



Shri ShamraoPatil (Yadavkar) Educational & Charitable Trust's
Sharad Institute of Technology College of Engineering
 Yadav (Ichalkaranji)-416121, Dist. – Kolhapur
 (An Autonomous Institute)

Department: Civil Engineering

Rev: Course Structure /01/NEP/2024-25

Class: T.Y. B. Tech

Semester: V

Course Code	Course Type	Course	Teaching Scheme				Evaluation Scheme					Credits
			L	T	P	Total Hrs.	CAI	CAII	MSE	ESE	Total	
23CE3501	PCC	Environmental Engineering	03	-	-	03	10	10	30	50	100	03
23CE3502	PCC	Design of Steel Structure	03	-	-	03	10	10	30	50	100	03
23CE3503	PCC	Transportation Engineering	02	-	-	02	10	10	30	50	100	02
23CE3504	PCC	Environmental Engineering Laboratory	-	-	02	02	15	15	-	20	50	01
23CE3505	PCC	Transportation Engineering Laboratory	-	-	02	02	15	15	-	20	50	01
23CE3506	VSEC	Auto CAD Laboratory	-	-	02	02	25	25	-	-	50	01
23CE3507	PEC	Program Elective Courses – I	03	-	-	03	10	10	30	50	100	03
23OECE33	OE	Open Elective – III	03	-	-	03	10	10	30	50	100	03
23CEMDXX	MDM	Multidisciplinary Minor – III	03	-	-	03	10	10	30	50	100	03
23CE3508	ELC	Mini Project	-	-	02	02	25	25	-	-	50	01
23CE3509	ELC	Industrial Training/ Field Training	-	-	-	-	-	-	-	50	50	Audit
23CE3510	MC	Constitution of India	01	-	-	01	25	25	-	-	50	Audit
23HSSM05	VEC	Aptitude skill- III	01	-	-	01	25	25	-	-	50	Audit
23HSSM06	VEC	Language skill-III	-	-	02	02	25	25	-	-	50	Audit
TOTAL			19	-	10	29	215	215	180	390	1000	21

Program Elective Courses – I

(Subject 1)	(Subject 2)	(Subject 3)
Site Administration and Control (23CE3507A)	Solid Waste Management (23CE3507B)	Advance Material and Techniques (23CE3507C)

Multidisciplinary Minor – III

Infrastructure Engineering (Basket A)	Architectural Aspect (Basket B)	Transportation Engineering (Basket C)
Construction Methods and Techniques (23CEMDA3)	Building Services (23CEMDB3)	Airport Engineering (23CEMDC3)

Open Elective – III

Sustainable Energy (23OECE33)

***Open Elective course will be offered to students of other programs and will not be offered to students of the same program**



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Environmental Engineering

23CE3501	PCC	Environmental Engineering	3-0-0	3 Credits
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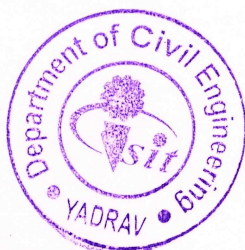
Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	Continuous Assessment -I : 10 Marks Continuous Assessment -II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Impart knowledge of design components necessary for water treatment and supply.
CO2	Able to assess the different water quality parameters, their importance and limitations, and also
CO3	Acquire the knowledge of different methods and stages for water treatment and need for the supply of safe potable water supply.
CO4	Assess different wastewater constituents and different sources of wastewater generation.
CO5	Adopting advanced water and wastewater treatment techniques.
CO6	Plan proper method for the final disposal of treated wastewater.

Course Content:

Unit 1: Water Demand and Quality Importance of water, sources, types of demand, factors affecting population growth and water consumption, effect of water demand variation on design of water supply components. Water quality parameters: Physical, chemical and biological category, permissible limits under BIS, water-borne diseases.	[5]
Unit 2: Water Treatment Sedimentation – plain, flocculation and coagulation. Filtration - sand filtration – types, application, working, design. Disinfection - theory, types, application. Water distribution – types, hydraulic analysis.	[6]
Unit 3: Municipal wastewater Sources, components, characteristics of wastewater with thrust on COD, BOD. Sewage and Sewerage system – types, simple hydraulic design of sewers, Grey water – concept and treatment.	[5]
Unit 4: Municipal wastewater treatment Types of treatment - general layout of STP, screens, detritus tank, ASTP – function, design considerations, F/M, MLSS, MLVSS, SVI. Trickling Filter – types, design consideration, efficiency,	[7]
Unit 5: Nanotechnology in Water Quality and Wastewater Introduction to nanotechnology: Introduction, nanomaterials – microporous materials, carbon nanotubes, photocatalysts.	[7]





Nanotechnology based water treatment strategies – importance, types of nano materials used, and mechanisms for contaminants' removal. Application of nanotechnology - for reduced waste and improved energy efficiency.	
Unit 6: Wastewater disposal Dilution method – favorable conditions, parameters to be considered, Streeter-Phelps equation, Classification of rivers in India. Disposal on land – conditions, limitations, sewage sickness.	[4]

Text Books:

1. Garg S. K. "Water Supply Engineering", Khanna Publishers, New Delhi. Ed. 35
2. Birdie J. S. and Birdie G.S. "Water Supply Engineering and Sanitary Engineering" Dhanpa Rai Publications, 8th Ed. New Delhi.
3. E.W. Steel, "Water Supply and Sewerage", McGraw – Hill publishers.
4. Wiesner M., Bottero J-Y., Environmental Nano technology : Applications and Impacts of Nano materials Applications and Impacts of Nano materials, McGraw Hill Professional.
5. Pradeep T., Textbook of Nano science and Nanotechnology, McGraw Hill Education (India) Private Limited

Reference books:

1. Peavy and Rowe, "Environmental Engineering", McGraw Hill Publishers, 4th Ed.2003
2. Sharma and Kaur, "Environmental Chemistry", Goyal Publisher
3. Government of India, "Water Supply and Treatment Manual".
4. Manual on Water Supply and Treatment, CPHEEO, Ministry of Jal Shakti/ Department of Drinking Water and Sanitation.



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Design of Steel Structures

23CE3502	PCC	Design of Steel Structures	3-0-0	3 Credits
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Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	Continuous Assessment -I : 10 Marks Continuous Assessment -II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Explain the principles of steel structure design
CO2	Analyze the connections in steel structures.
CO3	Analyze and design Tension and Compression members.
CO4	Analyze and design column and bases.
CO5	Design the beams in steel structures.
CO6	Explain the Limit state method of design.

Course Content:

Unit 1: Introduction Introduction to concepts of structural design. Idealization of real 3D structures in to 2D and 1D elements, Introduction to structural configurations advantages & disadvantages of steel structures, permissible stresses, factor of safety, methods of design, types of connections, various types of standard rolled sections, types of loads and load combinations.	[6]
Unit 2: Bolted and Welded connections Bolted and Welded connections: Analysis of axially & eccentrically loaded connections, Permissible stresses, Design of connections.(IS 800: 1984)	[5]
Unit 3: Tension & Compression members Tension members: Common sections, net effective area, load carrying capacity, connection using weld / bolts.(IS 800: 1984) Compression members: Common sections used, effective length and slenderness ratio, permissible stresses, load carrying capacity, connection using weld / bolt(IS 800: 1984)	[7]
Unit 4: Columns and Column Bases Columns: Simple and built-up section, lacing, battening, column subjected to axial force and bending moment, column splices.(IS 800: 1984) Column bases: Analysis and design of slab base, gusseted base, design of anchor bolt.(IS 800: 1984)	[6]
Unit 5: Beams Beams: Laterally supported & unsupported beams, design of simple beams, built up beams using flange plates, curtailment of flange plates, web buckling & web crippling, secondary and main beam arrangement, beam to beam connections.(IS 800: 1984)	[7]



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Unit 6: Introduction to Limit State method

Introduction to Plastic Analysis, Hinge formation, Collapse mechanism, Introduction to provisions in IS 800-2007, Basis for Design, Classification of cross-Sections, Limit state of strength and Limit state of serviceability, Partial Safety Factors for Loads, Partial Safety Factors for Materials.

[5]

Note: Unit 1 to 5 are based on working stress method of design (IS 800: 1984), Unit 6 is based Limit state method of design (IS 800 2007)

Use of IS 800: 1984, IS: Handbook No.1 for Steel Section /Steel Table, SP 6(6) is permitted for theory examination.

Text Books:

1. Duggal S. K., "Design of Steel Structures", Tata McGraw Hill Pub. Co. Ltd., New Delhi.
2. Dayaratnam P., "Design of Steel Structures", Wheeler Publishing, New Delhi
3. S. Ramamrutham, "Design Of Steel Structures" Dhanpatrai Publishing Co (p) Ltd
4. Gambhir, "Fundamentals of Structural Steel Design", Tata McGraw Hill Pub. Co. Ltd., New Delhi
5. Subramanian N., "Steel Structures: Design and Practice" Oxford Univ. Press, Delhi
6. Negi L.S., "Design of Steel Structures", McGraw Hill

Reference Books:

1. Publications of Bureau of Indian Standards, New Delhi, IS 800:1984
2. Publications of Bureau of Indian Standards, New Delhi, IS 800:2007
3. Vazirani & Ratwani, "Design of Steel Structures", Standard Book House, New Delhi
4. Duggal S. K., "Limit State Design of Steel Structures", Tata McGraw Hill Pub. Co. Ltd., New Delhi
5. Salmon and Johnson, "Steel Structures: Design and Behaviour", Harper and Row, New York
6. Steel Designers Manual



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Transportation Engineering

23CE3503	PCC	Transportation Engineering	2-0-0	2 Credits
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Teaching Scheme: Lecture: 2 hrs/week	Evaluation Scheme: Continuous Assessment -I : 10 Marks Continuous Assessment -II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks
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Course Outcomes: At the end of the course, students will be able to:

CO1	Understand the basics of Transportation Engineering and various road development programmers in India
CO2	Illustrate the principles of Highway Alignment
CO3	Understand the importance of Highway geometrics design as per IRC standards
CO4	Identify different highway elements and the types of pavements
CO5	Illustrate the various traffic characteristics while designing a traffic in road
CO6	Explain the significance of railway elements, railway stations and yards in the railway

Course Content:

Unit 1: Highway Alignment Highway Alignment, Factors Controlling Alignment, Engineering Survey for Highway Alignment, Pavement Surface Characteristics, Camber, Width of Carriage Way, Medians, Kerbs, Road Margins	[4]
Unit 2: Geometric Design Geometric Design, Importance of Geometric Design, Design controls and criteria, Sight distances, Types of Sight Distances, Stopping Sight Distance(SSD), PIEV theory, Overtaking sight distance (OSD), Super elevation, Transition curve. Mechanical Widening, Related Numerical	[6]
Unit 3: Highway materials Road making materials-Soil, stone aggregates - classification, properties of aggregates, design of aggregate gradation. Bitumen, bitumen emulsions, cut backs and modified binders, Mix design - Marshall method and Superpave procedure	[4]
Unit 4: Traffic Engineering Traffic Engineering, Scope of traffic engineering, Traffic Characteristics, Traffic Volume Studies, Spot Speed Studies, Speed and Delay Studies, Origin and Destination Studies, Parking Studies, Accident Studies. traffic control – signal design, intersections and transport facilities	[6]
Unit 5: Railway Engineering Classification of Indian Railways, Gauge of Track, Factors affecting the choice of a Gauge, Sleepers, Ballast. Rails, Types of Rails, Classification of Stations, Classification of Yards.	[4]



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Unit 6: Railway operation, control, Maintenance

Points and crossings, Signaling and interlocking –Train movement control systems. , renewal of component parts and drainage, maintenance of track-alignment

[4]

Text books:

1. Khanna and Justo, “ Highway Engineering” by(Nemchand& Bros., Roorkee)
2. Arora N. L., “ Transportation Engineering”
3. Bindra and Arora, “ Highway Engineering” by (Standard Publishers)
4. Vazirani V.N. and Chandola S.P., “ Transportation Engineering”(Khanna Publishers)
5. Shahani P.B, “Road Techniques” (Khanna Publishers)
6. Kadiyali L.R, “ Traffic Engineering and Transport Planning”(KhannaPublishers)
7. Rangwala, “Railway Engineering”(Charotar Publishing House)
8. Relevant IRC and IS Codes

Reference books:

1. Garber, N.J. and Hoel, L.A., “ Traffic and Highway Engineering” (West Publishing)
2. Khistry, C.J. “Transportation Engineering – An Introduction”(Prentice Hall of India)
3. Agor R. Surface Transportation (Railways and Highways)” (Khanna Publishers, N. Delhi)



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Environmental Engineering Laboratory

23CE3504	PCC	Environmental Engineering Laboratory	0-0-2	1 Credits
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Teaching Scheme:	Evaluation Scheme:
Practical: 2 hrs/week	Continuous Assessment -I : 15 Marks Continuous Assessment -II : 15 Marks End Semester Exam : 20 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Demonstrate quality parameters considered in water testing.
CO2	Conclude the status of water quality.
CO3	Define the wastewater characteristics and propose treatment
CO4	Define the measurement of air pollutants and demonstrate the air quality.

Course Content:

Section 1: Test in Lab

1. To determine pH, alkalinity, chlorides, EC and turbidity.
2. To determine percentage available chlorine in bleaching powder, residual chlorine, chlorine demand and break-point chlorination.
3. To determine optimum dose of alum, total, dissolved, suspended and volatile solids.
4. Determination of fluoride and total iron.
5. Determination of sulphates and nitrates.
6. Determination of SVI, BOD and COD.
7. Determination of DO, total hardness, temporary, permanent, calcium and magnesium hardness.
8. Assessment of SPM.

Section 2: Site Visit

1. Report on visit to nearby WTP.
2. Report on visit to nearby STP.

Text Books

1. "Manual on Water and Wastewater Analysis", NEERI publication 5th edition
2. "Guide Manual: Water and Wastewater Analysis" Central Pollution Control Board publication. 2005.

Reference books:

1. Standard Methods for the Examination of Water and Wastewater. American Public Health Association, 24th Ed.



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Transportation Engineering Laboratory

23CE3505	PCC	Transportation Engineering Laboratory	0-0-2	1 Credits
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Teaching Scheme:	Evaluation Scheme:
Practical: 2 hr/week	Continuous Assessment -I : 15 Marks Continuous Assessment -II : 15 Marks End Semester Exam : 20 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Understating on various tests for characterization of aggregate for road construction.
CO2	Understating on various tests for characterization of bitumen for road construction.
CO3	Understanding the importance of different tests for engineering practice and its suitability as road

Course Content:

1. Aggregate Impact test to determine the resistance of aggregate to sudden shock
2. Crushing test on aggregate to measure the resistance of aggregate against crushing under gradually applied compressive load
3. Los Angeles Abrasion test to measure the abrasion resistance of aggregate materials
4. Penetration test on bitumen to determine the consistency
5. Specific gravity test on bitumen
6. Softening point test on bitumen
7. Flash and Fire point test on bitumen
8. Ductility test to measure the adhesive properties of bitumen

Text books:

1. Khanna and Justo, "Highway Engineering" by (Nemchand & Bros., Roorkee)
2. Arora N. L., "Transportation Engineering"
3. Bindra and Arora, "Highway Engineering" by (Standard Publishers)
4. Vazirani V.N. and Chandola S.P., "Transportation Engineering" (Khanna Publishers)
5. Shahani P.B., "Road Techniques" (Khanna Publishers)
6. Kadiyali L.R., "Traffic Engineering and Transport Planning" (Khanna Publishers)
7. Rangwala, "Railway Engineering" (Charotar Publishing House)

Reference books:

1. IS 2386 (1963). Methods of test for aggregates for concrete. Bureau of Indian Standards. New Delhi
2. IS 1201-1209 (1978). Methods for Testing Tar and Bituminous Materials. Bureau of Indian Standards. New Delhi
3. IS 73 (2013). Paving Bitumen — Specification (Fourth Revision). Bureau of Indian Standards. New Delhi
4. MORTH (2013). Specifications of Road and Bridge Works (Fifth Revision). Indian Road Congress. New Delhi



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Auto CAD Laboratory

23CE3506	PCC	Auto CAD Laboratory	0-0-2	1 Credits
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Teaching Scheme:	Evaluation Scheme:
Practical: 2 hrs/week	Continuous Assessment -I : 25 Marks
	Continuous Assessment -II : 25 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Describe use & commands of CAD for civil engineering.
CO2	Explain various components of building.
CO3	Illustrate use of layers of CAD.
CO4	Develop drawing for building by using CAD software.

Course Content:

1. Introduction to computer aided drafting
2. Practice exercises on CAD software by using different commands
3. Drawing of plans of Single storeyed buildings using software
4. Developing sections and elevations for Single storeyed building
5. Exercises on development of working of buildings.
6. Exercises on development of Municipal drawing of buildings.

Text Books

1. AutoCAD – George Omura
2. AutoCAD 2019 training guide AutoCAD

Reference books:

1. David Frey (BPB Sybex Publications)



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Program Elective Courses -I

23CE3507A	PEC	Site Administration and Control	3-0-0	3 Credits
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Teaching Scheme: Lecture: 3 hrs/week	Evaluation Scheme: Continuous Assessment -I : 10 Marks Continuous Assessment -II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks
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Course Outcomes: At the end of the course, students will be able to:

CO1	Understand the roles, responsibilities, and principles of site administration.
CO2	Plan, schedule, and manage resources effectively on construction sites.
CO3	Apply quality control measures to ensure high construction standards.
CO4	Identify and mitigate safety risks and ensure compliance with Indian safety standards.
CO5	Maintain effective communication and documentation for site management.
CO6	Use legal and financial aspects of site operations efficiently.

Course Content:

Unit 1: Introduction to Site Administration Roles and responsibilities of site administrators. Site organization and layout planning. Importance of documentation and record-keeping at the site. Coordination between contractors, subcontractors, and labor. Overview of Indian legal requirements for construction site administration (e.g., labor laws, Building & Other Construction Workers Act).	[6]
Unit 2: Construction Site Planning and Control Site logistics and material management. Resource allocation: Manpower, materials, and machinery. Time scheduling and work sequence planning (e.g., bar charts, Gantt charts). Traffic management within and around the construction site. Safety measures and compliance with Indian safety standards (NBC and IS codes).	[6]
Unit 3: Site Supervision and Quality Control Role of supervision in ensuring construction quality. Implementation of quality control plans and inspection protocols. Use of checklists and quality audits on-site. Common construction defects and corrective measures. Tools and techniques for real-time quality monitoring	[6]
Unit 4: Construction Safety and Risk Management Site safety regulations and standards as per Indian codes (IS 3764, IS 13416). Identification and mitigation of hazards: Electrical, fire, excavation, and machinery. Risk management: Assessment, prevention, and control. Role of personal protective equipment (PPE). Accident reporting, investigation, and corrective measures.	[6]
Unit 5: Communication and Documentation on Site Importance of effective communication between stakeholders. Site meetings: Agenda, minutes, and follow-ups. Preparation of daily, weekly, and monthly progress reports. Documentation of	[6]





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labor attendance, material usage, and equipment logs. Use of technology in documentation (BIM, site management software).	
Unit6: Legal and Financial Aspects of Site Administration Construction contracts: Types, clauses, and dispute resolution. Compliance with labor laws and statutory obligations in India. Financial management on-site: Budget control, billing, and payments. Handling claims, variations, and delays. Ethical practices in site administration.	[6]

Text Books:

1. Construction Project Management: Theory and Practice by Kumar Neeraj Jha.
2. Building Construction by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain.
3. Construction Management and Planning by B. Sengupta and H. Guha.
4. Site Management for Engineers by R. B. Cooke and P. M. Williams.

Reference Books:

1. Construction Planning and Management by P. S. Gahlot and B. M. Dhir.
2. Handbook of Construction Management by P. K. Joy.
3. Site Management and Administration by Derek Millett.
4. The National Building Code of India (BIS, latest edition).
5. Labour Laws and Other Statutory Obligations by H.L. Kumar.



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Program Elective Courses -I

23CE3507B	PEC	Solid Waste Management	3-0-0	3 Credits
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Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	Continuous Assessment -I : 10 Marks Continuous Assessment -II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Outline the functional elements of solid waste through management.
CO2	Identify and interpret the characteristics of MSW.
CO3	Organize the collection system and optimize the route for MSW transfer.
CO4	Demonstrate the knowledge on fundamental principles of present and emerging technologies for MSW treatment and value recovery.
CO5	Analyze different treatment processes for disposal and recovery under MSW.
CO6	Examine and understand biomedical and hazardous waste collection, transport and disposal.

Course Content:

Unit 1: Fundamentals of solid waste management Definition, Sources and types of solid waste, composition of solid waste, environmental impact of solid waste, factors affecting solid waste generation rate, physical and chemical characteristics of solid waste, sampling methods, functional elements of solid waste management	[6]
Unit 2: Storage and Collection of solid waste Storage of solid waste, types of solid waste collection services, types of collection system- hauled and stationary container system, tools and equipment used in collection, terms used- pick up time, haul time, off-site and on site time, time and frequency of collection, collection route and its layout, labor requirement, route optimization	[7]
Unit 3: Transportation of solid waste Need of transfer operation, transportation vehicles, transfer station- definition, necessity, location, advantages and disadvantages, operation and maintenance of transfer station	[5]
Unit 4: Processing of Solid Waste Purpose of processing solid waste, mechanical volume reduction and size reduction, component separation- air separation, Magnetic separation, screening, hand sorting, inertial separation, drying and dewatering	[6]
Unit 5: Disposal of Solid Waste Composting, factors affecting composting, types of composting, land filling- site selection criteria, landfilling methods, advantages and disadvantages, Incineration- process, products of incineration and their uses, advantages and disadvantages,	[6]





Pyrolysis and its types, leachate, leachate treatment and collection system, impact of open dumping	
Unit 6: Biomedical and Hazardous Waste Biomedical waste – Definition, sources, types, biomedical waste management technologies, biomedical waste management rule-2016 Hazardous waste- Definition, sources, types, Physico-chemical, Chemical and Biological Treatment of hazardous waste	[6]

Text Books:

5. Construction Project Management: Theory and Practice by Kumar Neeraj Jha.
6. Building Construction by B.C. Punmia, Ashok Kumar Jain, and Arun Kumar Jain.
7. Construction Management and Planning by B. Sengupta and H. Guha.
8. Site Management for Engineers by R. B. Cooke and P. M. Williams.

Reference Books:

6. Construction Planning and Management by P. S. Gahlot and B. M. Dhir.
7. Handbook of Construction Management by P. K. Joy.
8. Site Management and Administration by Derek Millett.
9. The National Building Code of India (BIS, latest edition).
10. Labour Laws and Other Statutory Obligations by H.L. Kumar.





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Program Elective Courses -I

23CE3507C	PEC	Advance Materials and Techniques	3-0-0	3 Credits
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Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	Continuous Assessment -I : 10 Marks Continuous Assessment -II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Identify and classify advanced materials used in modern construction.
CO2	Explain the application of composite materials and high-performance concrete.
CO3	Assess the benefits of modern construction techniques like prefabrication and 3D printing.
CO4	Evaluate sustainability and durability aspects of advanced materials.
CO5	Apply knowledge of smart materials for structural health monitoring.
CO6	Understand the use of nanotechnology and green materials in construction.

Course Content:

Unit 1: Advanced Construction Materials High-performance concrete (HPC) and self-compacting concrete (SCC), Fiber-reinforced concrete (FRC) and polymer concrete, Geopolymer concrete, Smart materials: shape memory alloys, piezoelectric materials, Properties and applications of carbon fiber, glass fiber, and aramid fiber	[6]
Unit 2: Composite Materials in Construction Definition and classification of composites, fiber-reinforced polymers (FRP), and their applications, Sandwich panels and laminated composites, High-strength structural plastics, Case studies on composite material applications.	[6]
Unit 3: Modern Construction Techniques Prefabrication and modular construction, 3D printing in construction, Precast and pre-stressed construction methods, Tunnel Formwork and Mivan formwork, Hybrid construction techniques.	[6]
Unit 4: Sustainable and Green Construction Materials Recycled aggregate concrete and its applications, Green building materials and energy-efficient construction techniques, Phase change materials for thermal regulation, Concepts of net-zero energy buildings.	[6]
Unit 5: Nanotechnology in Construction Nano materials: carbon Nano-tubes, Nano-silica, Nano-clay, Applications of nanotechnology in cement and concrete, Self-cleaning and self-healing materials, Water-repellent and fire-resistant coatings, Impact of nanotechnology on durability and sustainability.	[6]

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Unit6: Smart and Intelligent Materials

Sensors and actuators in construction, Smart concrete and structural health monitoring systems, Bio-mimetic and bio-engineered construction materials ,Shape memory alloys and self-sensing materials, AI and robotics in modern construction.

[6]

Text Books:

1. P.K. Mehta & P.J.M. Monteiro – Concrete: Microstructure, Properties, and Materials
2. Chung Deborah D.L. – Composite Materials: Science and Applications
3. K.S. Jagadish, B. V. Venkatarama Reddy & K.S. Nanjunda Rao – Alternative Building Materials and Technologies
4. Gambhir M.L. – Concrete Technology
5. James K. Wight & James MacGregor – Reinforced Concrete: Mechanics and Design

Reference Books:

1. Sanjay Kumar Shukla – Advanced Civil Engineering Materials
2. P.C. Aitcin – High-Performance Concrete
3. A.M. Neville & J.J. Brooks – Concrete Technology
4. M. S. Shetty – Concrete Technology: Theory and Practice
5. S. K. Duggal – Building Materials



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MDM-III

23CEMDA3	MDM	Construction Methods and Techniques	3-0-0	3 Credits
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Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	Continuous Assessment -I : 10 Marks
	Continuous Assessment -II : 10 Marks
	Mid Semester Exam : 30 Marks
	End Semester Exam : 50 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Understand the fundamental principles of prefabricated structures
CO2	Analyze the processes involved in modular construction practices
CO3	Evaluate the requirements for effective formwork
CO4	Assess new design trends and construction techniques in high-rise buildings
CO5	Examine conventional and advanced bridge construction techniques
CO6	Investigate advanced construction techniques that promote sustainability

Course Content:

Unit 1:Prefabricated Structures: Introduction to Prefabricated structures, Planning for pre-casting, Selection of equipment for fabrication, Transport and erection of prefabricated components, Quality measures, Design considerations of precast elements, Safety measure during erection.	[6]
Unit 2:Modular Construction Practices Introduction to Modular Construction, Modular coordination, Modular Standardization, Modular System Building, Limitation and Advantages of Modular Construction	[6]
Unit 3:Formwork Requirements of Formwork, Loads carried by Formwork, Types of Formwork: Timber, Steel, Modular shuttering, Slip forms, Scaffolding, Deep Excavation Methods.	[6]
Unit 4:High Rise Buildings New Design Trends in Geometrical Forms, Construction Techniques of High Rise Buildings, High Rise Construction Techniques, and Brick work, Selected High-Tech High-Rise Buildings.	[6]
Unit 5: Bridge construction techniques Introduction to Embankments and Foundations, Conventional Bridge Construction Techniques, Accelerated Bridge Construction, Prefabricated Bridge Construction	[6]
Unit 6: Advanced construction techniques Advanced construction techniques for better sustainability; Techniques for reduction of Green	[6]



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House Gas emissions in various aspects of Civil Engineering Projects

Text Books:

1. Robert L. Peurifoy, Clifford, J. Schexnayder, Robert Schmitt and Aviad Shapira, Construction Planning, Equipment, and Methods, McGraw-Hill Education, 2018, Ninth Edition.
2. S. C. Sharma, Construction Equipment and Management, Khanna Publishing, 2019, First Edition

Reference Books:

1. Cameron Andres, Ronald Smith and W. Woods, Principles and Practices of Commercial Construction, Pearson, 2018, Tenth Edition.
2. D. S. Vijayan, S. Arvindan and A. Paulmakesh, Construction Materials and Techniques, Notion Press, 2021, First Edition.
3. Edward Allen and Joseph Iano, Fundamentals of Building Construction: Materials and Methods, Wiley, 2019, Seventh Edition.



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MDM-III

23CEMDB3	MDM	Building Services	3-0-0	3 Credits
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Teaching Scheme:	Evaluation Scheme:
Lecture: 3 hrs/week	Continuous Assessment -I : 10 Marks
	Continuous Assessment -II : 10 Marks
	Mid Semester Exam : 30 Marks
	End Semester Exam : 50 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Understand the importance and classification of building services.
CO2	Apply water supply and drainage systems for buildings.
CO3	Implement efficient and safe electrical systems in buildings.
CO4	Plan and design fire protection systems as per national standards.
CO5	Apply the principles of HVAC systems to ensure indoor air quality and comfort.
CO6	Study of sustainable and smart building services for energy conservation and environmental impact.

Course Content:

Unit 1: Introduction to Building Services Definition and importance of building services. Classification: Mechanical, electrical, plumbing, fire safety, and HVAC systems. Coordination of building services with architecture and structural design. Overview of building regulations and standards in India (e.g., NBC).	[6]
Unit 2: Water Supply and Drainage Systems Water supply systems: Sources, storage, and distribution. Hot and cold water systems in buildings. Drainage systems: Sanitary drainage, storm water drainage, and rainwater harvesting. Wastewater treatment and recycling systems. Plumbing materials, fixtures, and fittings.	[6]
Unit 3: Electrical Systems in Buildings Basic electrical systems: Wiring, circuit breakers, and distribution boards. Illumination systems: Types of lights and lighting design principles. Power supply systems: Standby generators, UPS, and renewable energy integration. Earthing systems and protection against electrical hazards. Energy-efficient electrical systems.	[6]
Unit 4: Fire Protection Systems Principles of fire safety in buildings. Fire detection systems: Smoke detectors, heat sensors, and alarm systems. Fire suppression systems: Sprinklers, hydrants, and extinguishers. Evacuation planning and fire safety regulations (NBC and IS codes). Case studies of fire incidents and lessons learned.	[6]
Unit 5: HVAC (Heating, Ventilation, and Air Conditioning) Systems	[6]





Principles of heating, ventilation, and cooling. Types of HVAC systems: Centralized and decentralized systems. Components of HVAC systems: Compressors, ducts, chillers, and fans. Indoor air quality and thermal comfort. Energy-efficient HVAC systems and renewable energy integration.	
Unit 6: Sustainable and Smart Building Services Concepts of green buildings and sustainable building services. Energy conservation and management in buildings. Smart building technologies: Automation, IoT, and Building Management Systems (BMS). Waste management in buildings. Case studies of sustainable and smart buildings in India.	[6]

Text Books:

1. Chatterton, David V. "Building Services Engineering." Routledge, 2013.
2. M.A. Aziz. "Building Services." McGraw Hill Education, 2017.
3. Singh, Gurucharan. "Water Supply and Sanitary Engineering." Standard Publishers, 2016

Reference Books:

1. Hall, Fred. "Building Services Handbook." Routledge, 2017.
2. Deolalikar, S.G. "HVAC and Building Services Design." Tata McGraw Hill, 2010.
3. Bureau of Indian Standards. "National Building Code of India 2016." BIS, 2016.
4. Kumar, Satish. "Energy Efficient Buildings in India." The Energy and Resources Institute (TERI), 2014.
5. Smith, Peter. "Sustainable and Resilient Building Services." Routledge, 2020.



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MDM-III

23CEMD3	MDM	Airport Engineering	3-0-0	3 Credits
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Teaching Scheme: Lecture: 3 hrs/week	Evaluation Scheme: Continuous Assessment -I : 10 Marks Continuous Assessment -II : 10 Marks Mid Semester Exam : 30 Marks End Semester Exam : 50 Marks
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Course Outcomes: At the end of the course, students will be able to:

CO1	Identify the elements of airport and aircraft
CO2	Understand the fundamental principles of airport planning
CO3	Illustrate the various geometric design elements of Runway and taxiway
CO4	Enumerate the elements of terminals and systems of parking aircrafts
CO5	Describe the grading requirements and characteristics of airport drainage
CO6	Understand the importance of installing visual aids and runway lighting

Course Content:

Unit 1: Introduction History of aviation, development of Air transportation in India, Open sky policy, parts of aeroplane, aircrafts characteristics, aerodromes, airport classifications as per ICAO.	[4]
Unit 2: Airport Planning Importance of Airport Planning, Airport site selection, factor affecting the Airport Size, Airport obstruction, clear Zone, Turning zone, zoning laws, Airport Architecture, estimation of future air traffic, development of new airport, requirements of an ideal airport layout.	[6]
Unit 3: Runway and Taxiway Design Wind rose and orientation of runway, wind coverage and crosswind component, factors affecting runway length, basic runway length, runway geometrics and runway patterns, Runway marking, taxiway geometric elements, layout, exit taxiway, Loading aprons, Holding aprons, Separation Clearance.	[8]
Unit 4: Terminal Area and Airport Pavement Terminal area elements and requirements, systems of air parking, gate position and capacity design aircraft parking, Hangars, Typical Airport layouts, maintenance and evaluation of airport pavement, Classification of Aircraft pavement as per ICAO	[6]
Unit 5: Grading and Drainage Airport grading importance and requirements, operations, airport drainage characteristics and requirements, surface drainage and its elements, Methods of sub surface drainage.	[6]
Unit 6: Air Traffic Control and Visual Aids Air traffic control objectives, control network and control aids, landing aids, airport markings, Elements of airport lighting, Runway Visibility.	[6]



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Text Books:

1. Robert Horonjeff, Francis X. McKelvey, William J. Sproule, Seth B. Young. Planning and Design of Airports. Tata McGraw Hill Pub. Co., New York
2. Richard de Neufville Amedeo R. Odoni. Airport Systems and Planning, Design and Management. Tata McGraw Hill Pub. Co., New York

Reference Books:

1. Dr. S. K. Khanna, M.G.Arora and S.S. Jain, Airport Planning & Design, Nem Chand & Bros., Roorkee
2. G.V. Rao Airport Engineering, Tata McGraw Hill Pub. Co., New Delhi
3. S.C.Rangwala and P.S.Rangwala. Airport Engineering, Charotar Publishing House Pvt. Ltd, Anand



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Mini Project-III

23CE3508	ELC	Mini Project III- Hackathon	0-0-2	01 Credit
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Teaching Scheme	Evaluation Scheme:
Practical: 2hrs/week	Continuous Assessment-I: - 25Marks
	Continuous Assessment-II: -25Marks

Pre-Requisites: Mini Project, Mini Project II

About Hackathon

The project is a part of addressing societal and industrial needs. Hackathon is one of the platforms where students will solve real world challenges. This Course focuses on the selection of methods/engineering tools/analytical techniques for problem solving.

Through this course, students will gain the understanding of engineering basics and ideas, gain practical experience, have the opportunity to display their skills and learn about teamwork, financial management, communication skills and responsibility

Course Outcomes: At the end of the course, students will be able to:

CO1	Select the appropriate method for solving the problem
CO2	Make use of various engineering techniques and tools to give a solution
CO3	Justify the methods /tools used to develop the solution
CO4	Design / simulate the model/ project work
CO5	Describe the solution with help of a project report and presentation
CO6	Conclude the outcomes of project.

Course Contents:

Week 1: Survey Design-1 <ul style="list-style-type: none">Ensure case study group students have made necessary communication and done a preparatory visit.Watch the lecture on survey design and study the notes.Prepare a questionnaire and try it out with your group members as mock.	[2]
Week 2: Survey Design-2 <ul style="list-style-type: none">Review survey questionnaire prepared by case study groups.Decide sampling strategy.Prepare a detailed schedule for fieldwork	[2]
Week 3: Fieldwork <ul style="list-style-type: none">Data Collection: Collect quantitative data (e.g., statistics, usage metrics) and qualitative data (e.g., user stories, testimonials).Use data collection tools like questionnaires, observation checklists, and digital analytics.	[2]



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<ul style="list-style-type: none">• Ensure data accuracy and reliability through proper sampling and recording methods.• 25% Presentation has to be conducted by mentor/guide based on above activity.	
Week 4: Trails and Experimentation-1 <ul style="list-style-type: none">• Initial Setup and Configuration• Concept Validation• Feasibility Testing	[2]
Week 5: Trails and Experimentation-2 <ul style="list-style-type: none">• Prototyping• Functionality Testing	[2]
Week 6: Trails and Experimentation-3 <ul style="list-style-type: none">• Bug Identification and Fixing• Integration Testing• Security Testing• 75% Presentation has to be conducted by mentor/guide based on above activity.	[2]
Week 7: Results <ul style="list-style-type: none">• Coordinator has to check and verify below points in term of result:• Functional Performance• Accuracy and Precision• Efficiency• Safety	[2]
Week 8: Validation <ul style="list-style-type: none">• Coordinator has to check and verify below points in term of validation:• Testing and Verification• Compliance with Standards• 75% Presentation has to be conducted by mentor/guide based on above activity.	[2]
Week 9: Integration Testing <ul style="list-style-type: none">• Validate that the hardware integrates seamlessly with other systems or components as intended• Perform compatibility tests with software, other hardware, and network systems.	[2]
Week 10: Documentation and Reporting <ul style="list-style-type: none">• Maintain comprehensive documentation of design, development, testing, and validation processes• Provide detailed reports on test results, issues found, and corrective actions taken.	[2]
Week 11: Final Presentation <ul style="list-style-type: none">• 100% Presentation has to be conducted by mentor/guide based on above activity.• Prototype/Final Software solution is mandatory at the time of final presentation along with report	[2]
Week 12: Exhibition <ul style="list-style-type: none">• Mini project exhibition will be schedule with interdepartmental evaluation.	[2]





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Internship/Field Training

23CE3509	ELC	Internship/Field Training	0-0-0	Audit
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Teaching Scheme:	Evaluation Scheme:
Lecture: NA	End Semester Exam : 50 Marks

Pre-Requisite: Basics of Civil Engineering, Good written and Oral Communication.

Course outcome: At the end of the course, students will be able to:

CO1	Verify the Technical knowledge in real industrial situations.
CO2	Develop interpersonal communication skills.
CO3	Discuss activities and functions of the industry in which the Internship/training has done.
CO4	Write the technical report.

Course Description:-

Internship / Training is educational and career development opportunity, providing practical experience in a field or discipline. At the end of the **Fourth and Fifth semester**, every student should undergo practical training in an industry / professional organization / Research laboratory with the prior approval of the HoD/TPO/Principal of the college and submit the report along with the completion certification from the Industry/ Organization. The report will be evaluated during the **Sixth semester** by the department.

Guideline for Students:-

1. Arrive at work as per schedule, ready to work and stay for the agreed upon time.
2. Present yourself in a professional manner at all times, including being appropriately dressed at workplace.
3. Communicate any concerns with your supervisor and the internship/Training coordinator in a timely manner and respectfully.
4. Demonstrate enthusiasm and interest in what you are doing, ask questions and take the initiative as appropriate.
5. Complete and submit assigned tasks by designated timelines. Meet all deadlines.

Student's Diary/ Daily Log

The main purpose of writing daily diary is to cultivate the habit of documenting and to encourage the students to search for details. It develops the students' thought process and reasoning abilities. The students should record in the daily training diary the day to day account of the observations, impressions, information gathered and suggestions given, if any. It should contain the sketches & drawings related to the observations made by the students.

The daily training diary should be signed after every day by the supervisor/ in charge of the section where the student has been working. The diary should also be shown to the Faculty Mentor. Student's Diary and Internship Report should be submitted by the students along with attendance record and an evaluation sheet duly signed and stamped by the industry to the SITCOE immediately





after the completion of the training. It will be evaluated on the basis of the following criteria:

- a) Regularity in maintenance of the diary.
- b) Adequacy & quality of information recorded.
- c) Drawings, sketches and data recorded.
- d) Thought process and recording techniques used.
- e) Organization of the information.

Internship Report

After completing the internship, the student should prepare a comprehensive report to indicate what he/she has observed and learned in the training period. Daily diary will also help to a great extent in writing the industrial report since much of the information has already been incorporated by the student into the daily diary. The competent authority should sign the training report. The Internship report should be evaluated on the basis of following criteria:

- a) Originality.
- b) Adequacy and purposeful write-up.
- c) Organization, format, drawings, sketches, style, language etc.
- d) Variety and relevance of learning experience.
- e) Practical applications, relationships with basic theory and concepts taught in the course.

Evaluation of Internship/Training

The student should be evaluated based on his training report and presentation, before an expert committee constituted by the concerned department as per norms. The evaluation will be based on the following criteria:

- a) Quality of content presented.
- b) Proper planning for presentation.
- c) Effectiveness of presentation.
- d) Depth of knowledge and skills.
- e) Attendance record, daily diary, departmental reports shall also be analyzed along with the Internship Report.



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Constitution of India

23CE3510	MC	Constitution of India	1-0-0	Audit
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Teaching Scheme:	Evaluation Scheme:
Lecture: 1 hr/week	Continuous Assessment -I : 25 Marks Continuous Assessment -II : 25 Marks

Course Outcomes: At the end of the course, students will be able to:

CO1	Define the meaning and features of Indian constitution and scheme of fundamental duties.
CO2	Illustrate federal structure of power, directive principles of state policy and emergency provisions in Constitution of India .
CO3	Illustrate Amendment of the Constitutional Powers and emergency provisions in Constitution of India
CO4	Illustrate the local self-government and rights to certain freedom under article 19 and 21.

Course Content:

Unit 1: Introduction to constitution Meaning of the constitution law and constitutionalism, Historical perspective of the Constitution of India, Salient features and characteristics of the Constitution of India, Scheme of the fundamental rights. The scheme of the Fundamental Duties and its legal status	[6]
Unit 2: Organization structures and their functions The Directive Principles of State Policy Its importance and implementation, Federal structure and distribution of legislative and financial powers between the Union and the States, Parliamentary Form of Government in India - The constitution powers and status of the President of India	[6]
Unit 3: Constitutional Powers Amendment of the Constitutional Powers and Procedure. The historical perspectives of the constitutional amendments in India, Emergency Provisions: National Emergency, President Rule, Financial Emergency 167	[6]
Unit 4: Constitutional Schemes in India Local Self Government Constitutional Scheme in India, Scheme of the Fundamental Right to Equality, Scheme of the Fundamental Right to certain Freedom under Article 19. Scope of the Right to Life and Personal Liberty under Article 21	[6]

Text Books:

1. Constitution of India Published by Government of India Ministry of Law and Justice (Legislative Department), 2020
2. Textbook on The Constitution of India by SR Bhansali Constitution of India by Bakshi P M January 2014



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Aptitude Skills- III (Verbal Ability)

23HSSM05	VEC	Aptitude Skills- III	1-0-0	Audit
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Teaching Scheme Lecture: 1 hr/week	Evaluation Scheme: Continuous Assessment-I : 25Marks Continuous Assessment-II : 25Marks
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Pre-Requisites: Aptitude Skills- I and II

Course Outcomes: At the end of the course, students will be able to:

CO1	Solve the questions on ordering of words & Parts of Speech
CO2	Organize contents of Business Communications such as CV, emails and letters.
CO3	Solve the questions based on jumbled paragraphs and reading comprehension.
CO4	Solve the questions on spotting error and sentence correction.
CO5	Summarize proceedings of any event or conference.
CO6	Discuss about current and critical issues during group discussion.

Course Contents:

Unit 1	Parts of Speech, Punctuation Word Family (Using the same word as different Parts of Speech)	[2] [2]
Unit 2	Analogy, Letter Writing (Formal), E-Mail Writing, CV Writing	[2]
Unit 3	Reading Comprehension, Paragraph Jumbles	[2]
Unit 4	Spotting Errors (in different parts of sentence), Subject-Verb Agreement Sentence Correction, Sentence Completion	[2]
Unit 5	One Word Substitution, Narrating Events /Reports, Summary/ Precis Writing	[2]
Unit 6	Dialogue writing, Group Discussion, Interview Skills (Using formal notations & gestures etc.)	[2]
Text Books: 1. Raymond Murphy, Essential English Grammar with Answers, Murphy 2. Objective General English by R.S. Aggarwal, S Chand Publishing; Revised edition (15 March 2017)		
Reference Books: 1. Rao and, D,V, Prasada, Wren & Martin High School English Grammar and Composition Book, S Chand Publishing, 2017 2. Murphy, Intermediate English Grammar with Answers, Cambridge University Press; Second edition		



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Language Skill-III

23HSSM06	VEC	Language Skill- III	0-0-2	Audit
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Teaching Scheme:	Evaluation Scheme:
Practical: 2hrs/week	Continuous Assessment-I : 25Marks Continuous Assessment-II : 25Marks

Pre-Requisites: Language Skill- I & II

Course Outcomes: At the end of the course, students will be able to:

CO1	Develop a program to read input and return output.
CO2	Develop a program using data types, String and variables
CO3	Develop a program using Unary, Binary and Ternary operator
CO4	Develop a program using Conditional and Logical statements.

1. Write a Python program to print "Hello, World!" Objective: Understand basic syntax, indentation, and output.	[2]
2. Write a program to demonstrate the use of different types of comments in Python. Objective: Single-line and multi-line comments.	[2]
3. Write a Python program that declares different types of variables and displays their data types using the type () function. Objective: Variables, data types, and type identification.	[2]
4. Write a program to demonstrate type casting and type conversion between int, float, and string. Objective: Type conversion, casting functions.	[2]
5. Write a Python script to perform string operations such as slicing, concatenation, upper (), lower (), and len (). Objective: String manipulation and built-in functions.	[2]
6. Write a program to demonstrate the use of all arithmetic, logical, and bitwise operators. Objective: Operator functionality.	[2]
7. Write a Python program to use membership and identity operators with examples. Objective: in, not in, is, is not.	[2]
8. Write a Python program using a ternary operator to find the larger of two numbers. Objective: Conditional (inline) expressions.	[2]
9. Write a program that takes user input for age and prints whether the person is a child, teenager, adult, or senior citizen using if-elif-else. Objective: Conditional statements and user input.	[2]



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10. Write a program to find the sum of the first 10 natural numbers using a while loop. Objective: Looping with while.	[2]
11. Write a Python script to display the multiplication table of a number using a for loop. Objective: Looping with for and range ().	[2]
12. Write a program that uses break, continue, and pass statements in appropriate looping scenarios. Objective: Loop control statements.	[2]
Text Books: <ol style="list-style-type: none">1. Python Projects (Author: Laura Cassell, Alan Gauld) Wrox publication2. Murach's Python Programming. Aut.: Michael Urban, Joel Murach, murach's Publication.	
Reference Books: <ol style="list-style-type: none">1. Fundamentals of Python (First Program) Cengage MINDTAP Publication 2nd Edition. Author: K.A. Kambert	



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