ENVIRONMENTAL STUDIES

Objectives:
- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations.

UNIT-I:
Ecosystems: Definition, Scope and Importance of ecosystem. Classification, structure and function of an ecosystem. Food chains, food webs and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II:
Natural Resources: Classification of Resources: Living and Non-Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable and non renewable energy sources, use of alternate energy source, case studies.

UNIT-III:
Biodiversity And Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity; habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV:

UNIT-V:

SUGGESTED TEXT BOOKS:
1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

Outcomes:
Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.
OBJECTIVES: To learn

- Understand a random variable that describes randomness or an uncertainty in certain realistic situations. It can be of either discrete or continuous type.
- In the discrete case, study of the binomial and the Poisson random variables and the Normal random variable for the continuous case predominantly describe important probability distributions. Important statistical properties for these random variables provide very good insight and are essential for industrial applications.
- Most of the random situations are described as functions of many single random variables. In this unit, the objective is to learn functions of many random variables through joint distributions.
- The types of sampling, sampling distribution of means, sampling distribution of variance, estimations of statistical parameters, testing of hypothesis of few unknown statistical parameters.
- The mechanism of queuing system, the characteristics of queue, the mean arrival and service rates.
- The expected queue length, the waiting line.
- The random processes, the classification of random processes, Markov chain, classification of states.
- Stochastic matrix (transition probability matrix), limiting probabilities, applications of Markov chains.

UNIT I

UNIT II
Multiple Random variables, Correlation & Regression: Joint probability distributions - Joint probability mass/density function, marginal probability mass/density functions. Covariance of two random variables, correlation - coefficient of correlation, the rank correlation. Regression - regression coefficient, the lines of regression and multiple correlation & regression.

UNIT III
Sampling Distributions and Testing of Hypothesis
Sampling: Definitions of population, sampling, statistic, parameter. Types of sampling, expected values of sample mean and variance, sampling distribution, standard error, sampling distribution of means and sampling distribution of variance.
Parameter estimations – likelihood estimate, interval estimations.
Testing of hypothesis: Null hypothesis, alternative hypothesis, type I, type II errors - critical region, confidence interval, level of significance. One sided test, two sided test.
Large sample tests:
(i) Test of equality of means of two samples equality of sample mean and population mean (cases of known variance & unknown variance, equal and unequal variances).
(ii) Test of significance of difference between sample S.D and population S.D.
(iii) Tests of significance difference between sample proportion and population proportion & difference between two sample proportions.
Small sample tests:
Student t-distribution, its properties; Test of significance difference between sample mean and population mean; difference between means of two small samples.
Snedecor’s F-distribution and its properties; Test of equality of two population variances.
Chi-square distribution, its properties; Chi-square test of goodness of fit.

UNIT IV
Queuing Theory: Structure of a queuing system, operating characteristics of queuing system, transient and steady states, terminology of queuing systems. Arrival and service processes - pure birth-death process. Deterministic queuing models - M/M/1 model of infinite queue, M/M/1 model of finite queue.

UNIT V
Stochastic processes: Introduction to Stochastic Processes – classification of random processes, methods of description of random processes, stationary and non-stationary random process, average values of single
random process and two or more random processes. Markov process, Markov chain, classification of states –
Examples of Markov Chains, Stochastic Matrix.

TEXT BOOKS:
1) Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers
2) Probability and Statistics for Engineers and Scientists by Sheldon M. Ross, Academic Press
3) Operations Research by S.D. Sarma,

REFERENCE BOOKS:

Outcomes:
- Students would be able to identify distribution in certain realistic situation. It is mainly useful for circuit as well as non-circuit branches of engineering. Also able to differentiate among many random variable involved in the probability models. It is quite useful for all branches of engineering.
- The student would be able to calculate mean and proportions (small and large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations. It is mainly useful for non-circuit branches of engineering.
- The students would be able to find the expected queue length, the ideal time, the traffic intensity and the waiting time. These are very useful tools in many engineering and data management problems in the industry. It is useful for all branches of engineering.
- The student would be able to understand about the random process, Markov process and Markov chains which are essentially models of many time dependent processes such as signals in communications, time series analysis, queuing systems. The student would be able to find the limiting probabilities and the probabilities in n\textsuperscript{th} state. It is quite useful for all branches of engineering.
ELEMENTS OF ELECTRICAL AND ELECTRONICS ENGINEERING

UNIT – I:
Electrical Circuits: Basic definitions, Types of elements, Ohm’s Law, Resistive networks, Kirchhoff’s Laws, Inductive networks, capacitive networks, Series, Parallel circuits and Star-delta and delta-star transformations.

UNIT – II:

UNIT – III:
Instruments: Basic Principle of indicating instruments – permanent magnet moving coil and moving iron instruments.

UNIT – IV:
Diode and it’s Characteristics: P-n junction diode, symbol, V-I Characteristics, Diode Applications, Rectifiers – Half wave, Full wave and Bridge rectifiers (simple Problems)
Transistors: PNP and NPN Junction transistor, Transistor as an amplifier, SCR characteristics and applications

UNIT – V:

TEXT BOOKS:
2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.

REFERENCE BOOKS:
Unit-I
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. 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-II
Belt, Rope and Chain Drives: 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.

Unit-III
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.

Unit-IV
IC Engines: IC Engine components and basic engine nomenclature, classification of IC Engines, otto cycle, diesel cycle, two stroke and four stoke cycle spark ignition and compression ignition engines. Application of IC Engines study of fuel supply systems in SI and CI Engines, study of fuel ignition, cooling and lubrication systems. Simple calculations of indicated power, brake power, mechanical efficiency, thermal efficiency and fuel consumption. Coal diesel, coal water, slurries as alternate fuels. Simple maintenance techniques.

Unit-V
Compressed air generation and applications. Types of air compressors, reciprocating and rotary compressors like roots blower, vane type, centrifugal, axial flow, screw type. Equation for kg of air compressed with and without clearance volume in a reciprocating air compressor, two stage air compressor with inter cooling, simple problems. Distribution of compressed air, application of compressed air, in Mining machinery, maintenance of compressed air, distribution systems.

TEXT BOOKS:
1. IC Engines by V. Ganesan
2. Theory Machines by Rattan.

REFERENCE BOOKS:
1. Turbomachines – Prof. Yahya.
2. Mining Technology (Vol- I & II) – Prof. D.J. Deshmukh
FUNDAMENTALS OF GEOLOGY

Objectives: To introduce fundamentals of geology to the student emphasizing the importance of mineralogy, structural geology, stratigraphy of earth. Course is also aimed at explanation of seismic zones, geology and mineral resources of India.

Unit-I
General Geology: origin, age, internal structure and composition of Earth. Landforms: Origin or mode of development, characteristic features and engineering considerations of landforms developed by Rivers, Wind, Glaciers, Oceans and Volcanoes.

Unit-II
Mineralogy: Physical properties, chemical composition and mode of occurrence of important rock-forming and ore-forming minerals. Petrology: Distinguish characteristic features, mode of formation and mode of occurrence of important igneous, sedimentary and metamorphic rocks.

Unit-III
Structural Geology: Strike and Dip, Fundamental types, characteristic features and mechanics of folds, faults, joints (fractures) and unconformities. Foliation and Lineation.

Unit-IV
Stratigraphy: Principles of stratigraphy, geological time scale, stratigraphic succession, description and mineral wealth of archeans, proterozoic basins, Gondwas, Deccan traps and Himalayas.

Unit-V

TEXT BOOKS:

REFERENCE BOOKS:

Outcomes: Mining engineering students are expected to know about the geology of the ground in which mining activity is proposed or in vogue. This course gives opportunity to get acquainted with the geological conditions of the ground and helps students to plan better and safer mining activities as an outcome of this course.
DEVELOPMENT OF MINERAL DEPOSITS

Objective: Course introduces underground and surface mining methods along with the associated activities such as drilling, blasting, supporting etc for mines. Modes of entry into the underground mines with special emphasis on various shaft sinking methods for development of mineral deposits are also described.

UNIT-I
Distribution of mineral deposits in India and other countries, mining contributions to civilization, mining terminology, stages in the life of the mine, introduction to underground and surface mining methods.

UNIT-II
Introduction to drilling and drilling equipment. Fundamentals of Explosive and blasting techniques.

UNIT-III
Objectives and limitations of mine supports, hydraulic props, Roof bolts, chock supports, Roadway support, face supports, side supports, junction supports, supports in special conditions, setting and withdrawal of supports, systematic supporting Rules.

UNIT-IV
Modes of entry into deposits for underground mining- shafts, inclines, adits etc – their fields of applications. Drivage of drifts, organization and cycle of operations, modern methods of drifting and tunneling, roadheaders, tunnel boring.

UNIT-V

TEXT BOOKS
1. Introductory mining engineering- Wiley India (P) Ltd, Howard L.Hartman, Jan M.Mutmansky
2. Elements of mining technology Vol-I - D.J. Deshmukh

REFERENCE BOOKS:
1. Roy Pijush Pal, Blasting in ground excavations and mines, Oxford and IBH, 1st ed 1993
2. C.P. Chugh, Drilling technology handbook, Oxford and IBH, 1st ed, 1977

Outcomes: Students can understand the fundamentals of drilling and blasting techniques for underground and opencast mines which can be put in practice later in the concerned mining industries. As deep underground mining is inevitable in near future, students must play an active role in participating in various activities like arrangement for sinking, ventilation, lighting etc.
ELECTRICAL AND ELECTRONICS ENGINEERING LAB

SECTION A: ELECTRICAL ENGINEERING:

1. Verification of KCL and KVL.
3. Speed control of DC motor.
4. Swinburne’s Test on DC shunt machine.
5. Brake test on DC shunt motor.
6. OC and SC tests on Single-phase transformer.
8. Regulation by an alternator by synchronous impedance method.

SECTION B: ELECTRONICS ENGINEERING:

1. PN Junction Diode Characteristics (Forward bias, Reverse bias)
2. Transistor CE Characteristics (Input and Output)
3. Study of CRO.
4. Class A Power Amplifier
5. Zener Diode Characteristics
6. Transistor CE Characteristics
7. Rectifier without Filters (Full wave & Half wave)
8. Rectifier with Filters (Full wave & half wave).

Note: Total 12 experiments are to be conducted.
(Six experiments from PART-A, Six experiments from PART-B)

GEOLOGY LAB

List of Experiments:

1. Identification and physical properties of impartment rock-forming and ore-forming minerals.
2. Identification and distinguish characteristics of important igneous, sedimentary and metamorphic rocks.
3. Determination of strike and dip of planar features by clinometer compass.
4. Study of models pertaining to folds, faults and unconformities.
5. Study and interpretation of Topographic Maps.
7. Study of Geomorphologic Map of India and Tectonic Map of India.
9. Vertical Electrical sounding Survey to determine depth to water table & bed rock.
10. Determination of unconfined compressive strength of important rocks.