रूख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

Khwaja Moinuddin Chishti Language University, Lucknow, U.P. (India)

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DEPARTMENT OF CIVIL ENGINEERING

ENGINEERING MATHEMATICS-III

SUBJECT CODE: AS 303

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

The subject aims to provide the student with:

1. Mathematics Fundamental necessary to formulate, solve and analyse the Engineering Problems

2. An understanding of Fourier Transforms, Laplace Transforms and Z Transforms.

3. An understanding of Numerical Techniques and Statistical Techniques.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Solve Problems in Engineering domain related to Laplace Transforms
CO-2	Analyse and solve Statistical Techniques.
CO-3	Analyse and solve Numerical Techniques.
CO-4	Understand the different type of numerical technique method
CO-5	Analyse and solve Complex Fourier transform

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ENGINEERING MATHEMATICS-III

SUBJECT CODE: AS 303

Unit	Topic
I	**Laplace Transform** : Laplace transform, Existence theorem, Laplace transforms of derivatives and integrals, Initial and final value theorems, Unit step function, Dirac- delta function, Laplace transform of periodic function, Inverse Laplace transform, Convolution theorem, Application to solve simple linear and simultaneous differential equations.
II	**Statistical Techniques:** Moments, Moment generating functions, Skewness, Kurtosis, Curve fitting, Method of least squares, Fitting of straight lines, Polynomials, Exponential curves, Correlation, Linear, non–linear and multiple regression analysis, Binomial, Poisson and Normal distributions, Tests of significations: Chi-square test, t-test.
III	**Numerical Techniques–I:** Zeroes of transcendental and polynomial equations using Bisection method, Regula-falsi method and Newton-Raphson method, Rate of convergence of above methods. Interpolation: Finite differences, Newton's forward and backward interpolation, Lagrange's and Newton's divided difference formula for unequal intervals.
IV	**Numerical Techniques–II:** Solution of system of linear equations, Matrix Decomposition methods, Jacobi method, Gauss- Seidel method. Numerical differentiation, Numerical integration, Trapezoidal rule, Simpson's one third and three-eight rules, Solution of ordinary differential equations (first order, second order and simultaneous) by Euler's, Picard's and fourth-order Runge- Kutta methods.
V	**Integral Transforms:** Fourier integral, Complex Fourier transform, Inverse Transforms, Convolution Theorems, Fourier sine and cosine transform, Applications of Fourier transform to simple one dimensional heat transfer equations, wave equations and Laplace equations, Z- transform and its application to solve difference equations.

Text/ Reference Books:

1. Peter V. O'Neil, Advance Engineering Mathematics Thomson Learning, 2007
2. Jain, Iyenger & Jain, Numerical Methods for Scientific and Engineering Computation, New Age International, New Delhi.
3. JN Kapur, Mathematical Statistics, S. Chand & company Ltd.
4. BS Grewal, Higher Engineering Mathematics, Khanna Publishers.

रूख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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DEPARTMENT OF CIVIL ENGINEERING

STRENGTH OF MATERIALS

SUBJECT CODE: CE 301

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To provide the basic concepts and principles of strength of materials.
2. To give an ability to calculate stresses and deformations of objects under external loadings.
3. To give an ability to apply the knowledge of strength of materials on engineering applications and design problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the concept of stress and strain under different conditions of Loading.
CO-2	Understanding the shear force and bending moment in beams and understanding bending of beams.
CO-3	Determine the stresses and strains in the members subjected to axial, bending and torsional loads
CO-4	Calculate the slope, deflection and buckling of loaded members
CO-5	Understanding the behavior of thin, thick cylinder and sphere against load.

रख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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STRENGTH OF MATERIALS

SUBJECT CODE: CE-301

Unit	Topic
I	**Stresses and strain-** Hooke's law, tension, compression and shear, composite bars, elastic constants, principal stresses and strains, Mohr's circle, torsion, solid and hollow circular shaft.
II	**Shear force and bending moment –** shear force and bending moment diagrams for simply supported, over-hanged and cantilever beams subjected to moments and varying loads, shear force, bending moments and torque diagrams for inclines beams & brackets subjected to concentrated load, udl, moments and varying loads.
III	**Deflections of beams –** Theory of bending, deflection of beams by Macaulay's method, moment area method and conjugate beam method, theories of failures.
IV	**Strain Energy-** Stain energy, Castigliano's theorem, calculation of deflection in statically determinate beams and trusses, Unit load methods, Williot Mohr's diagram.
V	**Theory of Columns -** Theory of columns – long column and short column, strut, Euler's formula, Rankine's formula, Secant formula, beam column.

Text/ Reference Books:

1. S.Ramamrutham &R.Narayanan (2005), Strength of Materials, DhanpatRai publications.
2. Mechanic of Materials by R.C. Hibbeler, Pearsons
3. Solid Mechanics by S.M.A. Kazimi, Tata Mcgraw Hill.
4. Engineering Mechanics of Solids By E.P. Popov, Pearson Education.

रख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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DEPARTMENT OF CIVIL ENGINEERING

BASIC SURVEYING

SUBJECT CODE: CE 302

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To provide the basic concepts and principles of surveying.
2. To give an ability to calculate bearing and levelling.
3. To give an ability to apply the knowledge of surveying on engineering applications and design problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the fundamental principles of surveying and levelling.
CO-2	Understanding the basic principles of surveying and studying various methods for horizontal and vertical measurements.
CO-3	An in-depth knowledge of triangulation, curves and total station survey.
CO-4	Understanding the area and volume measurement
CO-5	Knowledge on advanced surveying techniques in terms of Photogrammetry and GPS surveying.

BASIC SURVEYING

SUBJECT CODE: CE 302

Unit	Topic
I	**Introduction -** Plane and geodetic surveying; classification of surveying; basic principles; measurement of horizontal distance by conventional methods; taping on sloping ground, offsets, errors and sources of errors, field book. Leveling: definition of terms, leveling principle, leveling instruments, types of spirit leveling, methods of booking and reduction of levels, sensitiveness of level tube, errors in leveling, curvature and refraction correction
II	**Compass Survey -** Introduction, types of bearings and Compasses, conversion of bearings, magnetic declination. Theodolite Traversing: introduction, types of theodolite, definitions of terms, temporary and permanent adjustments, measurement of horizontal angles, methods of repetition and reiteration, measurement of vertical angles, traverse measurement and computation of coordinates, omitted measurements.
III	**Curve surveying –** Definitions, designation of curve, elements of simple curve, setting of simple circular curve, compound and reverse curve, transition curve. Vertical curves.
IV	**Area and volume computation –** computation of area by different methods, estimation of volume of earth work by means of section and contour lines, preliminary and detailed survey for canals, highways, railways, sewer lines.
V	**Geodetic surveying –** Introduction to geodetic surveying, triangulation surveying – base line measurement & correction, satellite stations. Surveying adjustments – principle of least square and adjustments of triangulation network

Text/ Reference Books:

1. Punmia B.C. (1994), Surveying and Levelling, Vol. I & II, Laxmi Publications.
2. Arora, K.R., Surveying, Vol-I, II and III, Standard Book House, 2015.
3. Bhavikatti, S.S., Surveying and Levelling, Vol. I and II, I.K. International, 2010.
4. Manoj, K. Arora and Badjatia, Geomatics Engineering, Nem Chand & Bros, 2011.

ख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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DEPARTMENT OF CIVIL ENGINEERING

FLUID MECHANICS

SUBJECT CODE: CE 303

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. This course deals with the basic concepts of fluid mechanics
2. To give an ability to calculate the fluid pressure.
3. To give an ability to apply the knowledge of fluid mechanics on engineering applications and design problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To understand the properties and behavior of different types of fluids. And also understand the concepts required to analysis fluids.
CO-2	Knowledge to analysis and measure the pressure acting on fluid at rest.
CO-3	To know the concepts required to analysis the fluid motion and the forces associated with it. Knowledge about the methods of flow measurement in pipes.
CO-4	Understanding the methodology for application of the dimensional analysis and model study to understand and solve complex problems associated with fluid flow
CO-5	To understand the boundary layer thickness

FLUID MECHANICS
SUBJECT CODE: CE 303

Unit	Topic
I	**Basic Concepts and Definitions**: Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapour pressure, boiling point, cavitation; surface tension, capillarity, Bulk modulus of elasticity, compressibility.
II	**Fluid Statics** - Fluid Pressure: Pressure at a point, Pascals law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U-Tube Differential Manometer, Micromanometers. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.
III	**Fluid Kinematics**- Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One-, two- and three -dimensional continuity equations in Cartesian coordinates
IV	**Fluid Dynamics**- Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation :venturimeter, orifice meter and pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Dimensional Analysis and Dynamic Similitude - Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number; Buckingham's π-Theorem.
V	**Boundary layers** – Boundary layers, laminar flow and turbulent flow, boaundary layer thickness, momentum integral equation, drag and lift separation of boundary layer, methods of separation of boundary layer.

Text/ Reference Books:

1. Dr. R. K. Bansal, fluid mechanics and hydraulics machines, Laxmi pub. Delhi
2. Hydraulics and Fluid Mechanics, P M Modi and S M Seth, Stand. Book House
3. Er. R.K. rajput, Fluid mechanics, S. Chand & Company Ltd.

रख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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DEPARTMENT OF CIVIL ENGINEERING

BUILDING MATERIAL AND CONSTRUCTION

SUBJECT CODE: CE 304

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. This course deals with the basic properties of building material
2. To give ability to knowledge about stone, bricks cement.
3. To give an ability to apply the knowledge of material behaviour on engineering applications and constructions problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To understand the properties of cement and uses.
CO-2	To know the different type of aggregate and properties
CO-3	To know the mixing of aggregate and different type of aggregate
CO-4	Understanding the origin of rock and manufacturing process of bricks
CO-5	To understand the advanced materials

BUILDING MATERIAL AND CONSTRUCTION

SUBJECT CODE: CE 304

Unit	Topic
I	**Cement –** compounds and propositions, types of Portland cement, pozzolanic cement, high alumina cement and other types, hydration mechanism and hydration products, setting and hardening, curing, strength of hardened cement, grade of cement, tests on cements, relevant BIS codes.
II	**Aggregates -** properties of coarse & fine aggregates, tests on aggregates, relevant BIS codal provisions; Concrete: Ingredients of concrete, properties of fresh and hardened concrete, strength of concrete, W/C ratio & porosity, additives and their types, concrete mix design.
III	**Special concretes -** Reinforced cement concrete, polymer concrete, fiber reinforced concrete, ferrocement, light weight concrete, roller compacted concrete, ready mix concrete, self compacting concrete, high performance concrete, bacterial concrete,
IV	**Bricks & Stones:** Forms of bricks, properties of bricks and stones, tests on bricks and stones, relevant BIS codes; Timber: structure of wood, defects in timber, seasoning, preservation; Plywood and its manufacturing.
V	**Other materials:**Flyash, paints & varnishes, gypsum, tar, bitumen & asphalt, nano materials, smart materials, composit materials, geosynthetics, heat & sound insulating materials, water proofing materials

Text/Reference Books

1. Building Materials by S K Duggal
2. Shetty, M.S (2002), Concrete Technology, S. Chand & Company Ltd.
3. Sharma &Kaul (1998), Building Construction, S.Chand& Company Pvt, New Delhi.
4.American Society for Testing and Materials (ASTM), Annual Book of ASTM Standards (post 2000)

ख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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DEPARTMENT OF CIVIL ENGINEERING

DISASTER MANAGEMENT

SUBJECT CODE: CE 305

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. This course deals with the identify and formulate environment problems
2. To give ability to economic, societal and environment impact assessment
3. To give an ability to apply engineering project management principles and environmental related problems

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	To understand the calculation of risk and frequency
CO-2	To know the different type of disaster
CO-3	To know the disaster impact on social and economical
CO-4	Understanding the disaster risk reduction method
CO-5	To understand the impact of disaster on engineering project

ख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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DISASTER MANAGEMENT

SUBJECT CODE: CE 305

Unit	Topic
I	Introduction - Concepts and definitions: disaster, hazard, vulnerability, risks severity, frequency and details, capacity, impact, prevention, mitigation).
II	Disasters - Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.), hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.
III	Disaster Impacts - Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.
IV	Disaster Risk Reduction (DRR) - Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response.
V	Disasters, Environment and Development - Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, landuse changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction and development methods.

Text/ Reference Books:

1. PradeepSahni, 2004, Disaster Risk Reduction in South Asia, Prentice Hall.

2. Singh B.K., 2008, Handbook of Disaster Management: Techniques &Guidelines, Pub.

3. Ghosh G.K., 2006, Disaster Management, APH Publishing Corporation.

4.Disaster Medical Systems Guidelines. Emergency Medical Services Authority, State

of California, EMSA no.214, June 2003

FLUID MECHANICS LAB
SUBJECT CODE: CE- 351

L-T-P:0-0-2
Credit:1

1. Measurement of viscosity
2. Study of Pressure Measuring Devices
3. Stability of Floating Body
4. Hydrostatics Force on Flat Surfaces/Curved Surfaces
5. Verification of Bernoulli's Theorem
6. Venturimeter
7. Orifice meter
8. Impacts of jets
9. Flow Visualisation -Ideal Flow
10. Length of establishment of flow
11. Velocity distribution in pipes
12. Laminar Flow

BASIC SURVEYING LAB
SUBJECT CODE: CE-352

L-T-P: 0-0-2
Credit: 1

1. Chain Surveying
2. Plane Table Surveying
3. Theodolite Traverse Surveying
4. Leveling / Route Surveying
5. House Setting
6. Setting out a Simple Circular Curve on Field
7. Height Measurement
8. Stadia Survey/ Tachometry
9. Contouring
10. Global Positioning System
11. Total Station

BUILDING, MATERIAL & CONSTRUCTION LAB

SUBJECT CODE: CE- 353

L-T-P: 0-0-2

Credit: 1

1. Brick tests
2. Aggregates test
3. Cement tests
4. Water absorption test
5. Flakiness test
6. Compression test on aggregates.
7. Setting time tests
8. Elongation index

रूख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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CIVIL ENGINEERING DRAWING LAB

SUBJECT CODE: CE-354

L-T-P:0-0-2

Credit: 1

1. Traditional drawing tools
2. Standard engineering lettering
3. Different geometric constructions
4. Types of lines
5. Perspective projections
6. Structural drawing – plan view, elevation view and cross sectional view.
7. Isolated footing and beam longitudinal.
8. Slab and stair reinforcement.

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DEPARTMENT OF CIVIL ENGINEERING

NUMERICAL METHODS

SUBJECT CODE: AS 403

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

 The subject aims to provide the student with:

1. Mathematics Fundamental necessary to formulate, solve and analyse the Engineering Problems

2. Solve Problems in engineering domain related to Roots of Equation, System of Linear Equations Curve Fitting and Ordinary Differential Equations.

3. Analyse and Solve problems related to Numerical Differentiation and Integration

COURSE OUTCOMES

After studying this course, students will be able to:	
CO-1	An understanding the Roots Equations
CO-2	Know the System of Simultaneous Linear Equations
CO-3	An understanding the Curve Fitting and least square regression
CO-4	An Understanding the Numerical Differentiation and Integration.
CO-5	An understanding the Ordinary Differential Equations

रूवाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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NUMERICAL METHODS

SUBJECT CODE: AS 403

Unit	Topic
I	**Roots of equation, Bracketing Methods:** Graphical methods, bisection method, false-position method, open methods: simple one point iteration, Newton Raphson method, secant method, multiple roots, system of non-linear equations.
II	**System of linear algebraic equations:** Gauss elimination method, matrix inversion method, error analysis and system condition, Jacobi method, Gauss Seidel method, LU Decomposition methods, Crout Decomposition, Banded systems, Cholesky Decomposition, eigen values and eigen vectors problems.
III	**Curve fitting: least squares regression:** linear regression, polynomials, lagrange interpolating polynomials, spline interpolation, Newton's Forward, Backward and Central Difference formula, Sterling's formula. Fourier approximation
IV	**Numerical differential and Integration:** Newton-Cotes integration formulas: Trapezoidal rule, Simpson's rule, integration with unequal segments, open integration formulas, Integration of equations: Romberg integration, Gauss Quadrature, improper integrals. Numerical Differentiation: High- Accuracy Differentiation formulas, Richardson extrapolation, Derivatives of unequally spaced data.
V	**Ordinary Differential equations:** Euler's method, modification and improvements of euler's method, Runga – Kutta methods, taylor's series method, boundary value problems. Partial Differential Equations: Finite Difference – Elliptic equations; Laplace equation; Parabolic equation, explicit method, implicit method, Crank – Nicolson method, Parabolic equations in two spatial dimensions.

Text/ Reference Books:

1. Numerical Methods for Engineers; S C Chapra, R P Canale, Tata McGrawHill.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
3. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 35th Edition, 2010.

रूख्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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DEPARTMENT OF CIVIL ENGINEERING

STRUCURAL ANALYSIS-1
SUBJECT CODE: CE 401

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. To give the knowledge of different type of structures.
2. To give an ability to calculate shear force and bending moment of objects under external loadings.
3. To give an ability to apply the knowledge of structure analysis on engineering applications and design problems.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Explain type of structures and method for their analysis. Three moment theorem
CO-2	Apply the concept of strain energy method and draw the shear force and bending moment diagram
CO-3	Apply the concept of slope deflection method
CO-4	Apply the concept of moment distribution method
CO-5	Apply the concept of influence lines and moving loads to compute bending moment and shear force at different sections.

रूख्वाजा मुईनुद्द्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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STRUCTURAL ANALYSIS - I
SUBJECT CODE: CE -401

Unit	Topic
I	Theorem of Three Moments: Static indeterminancy - Theorem of three moments- analysis of propped cantilevers- fixed & continuous beam - bending moment and shear force diagram.
II	Strain Energy Method: Static indeterminancy - Strain energy method - analysis of indeterminate structures, beams, pin jointed and rigid jointed structures - temperature effect - bending moment and shear force diagram.
III	Slope Deflection Method: Kinematic indeterminancy- Slope deflection method - analysis of continuous beams and portals - bending moment and shear force diagram.
IV	Moment Distribution Method Moment distribution method - analysis of continuous beams and portals - bending moment and shear force diagram
V	ILD and its application to determinate structures: Beams, trusses & 3-hinged arches, uses of ILD to statically determinate beams, trusses & arches.

Text/ Reference Books:

1. Structural Analysis by Pandit& Gupta, Tata McGrawHill.
2. Intermediate Structural Analysis by C. K. Wang, Tata McGrawHill.
3. S.Ramamrutham (2004), Theory of structures, DhanpatRai publications.
4. B.C.Punnia, Ashok kumar Jain &Arun Kumar Jain (2005), Theory of Structures, Laxmi Publications, India

रख़्वाजा मुईनुद्दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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DEPARTMENT OF CIVIL ENGINEERING

ADVANCE SURVEYING

SUBJECT CODE: CE 402

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. The course deals with the basics of surveying and levelling, concepts of total station
2. To provide knowledge on Photogrammetric and GPS surveying.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	In depth knowledge of field astronomy
CO-2	In-depth knowledge of triangulation for establishing accurate ground control points.
CO-3	Knowledge on concept of total station survey and EDM.
CO-4	Understand various applications, concepts of photogrammetric and get acquainted with GPS surveying
CO-5	Knowledge on advanced surveying techniques in terms of Photogrammetric and GPS surveying.

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Khwaja Moinuddin Chishti Language University, Lucknow, U.P. (India)

U.P. STATE GOVERNMENT UNIVERSITY,

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ADVANCE SURVEYING

SUBJECT CODE: CE 402

Unit	Topic
I	**Field Astronomy:** Astronomical terms, coordinate systems, solution of astronomical triangle; kinds of time, conversion of time; corrections to the observed altitude; determination of azimuth and latitude.
II	**Triangulation:** Principle & classification, triangulation figures and systems, selection of stations; inter-visibility and height of stations; satellite station and reduction to centre. Trigonometrical Levelling: plane and geodetic observations.
III	**Electronic Distance Measurement (EDM):** Importance, principle, classification; Applications of total station. GPS: Introduction, principle and applications, errors and adjustments.
IV	**Photogrammetry:** Basics of Photogrammetry Types of Photogrammetry and Interpretation Photomaps & Mosaics – Tilted photographs – Oblique and panoramic photographs – Terrestrial photogrammetry – around controls – photographic interpretations.
V	**Remote Sensing:** Introduction, principles, electromagnetic energy and its interaction with matter; sensors and platforms, image interpretation. **Geographic information system (GIS):** Overview, definition, components, data models.

Text/ Reference Books:
1. Surveying, B. C. Punmia and Jain Vol. 2 & 3 Laxmi Publications, New Delhi.
2. Advanced Surveying, Agor, Khanna Publications, Delhi.
3. Surveying-Bannister, Raymond and Baker, Pearson Education
4. Wolf, P.R., (1998), Elements of Photogrammetry, Mc.Graw – Hill International Book Company

DEPARTMENT OF CIVIL ENGINEERING

HYDRAULICS AND HYDRAULICS MACHINES
SUBJECT CODE: CE 403

L-T-P: 3-1-0

Credit: 4

COURSE OBJECTIVES

1. This course deals with the basic concepts of hydraulic and machines for engineering applications.
2. To understand the working principle of common fluid machines, particularly hydraulic machines.
3. To give an ability to apply the knowledge of hydraulic machine on engineering applications and problems

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understanding the methodology for application of the dimensional analysis and model study to understand and solve complex problems associated with fluid flow.
CO-2	To kwon the properties of turbulent flow and solve complex problem associated with turbulent flow
CO-3	To kwon the properties of turbulent flow and solve complex problem associated with turbulent flow
CO-4	Understand the behavior of open channel flow and types
CO-5	To know the working principle of turbines and pumps.

रूवाजा मुईनुद्‌दीन चिश्ती भाषा विश्वविद्यालय, लखनऊ, उत्तर प्रदेश (भारत)

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HYDRAULICS AND HYDRAULICS MACHINES

SUBJECT CODE: CE 403

Unit	Topic
I	**Dimensional and Model Analysis:** Dimensional analysis and its utility; Buckingham's pi theorem and Raleigh's method and their application to fluid flow problems; Dimensionless parameter in fluid flow and their relevance; Similarities: Application of dynamic similarity to model investigations, scale ratio for distorted model.
II	**Laminar Flow-** Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity.
III	**Turbulent Flow-** Reynolds experiment, Transition from laminar to turbulent flow. Definition of turbulence, scale and intensity, Causes of turbulence, instability, mechanism of turbulence and effect of turbulent flow in pipes. Reynolds stresses, semi-empirical theories of turbulence, Prandtl's mixing length theory, universal velocity distribution equation. Resistance to flow of fluid in smooth and rough pipes, Moody's diagram.
IV	**Uniform Flow-**Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Factors affecting Manning's Roughness Coefficient "n. Most economical section of channel. Computation of Uniform flow, Normal depth.
V	**Pumps:** Reciprocating Pumps, working principal of both double and single reciprocating pump, indicator diagram frictional loss, centrifugal pump, their advantages over reciprocating pump, classification of centrifugal pump, operation of centrifugal pump in series and parallel. **Turbine:** General layout of hydroelectric power plant, impulse and reaction turbines, efficiency of turbines, classification based on discharge, head and specific speed, unit power and unit discharge

Text/ Reference Books:
1. Fluid Mechanics by Daugherty, Robert L., McGraw Hill.
2. Fluid Mechanics by A.K.Jain, Khanna Publishers.
3. V.T.Chow (1996), Open Channel Hydraulics, McGraw Hill Publishing Co.
4. Modi & Seth (2001), Fluid Mechanics and Hydraulic Machinery, Standard Publications.

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DEPARTMENT OF CIVIL ENGINEERING

CONCRETE TECHNOLOGY
SUBJECT CODE: CE 404

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. This course deals with the basic concrete properties and concrete materials
3. To give an ability to apply the knowledge of concrete technology on engineering applications and problems

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the properties of constituent material of cement and different type of cement
CO-2	Understand the properties of aggregates and different type of aggregates
CO-3	Understand the properties of constituent material of concrete and different type of concrete
CO-4	Understand the strength of concrete and water cement ratio
CO-5	Design the concrete mix for various strengths using difference methods

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CONCRETE TECHNOLOGY

SUBJECT CODE: CE 404

Unit	Topic
I	**Properties of Cement -** Manufacturing, Types of cement, Properties of Cement Testing of Cement, Field Testing, Laboratory Testing methods, Setting properties of cement, soundness of cement, fineness and compressive strength of cement, cement mortar tests, Heat of Hydration
II	**Aggregates Fine aggregate and coarse aggregate–** Properties and testing methods , Bulking of Sand , sieve analysis , fineness modulus , properties and uses.
III	**Concrete Production Selection of materials for concrete -** water cement ratio , Properties of fresh concrete, workability, measurement of workability, process of manufacture of concrete, Statistical and quality control of concrete
IV	**Strength of concrete Strength of concrete –** gain of strength with age – testing of hardened concrete, Compressive strength, Tensile strength , Flexural strength – modulus of elasticity of concrete , Introduction to NDT Techniques , Stress and Strain characteristics
V	**Mix design & Different types of concrete-** Concrete mix design, concepts variables in proportioning, methods of mix design, Indian Standard method, Factor affecting the test results, Introduction to high performance concrete, high strength concrete, light weight concrete, Fibre reinforced concrete

Text/ Reference Books:

1. Shetty M.S. (2002), Concrete Technology, S. Chand & Company Ltd.
2. IS : 383 – 1970, Specification for Coarse and fine natural sources for Concrete, BIS, New Delhi.
3. IS : 12269-1987, Specification for 53 grade ordinary Portland Cement, BIS, New Delhi.
4. P.K.METHA (2005), Concrete: Microstructure, properties and Materials, Mcgraw-Hill

DEPARTMENT OF CIVIL ENGINEERING

COMPUTER AIDED DESIGN

SUBJECT CODE: CE 405

L-T-P: 2-0-0

Credit: 2

COURSE OBJECTIVES

1. This course deals with the basic Principles of software design
3. To give an ability to apply the knowledge of design of civil structures and problems

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Understand the hardware required for computer aided design work
CO-2	Understand the Principles of software design
CO-3	Understand the Computer applications in analysis and design of civil engineering structure
CO-4	Understand the Use of software in the area of structural, geotechnical and environmental fields
CO-5	To know the neural networks.

COMPUTER AIDED DESIGN

SUBJECT CODE: CE 405

Unit	Topic
I	Elements of computer aided design and its advantages over conventional design, Types of hardware required for CAD works.
II	Principles of software design, concept of modular programming, debugging and testing.
III	Computer applications in analysis and design of civil engineering systems.
IV	Use of software packages in the area of structural, geotechnical and environmental fields.
V	Expert system, their development and applications. Introduction to neural networks.

Text/ Reference Books:

1. Neural computing- waserman, Vonnostrand.
2. A.I. and expert system- Robert L. Lerine & Iane E Drang. Tata Mcgraw hill publications.
3. Computer aided design, S. Rajiv, Narosa publications.

DEPARTMENT OF CIVIL ENGINEERING

COMMUNICATION SKILLS

SUBJECT CODE: HS 401

L-T-P: 2-0-0

Credit: 0

COURSE OBJECTIVES

The objectives of this course are:
1. To provide an overview of Prerequisites to Business Communication.
2. To put in use the basic mechanics of Grammar.
3. To provide an outline to effective Organizational Communication.
4. To underline the nuances of Business communication.
5. To impart the correct practices of the strategies of Effective Business writing.

COURSE OUTCOMES

After studying this course, students will be able to:

CO-1	Discuss the importance of effective communication in business Effective Communication in Business
CO-2	Be effective communicators and participate in group discussions with confidence. Also be able to make presentations in a professional context.
CO-3	Write resumes, prepare and face interviews confidently. Make the transition smoothly from campus to corporate.
CO-4	Discuss the usefulness of visual aids and identify common presentation tools
CO-5	Identify key principles of effective public speaking Create formal reports and proposals

COMMUNICATION SKILLS
SUBJECT CODE: HS-401

Unit	Topic
I	**Introduction to Communication:** Need for effective communication, Functions of Communication and Induction to the students **The Fundamentals of Communication:** Communication Cycle, Levels of communication; Flow of communication; Communication networks; General and Technical Communication.
II	**Barriers to Effective Communication**: Miscommunication; Noise; Types of barriers; Communication across Culture, case Studies and Overcoming measures. **Non-verbal Communication and Body Language:** Forms of Non-verbal communication; Kinesics; Proxemics; Chronemics and Effective use of body language. **Grammar and Vocabulary:** Tenses, Determiners, prepositions, conjunctions, Model Auxiliaries, concord, active and passive voice, Homonyms, Homophones, Acronyms (general abbreviations).
III	**Presentation Skills:** 4Ps (Planning, Preparation, Practice, Presentation), Outlining; Effective use of A/V aids and Modes of Delivery **Listening Skills:** Hearing Vs listening, process of listening, types, Barriers to Listening, Qualities of a Good Listener and Active Vs Passive Listening **Telephone Skills :**Telephonic Communication: Do's and Don'ts
IV	**Speaking Skills:** Introducing yourself, Describing a person, place, situation and event, Giving instruction, Making inquiries – at a bank, post-office, air-port, hospital, reservation counter and role play **Writing Skills:** Basics of Writing, Paragraph Writing, Precise Writing, Memos, Advertisements, Paraphrasing and Summarizing **Study Skills:** Taking/making notes from reference Materials, Comprehending and Describing- Graphs and charts
V	**Letter Writing:** Informal Letter,(Formal)Business Letters: Essential and Occasional Parts of a letter, layout, Characteristic and Letter of Inquiry, Complaint and Adjustments, orders and replies of it **Report Writing:** Format ,Structure and Types, Technical Reports, Description and Proposal **Reading Skills:** Skimming and Scanning, Intensive and Extensive Reading, Poor habits of reading and The SQ3R Method **Computer Assisted Language Learning:** Effective e-mail messages and power-point presentation

Text/ Reference Books:

1. Muralikrishna C., Sunita Mishra "Communication Skills for Engineers" 2nd edition, Pearson, Delhi
2. Vyas Manish A., Yogesh L. Patel, "Tasks for the English Classroom", MacMillan, New Delhi, 2012.
3. Achar Deeptha, Charul Jian and et al, English for Academic Purposes,Book-1&2 University Gujrat

DEPARTMENT OF CIVIL ENGINEERING

HYDRAULICS LAB
CE-451

L-T-P: 0-0-2

Credit: 1

1. Performance Characteristics of a Centrifugal Pump (Rated Speed)
2. Performance Characteristics of Centrifugal Pump (Variable Speed)
3. Performance Characteristics of a Jet Pump
4. Performance Characteristics of a Self Priming Pump
5. Performance Characteristics of a Reciprocating Pump
6. Performance Characteristics of a Submersible Pump
7. Performance Characteristics of a Gear Pump
8. Characteristics Test on Pelton Turbine
9. Characteristics Test on Francis Turbine
10. Characteristics Test on Kaplan Turbine

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DEPARTMENT OF CIVIL ENGINEERING

ADVANCE SURVEYING LAB
SUBJECT CODE: CE-452

L-T-P: 0-0-2

Credit: 1

1. Angle measurements using Theodolite (Horizontal & Vertical Angle)
2. Fly levelling – Longitudinal & Cross Sectional leveling
3. Stadia tachometry
4. Tangential Tachometry
5. Curve setting – Simple Circular Curve
6. Contouring
7. Distance & angular measurement with Total Station
8. Co-ordinates and distance measurement with GPS.

DEPARTMENT OF CIVIL ENGINEERING

STRUCTURE ANALYSIS LAB -I
SUBJECT CODE: CE-453

L-T-P: 0-0-2

Credit: 1

1. Beam analysis.
2. Truss analysis
3. Two hinge arch analysis
4. Three hinge arch analysis
5. Beam with udl analysis
6. Beam with point load analysis
7. Gable analysis
8. Truss analysis

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DEPARTMENT OF CIVIL ENGINEERING

COMMUNICATION SKILLS LAB

SUBJECT CODE: HS-454

L-T-P: 0-0-2

Credit: 1

1. Competency Test: Computer based Test
2. Interpersonal Communication: Ice breakers, Jumble story
3. Listening Skill: Practice
4. Reading Skill: Practice and Test
5. Functional Grammar Practice and Test
6. Speaking Practice: Role Play and Communicative Activities
7. Letter writing: Practice and Test
8. Technical Report writing
9. E-mail Writing
10. Presentation Practice