Annexure – I

CREDIT FRAMEWORK STRUCTURE

Semester		I	II	III	IV	V	VI	VII	VIII	Total Credits
Basic Science courses	BSC	7	7	-	-	-	-	-	-	**14**
Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc.	ESC	6	6	-	-	-	-	-	-	**12**
Professional core courses	PCC	5	3	15	10	14	6	7	-	**60**
Professional Elective courses relevant to chosen specialization/branch	PEC	-	-	-	-	-	6	5	3	**14**
Compulsory Multidisciplinary Minor	MDM	-	-	2	3	3	3	3		**14**
Open subjects – Electives from other technical and /or emerging subjects	OE	-	-	-	-	-	2	3	3	**8**
Ability Enhancement Course (AEC), Indian Knowledge System (IKS), Value Education Course (VEC),Entrepreneurship/Economics/Management courses	HSSM	1	3	3	3	-	-	-	-	**10**
Vocations Skill Courses (VSC) , Skill Enhancement Courses(SEC)	VSEC	1	1		3	3	1	-	-	**9**
Project work, seminar and internship in industry or elsewhere, Industry Training and Skill Development, Capstone Course	ELC	-	-	2	1		2	2	14	**21**
Co-curricular Courses (CC) such as Health and Wellness, Yoga education sports, and fitness, Cultural Activities, NSS/NCC and Fine/ Applied/ Visual/ Performing Arts	CC	2	2	-	-	-	-	-	-	**4**
Total Credits (Major)		**22**	**22**	**22**	**20**	**20**	**20**	**20**	**20**	**166**

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Civil Engineering

SEMESTER IV

Sr. . No	Course Category	Course Code	Course Title	Hours per Week			Credits	Maximum Marks				No of Hours for ESE
				L	T	P		Mid-Sem Examination	Continual Assessment	End Sem Examination	Total	
1.	PCC	**24CV401T**	Structural Analysis	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**3**
2.	PCC	**24CV401P**	Structural Analysis Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**-**
3.	PCC	**24CV402T**	Fluid Mechanics	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**3**
4.	PCC	**24CV402P**	Fluid Mechanics Lab	**-**	**-**	**2**	**1**	**-**	**25**	**25**	**50**	**-**
5.	PCC	**24CV403P**	Surveying & Geomatics Lab	**-**	**-**	**2**	**2**	**-**	**50**	**50**	**100**	**-**
6.	VSC	**24CV404P**	Technical Skill Development - I	**-**	**-**	**4**	**2**	**-**	**50**	**-**	**50**	**-**
7.	VEC	**24CV405T**	Value Education Course	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**3**
8.	SEC	**24CV441P**	Career Development - IV	**-**	**-**	**2**	**1**	**-**	**50**	**-**	**50**	**-**
9.	ELC	**24CV406P**	Micro Project II*	**-**		**2**	**1**	**-**	**50**	**-**	**50**	**-**
10.	MDM	**24CV431M**	Multidisciplinary Minor - II	**3**	**-**	**-**	**3**	**20**	**20**	**60**	**100**	**3**
Total				**12**	**0**	**16**	**20**	**80**	**330**	**340**	**750**	**-**

*** Field Project or Community engagement project in the major discipline**

Multidisciplinary Minor - II	
24CV431M	MDM - II Basic Construction Materials

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Basket for Multi-Disciplinary Minor Courses (MDM)

A. Civil Engineering

Semester	Course Category	Course Code	Name of Course
III	MDM-I	24CV331M	MDM - I Basics of Civil Engineering
IV	MDM-II	24CV431M	MDM - II Basic Construction Materials
V	MDM-III	24CV531M	MDM - III Building Planning & Construction
VI	MDM-IV	24CV631M	MDM - IV Building Services
VII	MDM-V	24CV731M	MDM - V Smart Transit System

Basket for Program Elective Courses (PEC)

B. Civil Engineering

Semester	Course Category	Course Code	Name of Course
VI	PEC	24CV603T(i) 24CV603T(ii) 24CV603T(iii)	PE - I Advanced Structural Analysis PE - I Advanced Surveying PE - I Advanced Fluid Mechanics
VI	PEC	24CV604T(i) 24CV604T(ii) 24CV604T(iii) 24CV604T(iv)	PE - II Advanced Reinforced Cement Concrete Structures PE - II Air Pollution & Control PE - II Foundation Engineering PE - II Advanced Traffic Engineering
VII	PEC	24CV703T(i) 24CV703T(ii) 24CV703T(iii) 24CV703T(iv)	PE - III Advanced Steel Design PE - III Mass Rapid Transit System PE - III Ground Improvement Techniques PE - III Disaster Management

VII	PEC	24CV704T(i) 24CV704T(ii) 24CV704T(iii)	PE - IV Earthquake Resistant Design of Concrete Structures PE - IV Solid Waste Management PE - IV Irrigation Engineering
VIII	PEC	24CV802T(i) 24CV802T(ii) 24CV802T(iii)	PE - V Industrial Wastewater Treatment PE - V Retrofitting and Rehabilitation of Civil Infrastructure PE - V Modern Construction Materials

Basket for Open Elective Courses (OE)

C. Civil Engineering

Semester	Course Category	Course Code	Name of Course
VI	VI	24CV661O	OE - I Public Health Engineering
VII	VII	24CV761O	OE - II Green Buildings
VIII	VIII	24CV861O	OE - III Air Pollution and Control

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CIVIL ENGINEERING

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV401T	Structural Analysis	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
1. To understand the response of pin jointed and rigid jointed structures subjected to various loading. 2. To compare the advantages and limitations of statically and kinematically determinate structures. 3. To analyze the pin jointed and rigid jointed structure using various methods of analysis and select a particular method for a structure. 4. To analyze the simply supported beams and determinate trusses using Influence Line Diagram.	1. Analyze various pin jointed and rigid jointed structures. 2. Analyze the structure using strain energy and/or flexibility method. 3. Analyze the frame using slope deflection method. 4. Analyze the frame using Moment Distribution method. 5. Construct Influence Line Diagrams for determinate trusses and beams using Rolling Loads.

Unit I	**[9 Hrs]**
Pin jointed and rigid jointed structures: Methods of analysis of determinate structures. **Pin Jointed:** Axial Force Diagram **Rigid Jointed:** Axial Force, Shear Force and Bending Moment diagram. Determination of Indeterminacy in pin jointed and rigid jointed structures.	
Unit II	**[9 Hrs]**
Strain Energy: Analysis of Trusses, Beams and Frames (Max.indeterminacy = 2) **Flexibility Method:** Analysis for trusses and frames (Max.indeterminacy = 3)	
Unit III	**[9 Hrs]**
Slope Deflection Method: Analysis of portal frames with sway and without sway, frames with inclined legs. (Max. indeterminacy = 3)	
Unit IV	**[9 Hrs]**
Moment Distribution Method: Analysis of portal frames with and without sway up to single storey and three bays.	
Unit V	**[9 Hrs]**
Rolling Loads and Influence Line Diagrams: Simply Supported Beams and determinate Trusses.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Structural Analysis	R. C. Hibbeler	11th Edition, 2017	Pearson Publications
2	Basic structural Analysis	C. S. reddy	3rd Edition, 2019	Tata McGraw Hill
3	Structural Analysis, SI Edition	Aslam Kassimalli	4th Edition, 2019	Prentice Hall Publications

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Structural Analysis: Statically Indeterminate Structures	Salah Khalfallah	2nd Edition, 2019	Willey Publications
2	Statically Indeterminate Structures	C. K. Wang	17th Edition, 2019	McGraw Hill

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FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CV401P	Structural Analysis Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. To introduce students to fundamental experimental techniques used in determining structural behavior under various loading conditions. 2. To develop the ability to analyze determinate and indeterminate structures through laboratory experiments and compare the results with theoretical solutions. 3. To provide hands-on experience in using measuring instruments and equipment such as strain gauges, load cells, deflection measuring devices, and model testing setups.	1. To analyze pin jointed structures. 2. To determine the structural response of Arch. 3. To analyze the rigid jointed structures. 4. To determine the deflection of the columns under various support conditions. 5. To analyze the structures using the software and compare the results obtained manually.

Expt. No.	Title of the Experiment
1	Determination of support reactions of Two Hinged Arch.
2	Verification of Maxwell's Reciprocal Theorem using overhanging beam set up.
3	Determination of deflection for a portal frame
4	Calculation of deflections in a simply supported determinate truss
5	Verification of Maxwell's Reciprocal Theorem using simply supported determinate truss set up.
6	Determination of effective length of a column with different end conditions.
7	Verification of Maxwell's Reciprocal Theorem using software.
8	Verification of support reactions of Portal frame using software.
9	Verification of deflection of column using software.

Text Books

S.N	Title	Authors	Edition	Publisher
1	SAP 2000 software / STAAD.Pro			
2	Virtual Lab			https://www.vlab.co.in/broad-area-civil-engineering

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FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV402T	Fluid Mechanics	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
1. Impart the importance and practical significance of various fluid properties. 2. Discuss and evaluate the importance of various parameters on the fluid motion. 3. Discuss various flow measuring devices with their practical applications. 4. To understand the various losses occurring in pipe flow. 5. To compute uniform flow through open channel and understand the concept of specific energy.	At the end of the course, students will be able to- 1. Define the fundamental properties of fluids and apply the concepts of fluids statics. 2. Summarize the concept of dynamics of fluid flow. 3. Compare various flow measuring devices with their practical applications. 4. Apply the knowledge of theories and equations of pipe flow in analyzing and designing the pipe network systems and to discuss effects of water hammer pressures. 5. Utilize the concepts of uniform and critical flow through open channels, design of efficient channel sections and application of specific energy concept.

Unit I	**[09Hrs]**
Basics of Fluid Mechanics: Fluid Mechanics and its importance in civil Engineering, Rheological diagram and its significance, Fluid Properties, Pressure and its measurement, types of pressure gauges and manometers.	
Unit II	**[09Hrs]**
Kinematics and Kinetics of flow: Euler and Lagrangian approaches, velocity and acceleration of fluid, local and convective acceleration, Continuity equation, stream function and velocity potential functions, Streamline, path line and streak lines. Kinetics of Flow: Euler's Equation of motion, Bernoulli's Equation.	
Unit III	**[09Hrs]**
Measurement of Flow: For pipeline- Venturimeter, orifice meter, Nozzle meter, pitot Tube for velocity measurement. **For tank-** orifice and its types, hydraulic coefficients, mouth piece and its types. **For Open Channel-** Notches and weirs, velocity of approach, End contraction, Sharp crested weir, broad crested weir.	
Unit IV	**[09Hrs]**
Flow through Pipes: Hydraulically smooth and rough pipes: Frictional resistance to flow of fluid in smooth and rough pipes; Moody's chart; Darcy- Weisbach & Hazen-William's equation for frictional head loss; Hydraulic gradient and energy gradient: Pipes in series and parallel; Branched pipes; Siphon; transmission of power through pipes; Hardy-Cross methods of pipe networks; Water-hammer, pressure head due to sudden closure.	
Unit V	**[09Hrs]**
Uniform Flow Through Open Channels: (A) General: Types of channel and their geometrical properties; Types of flow in open channel. **(B) Uniform Flow: Chezy's and Manning's equations**: Hydraulically most efficient rectangular, triangular and trapezoidal sections; Computations of normal depth of flow, conveyance of channel, section factor for uniform flow, normal slope and normal discharge. **(C) Critical Flow:** Specific energy and its diagram; alternate depths; Computations of critical depth, section factor for critical flow, critical slope; normal, critical slope, Specific force and its diagram; Conditions of critical flow. **(D) Rapidly Varied Flow:** Definition of hydraulic jump; Equation of hydraulic jump in horizontal, rectangular channel; Length & height of jump; Energy loss in jump classifications of jump.	

Text Books

S.N	Title	Authors	Edition	Publisher
1	A Text Book of Fluid Mechanics and Hydraulic Machines	R.K. Bansal	9th edition	Laxmi Publications (P) Ltd., New Delhi
2	A Text Book of Fluid Mechanics and Hydraulic Machines	R.K. Rajput	6th edition	S Chand & Company (P) Ltd., New Delhi
3	Hydraulics, Fluid Mechanics and Hydraulic machines	P.N. Modi & S.M. Seth	21st edition	Standard Book House. Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Fluid Mechanics including Hydraulic Machines	A.K. Jain	2nd edition	Khanna Publishers
2	Hydraulics, Fluid Mechanics and Fluid Machines	S. Ramamrutham	9th edition	Dhanpat Rai Publishing Co... New Delhi

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CV402P	Fluid Mechanics Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. Adequate knowledge on the fundamental concepts of measurement techniques. 2. Correlate various flow measuring devices such as Venturimeter, orifice meter and notches etc. 3. Enrich the concept of fluid mechanics and hydraulic machines. 4. Demonstrate the standard experiments in fluid mechanics.	At the end of the course, students will be able to 1. Distinguish and calibrate different flow measuring devices. 2. Characterise the flow field based on the Reynolds number. 3. Standardize the friction in ducts & evaluate the effect of channel shapes on the discharge parameters and understand the theory of hydraulic jumps. 4. Identify type of fluid flow patterns and apply continuity equation.

Expt. No.	Title of the experiment
1	Determination of Frictional factor of a pipe line.
2	Determination of minor losses through a pipe system.
3	Analysis and types of Hydraulic jump in open channel.
4	Determination Chesy's and Manning constants.
5	Analysis of a Water Distribution network by Hardy crosses method.
6	Verification of Bernoulli's Theorem.
7	Calibration of Venturimeter and its practical utility.
8	Calibration of Orifice meter and its practical utility.
9	Calibration of Rectangular Notches.
10	Study of Reynolds's experiment.
11	Hydraulic Coefficients of an orifice and Mouthpiece.

Text Books

S.N	Title	Authors	Edition	Publisher
1	Hydraulics, Fluid Mechanics and Hydraulic machines	P.N. Modi & S.M. Seth	4th	Standard Book House. Delhi
2	A Text Book of Fluid Mechanics and Hydraulic Machines	, R.K. Bansal	9th	Laxmi Publications (P) Ltd., New Delh

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CV403P	Surveying and Geomatics Lab	-	-	2	1	25	25	50

Course Objectives	Course Outcomes
1. To know the basic concept of surveying 2. To understand the concept of levelling 3. To learn the concepts of geo-informatics	At the end of the course, students will be able to- 1. Demonstrate linear measurements of plotted points/objects 2. Demonstrate angular measurements of plotted points/objects 3. Understand the concepts of modern surveying techniques

Minimum 10 to be performed

Expt. No.	Title of the experiment
1	Determination of area of given polygon by tape and cross staff survey
2	Measurement of fore bearing and back bearing by compass and correcting them for suspected local attraction
3	Determination of elevation of various points with Auto level/Dumpy level
4	Measurement of horizontal and vertical angles by Vernier Theodolite
5	Determination of elevation of point by trigonometric leveling
6	Determination of tachometric constants
7	Determination of elevation of points, horizontal distance and gradient by tachometric survey
8	Setting out of simple circular curve by Rankine method of tangential angle
9	Measurement of coordinates by Total Station
10	Measurement of horizontal and vertical angles by Total Station
11	Remote elevation measurement by Total Station
12	Measurement of Latitude and Longitude using hand held GPS
13	Lay-out marking of building plan
14	Study of Remote Sensing and Drones
15	Two day survey camp on any one using advanced survey instruments (i) Contouring (ii) Road Survey (iii) Lay-outing (iv) Location of Boundary and area calculation

Text Books

S.N	Title	Authors	Edition	Publisher
1	Surveying and Levelling	N. N. Basak	2nd edition	McGraw Hill
2	Surveying Volume-I	S. K. Duggal	5th edition	McGraw Hill
3	Surveying Volume-I	Dr. K. R. Arora	17th edition	Standard Book House

FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CV441P	Technical Skill Development – I	-	-	4	2	50	-	50

Course Objectives	Course Outcomes
1.Learn how to navigate through documents and slide using the keyboard and mouse. 2.Learn to create, open, save, and manage documents and ppt. 3.Apply basic text and slide formatting.	1. Create new documents, edit existing ones, and apply various formatting techniques to improve document and presentation. 2. Design and create engaging presentations using themes, templates, and slide layouts. 3. Utilize various types of slides, including title slides, content slides, and custom layouts.

Topic No.	Content
1	Introduction to Microsoft Word and Basic Document Creation,
2	Editing and Advanced Document Formatting Tables and Lists
3	Inserting Elements in Documents and Reviewing and Collaboration Tools
4	Microsoft Power Point and Working with Slides
5	Text, Object Formatting, Inserting and Formatting Media

S. N	Evaluation Scheme
1	Practical assignments (creating documents and presentations)
2	Group project for collaborative presentations

Text Books

S.N	Title	Authors	Edition	Publisher
1	Microsoft Word, Excel, and PowerPoint: Just for Beginners	Dorothy House	-	
2	Microsoft Office 365 All-in-One for Dummies	Peter Weverka; Matt Wade	2	

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Microsoft Word In Easy Steps	Scott Basham	-	Kindle

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FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV405T	Value Education Course	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
Development of a holistic perspective through self-exploration and development of clarity about harmony between self, family, society and nature.	At the end of the course, students will be able to: 1. Demonstrate awareness about self and their surroundings and its interdependence. 2. Understand concepts of aspirations and happiness. 3. Recognize and explain the nine universal values in relationship and their application in visualizing a harmonious society. 4. Discuss concepts of conservation of nature and harmony and reusability. 5. Identify the scope of eco-friendly systems for enriching institutions.

Unit I : Introduction	**[9Hrs]**
Purpose and motivation for the course, Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations , Right understanding, Relationship and Physical Facility- the basic requirements for fulfillment of aspirations of every human being with their correct priority , Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario , Method to fulfill the above human aspirations: understanding and living in harmony at various levels.	
Unit II : Understanding Harmony	**[9Hrs]**
Understanding human being as a co-existence of the sentient 'I' and the material 'Body' , Understanding the needs of Self ('I') and 'Body' - happiness and physical facility , Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer) ,Understanding the characteristics and activities of 'I' and harmony in 'I' , Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail , Programs to ensure Sanyam and Health.	
Unit III : Values in relationships	**[9Hrs]**
Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfillment to ensure mutual happiness; Trust and Respect as the foundational values of relationship , Understanding the meaning of Trust; Difference between intention and competence , Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship , Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals , Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.	
Unit IV : Co-existing with nature	**[9Hrs]**
Understanding the harmony in Nature , Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature , Understanding Existence as Coexistence of mutually interacting units in all-pervasive space ,Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.	
Unit V : Holistics approach for engineers	**[9Hrs]**
Natural acceptance of human values , Definitiveness of Ethical Human Conduct , Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order , Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems. , Case studies of typical holistic technologies, management models and production systems , Strategy for transition from the present state to Universal Human Order: a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers b. At the level of society: as mutually enriching institutions and organizations ,Sum up	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Human Values and Professional Ethics	Gaur, Sangal, Bagaria	2010	Excel Books, New Delhi

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Jeevan Vidya: Ek Parichaya	A. Nagaraj	1999	Jeevan Vidya Prakashan, Amarkantak
2.	Human Values	A.N. Tripathi	2004	New Age Intl. Publishers, New Delhi
3.	The Story of My Experiments with Truth	M.K.Gandhi	2009	Fingerprint! Publishers

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Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation		
						CA	ESE	Total
24CV407P	Career Development IV	-	-	2	1	50	-	50

Course Objectives	Course Outcomes
1. The sole objective of imparting aptitude training is to make students able to critically evaluate various real-life situations by resorting to an analysis of key issues and factors. 2. This Aptitude Training helps them to demonstrate various principles involved in solving mathematical problems and thereby reducing the time taken for performing job functions. 3. To categorize, apply and use thought process to distinguish between concepts of Quantitative methods.	1. Students shall understand the concepts of Quadratic Equation, AP, GP, and HP. 2. Students shall understand the concepts of Averages and Mixture and allegations 3. Students shall understand the concepts of Blood relations CO 4. Students shall understand the concepts of cubes and Dice problem. 4. Students shall understand the concepts of clocks and Calendars.

Unit I	**[3Hrs]**
Aptitude: Quadratic Equation Arithmetic progression, Geometric progression, Harmonic progression	
Unit II	**[3Hrs]**
Aptitude: Average Mixture and Allegation	
Unit III	**[2Hrs]**
Aptitude: Blood Relation :- Family Tree, Coding Blood Relation, Pointing to a Person Problem	
Unit IV	**[2Hrs]**
Aptitude: Cubes and Dice Problems:- Number of cuts to be made, Number of colorful Faces of Cubes, Hidden Dice Number	
Unit V	**[4Hrs]**
Aptitude: Clocks :- Angle made by Hour hand, Minutes hand, Mirror and water Image of Clock, Behind and Ahead time concept Calendars :- Day on Specific date, Coded Calendars Problems, Calendars repetition	

Text Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude By R. S. Aggarwal	R.S. Aggarwal		
2	Quantitative Aptitude	Shripad Deo		Allied Publication
3	A Modern Approach to Verbal & Non-Verbal Reasoning	R.S. Aggarwal		

Reference Books

S.N	Title	Authors	Edition	Publisher
1	Quantitative Aptitude for CAT by Arun Sharma	Arun Sharma		

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FOURTH SEMESTER

Course Code	Course Name	Th	Tu	Pr	Credits	Evaluation			
						MSE	CA	ESE	Total
24CV431M	MDM - II Basic Construction Materials	3	-	-	3	20	20	60	100

Course Objectives	Course Outcomes
1. Provide fundamental knowledge of conventional and modern construction materials used in civil engineering. 2. Develop understanding of engineering properties, standards, and testing procedures of various materials. 3. Enable students to select appropriate construction materials for different structural and functional requirements. 4. Introduce sustainability concepts through the use of eco- friendly, recycled, and alternative construction materials. 5. Promote analytical and practical skills by correlating laboratory test results with material performance in real- world applications.	At the end of the course, students will be able to- 1. Identify and evaluate the engineering properties and quality of stones, bricks, and blocks used in construction. 2. Understand cement and lime manufacturing, types, and testing procedures for appropriate material selection. 3. Analyze concrete ingredients, workability characteristics, and the role of admixtures in improving concrete performance. 4. Classify timber and steel materials and assess their suitability using standard testing and preservation techniques. 5. Explore and apply modern, eco-friendly, and innovative construction materials for sustainable development.

Unit I **[09 Hrs]**

Stones and Bricks

Classification and characteristics of building stones; quarrying, dressing & preservation; tests on stones. Composition and manufacturing of clay bricks; characteristics of good bricks; types of bricks; tests on bricks. Introduction to hollow blocks, fly ash bricks, AAC blocks, and solid blocks.

Unit II **[09 Hrs]**

Cement and Lime

Raw materials & manufacturing process of cement (dry & wet process); types of cement: OPC, PPC, PSC, rapid hardening, low heat, sulphate resistant, white cement. Properties & tests of cement: fineness, consistency, setting time, compressive strength, soundness. Storage & handling of cement.

Unit III **[09 Hrs]**

Concrete & Admixtures

Ingredients of concrete; properties & grading of aggregates; tests on coarse & fine aggregates. Workability tests – slump cone, compaction factor, Vee-Bee test. Basic introduction to concrete mix design. Types of concrete – ready mix, fibre-reinforced, lightweight, self-compacting, high performance concrete. Admixtures: plasticizers, superplasticizers, accelerators, retarders, air-entraining agents, mineral admixtures

Unit IV **[09 Hrs]**

Timber and Structural Steel

Properties & classification of timber; defects, seasoning & preservation of timber; engineered wood products – plywood, particle board, MDF, laminates. Structural steel – properties & uses; corrosion, types & prevention.
Tests on steel – tensile test, bend and rebend test.

Unit V **[09 Hrs]**

Modern & Sustainable Construction Materials

Gypsum & gypsum boards; bitumen – types, properties, and tests (penetration, softening point, ductility, flash & fire point, viscosity). Plastics, PVC products & applications; glass and types; geosynthetics & applications. Eco-friendly & innovative materials – recycled aggregates, waste glass, fly ash bricks, sludge ash bricks, bamboo reinforcement, ferrocement. Smart materials – self-healing concrete, phase change materials, nano-materials (intro only).

Text Books

Sr.No.	Title	Authors	Edition	Publisher
1	Building Materials	S. K. Duggal	2nd	Tata McGraw Hill
2	Concrete Technology	M. S. Shetty	4th	S. Chand
3	Building Materials	S. V. Deodhar	3rd	Khanna Publishers

Reference Books

S. No.	Title	Authors	Edition	Publisher
1	Properties of Concrete	A. M. Neville	6th	Pearson
2	Construction Materials	P. Kumar Mehta	4th	Prentice Hall

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Chairman - BoS	Dean – Academics	Date of Release	Version	