Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

Branch- Common to All Discipline

New Scheme Based On AICTE Flexible Curricula

BT401	Mathematics-III	3L-1T-0P	4 Credits

OBJECTIVES: The objective of this course is to fulfill the needs of engineers to understand applications of Numerical Analysis, Transform Calculus and Statistical techniques in order to acquire mathematical knowledge and to solving wide range of practical problems appearing in different sections of science and engineering. More precisely, the objectives are:
- To introduce effective mathematical tools for the Numerical Solutions algebraic and transcendental equations.
- To enable young technocrats to acquire mathematical knowledge to understand Laplace transformation, Inverse Laplace transformation and Fourier Transform which are used in various branches of engineering.
- To acquaint the student with mathematical tools available in Statistics needed in various field of science and engineering.

Module 1: Numerical Methods – 1: (8 hours): 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.

Module 2: Numerical Methods – 2: (6 hours): 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.,

Module 3: Numerical Methods – 3: (10 hours): Ordinary differential equations: Taylor's series, Euler and modified Euler's methods. RungeKutta method of fourth order for solving first and second order equations. Milne's and Adam's predicator-corrector methods. Partial differential equations: Finite difference solution two dimensional Laplace equation and Poission equation, Implicit and explicit methods for one dimensional heat equation (Bender-Schmidt and Crank-Nicholson methods), Finite difference explicit method for wave equation.

Module 4: Transform Calculus: (8 hours): 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.

Module 5: Concept of Probability: (8 hours): Probability Mass function, Probability Density Function, Discrete Distribution: Binomial, Poisson's, Continuous Distribution: Normal Distribution, Exponential Distribution.

Textbooks/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

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Mining Engineering, IV-Semester

MI-402 DRILLING AND BLASTING

Drilling of Rocks in Underground and Surface Mines Principles of rock drilling. Classification of drilling system. Rock drilling methods, parameters affecting the choice of drilling system, long hole drilling, ring drilling and rotary drilling methods for underground mines. Drilling bits. Blasting in Underground Mines Explosives. Initiation systems and accessories for blasting in the underground mines. Blasting off the solid. Blasting of cut faces. Mass-blasting system for heavy blasting in hard rock mines. Blasting in Surface Mines Principles of blast round design for single and multi-row. Blast round design in surface mines. Bulk explosives Initiation systems and accessories. Evaluation Methods, Nuisances and Mitigation Evaluation of drilling and blasting methods for underground and surface mines by use of state-of-art techniques and gadgets. Blasting nuisances and their mitigation for underground and surface mines.

EVALUATION

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

References :
1. Hustrulid, W. A. Blasting Principles of Open Pit Mining, Vol. 1- General Design Concept, A.A. Balkema, Rotterdam, 1999.
2. Jimeno, C.L., Jimeno, E.L, Carcedo, E.J. Drilling and Blasting of Rocks, A.A.Balkema, Rotterdam, 1995. 3. Clark, G.B., Principles of Rock fragmentation, Wiley Interscience Publication, 1987.
4. Konya, C.J. and Walter, E.J. Surface Blast Design, New Jersey, 1990.
5. Bhandari, Sushil, Engineering Rock Blasting Operations, A.A.Balkema, Rotterdam, 1997.
6. Per-Anders Persson, Roger Holmberg, and Jaimin Lee. Rock Blasting and Explosives Engineering, CRC Press, 1994.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Mining Engineering, IV-Semester

MI-403 UNDERGROUND COAL MINING

Coal and coal measure rocks. Classification of mining methods. Division of mine area into panels on district and level patterns. Factors influencing the choice of mining method. Bord and Pillar Method Size of headings, pillars and panels. Development of panels by drivage of group of headings to strike, dip and rise with V, diagonal and straight fronts. Cycle of operations, work-organisation and scheduling for drivage of heading groups by conventional and continuous methods. Depillaring of panels with V, straight and diagonal fronts. Conventional and mechanized depillaring schemes with emphasis on coal, water, air routes and supports. Simultaneous development and depillaring, partial extraction, room and pillar methods. Longwall Method Classification of longwalls, advancing and retreating methods, working in districts and levels (central and boundary ventilation) size of panel, development of panel with single and multiple heading gate roads, various orientations of longwall face, single and double unit longwalls. Extraction of longwall panels with conventional and fully mechanized methods, length of face, daily advance, cycle of operations, organisation, scheduling and layouts with special reference to coal, water and air routes. Bleeder ventilation scheme. Gate, goaf and face area support in conventional and fully mechanised longwalls. Room and Pillar Method Shortwall Method Stowing: Applicability conditions, classification and description of various methods of goaf stowing. Surface and underground arrangements and precautions with stowing, full bore stowing and problems associated with stowing at surface and below ground. Comparison of Various Mining Methods

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

References :
1. Singh, R.D. Principles and Practices of Modern Coal Mining, New Age International (P) Ltd., Chennai, 1994.
2. Singh, T.N. Singh, Underground Winning of Coal – Oxford & IBH Publishing Co. Ltd., 1992.
3. Mathur, S.P., Coal Mining in India, M.S. Enterprises, Bilaspur, 1999.
4. Das S.K., Modern Coal Mining technology, Lovely Prakashan, Dhanbad 1994.
5. Singh T.N., Dhar, B.B. Thick Seam Mining, Problems and Issues, Oxford & IBH Publishers, 1992.
6. Mathur, S.P., Mining Planning for Coal., M.G. Consultants, Bilaspur, 1993.
7. Peng S.S., and Chiang, H.S., Longwall Mining, John Willey and Sons, New York, 1992.
8. Szwilski and Richards M.J., Underground Mining Methods and Technology, 1987. Internet: www.miningindia.com

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Mining Engineering, IV-Semester

MI-404 MINING MACHINERY – I

Transmission of Power Belt, rope, chain, gear, hydraulic and electro-hydraulic transmission. Compressed Air Comparison with other sources of power. Air compressors – types, construction, installation and maintenance. Compressed air transmission and distribution, compressed air drills, pneumatic picks, air motors and other compressed air equipment. Wire Ropes Types, construction and uses. Rope deterioration and maintenance. Capping and splicing of rope. Haulage Rope haulages. Track, mine tubs and cars. Safety appliances on haulage roads. Locomotive haulage. Mono rail. Statutory Provisions

EVALUATION

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

REFERENCE s :
1. Cherkassky, B.M., Pumps, Fans, Compressors, MIR Publishers, 1980.
2. Deshmukh, D.J., Elements of Mining Technology, Vol. I and II EMDEE Publishers, Nagpur,1989.
3. Walker, S.C., Mine Winding and Transport, Elsevier, 1988.
4. Karelin N.T., Mine Transport, Orient Longmans, N. Delhi.
5. Mason, E., Coal Mining Series, Mining Machinery, Virtue and Company Ltd., London.
6. Statham, I.C.F., Coal Mining, Vol. I, II, III and IV, Caxton Eastern Agencies, Calcutta.

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Mining Engineering, IV-Semester

MI-405 GEOLOGY – II

Geological Time Scale Petrology Definition and scope, main classes of rocks forming minerals. Igneous, sedimentary and metamorphic rocks – origin, characteristics, classification, uses and mining importance. Significance of texture and structure of rocks on geomechanical properties of rock mass. Stratigraphy Definition and scope. Stratigraphic correlation. Standard stratigraphic scale. Fossils – conditions, mode of preservation and uses. Major geological formations of India – Dharwar, Cuddapah, Vindhyan, Gondwana, Tertiary & Quaternary systems and their economic significance. Fuel Geology Coal and lignite - origin, occurrences, petrography. Structural features of coal-seam. Grades of coal. Occurrences in India. Petroleum and natural gas – formation of gas and oil basins, traps and reservoirs, occurrences in India. Coal bed methane. Geohydrology Sources of water in mines. Classification of rocks based on porosity and permeability. Water table and types of ground water. Geological controls on ground water movement in mines. Environmental Geology Geological hazards and their management. Weathering of ore and overburden – environmental complications.

EVALUATION

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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.

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Mining Engineering, IV-Semester

MI- 406 Computer Programming (C Language)

C language alphabet set, identifiers, Variables and constants Data types, Builtin and user Defined Data types Arrays operators and expressions Simple assignment and Input-output statements, preprocessor directives writing simple 'C' programs, compiling and executing 'C' Programs.

Conditional statements and loops: IF statement IF–ELSE statement, SWITCH statement, FOR statement, WHILE and Do WHILE statement.

Function: Function declaration or prototype. Function definition, function calling: call by value, call by reference, Recursion.

Introduction to pointers, File processing: concept of files, file opening, editing, reading and writing.

Reference Books :
1. Programming in ANSI C, by Balagurusamy, Tata McGraw Hill
2. The C programming Language. By Brian W. Kernighan and Dennis M.   Ritchie. Published by Prentice-Hall
3. Let us C by Y.Kanetkar, BPB Publication

Lab assignments :
1. Design and execute a 'C' program for multiplying two nXn matrics.
2. Design a 'C' program to calculate Average of 'n' numbers.
3. Design a 'C' program to add two numbers using call by value parameter passing mechanism.
4. Design a 'C' program to swap the contents of two variables using call by reference parameter passing mechanism.
5. Design a 'C' program to open a file and add contents to modify the file.