

**Mining Engineering, III-Semester**

**ES-3001 Energy, Environment, Ecology & Society**

**Unit –I**

**Energy-** Sources of Energy : Renewable & Non Renewable, Fossil fuel, Biomass Geothermal, Hydrogen, Solar, Wind, hydal, nuclear sources.

**Unit –II**

**Ecosystem** – Segments of Environment: Atmosphere, hydrosphere, Lithosphere, biosphere. Cycles in Ecosystem – Water, Carbon, Nitrogen. Biodiversity: Threats and conservation,

**Unit –III**

**Air Pollution & Sound Pollution -**

Air Pollution: Air pollutants, classification, (Primary & secondary Pollutants) Adverse effects of pollutants. Causes of Air pollution chemical, photochemical, Green house effect, ozone layer depletion, acid Rain.

Sound Pollution: Causes, controlling measures, measurement of sound pollution (deciblage), Industrial and non – industrial.

**Unit –IV**

**Water Pollution**– Water Pollution: Pollutants in water, adverse effects. Treatment of Domestic & Industrial water effluent.

**Soil Pollution** – Soil Profile, Pollutants in soil, their adverse effects, controlling measures.

**Unit –V**

**Society, Ethics & Human values**– Impact of waste on society. Solid waste management Nuclear, Thermal, Plastic, medical, Agriculture, domestic and e-waste). Ethics and moral values, ethical situations, objectives of ethics and its study . Preliminary studies regarding Environmental Protection Acts , introduction to value education, self exploration, sanyam & swasthya.

**References:**

1. Harris, CE, Prichard MS, Rabin's MJ, "Engineering Ethics"; Cengage Pub.
2. Rana SVS ; "Essentials of Ecology and Environment"; PHI Pub.
3. Raynold, GW "Ethics in information Technology"; Cengage.
4. Svakumar; Energy Environment & Ethics in society; TMH
5. AK De "Environmental Chemistry"; New Age Int. Publ.

- 6 BK Sharma, "Environmental Chemistry" ; Goel Publ. House.
7. Bala Krishnamoorthy; "Environmental management"; PHI
8. Gerard Kiely, "Environmental Engineering" ; TMH
9. Miller GT JR; living in the Environment Thomson/cengage
10. Cunningham WP and MA; principles of Environment Sc; TMH
11. Pandey, S.N. & Mishra, S.P. Environment & Ecology, 2011, Ane Books , Pvt. Ltd, New Delhi
12. Joseph, B. Environmental Studies, 2009 Tata Mcgraw Hill, Edu India Ltd. New Delhi.
13. Gour R.R, Sangal, R & Bagaria, G.P. , Excel Books, A-45, Naraina Phase-I New Delhi.-110028

Introduction Ventilation requirements in mines, natural ventilation and mechanical ventilation. Mine Gases Composition of atmospheric air. Mine gases - occurrences, properties, physiological effects, detection; sampling, analysis, monitoring. Methane layering, methane drainage. Radon and its daughter products - effects and control. Heat and Humidity Sources, effects and control of heat and humidity in mines. Cooling power of mine air – psychrometry, Kata thermometer, effective temperature. Air conditioning. Spot coolers. Airflow in Mine Workings Reynold's number, laminar and turbulent flow. Square law of mine ventilation. Frictional and shock losses. Equivalent orifice. Resistance in series and parallel. Ventilation control devices. Splitting of air current. Ventilation network analysis – conventional method and scope for computer application. Airborne Respirable Dust Definition – generation, physiological effects, sampling, measurement and control measures. Mine Illumination Flame safety lamp – construction, maintenance, gas testing. Cap lamps. Lamp room layout and organization. Underground lighting from mains. Illumination standards. Photometry. Illumination survey. Miners' Diseases

### **EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

### **References :**

1. Mishra, G.B. Mine Environment and Ventilation, Oxford University Press, 1992.
2. Hartman, H.L. Mine Ventilation and Air Conditioning, Wiley Interscience publication, 1993.
3. Hall, C.J., Mine Ventilation Engineering, Society of Mining Engineers, New Engineers, New York, Second Edition, 1992.
4. Vutukuri, V.S., Mine Environment Engineering, Trans Tech Publishers, 1986.
5. McPherson, M.J., Subsurface Ventilation and Environmental Engineering, Chapman and Hall Publication, London, 1993.

Distance Measurement Chains, tapes, electronic distance measurement, total station. Levelling Levels, reduced level, corrections for curvature and refraction, reciprocal levelling, contouring, tachemetry. Traversing Triangulation and Trilateration Theodolites, control point framework, baseline, satellite station, extension and double extension of base. Trilateration. Plane Table Surveying Methods, two and three point problems, errors. Curve Ranging Minor Instruments Planimeter, sextant, abney level, optical square. Computations Area and volume calculations. Theory of Errors Definitions, indices of precision and weights, correction and adjustment of measurements.

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Evaluation will be continuous an integral part of the class as well through external assessment.

### **References :**

1. Bannister, A. and Raymond. S., Surveying, ELBS, 6th Edition 1992.
2. Kennetkar, T.P. Surveying and Levelling, Vols. 1 and 2, United Book Corporation, Pune, 2010.
3. Punmia, B.C. Surveying, Vols. 1, 2 and 3, Laxmi Publications, 2010.

Status of Rock Mechanics Role and status of rock mechanics in mining and civil engineering. Stress and Strains Stresses in two and three dimensions. Stress tensors. Principal stresses. Stress invariants. Displacements and strains. Mohr's circle. Stress-strain relationships. Effect of temperature and pressure on stress and strain relationships. Equilibrium and compatibility equations. Rockmass Classification Systems Q-system, RMR, Modified RMR and their applications. Physico-Mechanical Properties of Rocks Specific gravity, hardness, porosity, moisture content, permeability, thermal conductivity. Compressive, tensile and shear strengths. Modulus of elasticity. Poisson's ratio and triaxial strength. Swell index, slake durability, point load index, Protodyakonov index. Determination of in-situ strength. Determination of In-situ Stresses Methods of measurement – hydrofracturing and stress-relief. Rheological Models and Time Dependent Properties of Rocks Theories of Rock Failure Griffith, Mohr-Coulomb, Hoek and Brown. Types of rock fractures. Post-failure Behaviour.

### **EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

### **References :**

1. Obert, L. and Duvall, W.I., Rock Mechanics and Design of Structure in Rock John Wiley and Sons Inc., New York, 1967.
2. Vutukuri, V.S., and Lama, R.D., Handbook on Mechanical Properties of Rocks, Vol. I, II, III and IV, Transtech Publication, Berlin, 1974/78.
3. Peng, S.S., Ground Control, Wiley Interscience, New York, 1987.
- 4 Brady, B.H.G. and Brown, S.T., Rock Mechanics, Wiley Interscience, 1985.
- 5 Hoek, E., and Brown, S.T., Underground Excavations in Rocks, Institute of Mining Metallurgy, London, 1980.

Importance of Geology in Mining Mineralogy Minerals – definition, formation and occurrences. Identification – physical, chemical and optical. Classification of minerals. Crystallography Scope, crystal systems. Polymorphism and isomorphism. Economic Geology Ores and gangue – genesis, classification, distribution in India and geological occurrences. Uses of important metallic and non-metallic minerals. Atomic mineral resources of India – genesis and occurrence. Structural Geology Stratified rocks and their structures. Attitude of strata. Outcrop and incrop. Folds – genesis, classification, identification in field, impact on landscape, mineral deposits, mining and tunnelling. Faults – mechanism of faulting, classification, impact of faulting on topography, significance of faults in mining engineering and tunnelling. Joints – definition and characteristics, classification, occurrence of joints in igneous, sedimentary and metamorphic rocks. Engineering considerations and treatments. Prospecting and Exploration Geological guides for prospecting of mineral deposits. Introduction to different methods of prospecting for mineral deposits – geological, geophysical, geochemical, geobotanical, aerial photography and remote sensing. Exploratory drilling methods. Trenching and pitting. Sampling grids. Drill hole logging. Deviation of drill holes and drill hole surveying. Directional drilling. Reserve Estimation Selection of methods, merits and demerits, applicability.

### **EVALUATION**

Evaluation will be continuous an integral part of the class as well through external assessment.

### **References :**

- Parbin Singh. Geology for Engineers, IBH Publications, N. Delhi. 1991.
2. Arthur Holemess, Principles of Physical Geology, Thomas Nelson and Sons, USA, 1964.
3. Ford, W.E. Dana's Textbook of Mineralogy (4th edition), Wiley Eastern Ltd., N. Delhi, 1989
- . 4. Winter, J.D. An Introduction to Igneous and Metamorphic Petrology, Prentice Hall, N. Delhi, 2001.
5. Billings, M.P. Structural Geology, Prentice Hall Inc., N. Jersey, USA, 1972
- . 6. Krishnan M.S. Geology of India and Burma, 3rd Edition, IBH Publishers, N. Delhi, 1984.

**AU/IP/ME/AT/MI -3006 Computer Programming-I (JAVA)**

Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector. Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

**References:**

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia.
5. Merlin Hughes, et al; [Java Network Programming](#) , Manning Publications/Prentice Hall

**List of Program to be made (Expandable)**

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write Programs to show Inheritance and Polimorphism.
6. Write a program to show Interfacing between two classes
7. Write a program to Add a Class to a Package
8. Write a program to demonstrate AWT.
9. Write a Program to show Data Base Connectivity Using JAVA
10. Write a Program to show “HELLO JAVA ” in Explorer using Applet
11. Write a Program to show Connectivity using JDBC
12. Write a program to demonstrate multithreading using Java.
13. Write a program to demonstrate applet life cycle.