Rajiv Gandhi Proudyogiki Vishwavidyalaya, Bhopal

Branch- Common to All Discipline

New Scheme Based On AICTE Flexible Curricula

BT302	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-Seidel, 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

Civil Engineering, III-Semester
CE301 Construction Materials

UNIT-I

Stones, Brick, Mortar and Concrete:

Stones :Occurrence, Classification of Rocks, varieties, Characteristics and their testing, uses, quarrying and dressing of stones, Deterioration of Stones, Retardation of Decay of Stones, Preservation of Stones, Artificial Stones.

Brick : Manufacturing , characteristics, Classification and uses, Improved brick from inferior soils, Hand molding brick table, Clay-fly ash brick table

Concrete : Ingredients, Grades of Concrete ,Concrete Production ,Special Concrete

UNIT-II

Timber ,Glass , Steel and Aluminium :

Timber: Important timbers, their engineering properties and uses, defects in timber, seasoning and treatment, need for wood substitutes, ,Plywood, Particle Board ,Fibre Board, Applications of wood and wood products , Plaster Boards, Adhesives, types of Gypsum Board and their uses

Glass: What is glass , Nature of Glass, Structure of Glass, Macro Molecular Structure, Main Oxides in Glass, Thermal and Optical Properties ,Effect of Coating,

Steel : Physical Properties of Structural Steel, Grades of Steel

Aluminium : Properties ,Forms ,Uses, Advantages

UNIT-III

Flooring , Roofing ,Plumbing and Sanitary Material:

Flooring and Roofing tiles , Types of Flooring – Marble, Kota stone , wood etc. Type of Roofing , P.V.C. materials, CI , GI, Asbestos pipe , Stone ware pipes

UNIT-IV

Paints, Enamels and Varnishes:

Composition of oil paint, characteristic of an ideal paint, preparation of paint, covering power of paints, Painting: Plastered surfaces, painting wood surfaces, painting metal Surfaces. Defects, Effect of weather, enamels, distemper, water wash and colour wash, Varnish, French Polish, Wax Polish

UNIT-V

Miscellaneous ConstructionMaterials:

Bitumen, Tar and Asphalt their characteristics and uses ,Ultra Poly Vinyl chloride Pipes, Thermal and sound insulating materials, and water proofing materials .

References Books:

1. Donald R Askeland, Pradeep P Fulay, Wendelin J Wright, The science and Engineering of Materials, Cengage Learning.
2. S K Duggal, Building Materials, New Age International.
3. P C Vaghese, Building Materials, PHI Learning.
4. S.C. Rangwala, Engineering Materials, Charotar.
5. M S Shetty, Concrete Technology, S. Chand Technical.
6. A M Neville, J J Brooks, Concrete Technology, Prentice Hall.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, III-Semester

CE302 Surveying

UNIT-I
Surveying &Levelling :
Basic Definitions of Surveying, Principles , Classification of surveying ,Methods of Linear Measurement Ranging , Accessories for linear measurement ,Chain Surveying , Compass Surveying , Plane Table Surveying ,Correction and Errors Definition of Levelling , types of levelling operations ,Principles , Problems , Computation of Area and Volumes

Unit –II
Theodolite Traversing:
Types, Temporary Adjustment ,latitude & Departure ,plotting & Adjustment ,Omitted Measurements EDM , Trigonometric Levelling

Unit-III
Tacheometry:
Tachometric systems and principles, stadia system, uses of analytic lens, tangential system, subtense system, instrument constant, field work reduction, direct-reading tacheometer , use of tacheometry for traversing and contouring.

Unit-IV
Curves:
Classification and use; elements of circular curves, calculations, setting out curves by offsets and by theodolites, compound curves, reverse curves, transition curves, vertical curves, setting out.

Unit-V
Hydrographic Survey:
Soundings, methods of observations, computations and plotting. Principles of photographic surveying: aerial photography, tilt and height distortions, Setting out works

REFERENCES

1. B.C Punmia , Surveying Vol-II & III ,Laxmi Publication.
2. S.K. Duggal, Surveying Vol. II McGraw Hill Publishing Company Ltd.
3. Saikia MD, Das BM, Das MM, Surveying, McGraw hill
4. T.P. Kanetkar and S.V. Kulkarini Surveying and Leveling-Part-I & II , Pune VidyarthiGrihaPrakashan, Pune.

5. Gopi A, Satikumar R- Advance surveying, Pearson
6. Remote Sensing and image interpretation by Lillesand T.M. and Kiefer R.W.
7. R.Agor, Advance Surveying ,Khanna Publisher
8. Chandra AM, Higher Surveying, New Age International, new Dwlhi
9. Bhavikatti SS, Surveying and Levelling Vol. II, I.K International
10. Venkatramaiah, Surveying, University Press, Mumbai
11. BhattaBasudeb, , Remote Sensing and GIS, Oxford, New Delhi.
12. Subramanaian, Surveying &levelling, Oxford, New Delhi.
13. Joseph George Fundamentals of Remote Sensing

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, III-Semester

CE303 Building Planning & Architecture

UNIT-I
Drawing of Building Elements- Drawing of various elements of buildings like various types of footing, open foundation, raft, grillage, pile and well foundation, Drawing of frames of doors, window, various types of door, window and ventilator, lintels and arches, stairs and staircase, trusses, flooring, roofs etc.

UNIT-II
Building Planning- Classification of buildings, Provisions of National Building Codes and Rules, Building bye-laws, open area, Setbacks, FAR terminology, Design and drawing of Building, Design concepts and philosophies, Preparing sketch plans and working drawings of various types of buildings like residential building, institutional buildings and commercial buildings, site plans, presentation techniques, pictorial drawings, perspective and rendering, model making, introduction to computer aided design and drafting, Applying of principle of architectural composition (i.e. unity, contrast, etc.), Principles of planning, orientation in detailed drawings.

UNIT-III
Building Services- Introduction of Building Services like water supply, sewerage and drainage systems, sanitary fittings and fixtures, plumbing systems, principles of internal & external drainage systems, principles of electrification of buildings, intelligent buildings, elevators & escalators their standards and uses, air-conditioning systems, fire-fighting systems, building safety and security systems, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

UNIT-IV
Principles of architectural design- Definition of architecture, factors influencing architectural development, characteristics features of style, historic examples, creative principles.
Principles of architectural composition– Unity, balance, proportion, scale, rhythm, harmony, Accentuation and contrast.
Organising principles in architecture– Symmetry, hierarchy, axis, linear, concentric, radial, and asymmetric grouping, primary and secondary masses, Role of colour, texture, shapes/ forms in architecture.
Architectural space and mass, visual and emotional effects of geometric forms, space activity and tolerance space. Forms related to materials and structural systems.
Elements of architecture : Functions – Pragmatic utility, circulatory function, symbolic function, Physiological function. Structure – Physical structure, Perceptual structure. Space in architecture Positive and negative space. Aesthetics: Visual perception. Protective: Protection from climate andother elements, architecture a part of the environment. Comfort factors.

UNIT-V

Perspective Drawing and Town Planning- Elements of perspective drawing involving simple problems, one point and two point perspectives, energy efficient buildings.

Concepts of master plan, structure plan, detailed town planning scheme and action plan, estimating future needs - planning standards for different land use, allocation for commerce, industries, public amenities, open areas etc., planning standards for density distributions, density zones, planning standards for traffic network, standard of roads and paths, provision for urban growth, growth models, plan implementation, town planning legislation and municipal acts, panning of control development schemes, urban financing, land acquisition, slum clearance schemes, pollution control aspects

References Books:

1. Shah, Kale &Patki; Building Design and Drawing; TMH
2. Malik &Meo; Building Design and Drawing
3. W B Mckay,OrientBlackswan Building Construction Vol 1 -4, Pearson
4. Gurucharan Singh and Jagdish Singh, Building Planning, Designing and Scheduling, Standard Publishers Distributors.
5. Layal JS, Dongre A, Building Design and Drawing, SatyaPrakashan
6. Ghose D.N., Civil Engineering Design and Drawing, CBS publisher
7. Das B M, Principles of Foundation Engineering, Cengage Learning.
8. Agrawal S. C., Architecture and Town Planning, DhanpatRai& Co.
9. S.C. Rangwala, Town Planning, Charotar Publishing House.
10. Lewis Keeble, Principles and Practice of Town and Country Planning.
11. Rame Gouda, Principles & Practices of Town Planning, University of Mysore, ManasaGangotri.

List of Experiments
1. Sketches of various building components.
2. Drawing of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. Drawings for services and interiors of buildings.
4. Drawings containing detailed planning of one/two bed room residential building (common to all student)
5. Drawing of residential and institutional building (Each student performs a different drawing).
6. Use of Auto CAD for preparation of drawings.

RAJIV GANDHI PROUDYOGIKI VISHWAVIDYALAYA, BHOPAL

New Scheme Based On AICTE Flexible Curricula

Civil Engineering, III-Semester

CE303 4Strength of Materials

UNIT I
Simple Stress and Strains: Concept of Elastic body stress and Strain, Hooke's law, Various types of stress and strains, Elastic constants, Stresses in compound bars, composite and tapering bars, Temperature stresses. Complex Stress and Strains- Two dimensional and three dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and Strains, Mohr's circle of stresses.

UNIT II
Bending and Shearing Stresses: Theory of simple bending, Concept of pure bending and bending stress, Equation of bending, Neutral axis, Section-Modulus, Differential equation of the elastic curve, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading, Bending stress distribution across a section of beam, Shearing Stress and shear stress distribution across a section in Beams.

UNIT III
Determination of Slope and Deflection of beams by Double Integration Method, Macaulay's Method, Area Moment Method, Conjugate Beam Method, and Strain Energy Method, Castiglione's Method, and Unit Load Method.

UNIT IV
Columns and Struts: Theory of columns,Slenderness ratio, Direct and bending stresses in short columns, Kern of a section. Buckling and stability, Euler's buckling/crippling load for columns with different end conditions, Rankin's formula, Eccentric loads and the Secant formula- Imperfections in columns. Thin Pressure Vessels: cylinders and spheres. Stress due to internal pressure, Change in diameter and volume. Theories of failure.

UNIT V
Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Torsion of solid and hollow circular shafts, Analyses of problems based on combined Bending and Torsion. Unsymmetrical Bending: Principal moment of Inertia, Product of Inertia, Bending of a beam in a plane which is not a plane of, symmetry. Shear center; Curved beams: Pure bending of curved beams of rectangular, circular and trapezoidal sections, Stress distribution and position of neutral axis.

Reference books:
1. Punmia B.C., Mechanics of Materials, ,Laxmi Publications (P) Ltd.
2. S.S Bhavikaati, Strength of Materials, Vikas Publisher, new Delhi
3. Rajput R. K., Strength of Materials, S. Chand.
4. S. Ramamrutham, R. Narayanan, Strength of Materials, DhanpatRai Publications.
5. R. Subramaniam, Strength of Materials, Oxford University Press.
6. Sadhu Singh , Strength of Material , Khanna Publishers
7. Mubeen A , Mechanics of solids , Pearsons

8. D.S PrakashRao, Strength of Material , University Press , Hyderabad
9. Debrath Nag, Strength of Material , Wiley
10. Jindal , Strength of Material , Pearsons.
11. Bansal R.K, Strength of Materials, Laxmi Publisher, New Delhi.
12. Nash, W.A., Strength of Materials, Mcgraw hills, New Delhi.
13. Chandramouli, Strength of Materials, PHI learning
14. Dongre A.P., Strength of Materials, Scitech, Chennai
15. Negi L. S ,Strength of Materials, McGraw Hill Professional.
16. Raj Puroshattam, Strength of Material , Pearsons
17. J.M. Gere,.J. G. Barry Mechanics of Material, Cengage Learning

List of Practical
1. Study of Universal testing machine
2. To determine the compressive and tensile strength of materials.
3. To determine the Brinell hardness of materials.
4. To determine the Rockwell hardness of materials
5. To determine the toughness of the materials.
6. To determine the stiffness of the spring.
7. To determine the deflection of beam by the use of deflection-beam apparatus.