

BEA-301 Mathematics-III

UNIT-I

Numerical Methods—Solution of polynomial and transcendental equations – Bisection method, Newton- Raphson method and Regula-Falsi method. Finite differences, Relation between operators, Interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

UNIT-II

Numerical Methods - Numerical Differentiation, Numerical integration: Trapezoidal rule and Simpson's 1/3rd and 3/8 rules. Solution of Simultaneous Linear Algebraic Equations by Gauss's Elimination, Gauss's Jordan, Crout's methods, Jacobi's, Gauss- Seidal and Relaxation method.

UNIT-III

Numerical Methods – Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. Runge Kutta method of fourth order for solving first and second order equations. Milne's and Adam's predictor-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poisson equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank- Nicholson methods), Finite difference explicit method for wave equation.

UNIT-IV

Transform Calculus - Laplace Transform, Properties of Laplace Transform, Laplace transform of periodic functions. Finding inverse Laplace transform by different methods, convolution theorem. Evaluation of integrals by Laplace transform, solving ODEs by Laplace Transform method, Fourier transforms.

UNIT-V

Concept of Probability - Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

REFERENCES:

1. P. Kandasamy, K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.
3. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
4. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.
5. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
6. Veerarajan T., Engineering Mathematics, Tata McGraw-Hill, New Delhi, 2008.
7. P. G. Hoel, S. C. Port and C. J. Stone, Introduction to Probability Theory, Universal Book Stall, 2003 (Reprint).
8. S. Ross, A First Course in Probability, 6th Ed., Pearson Education India, 2002.
9. W. Feller, An Introduction to Probability Theory and its Applications, Vol. 1, 3rd Ed., Wiley, 1968. Statistics.

MIA-302 Mining Environment – I

UNIT-I

Introduction Ventilation requirements in mines, natural ventilation and mechanical ventilation. Mine Gases Composition of atmospheric air. Mine gases - occurrences, properties, physiological effects.

UNIT-II

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.

UNIT-III

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.

UNIT-IV

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.

UNIT-V

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.

REFERENCES:

1. G.B. Mishra, 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.
6. Elements of mining technology by D.J Deshmukh vol.2

MIA-303 Mining Surveying – I

UNIT-I

Chain Survey Linear Measurements; Types of chains; Tapes; Errors in chaining and corrections in linear measurements; Direct and indirect Ranging; Principles of chain surveying. Offsets, Limiting length of offsets; Booking field notes; Obstacles in chaining; Instruments for setting out right angles.

UNIT-II

Compass Survey Theory of Magnetism; Dip of Magnetic needle; Prismatic Compass; Surveyor's Compass; Bearings; Designation of Bearings; Calculation of Included Angles; Local Attraction; Magnetic Declination.

UNIT-III

Plane Table Surveying Principles of Plane Tabling; Working operations; Methods of Plane Table Surveying; Two and Three point problems.

UNIT-IV

Miner's Dial Construction, Use, Tests and Adjustments; Loose and fast Needle surveying; Common sources of errors in Dial surveying; Methods of elimination and compensation.

UNIT-V

Levelling; Definitions of important terms used in levelling; Development in levelling Instruments; Types and Constructional details of Dumpy Level, Auto Level; Temporary and Permanent Adjustments; Methods of levelling; Straight edge levelling; Fly levelling; Check levelling; Reciprocal levelling; Longitudinal Sections; Cross- Sectioning; Trigonometric levelling; Methods of booking and reduction of levels; Levelling through drifts and shafts (Including steeply inclined shafts) ; Plumbing measurements of depth of shaft and subsidence.

REFERENCES:

1. Mine surveying by S. Ghatak
2. Surveying & Levelling by B. C. Punamia
3. Bannister, A. and Raymond. S., Surveying, ELBS, 6th Edition 1992.
4. Kennetkar, T.P. Surveying and Levelling, Vols. 1 and 2, United Book Corporation, Pune,

LIST OF EXPERIMENTS:

1. Ranging and Chaining of line of 50 Meter.
2. Determination of width of an obstacle which can be seen across but can't be chained.
3. Determination of area of a field by Cross staff survey.
4. Study of various types of chained

MIA-304 Rock Mechanics

UNIT-I

Application of rock mechanics in mining, Definition of important terms used in Rock mechanics, Classification of rock mass, Parameters of rock mass classification, Importance of rock mass classification, RQD, Q –system and Bieniawski Geo-mechanics classification of rock mass.

UNIT-II

Rock properties, Physico-mechanical properties of rock, Preparation and testing of specimen in the laboratory, ISRM standards, Determination of Physico-mechanical properties of rock as per ISRM standard testing procedures, Strength indices and their importance. Point load, Protodyakonov test, Impact and Cone Indenter strength Index.

UNIT-III

Rock as an elastic medium, Principle of elastic analysis, Rheological properties of rock, Importance of rheological models, Different types of rheological models, Dynamic properties of rocks, Anisotropy and Creep.

UNIT-IV

Principal stress and Principal plane, Analytical method of determining the magnitudes and directions of normal and shear stress on failure plane, Mohr's circle, Theories of failure of rock, Coulomb Navier theory, Mohr's theory, Griffith's theory, Empirical theories of failure of rock, Different modes of failure of rock.

UNIT-V

Earth stresses, Importance of measurements of in situ stress, measurements of insitu stress by Flat jack, Overcoring and Hydraulic fracturing technique. Design of circular and elliptical openings. Determination of safe span of roof.

REFERENCE:

1. Rock Mechanics By Obertabd Duvall.
2. Rock Mechanics By Goodman.
3. Rock Mechanics By Jager& Cook.
4. Rock Mechanics by B.S. Verma.
5. Rock Mechanics by B.P. Verma.
6. Rock Mechanics by Howard L. Hartman .

LIST OF EXPERIMENTS:-

- 1.To determine the important terms used in Rock mechanics.
- 2.To determine the Rock properties.
- 3.To determine the Different types of rheological models.
- 4.To determine the Mohr's circle.
- 5.To determine the Theories of failure of rock.
- 6.Brazilian Test for Tensile strength test.
- 7.Uniaxial strength test.
- 8.Triaxial strength test.
- 9.Stress relief or over coring technique.

MIA-305 Geology – I

UNIT-I

The Earth in Space and Time Solar System: - Size, Shape, Mass and Density of Earth; A Brief idea of the origin and the age of the Earth; Interior of the Earth:- seismic data, Density and Pressure within the Earth; The internal structure and composition of Earth; Elementary knowledge of Diastrophism, Earthquakes and volcanism:-Volcanic and Earthquake belts, their relationship with Plate Tectonics.

UNIT-II

Mineralogy Physical Properties of Minerals; Classification of various Rock forming Minerals; Introduction and preliminary study of principle Rock-Forming Mineral groups:- Garnet, Pyroxene, Amphibole, Mica, Feldspar and Felspethoid, Megascopic Properties of economically important Non-Silicate Minerals.

UNIT-III

Igneous and Metamorphic Petrology Elementary knowledge of Magma and its Crystallization; Classification of Igneous Rocks; Textures and Structures of Igneous Rocks; Petrographic Description of Common Igneous Rocks; Agents and Types of Metamorphism; Depth zones, Facies and Grades of Metamorphism and Petrographic Description of Common Metamorphic Rocks.

UNIT-IV

Sedimentary Petrology Textures and Structures of Sedimentary Rocks; Sedimentary Processes- Weathering, Transportation and Deposition; Classification and Petrographic Description of Common Sedimentary Rocks.

UNIT-V

Structural Geology Concept of Deformation; Primary and Secondary Planer & Linear Structure of Rocks; Topography and its Representation. Altitude of strata- Dip and strike; Outcrop patterns; Width of Outcrop and Thickness of beds; Structural Contours; Geological Maps; Study of Unconformity; Folds, Joints, Faults and their influence in Mining Operations.

TEXT BOOKS:

1. Engineering And General Geology : Parbin Singh
2. Physical And Engineering Geology : S.K. Garg
3. Rutley's Elements of Mineralogy : H.H. Read
4. Principles Of Petrology : G.W. Tyrell

LIST OF EXPERIMENTS:

1. Megascopic Description of Rock Forming Minerals.
2. Megascopic Description of important Igneous, Sedimentary, Metamorphic Rocks.
3. Basic Concept of Contours, Attitude of Beds, Width of Outcrop, True and Apparent Dips, Rules of V's.
4. Study of Geological Maps and Preparation of Cross Sections.

MIA-306 Computer Programming (C Language)

UNIT-I

Fundamentals of C Programming: History of C; Structure of a C Program; Data types; Constant & Variable, naming variables; Operators & expressions; Control Constructs – if-else, for, while, do-while; Case switch statement.

UNIT-II

Functions; Arguments; Return value; Parameter passing – call by value, call by reference; Return statement; Scope, visibility and life-time rules for various types of variable. static variable; Calling a function; Recursion – basics, comparison with iteration, types of recursion- direct, indirect, tree and tail recursion, when to avoid recursion, examples.

UNIT-III

Arrays: Arrays: Introduction to Arrays, Array Declaration, Single and Multidimensional Array, Memory Representation, Strings, String handling functions.

Pointers: Introduction to Pointers, Address operator and pointers, Declaring and Initializing pointers, Assignment through pointers. Pointer v/s array; Pointer to pointer; Array of pointer & its limitation; Function returning pointers; Pointer to function, Function as parameter.

UNIT-IV

Structure and Union: Declaration of structure, Accessing structure members, Structure Initialization, Union. Advanced Programming Techniques: Special constructs – Break, continue, exit(), goto & labels; Pointers- & and * operators, pointer expression, pointer arithmetic, dynamic memory management functions like malloc(), calloc(), free();

UNIT V

Miscellaneous Features: File handling and related functions; printf & scanf family; C preprocessor – basics, #Include, #define, #undef, conditional compilation directive like #if, #else, #elif, #endif, #ifdef and #ifndef; Variable argument list functions.

REFERENCES:

1. Kerninghan & Ritchie “The C programming language”, PHI
2. Schildt “C: The Complete reference” 4th ed TMH.
3. Cooper Mullish “The Spirit of C”, Jaico Publishing House, Delhi
4. Kanetkar Y. “Let us C”, BPB.

LIST OF EXPERIMENTS:

1. WAP to perform arithmetic operations (Addition, Subtraction, Multiplication, Division) on two numbers.
2. WAP to calculate gross salary of an employee [using formula: $\text{gross_sal} = \text{basic_sal} + \text{hra} + \text{da}$].
3. WAP to calculate area of circle.
4. WAP to evaluate marks of student for 3 subjects, calculate percentage and display their grades.
Marks grades
5. CASE -1: 90-100 A
6. CASE -2: 80-89 B
7. CASE -3: 65-79 C
8. CASE -4: Otherwise D
9. WAP to determine sum of odd series from 1 to N
10. WAP to calculate factorial of a number.
11. WAP to print Fibonacci series up to N. [E.g. - 0 1 1 2 3 5.....]
12. WAP to identify whether given number is prime or not.
13. WADF to identify whether given number is even or odd.
14. WADF to print whether given year is leap year or not.
15. WADF to check whether the 5 digit number is palindrome or not [A palindrome number or numeral palindrome is a number that remains the same when its digits are reversed. Like 16461, for example, it is "symmetrical".].
16. WADF to check whether 5 number entered is Armstrong number or not.[An Armstrong number is an n-digit number that is equal to the sum of the nth powers of its digits. Like 153]
17. WAP to find the sum of the digits of a number.
18. WAP to input 3 sides of triangle and identify the type of triangle.
19. WAP to input 5 digit numbers and find the sum of the first and last digit.
20. WAP to check whether the number is power of 2 or not.
21. WAP to find out GCD of two numbers.
22. WAP to check whether given number is perfect power of any natural number

MIA-307 Self study/GD Seminar

Objective of GD and seminar- is to improve the MASS COMMUNICATION and CONVINCING / under standing skills of students and it is to give student an opportunity to exercise their rights to express themselves. Evaluation will be done by assigned faculty base don group discussion and power point presentation.