

# **B.E. CIVIL ENGINEERING**

**CURRICULUM**

**REGULATION-2022**

**CHOICE BASED CREDIT SYSTEM (CBCS)**




**DEPARTMENT OF CIVIL ENGINEERING**

**MAHENDRA ENGINEERING COLLEGE**

**(AUTONOMOUS)**

**MALLASAMUDRAM WEST, TAMIL NADU 637503**

Mahendra Engineering College (Autonomous) - Civil Engin  
Syllabus - Regulation 2022

  
Head of the Department,  
Department of Civil Engineering,  
Mahendra Engineering College,  
Mallasamudram (W),  
Namakkal (Dt).





**MAHENDRA ENGINEERING COLLEGE**  
(Autonomous)



**DEPARTMENT OF CIVIL ENGINEERING**

**Regulation-2022- Curriculum**

**(CBCS)**

**V Semester**

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	22CE14501	Structural Analysis - I	PC	3	3	0	0	3
2	22CE14502	Design of Reinforced Concrete Elements	PC	3	3	0	0	3
3	22CE14503	Foundation Engineering	PC	3	3	0	0	3
4	22CE35501	Statistics & Simulation for Civil Engineering	PE	3	1	0	2	3
5		Professional Elective - I	PE	3	3	0	0	3
6	22MBAT6S06	Managerial Skills, Project and Quality Management	OE	3	3	0	0	3
7		Open Elective-4	OE	3	3	0	0	3
<b>PRACTICAL</b>								
8	22CE24501	Environmental Engineering Laboratory	PC	3	0	0	3	1.5
9	22CE24502	Soil Mechanics Laboratory	PC	3	0	0	3	1.5
10	22EN60002	Interview Skill and Soft Skill	HS	3	0	1	2	2
		<b>TOTAL</b>		<b>30</b>	<b>19</b>	<b>1</b>	<b>10</b>	<b>26</b>

Sl. No.		Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>									
1	22CE14601	Structural Analysis – II	PC	3	3	0	0	0	3
2	22CE14602	Concrete Technology	PC	3	3	0	0	0	3
3	22CE14603	Design of Steel Structures	PC	3	3	0	0	0	3
4	22CE14604	Highway Engineering	PC	3	3	0	0	0	3
5		Professional Elective - II	PE	3	3	0	0	0	3
6	22MC60001	Constitution of India	MC	3	3	0	0	0	-
<b>PRACTICAL</b>									
7	22CE24601	Concrete and Highway Materials Laboratory	PC	4	0	0	4	0	2
8	22CE34601	Formwork Systems, Components and Hands On	PC	3	1	0	2	0	2
9	22CE56601	Internship and Evaluation	EEC	4	0	0	2	0	1
<b>TOTAL</b>					<b>29</b>	<b>19</b>	<b>0</b>	<b>8</b>	<b>20</b>

  
 Head of the Department,  
 Department of Civil Engineering,  
 Mahendra Engineering College,  
 Matlasamudram (W),  
 Namakkal (Dt).



**MAHENDRA ENGINEERING COLLEGE**  
(Autonomous)





**DEPARTMENT OF CIVIL ENGINEERING**

**Regulation-2022- Curriculum (CBCS)**

**VII Semester**

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	22CE14701	Advanced Structural Design	P C	3	3	0	0	3
2	22CE14702	Construction Engineering and Management	PC	3	3	0	0	3
3	22CE14703	Estimation and Quantity Surveying	PC	3	3	0	0	3
4		Professional Elective - III	PE	3	3	0	0	3
5		Professional Elective - IV	PE	3	3	0	0	3
<b>PRACTICAL</b>								
6	22CE34701	Formwork Design and Drawings	PC	3	2	0	2	3
7	22CE24701	Structural Design Studio	PC	3	0	0	4	2
8	22CE36701	Project Work (Phase-I)	EEC	6	0	0	6	3
<b>TOTAL</b>				<b>27</b>	<b>17</b>	<b>0</b>	<b>12</b>	<b>23</b>

Head of the Department,  
Department of Civil Engineering,  
Mahendra Engineering College,  
Mallasamudram (W),  
Namakkal (Dt).

		<b>MAHENDRA ENGINEERING COLLEGE</b> (Autonomous)							
		<b>DEPARTMENT OF CIVIL ENGINEERING</b>							
<b><u>Regulation-2022- Curriculum (CBCS)</u></b>									
<b>VIII Semester</b>									
Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	
<b>THEORY</b>									
1		Professional Elective – V	PE	3	3	0	0	3	
2		Professional Elective – VI	PE	3	3	0	0	3	
<b>PRACTICAL</b>									
3	22CE36801	Project Work (Phase-II)	EEC	12	0	0	12	6	
<b>TOTAL</b>				<b>18</b>	<b>6</b>	<b>0</b>	<b>12</b>	<b>12</b>	

  
 Head of the Department,  
 Department of Civil Engineering,  
 Mahendra Engineering College,  
 Matlasamudram (W),  
 Namakkal (Dt).

## PROFESSIONAL ELECTIVES (PE): VERTICALS

S.NO	COURSE CODE	COURSE TITLE	CATEGORY	CONTACT PERIODS	L	T	P	C
<b>ELECTIVE I - ENVIRONMENTAL</b>								
1.	22CE15501	Air and Noise Pollution Control Engineering	PE	3	3	0	0	3
2.	22CE15502	Environmental health and Safety	PE	3	3	0	0	3
3.	22CE15503	Global Warming and Climatic Change	PE	3	3	0	0	3
4.	22CE15504	Hazardous Waste Management	PE	3	3	0	0	3
5	22CE15505	Industrial Waste Management	PE	3	3	0	0	3
6	22CE15506	Waste Water Engineering						
7	22CE15507	Water Quality Engineering						
<b>ELECTIVE II- GEOTECHNICAL</b>								
1	22CE15601	Advanced Geotechnical Laboratory	PE	3	3	0	0	3
2	22CE15602	Earth and Earth Retaining Structures	PE	3	3	0	0	3
3	22CE15603	Geo-environmental Engineering	PE	3	3	0	0	3
4	22CE15604	Ground Improvement Techniques	PE	3	3	0	0	3
5	22CE15605	Pile Foundation	PE	3	3	0	0	3
6	22CE15606	Rock Mechanics	PE	3	3	0	0	3
7	22CE15607	Tunnel Engineering	PE	3	3	0	0	3
<b>ELECTIVE III – CONSTRUCTION TECHNIQUES AND PRACTICES</b>								
1	22CE15701	Advanced Construction Techniques	PE	3	3	0	0	3
2	22CE15702	Architecture & Town Planning	PE	3	3	0	0	3
3	22CE15703	Construction Management and Safety	PE	3	3	0	0	3
4	22CE15704	Construction Project Planning and Scheduling	PE	3	3	0	0	3
5	22CE15705	Energy Efficient building	PE	3	3	0	0	3
6	22CE15706	Formwork Engineering	PE	3	3	0	0	3
7	22CE15707	Housing Planning and Management	PE	3	3	0	0	3
<b>ELECTIVE IV – TRANSPORTATION AND GEOINFORMATICS</b>								
1	22CE15708	Intelligent Transportation System	PE	3	3	0	0	3
2	22CE15709	Pavement Engineering	PE	3	3	0	0	3
3	22CE15710	Railways, Airport, Docks and Harbor	PE	3	3	0	0	3
4	22CE15711	Smart Cities	PE	3	3	0	0	3
5	22CE15712	Traffic Engineering and Management	PE	3	3	0	0	3
6	22CE15713	Remote Sensing Concepts	PE	3	3	0	0	3

7	22CE15714	Cartography and GIS	PE	3	3	0	0	3
<b>ELECTIVE V – STRUCTURAL ENGINEERING</b>								
1	22CE15801	Prestressed Concrete	PE	3	3	0	0	3
2	22CE15802	Structural Dynamics and Earthquake resistant structures	PE	3	3	0	0	3
3	22CE15803	Safety in Construction	PE	3	3	0	0	3
4	22CE15804	Bridge Structures	PE	3	3	0	0	3
5	22CE15805	Industrial Structures	PE	3	3	0	0	3
6	22CE15806	Prefabricated Structures	PE	3	3	0	0	3
7	22CE15807	Health Monitoring of Structures	PE	3	3	0	0	3
<b>ELECTIVE VI – WATER RESOURCES</b>								
1	22CE15808	Water Resources and Irrigation Engineering	PE	3	3	0	0	3
2	22CE15809	GroundWater Engineering	PE	3	3	0	0	3
3	22CE15810	Hydrology	PE	3	3	0	0	3
4	22CE15811	Water Quality and Management	PE	3	3	0	0	3
5	22CE15812	Watershed Conservation and Management	PE	3	3	0	0	3
6	22CE15813	Urban Water Infrastructure	PE	3	3	0	0	3
7	22CE15814	Integrated Water Resources Management	PE	3	3	0	0	3

  
 Head of the Department,  
 Department of Civil Engineering,  
 Mahendra Engineering College,  
 Malasamudram (W),  
 Namakkal (Dt).





**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**DEPARTMENT OF CIVIL ENGINEERING**

**Regulation-2022- Curriculum (CBCS)**

**V Semester**

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	22CE14501	Structural Analysis - I	PC	3	3	0	0	3
2	22CE14502	Design of Reinforced Concrete Elements	PC	3	3	0	0	3
3	22CE14503	Foundation Engineering	PC	3	3	0	0	3
4	22CE35501	Statistics & Simulation for Civil Engineering	PC	3	1	0	2	3
5		Professional Elective - I	PE	3	3	0	0	3
6	22MBAT6S06	Managerial Skills, Project and Quality Management	EEC	3	3	0	0	3
7		Open Elective-4	OE	3	3	0	0	3
<b>PRACTICAL</b>								
8	22CE24501	Environmental Engineering Laboratory	PC	3	0	0	3	1.5
9	22CE24502	Soil Mechanics Laboratory	PC	3	0	0	3	1.5
10	22EN60002	Interview Skill & Soft Skill	HS	3	0	1	2	2
		<b>TOTAL</b>		<b>30</b>	<b>19</b>	<b>1</b>	<b>10</b>	<b>26</b>



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**R2022-Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>
-------------------	--------------------------	-----------------------	-------------

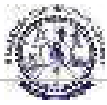
**SEMESTER V**

COURSE CODE	COURSE NAME	HOURS/WEEK			CREDIT	MAXIMUM MARKS
		L	T	P		
22CE14501	STRUCTURAL ANALYSIS I	3	0	0	3	100
<b>Objective(s)</b>	The main objectives of this course is: <ul style="list-style-type: none"> <li>To idealize and analyze statically indeterminate beams and frames.</li> <li>To obtain the influence lines for statically determinate and indeterminate structures using the Muller-Breslau Principle.</li> <li>To analysis the different types of arched structures</li> <li>To study the analysis of space truss and suspense cables with stiffness girder</li> <li>To analysis the plastic analysis of structure</li> </ul>					
<b>UNIT-I</b>	<b>MOVING LOADS</b>					<b>9</b>
Influence lines for reactions in statically determinate beams – I.L.D of support reaction, shear force and moment bending moment for beams subjected to u.d.l and several point loads- Influence lines for member forces in pin-jointed frames – Calculation of critical stress resultants due to concentrated and distributed moving loads.						
<b>UNIT-II</b>	<b>INFLUENCE LINES FOR INDETERMINATE BEAMS</b>					<b>9</b>
Muller Breslau’s principle – Influence lines for continuous beams and single storey rigid frames – Indirect model analysis for influence lines of indeterminate structures.						
<b>UNIT-III</b>	<b>ARCHES</b>					<b>9</b>
Arches as structural forms – Types of arches – Analysis of three hinged and two hinged – Normal thrust and radial shear in arches- Settlement and temperature effects.						
<b>UNIT-IV</b>	<b>SPACE AND CABLE STRUCTURES</b>					<b>9</b>
Analysis of Space trusses using method of tension coefficients – cables and suspensionbridges with two hinged stiffening girder - Three hinged stiffening girder						
<b>UNIT- V</b>	<b>PLASTIC ANALYSIS OF STRUCTURES</b>					<b>9</b>
Beams in pure bending – Plastic moment of resistance – Plastic modulus – Shape factor –Load factor – Plastic hinge and mechanism – Plastic analysis of indeterminate beams and frames – Upper and lower bound theorems						

Total hours to be taught		(L:45 )
<b>Outcome(s)</b>	At the end of the course the students will be able to: <ul style="list-style-type: none"> <li>❖ Draw the influence lines for beams and girders due to moving loads</li> <li>❖ Analyze the statically indeterminate beams and frames.</li> <li>❖ Determine the thrust and radial shear act on the arches.</li> <li>❖ Analyze the space truss using tension coefficient and suspension cable bridges.</li> <li>❖ Calculate the shape factor, load factor analysis for indeterminate beams.</li> </ul>	
<b>Text book :</b>		
<input type="checkbox"/>	Vaidyanadhan, R and Perumal, P, “Comprehensive Structural Analysis – Vol. 1 & Vol. 2”, infinity publishers (2016) Pvt. Ltd, New Delhi, 2016 & 2008	
<input type="checkbox"/>	Reddy. C.S., "Basic Structural Analysis", Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2013.	
<b>REFERENCES</b>		
<input type="checkbox"/>	Wang C.K. , “Indeterminate Structural Analysis”, Tata McGraw Hill Education Pvt. Ltd., New Delhi, 2010	
<input type="checkbox"/>	Devadas Menon, “Structural Analysis”, Narosa Publishing House, 2008	
<input type="checkbox"/>	Ghali.A., Nebille and Brown. T.G., "Structural Analysis - A unified classical and matrix approach" Sixth Edition, SPON press, New York, 2013.	
<input type="checkbox"/>	Gambhir. M.L., "Fundamentals of Structural Mechanics and Analysis"., PHI Learning Pvt. Ltd., New Delhi, 2011.	
<input type="checkbox"/>	L.S. Negi & R.S. Jangid, “Structural Analysis”, T ata McGraw Hill Publications, New Delhi, 6 <sup>th</sup> Edition, 2004.	
<input type="checkbox"/>	Punmia.B.C, Ashok Kumar Jain and Arun Kumar Jain, " Theory of structures", Laxmi Publications Pvt. Ltd., New Delhi, 2017	
<input type="checkbox"/>	<a href="https://nptel.ac.in/downloads/105101085/">https://nptel.ac.in/downloads/105101085/</a>	

<b>POs COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
CO1	2	3	-	-	-	1	1	1	-	1	-	1	3	1
CO2	1	2	-	-	-	1	1	1	-	1	-	1	1	1
CO3	1	2	-	-	-	1	1	1	-	1	-	1	3	1
CO4	2	3	-	-	-	1	1	1	-	1	-	1	1	1
CO5	1	2	-	-	-	1	1	1	-	1	-	1	3	1

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



R2022-Syllabus

Department	Civil Engineering	Programme Code	1021
------------	-------------------	----------------	------

**SEMESTER V**

COURSE CODE	COURSE NAME	HOURS/WEEK			CREDIT	MAXIMUM MARKS
		L	T	P		
22CE14503	FOUNDATION ENGINEERING				C	100
		3	0	0	3	
Objective(s)	The main objective of this course is <ul style="list-style-type: none"> <li>To understand the purpose of site examination and sub soil investigation.</li> <li>To learn the bearing capacity of shallow foundation.</li> <li>To study the load carrying capacity of friction and end bearing piles.</li> <li>To acquire knowledge in applications of raft foundation and settlement analysis.</li> <li>To impart the knowledge in graphical analyzes for various earth pressure theories.</li> </ul>					
UNIT-I	<b>SITE EXAMINATION &amp; SOIL EXPLORATION</b>				9	
Introduction – Planning a subsurface Exploration Programmes –Stages in Sub-Surface Explorations-Depth of Exploration-Lateral and Open Excavation Methods- Methods of Boring– Auger, Wash, Rotary, Percussion Boring-Sample Design Feature – Sampling techniques – Representative and undisturbed sampling – methods – Split spoon sampler – Dilatometer for Soil - Penetration tests (SPT and SCPT)- Bore log report – Geophysical method – Casagrande piezometer.						
UNIT-II	<b>SHALLOW FOUNDATION</b>				9	
Introduction – Location and depth of foundation – bearing capacity of shallow foundation on homogeneous deposits – Terzaghi’s formula Only– Factors affecting bearing capacity(Water Table Problems) – Problems on Bearing Capacity from insitu tests (SPT, SCPT and plate load) – Allowable bearing pressure-Liquefaction resistant Foundation.(Theory only).						
UNIT-III	<b>PILE FOUNDATION</b>				9	
Types of piles and their function – Factors influencing the selection of pile – Carrying capacity of single pile in granular and cohesive soil - Static formula - dynamic formulae (Engineering news and Hiley’s) – Capacity from insitu tests (SPT and SCPT) – Interpretation of pile load test ( routine test only)- Group capacity by different methods ,Converse - Labarra formula Only - Negative skin friction – Settlement of pile groups– under reamed piles –Micro Pile (Theory concepts) Foundation on expansive soil- Tension piles (Theory only).						
UNIT-IV	<b>RAFT FOUNDATION</b>				9	
Types of foundation – Contact pressure distribution – Isolated and combined footings – Types of proportioning - Mat foundation- Types of applications – Proportioning - floating foundation.- Codal provision - Determination of settlement of foundations on granular and clay deposits – Total and differential settlement - Allowable settlements – Methods of minimising total and differential settlements – Foundation settlement Prediction.						

UNIT-V	<b>EARTH PRESSURE AND RETAINING WALLS</b>	9
Plastic equilibrium in soils - active and passive states – Rankine’s theory - cohesionless and cohesive soil - Coulomb’s wedge theory – condition for critical failure plane – Earth pressure on retaining walls of simple configurations – Graphical methods (Culmann) –load Pressure on the wall due to line – Stability analysis of retaining walls- Sheet Piles, Cantilever and Anchored sheetpiles(Theory Only) – Friction Circle Method.		
Total hours to be taught		(45 Hrs)
Outcome(s)	At the end of the course the students will be able to: <ul style="list-style-type: none"> <li>• Summarize the stages in soil exploration and the soil sampling techniques.</li> <li>• Compute the bearing capacity of the shallow foundation.</li> <li>• Determine the load carrying capacity of pile foundation.</li> <li>• Describe the types of raft foundation and settlement concepts.</li> <li>• Apply Earth Pressure theories to calculate the active and passive earth pressure for Retaining wall.</li> </ul>	
<b>TEXT BOOK :</b>		
<input type="checkbox"/>	Murthy, V.N.S., “Soil Mechanics and Foundation Engineering”, CBS Publishers and Distributors Ltd., New Delhi, 2007.	
<input type="checkbox"/>	Gopal Ranjan and Rao A.S.R. “Basic and Applied soil mechanics”, New Age International Pvt. Ltd, New Delhi, 2005.	
<input type="checkbox"/>	Purushothama Raj. P., “Soil Mechanics and Foundation Engineering”, 2nd Edition, Pearson Education, 2013	
<input type="checkbox"/>	Varghese, P.C., ”Foundation Engineering”, Prentice Hall of India Private Limited, New Delhi, 2005.	
<b>REFERENCES</b>		
<input type="checkbox"/>	Das, B.M. “Principles of Foundation Engineering” 5 th edition, Thompson Asia Pvt.Ltd., Singapore, 2003.	
<input type="checkbox"/>	Kaniraj, S.R. “Design aids in Soil Mechanics and Foundation Engineering”, Tata McGraw Hill Publishing company Ltd., New Delhi, 2002.	
<input type="checkbox"/>	Punmia, B.C. "Soil Mechanics and Foundations", Laxmi Publications Pvt.Ltd., NewDelhi,2005	
<input type="checkbox"/>	Venkatramaiah, C. “Geotechnical Engineering”, New Age International Publishers, NewDelhi, 2007 (Reprint)	
<input type="checkbox"/>	Arora K.R. “Soil Mechanics and Foundation Engineering”, Standard Publishers and Distributors, New Delhi, 2005.	

POs COs	PO 1	P O2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	2	-	1	-	-	1	1	1	1	1	-	1	2	-
CO2	3	1	1	-	-	1	1	1	-	1	-	-	1	3
CO3	1	2	-	-	-	1	1	1	1	1	-	1	2	3
CO4	2	1	-	-	-	1	1	1	-	1	-	-	2	1
CO5	3	1	-	-	-	1	1	1	1	1	-	-	2	1

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



# MAHENDRA ENGINEERING COLLEGE



(Autonomous)  
Syllabus

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>			
<b>SEMESTER V</b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDI T</b>	<b>MAXIMUM MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>		
<b>22CE14502</b>	<b>DESIGN OF REINFORCED CONCRETE ELEMENTS</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>100</b>
<b>Objective(s)</b>	<p>The main objectives of this course is:</p> <ul style="list-style-type: none"> <li>To understand the different types of philosophies related to design of basic structural elements</li> <li>To get knowledge various types of slab.</li> <li>To study the design of flexural members.</li> <li>To learn the design of short columns.</li> <li>To know the different types of footing.</li> </ul>					
<b>UNIT-I</b>	<b>INTRODUCTION ABOUT DESIGN METHODS</b>					<b>9</b>
Materials and properties (steel and concrete) - Methods of working stress( Cracked and uncracked) and Limit state method– Codes and specifications- Design Load and Strength – Design philosophy of Limit state method.						
<b>UNIT-II</b>	<b>DESIGN OF BEAMS</b>					<b>9</b>
Analysis of singly and doubly reinforced rectangular and flanged beams - Behaviour of RC members in bond and Anchorage - Design of Beams (singly, doubly and flanged)- Behaviour of RC beams in shear and torsion - Design of RC Beam for combined bending shear and torsion.						
<b>UNIT-III</b>	<b>DESIGN OF COLUMNS</b>					<b>9</b>
Types of columns –Design of short Rectangular and circular columns for axial, uniaxial and biaxial bending- Design of lateral ties.						
<b>UNIT-IV</b>	<b>DESIGN OF SLABS AND STAIRCASES</b>					<b>9</b>
Types of slab- Design of one way, two way and continuous slabs subjected to uniformly distributed load for various boundary conditions- Design Procedure of Flat slab. Types of staircase-Design of Stair case (dog legged).						
<b>UNIT-V</b>	<b>DESIGN OF FOOTINGS</b>					<b>9</b>
Design of wall footing – T y p e s o f f o o t i n g - Design of Isolated footings ( rectangular and sloped) and combined rectangular footing for two columns only- Mat Foundation(Concept only)						

Total hours to be taught	<b>(L:45)</b>
<p>Out comes :</p> <p>At the end of the course, the student will able to</p> <ul style="list-style-type: none"> <li>• Summarize the different types of method of RC structures.</li> <li>• Find out the combined torsion &amp; shear for various types of beam.</li> <li>• Calculate the reinforcement details and draft the short column under various loading conditions.</li> <li>• Design and draw a reinforcement of the slab and Staircase.</li> <li>• Design various types of footing and sketch the reinforcing details.</li> </ul>	
<b>TEXT BOOK :</b>	
<input type="checkbox"/>	<a href="#">Krishna, Raju N.</a> , “Reinforced Concrete Design”, New Age International (P) Ltd., Publishers, New Delhi-110 002, 2016
<input type="checkbox"/>	Varghese, P.C., “Limit State Design of Reinforced Concrete”, Prentice Hall of India, Pvt. Ltd., New Delhi, 2 edition (2008)
<b>REFERENCES</b>	
<input type="checkbox"/>	Subramanian,N., “Design of Reinforced Concrete Structures”, Oxford University Press, New Delhi, 2013.
<input type="checkbox"/>	Punmia.B.C., Ashok Kumar Jain, Arun Kumar Jain, “Limit State Design of Reinforced Concrete”,Laxmi Publication Pvt. Ltd., New Delhi, 2007.
<input type="checkbox"/>	Bandyopadhyay. J.N., "Design of Concrete Structures",. Prentice Hall of India Pvt. Ltd., New Delhi, 2008.
<input type="checkbox"/>	Unnikrishna Pillai, S., Devdas Menon, “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., 3 <sup>rd</sup> edition2017
<input type="checkbox"/>	Sinha, S.N., “Reinforced Concrete Design”, Tata McGraw Hill Publishing Company Ltd., New Delhi, 3 <sup>rd</sup> edition 2017
<input type="checkbox"/>	Gambhir.M.L., "Fundamentals of Reinforced Concrete Design", Prentice Hall of India Private Limited, New Delhi, 2006.
<input type="checkbox"/>	IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2000
<input type="checkbox"/>	SP16, IS456:1978 “Design Aids for Reinforced Concrete to Bureau of Indian Standards, New Delhi, 1999
<input type="checkbox"/>	<a href="https://nptel.ac.in/courses/105105105/">https://nptel.ac.in/courses/105105105/</a>

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2					1	1	1		1		1	3	1
CO2	2	3				1	1	1		1		1	1	3
CO3	1	2	3			1	1	1		1		1	1	3
CO4	1	2	3			1	1	1		1		1	1	3
CO5	1	2	3			1	1	1		1		1	1	3

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation

**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**

**R2022-Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>			<b>1021</b>	
<b>SEMESTER-V</b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>22CE24501</b>	<b>ENVIRONMENTAL ENGINEERING LABORATORY</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>	<b>100</b>
<p>Course Objectives :</p> <p>The main objectives of this course is:</p> <ul style="list-style-type: none"> <li>• To learn the chemical characteristics of water and wastewater.</li> <li>• To know the procedure for BOD and COD tests.</li> <li>• To study about the heavy metals determination.</li> </ul>						
1.	Measurement of pH,Electrical conductivity and turbidity					
2.	Determination of fluoride in water by spectrophotometric method /ISE (Demonstration only)					
3.	Determination of iron in water (Demo)					
4.	Determination of Sulphate in water					
5.	Determination of Optimum Coagulant Dosage by Jar test apparatus					
6.	Determination of available Chlorine in Bleaching powder and residual chlorine in water					
7.	Determination of suspended, volatile, fixed and settle able solids in given sample.					
8.	Determination of Sludge Volume Index in waste water					
9.	Determination of Dissolved Oxygen					
10.	B.O.D. test					
11.	C.O.D. test					
12.	Determination of Nitrate in wastewater					
13.	Determination of coliform (Demonstration only)					
Total hours to be taught					30 Periods	
<p>Course Outcomes :</p> <p>At the end of the course the students will be able to:</p> <ul style="list-style-type: none"> <li>• To calibrate and standardize the equipment</li> <li>• To perform field oriented testing of water, wastewater</li> <li>• To perform coliform analysis</li> </ul>						



POs COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	2	3	-	-	-	1	1	1	1	1	-	-	2	-
CO2	2	3	-	-	-	1	1	1	1	1	-	-	1	2
CO3	2	3	-	-	-	1	1	1	1	1	-	-	2	3

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**R2022-Syllabus**

Department	Civil Engineering	Programme Code	1021			
<b>SEMESTER-V</b>						
COURSE CODE	COURSE NAME	HOURS/WEEK			CREDIT	MAXIMUM MARKS
		L	T	P	C	
<b>22CE24502</b>	<b>SOIL MECHANICS LABORATORY</b>	0	0	3	1.5	100
<p>Course Objectives :</p> <p>The main objectives of this course is:</p> <ul style="list-style-type: none"> <li>To gain knowledge on various index properties of soil.</li> <li>To study the density and compaction characteristics of soil.</li> <li>To know about the engineering properties of soil.</li> </ul>						
<b>LIST OF EXPERIMENTS</b>						
I	<p>DETERMINATION OF INDEX</p> <ol style="list-style-type: none"> <li>Special gravity of soil solids</li> <li>Grain size distribution – Sieve analysis</li> <li>Liquid limit tests</li> <li>Plastic limit tests</li> <li>Water Content –(Oven Drying &amp; Pycnometer)</li> </ol>					
II	<p>DETERMINATION OF INSITU DENSITY AND COMPACTION CHARACTERISTICS</p> <ol style="list-style-type: none"> <li>Field density Test (Sand replacement method)</li> <li>Determination of moisture – density relationship using standard Proctor compaction test.</li> <li>Determination of moisture – density relationship using Heavy Proctor compaction test.</li> <li>Field density Test (Core Cutter method)</li> </ol>					
III	<p>DETERMINATION OF ENGINEERING PROPERTIES</p> <ol style="list-style-type: none"> <li>Direct shear test in cohesion-less soil</li> <li>Unconfined compression test in cohesive soil</li> </ol>					
Total hours to be taught						30 Hrs
<p>Course Outcomes :</p> <p>At the end of the course the students will be able to:</p> <ul style="list-style-type: none"> <li>Calculate the various index properties of the soil.</li> <li>Demonstrate and illustrate the compaction characteristics of the soil.</li> <li>Determine the shear strength of the soil.</li> </ul>						

<b>POs COs</b>	<b>PO1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO 1</b>	<b>PSO 2</b>
<b>CO1</b>	2	3	-	-	-	1	1	1	1	1	1	-	3	1
<b>CO2</b>	3	-	-	1	-	1	1	1	1	1	1	-	3	1
<b>CO3</b>	2	3	-	-	-	1	1	1	1	1	1	1	3	1

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



# MAHENDRA ENGINEERING COLLEGE

(Autonomous)  
Accredited by NBA (Tier-I WA) : UG - CSE, ECE, EEE  
Mahendrapuri, Mallasamudram, Namakkal Dt. -637 503



## Syllabus - Regulation 2022

Department English

### Semester – V

(Common to all B.E./B.Tech. Programmes)

Course code	Course Name	Hours/week			Credit	Maximum marks
		L	T	P		
22EN60002(R)	<b>INTERVIEW SKILLS AND SOFT SKILLS</b>				<b>C</b>	<b>100</b>
	(Common to all B.E./B.Tech. Degree Programmes)	0	1	2	2	
<b>Objectives</b>	<ul style="list-style-type: none"> <li>To improve the learners reading fluency skills through extensive reading</li> <li>To help the learners obtain speaking skills in both formal and informal situation.</li> <li>To make them acquire presentation skills and interview skills to face challenges in the career aspects</li> </ul>					
<b>Outcomes</b>	<p><b>At the end of the course, the learners will be able to :</b></p> <ul style="list-style-type: none"> <li>Analyse the content and apply knowledge and skills efficiently wherever necessary.</li> <li>Create profile and other essential documents.</li> <li>Demonstrate soft skills effectively at the time of interview and workplace.</li> </ul>					

### LIST OF EXERCISES

11.	Introduction to Employability Skills
12.	Reading Comprehension
13.	Listening Comprehension
14.	Professional Email Writing

15.	Preparing One Page Resume
16.	Interview Skills (Mock Interview & Interview Etiquette)
17.	Corporate Skills (Polite Expressions, Telephone Etiquette, Online Etiquette & PPT Presentation)
18.	Group Discussion
19.	Soft Skills (Interpersonal, Intrapersonal, Leadership, Decision Making and Problem Solving)
20.	Public Speaking
<b>Total Hrs : 30</b>	

**Textbook:**

1	Joshi, Manmohan, <i>Soft Skills</i> , 1 <sup>st</sup> Edition. Bookboon, 2017
---	---

**Reference Books:**

1	Raman, Meenakshi & Sangeeta Sharma, <i>Technical Communication: Principles and Practice</i> , Ed.III, Oxford University Press, New Delhi. 2015.
2	Barun K. Mitra, <i>Personality Development and Soft Skills</i> , Oxford University Press, New Delhi, 2011

**Online Websites:**

<a href="https://www.ted.com/talks">https:// www.ted.com/talks</a>
<a href="https://www.joshtalks.com">https://www.joshtalks.com</a>
<a href="https://quizziz.com">https://quizziz.com</a>
<a href="http://www.pdfdrive.com">www.pdfdrive.com</a>
<a href="http://www.talkingbooks.com">www.talking books.com</a>



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**DEPARTMENT OF CIVIL ENGINEERING**

**Regulation-2022- Curriculum (CBCS)**

**VI Semester**

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	22CE14601	Structural Analysis – II	PC	3	3	0	0	3
2	22CE14602	Concrete Technology	PC	3	3	0	0	3
3	22CE14603	Design of Steel Structures	PC	3	3	0	0	3
4	22CE14604	Highway Engineering	PC	3	3	0	0	3
5		Professional Elective - II	PE	3	3	0	0	3
6	22MC60001	Constitution of India	MC	3	3	0	0	-
<b>PRACTICAL</b>								
7	22CE24601	Concrete and Highway Materials Laboratory	PC	4	0	0	4	2
8	22CE34601	Industry Oriented Course-I	PC	3	1	0	2	2
9	22CE56601	Internship and Evaluation	EEC	4	0	0	2	1
		<b>TOTAL</b>		<b>29</b>	<b>19</b>	<b>0</b>	<b>8</b>	<b>20</b>



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>				<b>1021</b>
<b>SEMESTER VI</b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>		
<b>22CE14601</b>	<b>STRUCTURAL ANALYSIS - II</b>				<b>C</b>	<b>100</b>
		3	0	0	3	
<b>Objective(s)</b>	<p>The main objectives of this course is:</p> <ul style="list-style-type: none"> <li>➤ To know the statically indeterminate structures using slope deflection method.</li> <li>➤ To gain knowledge on stiffness &amp; carryover moment of indeterminate beams and frames.</li> <li>➤ To learn the continuous beams and frames by matrix flexibility methods</li> <li>➤ To learn the continuous beams and frames by matrix stiffness methods</li> <li>➤ To study the finite element method of beam and truss element</li> </ul>					
<b>UNIT-I</b>	<b>MOMENT DISTRIBUTION METHOD</b>					<b>9</b>
Distribution and carryover of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway.						
<b>UNIT-II</b>	<b>SLOPE DEFLECTION METHOD</b>					<b>9</b>
Slope Deflection equations – Continuous beams and rigid frames (with and without sway) – Symmetry and anti symmetry – Simplification for hinged end – Support displacements – Deformed shape, Bending Moment and Shear Force Diagrams and axial force diagrams.						
<b>UNIT-III</b>	<b>STIFFNESS MATRIX METHOD</b>					<b>9</b>
Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of rigid frames (with redundancy limited to two)						
<b>UNIT-IV</b>	<b>FLEXIBILITY METHOD</b>					<b>9</b>
Equilibrium and compatibility – Determinate and Indeterminate structures – Indeterminacy – Primary structure – Compatibility conditions – Analysis of indeterminate , continuous beams, rigid jointed plane frames (with redundancy restricted to two).						
<b>UNIT-V</b>	<b>FINITE ELEMENT METHOD</b>					<b>9</b>
Introduction – Elasticity – Plane stress and plane strain- Discretisation of a structure – Displacement functions – 1D and 2D element – Beam element – Applications in FEM (Software name only).						
Total hours to be taught						<b>(L:45)</b>

**Course Outcome(s)**

At the end of the course the students will be able to:

- Calculate the bending moment of structures using moment distribution method.
- Apply the slope deflection method to analyze statically indeterminate structures.
- Identify the kinematic indeterminacy to analysis frames using matrix stiffness methods.
- Determine the response of structures by flexibility method.
- Apply the finite element method to solve different critical analytical problems in civil engineering field.

**Text book :**

- Vaidyanadhan, R and Perumal, P, “Comprehensive Structural Analysis – Vol. 1 & Vol. 2”, Laxmi Publications Pvt. Ltd, New Delhi, 2003.
- William Weaver Jr. & James M. Gere, "Matrix Analysis of Framed Structures", CBS Publishers and Distributors, Delhi, 2004
- Pandit G.S. & Gupta S.P. "Structural Analysis – A Matrix Approach", Tata McGraw Hill 2004.
- S.S.Rao,,” The Finite Element Method in Engineering” Pergamon Press, 2014

**REFERENCES**

- Ghali.A, Nebille,A.M. and Brown,T.G. “Structural Analysis” A unified classical and Matrix approach” 6<sup>th</sup> edition. Spon Press, London and New York, 2013.
- Coates R.C, Coutie M.G. and Kong F.K., “Structural Analysis”, ELBS and Nelson, 1990
- Punmia.B.C., Ashok Kumar Jain and Arun Kumar Jain, “Theory of Structures”, Laxmi Publications, 2004.
- Negi L.S. & Jangid R.S., “Structural Analysis”, Tata McGraw Hill Publications, New Delhi, 2003
- Gambhir. M.L., "Fundamentals of Structural Mechanics and Analysis"., PHI Learning Pvt. Ltd., New Delhi, 2011.
- <https://nptel.ac.in/courses/105101086/>

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3	-	-	-	1	-	1	1	1	-	1	1	3
CO2	2	3	-	-	-	1	-	1	1	1	-	1	1	3
CO3	1	2	-	-	-	1	-	1	1	1	-	1	1	3
CO4	2	3	-	-	-	1	-	1	1	1	-	1	1	3
CO5	3	-	-	-	-	1	-	1	1	1	-	1	1	3

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>				<b>1021</b>
<b>SEMESTER VI</b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
<b>22CE14602</b>	<b>CONCRETE TECHNOLOGY</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>100</b>
		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>	
<b>Objective(s)</b>	<p>The main objectives of this course is</p> <ul style="list-style-type: none"> <li>To gain knowledge on properties of materials used for making concrete.</li> <li>To learn the concrete mix design</li> <li>To know about the properties of fresh and hardened concrete.</li> <li>To gain knowledge about special concrete</li> <li>To study the various factors affecting concrete due to environment condition and concreting methods &amp; 3D printing.</li> </ul>					
<b>UNIT-I</b>	<b>INTRODUCTION TO MATERIALS</b>					<b>9</b>
<p>Properties , Types and Test of - Cement – Fine aggregate- Coarse aggregate- Water as per IS Codes - Admixtures- Mineral admixture (Fly ash, Silica fume, GGBS and met kaolin) – Chemical Admixture (water reducers, retarders, accelerators and viscosity modifying agent).</p>						
<b>UNIT-II</b>	<b>MIX DESIGN</b>					<b>9</b>
<p>Mix design for concrete using IS, A.C.I Method &amp; DOE method –Mix Design for high strength and high performance concrete.</p>						
<b>UNIT-III</b>	<b>FRESH AND HARDENED CONCRETE</b>					
<p>Fresh concrete properties –Test on fresh concrete -Hardened concrete properties - Destructivetesting- Non destructive tests on concrete.</p>						
<b>UNIT-IV</b>	<b>SPECIAL CONCRETES</b>					<b>9</b>
<p>Light and Heavy weight concrete - High Strength Concrete - High Performance Concrete – Polymer in Concrete - Fiber Reinforced Concrete- Ferrocement - Vaccum Concrete– Shotcrete - Self Compacting Concrete - Geopolymer Concrete- Ready Mix Concrete.</p>						

UNIT-V	DURABILITY OF CONCRETE	9
Permeability - chemical attack and sulphate attack - marine conditions - thermal properties of concrete - fire resistance - Extreme weather concreting- underwater concreting - Concept of 3D Printing - Eco Building (Green Building), Intelligent(Smart) buildings and Energy efficient buildings.		
Total hours to be taught		(L:45)
<b>Course Outcome(s)</b>		
At the end of the course the student should be able to :		
<ul style="list-style-type: none"> <li>• Elaborate about the properties of materials used for making concrete</li> <li>• Design the mix proportion of various grade of concrete as per ACI &amp; IS Code.</li> <li>• Describe the tests relevant to the use of fresh and hardened concrete.</li> <li>• Explain the mechanical properties of different types of special concrete.</li> <li>• Identify the various concreting methods, energy efficient technologies and 3D printing.</li> </ul>		
<b>Text book :</b>		
<input type="checkbox"/>	A.R.Santhakumar, "Concrete Technology", Oxford University Press India, 2006	
<input type="checkbox"/>	Shetty, M.S, "Concrete Technology, Theory and Practice", S. Chand and Company Ltd, New Delhi, 2008.	
<input type="checkbox"/>	BI Gupta Amit Gupta, "Concrete Technology", Standard Publisher Distributor, 2014	
<input type="checkbox"/>	Gambhir, M.L, "Concrete Technology", Tata McGraw Hill Publishing Company Ltd, New Delhi, 2004	
<b>REFERENCES</b>		
<input type="checkbox"/>	Peurifoy, R.L., Ledbetter, W.B. and Schexnayder, C., "Construction Planning, Equipment and Methods", 5 <sup>th</sup> Edition, McGraw Hill, Singapore, 1995.	
<input type="checkbox"/>	Varghese, P.C. "Building construction", Prentice Hall of India Pvt. Ltd, New Delhi, 2007.	
<input type="checkbox"/>	Arora S.P. and Bindra S.P., "Building Construction, Planning Techniques and Method of Construction", Dhanpat Rai and Sons, 1997	
<input type="checkbox"/>	<a href="https://nptel.ac.in/courses/105106176/">https://nptel.ac.in/courses/105106176/</a>	

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	1	1	-	-	1	-	1	1	2
CO2	2	-	-	-	-	1	-	-	-	1	-	-	1	1
CO3	2	3		-	-	1	1	-	-	1	-	-	1	1
CO4	1	2	3	-	-	1	1	-	-	1	-	-	1	3
CO5	3	-	-	-	-	1	1	-	-	1	-	-	1	1

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



**MAHENDRA ENGINEERING COLLEGE**  
(Autonomous)  
R2022-Syllabus



<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>			
<b><u>SEMESTER VI</u></b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
<b>22CE14603</b>	<b>DESIGN OF STEEL STRUCTURES</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>100</b>
		3	0	0	3	
<b>Objective(s)</b>	<p>The main objectives of this course is:</p> <ul style="list-style-type: none"> <li>To learn working stress method and limit state method, structural loads design of bolted and welded connections.</li> <li>To acquire knowledge about design concept of tension member for angles &amp; Plates.</li> <li>To study design of compression Member, lacing &amp; battening of</li> <li>To know the design procedure for laterally supported &amp; laterally unsupported beams.</li> <li>To learn design concepts for components of Industrial structures.</li> </ul>					
<b>UNIT-I</b>	<b>CONNECTIONS</b>					<b>9</b>
Introduction to steel structures - Properties of steel - Structural steel sections – Codal provisions of IS 800:2007- Types of connections – concept of connection using rivet, welding, bolting connection - Design of bolted and welded connections - Efficiency of joint- Eccentricity connections.						
<b>UNIT-II</b>	<b>TENSION MEMBERS</b>					<b>9</b>
Introduction- types of tension members –Net area – net effective sections for angles and tee in tensions – design of connections in tension member - use of lug angles – design of tension splice.						
<b>UNIT-III</b>	<b>COMPRESSION MEMBERS</b>					<b>9</b>
Theory of columns - Types of compression members – Slenderness ratio – Design of compression members – Built up columns - Lacing- Battening						
<b>UNIT-IV</b>	<b>FLEXURAL MEMBERS</b>					<b>9</b>
Beam types – Design of laterally supported beams –Design of unsupported beams – Design concept of Stiffness, Splice, built up Beams.						
<b>UNIT-V</b>	<b>INDUSTRIAL STRUCTURES</b>					<b>9</b>
Introduction of Industrial buildings – Design procedure of gantry girder – bracing, side rails, lower rails – Design of roof truss and purlins.						

Total hours to be taught	<b>(L:45)</b>
<p>Course outcomes :</p> <p>At the end of the course, the student will able to</p> <ul style="list-style-type: none"> <li>• Apply the type of connections using bolted and welded.</li> <li>• Analysis the tension members as per IS code Provision</li> <li>• Determine the lateral buckling of compression member.</li> <li>• Construct the moment and deflection for various types of beam.</li> <li>• Design the purlin and roof trusses as per codal provision.</li> </ul>	
<b>TEXT BOOK :</b>	
<input type="checkbox"/>	Subramanian,N. Design of Steel Structures, Oxford University Press, NewDelhi,2008
<input type="checkbox"/>	Dayaratnam, P., “Brick and Reinforced Brick Structures”, Oxford and IBH Publishing House, 1997
<input type="checkbox"/>	Bhavikatti,S.S, Design of Steel Structures . I.K International Publishing House, Pvt Ltd , New Delhi,2009
<input type="checkbox"/>	Duggal S.K, Limit state design of steel structures,Tata McGraw Hill Education Private Limited, New Delhi , 2011.
<input type="checkbox"/>	Ram Chandra, Design of Steel Structure –I ,Rajsons Publications Pvt. Ltd.,New Delhi , 2011.
<b>REFERENCES</b>	
<input type="checkbox"/>	“Teaching Resources for Structural Steel Design - Vol. I & II”, INSDAG, Kolkatta.
<input type="checkbox"/>	Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E., “Design of Steel Structures”, 3rd Edition, McGraw-Hill Publications, 1992.
<input type="checkbox"/>	S. Kanthimathinathan, Limit State Design of Steel Structures as per is: 800/2007, J.K Publications.
<input type="checkbox"/>	IS 3370 Part (I to IV) and IS1905:1987, Code of Practice for Structural use of Unreinforced Masonry Bureau of Indian Standards, New Delhi, 2002
<input type="checkbox"/>	<a href="https://nptel.ac.in/courses/105106112/">https://nptel.ac.in/courses/105106112/</a>

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	1	1	1	1	-	1	3	1
CO2	2	3	-	-	-	-	1	1	1	1	-	1	1	3
CO3	2	3	-	-	-	-	1	1	1	1	-	1	1	3
CO4	2	2	3	-	-	-	1	1	1	1	-	1	1	3
CO5	2	2	3	-	-	-	1	1	1	1	-	1	1	3

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



**MAHENDRA ENGINEERING COLLEGE**  
**(Autonomous)**



**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	
<b>SEMESTER VI</b>			
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>	<b>CREDIT</b>
<b>22CE14604</b>	<b>HIGHWAY ENGINEERING</b>	<b>L</b>	<b>T</b>
		<b>P</b>	<b>C</b>
		3	0
		0	3
<b>MAXIMUM MARKS</b>	<b>100</b>		
<b>Objective(s)</b>	<p>The main objectives of this course is</p> <ul style="list-style-type: none"> <li>To give an overview about the highway planning and alignment.</li> <li>To impart the knowledge in highway geometrics as per IRC standards, specifications.</li> <li>To study the design of highway pavements.</li> <li>To know the various construction materials used in highways .</li> <li>To get effective knowledge about the maintenance of pavements</li> </ul>		
<b>UNIT-I</b>	<b>HIGHWAY PLANNING AND ALIGNMENT</b>	<b>9</b>	
Significance of highway planning-History of road development in India - Classification of highways – Locations and functions – Factors influencing highway alignment – Road ecology - Engineering surveys for alignment, objectives, conventional and modern methods.			
<b>UNIT-II</b>	<b>GEOMETRIC DESIGN OF HIGHWAYS</b>	<b>9</b>	
Typical cross sections of urban and rural roads – Cross sectional elements – sight distances – Horizontal curves, Super elevation, transition curves, widening at curves – Vertical curves – Gradients, Special consideration for hill roads – Hairpin bends – Lateral and vertical clearance at underpasses.			
<b>UNIT-III</b>	<b>DESIGN OF FLEXIBLE AND RIGID PAVEMENTS</b>	<b>9</b>	
Design principles – pavement components and their role – Design practice for flexible and rigid pavements (IRC methods) – Highway drainage.			
<b>UNIT-IV</b>	<b>HIGHWAY CONSTRUCTION MATERIALS AND PRACTICE</b>	<b>9</b>	
Highway construction materials, properties and testing methods –Aggregate & bitumen – Bituminous and Concrete road construction, Different materials – Glass, Fiber, Plastic, Geo- textiles, Geo-Membrane – Construction machineries.			
<b>UNIT-V</b>	<b>EVALUATION AND MAINTENANCE OF PAVEMENTS</b>	<b>9</b>	
Pavement distress in flexible and rigid pavements –Pavement evaluation, roughness, present serviceability index, skid resistance, structural evaluation, evaluation by deflection measurements – Strengthening of pavements – Types of maintenance.			

Total hours to be taught		<b>(L:45)</b>
<b>Outcome(s)</b>	At the end of the course the students will be able to: <ul style="list-style-type: none"> <li>• Explain the Highway planning and alignment.</li> <li>• Prepare the highway geometrics as per IRC standards &amp; specifications.</li> <li>• Design the Rigid &amp; Flexible pavements.</li> <li>• Summarize the effective and economical usage of materials used in the highways construction.</li> <li>• Evaluate the pavements distress in an effective manner.</li> </ul>	
<b>TEXT BOOKS</b>		
<input type="checkbox"/>	Khanna, K and Justo, C.E.G., “Highway Engineering”, Khanna Publishers, Roorkee, 2001	
<input type="checkbox"/>	Arora, S and Saxena, S.C., “A text book of Railway Engineering “, Dhanpat Rai & Sons, Delhi, 2002.	
<b>REFERENCES</b>		
<input type="checkbox"/>	Kadiyali, L.R., “Principles and Practice of Highway Engineering”, Khanna Technical Publications, New Delhi, 2000	
<input type="checkbox"/>	Subramaniyam, K.P., “Transportation Engineering”, Scitech Publishers, Chennai, 2003	
<input type="checkbox"/>	Mundrey, J.S., “Railway Engineering”, Tata Mc Graw Hill, New Delhi, 2005	

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
<b>CO1</b>	1	2	-	-	-	-	-	-	-	-	1	1	2	3
<b>CO2</b>	1	2	-	-	-	-	-	-	-	-	1	1	2	3
<b>CO3</b>	2	2	3	-	-	-	-	-	-	-	1	1	2	3
<b>CO4</b>	1	2	-	-	1	-	-	-	-	-	-	1	1	3
<b>CO5</b>	2	3	-	-	-	-	-	-	-	-	-	1	2	3

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



**MAHENDRA ENGINEERING COLLEGE (Autonomous)**



**Regulations 2022**

<b>Department</b>		<b>Programme Code</b>				
<b>VI Semester</b> (Common to all B.E./B.Tech. Programmes)						
Course code	Course Name	Periods/week			Credit	Maximum marks
		L	T	P		
22MC60001	CONSTITUTION OF INDIA				C	100
		3	0	0	-	
<b>Objectives</b>	<ul style="list-style-type: none"> <li>To know about the salient features of the Constitution of India.</li> <li>To gain knowledge about structure and functions of Union Government.</li> <li>To learn about the structure and functions of State Government.</li> <li>To understand about amendments in Indian Constitution, Judicial review.</li> <li>To study in detail about the Indian society.</li> </ul>					
<b>Outcomes</b>	<p><b>On completion of the course, the learners should be able to:</b></p> <ul style="list-style-type: none"> <li>Summarize the features of the Indian Constitution and observe the fundamental duties, rights and responsibilities.</li> <li>Explain the functioning of Indian parliamentary system at the Center and the responsibilities of important functionaries.</li> <li>Describe the functioning of State Government and important functionaries.</li> <li>Recognize Amendments in Indian Constitution and Judicial review.</li> <li>Illustrate the composition and features of Indian society.</li> </ul>					
<b>UNIT-I</b>	<b>INTRODUCTION ABOUT INDIAN CONSTITUTION</b>					9
Historical Background – Constituent Assembly of India – Role and salient features - Philosophical foundations of the Indian Constitution – Preamble – Fundamental Rights – Directive Principles of State Policy – Fundamental Duties – Citizenship – Constitutional Remedies for citizens.						
<b>UNIT-II</b>	<b>STRUCTURE AND FUNCTION OF UNION GOVERNMENT</b>					9
Parliamentary system – Legislature, Executive. Union Government – Structures of the Union Government. Functions and Responsibilities of President – Vice President – Prime Minister – Cabinet – Council of Ministers, Union Territories.						
<b>UNIT-III</b>	<b>STRUCTURE AND FUNCTION OF STATE GOVERNMENT</b>					9

State Legislature - State Government – Structure and Functions – Governor – Chief Minister – Cabinet – Special Provisions (Article 370, 371, 371J) for some States. Judicial System in States – High Courts and other Subordinate Courts, Judicial review.		
<b>UNIT-IV</b>	<b>CONSTITUTION FUNCTIONS, AMENDMENTS AND REVIEW</b>	<b>9</b>
Indian Federal System – Centre-State Relations – President’s Rule – Assessment of working of the Parliamentary System in India - Constitutional Amendments – Methods in Constitutional Amendments (How and Why) and Important Constitutional Amendments. Amendments – 7,9,10,12,42,44, 61, 73, 74, 75, 86, and 91, 94, 95, 100, 101, 118. Savior of the Constitution – The Supreme Court of India – The Hon’ble Chief Justice of India and Hon’ble Judges of the Supreme Court. Judicial Review of Parliamentary and Executive functions.		
<b>UNIT-V</b>	<b>INDIAN SOCIETY</b>	<b>9</b>
Society : Nature, Meaning and definition; Indian Social Structure; Caste, Religion, Language in India; Constitutional Remedies for citizens – Political Parties and Pressure Groups; Right of Women, Children and Scheduled Castes and Scheduled Tribes and other Weaker Sections - Special Constitutional Provisions for SC & ST, OBC, Special Provision for Women, Children & Backward Classes.		
<b>TOTAL PERIODS</b>		<b>45</b>

<b>TEXTBOOKS:</b>	
1	Durga Das Basu, “Introduction to the Constitution of India “, Prentice Hall of India, New Delhi
2	R.C.Agarwal, (1997) “Indian Political System”, S.Chand and Company, New Delhi.
3	Maciver and Page, “ Society: An Introduction Analysis “, Mac Milan India Ltd., New Delhi.
4	K.L.Sharma, (1997) “Social Stratification in India: Issues and Themes”, Jawaharlal Nehru University, New Delhi.
<b>REFERENCES:</b>	
1	Sharma, Brij Kishore, “Introduction to the Constitution of India:, Prentice Hall of India, New Delhi.
2	U.R.Gahai, “Indian Political System “, New Academic Publishing House, Jalaendhar
3	R.N. Sharma, “Indian Social Problems “, Media Promoters and Publishers Pvt. Ltd.



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>			
<b>SEMESTER VI</b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT C</b>	<b>MAXIMUM MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>		
<b>22CE24601</b>	<b>CONCRETE AND HIGHWAY LABORATORY</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>100</b>
<b>I</b>	<b>TEST ON CEMENT</b>					
	1	Consistency, Initial and Final Setting Time of Cement				
	2	Fineness of cement				
	3	Specific Gravity				
<b>II</b>	<b>TESTS ON AGGREGATES</b>					
	1.	Specific Gravity and Water Absorption				
	2.	Gradation of Aggregate				
	3.	Crushing Value & Impact Value				
	4.	Flakiness and Elongation Index				
<b>III</b>	<b>MIX DESIGN</b>					
<b>IV</b>	<b>TESTS ON FRESH CONCRETE (Slump cone test, Flow table ,Compaction factor &amp; Vee bee test.)</b>					
<b>V</b>	<b>TESTS ON HARDENED CONCRETE</b>					
	1.	Compressive strength of concrete				
	2.	Flexure Strength test				
	3.	Split tensile strength				
	4.	Modulus of Elasticity				
	5.	Rebound Hammer Test				
	6.	Ultra Sonic Pulse Velocity Test				
<b>VI</b>	<b>TESTS ON BITUMEN</b>					
	1.	Penetration				
	2.	Ductility				
	3.	Viscosity				
<b>Total hours to be taught</b>						<b>60 Hrs</b>

**Course Outcomes :**

At the end of the course the students will be able to:

- Prepare different concrete mixes and check the workability properties
- Diagnose the properties of aggregates with different testing methods.
- Check the quality of existing bituminous roads and constituents.

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	0	-	-	-	1	1	1	-	1	-	1	2	-
CO2	1	2	3	-	-	-	1	1	-	1	-	1	2	-
CO3	3	-	-	-	-	1	1	1	-	1	-	1	2	-

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation

**MAHENDRA ENGINEERING COLLEGE****(Autonomous)****Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>			
<b><u>SEMESTER-VI</u></b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
<b>22CE34601</b>	<b>INDUSTRY ORIENTED COURSE-1</b>		<b>T</b>	<b>P</b>	<b>C</b>	<b>100</b>
		1	0	2	2	
<b>Objective(s)</b>	The main objectives of this course is <ul style="list-style-type: none"> <li>To acquire knowledge about the basic terminologies of formwork systems.</li> <li>To understand the different formwork materials and selection of materials.</li> <li>To learn the formwork connectors.</li> <li>To get the knowledge in various formwork accessories and scaffolding.</li> </ul>					
<b>UNIT-I</b>	<b>FORMWORK ELEMENTS</b>				<b>9</b>	
Basic Terminology-Temporary Structure- Requirements for Formwork-Selection of Formwork-Classification of Formwork-Traditional, Hanna and DSR						
<b>UNIT-II</b>	<b>FORMWORK MATERIALS , SPECIAL FORMS and PLANNING</b>				<b>9</b>	
Timber-Plywood- Steel- Aluminum -Plastic Form- Special Forms- Form Coatings-Mould Linings-Form Anchors-Tie System-Spreaders-Spacers-Form Lining Materials. Aerated floor - Formwork Planning and Monitoring -Configuration, Scope & Costing of Formwork-Logistics of Formwork- Improvement Measures.						
<b>LABORATORY</b>					<b>27</b>	
<b>SYSTEMS OF FORMWORK</b>						
<ul style="list-style-type: none"> <li>Identify the various formwork systems.</li> <li>Study on several formwork systems and its elements.</li> </ul>						
<b>FORMWORK CONNECTORS</b>						
<ul style="list-style-type: none"> <li>Study of various formwork ties.</li> <li>Study on various formwork Couplers and systems.</li> </ul>						
<b>SCAFFOLDING TECHNIQUES</b>						
<ul style="list-style-type: none"> <li>Study on Scaffolding Classifications.</li> <li>Scaffolding handling and erections.</li> </ul>						
Total hours to be taught					<b>(L:45)</b>	

**Outcome(s)**

At the end of the course the student should be able to:

- Describe the formwork terminologies and failures attributed to formwork.
- Classify the formwork materials.
- Explain the formwork systems and its elements.
- Elaborate the formwork ties and couplers.
- Summarize the scaffolding classification and techniques.

**REFERENCES**

- Formwork for concrete-by M.K.Hurd (ACI Committee 347)
- Formwork for concrete structures, Fourth Edition-by Garold Oberlender, Robert Peurifoy
- Formwork for concrete structures- by K N Jha.(IIT-Delhi)
- Formwork Engineering Guide-by L&T construction, technology centre, Chennai
- Formwork for concrete-by M.K.Hurd (ACI Committee 347)

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	-	-	-	1	1	1	1	1	1	1	3	1
CO2	2	-	-	-	-	1	1	1	1	1	1	1	3	1
CO3	2	-	-	-	-	1	1	1	1	1	1	1	3	1
CO4	3	-	-	-	-	1	1	1	1	1	1	1	3	1
CO5	2	-	-	-	-	1	1	1	1	1	1	1	3	1



**MAHENDRA ENGINEERING COLLEGE**  
(Autonomous)



**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>
-------------------	--------------------------	-----------------------	-------------

**SEMESTER-VI**

<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>22CE56601</b>	<b>INTERNSHIP AND EVALUATION</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>100</b>

**OBJECTIVES:**

The main objectives of this course is:

- To develop skills in facing and solving the problems experiencing in the field.
- To enhance the practical knowledge of the students.
- To develop their skills and get industrial knowledge.

**SYLLABUS:**

The students individually undertake training in reputed engineering companies doing construction during the summer vacation for a specified duration of four weeks. At the end of training, a detailed report on the work done should be submitted within ten days from the commencement of the semester. The students will be evaluated through a viva-voce examination by a team of internal and external staff.

**COURSE OUTCOMES :**

On completion of the course, the students will be able to

- Outline the civil engineering field projects in the field.
- Analyze the material and manpower resources management.
- Prepare project report.

<b>POs</b> <b>COs</b>	<b>PO 1</b>	<b>PO 2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO1 0</b>	<b>PO1 1</b>	<b>PO1 2</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	2	3	-	-	-	1	1	1	1	1	-	-	2	1
<b>CO2</b>	2	3	-	-	-	1	1	1	1	1	-	-	1	2
<b>CO3</b>	3	2	-	-	-	1	1	1	1	1	-	-	2	3



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**DEPARTMENT OF CIVIL ENGINEERING**

**Regulation-2022- Curriculum (CBCS)**

**VII Semester**

Sl. No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C
<b>THEORY</b>								
1	22CE14701	Advanced Structural Design	PC	3	3	0	0	3
2	22CE14702	Construction Engineering and Management	PC	3	3	0	0	3
3	22CE14703	Estimation and Quantity Surveying	PC	3	3	0	0	3
4		Professional Elective - III	PE	3	3	0	0	3
5		Professional Elective - IV	PE	3	3	0	0	3
<b>PRACTICAL</b>								
6	22CE34701	Industry Oriented Course-II	PC	3	2	0	2	3
7	22CE24701	Structural Design Studio	PC	3	0	0	4	2
8	22CE36701	Project Work (Phase – I)	EEC	6	0	0	6	3
<b>TOTAL</b>				<b>27</b>	<b>17</b>	<b>0</b>	<b>12</b>	<b>23</b>



**MAHENDRA ENGINEERING COLLEGE**  
(Autonomous)



**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>			
<b>SEMESTER VII</b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>		
<b>22CE14701</b>	<b>ADVANCED STRUCTURAL DESIGN</b>	3	0	0	3	<b>100</b>
<b>Objective(s)</b>	<p>The main objective of this course is,</p> <ul style="list-style-type: none"> <li>• To learn concept and design of retaining wall</li> <li>• To acquire knowledge of circular and rectangular water tank</li> <li>• To study and learn about plate girder</li> <li>• To know the design concept of yield line theory and flat slab</li> <li>• To learn design concept of masonry wall and Pier.</li> </ul>					
<b>UNIT-I</b>	<b>RETAINING WALLS</b>					<b>9</b>
Design of cantilever and counter fort retaining walls.						
<b>UNIT-III</b>	<b>WATER TANKS</b>					<b>9</b>
Design of rectangular and circular water tanks ground, under and overhead water tank						
<b>UNIT-II</b>	<b>PLATE GIRDERS</b>					<b>9</b>
Introduction – plate girder- intermediate and end bearing stiffeners (concept only) –web splices- Design of welded plate girder(Without Stiffener) – Design procedure for plate girder with stiffener.						
<b>UNIT-IV</b>	<b>YIELD LINE THEORY AND FLAT SLABS</b>					<b>9</b>
Assumptions - Characteristics of yield line - Determination of collapse load / plastic moment - Application of virtual work method - square, rectangular, circular and triangular slabs - Design Problems.						
<b>UNIT-V</b>	<b>STRUCTURAL MASONRY</b>					<b>9</b>
IS codal provision – Design of wall and Pier.						
Total hours to be taught						<b>(L:45)</b>

**Outcome(s)**

At the end of the course the students will be able to:

- Design cantilever and counter fort retaining wall.
- Calculate the reinforcement details of water tank.
- Find the load acting on plate girder.
- Apply yield line theory for various shapes of slab.
- Design of masonry walls & piers.

**Text book :**

- Subramanian,N. Design of Steel Structures, Oxford University Press, NewDelhi,2008.
- Ram Chandra.N. and Virendra Gehlot, “Limit State Design”, Standard Book House, 2004..
- Varghese.P.C., "Advanced Reinforced Concrete Design", Prentice Hall of India Pvt. Ltd., New Delhi, 2012.
- Gambhir.M.L., "Design of Reinforced Concrete Structures", Prentice Hall of India Private Limited, 2012.
- Punmia B.C, Ashok Kumar Jain, Arun K.Jain, "R.C.C. Designs Reinforced Concrete Structures", Laxmi Publications Pvt. Ltd., New Delhi, 2006.

**REFERENCES**

- Duggal S.K, Limit state design of steel structures,Tata McGraw Hill Education Private Limited, New Delhi , 2011.
- Subramanian. N., "Design of Reinforced Concrete Structures", Oxford University, New Delhi, 2013.
- IS456:2000, Code of practice for Plain and Reinforced Concrete, Bureau of Indian Standards, New Delhi, 2007
- IS 800:2007, “General Construction in steel- Code ofPractices”
- IS 3370(part 2) : 2009, “ Concrete structures for storage of liquid – code of practices”

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	1	1	1	1	-	1	3	3
CO2	2	2	3	-	-	-	1	1	1	1	-	1	2	3
CO3	2	3	-	-	-	-	1	1	1	1	-	1	2	3
CO4	2	2	3	-	-	-	1	1	1	1	-	1	2	3
CO5	2	2	3	-	-	-	1	1	1	1	-	1	2	3

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



**MAHENDRA ENGINEERING COLLEGE**  
(Autonomous)



**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>			<b>1021</b>	
<b><u>SEMESTER-VII</u></b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
<b>22CE14702</b>	<b>CONSTRUCTION ENGINEERING AND MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	<b>100</b>
		3	0	0	3	
<b>Objective(s)</b>	<p><b>The main objective of this course is</b></p> <ul style="list-style-type: none"> <li>• To understand the basics of construction planning.</li> <li>• To know about the scheduling techniques.</li> <li>• To gain the knowledge of monitoring the projects through cost control.</li> <li>• To study the concept of organization and use of project information.</li> <li>• To learn about the quality concepts and data base models in construction.</li> </ul>					
<b>UNIT-I</b>	<b>CONSTRUCTION PLANNING</b>				<b>9</b>	
Basic Concepts in the Development of Construction Plans – Choice of Technology and Construction Method – Defining Work Tasks – Work Break down Levels – Defining Precedence Relationships among Activities – Estimating Activity Durations – Estimating Resource Requirements for Work Activities-Project Schedule and Budget.						
<b>UNIT-II</b>	<b>SCHEDULING PROCEDURES AND TECHNIQUES</b>				<b>9</b>	
Construction Schedules - Work Scheduling Fundamentals - Critical Path Method – Scheduling Calculations - Bar chart method of Work scheduling - Float - Types of Floats - usage of Floats – Presenting Project Schedules - Scheduling for Activity-on-Arrow and with Leads, Lags, and Windows – Scheduling with Resource Constraints and Precedence - Use of Advanced Scheduling Techniques - Scheduling with Uncertain Durations - Crashing and Time/Cost Tradeoffs - Improving the Scheduling Process						
<b>UNIT-III</b>	<b>COST CONTROL, MONITORING AND ACCOUNTING</b>				<b>9</b>	
The Cost Control Problem – The Project Budget – Forecasting for Activity Cost Control – Financial Accounting Systems and Cost Accounts – Control of Project Cash Flows –Schedule Control – Schedule and Budget Updates – Relating Cost and Schedule Information.						
<b>UNIT-IV</b>	<b>ORGANIZATION AND USE OF PROJECT INFORMATION</b>				<b>9</b>	
Types of Project Information - Accuracy and Use of Information - Computerized Organization and Use of Information - Organizing Information in databases – BIM software.						
<b>UNIT-V</b>	<b>QUALITY CONTROL AND DATABASE MODEL</b>				<b>9</b>	
Quality and Safety Concerns in Construction - Work and Material Specifications - Total Quality Control - principles, tools and techniques - Relational Model of Databases - Other Conceptual						

<b>Course Outcome(s)</b>	
<b>At the end of the course the students should</b>	
<ul style="list-style-type: none"> <li>• Identify the choice of techno</li> <li>• Prepare the scheduling report on the project.</li> <li>• Evaluate costing and financial aspects of projects.</li> <li>• Apply the concept of organization and use project information.</li> <li>• Prepare the data base model and application programs.</li> </ul>	
<b>REFERENCES</b>	
<input type="checkbox"/>	Chitkara, K.K. Construction Project Management: Planning, Scheduling and Control, McGraw- Hill Publishing Company, New Delhi, 1998.
<input type="checkbox"/>	Chris Hendrickson and Tung Au, Project Management for Construction – Fundamental Concepts for Owners, Engineers, Architects and Builders, Prentice Hall, Pittsburgh, 2000.
<input type="checkbox"/>	Halpin, D. W., Financial and Cost Concepts for Construction Management, John Wiley & Sons, New York, 1985.
<input type="checkbox"/>	Willis, E. M., Scheduling Construction Projects, John Wiley & Sons, 1986.
Models of Databases - Centralized Database Management Systems - Databases and Applications Programs – Information Transfer and Flow Transfer and Flow	
Total hours to be taught	
45	

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO1 1	PO 12	PSO 1	PSO 2
	CO1	2	3	-	-	-	-	-	1	1	1	3	-	2
CO2	3	-	-	-	-	-	-	1	-	1	2	1	2	2
CO3	2	3	-	-	-	-	-	1	-	1	3	1	2	2
CO4	3	-	-	-	-	-	-	1	1	1	3	1	3	1
CO5	3	-	-	-	-	-	-	1	1	1	2	1	2	2

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>			
<b>SEMESTER-VII</b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDI T</b>	<b>MAXIMU M MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>22CE14703</b>	<b>ESTIMATION AND QUANTITY SURVEYING</b>	3	0	0	3	<b>100</b>
<b>OBJECTIVES</b>	<p>The main objectives of this course is:</p> <ul style="list-style-type: none"> <li>To study the quantities of item of works involved in buildings,</li> <li>To impart the basics of public health works, road works and irrigation works.</li> <li>To learn the specification and its types.</li> <li>To understand the process of tender and contract documents.</li> <li>To know the methods of valuation and depreciation.</li> </ul>					
<b>UNIT-I</b>	<b>ESTIMATE OF BUILDINGS</b>				<b>9</b>	
Types of estimates –Methods of estimates -Load bearing and framed structures – long wall and short wall method – center line method - Calculation of quantities of brick work, RCC, PCC, Plastering, white washing, colour washing and painting / varnishing for shops, rooms, residential building with flat and pitched roof.						
<b>UNIT-II</b>	<b>ESTIMATE OF OTHER STRUCTURES</b>				<b>9</b>	
Estimating of septic tank, soak pit – sanitary and water supply installations – sewer line – tube well – estimate of bituminous and cement concrete roads – estimate of retaining walls – culverts.						
<b>UNIT-III</b>	<b>ANALYSIS OF RATES AND SPECIFICATIONS</b>				<b>9</b>	
Data – Schedule of rates – Analysis of rates – Cost Estimates using Computer software’s(theory) - Specifications – Detailed and general specifications – Constructions – Sources – Types of specifications.						
<b>UNIT-IV</b>	<b>CONTRACTS AND TENDERS</b>				<b>9</b>	
Contract – Types of contracts – Formation of contract – Contract conditions – Contract for labour, material, design, construction- Drafting of contract documents- Construction contracts – Contract problems – Arbitration and legal requirements. Tenders- TTT Act 2000 – Tender notices and Document – types – tender procedures – Drafting model tenders, E-tendering - report on estimate of residential building						
<b>UNIT-V</b>	<b>VALUATION</b>				<b>9</b>	
Definitions – Various types of valuations – Valuation methods –Necessity – Capitalised Value – Depreciation - Valuation of land – Buildings – Valuation of plant and machineries- Calculation of Standard rent - Mortgage - lease.						

Total hours to be taught		(45 Hrs)
<b>Outcome(s)</b>	At the end of the course the students will be able to: <ul style="list-style-type: none"> <li>• Estimate the material quantities of building</li> <li>• Evaluate the material quantities of Road and other civil works.</li> <li>• Prepare civil work rate analysis.</li> <li>• Prepare tender and contract documents.</li> <li>• Apply valuation and material quantities, prepare a bill of quantities.</li> </ul>	
<b>TEXT BOOKS :</b>		
<input type="checkbox"/>	Dutta, B.N., “Estimating and Costing in Civil Engineering”, UBS Publishers & Distributors Pvt. Ltd., 2003	
<input type="checkbox"/>	Kohli, D.D and Kohli, R.C., “A Text Book of Estimating and Costing (Civil)”, S.Chand & Company Ltd., 2004	
<input type="checkbox"/>	Chakraborti M, “Estimation, Costing, Specification and Valuation in Civil Engineering (including Computer estimation)”, 2001.	
<input type="checkbox"/>	G.S.Birdie, “Text book of Estimation and Costing (Civil Engineering)”, Dhanpat Rai & Sons, 1986.	
<b>REFERENCES:</b>		
<input type="checkbox"/>	PWD Data Book	
<input type="checkbox"/>	Tamilnadu Transparencies in Tender Act,1998	
<input type="checkbox"/>	Arbitration and Conciliation Act,1996	
<input type="checkbox"/>	Standard Bid Evaluation Form, Procurement of Goods or Works, The World Bank, April 1996.	
<input type="checkbox"/>	Standard Data Book for Analysis and Rates, IRC, New Delhi, 2003	
<input type="checkbox"/>	<a href="https://nptel.ac.in/courses/105103093/14">https://nptel.ac.in/courses/105103093/14</a> <a href="https://nptel.ac.in/courses/105104161/6">https://nptel.ac.in/courses/105104161/6</a> <a href="https://nptel.ac.in/courses/105103023/8">https://nptel.ac.in/courses/105103023/8</a>	

POs COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	-	-	-	-	-	1	1	1	1	1	-	2	-
CO2	2	3	-	-	-	-	-	1	1	-	-	-	3	-
CO3	2	3	-	-	-	-	-	1	-	-	-	-	2	-
CO4	3	-	-	-	-	1	1	1	1	-	-	-	2	-
CO5	2	3	-	-	-	-	-	1	1	-	-	-	2	-

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation

**MAHENDRA ENGINEERING COLLEGE****(Autonomous)****Syllabus****Department****Civil Engineering****Programme Code****1021****SEMESTER VII**

<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>		
<b>22CE34701</b>	INDUSTRY ORIENTED COURSE-II	1	0	2	2	<b>100</b>
<b>Objective(s)</b>	The main objectives of this course is <ul style="list-style-type: none"> <li>To study the design principles for formwork.</li> <li>To get the knowledge in design of various formwork elements.</li> <li>To learn the formwork connectors.</li> <li>To get the knowledge in various formwork accessories and scaffolding.</li> </ul>					
<b>UNIT-I</b>	<b>DESIGN PRINCIPLES FOR FORMWORK</b>					<b>9</b>
Objective of Formwork Design- Loads on Formwork- dead, imposed and environmental - Assumptions design basis- Estimating Permissible Stresses, maximum bending Moment, shear force and deflection						
<b>UNIT-II</b>	<b>FORMWORK DESIGN AND ERECTION</b>					<b>9</b>
Design of foundation Formwork, Column Formwork, Slab and Beam Formwork- Erection Procedures- Foundation walls-Wall Climbing Formwork (Type-1)-Column Formwork (Doka -Top50 & RS only) Slab and Beam Formwork- (Mivans, PERI & RMD Concepts only) –formwork for Special structures.						
<b>LABORATORY</b>						<b>27</b>
<b>VERTICAL FORMWORK SYSTEMS</b>						
<ul style="list-style-type: none"> <li>Erection of Duo column Formwork Systems.</li> </ul>						
<b>HORIZONTAL FORMWORK SYSTEMS</b>						
<ul style="list-style-type: none"> <li>Erection of Multiflex slabs and beams Formwork Systems.</li> <li>Erection of Aerodeck composite panel Formwork Systems.</li> <li>Erection of Kiwi stage Formwork systems.</li> <li>Erection of table Formwork systems.</li> </ul>						
Total hours to be taught						<b>(L:45)</b>

**Course Outcomes:**

At the end of the course the student will be able to

Apply the design principles on formwork elements.

Calculate the forces on formwork elements and elaborate the formwork erection procedures.

Describe the erection procedures for vertical formwork.

Describe the erection procedures for horizontal formwork.

POs COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	-	-	-	-	1	1	1	1	1	1	1	3	1
CO2	3	-	-	-	-	1	1	1	1	1	1	1	3	1
CO3	2	-	-	-	-	1	1	1	1	1	-	1	3	1
CO4	2	-	-	-	-	1	1	1	1	1	-	1	3	1

**MAHENDRA ENGINEERING COLLEGE****(Autonomous)****Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>
-------------------	--------------------------	-----------------------	-------------

**SEMESTER-VII**

<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>22CE24701</b>	<b>STRUCTURAL DESIGN STUDIO</b>	<b>0</b>	<b>0</b>	<b>4</b>	<b>2</b>	<b>100</b>

**Objective :** The main objectives of this course is:

- To learn the software for analyses.
- To acquire knowledge about various structural elements
- To study the structural elements using excel sheet.
- To impart knowledge of plane frame, truss and framed building.

**LIST OF EXPERIMENTS**

1.	Analysis using Software (i) One Way slab (ii) Two Way Slab (iii) Column (iv) Footing (v) Beams (vi) Analysis the Multi storey-building using loads (wind load, Seismic load)
2.	Design Using Excel Sheet (i) One Way slab (ii) Two Way Slab (iii) Column (iv) Footing (v) Beams
3.	Analysis and Design of Plane Frame and Truss
4.	Assignment: Analysis and Design of Framed Building

<b>Total hours to be taught</b>	<b>45 Hrs</b>
---------------------------------	---------------

**Outcome :**

At the end of the course the students will be able to:

- Estimate the behavior of structural elements under various loadings..
- Design the structural elements using Excel sheet.
- Analyze and design of plane frame, Truss, water tank, retaining wall and Framed structures.

<b>POs</b> <b>COs</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	3	-	-	-	-	-	1	1	1	1	-	1	3	1
<b>CO2</b>	2	2	3	-	-	-	1	1	1	1	-	1	1	3
<b>CO3</b>	2	2	3	-	3	-	1	1	1	1	-	1	1	3

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation



**MAHENDRA ENGINEERING COLLEGE**  
(Autonomous)





**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>			
<b>SEMESTER-VII</b>						
<b>COURSE CODE</b>	<b>COURSE NAME</b>	<b>HOURS/WEEK</b>			<b>CREDIT</b>	<b>MAXIMUM MARKS</b>
		<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>	
<b>22CE36701</b>	<b>Project Work (Phase I)</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>3</b>	<b>100</b>
<b>OBJECTIVES:</b>						
The main objectives of this course is:						
<ul style="list-style-type: none"> <li>To impart &amp; improve the design capability of the student.</li> <li>To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.</li> </ul>						
<b>STRATEGY:</b>						
<ul style="list-style-type: none"> <li>This course conceives purely a design problem in any one of the disciplines of Civil Engineering; e.g., Design of an RC structure, Design of a waste water treatment plant, Design of a foundation system, Design of traffic intersection etc. The design problem can be allotted to either an individual student or a group of students comprising of not more than four. At the end of the course the group should submit a complete report on the design problem consisting of the data given, the design calculations, specifications if any and complete set of drawings which follow the design.</li> </ul>						
<b>OUTCOME:</b>						
On completion of the course, the students will be able to						
<ul style="list-style-type: none"> <li>Explain the Civil Engineering problems reviewing available literature</li> <li>Prepare the plan of a civil engineering structure, layout of treatment plant. etc.,</li> <li>Test the properties of various material, characteristics of samplings</li> <li>Analyze and design complex civil engineering problems.</li> <li>Prepare the consolidated project report for tender or any other purpose</li> </ul>						
<b>Total hours to be taught</b>					<b>60 Hrs</b>	

<b>POs</b> <b>COs</b>	<b>P O1</b>	<b>P O2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO 10</b>	<b>PO 11</b>	<b>PO 12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	2	-	-	-	-	1	1	1	1	1	-	-	2	2
<b>CO2</b>	1	-	-	-	-	1	1	1	1	1	-	-	1	3
<b>CO3</b>	1	2	3	-	-	1	1	1	1	1	-	-	2	3
<b>CO4</b>	3	2	1	-	-	1	1	1	1	1	-	-	2	1
<b>CO5</b>	3	1	-	-	-	1	1	1	1	1	-	-	3	1

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation

		<b>MAHENDRA ENGINEERING COLLEGE</b> <b>(Autonomous)</b>							
		<b>DEPARTMENT OF CIVIL ENGINEERING</b>							
<b><u>Regulation-2022- Curriculum (CBCS)</u></b>									
<b>VIII Semester</b>									
Sl.No.	Course Code	Course Title	Category	Contact Periods	L	T	P	C	
<b>THEORY</b>									
1		Professional Elective – IV	PE	3	3	0	0	3	
2		Professional Elective – V	PE	3	3	0	0	3	
<b>PRACTICAL</b>									
3	22CE36801	Project Work (Phase II)	EEC	12	0	0	12	6	
<b>TOTAL</b>				<b>18</b>	<b>6</b>	<b>0</b>	<b>12</b>	<b>12</b>	



**MAHENDRA ENGINEERING COLLEGE  
(Autonomous)**



**Syllabus**

<b>Department</b>	<b>Civil Engineering</b>	<b>Programme Code</b>	<b>1021</b>
-------------------	--------------------------	-----------------------	-------------

**SEMESTER- VIII**

COURSE CODE	COURSE NAME	HOURS/WEEK			CREDIT	MAXIMUM MARKS
		L	T	P	C	
<b>22CE36801</b>	<b>Project Work (Phase II)</b>	0	0	12	6	<b>100</b>

**OBJECTIVES:**

The main objectives of this course is:

- To develop the ability to solve a specific problem right from its identification and literature review till the successful solution of the same.
- To train the students in preparing project reports and to face reviews and viva voce examination.

**EVALUATION PROCEDURE**

The students in a group of 3 to 4 works on a topic approved by the head of the department under the guidance of a faculty member and prepare a comprehensive project report after completing the work to the satisfaction of the supervisor. The progress of the project is evaluated based on a minimum of three reviews. The head of the department may constitute the review committee. A project report is required at the end of the semester. The project work is evaluated based on oral presentation and the project report jointly by external and internal examiners constituted by the head of the department.

**OUTCOME:**

On completion of the course, the students will be able to

- Summarize literature review of state-of-the-art works in civil engineering.
- Identify the real-world problems.
- Design and conduct relevant tests on various building materials as per BIS.
- Apply the advanced software techniques / skills.
- Prepare the project reports in the prescribed formats.

<b>Total hours to be taught</b>	<b>180 Hrs</b>
---------------------------------	----------------

<b>POs COs</b>	<b>P O1</b>	<b>P O2</b>	<b>PO 3</b>	<b>PO 4</b>	<b>PO 5</b>	<b>PO 6</b>	<b>PO 7</b>	<b>PO 8</b>	<b>PO 9</b>	<b>PO1 0</b>	<b>PO1 1</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
<b>CO1</b>	2	-	-	-	-	1	1	1	1	1	-	-	2	2
<b>CO2</b>	1	-	-	-	-	1	1	1	1	1	-	-	1	3
<b>CO3</b>	1	2	3	-	-	1	1	1	1	1	-	-	2	3
<b>CO4</b>	3	2	1	-	-	1	1	1	1	1	-	-	2	1
<b>CO5</b>	3	1	1	-	-	1	1	1	1	1	-	-	2	2

"-" - No correlation , "1" - Lower correlation , "2" - Moderate correlation , "3" – Higher correlation