized light – Reflection, refraction, double refraction – Polarizing and Ore microscopes - Polarizer and analyzer – Thin sections and polished sections – Examination of the minerals under the microscope – Optical properties – Pleochroism, Extinction, Interference colors.

UNIT – V

Objective: At the end of this unit, students will know, Difference between rock and mineral, Different types of rocks, Igneous rocks in detail.

Petrology : Igneous petrology – Rocks , 3 fold classification – Origin, form, structures, textures and classification of igneous rocks – Bowen's reaction principle – Study of rocks – Granite, syenite, gabbro, pegmatite, dolerite.

UNIT – VI

Objective: This unit helps the students to understand Process of formation sedimentary and metamorphic rocks, their structures and textures.

Sedimentary petrology – Formation, structures, textures and classification of sedimentary rocks – Petro graphic characteristics of conglomerate, breccia, sandstone, shale, limestone – Metamorphic petrology – Formation, structures, textures and classification of metamorphic rocks – Petrography of gneiss, schist, slate, marble, quartzite, charnockite.

TEXT BOOKS :

1. Engineering Geology – Parbin Singh
2. Principles of Engineering Geology – K.M.Bangar
3. A text book of Geology – G.B.Mahapathra

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II Year - I Semester

L	T	P	C
4	0	0	3

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

- The Learning objectives of this paper is to understand the concept and nature of Managerial Economics and its relationship with other disciplines and also to understand the Concept of Demand and Demand forecasting, Production function, Input Output relationship, Cost-Output relationship and Cost-Volume-Profit Analysis.
- To understand the nature of markets, Methods of Pricing in the different market structures and to know the different forms of Business organization and the concept of Business Cycles.
- To learn different Accounting Systems, preparation of Financial Statement and uses of different tools for performance evaluation. Finally, it is also to understand the concept of Capital, Capital Budgeting and the techniques used to evaluate Capital Budgeting proposals.
-

UNIT-I

Introduction to Managerial Economics and demand Analysis:

Definition of Managerial Economics –Scope of Managerial Economics and its relationship with other subjects –Concept of Demand, Types of Demand, Determinants of Demand- Demand schedule, Demand curve, Law of Demand and its limitations- Elasticity of Demand, Types of Elasticity of Demand and Measurement- Demand forecasting and Methods of forecasting, Concept of Supply and Law of Supply.

UNIT – II:

Production and Cost Analyses:

Concept of Production function- Cobb-Douglas Production function- Leontief production function - Law of Variable proportions-Isoquants and Isocosts and choice of least cost factor combination-Concepts of Returns to scale and Economies of scale-Different cost concepts: opportunity costs, explicit and implicit costs- Fixed costs, Variable Costs and Total costs – Cost –Volume-Profit analysis-Determination of Breakeven point(simple problems)- Managerial significance and limitations of Breakeven point.

UNIT – III:

Introduction to Markets, Theories of the Firm & Pricing Policies:

Market Structures: Perfect Competition, Monopoly, Monopolistic competition and Oligopoly – Features – Price and Output Determination – Managerial Theories of firm: Marris and Williamson's models – other Methods of Pricing: Average cost pricing, Limit Pricing, Market Skimming Pricing, Internet Pricing: (Flat Rate Pricing, Usage sensitive pricing) and Priority Pricing.

UNIT – IV:

Types of Business Organization and Business Cycles:

Features and Evaluation of Sole Trader, Partnership, Joint Stock Company – State/Public Enterprises and their forms – Business Cycles : Meaning and Features – Phases of a Business Cycle.

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UNIT – V:

Introduction to Accounting & Financing Analysis:

Introduction to Double Entry Systems – Preparation of Financial Statements-Analysis and Interpretation of Financial Statements-Ratio Analysis – Preparation of Funds flow and cash flow statements (Simple Problems)

UNIT – VI:

Capital and Capital Budgeting: Capital Budgeting: Meaning of Capital-Capitalization-Meaning of Capital Budgeting-Time value of money- Methods of appraising Project profitability: Traditional Methods(pay back period, accounting rate of return) and modern methods(Discounted cash flow method, Net Present Value method, Internal Rate of Return Method and Profitability Index)

Course Outcome:

*The Learner is equipped with the knowledge of estimating the Demand and demand elasticities for a product and the knowledge of understanding of the Input-Output-Cost relationships and estimation of the least cost combination of inputs.

* One is also ready to understand the nature of different markets and Price Output determination under various market conditions and also to have the knowledge of different Business Units.

*The Learner is able to prepare Financial Statements and the usage of various Accounting tools for Analysis and to evaluate various investment project proposals with the help of capital budgeting techniques for decision making.

TEXT BOOKS

1. Dr. N. AppaRao, Dr. P. Vijay Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi – 2011
2. Dr. A. R. Aryasri – Managerial Economics and Financial Analysis, TMH 2011
3. Prof. J.V.Prabhakararao, Prof. P. Venkatarao. 'Managerial Economics and Financial Analysis', Ravindra Publication.

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REFERENCES:

1.Dr. B. Kuberudu and Dr. T. V. Ramana: Managerial Economics & Financial Analysis, Himalaya Publishing House, 2014.
2. V. Maheswari: Managerial Economics, Sultan Chand.2014
3. Suma Damodaran: Managerial Economics, Oxford 2011.
4. VanithaAgarwal: Managerial Economics, Pearson Publications 2011.
5. Sanjay Dhameja: Financial Accounting for Managers, Pearson.
6. Maheswari: Financial Accounting, Vikas Publications.
7. S. A. Siddiqui& A. S. Siddiqui: Managerial Economics and Financial Analysis, New Age International Publishers, 2012
8. Ramesh Singh, Indian Economy, 7th Edn., TMH2015
9. Pankaj Tandon A Text Book of Microeconomic Theory, Sage Publishers, 2015
10. Shailaja Gajjala and Usha Munipalle, Univerties press, 2015

II Year - I Semester

L	T	P	C
0	0	3	2

ELECTRICAL & ELECTRONICS ENGG.LAB

Section A: Electrical Engineering:

Learning Objectives:

- To predetermine the efficiency of dc shunt machine using Swinburne's test.
- To predetermine the efficiency and regulation of 1-phase transformer with O.C and S.C tests.
- To obtain performance characteristics of DC shunt motor &3-phase induction motor.
- To find out regulation of an alternator with synchronous impedance method.
- To control speed of dc shunt motor using speed control methods.
- To find out the characteristics of PN junction diode & transistor
- To determine the ripple factor of half wave & full wave rectifiers.

The following experiments are required to be conducted as compulsory experiments:

1. Swinburne's test on D.C. Shunt machine (Predetermination of efficiency of a given D.C. Shunt machine working as motor and generator).
2. OC and SC tests on single phase transformer (Predetermination of efficiency and regulation at given power factors).
3. Brake test on 3-phase Induction motor (Determination of performance characteristics)
4. Regulation of alternator by Synchronous impedance method.
5. Speed control of D.C. Shunt motor by

   a) Armature Voltage control b) Field flux control method
6. Brake test on D.C. Shunt Motor.

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Section B: Electronics Engineering.

The following experiments are required to be conducted as compulsory experiments:

1.PNjunction diode characteristics a) Forward bias b) Reverse bias (Cut in voltage and resistance calculations)

2. Transistor CE characteristics (Input and output)

3. Half wave rectifier with and with out filters.

4. Full wave rectifier with and with out filters.

5. CE amplifiers.

6. OP- Amp applications (inverting, non inverting, integrator and differentiator)

Learning Outcomes:

- Able to find out the efficiency of dc shunt machine without actual loading of the machine.
- Able to estimate the efficiency and regulation for different load conditions and power factors of single phase transformer with OC and SC test.
- Able to analyse the performance characteristics and to determine efficiencyof DC shunt motor &3-phase induction motor.
- Able to pre-determine the regulation of an alternator by synchronous impedance method.
- Able to control the speed of dc shunt motor using speed control methods.
- Able to find out the characteristics of PN junction diode & transistor
- Able to determine the ripple factor of half wave & full wave rectifiers.

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II Year - I Semester

L	T	P	C
4	0	0	3

FLUID MECHANICS AND HYDRAULICS MACHINES LAB

Course Objective: To impart practical exposure on the performance evaluation methods of various flow measuring equipment and hydraulic turbines and pumps.

1. Impact of jets on Vanes.
2. Performance Test on Pelton Wheel.
3. Performance Test on Francis Turbine.
4. Performance Test on Kaplan Turbine.
5. Performance Test on Single Stage Centrifugal Pump.
6. Performance Test on Multi Stage Centrifugal Pump.
7. Performance Test on Reciprocating Pump.
8. Calibration of Venturimeter.
9. Calibration of Orifice meter.
10. Determination of friction factor for a given pipe line.
11. Determination of loss of head due to sudden contraction in a pipeline.
12. Turbine flow meter.

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II Year - II Semester

L	T	P	C
4	0	0	3

KINEMATICS OF MACHINERY

Objective: The students completing this course are expected to understand the nature and role of the kinematics of machinery, the mechanisms and machines. The course includes velocity and acceleration diagrams, analysis of mechanisms joints, Cams and their applications. It exposes the students to various kinds of power transmission devices like belt, rope, chain and gear drives and their working principles and their merits and demerits.

UNIT – I

Objective: The objective of this unit is to make student understand the purpose of kinematics, Kinematic joint and mechanism and to study the relative motion of parts in a machine without taking into consideration the forces involved.

MECHANISMS : Elements or Links – Classification – Rigid Link, flexible and fluid link – Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained .

Grubler's criterion , Grashoff's law, Degrees of freedom, Kutzbach criterion for planar mechanisms, Mechanism and machines – classification of machines – kinematic chain – inversion of mechanism – inversion of mechanism – inversions of quadric cycle, chain – single and double slider crank chains.

UNIT – II

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Objective: The objective of this unit is to make student understand various mechanisms for straight line motion and their applications including steering mechanism.

LOWER PAIR MECHANISM: Exact and approximate copiers and generated types – Peaucellier, Hart and Scott Russul – Grasshopper – Watt T. Chebicheff and Robert Mechanisms and straight line motion, Pantograph.

Conditions for correct steering – Davis Steering gear, Ackermans steering gear – velocity ratio; Hooke's Joint: Single and double – Universal coupling–application–problems.

UNIT – III

Objective: The objective of this unit is to make student understand the velocity and acceleration concepts and the methodology using graphical methods and principles and application of four bar chain. To understand the application of slider crank mechanism etc. and study of plane motion of the body

KINEMATICS: Velocity and acceleration – Motion of a link in machine – Determination of Velocity and acceleration diagrams – Graphical method – Application of relative velocity method four bar chain. Velocity and acceleration analysis of for a given mechanism, Kleins construction, Coriolis acceleration, determination of Coriolis component of acceleration.

Plane motion of body: Instantaneous center of rotation, centroids and axodes – relative motion between two bodies – Three centres in line theorem – Graphical determination of instantaneous centre, diagrams for simple mechanisms and determination of angular velocity of points and links.

UNIT – IV

Objective: The objective of this unit is to make student understand the theories involved in cams. Further the students are exposed to the applications of cams and their working principles.

CAMS

Definitions of cam and followers – their uses – Types of followers and cams – Terminology – Types of follower motion: Uniform velocity, Simple harmonic motion and uniform acceleration and retardation. Maximum velocity and maximum acceleration during outward and return strokes in the above 3 cases.

Analysis of motion of followers: Roller follower – circular cam with straight, concave and convex flanks.

UNIT – V

Objective: The objective of this unit is to make student understand gears, power transmission through different types of gears including gear profiles and its efficiency.

GEARS

Higher pairs, friction wheels and toothed gears–types – law of gearing, condition for constant velocity ratio for transmission of motion, Form of teeth: cycloidal and involute profiles. Velocity of sliding – phenomena of interferences – Methods of interference. Condition for minimum number of teeth to avoid interference, expressions for arc of contact and path of contact – Introduction to Helical, Bevel and worm gearing.

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UNIT – VI

Objective: The objective of this unit is to make student understand various power transmission mechanisms and methodologies and working principles. Students are exposed to merits and demerits of each drive.

Power Transmissions : Introduction, Belt and rope drives, selection of belt drive- types of belt drives, V-belts, materials used for belt and rope drives, velocity ratio of belt drives, slip of belt, creep of belt, tensions for flat belt drive, angle of contact, centrifugal tension, maximum tension of belt, Chains- length, angular speed ratio, classification of chains.

Introduction to gear Trains, Train value, Types – Simple and reverted wheel train – Epicyclic gear Train. Methods of finding train value or velocity ratio – Epicyclic gear trains. Selection of gear box-Differential gear for an automobile.

TEXT BOOKS:

1. Mechanism and Machine Theory by Ashok G. Ambekar, PHI Publishers
2. Theory of Machines – S. S Rattan- TMH
3. Theory of machines and Mechanisms – J.J Uicker, G.R.Pennock & J.E.Shigley - Oxford publishers.

REFERENCES:

1. Theory of Machines Sadhu Singh Pearsons Edn
2. Theory of machines and Machinery /Vickers /Oxford .
3. Theory of Machines by Thomas Bevan/ CBS
4. Kinematics of Machinery through Hyper Works – J.S. Rao – Springer Publ
5. Theory of Mechanisms and machines – A.Ghosh & A.K.Malik – East West Press Pvt. Ltd.

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II Year - II Semester

L	T	P	C
4	0	0	3

MATERIALS ENGINEERING

Course Objectives:

To impart the knowledge of the different types of stresses and strains acts on Beams. To acquire Knowledge on Shear force and Bending moment diagrams and shear stresses. To make the student learn and understand about cast iron & steels, Heat treatment of alloys, Non-ferrous Metals, Ceramic materials and Composite materials.

UNIT – I

Objectives: The student should be able to understand the basic concepts of strength of materials, different types of stresses and strains acts on Beams.

MECHANICS OF SOLIDS

SIMPLE STRESSES & STRAINS : Elasticity and plasticity – Types of stresses & strains– Hooke's law– stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio & volumetric strain – Elastic moduli & the relationship between them – Bars of varying section – composite bars – Temperature stresses.Strain energy – Resilience – Gradual, sudden, impact and shock loadings.

UNIT – II

Objectives: To understand the concept of shear force and bending moment and The student should be able to draw shear force and bending moment diagrams for various stresses acting on various types of beams.

SHEAR FORCE AND BENDING MOMENT : Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

Objectives: To understand the concept of shear stresses and its distributation.

SHEAR STRESSES : Derivation of formula – Shear stress distribution across various beams sections like rectangular, circular, triangular, I, T angle sections.

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UNIT –IV

Objectives: The student should be able to understand the basic concepts of Metallurgy and materials science and various types of heat treatments of alloys.

METALLURGY AND MATERIAL SCIENCE

Cast Irons and Steels : Structure and properties of White Cast iron, Malleable Cast iron, grey cast iron, Spheriodal graphite cast iron, Alloy cast irons. Classification of steels, structure and properties of plain carbon steels, Low alloy steels, Hadfield manganese steels, tool and die steels.

Heat treatment of Alloys: Annealing, normalizing, Hardening, tempering , Hardenability, surface - hardening methods, Age hardening treatment, Cryogenic treatment of alloys.

UNIT – V

Objectives: To learn about Non ferrous materials, its alloys and ceramic materials.

Non-ferrous Metals and Alloys : Structure and properties of copper and its alloys, Aluminium and its alloys, Titanium and its alloys.

Ceramic materials: Crystalline ceramics, glasses, cermaets, abrasive materials, nanomaterials –definition, properties and applications of the above.

UNIT – VI

Objectives: To learn about composite materials and various methods for manufacturing composite materials.

Composite materials : Classification of composites, various methods of component manufacture of composites, particle – reinforced materials, fiber reinforced materials, metal ceramic mixtures, metal –matrix composites and C – C composites.

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TEXT BOOKS :

1. Strength of materials by Bhavikatti, Lakshmi publications.

2. Solid Mechanics, by Popov

3. Introduction to Physical Metallurgy / Sidney H. Avener.

4. Essential of Materials science and engineering/ Donald R.Askeland/Thomson.

REFERENCES :

1. Strength of Materials -By Jindal, Umesh Publications.

2. Analysis of structures by Vazirani and Ratwani.

3. Mechanics of Structures Vol-III, by S.B.Junnarkar.

4. Material Science and Metallurgy/kodgire.

5.Science of Engineering Materials / Agarwal

II Year - II Semester

L	T	P	C
4	0	0	3

MINING GEOLOGY – II

Course Objectives:

To impart the knowledge of the forces acting in the earth's crust, deformation caused by them, different economic minerals and emphasizes their distribution in India. students will know the basic principles of stratigraphy and procedure to be adopted in sampling and mineral wealth of India and Andhra Pradesh

UNIT – I

Objective: This unit deals with the topics like forces acting in the earth's crust, deformation caused by them, attitude of beds etc.,.

Structural Geology – Stratified rocks and their structures - Attitude of beds – Strike and dip – Thickness of beds – Folds – genesis, classification, identification in field, impact on landscape, mineral deposits and mining – Unconformities – Types, importance and identification – Faults – Definition, mechanism of faulting, classification, impact of faulting on topography, significance of faults in mining – Joints – definition and characteristics, classification, occurrence of joints in igneous, sedimentary and metamorphic rocks – Differences between joints and faults – Overlap – Inlier and outlier, their importance.

UNIT – II

Objective: The students will know the different processes which are responsible for the formation different economic minerals.

Economic Geology – Ore minerals and gangue minerals – Syngenetic and epigenetic deposits – Processes of ore formation – Magmatic concentration, Sublimation, Contact metasomatism, Hydrothermal processes, Sedimentation, Evaporation, Residual and mechanical concentration, Oxidation and supergene enrichment, Metamorphism

UNIT – III

Objective: This unit tells the students briefly about the origin and occurrence of different minerals and emphasizes their distribution in India.

Origin, occurrence, distribution and uses of minerals of coal, Iron, lime stone, Lead, Zinc, Copper Manganese, Chromite, , Beach sands, Rock Phosphate, Clay and Graphite.

UNIT – IV

Objective: By the end of this unit, students will know the basic principles of stratigraphy and definition of fossil, their preservation and uses.

Stratigraphy – Definition principles of Stratigraphic correlation – Geological time scale - Indian stratigraphic scale physiographic divisions Economic minerals occurring in different systems, metallogenic epochs and provinces - Fossils – Conditions, mode of preservation and uses.

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UNIT – V

Objective: This unit throws light on estimation of ore reserves, procedure to be adopted in sampling and mineral wealth of India and Andhra Pradesh

Estimation of Ore reserves– Definition, classification and importance – Sampling – Definition, types, preservation of core samples and importance. Mineral wealth of India – Mineral wealth of Andhra Pradesh – Industrial uses of different minerals.

UNIT – VI

Objective: This unit will make the students to get knowledge in finding ore deposits using geological, geophysical and geochemical knowledge

Introduction to different methods of prospecting for mineral deposits – geological, geophysical, geochemical, geobotanical, aerial photography and remote sensing.

Books for reference

1. Principles of Engineering Geology – Parbin Singh
2. Principles of Engineering Geology – K.M.Bangar
3. A text book of Geology – G.B.Mahapathra
4. Mining geology- Arogya Swamy

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II Year - II Semester

L	T	P	C
4	0	0	3

MINE SURVEYING – I

Course Objectives:

To impart the knowledge of measurements of distances and angles, determination of different levels and level difference and computation of areas, volumes which includes determination of capacity of reservoirs, volumes of barrow pits. The knowledge of modern instruments like Theodolite surveying and tachometric surveying, designing & setup of curves and global positioning systems.

UNIT – I

Objective: By this chapter the student can learn measurements of distances and angles and the overview .

INTRODUCTION & DISTANCES AND DIRECTION: Overview of plane surveying (chain, compass and plane table), Objectives, Principles and classifications. Direct and indirect ranging, chaining along sloping ground. Obstacle in chaining, errors and their elimination.

Distance measurement conventions and methods; use of chain and tape, Electronic distance measurements, Meridians, Azimuths and Bearings, declination, computation of angle.

UNIT – II

Objective: : By this chapter the student can learn the Determination of different levels and level difference and drawing centaurs .

LEVELING AND CONTOURING: Concept and Terminology, Temporary and permanent adjustments-method of leveling. Characteristics and Uses of contours- methods of conducting contour surveys and their plotting. Methods of plane table, radiations. Intersection, traversing and resection. 2-point and 3-point problem. Adjustment and common error in plane table survey.

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UNIT – III

Objective: : By this chapter the student can learn Computation of areas, volumes which includes determination of capacity of reservoirs, volumes of barrow pits

COMPUTATION OF AREAS AND VOLUMES: Area from field notes, computation of areas along irregular boundaries and area consisting of regular boundaries. Embankments and cutting for a level section and two level sections with and without transverse slopes, determination of the capacity of reservoir, volume of barrow pits.

UNIT –IV

Objective: By this chapter the student can learn the uses of fundamental instruments in first law units. The knowledge of modern instruments like Theodolite surveying and tachometric surveying are taught at length

THEODOLITE & TACHEOMETRIC SURVEYING:

Theodolite, description, uses and adjustments – temporary and permanent, measurement of horizontal and vertical angles. Principles of Electronic Theodolite. Trigonometrically leveling, traversing.

Stadia and tangential methods of Tachometry. Distance and Elevation formulae for Staff vertical position.

UNIT – V

Objective: : By this chapter the student can learn Survey dealing with curves, both simple and compound curves .Designing & setup of curves are dealt in this unit

Curves: Types of curves, design and setting out – simple and compound curves.

UNIT -VI

Objective: : By this chapter the student can learn Geodetic surveying, global positioning systems and introduction to GIS.

Introduction to geodetic surveying, Total Station and Global positioning system, Introduction to Geographic information system (GIS).

TEXT BOOKS:

1. "Surveying (Vol – 1, 2 & 3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
2 .Duggal S K, "Surveying (Vol – 1 & 2), Tata Mc.Graw Hill Publishing Co. Ltd. New Delhi, 2004.
3. Surveying and levelling by R. Subramanian, Oxford university press, New Delhi

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II Year - I Semester

L	T	P	C
4	0	0	3

SURFACE MINING

Course Objectives:

To impart the knowledge of Opencast Mining, Ground Water control, use of drilling machines,
Smooth Blasting and Pre- splitting, Mining methods and selection of high angle conveyor and In-Pit Crusher Conveyor System

UNIT-I:

Objective: Student can get introduction of application of Opencast Mining, method of opening Open Cast mining and its Advantages and disadvantages

Introduction: General consideration for the applicability of opencast mining, limits of open cast mining and its advantages and disadvantages. Method of opening box cut, selection of site for box cut.

UNIT-II:

Objective: Student can get an idea of how to open a large opencast mine. How the removal of overburden is taking place, and how the overburden is removed from the site to Overburden Dump Area. What is bench height, Width and slope angle and factors affecting slope stability. Various types of slope failures and Ground Water control.

Open Pit Layout and Design: Planning the layout and open pit mine with special reference to large mechanized mines. Optimum dimensions of open pit mines. Removal of over burden and disposal, open cast bench- number, height, width and slope angle of the bench. Factors affecting the stability of the slope. Various types of slope failures, problems on slope failures. Ground water control.

UNIT-III:

Objective: Student can understand what the drilling machines available are, how the drilling is taking place and what mechanics of Drilling is.

Drilling and Blasting: Drillability, mechanics of drilling, major types of drilling machines, basics of mechanics of blasting, principles of fragmentation.

UNIT- IV

Objective: Student can understand what are the factors responsible for Blasting parameters, how can we control fly rocks, what are the novel methods like Smooth Blasting and Pre- splitting.

Design of blasting: with special reference to heavy blasting, air blasting, ground vibrations, fly rocks novel methods of drilling, smooth blasting and pre-splitting.

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UNIT-V:

Objective: How the methods of opencast mining are affecting, what the major Mining methods available are, and what the machinery available are, and how it can be used in OCM. What are the special precautions to be taken in case of Heavy Earth Moving machinery like Bucket Wheel Excavator?

Surface Mining Methods: Casting, strip, quarrying and Placer Mining, and Modern Methods Excavation and loading: Shovels, Dragline, Front-end loader, Stackers, Graders. Non-Cyclic Surface Mining: Bucket Wheel Excavators and Continuous surface miners.

UNIT-VI:

Objective: Student can understand what are the loading and transporting equipment are available. How the Shovel and Dumper combination is going to work out. What are the factors that will be useful in the selection of high angle conveyor and In-Pit Crusher Conveyor System?

Transport Equipments: Dumpers, Aerial ropeways-monocable and bicable types and their constructional details. Shovel – dumper combination, high angle conveyor and in-pit crusher. Selection of equipments.

TEXT BOOKS:

1. Surface Mining Technology by S. K. Das, Lovely Prakashan, Dhanbad, 1994.

2. Surface Mining by G. B. Mishra, Dhanbad Publishers, 1978.

REFERENCE BOOKS:

1. Elements of Mining Technology, Vol. – I, D. J. Deshmukh, 6th Edition, Central Techno Publications, Nagpur, 1998.

2. Opencast Mining – R. T. Deshmukh, M. Publications, Nagpur, 1996.

3. Latest Development of Heavy Earth Moving Machinery Amithosh De, Annapurna Publishers, Dhanbad, 1995.

4. Rock Slope Engineering, Hoek and Bray, the Institution of Mining and Metallurgy, 1981.

5. Introductory Mining Engineering, Hartman, John Wiley and Sons, 1987.

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II Year - II Semester

L	T	P	C
4	0	0	3

INDUSTRIAL ENGINEERING AND MANAGEMENT

Course Objectives:

1. To impart fundamental knowledge and skill sets required in the Industrial Management and Engineering profession, which include the ability to apply basic knowledge of mathematics, probability and statistics, and the domain knowledge of Industrial Management and Engineering
2. To produce graduates with the ability to adopt a system approach to design, develop, implement and innovate integrated systems that include people, materials, information, equipment and energy.
3. To enable students to understand the interactions between engineering, business, technological and environmental spheres in the modern society.
4. To enable students to understand their role as engineers and their impact to society at the national and global context.

UNIT – I

INTRODUCTION: Definition of industrial engineering (I.E), development, applications, role of an industrial engineer, differences between production management and industrial engineering, quantitative tools of IE and productivity measurement. concepts of management, importance, functions of management, scientific management, Taylor's principles, theory X and theory Y, Fayol's principles of management.

UNIT – II

PLANT LAYOUT: Factors governing plant location, types of production layouts, advantages and disadvantages of process layout and product layout, applications, quantitative techniques for optimal design of layouts, plant maintenance, preventive and breakdown maintenance.

UNIT – III

OPERATIONS MANAGEMENT: Importance, types of production, applications, workstudy, method study and time study, work sampling, PMTS, micro-motion study, rating techniques, MTM, work factor system, principles of Ergonomics, flow process charts, string diagrams and Therbligs,

UNIT – IV

STATISTICAL QUALITY CONTROL: Quality control, its importance, SQC, attribute sampling inspection with single and double sampling, Control charts – $\overline{X}$ and R – charts $\overline{X}$ AND *S* charts and their applications, numerical examples.

TOTAL QUALITY MANAGEMENT: zero defect concept, quality circles, implementation, applications, ISO quality systems. six sigma – definition, basic concepts

UNIT – V

RESOURCE MANAGEMENT: Concept of human resource management, personnel management and industrial relations, functions of personnel management, Job-evaluation, its importance and types, merit rating, quantitative methods, wage incentive plans, types.

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UNIT - VI

VALUE ANALYSIS: Value engineering, implementation procedure, enterprise resource planning and supply chain management.

PROJECT MANAGEMENT: PERT, CPM – differences & applications, critical path, determination of floats, importance, project crashing, smoothing and numerical examples.

TEXT BOOKS:

1. Industrial Engineering and management / O.P Khanna/Khanna Publishers.
2. Industrial Engineering and Production Management/Martand Telsang/S.Chand & Company Ltd. New Delhi

Reference Books:

1. Industrial Management / Bhattacharya DK/Vikas publishers
2. Operations Management / J.G Monks/McGrawHill Publishers.
3. Industrial Engineering and Management Science/ T. R. Banga, S. C. Sharma, N. K. Agarwal/Khanna Publishers
4. Principles of Management /Koontz O' Donnel/McGraw Hill Publishers.
5. Statistical Quality Control /Gupta/Khanna Publishers
6. Industrial Engineering and Management /NVS Raju/Cengage Publishers

Course outcome:

Upon successful completion of this course you should be able to:

1. Design and conduct experiments, analyse, interpret data and synthesize valid conclusions

2. Design a system, component, or process, and synthesize solutions to achieve desired needs

3. Use the techniques, skills, and modern engineering tools necessary for engineering practice with appropriate considerations for public health and safety, cultural, societal, and environmental constraints

4. Function effectively within multi-disciplinary teams and understand the fundamental precepts of effective project management

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II Year - II Semester

L	T	P	C
0	0	3	2

GEOLOGY LAB

Objectives: To impart exposure on properties of minerals, faults and economic minerals

List of Experiments

1. Study of Physical properties minerals.
2. Demonstration of Crystal models
3. Demonstration of Optical properties of minerals
4. Study of important Igneous, sedimentary and metamorphic rocks.
5. Recognition of folds, faults, unconformities from maps.
6. Simple problems on strike and dip.
7. Study of important economic minerals.

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II Year - II Semester

L	T	P	C
0	0	3	2

MATERIALS LAB

Objectives: To impart practical exposure on various tests for tension,hardness, tortion,etc., and to study microstructure of various engineering materials.

(A) MECHNICS OF SOLIDS LAB :

1. Direct tension test
2. Bending test on
    a) Simply supported
    b) Cantilever beam
3. Torsion test
4. Hardness test
    a) Brinells hardness test
    b) Rockwell hardness test
5. Compression test on cubes
6. Impact test

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(B) METALLURGY LAB :

1. Preparation and study of the Micro Structure of pure metals like Iron, Cu and Al.
2. Preparation and study of the Microstructure of Mild steels, low carbon steels, high – C steels.
3. Study of the Micro Structures of Cast Irons.
4. Study of the Micro Structures of Non-Ferrous alloys.
5. Study of the Micro structures of Heat treated steels.
6. Hardeneability of steels by Jominy End Quench Test.
7. To find out the hardness of various treated and untreated steels.

II Year - II Semester

L	T	P	C
0	3	0	0

PROFESSIONAL ETHICS AND HUMAN VALUES

Course Objectives:

***To give basic insights and inputs to the student to inculcate Human values to grow as a responsible human beings with proper personality.**
***Professional Ethics instills the student to maintain ethical conduct and discharge their professional duties.**

UNIT I: Human Values:
Morals, Values and Ethics – Integrity –Trustworthiness - Work Ethics – Service Learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty – Courage – Value Time – Co-operation – Commitment – Empathy – Self-confidence – Spirituality- Character.

UNIT: II: Principles for Harmony:
Truthfulness – Customs and Traditions -Value Education – Human Dignity – Human Rights – Fundamental Duties - Aspirations and Harmony (I, We & Nature) – Gender Bias - Emotional Intelligence – Salovey – Mayer Model – Emotional Competencies – Conscientiousness.

UNIT III: Engineering Ethics and Social Experimentation:
History of Ethics - Need of Engineering Ethics - Senses of Engineering Ethics- Profession and Professionalism —Self Interest - Moral Autonomy – Utilitarianism – Virtue Theory - Uses of Ethical Theories - Deontology- Types of Inquiry –Kohlberg's Theory - Gilligan's Argument –Heinz's Dilemma - Comparison with Standard Experiments — Learning from the Past –Engineers as Managers – Consultants and Leaders – Balanced Outlook on Law - Role of Codes – Codes and Experimental Nature of Engineering.

UNIT IV: Engineers' Responsibilities towards Safety and Risk:

Concept of Safety - Safety and Risk – Types of Risks – Voluntary v/sInvoluntary Risk – Consequences - Risk Assessment – Accountability – Liability - Reversible Effects - Threshold Levels of Risk - Delayed v/sImmediate Risk - Safety and the Engineer – Designing for Safety – Risk-Benefit Analysis-Accidents.

UNIT V: Engineers' Duties and Rights:

Concept of Duty - Professional Duties – Collegiality - Techniques for Achieving Collegiality – Senses of Loyalty - Consensus and Controversy - Professional and Individual Rights – Confidential and Proprietary Information - Conflict of Interest-Ethical egoism - Collective Bargaining – Confidentiality - Gifts and Bribes - Problem solving-Occupational Crimes-Industrial Espionage- Price Fixing-Whistle Blowing.

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UNIT VI: Global Issues:

Globalization and MNCs –Cross Culture Issues - Business Ethics – Media Ethics - Environmental Ethics – Endangering Lives - Bio Ethics - Computer Ethics - War Ethics – Research Ethics -Intellectual Property Rights.

- Related Cases Shall be dealt where ever necessary.

Outcome:

***It gives a comprehensive understanding of a variety issues that are encountered by every professional in discharging professional duties.**

***It provides the student the sensitivity and global outlook in the contemporary world to fulfill the professional obligations effectively.**

References:

1. Professional Ethics by R. Subramaniam – Oxford Publications, New Delhi.
2. Ethics in Engineering by Mike W. Martin and Roland Schinzinger - Tata McGraw-Hill – 2003.
3. Professional Ethics and Morals by Prof.A.R.Aryasri, DharanikotaSuyodhana - Maruthi Publications.
4. Engineering Ethics by Harris, Pritchard and Rabins, Cengage Learning, New Delhi.
5. Human Values & Professional Ethics by S. B. Gogate, Vikas Publishing House Pvt. Ltd., Noida.
6. Engineering Ethics & Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd – 2009.
7. Professional Ethics and Human Values by A. Alavudeen, R.Kalil Rahman and M. Jayakumaran – University Science Press.
8. Professional Ethics and Human Values by Prof.D.R.Kiran-Tata McGraw-Hill - 2013
9. Human Values And Professional Ethics by Jayshree Suresh and B. S. Raghavan, S.Chand Publications

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III Year - I Semester

L	T	P	C
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UNDERGROUND COAL MINING TECHNOLOGY

Course Objectives: To understand coal growth in India and all over the world and different terminology used in coal mining including modern methods. the student will have the new innovative thoughts through computer application.

UNIT - I

Introduction: Present situation and future growth of coal mining industry in India and world, different coal mining industries in India, factors effecting selection of mode of entry and different types of mode entry: incline, shaft, inclined shaft, coal mine development and its scenario, different terminology used in coal mine development, different coal mining methods, factors influencing choice of coal mining methods. Software application in coal mines for development and depillaring operations.

UNIT - II

Boad and Pillar Mining: applicability, limitations, advantages and disadvantages of Bord and pillar mining method, development and depillaring sequence operations in Bord and Pillar mining, and its related calculations, local fall, main fall, air blast. Dangers associated with B& P method and precautions. Case study with layout.

UNIT – III

Longwall Mining: Applicability, limitations, merits and demerits, different longwall mining methods, factors influencing selection of longwall method, method of development and depillaring and its related calculations. Thin seam and thick seam mining with longwall mining method, Case study with layout.

UNIT - IV

Thick Seam and deep seam Mining: Problems associated with thick and deep seam Mining, selection of mining method, caving and stowing methods, limitations and applicability: different slicing methods-(inclined Slicing, Horizontal Slicing, Diagonal Slicing, Transversely Inclined Slicing),and Caving methods (Sublevel Caving) Working Steep and Moderately Thick Seams: Blasting Gallery Method , room and pillar method , The Velenje Method, Descending Shield Method of Mining.

UNIT – V

Modern coal mining methods: applicability, limitations, merits and demerits of Inseam Mining and Horizon Mining, Hydraulic Mining, plough methods, chirimiri caving method, shield mining, method of extraction by coal gasification and contiguous seam. Working underneath surface features, extraction of multi seams, problems and issues: Coal Bed Methane. Goaf Control: strip packing or solid stowing, Hydraulic Stowing etc. Procurement of stowing materials and its transportation, theoretical aspects and case studies.

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UNIT – VI

Future Innovations: blind long hole pre-shattering methods, scientific mining approach, application of mining software for mine development and extraction and production planning and design of workings, Size and grade control by CSP and CWP,.. case study.

Outcome: understand students about all coal mining methods and their limitations, handling and working in difficult working conditions in the field.

Text Books:

1. Principles and Practices of Modern Coal Mining – R. D. Singh, New Age International, 1997.
2. Modern Coal Mining Technology – S. K. Das, 2nd edition, Lovely Prakashan Publishers, 1994.

Reference Books:

1. Underground Coal Mining Methods – J. G. Singh, Braj Kalpa Publishers, Varnasi, 2000.
2. Coal Mining – I.C.F. Statham, Vol. I, II, III and Vol. III. The Caxton Publishing Company Ltd. Inc. 1958.
3. Elements of Minning technology- D.J Deshmukh Vol.1
4. Modern Coal mining Technology: Samir kumar Das
5. Underground winning of coal:T.N Singh

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III Year - I Semester

L	T	P	C
4	0	0	3

MINE ENVIRONMENTAL ENGINEERING-I

Course objectives: To Understand atmosphere and mine atmosphere conditions, heat and humidity levels in mines and controlling method. To know the necessity of ventilation in mines and quantity and quality levels. To know about ventilation standards planning and layout.

UNIT - I

MINE AIR: Atmospheric air composition, mine air composition and comparison, Mine gases-origin, occurrence, physiological effects, detection, monitoring and control. Methane layering, degasification of coal seams, production, assessment, physiological effects and control. Sampling and testing of different gases using different detectors including multi-gas detector.

UNIT - II

MINE CLIMATE: Sources of heat in mines, effects of heat and humidity in mines, testing methods and devices::psychometry, kata thermometer, control methods or improving of cooling power of mine air: Air conditioning basic vapor cycle, representative layout.

UNIT - III

VENTILATION: necessity of ventilation, , different ventilation systems, principles on different basis and its related calculations, factors effecting selection ventilation system, mechanism of airflow through mine openings, Laws of air flow, resistance of airways, equivalent orifice, Distribution of air flow and control devices. Natural ventilation calculation of NVP, thermodynamic aspects, artificial aids to natural ventilation

UNIT - IV

MECHANICAL VENTILATION: different types of mine fans installation, operation details, applicability, limitations, efficiencies and characteristic, factors for effecting selection of mine fan, testing and output control of fans, operation of mine fans (Series and parallel). Fan laws, drives, Evasee, diffusers, booster fans, auxiliary ventilation. Reversal of air currents and controlled recirculation.

UNIT – V

VENTILATION PLANNING AND DESIGN: .ventilation survey both quantity and pressure and related calculations. Mine ventilation design criteria and factors, Accenssional, descensional, homotropal, anti – tropal ventilation plan. Central and boundary ventilation systems – layouts and comparisons. Standard of ventilation including permissible air velocities

UNIT – VI

Ventilation layout for coal mining and metal mining. Calculation of air quantity and total mine head required for ventilating a mine. Introduction to Network analysis, Hardy – Cross method, Ventilation survey. Case study

Course Outcome: Familiar with mine ventilation systems, quantity and quality requirements, decide ventilation system and method and develop mine ventilation plan and layout for any given mine.

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TEXT BOOKS:

1. Elements of Mining Technology - Vol II- D. J. Deshmukh, 9th Edition, Central Techno Publication
2. Mine Environment and Ventilation – G. B. Mishra, Oxford University Press, 1994.

REFERENCES:

1. Mine ventilation and air conditioning – Howard L. Hartman. Wiley International, 1976.
2. Environmental Engineering in Mines – Vutukuri & Lama, Cambridge University Press, Cambridge,
3. Legislation in Indian mines a critical appraisal Vol. I and Vol. II – Prasad and Rakesh. Vivek Publications, Varanasi 1999.
4. Mine Ventilation Vol. – II, S. Ghatak, Coalfield Publishers, 1993.

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III Year - I Semester

L	T	P	C
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ELECTRICAL EQUIPMENT IN MINES

Course Objectives: To Understand standards of lighting in different working areas, AC and Dc motors and its maintenance, earthling methods and applicability. To be Familiar with LAN, EWAN system.

UNIT - I

Mine power supply: Choice of voltage, surface and underground supply: Tariff Computation, standards of lighting and method of illumination in open cast and underground . Mine Cables- types, Construction details, installation of cables through shaft and other locations, fault location, cable jointing , care and maintenance, Gate-end boxes and switch gears. Principles of flame-proof enclosures

UNIT - II

Earthing Methods, protective devices, overload, under-voltage earth leakage, D.C. Supply-rectifiers, storage batteries.

UNIT - III

Electrical Equipment: Mining transformers used in mines, lighting transformer, no load on load operations, losses and efficiency and voltage regulation. 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.

UNIT - IV

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.

UNIT - V

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

UNIT - VI

Intrinsically – safe circuit – methods of attaining intrinsic safety, zeener safety barriers and their application. Indian electricity rules as applied to mines.

Course outcomes: identify flame proof and intrinsically safe apparatus. Operating DG sets.

TEXT BOOK:

1. Electrical equipment in Mines by H.Cotton
2. Electrtechnology mining by N.Merinovic

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III Year - I Semester

L	T	P	C
4	0	0	3

MINE SURVEYING-II

Course Objectives: To Understand correlation and stope survey methods and know and limitations of photogrammetry and modern survey methods. To be Familiar with dip and strike problems and surveyor responsibility in underground

UNIT I:
CORRELATION SURVEY: Principles, Classification, Methods, Shaft Plumbing, Assumed Bearing, Weisback Triangle, Co-planning, Weis-back quadrilateral, Problems on correlation survey etc. and degree of accuracy. Orientation of underground net through adits, inclines and shafts. Depth of shaft. Magnetic and gyroscopic orientation

UNIT II:
OPENCAST, STOPE & SUBSIDENCE SURVEY: Opencast: Principles, methods and survey network, Calculation of areas and volumes, mid ordinate and average ordinate, trapezoidal method, Simpson method, contour method.
SUBSIDENCE SURVEY: Principles, method and degree of accuracy, underground traversing, setting out gradients in tunnels and adits
STOPE SURVEYING: Definition, purpose, methods: Tape triangulation, Ray, steeply dipping ore bodies, moderately dipping ore bodies, degree of accuracy.

UNIT – III
CURVE SETTING: Types of curves, simple and compound curves by linear and angular methods on surface and in the underground. Requirements and functions of a super elevation and transition curve.

UNIT IV
Modern survey: Special Mine surveys-survey of installations of Mine, EDM & ITS Application, GPS, total station, survey for connecting national grid. Field Astronomical terms and definitions. Determination of the meridian Longitude and latitude of a place.

UNIT V:
Photogrammetry: General principles, Elements of photogrametry; orientation of photographs, finding heights and distances of ground points from photographs. Gyrotheodolite survey. Elements of Photogrammetry, field astonomy: Principles & Definitions, Determination of true Meridian, Latitude & Longitude & Time

UNIT VI:
Problems in mine surveying. Dip & fault problems. Mine plans & sections, Types of plans, preparation and preservation of plans and sections. Regulations pertaining to mine plans and sections and mine surveying. duties and responsibilities of surveyors care and precaution in storage statutory responsibilities.

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Course outcome:

Ready to do curve setting in surface and underground, able to do latest surveying by total station.

TEXT BOOKS:

1. Dr.B.C.Punimia "Surveying" Vol II & III
2. Kanetakar & Kulkarni "Surveying and Leveling" Vol – II

REFERENCES:

1 JJ.Holland K.Wardell "Coal mines series editor E.Mason". Vol – II
2 Statham "Coal Mining Practice" Vol- IV
3 Basak "Surveying & Levelling"
4 Ghatak "Mine Surveying and Levelling"

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III Year - I Semester

L	T	P	C
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MINING MACHINERY & MECHANIZATION-I

Course Objectives:

To understand the electrical layouts and power distribution in mine, rope haulage layouts, technical details and applications. To study the various modes of transport means and electrical circuits, the types of pumps, installations and design calculations. And to know the various statutory aspects like CMR, MMR and the relevant DGMS circulars related to this course.

UNIT I INTRODUCTION

Different types of motive power used in mines – their fields of application, relative merits and demerits; transmission and distribution of compressed air in mines, compressed air drills. Elements of the transport system, classification and techno-economic indices. Wire ropes – classification, construction, fields of application, rope capping and splicing; deterioration of rope in use and its prevention; testing of ropes, selection and maintenance, rope calculations.

UNIT II ROPE HAULAGE

Rail Track and tubs– gauge; layout, curves, turnouts and cross-over, track maintenance, main features of rolling stock like tubs, mine cars man riding cars and tipplers;Types of rope haulages – merits, demerits and fields of application, constructional features, safety appliances and rope haulage calculations.

UNIT III OTHER TRANSPORT SYSTEMS-I

Locomotives – diesel, trolley-wire, battery locomotives, constructional features and safety devices and comparison of different types; underground and surface battery charging stations and safety measures, locomotive calculations;

UNIT IV OTHER TRANSPORT SYSTEMS-II

shuttle cars, underground trucks, load-haul- dumpers, SDL vehicles, aerial rope ways, gravity transport, principles of hydraulic& pneumatic transportation and their fields of application, electric layouts, man-riding systems.

UNIT V PUMPING & CONVEYING

Different types of drives, installation and maintenance of pumps and pipes in shafts and roadways, electrical layouts, various sources of water in mines, design of sumps.

Face haulage and conveyors – Various types of conveyors, Scraper chain conveyors, AFCs, belt conveyors, cable belt conveyor, shaking and vibrating conveyors, armoured flexible conveyors, high angle conveying, electrical layouts. Numerical problems in conveyors

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UNIT VI MINE ELECTRICAL ENGINEERING

Distribution of electric power in mines, types of mine cables and their fields of applications, mining switch gears and their installation in hazardous atmosphere, flame proof enclosures, intrinsically safe circuits, (examples) safety aspects and signalling. Mine telephone system and latest development in mine communications.

OUTCOME:

- The students will have basic knowledge on motive power used in mines, pumping, rope haulage and face haulage & conveying transport systems. They also will know about mine electrical engineering in all statutory aspects.

TEXT BOOKS

1. Cherkassky, B.M., Pumps, Fans, Compressors, MIR Publishers, 1980.
2. Walker, S.C., Mine Winding and Transport, Elsevier, 1988.

REFERENCE BOOKS:

1. Karelin N.T., Mine Transport, Orient Longmans, N. Delhi.
2. Mason, E., Coal Mining Series, Mining Machinery, Virtue and Company Ltd., London.
3. Statham, I.C.F., Coal Mining, Vol. I, II, III and IV, Caxton Eastern Agencies, Calcutta.
4. Deshmukh D.J., Elements of Mining Technology, Vol. III EMDEE Publishers, Nagpur,1989.
5. Universal Mining School - Lecture notes, cardiff, U.K

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III Year - I Semester

L	T	P	C
4	0	0	3

ADVANCED ENGLISH COMMUNICATION SKILLS LAB

1. Introduction

The introduction of the English Language Lab is considered essential at 3rd year level. At this stage the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context. The proposed course should be an integrated theory and lab course to enable students to use 'good' English and perform the following:

i) Gather ideas and information, to organise ideas relevantly and coherently.

ii) Engage in debates.

iii) Participate in group discussions.

iv) Face interviews.

v) Write project/research reports/technical reports.

vi) Make oral presentations.

vii) Write formal letters.

viii) Transfer information from non-verbal to verbal texts and vice versa.

ix) To take part in social and professional communication.

2. Objectives:

This Lab focuses on using computer-aided multimedia instruction for language development to meet the following targets:

i) To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.

ii) Further, they would be required to communicate their ideas relevantly and coherently in writing.

3. Syllabus:

The following course content is prescribed for the Advanced Communication Skills Lab:

i) Functional English - starting a conversation – responding appropriately and relevantly – using the right body language – role play in different situations.

ii) Vocabulary building – synonyms and antonyms, word roots, one-word substitutes, prefixes and suffixes, study of word origin, analogy, idioms and phrases.

iii) Group Discussion – dynamics of group discussion , intervention, summarizing, modulation of voice, body language, relevance, fluency and coherence.

iv) Interview Skills – concept and process, pre-interview planning, opening strategies, answering strategies, interview through tele and video-conferencing.

v) Resume' writing – structure and presentation, planning, defining the career objective, projecting ones strengths and skill-sets, summary, formats and styles, letter-writing.

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vi) Reading comprehension – reading for facts, guessing meanings from context, scanning, skimming, inferring meaning, critical reading.

vii) Technical Report writing – Types of formats and styles, subject matter – organization, clarity, coherence and style, planning, data-collection, tools, analysis.

4. Minimum Requirement:

The English Language Lab shall have two parts:

i) **The Computer aided Language Lab** for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

ii) **The Communication Skills Lab** with movable chairs and audio-visual aids with a P.A System, a T. V., a digital stereo –audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with LAN with minimum 60 multimedia systems with the following specifications:

iii) P – IV Processor

a) Speed – 2.8 GHZ

b) RAM – 512 MB Minimum

c) Hard Disk – 80 GB

iv) Headphones of High quality

5. Suggested Software:

The software consisting of the prescribed topics elaborated above should be procured and used.

Suggested Software:

i) **Clarity Pronunciation Power** – part II

ii) **Oxford Advanced Learner's Compass**, 7th Edition

iii) **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**

iv) **Lingua TOEFL CBT Insider**, by Dreamtech

v) **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)

The following software from 'train2success.com'

i) **Preparing for being Interviewed,**

ii) **Positive Thinking,**

iii) **Interviewing Skills,**

iv) **Telephone Skills,**

v) **Time Management**

vi) **Team Building,**

vii) **Decision making**

English in Mind, Herbert Puchta and Jeff Stranks with Meredith Levy, Cambridge

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6. Books Recommended:

1. **Effective Technical Communication**, M. Ashraf Rizvi, Tata Mc. Graw-Hill Publishing Company Ltd.
2. **A Course in English communication** by Madhavi Apte, Prentice-Hall of India, 2007.
3. **Communication Skills** by Leena Sen, Prentice-Hall of India, 2005.
4. **Academic Writing- A Practical guide for students** by Stephen Bailey, Rontledge Falmer, London & New York, 2004.
5. **English Language Communication : A Reader cum Lab Manual** Dr A Ramakrishna Rao, Dr G Natanam & Prof SA Sankaranarayanan, Anuradha Publications, Chennai
6. **Body Language- Your Success Mantra** by Dr. Shalini Verma, S. Chand, 2006.
7. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice**, New Age International (P) Ltd.,Publishers, New Delhi.
8. Books on **TOEFL/GRE/GMAT/CAT** by Barron's/cup
9. **IELTS series with CDs** by Cambridge University Press.
10. **Technical Report Writing Today** by Daniel G. Riordan & Steven E. Pauley, Biztantra Publishers, 2005.
11. **Basic Communication Skills for Technology** by Andra J. Rutherford, 2nd Edition, Pearson Education, 2007.
12. **Communication Skills for Engineers** by Sunita Mishra & C. Muralikrishna, Pearson Education, 2007.
13. **Objective English** by Edgar Thorpe & Showick Thorpe, 2nd edition, Pearson Education, 2007.
14. **Cambridge Preparation for the TOEFL** Test by Jolene Gear & Robert Gear, 4th Edition.
15. **Technical Communication** by Meenakshi Raman & Sangeeta Sharma, Oxford University Press.

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DISTRIBUTION AND WEIGHTAGE OF MARKS:

Advanced Communication Skills Lab Practicals:

1. The practical examinations for the English Language Laboratory practice shall be conducted as per the University norms prescribed for the core engineering practical sessions.
2. For the English Language lab sessions, there shall be a continuous evaluation during the year for 25 sessional marks and 50 End Examination marks. Of the 25 marks, 15 marks shall be awarded for day-to-day work and 10 marks to be awarded by conducting Internal Lab Test(s). The End Examination shall be conducted by the teacher concerned with the help of another member of the staff of the same department of the same institution.

III Year - I Semester

L	T	P	C
0	0	3	2

MINE SURVEYING LAB

Course objectives: To Understand different equipment and compare accuracy levels and to study several experiments and conversant with it. To find the importance of latest technology through total station. To be familiar with conventional symbols used in mines. it enables the student to attain good practical knowledge.

List of Experiments

1. Triangulation survey by theodolite
2. Measure horizontal and vertical angles by theodolite
3. Measure horizontal angles by method of repetition and reiteration using theodolite
4. Trigonometric Leveling - Heights and distance problem
5. Signs and conventions used by GSI, MMR, CMR
6. Finding heights and distance using Principles of tachometric surveying
7. Curve setting – different methods by total station
8. Setting out works for buildings & pipe lines.
9. Determine area using total station
10. Traversing using total station
11. contouring using total station
12. Determination of remote height using total station
13. Coordinate measurement by total station and GPS
14. Traversing and recording position of points by GPS
15. Distance, gradient, Difference, height between two inaccessible points using total stations.

Course outcome: Familiar with equipment and capable to do work independently at any time if you get chance

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EQUIPMENT TO BE USED:

1. Theodolites, and leveling staffs.
2. Tachometers.
3. Total Station.

III Year - I Semester

L	T	P	C
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MECHANICAL ENGINEERING LAB

Course Objectives:

Students should able to verify the principles studied in thermal and engineering design course by performing experiments in the laboratory

THERMAL EXPERIMENTS

1. Study of I.C. engines and components
2. Performance test on 4 S diesel engine
3. Performance test on reciprocating air-compressor
4. Study of refrigeration system
5. Study of Boilers
6. Disassembly /Assembly of Engines

ENGINEERING DESIGN

1. Cam displacement and velocity analysis
2. Whirling of shaft-determination of critical speed of shaft with concentrated loads
3. Determination of moment of inertia by oscillation method for connecting rod and flywheel.
4. Vibrating system – spring mass system – determination of damping co-efficient of single degree of freedom system.
5. Transverse vibration – free – beam, determination of natural frequency and deflection of beam.
6. Study of Gears and linkage mechanisms

OUTCOMES:

- ability to use of thermal experiments related to IC and refrigeration and air conditioning
- ability to use of various engineering design experiments

REFERENCE BOOKS:

1. Nag, P.K. Basic and Applied Thermodynamics, 8th Edition, Tata Mc Graw Hill, 2008.
2. Rajput, R.K. Thermal Engineering, 6th Edition, Laxmi Publications, 2007
3. Ballaney, P.L. Thermal Engineering, Khanna Publishers, 24th Edition, 2003.
4. Shigley J.E., Pennock G.R. and Uicker J.J. Theory of Machines and Mechanisms, Oxford University Press, 2003

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III Year - II Semester

L	T	P	C
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MINE SYSTEMS ENGINEERING

Course Objectives: To expose the students to advanced optimization procedures to be adapted in mining. Further to understand the job sequencing and transportation models to maximize the productivity of the mining industry.

UNIT – I

Development – Definition– Characteristics and Phases – Types of models – Operations Research models– applications.

ALLOCATION: Linear Programming Problem Formulation – Graphical solution – Simplex method –Artificial variables techniques -Two–phase method, Big-M method – Duality Principle.

UNIT – II

TRANSPORTATION PROBLEM – Formulation – Optimal solution, unbalanced transportation problem –Degeneracy. Assignment problem – Formulation – Optimal solution - Variants of Assignment Problem-Traveling Salesman problem.

SEQUENCING – Introduction – Flow **–**Shop sequencing – n jobs through two machines – n jobs through three machines – Job shop sequencing – two jobs through 'm' machines.

UNIT – III

REPLACEMENT: Introduction – Replacement of items that deteriorate with time – when money value is not counted and counted – Replacement of items that fail completely, group replacement.

UNIT – IV

THEORY OF GAMES: Introduction – Minimax (maximin) – Criterion and optimal strategy – Solution of games with saddle points – Rectangular games without saddle points – 2 X 2 games – dominance principle – m X 2 & 2 X n games -graphical method.

WAITING LINES : Introduction – Single Channel – Poisson arrivals – exponential service times – with infinite population and finite population models– Multichannel – Poisson arrivals – exponential service times with infinite population single channel Poisson arrivals.

UNIT – V

INVENTORY : Introduction – Single item – Deterministic models – Purchase inventory models with one price break and multiple price breaks – shortages are not allowed – Stochastic models – demand may be discrete variable or continuous variable – Instantaneous production. Instantaneous demand and continuous demand and no set up cost.

UNIT – VI

DYNAMIC PROGRAMMING: Introduction – Bellman's Principle of optimality – Applications of dynamic Programming- capital budgeting problem – shortest path problem – linear programming problem.

SIMULATION: Definition – Types of simulation models – phases of simulation– applications of simulation – Inventory and Queuing problems – Advantages and Disadvantages – Simulation Languages.

Course Outcome: The student will be in a position to maximize the production by implementing different optimization technique.

TEXT BOOKS :

1. Operations Research / S.D.Sharma-Kedarnath
2. Introduction to O.R/Hiller & Libermann (TMH).

III Year - II Semester

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MINERAL ENGINEERING & FUEL TECHNOLOGY

Course Objectives:

To introduce the subject to the Mining Engineering Students. To discuss the subject and various methods.To make the Mining Engineering Students familiar with the various processes.

UNIT - I

Introduction to Mineral Engineering – Sampling and sampling methods – Particle size determination – Test sieves – Laboratory sizing methods – Graphical representation – Sub-sieve Sizing – Industrial screening – Screen surfaces – Types of industrial screens – Dry and wet screening – Factors effecting rate of screening – Screen efficiency.

Liberation – Comminution – Laws of comminution – Crushing – Reduction ratio – Classification of Crushers, description and characteristics – Grinding – Ball, rod, tube mills – FAG and SAG mills – Methods of feeding and discharge, Grinding media, Liners, Operation – Theory of ball mill – Critical speed – Open and closed circuit grinding – Circulating load – Wet and dry grinding.

Density – Pulp density – % solids – Dilution ratio – Settling of solids in fluids – Stoke's and Newton's laws – Terminal velocity – Free and Hindered settling – Equal settling particles – Settling ratio – Principles of Classification – Sizing and sorting classifiers –Hydrocyclone – Construction and operation – d_{50} – Design and operating variables – Classification as a means of concentration.

UNIT – II

Beneficiation Operations – Gravity concentration – Concentration Criterion – Float and sink – HMS – Heavy Media Cyclone – Jigging – Principles and methods – Types of Jigs – Applications – Flowing film concentration – Basic principles – Humphrey spiral – Tabling – Shaking tables – Operation and applications.

Flotation – Contact angle – Natural and acquired flotability – Frothers, Collectors, Modifying agents and their action in flotation – Froth flotation and its mechanism – Factors effecting the flotation – Flotation machines – Column flotation – Flotation circuits – Flotation applications.

Magnetic separation – Types of separators – Dry and Wet, Low and High intensity magnetic separators – HGMS – Applications – Electrical separation – Electrostatic and High tension separators – Separation of solids from fluids – Flocculation – Thickening – Industrial thickeners – Filtration and its mechanism – Types of filters – Dust control.

UNIT – III

Properties of Bulk solids – Materials Handling operations – Storage, Conveying Feeding and Pumping – Ore testing – Role of Ore microscope in Mineral Processing – Processing flowsheets for common minerals.

Material Balance equations – Ratio of concentration – Ratio of enrichment – Recovery, Rejection losses – Efficiency of a concentrating operation – Metallurgical efficiency.

UNIT – IV

Solid fuel, Coal – Origin and formation of coal – Constituents of coal – Proximate analysis of coal and its usefulness – Representing proximate analysis on dry, daf and dmmf basis – Ultimate analysis – Calorific value of coal – Rank of coal – Varieties of coal and their uses – Coking and Non-coking coals – Classification of Indian coals – Indian coal reserves – Coal utilization for Combustion, Carbonization, Gassification and Liquifaction.

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UNIT – V

Coal Beneficiation – Need, Purpose and Advantages – Coal Breaking – Sizing and Grading – Coal Screening – Washability of coal – Float and Sink – Washability curves – HMS processes – Medium recovery systems – Jigging – Types of Jigs : Baum, Batac and Feldspar Jigs – Heavy medium cyclone process – Water only cyclones

Flotation – Theories of flotation of coal – Factors effecting the flotation of coal – Flotation machines – Column flotation – Oil agglomeration – Wet washing versus dry cleaning – Dewatering – Coal washing efficiency – Organic efficiency – Tromp curve – Coal Washing practice in India – Problems and economics of coal washing in India.

UNIT – VI

General classification of fuels – Factors to be considered to choose a fuel for particular purpose – Types of solid, liquid and gaseous fuels – Manufacturing methods of coke – Properties and uses of liquid fuels – Classification, properties and uses of gaseous fuels – Advantages and disadvantages of solid, liquid and gaseous fuels.

Course Outcome:

Mining Engineering students will be able to understand the subject and practice in the regular mining industries without the aid of Mineral engineers.

Text Books:

1. Mineral Beneficiation – A Concise Basic Course — D.V.SUBBARAO
2. Mineral Processing Technology — B.A.WILLS
3. Coal – Its Beneficiation — D.V.SUBBA RAO
4. Elements of Fuels, Furnaces & Refractories — O.P.GUPTA

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III Year - II Semester

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MINE ENVIRONMENTAL ENGINEERING -II

Course Objectives

Understand process of spontaneous heating, fires, explosion, inundation and adverse effects, rescue and recovery operation and standards of lighting arrangement.

UNIT – I: Mine Fires: Classification, surface and underground fires, Prevention and control of underground fires, fire fighting and its organization, study of atmosphere behind sealed off areas, re-opening sealed off areas.

UNIT-II: Spontaneous heating: Mechanism, factors governing spontaneous heating, stages of spontaneous heating, symptoms of spontaneous heating in underground mines, detection and prevention of Spontaneous heating, interpretation of mine air samples, Graham's index, and problems on Graham's index. Incubation period

UNIT – III: Explosions: Types, mechanism, ignition temperature, lag on ignition, Causes and preventive measures of underground explosions (Fire damp and coal dust explosions) causes and preventive measures. Stone dusting, stone dust and water barriers, investigation after explosion. Dust production in mines and its control. Health hazards. Sampling and assessment of airborne dust.

UNIT – IV: Inundations: Causes of mine inundations from surface and underground sources. Dams: Types, design, construction of water dams. Dewatering water logged workings, Precautionary and protective measures on surface and in underground when approaching old water logged areas and dewatering of water logged areas/workings, safety boring apparatus.

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UNIT-V: Mine Illumination/Mine Lighting: Technical terms in lighting and photometry, underground lighting, electric safety lamp, different types of portable lamps, methods of illumination in underground mines- Fixed system, mobile system. standards of mine lighting in opencast and underground mines, Illumination survey lamina and luminance calculations.

UNIT – VI: Mine Rescue: Mine rescue and equipment, Short distance apparatus. Self-contained oxygen – breathing apparatus, Self rescuers, gas masks,rescue stations, rescue organization, reviving apparatus. Rescue and recovery work in connection with fire, explosions, and inundations. Basic principles of risk management.

Course outcome: prevent occurrence of disaster, familiar with rescue and recovery operation from fire, explosion inundation disasters

Text Books:

1. EMT Volume-IIA by Deshmukh;2. Mine fire and spontaneous heating- S.P. Banarjee
4. Mine Ventilation – Dr. G.B. Mishra; 5. Mine Ventilation – Penman
6. Ramulu M.A "Mine fires, explosions, rescue, recovery and inundations"

Reference Book:

Fires in coal Mines L.C Kaku

III Year - II Semester

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MINING MACHINERY & MECHANISATION-II

Course Objectives:

- To understand the functioning of winding engines and other winding accessories
- To study surface and pit bottom layouts, various coal face machinery
- To study the design and construction details of excavating & transporting equipments used in surface mines.
- To know the various statutory aspects like CMR, MMR and the relevant DGMS circulars related to this course.

UNIT I WINDING ENGINES

Winding systems, drum winders, drives, mechanical braking of winders, safety devices in winding, overwind and overspeed protection, Koepe and multi-rope friction winding, electrical layouts. Duty cycles of drum winders of different drum cross-sections. Special problems of deep shaft winding.

UNIT II WINDING ACCESSORIES AND LAYOUTS-I

Head gear and their design, head sheave, cages and skips, suspension gear, shaft fittings and appliances – guides, keps, etc., signalling systems, winding calculations relating to rope size & numbers, capacity & power requirement for cages, skips, drum and Koepe winding systems.

UNIT III WINDING ACCESSORIES AND LAYOUTS-II

Surface and Pit-bottom layouts - Mine car circuits at the surface and pit bottom, creepers, skip winding – loading and discharge arrangements. Case studies, railway sidings and layouts.

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UNIT IV COAL FACE MACHINERY

Construction, salient mechanical and electrical features and operations of coal drills and their control panels, coal cutters, different types of mechanical loaders coal ploughs, cutter loaders and continuous miners; development road headers in face mechanisation, longwall mining equipment, electrical and hydraulic layouts; condition monitoring of mining machinery for underground and opencast mines and ore handling plants, modern concepts in underground mine mechanisation.

UNIT V EXCAVATION AND LOADING MACHINERY IN SURFACE MINES

Classification. Hydraulic system diagram. Under carriage. Design and Constructional details of Front end loaders, Hydraulic excavators and Electric Rope shovel, Backhoe, Dragline, Bucket Wheel Excavator. Bucket Chain Excavator and Surface Miners.

UNIT VI OTHER MACHINERY IN SURFACE MINES

Classification of transport equipments; Understanding of construction and technical specifications of Dumpers of different types including multi-axial dumpers,, Tractors, trailers, dump trucks, Rippers (types), Motor Graders, Bull Dozers, Rock breakers, Road Compactors, Water Tankers.

Course outcomes:

- The students will have the knowledge on functions of winding engines, winding accessories, pit-top and bottom mine circuits. They will also know about working of various coal face machinery, and design & constructional details of excavating and other prominent machinery used in surface mines.

TEXT BOOKS:

1. Amitosh Dey, Heavy Earth Moving Machinery, Lovely Prakashan Publications, Dhanbad, 2000.
2. Walker, S.C., Mine Winding and Transport, Elsevier, 1988.
3. Ramlu, M.A. Mine Hoisting, CRC Press, 1996

REFERENCE BOOKS:

1. Hartman, H. L. (Editor), SME Mining Engineering Handbook, 3rd edition, Vol I & II, Society of Mining Engineers, New York, 2011.
2. Cherkassky, B.M., Pumps, Fans, Compressors, MIR Publishers, 1980.
3. Deshmukh, D.J., Elements of Mining Technology, Vol. I, II and III, EMDEEE Publishers, Nagpur, 1979.
4. Alemgren G., Kumar U., and Vagenas N., Mine Mechanisation and Automation, A.A., Balkema Publication, 1993.
5. Mason, E., Coal Mining Series, Surveying, Vol I and II Virtue and Company Limited, London, 1985.

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III Year - II Semester

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INDUSTRIAL ROBOTICS
(OPEN ELECTIVE)

Course Objectives:

1. To give students practice in applying their knowledge of mathematics, science, and Engineering and to expand this knowledge into the vast area of robotics.
2. The students will be exposed to the concepts of robot kinematics, Dynamics, Trajectory planning.
3. Mathematical approach to explain how the robotic arm motion can be described.
4. The students will understand the functioning of sensors and actuators.

UNIT-I

INTRODUCTION: Automation and Robotics, CAD/CAM and Robotics – An over view of Robotics – present and future applications – classification by coordinate system and control system.

UNIT – II

COMPONENTS OF THE INDUSTRIAL ROBOTICS: Function line diagram representation of robot arms, common types of arms. Components, Architecture, number of degrees of freedom – Requirements and challenges of end effectors, determination of the end effectors, comparison of Electric, Hydraulic and Pneumatic types of locomotion devices.

UNIT – III

MOTION ANALYSIS: Homogeneous transformations as applicable to rotation and translation – problems.

MANIPULATOR KINEMATICS: Specifications of matrices, D-H notation joint coordinates and world coordinates Forward and inverse kinematics – problems.

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UNIT – IV

Differential transformation and manipulators, Jacobians – problems

Dynamics: Lagrange – Euler and Newton – Euler formulations – Problems.

UNIT V

General considerations in path description and generation. Trajectory planning and avoidance of obstacles, path planning, Skew motion, joint integrated motion –straight line motion – Robot programming, languages and software packages-description of paths with a robot programming language.

UNIT VI

ROBOT ACTUATORS AND FEED BACK COMPONENTS:

Actuators: Pneumatic, Hydraulic actuators, electric & stepper motors.

Feedback components: position sensors – potentiometers, resolvers, encoders – Velocity sensors.

ROBOT APPLICATIONS IN MANUFACTURING: Material Transfer - Material handling, loading and unloading- Processing - spot and continuous arc welding & spray painting - Assembly and Inspection.

Text Books:

1. Industrial Robotics / Groover M P /Pearson Edu.
2. Robotics and Control / Mittal R K & Nagrath I J / TMH.

References:

1. Robotics / Fu K S/ McGraw Hill.
2. Robotic Engineering / Richard D. Klafter, Prentice Hall
3. Robot Analysis and Control / H. Asada and J.J.E. Slotine / BSP Books Pvt.Ltd.
4. Introduction to Robotics / John J Craig / Pearson Edu.

Course outcomes:

Upon successful completion of this course you should be able to:

1. Identify various robot configuration and components,
2. Select appropriate actuators and sensors for a robot based on specific application
3. Carry out kinematic and dynamic analysis for simple serial kinematic chains
4. Perform trajectory planning for a manipulator by avoiding obstacles.

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ENTERPRENEURSHIP
(OPEN ELECTIVE)

COURSE OBJECTIVE:
To develop and strengthen entrepreneurial quality and motivation in students. To impart basic entrepreneurial skills and understandings to run a business efficiently and effectively.

UNIT I ENTREPRENEURAL COMPETENCE
Entrepreneurship concept – Entrepreneurship as a Career – Entrepreneurial Personality - Characteristics of Successful, Entrepreneur – Knowledge and Skills of Entrepreneur.

UNIT II ENTREPRENEURAL ENVIRONMENT
Business Environment - Role of Family and Society - Entrepreneurship Development Training and Other Support Organizational Services –

UNIT III INDUSTRIAL POLACIES
Central and State Government Industrial Policies and Regulations - International Business.

UNIT IV BUSINESS PLAN PREPARATION
Sources of Product for Business - Prefeasibility Study - Criteria for Selection of Product - Ownership - Capital - Budgeting Project Profile Preparation - Matching Entrepreneur with the Project - Feasibility Report Preparation and Evaluation Criteria.

UNIT V LAUNCHING OF SMALL BUSINESS
Finance and Human Resource Mobilization Operations Planning - Market and Channel Selection - Growth Strategies - Product Launching – Incubation, Venture capital, IT startups.

UNIT VI MANAGEMENT OF SMALL BUSINESS
Monitoring and Evaluation of Business - Preventing Sickness and Rehabilitation of Business Units- Effective Management of small Business.

COURSE OUTCOME:
Students will gain knowledge and skills needed to run a business.

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TEXTBOOKS
1. Hisrich, Entrepreneurship, Tata McGraw Hill, New Delhi, 2001.
2. S.S.Khanka, Entrepreneurial Development, S.Chand and Company Limited, New Delhi, 2001.

REFERENCES
1. Mathew Manimala, Entrepreneurship Theory at the Crossroads, Paradigms & Praxis, Biztrantra ,2nd Edition ,2005
2. Prasanna Chandra, Projects – Planning, Analysis, Selection, Implementation and Reviews, Tata McGraw-Hill, 1996.
3. P.Saravanavel, Entrepreneurial Development, Ess Pee kay Publishing House, Chennai - 1997.
4. Arya Kumar. Entrepreneurship. Pearson. 2012
5. Donald F Kuratko, T.V Rao. Entrepreneurship: A South Asian perspective. Cengage Learning. 2012

QUALITY AND RELIABILITY ENGINEERING
(OPEN ELECTIVE)

Course Objective:

To introduce the concept of maintenance of different types of equipment and its management including preventive maintenance measures to be adopted .The cause of the equipment failures, and reliability models and hazard models will help in understanding the machine perfromace and productivity in any machine operation .

UNIT-I

Introduction: Need for maintenance, Facts and Figures, Modern maintenance, Problem and maintenance, Strategy for the 21" century, Engineering Maintenance objectives and maintenance in equipment life cycle, terms and definitions.

UNIT- II

Maintenance Management and control: Maintenance manual, maintenance, facility evaluation, functions of effective maintenance management, maintenance project control methods, Maintenance management control indices.

UNIT-III

Types of Maintenance: Preventive maintenance, elements of preventive, maintenance program, establishing, preventive maintenance program PM Program, evaluation and improvement, PM measures, PM models, corrective maintenance, corrective maintenance types, corrective maintenance steps and downtime components, corrective maintenance measures, corrective maintenance models.

UNIT-IV

Basic concepts of Reliability: Introduction, reliability and quality, failure and failure modes, causes of failure and reliability, maintainability and availability, history of reliability, reliability literature. Reliability mathematics: Introduction, random experiment, probability, random variables, distribution functions, discrete distribution, continuous distribution, numerical characteristics of random variables. laplace transform.

UNIT-V

Component reliability & Hazard models: Introduction, component reliability from test data, mean time to failure, time dependent hazard models. stress dependent hazard models, derivation of reliability, function using markov, treatment of field data. System reliability models: Introduction, system with component within series - System with parallel component - K - out - of - M systems - Non series parallel systems - system with - mixed - mode failure - fault - tree technique.

UNIT-VI

Reliability management: Reliability programming-management policies and decisions - reliability management by objectives - reliability group-reliability data, acquisition analysis - management people for reliability.

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Course Outcome:

The maintenance and reliability engineering will help the students in enhancing the basic concepts required in understanding the performance reliability of different types of mining machinery used in open cast and in underground coal and metal mines .

TEXT BOOKS:

Reliability, maintenance and safety engineering by Dr.A.K.Gupta / Laxmi publications
Industrial safety management by L.M.Deshmukh / TMH
Reliability engineering - Balaguruswamy / TMH

REFERENCES:

1. Maintenance engineering and management by RC.Mishra / PHI
2. Reliability engineering. by Elsayed / Pearson
3. Engineering maintenance a modern approach, B.S Dhallon,2002, C.RR Publishers

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WASTE WATER MANAGEMENT
OPEN ELECTIVE

Learning Objectives:

- Outline planning and the design of waste water collection ,conveyance and treatment systems for a community/town/city
- Provide knowledge of characterization of waste water generated in a community
- Impart understanding of treatment of sewage and the need for its treatment
- Summarize the appurtenance in sewage systems and their necessity
- Teach planning and design of septic tank and imhoff tank and the disposal of the effluent from these low cost treatment systems
- Effluent disposal method and realize the importance of regulations in the disposal of effluents in rivers

UNIT-I:

Introduction to Sanitation-Systems of sanitation- relative merits and demerits - collection and conveyance of waste water - classification of sewerage systems-Estimation of sewage flow and storm water drainage- fluctuations-types of sewers- Hydraulics of sewers and storm drains-design of sewers- appurtenances in sewerage- cleaning and ventilation of sewers

UNIT-II:

Pumping of wastewater: Pumping stations-location- components- types of pumps and their suitability with regard to wastewaters.

House Plumbing: Systems of plumbing-sanitary fittings and other accessories-one pipe and two pipe systems-Design of building drainage

UNIT-III:

Sewage characteristics-Sampling and analysis of waste water-Physical, chemical and Biological examination-measurement of BOD & COD- BOD equations

Treatment of sewage: Primary treatment- Screens-grit chambers- grease traps- floatation-sedimentation-design of preliminary and primary treatment units.

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UNIT-IV:

Secondary treatment: Aerobic and anaerobic treatment process -comparison.

Suspended growth process: Activated sludge process, principles, design and operational problems, modifications of Activated sludge processes, Oxidation ponds, Aerated Lagoons.

Attached Growth process: Trickling Filters-mechanism of impurities removal-classification-design -operation and maintenance problems. RBCs. Fluidized bed reactors

UNIT-V:

Miscellaneous Treatment Methods: Nitrification and Denitrification- Removal of phosphates-UASB- Membrane reactors- Integrated fixed film reactors. Anaerobic Processes: Septic Tanks, Imhoff tanks- working principles and Design-disposal of septic tank effluent-FAB Reactors

UNIT-VI:

Bio-solids (sludge) management: Characteristics- handling and treatment of sludge-thickening-anaerobic digestion of sludge

Disposal of sewage: Methods of disposal- disposal into water bodies- Oxygen sag Curve-Disposal into sea-disposal on land- sewage sickness

Outcomes:

By the end of successful completion of this course, the students will be able to:

- Plan and design the sewerage systems
- Characterization of sewage
- Select the appropriate appurtenances in the sewerage systems
- Select the suitable treatment flow for sewage treatment
- Identify the critical point of pollution in a river for a specific amount of pollutant disposal into the river

Text Book:

1. Waste water Engineering Treatment and Reuse by Metcalf & Eddy, Tata McGraw- Hill edition.
2. Elements of Environmental Engineering by K.N. Duggal, S.Chand & Company Ltd. New Delhi, 2012.
3. Environmental Engineering by Howard S.Peavy , Donald R. Rowe, Teorge George Tchobanoglus- Mc-Graw-Hill Book Company, New Delhi, 1985
4. Wastewater Treatment for pollution control and Reuuse, by soli.J Areivala, sham R Asolekar, Mc-GrawHill, New Delhi; 3rd Edition
5. Industrial water & wastewater management by KVSG MuraliKrishna

Reference Book:

1. Environmental Engineering-II: Sewage disposal and Air pollution Engineering , by Garg, S.K.,: Khanna publishers
2. Sewage treatment and disposal by Dr.P.N.Modi & Sethi.
3. Environmental Engineering, by Ruth F. Weiner and Robin Matthews- 4th Edition Elsevier, 2003
4. Environmental Engineering by D. Srinivasan, PHI Learning private Limited , New Delhi,2011.

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ROCK EXCAVATION ENGINEERING

(OPEN ELECTIVE)

Course objective:

Rock engineering deals with the rock as a geological material and require the basic understanding of the engineering properties of rock and rock mass is essential. The estimation of rock mass strength, its behavior during excavation, types of drilling and blasting methods depend on the rock mass characterization. The selection of suitable excavation equipment is entirely based on rock mass and its geological defects such as faults, joints and planes of weakness.

UNIT I

Introduction: Concepts and historical developments and design in rock excavation, factors affecting rock fragmentation, mechanism of rock breakage and fractures. Rock Fragmentation: Method of rock fragmentation - explosive action, cutting, ripping and impacts.

UNIT-II

Mechanical Properties of Rocks : Application 'of compression, tensile and multi - axial strength, index test and abrasivity, anistrophy, elasticity, porosity, lamination, bedding joints in rock fragmentation process. Principles of Rock Cutting Technology: Drilling and its various types i.e., rotary, percussive; rotary - percussive mechanism of rock percussion, theory of single tool rock cutting, crack initiation and propagation, breakage pattern.

UNIT- III

Rock cutting pricks, discs and rolls cutter. Water jet cutting. Method of assessing drillability and cuttability of rock.

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UNIT- VI

Principles of Excavation Machines: Roadheaders, TBMs' coalface cutters loaders, Bucket Wheel Excavators, draglines and Continuous Miners both surface and underground.

UNIT- V

Rock' Cutting Tools: Cutting tool material - different types relative application and their choice, tool shape and size, specific energy consumption, tool wear, drill bit types.

UNIT VI

Effect of operational parameters on tool performance and replacementof cutting tools of excavating machines.

Course Outcome:

The student will be in a position to appreciate the engineering properties of rock mass and its response to design of excavation, selection of right type of equipment for excavation, to avoid breakdowns and to improve the efficiency and machine performance.

TEXT BOOKS:

1. Principles of Rock Fragmentation, GB.Clark, John wiley and Sons, New York,1987.

2. Rock mechanics and Design of structures, Obert and duvval, John wiley and Sons, New York.

REFERENCES:

1. SME mining engineering hand book, Hartman, Society for Mining, Metallurgy and Exploration.

2. Introductory mining Engineering, Hartman, john wiley International, 1976.

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MINE SAFETY ENGINEERING

(OPEN ELECTIVE)

Course Objective:

To learn the level of risk associated with mining, risk assessment and management
To know the occupational diseases, mine disasters and mitigation

UNIT I MINE ACCIDENTS

Accident in mines;- different types, accident investigations; accident analysis; accident prevention and corrective action, accident proneness, creating and maintaining safety awareness, ZAP and MAP, job safety analysis, safety meeting and committee.

UNIT II HEALTH AND MINE SAFETY

Definition of health and safety, management's role – function; evolution of management involvement, management's training, responsibility, cost of health and safety, role of labour organizations – Union impact and involvement, role of government – statutory controls and directions, spot and regular inspections, enforcement of standards, penalties for violations, collection and distribution of statistical data.

UNIT III FAULT TREE ANALYSIS

Introduction – methodology, symbols and Boolean techniques, qualitative analysis, computerized methods, statistical analysis, safety information, systems design.

UNIT IV RISK ASSESSEMENT

Principles, risk and hazard control, risk and hazard evaluation and data collection for identified health risks, exposure assessment and risk characterization, probabilistic risk analysis,

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UNIT V DISASTER MANAGEMENT

Risk management, safety culture, human factors, reliability evaluation, safety audit. Identification of causes of mine disasters, preventive action, disaster management and mitigation, typical cases of mine disasters in India

UNIT VI MINER'S OCCUPATIONAL DISEASES AND ENQUIRY COMMITTEE

Miner's occupational health and diseases, preventive medical examinations, various types of injuries, compensable diseases, medical attention and removable of causative factors in the mines. Recommendations of inquiry committee carried out for safety and health issues in India.

Course Outcome:

- The students will have deep knowledge about the mine accidents, disaster, disease and mine safety with risk assessment, mitigation and management.

TEXTBOOKS:

1 Brown, D.B., System Analysis and Design for Safety, Prentice Hall, 1976.
2 Stranks, J., Management Systems for Safety, Pitman Publishing, 1994.

REFERENCES

1 DeReamer, R., Modern Safety Practices, John Wiley and Sons.
2 Wahab Khair. A., New Technology in Health and Safety, SMME, 1992.
3 Zyl, D.A., Koval, M, Li Ta, M. (Ed.). Risk Assessment / Management Issues in the Environmental Planning in Mines, SMME, 1992.
4 Prasad, S.D. and Rakesh., A Critical Appraisal of Mine Legislations. Lovely Prakashan, 1995. Dhanbad.
5 Mine Disasters of India, NCSM Publication.
6 Kejriwal, B.K., Safety in Mines, Gyan Khan Prakashan, Dhanbad, 1994.

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III Year - II Semester

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MINERAL ENGINEERING LAB

Course Objectives:

To introduce the laboratory techniques to the Mining Engineering Students. To give hands-on experience to the various laboratory techniques and procedures. To make the Mining Engineering Students familiar with the various techniques commonly performed in Mining industry.

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

Course Outcome

Mining Engineering students will be able to perform laboratory techniques on his own in laboratory as well as in Mining and Mineral Industries.

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III Year - II Semester

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ENVIRONMENTAL ENGINEERING LAB

Course objective:

To be familiar with detection of different gases using deferent methods detectors and multi gas detector, to find flammable index of coal dust and understand the rescue and recovery operations using different rescue apparatus

1. Determination of CO, CH4, H2S, SO2, O2, CO2, Nitrous fumes by corresponding detectors.
2. Study and application of infrared gas analiser.
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.

Course outcome: The student will familiar with rescue and recovery operation from different disasters in mine

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III Year - II Semester

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MINE PLANNING AND DESIGN LAB

Course objective: creation and utilization of data base for various studies and applications of the same for planning & design of mining projects.

1. Determination of stripping ratio.
2. Determination of Pit limits.
3. Calculations of powder factor of blasting in open cast & underground mining blasting.
4. Calculation of fleet size for shovel, dumper combination in open cast mine.
5. Estimation/calculation of production in underground mine using, LHD, SDL ,RH, CM, long wall equipments.
6. Ventilation study & Calculation for bord &pillar and long wall panels in underground coal mines.
7. Design of Pillars.
8. Subsidence Predictions.
9. Problems on network analysis for ventilation
10. Slope stability problems.

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IV Year - I Semester

L	T	P	C
4	0	0	3

COMPUTER APPLICATIONS IN MINING

Course Objectives:

To introduce the concepts on computer basics and its applications on mining industry. It covers the the application of geo-statistical methods in sampling, reserve estimation, computation of grade-tonnage curves, production scheduling simulation and modeling of mine structures using simulation language.

UNIT-I

Introduction to structure terminology and peripherals, algorithms, flow charts, programs, dedicated systems. application in mining.

UNIT-II

Exploration, rocket topographic models, bore hole compositing, ore reserve calculation, interpolation, geostatical models, open pit design, ultimate pit design, introductory process control, underground mine design.

UNIT-III

Production scheduling: Operational simulation: Introduction, simulation overview, objective, understand the role of modeling. Understanding the basic concept in simulation, example of simulation in mining aspects, simulation of machine repair problem.

UNIT-IV

concept of variability and prediction, example with dumping time problem, fitting distribution with chi-square test, random number generation, properties of random number, pseudorandom number, random variants generation.

UNIT -V

methods of random variants generation, inverse transform method, acceptance rejection method, composition method, empirical method and rectangular approximation.

UNIT-VI

simulation languages, GPPS and SLAM, logical flow diagram of different milling activities, coding with GPSS and SLAM of different mining problems. Computer control, remote control, automatic, applications and limitations of control

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Course Outcome:

Basic knowledge of computer applications is essential in the mineral industry as most of the softwares were already commercially available to meet different application areas of mining (opencast, underground methods). These softwares proven to be very effective and hence basic knowledge of computer and exposure to developments of computational skills to handle mining soft wares is essential to be accepted by the industry. Application areas include rock engineering, mine design, slope stability, mining geo-statistics, financial analysis, valuation, risk analysis, feasibility etc.

TEXT BOOKS:

1. T.C.Bartee, digital computer fundamental, Mc Graw Hill, 4th edition 1984.

2. P.Malvino and D.P.leach digital principals and applications Mc Graw Hill 5th edition 1994.

REFERENCE:

1. R.V. Ramani, application of computer methods in the mineral industry.

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IV Year - I Semester

L	T	P	C
4	0	0	3

UNDERGROUND METAL MINING TECHNOLOGY

Course objectives:

Understand peculiarities and limitations of metal mining, familiar with different stoping methods, design and planning of stoping methods.

UNIT – I: Introduction to Metal Mining: Peculiarities of Metalliferous deposit. Scope and limitations of underground mining, Opening up of underground deposits, choice of entry shaft and combination and their applicability, limitations.

UNIT – II: Mine Developments: Methods of developments,Factors effecting choice of level interval, Cross cuts, Drive, shape and size of drive, winzes, Raises, block size, shaft station, ore bin, ore pass and their position in relation to ore body and general scheme of its development.Division of mining area into working units and level pattern, dimensions of panels and blocks.

UNIT –III: Stoping: Classification of stoping methods, applicability, limitations, merits and demerits, Factors affecting choice of stopping methods like depth, dip, Width grade / value of deposit, physio mechanical characteristics of the ore and wall rocks. Stope design and production planning in various methods of stoping. Production and cycle time estimates. Stope and development support, mining cycles, shift times, estimating equipment's requirements

UNIT –IV: Stoping Methods: Stoping without supports**:** Open stopping, overhand, underhand, breast stoping. Stoping with Supports: shrinkage stopping cut and fill stopping, square set stopping. Caving methods: Top Slicing, sublevel caving and block caving.

UNIT – V: Special Stoping methods: Sublevel stoping, long-hole stoping, blast hole stoping, raise stoping, V.C.R Stoping, in-situ leaching, bio-mineral engineering, hydraulic mining, blast hole stoping, underground bench blasting, Extraction of remnant pillars, shaft pillars and contiguous reefs, their supporting system and special precautions during extraction.

UNIT – VI: Deep mining: concept of deep mining, special problems of deep mining, , salt potash and sulphur mining and their special problems, stoping practices in rock burst prone mines.Under sea mining, novel mining methods, application of tunnel and shaft boring machines and their applications.

Course outcome: Stope design and planning is essential in various stoping methods for effective production.

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Suggested Text books:

1. Introductory Mining Engg: Harman, John Wiley and sons; 2. EME-D.J Deshmukh

Reference Books:

1. Deep Mining-jack Spalding, mining publications;
2. Peele:"Mineral engineers hand book"Vol.I&II
2. U/G Mining Method-Hustrulid, society for mining, metallurgy & Exploration
3. Wood-roof S.C:"Methods of working coal and metal mines",Vol.III
4. Shevyaov:"Mining and mineral deposits". 5. Popov:"Working of mineral deposits".

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IV Year - I Semester

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ROCK MECHANICS & GROUND CONTROL

Course objectives: The geotechnical engineering studies will provide an understanding for the assessment of Rock mass characterization based on Rock mass properties. Provides Knowledge of stress and stress regime along the mine openings, methods of stress measurement, stress regime, induced stresses, failure modes, propagation of failures in the rock due to dynamic loading.

UNIT - I

Historical Development: Definition, scope and development of the science of Rock Mechanics. Analysis of stress and strain in three dimensions, principal stress, stress ellipsoid and stress directors surface; Determination of principal stresses, stress invariants Determination of maximum shearing stress, Octahedral stresses Homogeneous deformation Strain at a point principal axes of strains Differential equations of equilibrium. Compatibility equation of stains Compatibility equation in terms of stress components, stress function.

UNIT – II

Geo-Engineering Studies:- Under ground geo-technical mapping. Phaysico – mechanical properties and strength indices of rock and their determination: density, Tensile Compressive and shear strength Young's modulus, Poisson's ratio Impact strength and protodya Konov's strength index, point load index, Rock quality designation (RQD); Slack durability index. Rock mass rating (RMR) Cavability index Brinnels hardness and contact strengths.

UNIT – III

Rock Behavior: Confining pressures, effect of water, time temperature In-situ stresses and their estimation, Horizontal stress and vertical stress, Intact rock strength and defomability; measuring devices Load, stress, strain Dynamic loading of rocks.Determination of the principal stresses – Moire method Engineering classification of rocks. Theories of failure of rock and their applications.

UNIT –IV

Definition and concept of ground control in mines, ground control practices in mines. Constraints on ground control design, characteristics' of coal measures strata. Pre mining stresses. Theories of mechanics of strata behavior. stress concentration around underground openings, strata monitoring.

UNIT – V

Roof supports: timber and steel supports, friction and hydraulic prop arches, shorcret, roof truss, roof bolts, powered supports, stowing caving strip packing pump packing rock reinforcement. Design of structures and rock, design of underground openings, design of pillars, design of open pit slopes, waste dumps and embankments. Design of stopes.

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UNIT – VI

Subsidence: theories of subsidence, factors affecting subsidence, prediction and measurement of subsidence. Damage and prevention of damage due to subsidence. Rock bursts and Bumps –causes ,occurrence and control.

Course Outcomes:

The student is familiar with the principles of rock engineering, knowledge of stress regime, measurement for in-situ stress, rock mass classification systems, support analysis and design. Concepts on ground control practices in mines will be useful during design of open cast slopes, underground excavations including shafts, waste dump design, embankments and other rock engineering structures

Text Books:

1. Rock Mechanics & Ground control by Dr. B.S. Verma
2. Rock Mechanics by Obert & Dual , US bureau of Mines
3. Society of Mining Engineers, volumes, SME, Colorado.
4. Coal Mine & ground control byS. Peng

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IV Year - I Semester

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MINE LEGISLATION & GENERAL SAFETY

Course Objectives:

It is very important to all mining engineering students because, it provides an insight to various laws, rules and Acts related to Mines Safety and mining legislation. A separate paper on the above subject is one of the requirements for the DGMS certification for qualifying in the exam of Mines Manager.

UNIT - I

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

UNIT - II

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

UNIT - III

Indian Electricity rule, Mine rescue rule, industrial dispute Act.

UNIT - IV

V-T rules, Pit Head Bath Rules, DGMS circular.

UNIT - V

Coal mines regulations and metalliferous mines regulations

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UNIT - VI

Introduction to rescue rules, vocational training rules, maternity benefit act and rules. Causes & Classification of Accidents, accidents statistics, Accidents investigation & Reports.

Course Outcome:

The student will be benefitted with this course paper as it covers all the mining legislation and statutory Ruls, Acts and amendments made from time to time. This paper is one of the qualifying papers for DGMS exams.

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

IV Year - I Semester

L	T	P	C
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ROCK SLOPE ENGINEERING

(Elective-I)

Course Objectives:

To introduce the basic mechanics of rock slope failures To learn the types of rock failure and its influencing parameters

UNIT BASIC MECHANICS OF ROCK SLOPE FAILURE

Rock slope economics; continuum mechanics approach to slope stability; slope parameters; effect of water pressure; factor of safety of slopes; slope height vs slope angle; design of slopes.

UNIT II GEOLOGICAL AND ROCK STRENGTH PROPERTIES

Geological parameters affecting slope stability; graphical representation of geological data; plotting and analysis of field measurements; physico-mechanical properties affecting slope stability, shearing on incline plane, determination of shear strength of rock and rock discontinuities; Ground water flow in rock masses; field measurement of permeability; measurement of water pressure.

UNIT III PLANE FAILURE

Plane failure analysis; graphical analysis of stability; influence of ground water on stability; influence of tension crack; analysis of failure on a rough plane; rock reinforcement of slopes;

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UNIT IV WEDGE FAILURE

Analysis of wedge failure; wedge analysis including cohesion and water pressure; Wedge stability charts for friction only; case studies. Numerical problems.

UNIT V CIRCULAR AND TOPPLING FAILURE

Conditions for circular failure; derivation of circular failure analysis; effect of ground water; circular failure charts; Bishop's and Janbu's methods of failure analysis; case studies. Types of toppling failure; secondary toppling modes; analysis of toppling failure; limit equilibrium analysis of toppling failures; Influence of slope curvature on stability; slope depressurisation; protection of slopes; control of rock falls; measurement and monitoring and interpretation of slope displacements. Numerical problems.

UNIT VI ROCK SLOPE FAILURE MONITORING AND SLOPE STABILIZATION

Types of slope movement, Surface and Sub-surface monitoring methods inclusing instrumentation and techniques & Guidelines for monitoring programs. Causes of rock falls; Rock slope stabilization programs – stabilization by rock reinforcement & rock removal; protection measures against rock falls.

Course Outcome:

The students will know the fundamental mechanics of rock slope failure, types of failure and its influencing parameters

TEXT BOOKS:

1. Hoek, E and Bray, J.W., Rock Slope Engineering, Institution of Mining and Metallurgy, 1991.
2. Goodman, R.E., Rock Mechanics, John Wiley and Sons, 1989.
3. Singh, R.N. and Ghose, A.K., Engineered Rock Structures in Mining and Civil Construction, A.A. Balkema, Netherlands, 2006.

REFERENCE BOOKS

1. Duncan C. Wylie and Chris Mah, Rock Slope Engineering, 4th Edition, 4th Edition, CRC Press, 456p, 2004.
2. John Read and Peter Stacey, Guidelines for Open Pit Slope Design, 1st Edition, CRC Press, 510p, 2009.
3. William A. Hustrulid (Ed), Michael K. McCarter (Ed) and Dirk J. A. Van Zyl (Ed), Slope stability in Surface Mining, Society for Mining, Metallurgy, and Exploration, 442p, 2001.
4. John Jaeger, N. G. Cook and Robert Zimmerman, Fundamentals of Rock Mechanics, 4th Edition, Wiley-Blackwell; 4 edition, 488p, 2007.

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MINE SUBSIDENCE ENGINEERING

Course Objectives:

The mine subsidence is a common phenomena in any underground coal mining operations. The subsidence prediction, causes and analysis and preventive measures to be taken form an important role in coal mining operations. The subsidence impact on surface structures, governing laws to subsidence control, instrumentation and monitoring techniques and to minimize such effects need to be emphasized.

UNIT-I

Introduction: strata movement at the mining horizon, convergence in mine working, factors influencing convergence in mine working. subsidence mechanism; Zones of movement in the ovelying beds, veritical and horizontal movements, subsidence trough, angle of draw, angle of break sub-surface subsidence.

UNIT-II

subsidence prediction: different methods of surface subsidence prediction - graphical, analytical, profile function, empirical and theoretical models.

UNIT-III

Time influence and impact on structures: Influence of item on subsidence, example from long wall and bord and pillar working.

UNIT -IV

Mining damage to building, industrial installations, railway lines, pipes cannels, etc.,

UNIT-V

calculation of ground movement over time. types of stress on structures stress-strain behavior of soils. Different standards suggested for mining and ground in respect of subsidence.

UNIT-VI

Time influence and impact on structures: influence of item on subsidence, examplr from long wall and board and pillar working.

Course Outcome:

The subsidence of mined out areas. The mechanism of failure of strata after creating the voids and filling the mine voids with different materials need to be addressed to monitor the ground movement.

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TEXT BOOKS:

1. Kratzsch, H.Mining susnsidence Engineering, Sringer vertag publications, Berlin,1983

2. Whittakerm B.N. and Raddish, D.J.Subsudebce, occurrence, prediction and contol Elsvier publication amsterdam, 1989.

3. Brauner, G.Subsidence due to underground Mining, Part I & II and III U.S. Department of Interior, Bureau of Mines, 1973

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ROCK FRAGMENTATION ENGINEERING

Course Objectives:

To introduce the theory of rock breaking, and its applications by using various types of rock drilling and lasting methods> The parameters required for proper drilling and blasting including controlled blasting techniques are necessary for rock excavation and design.

UNIT- I

General theory of rock cutting, Selection of cutting tools for optimum penetration and wear characteristics.

UNIT-II

Mechanics of rotary, percussive and rotary - percussive drilling, short and long hole drilling equipment, different types of bits, bit wear, drilling in difficult formations, drillibality of rocks, drilling performance and costs.

UNIT-III

Mechanism of Rock breaking machines, pneumatic and Hydraulic rock hammers. Mechanics of rock fragmentation and fracture by explosive action, explosives. .

UNIT-IV

Blasting accessories, blasting parameters, design of blasting rounds for opencast and underground mines, blastability of rocks, blasting efficiency, mean fragment size.

UNIT- V

Computational models of blasting; transient ground motion, misfires, blown out shots, incomplete detonation - their causes and remedial measures.

UNIT- VI

Controlled blasting techniques, perimeter blasting, safety precautions, ground vibrations and air over pressure from blasting. Instrumentation in blasting, Borehole pressure transducer, V.O.D Probe, vibration monitor, high speed Video Camera. Impact of ground vibration and sound on the neighboring structures and communities, and mitigative measures.

Course Outcome:

The student will understand the basic techniques required for rock fragmentation. This require proper understanding of the mechanism required to fragment the rock, types of drilling and blasting practices involved for the proper design and excavation

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TEXTBOOKS

I. "Drilling & Blasting" Minetech by Pradhan G.K., Ghose A.K.

2. Advance in Drilling and Blasting by SASTRY V.R

Course outcome:

Upon completion of the subject, students will be able to

1. Apply the systems concept for the design of production and service systems;
2. Make forecasts in the manufacturing and service sectors using selected quantitative and qualitative techniques
3. Apply the principles and techniques for planning and control of the production and service systems to optimize/make best use of resources;
4. Understand the importance and function of inventory and to be able to apply selected techniques for its control and management under dependent and independent demand circumstances.

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IV Year - I Semester

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DEEP SEA MINING
(ELECTIVE –II)

Course objectives: A part from land mineral resources, the oceans also contains valuable minerals wealth such as petroleum, natural gas, manganese and other sulphide minerals. Knowledge of mining of shallow and deep sea mineral resources required good understanding of the nature of continental shelf, slope ad sea floor, ad mining conditions. The mining of minerals from sea, is totally a different technology and required special excavation and extraction equipment. the production of oil and natural gas from off-shore areas needs more sophisticated technologies for exploration and oil field development

UNIT - I

Introduction to Marine environment. Characteristics of the ocean floor.

UNIT - II

Profile of the sea. Shelf, slope and rise Nature of the deposits of environments.

UNIT - III

Exploration and characterization of inland water. Mineralogical studies of marine sediments and continental slope. Continental shelf and deep sea bed mineral resources. Exploration systems of dissolved and un dissolved mineral deposits;

UNIT - IV

Off shore exploration of oil and gas and sub sea systems.

UNIT - V

Deep sea bed Mining . Wells and algae for extraction of minerals, Economic & Technologies.

UNIT - VI

Environmental impact of ocean mining. Law of the sea, legal considerations in ocean mining.

Course outcome: the new technologies for the extraction of oil and gas production, developments in marine technologies for the extraction of deep seated minerals and future

Suggested Text books:

1. Hartman HL “Introductory Mining Engg” Willey Eastern.
2. Issues of “MARINE MINING” Manjula R.Shyam “Metals fom sea bed Prospects of mining poly matallic nodules of India “Oxfod & IBH”.

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MINE CONSTRUCTION ENGINEERING

Course Objectives:

Mine construction involves various aspects of selection criteria starting from site selection, design of underground structures , access to different working areas, development of stoping/ mining methods, and the ultimate goal of extraction and bringing the mineral from the underground to the surface.

UNIT I

Size of mine. Environment and ecology, selection criterial for site of the openings geological investigations. Under ground mine shaft sinking methods through alluvium, soft and had rock,

UNIT II

Mechanization; consolidation of loose ground shaft lining; ground pressure, thickness of lining, design and procedure of laying the lining. Construction of shaft collar heap stead.

UNIT III

Design and construction of insets; shaft bottom, excavation for mechanized decking of cages; skip loading, pit bottom lay outs, installation of main haulages. Main sump size, construction under ground substation; first aid room and office.

UNIT IV

Surface inclines; drivage through soft and hard rock, construction of portals and lining of inclines, literal and vertical pressures. Underground developments, drivage of roads in stone and coal, mechazation support systems opening of faces. Surface layouts pit top circuits and coal handling and coal preparation plant, railway siding and weigh bridges, surface and underground coal bunkers winding house substation, lamp room.

UNIT V

Pit head bath, crèche dispensary: office, work-shop; material handling. Stowing installation, bunkers, water tanks, mixing chamber.

UNIT VI

Open pit mines opening out trenches, haul roads, construction of benches. Assembling and transporting of draglines, shovels etc. Scheduling for mine constructions PERT/CPM.

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Course Outcome:

The students have the opportunity to learn understand different stages of operations involved during the development stages of the underground mine structures in order to optimize the recovery of the ore/ mineral obtained from underground mining methods.

Suggested Text books:

1. Pazdziora J. “Design of Underground hard coal mine”.
2. Popov “Working of Mineral Deposits”.
3. Bokey “Mining”
4. “Rzhevsky Unit operations in open cast mines”

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TUNNELING ENGINEERING

Course Objectives:

Tunnel engineering is widely applied technology during construction of the underground openings in different strata conditions. Geology and geotechnical properties of rock mass plays vital role in governing the tunnel geometry. The rock mass behavior , size of the excavation, sequencing, drilling and blasting parameters play a major role in tunnel construction.

UNIT-I

Introduction to tunneling geological concept of tunneling.Influence of geological aspects on design and construction of tunnels.

UNIT-II

Tunneling mehtods: soft ground, drill and blast, roadways drivage machines, tunnel boring machine (TBM).Stress and displacements associated with excavating tunnels, ground control or treatment in tunneling and drivages.

UNIT-III

Design of support in tunnels steel supports, rock enforcements, new australian tunneling mehtods (NATAM)

UNIT-IV

Design of tunnel rock condition RMR,Q-system, RSR, Rock mass behavior, stress strain behavior, and stress analysis of tunnels.

UNIT-V

Maintenance: Dewatering, ventilation and illumination of drivages and tunnels.

UNIT-VI

numerical techniques, introductory use of FLAC,PLAXIS etc.

Course Outcome:

The concept of design of tunnels and rock excavation, rock mass response during excavation process, rock-support interaction, support design, construction of supports, the effectiveness of support systems and related aspects of safety and maintenance of tunnels will provide a better understanding during construction of tunnels.

TEXT BOOKS:

1. Tunnel Engineering - Hand book - Thomas R.Kuesel,Eleyn H.King,

2. Harbor, Dock and Tunnel Engineering - by R.Srinivasam

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IV Year - I Semester

L	T	P	C
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IPR & PATENTS

Objectives:

***To know the importance of Intellectual property rights, which plays a vital role in advanced Technical and Scientific disciplines.**

***Imparting IPR protections and regulations for further advancement, so that the students can familiarize with the latest developments.**

Unit I: Introduction to Intellectual Property Rights (IPR)

Concept of Property - Introduction to IPR – International Instruments and IPR - WIPO - TRIPS – WTO -Laws Relating to IPR - IPR Tool Kit - Protection and Regulation - Copyrights and Neighboring Rights – Industrial Property – Patents - Agencies for IPR Registration – Traditional Knowledge –Emerging Areas of IPR - Layout Designs and Integrated Circuits – Use and Misuse of Intellectual Property Rights.

Unit II: Copyrights and Neighboring Rights

Introduction to Copyrights – Principles of Copyright Protection – Law Relating to Copyrights - Subject Matters of Copyright – Copyright Ownership – Transfer and Duration – Right to Prepare Derivative Works –Rights of Distribution – Rights of Performers – Copyright Registration – Limitations – Infringement of Copyright – Relief and Remedy – Case Law - Semiconductor Chip Protection Act.

UNIT III: Patents

Introduction to Patents - Laws Relating to Patents in India – Patent Requirements – Product Patent and Process Patent - Patent Search - Patent Registration and Granting of Patent - Exclusive Rights – Limitations - Ownership and Transfer — Revocation of Patent – Patent Appellate Board - Infringement of Patent – Compulsory Licensing — Patent Cooperation Treaty – New developments in Patents – Software Protection and Computer related Innovations.

UNIT IV: Trademarks

Introduction to Trademarks – Laws Relating to Trademarks – Functions of Trademark – Distinction between Trademark and Property Mark – Marks Covered under Trademark Law - Trade Mark Registration – Trade Mark Maintenance – Transfer of rights - Deceptive Similarities - Likelihood of Confusion - Dilution of Ownership – Trademarks Claims and Infringement – Remedies – Passing Off Action.

UNIT V: Trade Secrets

Introduction to Trade Secrets – General Principles - Laws Relating to Trade Secrets - Maintaining Trade Secret – Physical Security – Employee Access Limitation – Employee Confidentiality Agreements – Breach of Contract –Law of Unfair Competition – Trade Secret Litigation – Applying State Law.

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UNIT VI: Cyber Law and Cyber Crime

Introduction to Cyber Law – Information Technology Act 2000 - Protection of Online and Computer Transactions - E-commerce - Data Security – Authentication and Confidentiality - Privacy - Digital Signatures – Certifying Authorities - Cyber Crimes - Prevention and Punishment – Liability of Network Providers.

- Relevant Cases Shall be dealt where ever necessary.

Outcome:

*** IPR Laws and patents pave the way for innovative ideas which are instrumental for inventions to seek Patents.**

***Student get an insight on Copyrights, Patents and Software patents which are instrumental for further advancements.**

References:

1. Intellectual Property Rights (Patents & Cyber Law), Dr. A. Srinivas. Oxford University Press, New Delhi.
2. Deborah E.Bouchoux: Intellectual Property, Cengage Learning, New Delhi.
3. PrabhuddhaGanguli: Intellectual Property Rights, Tata Mc-Graw –Hill, New Delhi
4. Richard Stim: Intellectual Property, Cengage Learning, New Delhi.
5. Kompal Bansal &Parishit Bansal Fundamentals of IPR for Engineers, B. S. Publications (Press).
6. Cyber Law - Texts & Cases, South-Western's Special Topics Collections.
7. R.Radha Krishnan, S.Balasubramanian: Intellectual Property Rights, Excel Books. New Delhi.
8. M.Ashok Kumar and MohdIqbal Ali: Intellectual Property Rights, Serials Pub.

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IV Year - I Semester

L	T	P	C
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COMPUTER APPLICATION IN MINING LABORATORY

Course Objectives:

Providing basic introduction on CAD applications, with reference to generation of basic CAD drawings for mine planning. Different types of drawing commands, editing, query based commands, for the preparation of CAD graphics.

Part-A

1. Learning of the following commands using a CAD package.
2. Drawing Commands: Line, arc, circle; polygon, Donut, Solid, Spline Pline, Text, M Line, ellipse, dimensioning, object snaps point, Hatch, layers, Units.
3. Editing Commands: Limits, Erase, Array, Copy, Move, Offset, Stretch, Pedit, change properties, Trim, Extend, Fillet, Chamfer, Break, Mirror, Scale, Rotate, Zoom, Pan. Enquiry Commands: Id, list, Dist, Area, DB list, Status Selection sets i.e. window, crossing, fence, W polygon. Plotting.

Part·B

8 exercises (mining drawing) using any of the above commands.

Course Outcome:

The students will be provided with exposure on CAD graphics, to demonstrate these abilities in the form of CAD mine drawings.

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IV Year - I Semester

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ROCK MECHANICS & GROUND CONTROL LAB

Course Objectives:

To introduce the basic concepts of determining the physic-mechanical properties of rocks and rock masses. Determination of various rock mass properties such as uniaxial compressive strength, tensile strength, impact, slake durability and shear strength properties for rock and soil.

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) Apparatus.
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 Mohr's circle.
9. Determination of Angle of Internal Friction.
10. Determination of Shear strength of Rock Sample or Soil.

Course Outcome:

Practical determination of different types of equipment for testing the rock strength and other material properties in the Rock testing laboratory. To provide hands on experience in handling different types of rock testing equipments.

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IV Year - II Semester

L	T	P	C
4	0	0	3

PRODUCTION PLANNING AND CONTROL

Course objectives:

This subject provides students with

1. An understanding of the concepts of production and service systems;
2. The ability to apply principles and techniques in the design, planning and control of these systems to optimise/make best use of resources in achieving their objectives.
3. Identify different strategies employed in manufacturing and service industries to plan production and control inventory.
4. Measure the effectiveness, identify likely areas for improvement,develop and implement improved planning and control methods for production systems.

UNIT – I

Introduction: Definition – objectives and functions of production planning and control – elements of production control – types of production – organization of production planning and control department – internal organization of department.

UNIT – II

Forecasting – importance of forecasting – types of forecasting, their uses – general principles of forecasting – forecasting techniques – qualitative methods and quantitive methods.

UNIT – III

Inventory management – functions of inventories – relevant inventory costs – ABC analysis – VED analysis – EOQ model – Inventory control systems – P–Systems and Q-Systems
Introduction to MRP I, MRP II, ERP, LOB (Line of Balance), JIT and KANBAN system.

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UNIT – IV

Routing – definition – routing procedure –route sheets – bill of material – factors affecting routing procedure, schedule –definition – difference with loading

UNIT – V

Scheduling policies – techniques, standard scheduling methods. Line Balancing, aggregate planning, chase planning, expediting, controlling aspects.

UNIT – VI

Dispatching – activities of dispatcher – dispatching procedure – follow up – definition – reason for existence of functions – types of follow up, applications of computer in production planning and control.

TEXT BOOKS:

1. Elements of Production Planning and Control / Samuel Eilon/Universal Book Corp.
2. Manufacturing, Planning and Control/Partik Jonsson Stig-Arne Mattsson/TataMcGrawHill

REFERENCES:

1. Inventory Control Theory and Practice / Martin K. Starr and David W. Miller/Prentice-Hall
2. Production Planning and Control/Mukhopadyay/PHI.
3. Production Control A Quantitative Approach / John E. Biegel/Prentice-Hall
4. Production Control / Franklin G Moore & Ronald Jablonski/ Mc-GrawHill
5. Production and Operations Management/Shailendra Kale/McGraw Hill
6. Production and Operations Management/Ajay K Garg/McGraw Hill

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IV Year - II Semester

L	T	P	C
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MINE ECONOMICS AND INVESTMENT

Course objectives:

Study of estimation and valuation of mineral deposits, Study of project appraisal and Study of finance and accounting

UNIT I INTRODUCTION

Mineral industry and its role in national economy; world and national mineral resources; Mining - A unique investment environment; special risk factors in mine investment and evaluation; national mineral policy.

UNIT II ORE RESERVE ESTIMATION

Methods of sampling, sampling frequency; analysis of sampling data, estimation of reserves, introduction to geo-statistica l methods, classification of reserves.

UNIT III MINE VALUATION

Time value of money; annuity; redemption of capital, net present value; depletion allowance; depreciation; inflation; escalation; rates of return; Hoskold's Two rate method;

UNIT IV ECONOMIC EVAULATION

capital and operating cost including wages, incentives, material, etc.; assets; liabilities; cash flows and discounted cash flow; profitability index – their implications in mine economic evaluation.

UNIT V PROJECT APPRAISAL

Methods of project evaluation – pay back, annual value, benefit/cost ratio, ERR and IRR, etc., evaluation of exploratory mining areas and operating mines; mine project financing, its risks and constraints; mine taxation; critical impact of depreciation, depletion, type of funding, reserves, life, etc. on mine profitability.

UNIT VI FINANCE AND ACCOUNTING

Sources of mine funds – shares, debentures, fixed deposit, sinking fund, capital gearing, P & L account, balance sheet, typical case studies of mine feasibility. Cost estimation of individual mining operations and overall mining cost, cost control methods.

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Course Outcome:

The students will have knowledge on estimation and valuation of mineral deposits. They will possess about project appraisal, finance and accounting.

TEXTBOOKS:

1 Deshmukh, R.T., Mineral and Mine Economics, Mira Publications, Nagpur, 1986.

2 Arogyaswamy, R.N.P. Courses in Mining Geology, Oxford and IBH Publishing Co., 1994.

REFERENCES

1 Sloan, D.A., Mine Management, Chapman and Hall, London, 1983.
2 Chatterjee, K.K., Mineral economics, Wiley Eastern, 1992.
3 Park, R.J., Examination and Valuation of mineral property
4 How to read a balance sheet ILO 1992.

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IV Year - II Semester

L	T	P	C
4	0	0	3

MINE HEALTH AND SAFETY ENGINEERING

Course Objectives: Mine health and safety engineering is very important area which will address the different aspects of mine health and safety related problems. In any mine, the safety of men and material is very important along with production of mineral. Mining is considered as a hazardous profession which involves, occupational diseases during prolonged exposure to work environment. Safety of the work men is considered to be of paramount importance.

UNIT I

Mine accidents, types of accidents, roof fall accidents.

UNIT II

Planning for safety, Safety analysis, Safety prevention and precautions.

UNIT III

Information system and safety audits.

UNIT IV

Hazard control- engineering approach, systems approach, Hazard analysis.

UNIT V

Safety management, Economics of safety and cost- effectiveness.

UNIT VI

Occupational hygiene, occupational diseases, Occupational hazards in mines.

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Course outcome:

The students will have the opportunity to understand and analyze the envisaged problems related to safety aspects and mine health related problems. The statutory provisions related to mine safety and health related problems will help in competing the examinations organized by the Director General of Mines Safety.

TEXT BOOKS:

1. ridley,J & C Channing: Safety at work: Butter worth- Heinemaan. Oxford,2001.
2. Rodgers. W.P: Introduction of system safety Engineering: John Wiley &Sons Inc., NewYork, 1971.
3. Greem A R; Safety in Mines Reserch : A,R. Balkena, Rotterdam,1985.

IV Year - II Semester

L	T	P	C
4	0	0	3

PLANNING OF UNDERGROUND METAL MINNING PROJECT

(ELECTIVE-III)

Course Objectives:

The objective is to introduce the basic concepts and principles of underground metal mining methods and practices. The planning of different methods for stoping for the exploitation of ores, strata control problems followed by discussions on some case studies to enhance the understanding of these methodologies for mine planning process.

UNIT I: Planning and scheduling of insets, shaft bottoms. Winding and transport system.

UNIT II: Surface layouts including mill and consentrator plants.

UNIT III: Determination of number and dimentions of stops.

UNIT IV: Planning and scheduling of a cycle of operations.

UNIT V: Concept of Ore blending. Overall planning and scheduling of activities in metal mining and processing.

UNIT VI: Case studies of planning of Mining operations.

Course outcome:

The concept of mine planning process is required for the student for developing underground metal mining project. The discussions on case studies on different mining methods will help in understanding that what types of stoping methods can be adopted to different types of mineral deposits.

Text Book:

1.Agoshkov M.,et al., Mining of ores and non metallic minerals, Mir publishers, Moscow.

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PLANNING OF UNDERGROUND COAL MINNING PROJECT

Course Objectives: The planning of underground coal mining is to introduce the coal mining conditions, strata control problems during conducting mining operations. The design concepts, different mining methods involved for the extraction of thick and thin seam mining for coal and maintaining safe working conditions during the mining of coal have been covered.

UNIT-I

Objective and stages of planning, project report.

UNIT-II

Determination of mine parameters, planning of exploitations by Board and pillar and longwell mining.

UNIT-III

Selection of face and underground transport equipment

UNIT-IV

Exploitation of thick coal seams. Planning and design layouts for ventilation, drainage and power ventilation management.

UNIT-V

Productivity and quality control, planning of deep underground coal mines.

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UNIT-VI

Automation in underground coal mines, coal seams gas 9CGS). Coal bed methane (CBM), Gobal energy scenario.

Course Outcome:

The course will provide an insight into the problem of working the coal seams having weak strata conditions. Therefore, the planning and design is an important component in the extraction process. Different methods of coal mining, advantages and disadvantages need to be analysed and logical application of choice of mining methods can be evaluated.

TEXT BOOKS:

1. Longwall mining by Peng.S.S

2. Coal Mining by S.P..Mathur.lhk

PLANNING OF SURFACE MINING PROJECT

Course Objectives: The basic objective is to introduce the entire concept of Planning of the surface mining operations in which the entire phasing and sequencing of equipment planning, selection components are discussed for the optimization of the production and increasing the production cycle coupled with financial analysis.

UNIT I

preliminary investigations, Stages of planning. Feasibility Report, Planning Inputs, Monitoring of Projects.

UNIT II

Estimation of mine life. Open pit Slope angels, Ultimate pit limit, Interrelation and planning of unit operations.

UNIT III

Transport and dumping systems, Ore blending, Equipment selection.

UNIT IV

design of haul roads, Extraction methods for beach and deposits.

UNIT V

Mining of developed coal seams.

UNIT VI

Selective mining Estimation of profitability, Productivity and quality control, Surface Mining of Tar sands.

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Course Outcome:

The basic concept is to introduce the basic concepts of mine planning, different components involved, selection of proper types of equipment for improving the productivity in surface mining operations, optimization of production capacities in surface mining operations covering different types of mineral deposits.

Text Books:

1. Open Cast Mining Unit Operations by Rzhevsky, V.V., Mir publishers.

2. Opencast Mining Technology and Integrated Mechnizations by Rzhevsky, V.V., Mir publishers.

IV Year - II Semester

L	T	P	C
0	3	0	2

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IV Year - II Semester

L	T	P	C
0	0	0	10

PROJECT WORK

Objectives:

The aim of the course is to make the student perform a comprehensive project work that involves either or all of the following: optimum design of a mechanical component or an assembly, thermal analysis, computer aided design & analysis, cost effective manufacturing process, material selection, testing procedures or fabrication of components and prepare a detailed technical thesis report. The completed task should also take into account the significance of real time applications, energy management and the environmental affects.

Outcomes:

After completing the project work the student should learn the technical procedure of planning, scheduling and realizing an engineering product and further acquire the skills of technical report writing and data collection.

Course content:

The student should work in groups to achieve the aforementioned objectives and the outcomes.

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