RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Mining Engineering, III-Semester

Material Science

Crystal Atoms of Solid: Structure of atom binding in solids metallic, space lattice and crystal system arrangement of atoms in BCC, FCC and HCP crystal. Mechanical , Electrical , thermal , Magnetic & optical Properties of materials
Types of materials .

Plastic deformations of metals: Point and line defects in crystals, their relation to mechanical properties, deformation of metal by slip and twinning, stress strain curves of polycrystalline materials ,Cold and hot working of metals and their effect on mechanical properties .

Alloy Formation and Binary diagram: Phase in metal system solution and inter-metallic compounds. Hume-Rottery's rules, solidification of pure metals and alloy equilibrium diagrams of iso-morphous, eutectic, peritectic and eutectoid system Iron carbon equilibrium diagram.

Heat treatment of Alloys: Principles of heat treatment of steel TTT curves Heat treating processes, normalizing, annealing and spherodizing, hardening, tempering, Case hardening aus-tempering, mar-tempering, precipitation

hardening process with reference to AI, Cu alloys.

Engineering Materials & their applications : Ferrous & Non ferrous metals , base alloys, bronze brasses and Duralumin. Study of Advanced materials: Shape memory alloys, Carbon nano tubes, composite materials, Smart materials

Powder Metallurgy: Property and application of powder metallurgy, various processes and methods of making products

by powder metallurgy techniques. Polymers & Plastics ,their properties & applications in engineering .Refractory materials .

EVALUATION

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

References:

1. Narula GK, KS and Gupta VK; Material sciemce; Mc Graw Hill Education
2. Askeland , Essentials of Materisl Science & Engineering CENGAGE Learning .
3. R Balasubramaniam , Callister's Material Science ,Wiley Students edition
4. James F Shackelford ;Introduction to Material Science for Engineers PEARSON, Sixth edition.
5. Raghavan V; Material science and Engineering, PHI Publication.
6. Sriniwasan R; Engineering materials and Metallurgy;
7. Agarwal BK Introduction to Engineering Materials , Mc Graw Hills

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Mining Engineering, III-Semester

GEOLOGY – I

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 Minerology (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 Ino., N. Jersey, USA, 1972

. 6. Krishnan M.S. Geology of India and Burma, 3rd Edition, IBH Publishers, N. Delhi, 1984.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Mining Engineering, III-Semester

MINING ENVIRONMENT – I

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. REFERE

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.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Mining Engineering, III-Semester

MINING SURVEYING – I

Distance Measurement Chains, tapes, electronic distance measurement, total station. Levelling Levels, reduced level, corrections for curvature and refraction, reciprocal levelling, contouring, tacheometry. 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.

EVALUATION

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.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Mining Engineering, III-Semester

ROCK MECHANICS

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.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA BHOPAL

Choice Based Credit System

Mining Engineering , III-Semester

Communication Skills

Introduction: Communication, definition and role of communication, Process of communication, Importance of professional communication, Levels of communication, Types of communication, Challenges in communication. Non –verbal communication – Body language, personal appearance, posture, gesture and hand movement, eye contact, facial expressions, paralinguistic features - proxemics, haptics, chronemics. Oral presentations. Case studies.

Books recommended:

1. Business Communication, Mc Graw Hill Education, Matthukutty M. Monippally.
2. Effective Business Communication , Mc Graw Hill Education, Neera Jain, Shoma Mukherji.
3. Technical Communication , Cengage , P. Subba Rao, B. Anita Kumar, C. Hima Bindu.
4. Business Correspondence & Report Writing , Mc graw Hills. , R.C. Sharma & Krishna Mohan .
5. Technical Communication – Principles & Practice , Oxford , Meenakshi Raman.
6. Business Communication- Mc graw Hills , Peter Cordom.
7. Communication Skills , Oxford , Sanjay Kumar & Pushpa TMH.
8. Effective Technical Communication , M. Ashraf Rizvi ,Mc Graw Hill Education.

Language Lab II

Module 1 : Reading comprehension
Module 2 : Role plays
Module 3 : Debate
Module 4 : Group discussion
Module 5 : Resume writing
Module 6 : Interview skills
Module 7 : Body language
Module 8 : Oral presentations