

Sanjay Ghodawat University

Kolhapur



School of Engineering & Technology
Department of Civil Engineering

B. Tech. Civil Engineering
(Third Year)

Curriculum Book

(Programme Structure and Course Contents)

Academic Year 2024 -25



THIRD YEAR

A.Y. 2024 - 25

Semester V						
Course Code	Course Title	C	Evaluation Scheme			
			Component	Exam	Wt %	Min. Passing %
UCE501 (PC)	Design of Steel Structures	4	Theory and Practical	FET	50	40
				ESE	50	40
UCE502 (PC)	Environmental Engineering	4	Theory and Practical	FET	50	40
				ESE	50	40
UCE503 (PC)	Foundation Engineering	4	Theory and Practical	FET	50	40
				ESE	50	40
UCE-X (PE-II)	Program Elective – I	4	Theory and Practical	FET	50	40
				ESE	50	40
UOE-X	Uni. Open Elective-I	4	Theory and Practical	FET	50	40
				ESE	50	40
NCMC	Industrial Safety Training	-	Practical	FEP	100	40
		20	Total Credits:20			

Program Elective – I	
UCE551	Advanced Building Materials
UCE552	Numerical Methods

University Open Elective I	
Course Code	Course title
UOE551	Renewable Energy (Mech)
UOE 552	Water Power Engineering (Civil)
UOE 553	Fundamental of Aeronautical Engineering (Aero)
UOE 554	Internet of Things (Elec)



Semester VI						
Course Code	Course Title	C	Evaluation Scheme			
			Component	Exam	Wt %	Min. Passing %
UCE601 (PC)	Construction Management	4	Theory and Practical	FET	50	40
				ESE	50	40
UCE602 (PC)	Design of Concrete Structures	4	Theory and Practical	FET	50	40
				ESE	50	40
UCE603 (PC)	Design of Steel Structures Lab and Software Proficiency Lab	4	Theory and Practical	FET	50	40
				ESE	50	40
UCE-X (PE-IV)	Program Elective-II	4	Theory and Practical	FET	50	40
				ESE	50	40
UOE -X	Uni. Open Elective II	4	Theory and Practical	FET	50	40
				ESE	50	40
(NCCM)	Creativity and Innovations	NC	Practical	FEP	100	40
		20	Total Credits:20			

Program Elective – II	
UCE651	Advanced Fluid Mechanics
UCE652	Advanced Surveying
UCE653	Site Investigation and Soil Exploration
UCE654	Computational Fluid Dynamics

University Open Elective II	
Course title	Course title
UOE651	Total Quality Management (Mech)
UOE 652	Construction Project Management (Civil)
UOE 653	Flying Vehicle Aerodynamics (Aero)
UOE 654	Automotive Electronics (Elec)



Contents

Design of Steel Structures	4
Environmental Engineering.....	7
Foundation Engineering.....	9
Advanced Building Material.....	13
Numerical Methods	16
Construction Management.....	19
Design of Concrete Structures	21
Design of Steel Structure and Software Proficiency Lab	23
Advanced Fluid Mechanics.....	26
Site Investigation and Soil Exploration.....	28



Course Code UCE501	Course Title Design of Steel Structures (Program Core School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
3	-	1	4	Theory and Practical	FA	50	40%	40%
					SA	50	40%	

Course Description:
This includes structural behavior of steel member subjected to different nature of force (Axial tension, axial compression, flexural and moving loads etc.). Analysis and design of end connections may be bolted or welded for each structural steel element. Also, in this course study of structural behavior of steel member beyond the elastic limit.

Course Learning Outcome(s)	
<i>At the end of this course students will able to:</i>	
CLO1	Explain ² behavior of structural steel elements and the design philosophies and Analyze ⁴ and design ⁵ bolted and welded connections in steel structures
CLO2	Analyze ⁴ and design ⁵ of structural steel tension, compression members
CLO3	Analyze ⁴ and design ⁵ column and column bases
CLO4	Analyze ⁴ and design ⁵ beams and gantry girder and plastic analysis of steel member

UNIT	DESCRIPTION	HOURS
I	Introduction to Design of steel structures: a) Design Philosophy, comparison of LSM & WSM, advantages and disadvantages of steel structures, types of steel structures, grades of structural steel, various rolled steel sections, loads and load combinations partial safety factors for load and materials, load calculation for roof trusses Types of bolts & welds, analysis and Design of axially and eccentrically loaded bolted and welded connections (subjected to bending and torsion)	6



II	Tension Members: Common sections, Net area, modes of failure, load carrying capacity, Design of axially loaded tension members, Design of end connections (Bolted and welded)	6
III	Compression Members as Struts: Common sections, economical sections, effective length, slenderness ratio, modes of failure, classification of cross section, behavior of compression member, load carrying capacity, Design of compression members.	6
IV	Columns: Design of column subjected to axial and eccentric loading, design of lacing, battening system, column splices, Column Bases Design of slab bases & gusseted base subjected to axial and eccentric load and design of concrete pedestal	6
V	Beams: Types of sections, behavior of beam in flexure, design of laterally supported, unsupported beams and built-up beam using flange plates, curtailment of flange plates, check for deflection, shear, web buckling & web crippling. Secondary and main beam arrangement, beam to beam connections Gantry girder: Forces acting on gantry girder, commonly used sections, design of gantry girder as laterally unsupported beam, connection details	6
VI	Plastic Analysis: Plastic analysis of steel structures, shape factor, plastic hinge, collapse mechanism, upper bound theorem and lower bound theorems, application to continuous beam, single bay single storied rectangular frame	6

Laboratory Work	
1	Three numerical/design-based assignment on each unit
Text Books	
1	Dr. M. R. Shiyekar, Limit state design in structural steel, PHI publications.
2	S.S. Bhavikatti, Design of steel structure by Limit State Method as per IS: 800-2007, I K International Publishing House, New Delhi.
References	
1	K.S. Sairam, Design of Steel Structures, Pearson
2	S.K. Duggal, Limit State Design of Steel Structures, Tata Mc-Graw Hill India Publishing House



3	N.Subramanian, Design of steel structures, Oxford University Press
4	S. Ramamrutham, Design of Steel structures, Dhanapat Rai, Publication



Course Code UCE502	Course Title Environmental Engineering (Program Core School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
3	-	2	4	Theory and Practical	FA	50	40%	40%
					SA	50	40%	

Course Description:
This course provides knowledge about water supply Engineering and sanitary engineering. It also focuses on the design of water treatment and waste water treatment plant units.

Course Learning Outcome(s)	
<i>At the end of this course students will able to:</i>	
CLO1	Describe ³ the various sources of water with respect to quality and quantity of water.
CLO2	Describe ⁴ and design the various water treatment units.
CLO3	Explain ³ sources, characteristics and methods of wastewater collection.
CLO4	Design ⁴ the primary and secondary wastewater treatment units.

UNIT	DESCRIPTION	HOURS
I	Sources of water, demand of water, factors affecting demand, fluctuations in demand, rate of water consumption, design period & population forecast. Water quality parameters, drinking water quality standards- BIS, WHO Standard	6
II	water treatment process: Aeration, Coagulation & Flocculation, Sedimentation- types of sedimentation tanks, Filtration, Types of filters, Multimedia & Pressure filter, Disinfection- methods of disinfection	6
III	Water distribution systems, method of distributing water, layout pattern, Water supply appurtenances, maintenance & leak detection of water distribution system.	6



IV	Wastewater: Components of wastewater flows, wastewater sources and flow rate, Variations inflow rates and strength, wastewater constituents, Characteristic of Municipal waste water, Sewerage system	6
V	Primary Treatment: Screening, comminuting, Grit removal, Oil and Grease trap Primary settling tank. Secondary Treatment: Activated sludge process, Process design and operating parameters, modification of ASP, Concept of trickling filter, Secondary	6
VI	Sludge: Characteristics, Treatment and disposal, Stream pollution: Classification, Concept of Self Purification and DO sag curve. Disposal of wastewater: methods, effluents standards for stream and land disposal as per MPCB and Concept of environmental impact assessment.	6

Laboratory Work	
1	One assignment on each unit
Text Books	
1	Peavey, H. S. Rowe, D.R., Environmental Engineering, McGraw-Hill Book
2	Viessman W. and Hammer M.J. Water supply and pollution Control, Harper
3.	Water Supply Engineering by S. K. Garg, Khanna Publishers, New Delhi
4.	Water Supply Engineering by Dr. B. C. Punmia, Laxmi Publishers, New Delhi
References	
3	Water Supply Engineering by Dr. P. N. Modi, Standard Book House, New Delhi
2	Waste water Engineering, P. N. Modi.
3	Viessman W. and Hammer M.J. Water supply and pollution Control, Harper
4	Prestressed concrete-Sinha & Roy S.Chand & Co. New Delhi



Course Code UCE503	Course Title Foundation Engineering (Program Core School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
3	-	2	4	Theory and Practical	FA	50	40%	40%
					SA	50	40%	

Course Description:
The course will focus on the design of shallow foundation and axially loaded pile foundation. The field and laboratory soil testing methods will be discussed to determine the required design parameters. Lateral earth pressures theories and design of various retaining structures will be covered. The selection of proper foundation or characteristics of foundations for different soils will be discussed.

Course Learning Outcome(s)	
<i>At the end of this course students will able to:</i>	
CLO1	Identify² the investigation plan to explore the subsurface
CLO2	Define² and calculate³ load bearing capacity by using different classical theories
CLO3	Discuss³ different types of shallow foundations and design those. Predict the possible settlement of foundations
CLO4	Explain² well foundation, caissons, sheet piles and coffer dams

UNIT	DESCRIPTION	HOURS
I	Necessity, Planning, No & depth of bore holes, Exploration Methods(auger boring (hand and continuous flight augers), and wash boring, rotary drilling. Soil sampling (disturbed and undisturbed)	6
II	Definitions, Modes of failure, Terzaghi's bearing capacity theory, I.S. Code method of bearing capacity evaluation & computation (IS 6403), Effect of various factors on bearing capacity(Size & Shape, Depth, WT, Eccentricity),	6



	Bearing capacity evaluation from Plate load test, S.P.T. (By I.S. Code method) and pressure meter tests with detailed procedure	
III	Types and their selection, minimum depth of footing, Assumptions & limitations of rigid design analysis. Design of Isolated, combined, strap, footing (Rigid analysis), Raft foundation (elastic analysis), floating foundations (R.C.C. Design is not expected) Foundation Settlement: computations from I.S. 8009 (1976 (Part I) approach, consolidation, Settlement computations, Concept of total settlement, differential settlement and angular distortion	6
IV	Classification and their uses, single pile capacity evaluation by static and dynamic methods, pile load test. Negative skin friction, Group action piles, spacing of piles in a group, Group efficiency. Under reamed piles – equipment, construction and precautions	6
V	Element of wells, types, methods of construction, tilt and shift, remedial measures, Pneumatic caissons: sinking method (Sand island method, Caisson disease. Types and material used for sheet piling, Common types of cofferdams, Soil pressure distribution, Braced cofferdam	6
VI	Slope classification, slope failure, modes of failure. Infinite slope in cohesive and cohesion less soil, Taylor’s stability number, Swedish slip method and concept of Friction circle method, Landslides	6

	Laboratory Work
1	One assignment on each unit
	Text Books
1	K. R. Arora, “Soil Mechanics and Foundation Engineering” Standard Publication.
2	Punmia, B. C., Jain A. K., and Jain A. K Soil Mechanics and Foundations, Laxmi Publications.
	References



1	Alam Singh, “Text book of soil mechanics in theory and practice” Asian Publishing House, Bombay.
2	N. S. Murthy, “Soil mechanics and Foundation engineering” by V., U. B. S. Publishers and distributors New Delhi.
4	P. Purushottam Raj, “Geotechnical Engineering”, Tata Mcgraw Hill Company Ltd. New Delhi



Program Elective I



Course Code UCE551	Course Title Advanced Building Material (Program Core School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
3	-	2	4	Theory and Practical	FA	50	40%	40%
					SA	50	40%	

Course Description:
This is a mainly practical course aimed to get knowledge of Advanced Building Material and areas within engineering.

Course Learning Outcome(s)	
<i>At the end of this course students will able to:</i>	
CLO1	Acquire² skills in basic engineering practices (Use of different types of machines, tools and equipment)
CLO2	Identify various building materials according to their requirements and applications
CLO3	Select various building materials according to use, site specifications and available market forms and sizes, colour, etc
CLO4	Apply various building materials according to use, site specifications

UNIT	DESCRIPTION	HOURS
I	1.1 Factors affecting the selection of floor finishes 1.2 Types of flooring and their uses, Wood - Strip flooring, block flooring, Timber board, Timber Sheet, etc Tiles – Vitrified, Mosaic, Ceramic, Linoleum, Thermoplastic tiles, Flexible PVC Tiles, Cork, tiles, quarry tiles, rubber tiles Terrazzo, marble finish, IPS, Kota, Granite, Cement Concrete Tile, Asbestos tile 1.3 Requirements and uses of the following types of wall finishes. Materials: 1. Wall papers	6



	2. Cement mortar plaster 3. Tiles 4. Gypsum plaster 5. Stucco plaster 6. Special External Finishes for plaster surface • Rough cast • Smooth cast • Barium plaster	
II	<p>Requirements & uses of the following ceiling materials:</p> <p>1. Ply wood 2. Hard board 3. Plain A.C. Sheet 4. Fiber board 5. Asbestos tiles 6. Glass roof tiles 7. Thermocole sheets 8. Gypsum plaster board 9. Sprayed plaster 10. Fiber Glass</p> <p>2.2 Standard sizes, uses & their requirements:</p> <p>1. G.I. Sheet 2. Mangalore tiles 3. Acrylic Sheet 4. PVC Sheet</p>	6
III	<p>3.1 Types, sizes & uses of building fixtures and hardware as per ISI.</p> <p>1. Tower bolt 2. Hinges 3. Door handles 4. Door springs & Floor springs 5. Latches 6. Aldrop 7. Floor door stopper 8. Locks 9. Door closer 10. Patch Fittings (all fittings for glass) 11. Wire mesh (mosquito & fly proof) 12. Magic eye (eye hole)</p> <p>3.2 Painting and Objectives for painting</p> <p>3.3 Characteristics of an ideal paint</p> <p>3.4 Ingredients of an oil borne paint</p> <p>3.5 Types , Requirement & uses</p> <p>1. Aluminium Paint 2. Anti Corrosive Paint 3. Cellulose Paint 4. Cement Paint 5. Emulsions 6. Oil Paints 7. Water based paints 8. Plastic Paints 9. Synthetic Rubber Paint 10. Silicate Paint 11. Enamel Paint</p> <p>3.6 Failure of paint.</p> <p>3.7 Defects in Painting</p> <p>3.8 Varnishing & its objectives</p> <p>3.9 Characteristics of an ideal Varnish.</p> <p>3.10 Ingredients of a varnish.</p> <p>3.11 Types of varnishes, Requirement & uses of different types of varnishes</p>	6



IV	4.1 Roofing Tiles 4.2 Earthenware products 4.3 Stoneware products 4.4 Terra cotta and other clay wares, porcelain 4.5 Asbestos cement sheets 4.6 A.C. Pipes 4.7 Cement hollow blocks, cement grills (jalis) & decorative post for railing	6
V	5.1 Steel - Properties, uses of different types of Steel (1) C.I.(2) W.I.(3) M.S. 5.2 Different forms of M.S. Sections. 5.3 Various categories of steel. 5.4 Advantages of Tor Steel over Mild Steel (M.S)	6
VI	6.1 Aluminum 6.2 Properties & uses of Aluminum 6.3 Aluminum alloys- Properties & uses 6.4 Different market forms of Aluminum	6

	Laboratory Work
1	One assignment on each unit
	References
1	Engineering Materials (Material Science) S.C Rangwala Charotar Publications, Anand
2	Building Construction B.C.Punmia Laxmi Publications Pvt Ltd.
	Indian Architect & Builder Magazine/Journal Jasubhai Media Publications Ltd,



Course Code UCE552	Course Title Numerical Methods (Program Core School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
3	-	2	4	Theory and Practical	FA	50	40%	40%
					SA	50	40%	

Course Description:
This course is a basic course offered to UG student of Civil Engineering. It contains solution of system of linear equations, roots of non-linear equations, interpolation, numerical differentiation and integration. It plays an important role for solving various civil engineering problems. Therefore, it has tremendous applications in diverse fields in civil engineering.

Course Learning Outcome(s)	
<i>At the end of this course students will able to:</i>	
CLO1	Discuss² various aspects of MATLAB/Scilab and their utility as tool in coding various numerical methods.
CLO2	Calculate³ roots of the equation
CLO3	Solve² linear algebraic equations
CLO4	Discuss² curve fitting, numerical integration

UNIT	DESCRIPTION	HOURS
I	Introduction: Mathematical modeling in engineering problem solving, approximations and different types of errors, Taylor series, introduction to MATLAB programming, introduction to Scilab	6
II	Roots of Equations: Roots of algebraic and transcendental equations: Bracketing methods – bisection method, false position, Open methods – Newton Raphson, application: Analysis of electrical circuits using above methods.	6



III	Linear Simultaneous Algebraic Equations: Cramer’s rule, Gauss elimination – pit falls and remedies, Gauss-Seidal, Gauss-Jordan method, Newton Raphson method. Introduction to eigen value and eigen vectors and iterative method to estimate the m application: solving resistive networks.	6
IV	Curve Fitting: Interpolation - Newton’s polynomial, Lagrange polynomial	6
V	Numerical Integration and Differentiation: [04 Hrs] [02 Hrs] Integration: Newton-Cotes formulae - Trapezoidal rule, Simpson’s Rule, application: calculation of RMS values.	6
VI	Ordinary Differential Equations: Euler’s method, Modified Euler’s method, Runge-kutta methods.	6

	Laboratory Work
1	One assignment on each unit
	Text Books
1	Numerical Methods In Engineering & Science, by BS Grewal, Khanna Publishers, New Delhi, India.
2	
	References
1	Steven Chapra, Raymond P. Canale, “Numerical Methods for Engineers”, McGrawHill International Student Edition.
2	Santosh K. Gupta, “Numerical Methods for Engineers”, Wiley Eastern.
3	S. S. Sastry, “Numerical Methods”, Prentice Hall of India, New Delhi (3rd edition)
4	Rudra Pratap, “MATLAB Programming” Tata McGraw Hill, NewDelhi.



Semester VI



Course Code UCE601	Course Title Construction Management (Program Core School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
3	-	1	4	Theory and Practical	FA	50	40%	40%
					SA	50	40%	

Course Description:
This course will cover the basic concepts in construction management with a focus on construction projects. The Pre-requisites of this course are Basic Mathematics with Probability and Statistics.

Course Learning Outcome(s)	
<i>At the end of this course students will able to:</i>	
CLO1	Explain importance management in construction field
CLO2	Apply the knowledge Quantitative Techniques, quality management and safety management in civil engineering field
CLO3	Apply the knowledge of engineering economy in civil engineering field
CLO4	Explain importance of material and resources management

UNIT	DESCRIPTION	HOURS
I	Introduction To Management: Principles of Management (Henry Fayol), Functions of Management: Planning- Organizing , Staffing Directing Supervision, Coordination, Communication, Motivation, Leading Controlling –Decision Making: Process, introduction to decision tree	6
II	Quantitative Techniques: Linear Programming – Simple LP model, Graphical Method, Simplex Method (Concept Only), Transportation Problem, optimality test, Assignment Model. (Balanced and Unbalanced problem), Sensitivity Analysis (Concept Only)	6
III	Safety management: Introduction, causes of accidents, costs of accidents, safety	6



	health management, safety audit, PPE, Workman’s Compensation act, Child Labour act, Minimum Wages Act.	
IV	Engineering Economics: Importance, Time Value of Money, Equivalence Cash flow diagram, types of interest, Economic Comparison Methods: Present Worth Method, EUAC method, , Net Present Value, Rate of Return, Benefit- Cost Ratio, Payback Period Method, Capitalized Cost method and Linear Break Even Analysis	6
V	Material Management :- Objectives, need for Inventory Control, EOQ Analysis, ABC analysis, Safety Stock, Purchase Procedure, Stores Record, site layout, Factor Affecting site layout	6
VI	Quality Management: Importance, Dimensions of quality, Concept of QA, QC, Quality Circle. Sampling and Testing, QMS- purpose. Work study concept.	6

Laboratory Work

- 1 At least two assignment on each unit
- 2 Visit Report regarding safety management on site
- 3 Visit Report regarding site lay out.
- 4 Prepare Site layouts for
 - a) Multi storey building b) Dams project c) Bridge project
- 5) Visit Report on material management on site

Text Book

1. Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGraw Hill Publishing Company, New Delhi, 1998.

References

1. Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.
2. Calin M. Popescu, Chotchai Charoenngam, Project Planning, Scheduling and Control in Construction: An Encyclopedia of terms and Applications, Wiley, New York, 1995
3. Jha, Kumar Neeraj., Construction Project management, Theory & Practice, Pearson Education India, 2015.
4. Engineering Economics – Layland Blank and Torquin.



Course Code UCE602	Course Title Design of Concrete Structures (Program Core School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
3	-	1	4	Theory and Practical	FA	50	40%	40%
					SA	50	40%	

Course Description:
This course provides knowledge about different types of RC element design. The course shall be taught using a combination of lectures, interactive tutorials. This course focuses on the principles of design of Beam, column, slab, footing, staircase etc. It also focuses on the analysis, design and construction aspects of RC building elements.

Course Learning Outcome(s)
<i>At the end of this course students will able to:</i>
CLO1 Extend ³ the concept shear, bond, development length and design the shear reinforcement
CLO2 Analyze ⁴ and design ⁵ of the reinforced concrete beam sections.
CLO3 Design ⁵ of RCC slab, column, footing.
CLO4 Analyze ⁴ and design ⁵ of the prestressed concrete beam sections.

UNIT	DESCRIPTION	HOURS
I	Introduction- Stress strain behavior of concrete and steel, Behavior of RCC, Permissible stresses in steel and concrete, Design philosophies, Various limits states, Characteristics strength and Characteristic load, Load factor, Partial safety factors. Concept -Limit state of collapse (shear and bond): Shear failure, Types of Shear reinforcement, Design of Shear reinforcement, Bond-types, Factors affecting bond Resistance, Check for development length.	6
II	Limit state of collapse (flexure): Analysis and Design of Singly and Doubly Reinforced rectangular sections, concept -Singly reinforced T and L beams.	6



III	Design of slabs: One way, two way with different support conditions as per IS:456, Cantilever slab.	6
IV	Analysis and Design of axially loaded column introduction of eccentrically (uni-axial & biaxial) loaded circular and rectangular columns, Introduction of Interaction diagram, Circular column with helical reinforcement.	6
V	Design of isolated rectangular column footing with constant depth subjected to axial load and moment, Introduction to Design of combined rectangular footing.	6
VI	Introduction of prestress concrete, Advantage and disadvantages of prestress. Methods of prestressing, Analysis of simple pre-stressed rectangular section.	6

Laboratory Work	
1	One numerical/design-based assignment on each unit
Text Books	
1	Fundamentals of Reinforced Concrete. Sinha and Roy, S. Chand and company Ltd. Ram Nagar, New Delhi.
2	Limit state theory and Design of concrete structure -Karve and Shah Structures publications, Pune
	Reinforced Concrete Design Limit state - brothers Roorkee - A.K. Jain Nemchand brothers Roorkee.
	Prestressed concrete-T.Y.Lin john wiley & sons Newyark
References	
1	Limit State Design of reinforced concrete, P.C.Varghese Prentice Hall, New Delhi.
2	Reinforced Concrete Design by B.C. Punmia Mcmillan India Ltd. New Delhi
3	Special publications -16 Bureau of Indian standards
4	IS 456-2000 Bureau of Indian standards
5	Prestressed concrete- N. Krishnaraju,Tata McGraw-Hill Publications
6	Prestressed concrete-Sinha & Roy S.Chand & Co. New Delhi



Course Code UCE603	Course Title Design of Steel Structure and Software Proficiency Lab (Program Core School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
-	-	4	2	Theory and Practical	FA	100	40%	40%
							40%	

Course Description:
This course requires the student to know about the basic of civil engineering, structural analysis, force, loads acting on structure, structural design procedure etc.

Course Learning Outcome(s)	
<i>At the end of this course students will able to:</i>	
CLO1	Analyse ⁴ and design ⁵ of truss, gantry girder and Bracket
CLO2	Analyse ⁴ and design ⁵ of column and column bases
CLO3	Draw ¹ detail drawing of design structure using Auto cad
CLO4	Analyse ⁴ and design ⁵ plate girder or steel building frame

PROJECT	DESCRIPTION	HOURS
	Project: The students are expected to Analyze and design the following steel structures and submit report of same in printed form. Project 1 is compulsory and students have to select any one from project 2 and 3.	
I	Design of Industrial shed for different location of the India It includes Analysis and Design of truss. Analysis and Design of gantry girder. Analysis and Design of bracket, Analysis and Design of column. Analysis and Design of Column bases. Analysis and Design of bracings, one full imperial drawing sheet on above design using Auto cad Software	24
II	Design of welded plate girder and its end connections, one full imperial drawing sheet on above design using Auto cad Software	12
III	Design of G+1 Steel Building frame One full imperial drawing sheets on above design using Auto cad Software. Students must analyze and design any one project using relevant software like STADD Pro, ETABS, SAP 2000 and ANSYS etc	12



Laboratory Work	
1	1. Calculation of loads and load combinations for the truss 2. Analysis of truss using any finite element tool 3. Design of truss members 4. Analysis and Design of Gantry girder 5. Analysis and Design of Bracket 6. Analysis and Design of Column 7. Analysis and Design of Column bases 8. Detailing of truss joint and other elements in AutoCAD 9. Preparation of detailed drawings 10. Preparation of Spiral Report.
Text Books	
1	Dr. M. R. Shiyekar, Limit state design in structural steel, PHI publications.
2	S.S. Bhavikatti, Design of steel structure by Limit State Method as per IS: 800-2007, I K International Publishing House, New Delhi.
References	
1	K.S. Sairam, Design of Steel Structures, Pearson
2	S.K. Duggal, Limit State Design of Steel Structures, Tata Mc-Graw Hill India Publishing House
3	N.Subramanian, Design of steel structures, Oxford University Press
4	S. Ramamrutham, Design of Steel structures, Dhanapat Rai, Publication



Program Elective II



Course Code UCE651	Course Title Advanced Fluid Mechanics (Program Elective School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
3	-	-	3	Theory and Practical	FA	50	40%	40%
					SA	50	40%	

Course Description:
Advanced fluid mechanics deals with knowledge of in depth study of Kinematics of Flow, Boundary Layer Theory and compressible flow. Fluid statics will be dealt with detail.

Course Learning Outcome(s)	
<i>At the end of this course students will able to:</i>	
CLO1	Recognize² the basics of fluid mechanics Discuss⁴ kinematics of fluid flow
CLO2	Discuss² concept of conformal mapping
CLO3	Discuss² boundary behavior
CLO4	Explain² and Discuss⁴ compressible flow concept

UNIT	DESCRIPTION	HOURS
I	Classification of flows, Equation of continuity for three-dimensional flow in Cartesian co-ordinates, equation of continuity for one-dimensional flow along a streamline, types of motion, rotational and irrotational motion, velocity potential, stream function and flow net, Euler's equation of motion along a streamline and its integration, Bernoulli's equation	6
II	Kinematics of Flow: Continuity Equation in polar and cylindrical coordinates, solving laplace's equation by graphical & relaxation method	6
III	Laminar Flow: Navier Stokes equation-derivation, exact flow between parallel plates-it's exact solution. Flow near an oscillating plate & suddenly accelerated	6



	plate.	
IV	Turbulent Flow: Reynold’s equation of motion, typical solution, Energy and Momentum equation, Statistical theory of turbulence, Isotropic and homogeneous turbulence, probability density flow	6
V	Boundary Layer Theory: Development of boundary layer on a flat plate nominal, displacement, momentum, energy thicknesses, laminar, transitional and turbulent boundary layer, laminar sub layer, Local and mean drag coefficients. Karman’s momentum integral equation, Karman Pohlhausen’s solution, Boundary layer separation	6
VI	Compressible Flows: Speed of sound and Mach number, Basic equations for one dimensional flows, Isentropic relations, Normal-shock wave, Rankine-Hugoniot relations, Fanno and Rayleigh curve, Mach waves.	6

Laboratory Work	
1	One assignment on each unit.
Text Books	
1	Modi. P. M. and Seth S. N., “Fluid mechanics & hydraulics”, 10 th Edition, Standard Publications (2015).
2	R. K. Bansal, “Fluid mechanics & hydraulics”, 14 th Edition, Khanna publications (2009).
References	
1	Fluid Mechanics – A.K. Jain – Khanna Pub., Delhi
2	John D. Anderson Jr, Modern Compressible Flow with Historical Perspective, McGraw-Hill, 1990.
3	Fluid Mechanics – S. Nagrathanam – Khanna Pub., Delhi
4	Fluid Mechanics through Problems – Garde R. J.
5	Fundamentals of Fluid Mechanics, Munson, Young, Okiishi, Huebesch, Wiley Publication



Course Code UCE653	Course Title Site Investigation and Soil Exploration (Program Elective School of Technology)
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L	T	P	Credits	Evaluation Scheme				
				Component	Exam	WT (%)	Mini. Passing %	
3	-	2	4	Theory and Practical	FA	50	40%	40%
					SA	50	40%	

Course Description:
This course intends to provide students a comprehensive knowledge on Geotechnical Exploration & Investigations. The course focuses the methods of exploration, instrumentation required for exploration. The course also focuses on the report writing aspects of the geotechnical exploration. This course is important, as geotechnical investigation is an important form of any Civil engineering project.

Course Learning Outcome(s)	
<i>At the end of this course students will able to:</i>	
CLO1	Explain² importance of geotechnical exploration
CLO2	Explain² principles of exploration and site investigations
CLO3	Describe² various field techniques used in geotechnical engineering for ascertaining the nature and behavior of soil strata
CLO4	Perform² geotechnical exploration at various sites & prepare detailed site investigation report

UNIT	DESCRIPTION	HOURS
I	Importance and objectives of Geotechnical exploration, Principal methods of subsurface exploration, open pits and shafts. Types of borings, selection depth of boring for different structures, and for different nature of ground profile	6



II	Planning of subsurface exploration program for major civil engineering project, Indirect methods of exploration (Seismic refraction method, electrical resistivity method), qualitative and quantitative interpretation of test results, advantages, limitations and criteria for selection of method for investigation	6
III	Types of soil samples & their suitability, precautions in sampling, parameters for sampler design, boring and sampling records handling, preservation & shipment of samples, underwater sampling	6
IV	Standard Penetration test, Plate load test (PLT), field vane shear test, Technical Report writing, report format, recommendations	6
V	Bearing capacity: – ultimate bearing capacity, safe bearing capacity and allowable bearing pressure – general and local shear failure – Terzaghi’s theory of bearing capacity – effect of water table - plate load test – limitations.	6
VI	Deep foundations: - Pile foundation – necessity of pile foundation – classification of piles according to materials, mode of transfer of loads, method of installation, use and displacement of soil. Well foundations/caissons – shapes of wells and component parts – well sinking – tilts and shifts – measures for rectification of tilts and shifts.	6

	Laboratory Work
1	One assignment on each unit.
	Text Books
1	Basic and Applied soil mechanics: Gopal Ranjan & A.S. Rao, New Edge International Ltd., (2004)
	References
1	Site Investigation Practice, Joyce, M.D ESFN. SPON Publishers, 1982.



2	Basic and Applied soil mechanics: Gopal Ranjan & A.S. Rao, New Edge International Ltd., (2004)
3	Foundation Analysis & Design: Bowles, J.E., McGraw Hill (1996)
4	Site investigation by Clayton, Mathews and Simons
5	Surveying: Theory and Practice by James M. Anderson, Edward M. Mikhail, Tata McGraw Hill.