JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

II Year B.Tech. Mining Engg. I-Sem	**L**	**T/P/D**	**C**
	4	**-/-/-**	**4**

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:

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary.

Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Problems and Global Efforts: C**limate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montréal Protocol.

UNIT-V:

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building, Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

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:

1. Environmental Science: towards a sustainable future by Richard T.Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M.Masters and Wendell P. Ela .2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B.Botkin & Edward A.Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

Outcomes:

Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which inturn helps in sustainable development

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PROBABILITY AND STATISTICS

Objectives: To learn

- Understand a random variable that describes randomness or an uncertainty in certain realistic situation. 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

Single Random variables and probability distributions: Random variables – Discrete and continuous. Probability distributions, mass function/ density function of a probability distribution . Mathematical Expectation, Moment about origin, Central moments Moment generating function of probability distribution.

Binomial, Poisson & normal distributions and their properties. Moment generating functions of the above three distributions, and hence finding the mean and variance.

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 varience, sampling distribution, Standard error, Sampling distribution of means and sampling distribution of varience.

Parameter estimations – likelihood estimate, interval estimations.

Testing of hypothesis: Null hypothesis, Alternate 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 varience & unknown varience, equal and unequal variances)
(ii) Tests 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 it's properties. Test of equality of two population variences

Chi-square distribution , it's 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:

1. Mathematics for Engineers by K.B.Datta and M.A S.Srinivas,Cengage Publications
2. Probability and Statistics by T.K.V.Iyengar & B.Krishna Gandhi Et
3. Fundamentals of Mathematical Statistics by S C Gupta and V.K.Kapoor
4. Probability and Statistics for Engineers and Scientists by Jay l.Devore.

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 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^{th} state. It is quite useful for all branches of engineering

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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.
DC Machines: Principle of operation of DC Generator – emf equation - types – DC motor types –torque equation – applications – three point starter.

UNIT – II:
Transformers : Principle of operation of single phase transformers – emf equation – losses – efficiency and regulation.
AC Machines : Principle of operation of alternators – regulation by synchronous impedance method – Principle of operation of induction motor – slip – torque characteristics – applications.

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 Chacracteristics, 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:
Cathode Ray Oscilloscope : Principles of CRT (Cathode Ray Tube), Deflection, Sensitivity, Electrostatic and Magnetic deflection, Applications of CRO - Voltage, Current and frequency measurements.

TEXT BOOKS:
1. Essentials of Electrical and Computer Engineering by David V. Kerns, JR. J. David Irwin/Pearson.
2. Principles of Electrical and Electronics Engineering by V.K.Mehta, S.Chand & Co.

REFERENCE BOOKS:
1. Introduction to Electrical Engineering – M.S Naidu and S. Kamakshaiah, TMH Publ.
2. Basic Electrical Engineering by Kothari and Nagarath, TMH Publications, 2nd Edition.

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MECHANICAL TECHNOLOGY

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.

Gear Trains: Introduction – 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.

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. Ganeshan
2. Theory Machines by Rattan.
3. Thermal Engineering – R.S. Khurmi & J.K. Gupta.

REFERENCE BOOKS:

1. Turbomachines – Prof. Yahya.
2. Mining Technology (Vol- I & II) – Prof. D.J. Deshmukh

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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, Gondwanas, Deccan traps and Himalayas.

Unit-V
Groundwater: Hydrological cycle, vertical distribution of groundwater. Types of aquifers, geological formations as aquifers, springs, engineering considerations of groundwater and groundwater exploration. Earthquakes: Mode of propagation of seismic energy, causes, effects and distribution of earthquakes, seismic Zoning Map of India. Geology and Mineral Resources of India.

TEXT BOOKS:

1. A Text Book of Geology by P.K. Mukherjee.

REFERENCE BOOKS:

1. Fundamentals of Engineering Geology by F.G. Bell (1982) Butterworth Publication.
2. Principles of Physical Geology by Arthur Holmes.

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.

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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
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, ventilation and lighting, temporary and permanent lining. Widening and deepening of shafts, special methods of shaft sinking **:** piling, caisson, freezing and cementation method of shaft sinking. Modern techniques of shaft sinking.

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 on active role in participating in various activities like arrangement for sinking, ventilation, lighting etc.

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ELECTRICAL AND ELECTRONICS ENGINEERING LAB

SECTION A: ELECTRICAL ENGINEERING:

1. Verification of KCL and KVL.
2. Magnetization characteristics of D.C. Shunt generator.
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.
7. Brake test on 3-phase Induction motor.
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)

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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 srike 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.
6. Study of Geological Maps of Andhra Pradesh & India.
7. Study of Geomorphologic Map of India and Tectonic Map of India.
8. Study of Seismotectonic Atlas of India.
9. Vertical Electrical sounding Survey to determine depth to water table & bed rock.
10. Determination of unconfined compressive strength of important rocks.