

MTH – 301 COMPUTATIONAL TECHNIQUES

UNIT I MATRICES

Eigenvalues and Eigenvectors of a real matrix , Characteristic equation , Properties of Eigenvalues and eigenvectors , Cayley-Hamilton Theorem , Diagonalization of matrices , Reduction of a quadratic form to canonical form by orthogonal transformation

UNIT II INFINITE SERIES

Sequences , Convergence of series , General properties , Series of positive terms , Tests of convergence (Comparison test, Integral test, Comparison of ratios and D'Alembert's ratio test) , Alternating series , Series of positive and negative terms , Absolute and conditional convergence , Power Series , Convergence of exponential, logarithmic and Binomial Series.

UNIT III FUNCTIONS OF SEVERAL VARIABLES

Limits and Continuity , Partial derivatives , Homogeneous functions and Euler's theorem , Total derivative , Differentiation of implicit functions , Change of variables , Partial differentiation of implicit functions , Taylor's series for functions of two variables . Errors and approximations , Maxima and minima of functions of two variables

UNIT IV IMPROPER INTEGRALS

Improper integrals of the first and second kind and their convergence , Evaluation of integrals involving a parameter by Leibnitz rule – Beta and Gamma functions , Properties , Evaluation of integrals using Beta and Gamma functions , Error functions.

UNIT V MULTIPLE INTEGRALS

Double integrals , Change of order of integration , Area enclosed by plane curves , Triple integrals , Volume of Solids , Change of variables in double and triple integrals , Area of a curved surface.

TEXT BOOKS :

1. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, New Delhi, 40th Edition, 2007.
2. Ramana B.V., "Higher Engineering Mathematics", Tata McGraw Hill Co. Ltd.,

CEC(302)-TRANSPORTATION ENGINEERING-I

UNIT I Introduction- Tractive resistances & Permanent way: Principles of Transportation, transportation by Roads, railways, Airways, Waterways, their importance and limitations, Route surveys and alignment, railway track, development and gauges, Hauling capacity and tractive effort.

i) Rails: types, welding of rails, wear and tear of rails, rail creep.

ii) Sleepers: types and comparison, requirement, sleeper density.

iii) Rail fastenings: types, Fish plates, fish bolts, spikes, bearing plates, chain keys, check and guard rails.

iv) Ballast: Requirement, various materials used, quantity of ballast, different methods of plate laying, material trains, calculation of materials required, relaying of track.

UNIT II Geometric Design; Station & Yards; Points and Crossings & Signaling and interlocking: Formation, cross sections, Super elevation, Equilibrium, Cant and Cant deficiency, various curves, speed on curves. Types, locations, general equipments, layouts, marshalling yards, Definition, layout details, design of simple turnouts, Types of signals in stations and yards, principles of signaling and inter-locking.

UNIT-III Bridge Site Investigation And Planning; Loading Standards & Component parts: Selection of site, alignment, collection of bridge design data: essential surveys, hydraulic design, scour, depth of bridge foundation, Economical span, clearance, afflux, type of road & railway bridges. : Design loads and forces, Impact factor, Indian loading standards for Railways Bridges and Highway Bridges, Bridge super structure and sub-structures, abutments, piers, wing walls.

Unit-IV Bridge Foundations, Construction, Testing and Strengthening of Bridges : Different types of foundation: piles and wells, sinking of wells, coffer-dams. Choice of bridges and choice of materials, details of construction underwater and above water, sheet piles coffer dams, Erection of bridges, girders, equipments and plants. inspection and Data collection, strengthening of bridges, Bridge failure.

UNIT-V Tunnels: 1. Selection of route, Engineering surveys, alignment, shape and size of tunnel, bridge action, pressure relief phenomenon, Tunnel approaches, Shafts, pilot shafts 2, Construction of tunnels in soft soil, hard soil and rock, Different types of lining, methods of lining, Mucking operation, Drainage and ventilation, Examples of existing important tunnels in India and abroad.

References

1. Chakraborty and Das; Principles of transportation engineering; PHI
2. Rangwala SC; Railway Engineering; Charotar Publication House, Anand
3. Rangwala SC; Bridge Engineering; Charotar Publication House, Anand
4. Ponnuswamy; Bridge Engineering; TMH
5. Railway Engineering by Arora & Saxena - Dhanpat Rai & Sons.
6. Railway Track by K.F. Antia
7. Principles and Practice of Bridge Engineering S.P. Bindra - Dhanpat Rai & Sons
8. Bridge Engineering - J.S. Alagia - Charotar Publication House, Anand
9. Railway, Bridges & Tunnels by Dr. S.C. Saxena .

CEC(303)-BUILDING DESIGN & DRAWING

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 – Provisions of National Building Code, Building bye-laws, open area, set backs, FAR terminology, principle of architectural composition (i.e. unity, contrast, etc.), principles of planning, orientation.

UNIT-III Building Services – Introduction of Building Services like water supply and drainage, electrification, ventilation and lightening and staircases, fire safety, thermal insulation, acoustics of buildings.

UNIT-IV Design and Drawing of Building – Design and preparation of detailed drawings of various types of buildings like residential building, institutional buildings and commercial buildings, detailing of doors, windows, ventilators and staircases etc.

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

References

1. Malik & Meo; Building Design and Drawing By
2. Shah, Kale & Patki; Building Design and Drawing; TMH
3. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling

List of Experiments (Expandable)

1. Sketches of various building components.
2. One drawing sheet of various building components containing doors, windows ventilators, lintels and arches stairs foundations etc.
3. One drawing sheet each for services and interiors of buildings.
4. One drawing sheet containing detailed planning of one/two bed room residential building (common to all student)
5. One drawing sheet each of residential and institutional building (Each student perform different drawing).
6. Use of AutoCAD for preparation of drawings.

CEC(304)-ENGINEERING GEOLOGY

UNIT-I Introduction and Physical Geology: Objects and scope of geology. The crust and the interior of the earth, origin and age of the earth, Sub-aerial and sub-terrain weathering, denudation and deposition, wind, river, glacial and marine erosion, volcanoes, soil formation, soil profile, geological classification of soil and concept of earthquake Plate- tectonics.

UNIT-II Mineralogy and Crystallography: Fundamentals of mineralogy, study of common rock forming minerals, ores and minerals of economic importance to civil engineering., elements of crystallography and introduction to crystal systems.

UNIT-III (1) Petrology: Composition of earth's crust, study of igneous, sedimentary and metamorphic rocks and their formation, characteristics classification, Rocks of civil engineering importance.

(2)Geology of India: Physical features of India, Brief geological history of India, occurrence of important ores and minerals in India.

UNIT-IV Structural Geology: Structures related to rocks, Dip, Strike and outcrops, Classification and detailed studies of geological structures i.e. folds, Faults, Joints, Unconformity and their importance in Civil Engineering.

UNIT-V Applied Geology: Introduction to applied geology and its use in civil engg., properties of rocks, selection of sites for roads, bridges, dams, reservoirs and tunnels. Prevention of engineering structures from seismic shocks, stability of hill sides, water bearing strata, artesian wells, Use of remote-sensing techniques in selection of above sites.

Reference:

1. Prabin Singh – “Engineering and General Geology”
2. Gulati ; Geotechnical Engineering; TMH
3. P.K. Mukerjee – “ A text Book of Geology”
4. S.K. Garg – “ A text Book of Physical and Engineering Geology”

List of Experiment (Expandable)

1. Identification of simple rock forming minerals and important ores.
2. Identification of rock
3. Simple map Exercises.
4. Field Visit / Geological Excursion.

CEC(305)-STRENGTH 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, Combined Bending and Torsion, Theories of failure.

UNIT-II Bending & Deflection: Theory of simple bending: Concept of pure bending and bending stress, Equation of bending. Neutral axis, Section-Modulus, Determination of bending stresses in simply supported, Cantilever and Overhanging beams subjected to point load and uniformly distributed loading. Bending & shear stress distribution across a section in Beams. Deflection of beams: Double Integration Method. Conjugate Beam Method, Macaulay's Method Area Moment Method.

UNIT-III Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow shafts, Open and closed coil springs, Leaf Spring, Spiral Spring, Pressure Vessels: Thin and Thick walled cylinders and spheres. Stress due to internal pressure, Change in diameter and volume, Compound cylinders and shrink fittings.

UNIT-IV 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.

UNIT-V Columns and Struts: Euler's buckling load for uniform section, various end conditions, slenderness Ratio, Stress in columns, Rankine formulae, Eccentric loading on columns.

Reference

1. Nash; Strength of Materials (Schaum), TMH.
2. Rattan SS; strength of Materials;
3. Negi; Strength of materials; TMH
4. Sadhu Singh; Strength of Materials, ,
5. Ramamrutham; Strength of Materials, ,
6. Subramaniam; Strength of Materials; R; Oxford
7. National Building Code of India, Part-IV

List of Experiments –

The experimental work to cover tension, compression, bending and impact test etc. on steel, cast iron, RCC and timber, Fire Resistant Test of Structures and Combustibility of Building Materials Test as per I.S.I. and other experiments based on the syllabus.

CEC(306)-ENERGY EFFICIENT & GREEN BUILDING

UNIT-I Energy Efficient Green Buildings - The green Building concept, rating systems in India and world, GRIHA, LEED, etc. , some top green buildings in the world, sustainable practices used in the design and construction phases of Green Buildings, Energy Efficient Solar Homes & Buildings, Energy Savings in Homes, IGBC certification.

UNIT-II Energy Conscious Buildings – Introduction, Climate and Buildings In India, Factors affecting climate, Climatic zones and their characteristics, Implications of climate on building design ,Urban climate ,Microclimate, Tools for analyzing weather data, illustrative example. National Building Code, Energy Conservation Building Codes, Key barriers to green building in India, Overcoming the barriers, implementation approach, etc.

UNIT-III Principles Of Energy Conscious Design Of Buildings In India – Introduction Building Envelope, Site, Orientation, Building Configuration, Building Components, Passive Heating, Direct Gain ,Indirect Gain, Thermal storage wall, Roof top collectors, Isolated Gain, Solarium (Attached greenhouse/sunspace), Passive Cooling, Ventilation Cooling, Cross ventilation, Wind tower, Induced ventilation, various types of cooling system, Earth Coupling, Earth-air pipe system , Basic Principles & Systems of Day-lighting , Building Materials ,Embodied Energy & Alternative Building Materials.

UNIT –IV Thermal Performance Of Buildings - Introduction, Heat Transfer, Solar Radiation, Simplified Method for Performance Estimation ;Example Computer-based Tools DESIGN GUIDELINES: Description of Buildings, Methodology, General Recommendations, Specific Guidelines.

UNIT-V Zero Energy Buildings - Opportunities and challenges in designing a Net zero building ,Energy efficient solar buildings, Design aspects ,Climatic zones ,Passive design features and their advantages, Sunshades, Window design, Double glazed windows Building insulation, Evaporative cooling, Landscaping, Surface to volume ratio Passive heating ,Earth air tunnel ,Solar chimney, Wind tower, Applicable passive features for various climatic zones, Energy-efficient lighting, Indoor lighting ,Outdoor lighting ,Energy efficient air conditioners, Renewable energy systems, Solar water heating system Building integrated PV system.

References –

1. L. Zagreus, D. Lehrer, and C. Huizenga. 2006. Occupant Satisfaction with Indoor Environmental Quality in Green Buildings.
2. ASHRAE Energy Standard 90.1-2010 for Buildings Except Low-Rise Residential. Washington, D.C.
3. D. Winiarski, M. Yazdanian, J. Huang, and D. Crawley. 2011. *U.S. Department of Energy Commercial Reference Building Models of the National Building Stock*.
4. Gurucharan Singh & Jgdish Singh Building Planning, Design and Scheduling .

List of experiments:-

1. Detect and measure the turbulent airflow around test structures.
2. Using the thermal mass of the building to lighten the load of an air conditioner.
3. Using passive solar design to cool and heat a house.
4. Determine if designing a different roof helps with regular ventilation.
5. Determine if energy costs are reduced by painting a slope roof white.
6. Energy saving at home- the thermal envelope.

CEC(307)-PROGRAMMING LANGUAGE IN C

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 CASE -1: 90-100 A CASE -2: 80-89 B CASE -3: 65-79 C CASE -4: Otherwise D
5. WAP to determine sum of odd series from 1 to N
6. WAP to calculate factorial of a number.
7. WAP to print Fibonacci series up to N. [E.g. - 0 1 1 2 3 5.....]
8. WAP to identify whether given number is prime or not.
9. WADF to identify whether given number is even or odd.
10. WADF to print whether given year is leap year or not.
11. 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".].
12. 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]
13. WAP to find the sum of the digits of a number.
14. WAP to input 3 sides of triangle and identify the type of triangle.
15. WAP to input 5 digit numbers and find the sum of the first and last digit.
16. WAP to check whether the number is power of 2 or not.
17. WAP to find out GCD of two numbers.
18. WAP to check whether given number is perfect power of any natural number