



D. no 576
06/02/2025

DEPARTMENT OF CIVIL ENGINEERING

MINUTES OF BOARD OF STUDIES MEETING, DEC 2024 ALONG WITH ITS ANNEXURES



Summary of Board of Studies Meeting held on 06th Dec, 2024

COURSES WHERE SYLLABUS REVISION WAS CARRIED OUT
(Session: Jan- June 2025)

(Course / Subject name)	Course Code	Year/Date of introduction	Year/Date of revision	Percentage of content added or replaced	Item No.	Page No.
Structural Design & Drawing (Steel)	2110622	--	2024	5%	6	4, 11, 14, 15

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Summary of Board of Studies Meeting held on 06th Dec, 2024

NEW COURSES ADDED
(Session: July - Dec 2024)

(Course/subject name)	Course Code	Activities/contents which have a bearing on increasing skill and employability	Item No.	Page No.
Solid & Hazardous Waste Management	2110621	Management of solid waste, its characterization, rules & regulations, Biomedical Waste, E-waste, Radioactive Waste.	5,6	4,11,12,13
Applied Seismology for Engineers	H110808	Seismic loading analysis, synthetic ground motions, seismic hazard analysis, source characterization, and ground response analysis	4	3
Finite Element Method	H110809	Finite element method along with its concept & application, Linear Static and Dynamic Finite Element Analysis	4	3
Environmental Remediation of Contaminated Sites	H110810	Integrated approaches to remediating contaminated sites, Screen, choose and design appropriate technologies for remediation	4	3
Climate Change Science	H110811	Atmospheric fluid dynamics, climate variability's, climatological applications	4	3
Remote Sensing and GIS for Rural Development	2110664	Rural Development, Remote Sensing & GIS, Its Application, Case Studies, Software Knowledge.	7	4, 11

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Minutes of Board of Studies Meeting held on 06th Dec 2024

The meeting of Board of Studies of the Civil Engineering department was held on Friday, 06th Dec 2024 in online mode. Following were present:

1. Dr Alok Verma (Subject Expert nominated by Academic Council)
Professor, Civil Engg, DTU, New Delhi
2. Er Atul Khare (Representative from Industry/ Corporate Sector/ Allied Area)
Principal Executive Director, Railway Board, Noida
3. Er Alok Tiwari (Representative from Alumni)
Chief Administrative officer (Construction), SERC
4. Dr. S. Tiwari (Chairman BoS & Head of the department)
5. Dr. S. K. Jain (Member, BOS)
6. Dr. M. K. Trivedi (Member, BOS)
7. Prof. A. K. Dwivedi (Member, BOS)
8. Prof. A. K. Saxena (Member, BOS)
9. Prof. G. Bhadoriya (Member, BOS)
10. Prof Aditya Agarwal (Member, BOS)
11. Dr. Hemant Shrivastava (Member, BOS)
12. Dr. Prachi Singh (Member, BOS)
13. Dr. Abhilash Shukla (Member, BOS)

Leave of absence was granted to the external members who could not attend the meeting.

Following agendas were discussed & deliberated upon

Item No. /CE - 1	To confirm the minutes of previous BoS meeting held in the month of May-June 2024. Previous Board of Studies meeting minutes dated 31 st May 2024 are confirmed.
Item No. /CE - 2	To propose the scheme structure of VIII Semester with the provision of ONE DE & ONE OC course to be offered in online mode with credit transfer for the batch admitted in academic year 2021-22. (The total credits from I-VIII semester should not be less than 160 for this batch). The finalized scheme of B.Tech VIII Semester for 2021-22 admitted batch is attached in Annexure - I.
Item No. /CE - 3	To propose the list of courses which the students can opt from SWAYAM/NPTEL/ other MOOC Platforms/ Institution (MITS) MOOC, to be offered in online mode under Departmental Elective (DE) category courses (DE-5) and open category (OC3) for credit transfer in the VIII Semester under the flexible curriculum (Batch admitted in academic year 2021-22) Following courses are finalized as Departmental Elective (DE-5) courses for VIII semester which will be offered in online mode through SWAYAM/NPTEL for credit transfer under the flexible curriculum for 2021-22 admitted batch. 1. 110861, Introduction to Civil Engineering Profession 2. 110862, Plastic Waste Management 3. 110864, Retrofitting and Rehabilitation of Civil Infrastructure Following courses are finalized as Open Category (OC-3) courses for VIII semester which will be offered in online mode through SWAYAM/NPTEL for credit transfer under the



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	flexible curriculum for 2021-22 admitted batch. 1. 910301, Natural Hazards 2. 910302, Strategies for Sustainable Design
	To propose the list of "Additional Courses" which can be opted for getting an (i) Honours (for students of the host department) (ii) Minor Specialization (for students of other departments) [These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the B.Tech. VIII semester students (for the batch admitted in 2021-22)] and for B.Tech. VI semester (for the batch admitted in 2022-23)] Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Minor Specialization during VIII semester for 2021-22 admitted batch. 1. Strategies for Sustainable Design (M110801) 2. Rural Water Resources Management (M110802) 3. Structural Analysis-1 (M110803) 4. Concrete Technology (M110804)
Item No. /CE - 4	<i>onal courses for getting Minors during VI semester for 2021-22 admitted batch and are running on SWAYAM/NPTEL platform in upcoming semester, Hence these courses are also offered as additive courses for getting Minors during VIII Semester provided students can opt only those courses which they have not taken for any credit transfer facility earlier.</i> 1. Hydraulic Engineering (M11601) 2. Water & Wastewater Treatment (M110602) Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Honours during VIII semester for 2021-22 admitted batch. TRACK-1: STRUCTURE ENGINEERING 1. Applied Seismology for Engineers (H110808) 2. Finite Element Method (H110809) TRACK-2: ENVIRONMENTAL ENGINEERING 1. Environmental Remediation of Contaminated Sites (H110810) 2. Climate Change Science (H110811) <i>Following SWAYAM/NPTEL courses were offered as additional courses for getting Honours during VI semester for 2021-22 admitted batch and are running on SWAYAM/NPTEL platform in upcoming semester, Hence these courses are also offered as additive courses for getting Honours during VIII Semester provided students can opt only those courses which they have not taken for any credit transfer facility earlier or as DE course.</i> TRACK-1: STRUCTURE ENGINEERING 1. Structural Dynamics (H110601) 2. Construction Methods & Equipment Management (H110606) 3. Soil Structure Interaction (H110607) TRACK-2: ENVIRONMENTAL ENGINEERING 1. Environmental Impact Assessment (H110605) 2. Applied Environmental Microbiology (H110608)



	3. Biological process design for wastewater treatment (H110609) Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Minor Specialization during VI semester for 2022-23 admitted batch. 1. Hydraulic Engineering (M110601) 2. Water & Wastewater Treatment (M110602) Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Honours during VI semester for 2022-23 admitted batch. TRACK-1: STRUCTURE ENGINEERING 1. Structural Dynamics (H110601) 2. Construction Methods & Equipment Management (H110606) 3. Soil Structure Interaction (H110607) TRACK-2: ENVIRONMENTAL ENGINEERING 1. Environmental Impact Assessment (H110605) 2. Applied Environmental Microbiology (H110608) 3. Biological process design for wastewater treatment (H110609)
Item No. /CE - 5	To review and finalize the scheme structure of B.Tech VI Semester under the flexible curriculum (Batch admitted in 2022-23) The finalized scheme of B.Tech VI Semester for 2022-23 admitted batch is attached in Annexure – II.
Item No. /CE - 6	To review & finalize the syllabi for all Departmental Core Courses (DC) of B. Tech VI Semester (for batch admitted in 2022-23) under the flexible curriculum along with their COs. The syllabus along with COs for Departmental Core (DC) courses which are being offered in VI Semester were discussed & finalized. The finalized Scheme for B.Tech Civil Engineering VI Semester (for batch admitted in 2022-23) along with the syllabus is attached in Annexure – II and the same has been incorporated in the syllabus file for 2022 batch.
Item No. /CE - 7	To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered for batches admitted in 2022-23 in online mode under Departmental Elective (DE) Course with credit transfer, in the VI Semester. Following SWAYAM/NPTEL courses are offered as Departmental Elective (DE) courses in VI Semester for batch admitted in 2022-23 with credit transfer. 1. Geotechnical Engineering II – Foundation Engineering (2110661) 2. Remote Sensing and GIS for Rural Development (2110664)
Item No. /CE - 8	To review and finalize the courses & syllabi to be offered (for batch admitted in 2022-23) under the Open Category (OC) Courses to be offered in traditional mode for B Tech VI semester of other departments along with their COs. Following courses are going to be offered as Open Category (OC) courses for VI Semester students (for batch admitted in 2022-23) 1. Building Services & Maintenance (910111) 2. Sustainable Materials & Green Buildings (910110) The syllabus along with COs for these OC courses were discussed & finalized. The



	syllabus is attached in Annexure – III and the same has been incorporated in the syllabus file for 2022 batch.																				
Item No. /CE - 9	To review and finalize the Experiment list/ Lab manual/Skill based mini-project for all the Laboratory Courses to be offered in B.Tech.VI semester (for batch admitted in 2022-23). The list of experiments along with list of projects which can be assigned as ‘Skill based mini project’ for laboratory course to be offered in VI semester for 2022-23 admitted batch were finalized along with the syllabi of courses offered in B.Tech VI Semester as mentioned in agenda Item No. 6. The same is attached in Annexure – II along with syllabus of these courses.																				
Item No. /CE - 10	To review and finalize the scheme structure of B. Tech. IV Semester under the flexible curriculum (for batch admitted in 2023-24). The Scheme for IV Semester for B.Tech Civil Engineering for batch admitted in 2023-2024 was discussed and finalized. The scheme as well as syllabus is being attached in Annexure – IV.																				
Item No. /CE - 11	To review and finalize the syllabi for all Departmental Core (DC) Courses of B. Tech. IV Semester (for batch admitted in 2023-24) under the flexible curriculum along with their Cos The Syllabus for IV Semester for B.Tech Civil Engineering for batch admitted in 2023-2024 were finalized along with the Scheme as mentioned in agenda Item No. 10. The scheme as well as syllabus is being attached in Annexure – IV.																				
Item No. /CE - 12	To review and finalize the Experiment list/ Lab manual/Skill based mini-project for all the Laboratory Courses to be offered in Batch IV semester (for batch admitted in 2022-23) The list of experiments for laboratory course to be offered in IV semester for 2022-23 admitted batch were finalized along with the syllabi of courses offered in B.Tech IV Semester as mentioned in agenda Item No. / CE – 11																				
Item No. /CE - 13	To finalize the Skill Internship Project (SIP) module to be offered in Dec 2024. Three modules have been finalized from the department. The details of the courses are attached in Annexure-V.																				
Item No. /CE - 14	To propose the content of the courses identified for MITS-MOOC development to be offered in blended mode for VII Semester DE/OC courses for the batch admitted in 2022-23. These courses are identified for MITS-MOOC development to be offered in blended mode for VII Semester DE/OC courses. <table><tr><th>S. No.</th><th>Course Name</th><th>Faculty Name</th><th>Category (DE/SP C-3/OC)</th></tr><tr><td>1</td><td>Integrated Waste Management System</td><td>Dr Prachi Singh</td><td>OC</td></tr><tr><td>2</td><td>Advanced Structural Design (RCC)</td><td>Dr Abhilash Shukla</td><td>DE</td></tr><tr><td>3</td><td>Sustainable Materials & Green Buildings</td><td>Dr Abhilash Shukla</td><td>OC</td></tr><tr><td>4</td><td>Design of Earthquake Resistant Structures</td><td>Dr Hemant Shrivastava</td><td>DE</td></tr></table>	S. No.	Course Name	Faculty Name	Category (DE/SP C-3/OC)	1	Integrated Waste Management System	Dr Prachi Singh	OC	2	Advanced Structural Design (RCC)	Dr Abhilash Shukla	DE	3	Sustainable Materials & Green Buildings	Dr Abhilash Shukla	OC	4	Design of Earthquake Resistant Structures	Dr Hemant Shrivastava	DE
S. No.	Course Name	Faculty Name	Category (DE/SP C-3/OC)																		
1	Integrated Waste Management System	Dr Prachi Singh	OC																		
2	Advanced Structural Design (RCC)	Dr Abhilash Shukla	DE																		
3	Sustainable Materials & Green Buildings	Dr Abhilash Shukla	OC																		
4	Design of Earthquake Resistant Structures	Dr Hemant Shrivastava	DE																		



	The detail course content is attached in Annexure VI .								
Item No. /CE - 15	To review the CO attainments, identify gaps and suggest corrective measures for the improvement in the CO attainment levels for the courses taught in Jan-June 2024 Session. CO attainment calculations & gap analysis has been done based upon mathematical model developed by the institute. On the basis of this analysis it is observed that in some of the courses the CO attainment level for some COs is found to be below the set target, for those COs corrective actions to be taken have been suggested. The compiled report is attached in Annexure – VII. The summary of the same is presented below: <table><tr><th>Total No of Courses</th><th>Total Number of Cos</th><th>No. of COs Not attained</th><th>Percentage of COs not attained</th></tr><tr><td>16</td><td>80</td><td>53</td><td>66.25%</td></tr></table>	Total No of Courses	Total Number of Cos	No. of COs Not attained	Percentage of COs not attained	16	80	53	66.25%
Total No of Courses	Total Number of Cos	No. of COs Not attained	Percentage of COs not attained						
16	80	53	66.25%						
Item No. /CE - 16	To review the PO attainment, CO-PO mapping matrix and action to be taken to improve PO attainment level. PO attainment calculations of 2020-2024 batch has been done and the gap analysis in PO attainment level has been carried on the basis of the set targets. The compiled report is attached in Annexure – VIII.								
Item No. /CE - 17	To review curricula feedback from various stakeholders, its analysis and impact The curricula feedback has been taken from various stakeholders. The compiled report along with its analysis & ATR is attached in Annexure – IX								
Item No. /CE - 18	To discuss and recommend the scheme structure & syllabi of PG Programme (M.E./M.Tech./MCA/MBA) along with their COs (for batch admitted in 2023-24). The Scheme for IV Semester for M.E/M.Tech Civil Engineering for batch admitted in 2023-2024 was finalized. The scheme is being attached in Annexure – X.								
Item No. /CE - 19	Any other matter. None								

The following comments were made by the expert present in the meeting:

1. **There should be a course related to construction waste material along with plastic waste material.**

The Scheme structure of VII Semester consists of a course on “Integrated Waste Management for Smart cities”, this course includes a part on construction and demolition waste.

2. **There should be a course related to underground construction which will enhance the employability of the students.**

The Scheme structure of V Semester consists of a course on “Railway, Airport and Tunnel Engineering”, this course includes underground construction techniques. Also in July Dec 25 semester, if any course on underground construction is offered through SWAYAM/NPTEL, the same will introduced in curriculum.

3. **There should be the content of BIM 4D, REVIT in the syllabus of BTech Civil Engineering.**

The Scheme structure of VII Semester consists of a lab course on “Software Application for solving Civil Engineering problem”, there this software’s application will be included in the curriculum while finalizing the syllabus for July Dec 25 semester in the next BoS Meeting.



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4. There should be a course on GPS.

While finalizing the curriculum for July Dec 25, if any 8 week / 12 week SWAYAM/NPTEL course on GPS is being offered, then same will be added.

5. There should be a component of composite material in Structural Design and Drawing (Steel).

The syllabus of Structural Design and Drawing (Steel) is modified accordingly.

6. There should be course on Bridge Engineering.

In previous semester, and SWAYAM/NPTEL course on Bridge Engineering offered as Honours.

7. There should be a course on Construction Techniques.

A SWAYAM/NPTEL course on Construction Methods & Equipment Management is being offered as Honor course.

The meeting ended with vote of thanks to the chair and external members.

(Dr. Abhilash Shukla)
Member, BoS

(Dr. Prachi Singh)
Member, BoS

(Dr. Hemant Shrivastava)
Member, BoS

(Prof. Aditya K. Agarwal)
Member BoS
(Prof. G. Bhadoriya)
Member BoS
(Prof. A. K. Saxena)
Member BoS
(Prof. A. K. Dwivedi)
Member BoS
(Dr. M. K. Trivedi)
Member, BoS
(Dr. S. K. Jain)
Member, BoS
(Er Alok Tiwari)
Alumni Representative
(Er Atul Khare)
Industry Representative
(Dr. Alok Verma)
Subject Expert Nominated by
Academic Council
Dean
Faculty of Engineering & Technology
MITS-DU
(Dr. S. Tiwari)
Head of Department & Chairman, BoS



ANNEXURE – I

(Scheme 8th Sem B.Tech Civil Engineering (2021
Admitted Batch))

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Scheme of Evaluation
B. Tech. VIII Semester (Civil Engineering)

(For Batch Admitted in 2021-2022)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted										Total Marks	Contact Periods per Week			Total Credits	Mode of Teaching	Mode of Exam
				Theory Slot			Practical Slot		MOOCS											
				End Sem.	Mid Sem.	Quiz / Assignment	End Sem.	Lab Work / Sessional	Assignment	Exam	L	T	P							
1.	1108XX	DE	Departmental Elective-V (DE-5)*	-	-	-	-	-	-	-	25	75		3	-	-	3	Online	MC Q	
2.	910XXX	OC	Open Category Course-III (OC-3)*	-	-	-	-	-	-	-	25	75		3	-	-	3	Online	MC Q	
3.	110821	DLC	Internship / Project**(DLC-7)	-	-	-	250	150			-	-	400	-	-	18	9	Interactive	SO	
4.	110822	PD	Professional Development [#]	-	-	-	50	-			-	-	50	-	-	4	2	Interactive	SO	
Total				-	-	-	300	150			50	150		6	-	22	17			
5.	Additional Courses for obtaining Honours or Minor Specialization by desirous students			Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization																

*Proficiency in course/subject - includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance etc. in that particular course/subject

MCQ - Multiple Choice Questions, PP - Pen paper Mode, A+O - Assignment + Oral, SO - Submission + Oral

*Course will run through SWAYAM/NPTEL/MOOC with credit transfer

#Evaluation will be based on participation/laurels brought by the students to the institution in national/international technical and other events during the complete tenure of the UG program (participation in professional chapter activities, club activities, cultural events, sports, and personality development activities, collaborative events, MOOCs and technical events)

*** Innovation & Start-up: Only for the students who have opted relevant Novel Engaging Courses (NEC): Innovation: From Creativity to Entrepreneurship (Part 2- Technology, Science, Innovation, and Society), Introduction to Entrepreneurship, Opportunities, and Start-up: How to start, survey, Financial, Legal, Pitching and Funding

Innovation: From Creativity to Entrepreneurship (Part 2- Technology, Science, Innovation, and Society), Introduction to Entrepreneurship, Opportunities, and Start-up: How to start, survey, Financial, Legal, Pitching and Funding

Mode of Teaching				Mode of Examination			
Theory	Blended	Lab	SIP/ Project	Theory		SIP/Projects	
				Offline	Online Mentoring	Interactive	PDC
Offline	Online	Blended	Lab	Offline	Online Mentoring	Interactive	PDC
-	-	-	-	9	6	2	2
				53%	35%	12%	12%
				Total Credits		Total Credits	
				17		17	
				Credits %		Credits %	
				53%		53%	

DE - 5 (Through SWAYAM/NPTEL)		OC - 3 (Through SWAYAM/NPTEL)	
110861. Introduction to Civil Engineering Profession		910301. Natural Hazards	
110862. Plastic Waste Management		910302. Strategies for Sustainable Design	
110864. Retrofitting and Rehabilitation of Civil Infrastructure			

Dec 2024

Civil Engineering Department, MITS Gwalior



ANNEXURE – II

**(Scheme & Syllabus 6th Sem B.Tech Civil
Engineering (2022-2023 Admitted Batch))**

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Scheme of Evaluation

B. Tech. VI Semester (Civil Engineering)

For batches admitted in academic session 2022-23

For batches admitted in academic session 2022 – 23																					
S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted										Contact Hours			Mode of Teaching (Offline/ Online)	Mode of Exam	Duration of Exam		
				Theory Slot				Practical Slot			MOOCs			Total Marks	per week						
				End Sem.		Mid Sem	Quiz/ Assignment	End Sem	Lab Work & Sessional	Skill Based Mini Project	Assig nment	Exam	L		T	P					
				End Term Evaluation	Proficiency in subject /course																
1.	2110620	MC	Artificial Intelligence & Machine Learning	50	10	20	20	20	60	20	20	-	-	200	3	-	2	4	Blended	MCQ	1.5 Hrs
2.	2110621	DC	Solid & Hazardous Waste management (DC - 14)	50	10	20	20	20	-	-	-	-	-	100	3	-	-	3	Blended	MCQ	1.5 Hrs
3.	2110622	DC	Structural Design & Drawing (Steel) (DC - 15)	50	10	20	20	20	-	-	-	-	-	100	3	1	-	4	Blended	PP	2 Hrs
4.	21106XX	DE	Departmental Elective - I (DE - 1)*	-	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
5.	910XXX	OC	Open Category Course – I (OC - 1)	50	10	20	20	20	-	-	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
6.	2110623	DLC	Minor Project - II (DLC - 4)	-	-	-	-	-	60	40	-	-	-	100	-	-	4	2	Offline	SO	-
7.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	-	50	-	-	-	-	50	-	-	2	1	Interactive	SO	-
8.		NSS	**Natural Sciences & Skills	200	40	80	80	80	120	40	40	-	-	600	1	-	2	2*	-	-	-
Total				400	80	160	160	160	290	100	60	25	75	1350	15	1	8	22	-	-	-
9.	1000007	MAC	Intellectual Property Rights	50	10	20	20	20	-	-	-	-	-	100	2	-	-	Grade	Online	MCQ	1.5 Hrs
Additional Courses for obtaining Honours or Minor Specialization				Permitted to opt for maximum 02 additional courses for the award of Honours or Minor Specialization																	
Summer Internship Project – III (On Job Training) for four weeks duration: Evaluation in VII Semester				Summer Internship Project – III (On Job Training) for four weeks duration: Evaluation in VII Semester																	

Summer Internship Project – III (On Job Training) for four weeks duration: Evaluation in VII Semester

Proficiency in course/subject – includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance etc. in that particular course/subject

MCQ – Multiple Choice Questions, PP – Pen paper Mode, A+O – Assignment + Oral, SO – Submission + Oral

Course will run through SWAYAM/NPTEL/MOOC with credit transfer

Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Science/ Language

("Natural Sciences & Skills" treated as Mandatory Audit Courses from first to fourth semester and cumulative

("Natural Sciences & Skills" treated as Mandatory Audit Courses from first to fourth semester and cumulative marks converted as a cluster of credits and awarded in the VI semester)

Mode of Teaching										Mode of Examination				Total Credits
Theory			Lab	MDOC	NEC	Theory		Lab	MCQ	SO	SIP/SLP/NEC			
Offline	Online	Blended	Offline	Online Mentoring	Interactive	PP	A+O							
		13	3	3	1	7	-		9	3	1	22		
-	-	65%	15%	15%	5%	35%	-		48%	15%	50%	Credits %		

Departmental Elective I (SWAYAM/NPTEL) (DE-I)

1. 2110661, Geotechnical Engineering II – Foundation Engineering

2. 2110664, Remote Sensing and GIS for Rural Development

Open Category Course – I (OC-1)

1.910111, Building Maintenance & Services

2.910110, Sustainable Materials & Green Buildings

Civil Engineering Department, MITS Gwalior

Dec 2024

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ANNEXURE – II

SYLLABUS FOR COURSES TO BE OFFERED IN VI SEMESTER

Course Code: 2110621

Course Name: Solid & Hazardous Waste Management

L	T	P	Credit
3	0	0	3

Course Objective:

To provide students with the knowledge and skills to manage solid, hazardous, and special waste types, focusing on collection, processing, and disposal, while exploring sustainable practices involved in management of waste.

SYLLABUS

Unit I Introduction:

Introduction to waste and waste management, classification of solid waste, objective of solid waste management, Issues related to solid waste, elements of waste management system. Solid waste sources – Nature and characteristics (physical, chemical & biological) – Quantities and Qualities – Generation rates. Overview of MSW Rule 2016 and implementation of SBM and smart waste management solutions in the country.

Unit II

Collection, storage and disposal of waste:

Implementation of 5R policy in waste management. On-site handling, storage and processing of waste. Collection of waste: collection systems and its analysis, collection vehicles, vehicle routing, route balancing, Transfer station, transportation of wastes. Disposal of waste through landfills – types of landfills, planning & operation of landfills, leachate management & control of gases in landfills, environmental monitoring of landfills.

Unit III

Processing and energy recovery form waste:

Conveying and compacting waste, shredding, material separation, recycling of waste: examples/case study. Biological processing of waste involving composting, Vermicomposting and biomethanation. Concept of Refused derived fuel. Thermal processing of municipal solid waste involving incineration, pyrolysis, gasification.

Unit IV

Hazardous Waste Management:

Introduction to hazardous waste: Definition, types, characterization and composition, source, health effects. Storage and transportation of hazardous waste, labeling of hazardous waste, Physical, Chemical and Biological treatment of hazardous waste, bioremediation of hazardous waste and disposal of waste. Overview of hazardous waste management rules.

Unit V

Other wastes and their management:

Biomedical waste management – sources, types and classification of biomedical wastes, health effects, challenges in waste management and biomedical waste management practices.



E-waste management – sources, types and classification of e-wastes, effects, challenges in waste management and handling of E-waste.

Plastic waste management – types of plastics, sources of plastic waste, impacts of plastic waste, plastic waste management practices.

Course Outcomes:

Upon completion of the course the student will be able to:

CO 1: Explain the principles & concepts of waste management

CO 2: Apply various techniques of handling the waste.

CO 3: Apply various techniques of processing and energy recovery from waste.

CO 4: Apply various techniques to manage hazardous waste.

CO 5: Analyze the challenges and impacts of managing biomedical, e-waste, and plastic waste

Text Books:

1. Text Book of Solid Wastes Management, Iqbal H. Khan and Naved Ahsan, CBS Publishers, 1st edition 2012
2. Integrated Solid Waste Management, Hilary Theisen and Samuel A. Vigil. George Tchobanoglous, McGraw Hill New York, 1993

Reference Books:

1. Environmental Engineering, Rowe, Peavy & Tchobanoglous, Tata McGraw Hill Publications, 2017
2. CPHEEO, Manual on Municipal Solid Waste management, Central Public Health and Environmental Engineering organization, Government of India, New Delhi, 2016
3. Solid Waste Engineering, Vesilind P.A., Worrel H. W. and Reinhard, Thomson Learning Inc, 2003
4. Charles A. Wentz, Hazardous Waste Management, McGraw Hill, New York. 1995.
5. David Rimbers, Municipal Solid Waste Management: Pollution Technologies Review, Noyes Data Corporation, London, 1990.
6. Michael D. Lagrega, Philip L. Buckingham, Jeffrey C. Evans. Hazardous Waste Management, McGraw Hill, New York. 1994.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantial



Course Code: 2110622

Course Name: Structural Design & Drawing (Steel)

L	T	P	Credit
3	1	0	4

Course Objectives:

To comprehensively study the design principles and behavior of steel structural components as per IS 800-2007, including the analysis and design of compression, tension, and flexural members, bolted and welded connections, plate girders, column bases, and both laterally restrained & unrestrained beams and Introduction to plate girders & composite construction, while understanding their performance under gravity loads and using simple and built-up sections.

Syllabus:

Unit-I

Structural properties of steel, Design of structural connections – Bolted and Welded connections, Codal provision.

Unit-II

Design of Tension members. Lug angles & Tension splices. Codal provision.

Unit-III

Design of Compression member - simple and compound, Lacings & Battens. Codal provision.

Unit-IV

Design of Laterally supported and unsupported beams, web buckling and crippling. Codal provision.

Unit-V

Design of bases for steel columns, Introduction to plate girder, Introduction to composite construction. Codal provision.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Design the steel connections using relevant IS codes.
- CO 2: Design tension members using relevant IS codes.
- CO 3: Design simple and built up compression member using relevant IS codes.
- CO 4: Design flexural members using relevant IS codes.
- CO 5: Design column bases and explain plate girders and composite construction.

Text Books:

1. Limit State Design of Steel Structures, S. K. Duggal, McGraw Hill Publication, 3rd edition, 2017

Reference Books:

1. Design of Steel Structures, S. S. Bhavikatti, International Publishing House, 2014
2. Design of Steel Structures, N. Subramanian, Oxford University Press India, 2008



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Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially

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Course Code: 2110623
Course Name: Minor Project - II

L	T	P	Credit
0	0	4	2

Course Objectives:

To prepare students to address real-life civil engineering challenges through innovative problem-solving and the application of conventional and software-based methods, while fostering professional expertise, social responsibility, teamwork, leadership, and effective communication. Additionally, students will develop skills in technological innovation, system implementation, professional reporting, data presentation, and the use of computer tools and graphics for engineering solutions.

Syllabus:

Each candidate shall work on an approved project of a public building or any other civil engineering work and shall submit design and a set of drawings.

OR

Shall submit a detailed report of experimental work / software package on any specific problem of importance.

Course Outcomes:

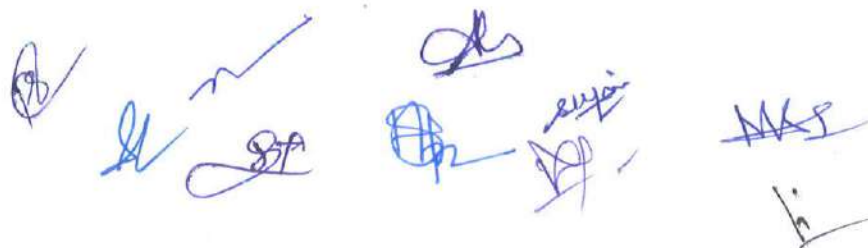
Upon completion of the course, the students will be able to:

- CO 1: Recognize** various engineering problems and techniques to solve them.
- CO 2: Reproduce** the solution of the problems upon the need of society.
- CO 3: Cooperate** to work within group.
- CO 4: Develop** the writing and communication skills for various engineering problems.
- CO 5: Display** lifelong learning.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially





Course Code: 2110620
Course Name: Artificial Intelligence & Machine Learning

L	T	P	Credit
3	0	2	4

COURSE OBJECTIVES:

To equip students with fundamental knowledge of Artificial Intelligence, Neural Networks, and Machine Learning, including basic representation, reasoning paradigms, and the operational techniques used in these fields.

Unit – I:

Introducing Artificial Intelligence: Definition, Goals of AI, Task of AI, Computation, Psychology and Cognitive Science. Perception, Understanding, and Action. Artificial intelligence vs machine learning vs deep learning and other related fields. Applications of Artificial intelligence and Machine Learning in the real world.

Unit – II:

Problem, Problem Space and Search:

Production System, Blind Search: BFS & DFS, Heuristic Search, Hill Climbing, Best First Search

Introduction to Neural Networks:

History, Biological Neuron, Artificial Neural Network, Neural Network Architectures, Classification, & Clustering

Unit – III:

Introduction to Machine Learning: Traditional Programming vs Machine learning. Key Elements of Machine Learning: Representation, process (Data Collection, Data Preparation, Model selection, Model Training, Model Evaluation and Prediction), Evaluation and Optimization. Types of Learning: Supervised, Unsupervised and reinforcement learning. Regression vs classification problems.

Unit – IV:

Supervised Machine Learning: Linear regression: implementation, applications & performance parameters. Decision tree classifier, terminology, classification vs regression trees, tree creation with Gini index and information gain, ID3 algorithms, applications and performance parameters. Random forest classifier. Case study on regression and classification for solving real world problems.

Unit – V:

Unsupervised Machine Learning: Introduction, types: Partitioning, density based, DBSCAN, distribution model-based, hierarchical, Agglomerative and Divisive, Common Distance measures, K-means clustering algorithm. Case study on clustering for solving real world problems.



RECOMMENDED BOOKS:

1. Artificial Intelligence: A Modern Approach by Stuart J. Russell and Peter Norvig, Prentice Hall.
2. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
3. Introduction to AI & Expert System: Dan W. Patterson, PHI.
4. Pattern Recognition and Machine Learning, Christopher M. Bishop
5. Introduction to Machine Learning using Python: Sarah Guido
6. Machine Learning in Action: Peter Harrington

COURSE OUTCOMES: After completing the course, the student will be able to:

CO1: Define basic concepts of Artificial Intelligence & Machine Learning.

CO2: Illustrate various techniques for search and processing.

CO3: Identify various types of machine learning problems and techniques.

CO4: Analysis various techniques in Artificial Intelligence, ANN & Machine Learning.

CO5: Apply AI and ML techniques to solve real world problems.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

List of experiments of AIML

1. Predicting Concrete Strength Using Machine Learning
2. Predicting Soil Bearing Capacity
3. Construction Project Risk Prediction
4. Material Waste Prediction in Construction
5. Optimal Site Selection for Construction Projects Using ML
6. Predicting Construction Material Performance Using Machine Learning
7. Machine Learning for Seismic Risk Assessment
8. Estimating Construction Project Costs with Regression Models
9. Smart Building Energy Optimization
10. Water quality data analysis using machine learning

List of Skill Based Mini Projects:

1. Write a program to predict compressive strength using a dataset with concrete mixture details and strength values to predict the. Evaluate the model using metrics like Mean Absolute Error (MAE) and Root Mean Squared Error (RMSE).
2. Write a program to predict future congestion levels using past traffic data (volume, speed, weather, time). Use regression models like Random Forest or XGBoost for prediction.
3. Write a program to predict energy usage using historical data on temperature, humidity, and occupancy. The goal is to minimize energy consumption by predicting usage patterns and optimizing HVAC systems.
4. Develop a classification model to predict the condition of pavement (e.g., good, fair, poor) using features



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like traffic load, weather conditions, and maintenance logs.

5. Develop a model that can predict material costs for future projects, helping in cost estimation and planning using historical cost data to.
6. Use historical geotechnical data to train a regression model that can predict the soil's bearing capacity for different building types.
7. Implement anomaly detection algorithms (e.g., Isolation Forest or auto encoders) on vibration data to identify structural defects such as cracks, deformation, or fatigue.
8. Implement a classification model that determines the suitability of land for construction projects (e.g., residential, commercial) based on geotechnical parameters.



Course Code: 1000007

Course Name: Intellectual Property Rights

L	T	P	Credit
2	0	0	Grade

COURSE OBJECTIVE:

To acquaint learners with the fundamental concepts of Intellectual Property Rights (IPR), develop their expertise in IPR-related issues, and sensitize them to emerging challenges and the rationale behind IPR protection.

Syllabus

UNIT I: Introduction: Introduction to IPRs, Basic concepts and need for Intellectual Property – Meaning and practical aspects of Patents, Copyrights, Geographical Indications, IPR in India and Abroad. Nature of Intellectual Property, Industrial Property, technological Research, Inventions and Innovations – Important examples of IPR.

UNIT II: Intellectual Property Rights: The IPR tool kit, Patents, the patenting process, Patent cooperation treaties: International Treaties and conventions on IPRs, TRIPS Agreement, PCT Agreement, Patent Act of India, Patent Amendment Act, Design Act, Trademark Act, Geographical Indication Act.

Unit III: Fire & Explosion: Intellectual Property Protections: IPR of Living Species, protecting inventions in biotechnology, protections of traditional knowledge, biopiracy and documenting traditional knowledge, Digital Innovations and Developments as Knowledge Assets – IP Laws, Cyber Law and Digital Content Protection. Case studies: The basmati rice issue, revocations of turmeric patent, revocation of neem patent.

Unit IV: Exercising and Enforcing of Intellectual Property Rights: Rights of an IPR owner, licensing agreements, criteria for patent infringement. Case studies of patent infringement, IPR – a contract, unfair competitions and control, provisions in TRIPS.

Unit 5: Role of Patents in Product Development: Commercialization, Recent changes in IPR laws impacting patents and copy rights, intellectual cooperation in the science and allied industry. Patentable and non-patentable research. Case studies

Reference Books:

1. P.B. Ganguli, Intellectual Property Rights: Unleashing the Knowledge Economy. Tata Mc Graw Hill, 2001.
2. Steve Smith, The Quality Revolution. 1st ed., Jaico Publishing House, 2002.
3. Kompal Bansal and Praishit Bansal. Fundamentals of IPR for Engineers, 1st Edition, BS Publications, 2012.
4. Prabhuddha Ganguli. Intellectual Property Rights. 1st Edition, TMH, 2012.
5. R Radha Krishnan & S Balasubramanian. Intellectual Property Rights. 1st Edition, Excel Books, 2012.



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6. M Ashok Kumar & Mohd. Iqbal Ali. Intellectual Property Rights. 2nd Edition, Serial Publications, 2011.
7. Vinod V. Scople, Managing Intellectual Property. Prentice Hall of India PvtLtd, 2012.
8. Deborah E. Bouchoux. Intellectual Property: The Law of Trademarks, Copyrights, Patents and Trade Secrets. Cengage Learning, 3rd ed. Edition, 2012.
9. Prabuddha Ganguli. Intellectual Property Rights: Unleashing the Knowledge Economy. McGraw Hill Education, 2011. Edited by Derek Bosworth and Elizabeth Webster.

Course Outcomes:

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

CO1. Imbibe the knowledge of Intellectual Property and its protection through various laws

CO2. Apply the knowledge of IPR for professional development

CO3. Develop a platform for protection and compliance of Intellectual Property Rights & knowledge CO4. Create awareness amidst academia and industry of IPR and Copyright compliance

CO5. Deliver the purpose and function of IPR and patenting.

Course Articulation Matrix

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

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ANNEXURE – III

(Syllabus 6th Sem B.Tech Civil Engineering (2022 Admitted Batch))

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ANNEXURE – III

SYLLABUS FOR OPEN CATEGORY COURSES (OCs) TO BE OFFERED IN VI SEMESTER

Course Code: 910111

Course Name: Building Services & Maintenance

L	T	P	Credit
3	0	0	3

Course Objectives:

To gain knowledge and understanding of essential building services, including fire-fighting systems, water management, and lift planning and maintenance in high-rise buildings, and to develop skills for the effective maintenance and management of these services.

Syllabus:

Unit I

Introduction: Introduction to primary services in a building, Type of services required to keep facility usable, planning of services. Organization structures of services management. Role and administrative functions of supervisors. Outline of the concept of carbon trading and self sustainable zero carbon building. Importance

Unit II

Fire Fighting: Standard fire, fire resistance, classification of buildings. Basic requirement of the works for fighting system, various components of the fire fighting system. Maintenance required of the system, fire fighting in high-rise buildings, commercial/industrial complexes. Public buildings, checklist for fire safety. Provision of NBC.

Unit III

Lifts/Elevators, Escalators: Legal formalities for elevators, various types of lifts, working mechanisms of lift and escalators. Indian standard codes for planning & installations of elevator, inspection & maintenance of lifts.

Unit IV

Plumbing Services Water Supply System: Basics of Plumbing systems. Requirement of Plumbing works, Agency, Activity flow chart for plumbing work. Quality checking of materials. Water supply and distribution system is high-rise building & other complexes, pumps and pumping mechanisms. Operation & maintenance of fittings & fixtures of water supply & sanitary. Do's & Don'ts for water pipe networks.

Unit V:

Maintenance and management of services: Telecommunication network, computer network LAN, Electrical network & appliances. Basics of single phase & three phase electrification, precautions and safety measures during electrification. Indian standard codes for electrical appliances & wiring operations & maintenance of network & appliances. Landscaping & Horticulture. Building maintenance management, applications of computer in service management. Flowcharts of air conditioning & heating.



Centralised systems, monitoring and working of the equipments, Checklist of inspection, Performance testing. Water proofing. Damp proofing & Termite proofing. Working procedure & stages of work of water proofing for W.C., Bathrooms, Terrace, sloping roof, Basements, tanks. Use of chemicals for water proofing treatment.

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Identify various services required in a building.

CO2: Carry out planning of fire fighting system for a building.

CO3: Develop a management strategy for maintenance of building services in a building.

CO4: Design a sustainable building services plan for a building.

Reference Books:

1. Building services Design and Management by Jakie Partman, Willey Blackwell 2014.
2. Building Services Engineering by David V .Chadderton, Routledge 2013.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

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Course Code: 910110

Course Name: Sustainable Materials & Green Buildings

L	T	P	Credit
3	0	0	3

Course Objectives:

To equip students with a comprehensive understanding of sustainability in the context of building materials and construction practices, including the use of low-carbon cements, advanced brick kilns, and recycled aggregates to reduce natural resource consumption. The course emphasizes indoor air quality through the study of VOCs and explores concepts of embodied, operational, and life cycle energy while promoting energy efficiency through optimal design and Building-Integrated Photovoltaics (BIPV). Additionally, students will gain awareness of sustainability standards and certifications such as ECBC, LEED, and GRIHA.

Syllabus:

Unit-I

Embodied energy, Operational energy in Building and Life cycle energy. Ecological foot print, Bio-capacity and calculation of planet equivalent.

Unit-II

Role of Material: Carbon from Cement, alternative cements and cementitious material, Alternative fuel for cements for reduction in carbon emission. Sustainability issues for concrete. Role of quality, minimization of natural resource utilization, High volume fly ash concrete, geo-polymer concrete etc. concrete with alternative material for sustainability.

Unit-III

Reduction in water consumption in concrete, Recycled aggregate, Energy for grinding crushing of cement aggregate etc. and reduction. Operational energy in building role of materials and thermal conductivity. Clay Bricks, Types kilns, Comparative energy performance emission performance and financial performance, Indoor air quality.

Unit-IV

Paints, Adhesive and sealants for use in building, Volatile organic content (VOC) emission issues and indoor air quality for Sustainability and Health hazard. Operational energy reduction and net zero building, Optimization for design of building for energy efficiency and example of optimization through use of Evolutionary genetic algorithm.

Unit-V

Radiation budget, Surface water balance, Effects of trees and microclimatic modification through greening, Use of Building Integrated Photo Voltaic (BIPV) and other renewable energy in buildings, basic concepts and efficiency. Energy codes ECBC requirement, Concepts of OTTV etc, Green Performance rating, requirements of LEED, GRIHA.

Course Outcomes

Upon completion of the course, the students will be able to:

CO1: Apply the concepts of sustainability in the context of building and conventional engineered building materials.

CO2: Explain the Concepts of VOC and indoor air quality.



CO3: Apply the concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV.

CO4: Apply the guidelines of ECBC, LEED, GRIHA while planning a building.

CO5: Use renewable energy sources in buildings.

Text Book:

1. Sustainable Construction: Green Building Design and Delivery, John Wiley & sons, 2005.
2. Building Reuse: Sustainability, Preservation, and the Value of Design by Kathryn Rogers Merlino, University of Washington Press, 2018.

Reference Books:

1. Natural Design, Organic Architecture: Lessons for Building Green by Frank Lloyd Wright, Rizzoli; Illustrated edition

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	3	2	2	1	-	2	3	-	-	-	1	3	3	-
CO2	3	2	2	1	-	2	3	-	-	-	1	3	3	-
CO3	3	2	2	1	-	2	3	-	-	-	1	3	3	-
CO4	3	2	2	1	-	2	3	-	-	-	1	3	3	-
CO5	3	2	2	1	-	2	3	-	-	-	1	3	3	-

1 - Slightly; 2 - Moderately; 3 - Substantially

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ANNEXURE – IV

(Scheme & Syllabus 4th Sem B.Tech Civil Engineering (2023-2024 Admitted Batch))

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Scheme of Evaluation

B. Tech. IV Semester (Civil Engineering)

For batches admitted in academic session 2023-24

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted										Total Marks	Contact Hours per week			Mode of Teaching (Offline/Online)	Mode of Exam	Duration of Exam
				Theory Slot				Practical Slot							L	T	P			
				End Sem Exam	Proficiency in subject /course	Continuous Evaluation		End Sem Exam	Continuous Evaluation		Continuous Evaluation									
						Mid Sem Exam	Quiz/Assignment		Lab Work & Sessional	Skill Based Mini Project										
1.	3100028	BSC	Engineering Mathematics – III (BSC-3)	50	10	20	20	20	-	-	-	3	1	-	4	Offline	PP	2 Hrs		
2.	3110421	DC	Fluid Mechanics - II (DC - 9)	50	10	20	20	20	-	-	-	2	1	-	3	Blended	PP	2 Hrs		
3.	3110422	DC	Theory of Structure - II (DC -10)	50	10	20	20	20	-	-	-	2	1	-	3	Offline	PP	2 Hrs		
4.	3110423	DC	Water Supply Engineering (DC - 11)	50	10	20	20	20	40	30	30	2	1	2	4	Blended	PP	2 Hrs		
5.	3110424	DC	Water Resources Engineering (DC – 12)	50	10	20	20	20	-	-	-	2	1	-	3	Blended	PP	2 Hrs		
6.	3110425	DLC	Civil Drawing Lab (DLC – 3)	-	-	-	-	-	40	30	30	-	-	2	1	Offline	SO	-		
7.	3110426	MC	Cyber Security	50	10	20	20	20	-	-	-	2	-	-	2	Online	MCQ	1.5 hrs		
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	-	50	-	-	-	-	2	1	Interactive	SO	-		
Total				300	60	120	120	120	130	60	60	13	5	6	21	-	-	-		
9.	3000002	Natural Science & Skills	Engineering Chemistry	50	10	20	20	20	30	10	10	1	-	2	Grade	Blended	MCQ	1.5 hrs		
10.	1000001	MAC	Indian Constitution & Traditional Knowledge	50	10	20	20	20	-	-	-	2	-	-	Grade	Online	MCQ	1.5 hrs		
Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester																				

Summer Internship Project-II (Soft skills Based) for two weeks duration: Evaluation in V Semester

*Proficiency in course/subject - includes the weightage towards ability/ skill/ competence/knowledge level /expertise attained /attendance etc. In that particular course/subject

MCQ - Multiple Choice Questions, PP - Pen paper Mode, A+O - Assignment + Oral, SO - Submission + Oral

**Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Science/ Language

(*Natural Sciences & Skills" treated as Mandatory Audit Courses from first to fourth semester and cumulative marks converted as a cluster of credits and awarded in the VI semester)

NOTE: Under Natural Science & Skills, Lateral Entry Admitted students have to appear for two courses in this semester: Engineering Chemistry & Language.

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Lab		Theory		Lab		Total Credits	
Offline	Online	Blended	Offline	Interactive	PP	A+O	MCQ	SO	NEC
7	2	9	2	1	16	-	2	2	1
33%	9%	43%	9%	5%	76%	-	9%	9%	5%
								21	Credits %



DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS B.Tech Civil Engineering

2023 ONWARDS ADMITTED BATCHES

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SEMESTER-IV

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Course Code: 3110421
Course Name: Fluid Mechanics – II

L	T	P	Credit
2	1	0	3

Course Objectives:

To develop a comprehensive understanding of fluid flow patterns, including laminar and turbulent flows, boundary layer theory, drag and lift estimation, open channel flow classification and design, critical and non-uniform flow analysis, hydraulic jump characteristics, and the design principles of pumps and turbines for practical engineering applications.

Syllabus:

Unit-I

Turbulent Flow: Laminar and turbulent boundary layers and laminar sub layer, hydro dynamically rough boundaries, velocity distribution in turbulent flow, Resistance of smooth and artificially roughened pipes, Commercial pipes, aging of pipes.

Pipe Flow Problems: Losses due to sudden expansion and contraction, losses in pipe fittings and valves, Concepts of equivalent length, Hydraulic and energy gradient lines, Siphon, Pipes in series, in parallel, Branching of pipes.(Hardy Cross method)

Pipe Network: Water hammer (only quick closure case) transmission of power.

Unit - II Forces on immersed bodies:

Introduction, Force Exerted by a flowing fluid on a stationary body, Expression for Drag & Lift, Drag on a sphere, Terminal velocity of a Body, Drag on a cylinder. Introduction to Development of Lift on a Circular Cylinder and an Airfoil

Unit – III Uniform Flow in open Channels:

Channel geometry and elements of channel section, Velocity distribution, Energy in open channel flow, Specific energy, Types of flow, Critical flow and its computations, Uniform flow and its computations, Chezy's and Manning's formulae, Determination of normal depth and velocity, Normal and critical slopes, Economical sections.

Unit - IV Gradually varied flow

Basic assumptions and dynamic equations of gradually varied flow, characteristics analysis and computations of flow profiles, rapidly varied flow-hydraulic jump in rectangular channels and its basic characteristics, Surges in open channels.

Unit - V Introduction to Fluid Machinery: Turbines & Pumps

Turbines: Classifications, definitions, Similarity laws, Specific speed and unit quantities, Pelton turbine – their construction and settings, Speed regulation, Dimensions of various elements. Action of jet, Torque, Power and efficiency for ideal case, Characteristics curves. Reaction turbines construction & setting, Draft tube theory, Runaway speed, Simple theory of design and characteristic curves, Cavitation.

Pumps: Principle of working & criteria for selection of different types of pump, viz. Centrifugal, Reciprocating.

Dec 2024

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Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Differentiate different types of fluid flow & fluid machinery.

CO 2: Describe principles of analysis of fluid flow problem.

CO 3: Explain basic principles for measurement of different forces acting on fluid body.

CO 4: Analyze pipe flow, open channel flow problems & various characteristics of hydraulic machines.

CO 5: Design open & closed conduit systems.

Text Books:

1. Fluid Mechanics, Modi & Seth, Standard Book house, Delhi, 21st edition, 2017
2. Open Chanel Flow, K. Subramanya, Tata McGraw Hill, New Delhi, 5th edition, 2019

Reference Books:

1. Open Channel Flow, Rangaraju, Tata Mc Graw Hill Publishing Comp. Ltd., New Delhi, 1st edition, 2001
2. Fluid Mechanics, A.K. Jain, Khanna Publishers, Delhi, 1988
3. Fluid Mechanics, Hydraulics & Hydraulic Mechanics, K.R. Arora, Standard Publishers, 2009
4. Open Channel Hydraulics, Chow V.T., McGraw Hill, New York, 57th edition, 2009

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

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Course Code: 3110422

Course Name: Theory of Structure - II

L	T	P	Credit
2	1	0	3

Course Objectives:

To develop an understanding of the analysis of beams and frames using Moment Distribution Method, Kani's method, Approximate method and Matrix Method; influence line diagram for determinate beam, trusses and Three Hinged Arches; Plastic analysis of beams and frames

Syllabus:

Unit – I

Moment distribution method in analysis of frames with sway, Analysis of box frames, analysis of beams and frames by Kani's methods.

Unit – II

Analysis of tall frames, Calculation of various loads including wind and earthquake loads, Introduction to Code provisions for lateral loads. Approximate analysis of multistorey frames for vertical and lateral loads.

Unit – III

Matrix Method of Structural Analysis: Force method and displacement method.

Unit-IV

Rolling Load and Influence Lines

Maximum SF & BM curves for various types of Rolling loads, EUDL, Influence Lines for determinate structural beams, Trusses, Three Hinged Arches.

Unit-V

Plastic analysis of beams & frames

Course Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain various methods for analysis of structures and frames.

CO 2: Analyse various loads on framed structures using codal provisions.

CO 3: Analyse different type of structures for various load conditions by different methods.

CO 4: Draw influence line diagrams for statically determinate & indeterminate structure.

CO 5: Analyse beams & frames using plastic analysis.

Text Books:

1. Intermediate structural analysis, Wang C.K., McGraw Hill, New York, 1984
2. Basic Structural Analysis, Reddy C. S., Tata McGraw Hill Publishing Company, 2017
3. Theory of Structures, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publications, 9th edition, 2014


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Reference Books:

1. Elementary Structural Analysis, Norris C.H., Wilbur J.B. McGraw Hill International
2. Structural Analysis, Aslam Kassimali, C. L. Publisher, 2014
3. Structural Analysis, R. C. Hibbler, Pearson Publication, 2017
4. Indeterminate Structural Analysis, Kinney Sterling J., Addison Wesley
5. Matrix Methods of Framed Structures, Weaver W & Gere J. M., CBS Publishers, Delhi

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
C01	3	1	1	-	-	1	-	-	-	-	-	2	-	1
C02	3	3	3	3	-	1	-	-	-	-	-	2	-	1
C03	3	3	3	3	-	1	-	-	-	-	-	2	-	1
C04	3	3	3	3	-	1	-	-	-	-	-	2	-	1
C05	3	3	3	3	-	1	-	-	-	-	-	2	-	1

1 - Slightly; 2 - Moderately; 3 – Substantially

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Course Code: 3110423
Course Name: Water Supply Engineering

L	T	P	Credit
2	1	2	4

To develop a comprehensive understanding of drinking water supply systems, water quantity and quality standards, mechanism of water conveyance, concepts and design of water treatment and distribution systems.

Syllabus:

Unit-I

Water demand (types variation, factors affecting it), Design period, population forecasting methods, estimation of water requirement of cities, Sources of Water, Source selection, underground water quality & quantity, characteristics of water (laboratory method & effects), water borne diseases, standards for drinking water.

Unit-II

Water treatment flow diagram, design, construction, working of (Aerators, screens, plain sedimentation tank, tube settlers), coagulants & coagulation, flocculation, feeding and mixing of coagulants, optimum dose of coagulants, design & working of clariflocculator, filtration (Theory & types), Design, operation & construction of slow sands & Rapid sand gravity filters, pressure filters.

Unit-III

Disinfectants (types) & disinfection method of disinfection, chlorine & chlorine compounds, types of chlorination, Hardness (Causes & types), various methods of softening, Recarbonation, calculation of chemical requirements, Removal of colour, odor, Taste, Iron & manganese, algae removal, fluoridation / defluoridation, desalination, latest treatment techniques.

Unit-IV

Intake structures (location, types & design), conduits for transporting water, forces on conduits, types of pressure pipe, joints, corrosion of pipe (causes & control), pipe appurtenances (design), pumping of water (numerical problems), types of pumps, Economical diameter of rising main (numerical), pumping stations.

Unit-V

Requirement of good distribution system, layout of distribution, methods of distribution, Distribution reservoir and calculation of its capacity, fixing size of pipe, Analysis of pipe networks (Hardy cross method, Equivalent pipe method), appurtenances used in distribution networks, water supply & plumbing system in building, Rural water supply.

Courses Outcomes:

Upon completion of the course, the students will be able to:

CO 1: Explain the concepts of water supply engineering.

CO 2: Apply suitable water treatment technique.

CO 3: Analyze a given water supply scheme.

CO 4: Design a water supply and distribution system based upon the needs of society.

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Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially

Text Books:

1. Water Supply Engg., B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2016
2. Water Supply Engg., S. K. Garg, Khanna Publishers New Delhi, 2017

Reference Books:

1. Water Supply & Sanitary Engg., G.S. Birdie, Dhanpat Rai Publishing Company, 2014
2. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, 6th edition, 2008
3. Environmental Engineering, Peavy, Rowe & Tchobanoglous, McGraw Hill Publication, 2017
4. Manual of Water Supply and Treatment by CPHEEO, GOI, 2009

List of Experiments:

1. Determination of pH of a given water sample.
2. Determination of Total Solids, Dissolved Solids and Suspended Solids of water sample.
3. Determination of Chloride concentration in water sample.
4. Determination of turbidity of water sample using turbidity meter.
5. Determination of acidity of the water sample.
6. Determination of alkalinity of the water sample.
7. Determination of Hardness of the water sample.
8. Determination of D.O concentration of a given water sample.
9. Determination of optimum dose of coagulants required for the treatment of a given water sample.
10. Determination of MPN of the given water sample.
11. Determination of Sulphate of a given water sample.
12. Determination of Nitrate of a given water sample.

List of Skill Based Mini Project

1. Estimation of drinking water requirement for various locations including new upcoming localities in and around Gwalior city.
2. Design of water supply & distribution layout system for various new upcoming localities in and around Gwalior city.
3. Study of existing water supply & distribution scheme available for Gwalior city and suggest improvement in it.
4. Study of existing water supply sources and determination of water quality of those sources.
5. Determination of water quality characteristics of various localities in and around Gwalior city.



6. Draw a water quality map for various localities in and around Gwalior city.
7. Comparative analysis of water quality between Municipal Corporation supplied water in city & R.O. treated water.
8. Study of new water treatment plant in the city.
9. Design of water treatment system for new upcoming localities in and around Gwalior city.
10. Performance evaluation of existing water treatment plants in city.

Upon completion of the course, the students will be able to:

CO 1: Follow sampling procedure & other guidelines for sampling & analysis of water samples.

CO 2: Check various water quality parameters.

CO 3: Improve the water quality by suggesting suitable corrective measures.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PS01	PS02
CO1	-	2	-	3	-	2	-	2	2	2	-	2	2	-
CO2	-	2	-	3	-	3	2	2	2	2	-	2	2	-
CO3	-	-	2	-	-	-	2	-	-	2	-	2	-	-

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Course Code: 3110424

Course Name: Water Resources Engineering

L	T	P	Credit
2	1	0	3

Course Objectives:

To develop a comprehensive understanding of water resources management, including crop water requirements, irrigation systems, reservoir planning, and canal design using Khosla's, Bligh's, Lacey's, and Kennedy's theories; to analyze components of the hydrological cycle, such as rainfall, infiltration, and evaporation; to study hydrometry, groundwater hydrology, runoff estimation, rainfall analysis, hydrographs, and flood estimation methods for effective water resource planning and management.

Syllabus:

Unit – I

Hydrology: Definition, Hydrological Cycle, Precipitation, Evaporation, Infiltration, Runoff, Estimation of Runoff, Empirical Formulae, Rainfall-Runoff relationships, Hydrometry, Methods of Stream Gauging, Rating Curves, Ground Water: Elements of Ground water Hydrology, Well Hydraulics, Equations of Ground Water flow, Solutions and applications.

Unit - II

Hydrographs & Hyetographs, Hydrographs analysis, Unit Hydrographs, Methods of constructing, Unit Hydrographs, S-curve Hydrograph, Synthetic unit Hydrograph, Flood and its estimation by different methods.

Unit-III Irrigation Water Requirement and Soil Water Crop Relationship:

Irrigation, Definition, Necessity, Advantages and disadvantages, Type and methods, Irrigation development.

Soil: Types and their occurrence, Suitability for irrigation purposes, Wilting, Coefficient and field capacity, Optimum water supply, Consumptive use and its determination. Irrigation methods - surface and subsurface, Sprinkler and drip irrigation.

Duty of water, factors affecting duty and methods to improve duty, Suitability of water for irrigation, Crops and crop seasons, Principal crops and their water requirement, Crop ratio and crop rotation, Intensity of irrigation, Water logging-causes, effects & its prevention.

Unit – IV Reservoir Planning and Canal Irrigation

Types of reservoir, Reservoir planning, Estimation of storage capacity by mass curve analyses, Economical height of dam, Reservoir sedimentation, Canal systems, Planning and layout of canal systems, Regime concept and tractive force method of channel design, Channel losses, Design of unlined and lined canals, Kennedy's and Lacey's silt theories, Typical canal section, Water-logging: Causes and effects, Remedial measures, Salinity, Land reclamation and Drainage.

Unit – V Diversion works and Canal Regulation Structures

Elements of diversion works, Type of weirs and barrages, Weir design for surface and sub-surface



flow, Bligh's, Lane's and Khosla's theories, Silt excluders and Silt ejectors.
Canal regulation structure like Head & Cross regulations, falls, Escapes, Outlets, Their Need, Functions sketches.

Course Outcomes:

Upon completion of the course, the students will be able to:

- CO 1: Apply** the concept of hydrology for measurement & forecasting of rainfall & runoff.
- CO 2: Analyse** runoff hydrograph by various methods.
- CO 3: Analyse** various requirements for an efficient irrigation project.
- CO 4: Design** different components of irrigation system using different theories.
- CO 5: Plan** an efficient, economical & safe irrigation system.

Text Books:

1. Engineering. Hydrology, K. Subramanya, Tata McGraw Hill Publ. Co. 4th edition, 2013
2. Hydrology & Water Resources Engineering, S. K. Garg, Khanna Publishers, 2016
3. Irrigation Engineering & Hydraulic Structures, Santosh Kumar Garg, Khanna Publishers, 2017
4. Irrigation, Water Power & Water Resources Engg., K.R. Arora, Standard Publishers Distributors, 2010

Reference Books:

1. Engineering. Hydrology, J. NEMEC, Prentice Hall, 1972
2. Hydrology for Engineers, Linsley, Kohler, Paulnus, Tata Mc Graw Hill, 2014
3. Engineering Hydrology, H. M. Raghunath, New Age International Publishers, 5th edition, 2015.
4. Irrigation, Water Resources & Water Power, Dr. P.N. Modi, Standard Book House, 9th edition, 2014
5. Irrigation Engineering by Varshney & Gupta, Vol I & II, Nemchand Publishers, 2007.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 - Substantially

(Signatures of faculty members)



Course Code: 3110425
Course Name: Civil Drawing Lab

L	T	P	Credit
0	0	2	1

Course Objectives:

To develop proficiency in civil engineering drawing by preparing plans, elevations, and sections of building components, creating detailed sketches of elements like doors and windows, and utilizing software tools such as AutoCAD for accurate and efficient drafting.

Syllabus:

List of Experiments:

1. One drawing sheet containing Foundations and Footing using AutoCAD
2. One drawing sheet containing Doors, Windows, Ventilators using AutoCAD
3. One drawing sheet containing Lintels, Trusses and Arches etc. using AutoCAD
4. One drawing sheet containing detailed planning of one room residential building
5. One drawing sheet containing detailed planning of multi rooms residential building
6. Drawing sheets one each of residential building using AutoCAD
7. One Drawing sheet of Institutional building using AutoCAD
8. One Drawing sheet of Commercial building using AutoCAD
9. One Drawing sheet of Hospital building using AutoCAD
10. Sketches of various building components i.e. floors, roof & roof covering
11. Sketches of various building components i.e. staircase

List of Skill Based Mini Project

1. To design an institution building of given area using AutoCAD with all the required components
2. To design an Residential building of given area using AutoCAD with all the required components
3. To design an Multistorey building of given area using AutoCAD with all the required components
4. To design an Hospital building of given area using AutoCAD with all the required components

Course Outcomes:

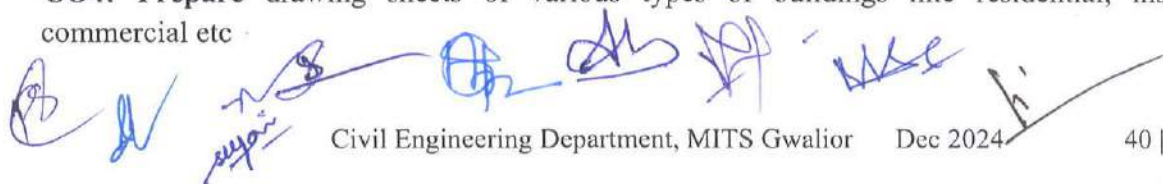
Upon completion of the course, the students will be able to:

CO1: Attempt to draw different components of a building.

CO2: Produce plan, elevation & section of various components of a residential and institutional building.

CO3: Use AutoCAD software in civil engineering drawing.

CO4: Prepare drawing sheets of various types of buildings like residential, institutional, commercial etc





Course Articulation Matrix

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

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Course Code: 3110426
Course Name: Cyber Security

L	T	P	Credit
2	0	0	2

Course Objectives: To analyze cyber-attacks, types of cybercrimes, cyber laws and also how to protect them self and ultimately the entire Internet community from such attacks.

Course Contents:

Unit 1: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

Unit 2: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy. Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics

Unit 3: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Organizational security Policies and Measures in Mobile Computing Era, Laptops.

Unit 4: Introduction, cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.

Unit 5: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Datalinking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc

Course Outcomes

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

CO 1: Analyze cyber-attacks, types of cybercrimes and cyber laws

CO2: Interpret and forensically investigate security incidents

CO3: Apply policies and procedures to manage Privacy issues

CO4: Design and develop secure software modules



TEXT BOOKS:

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley.
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

REFERENCES:

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson, CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa (john) Wu, J. David Irwin, CRC Press T&F Group.

Course Articulation Matrix

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

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Course Code: 1000001

Course Name: Indian Constitution and Traditional Knowledge

L	T	P	Credit
2	0	0	Grade

Course Objectives:

- The course aims to provide students with the continuous, comprehensive and cumulative understanding of Indian Knowledge Tradition (Philosophy, Language, Art) and its modern interpretation and analysis.
- It intends to connect the students' modern advanced knowledge system with the roots of Indian Knowledge Tradition for their development and better understanding of the essentials of thought process, intellection and inference.
- To impart the knowledge of the Yogic Science and an insight into Sanskrit Literature which will promote interest among students in discerning the significance of health and wisdom with an Indian perspective.
- The objective of the syllabus is to familiarize students with the essential features and basic principles of the constitution of India.
- It will acquaint them with the concept of government, its organs and various types.
- It will provide students with a comprehensive and clear understanding of the basic fundamental rights and duties.

Unit-1

- Introduction to Basic Structure of Indian Knowledge System
- Homogeneity of modern science and Indian Knowledge Tradition
- Yoga: Promoting positive health and personality
- Case Studies

Unit-2

- Indian Philosophy or Darshanas: Jainism, Buddhism, Yoga, Śaiva and Vedanta
- Indian Linguistic Tradition: Panini's Ashtadhyayi
- Indian Art: Mauryan art, Buddhist art, Gupta art, Muslim Art & Culture Contemporary art
- Case Studies

Unit 3 Introduction to Political Science

- Nature and scope of political science
- Definition, elements and theories of origin of State (Social Contract and Evolutionary)
- Meaning and features of Civil Society
- Indian Political Thought: Raja Ram Mohan Roy, Swami Vivekanand, Gandhi, Ambedkar

Unit 4 Concept of Government and Its Organs

- Government: Definition and its characteristics
- Types and meaning of Legislature: Composition, Function and Role of the Parliament (Lok Sabha and Rajya Sabha)
- The Powers, Position and Role of the President, Prime Minister and the Cabinet
- The Powers, Position and Role of the Governor and the Chief Minister; Composition and the role of Supreme Court, Judicial Review and Judicial Activism

Unit 5 Salient features of Indian Constitution

- Preamble, Conventions, Sovereignty of the Constitution and the Rule of Law
- Parliamentary Democracy, Federalism, Secularism and Socialism
- Fundamental Rights, Directive Principles of State Policies and Fundamental Duties



- Election Commission and Electoral Reforms

Basic Readings:

1. O.P. Gauba, *Political Theory*, Macmillan, (latest edition).
2. D.D. Basu, *Introduction to the Constitution of India*, (Latest Edition).
3. N.G. Jayal & Pratap Bhanu Mehta, *The Oxford Companion of Politics in India*, 2000.
4. W.H. Morris-Jones, *The Government and Politics of India*.
5. Swami Jitamanand, *Holistic Science and Vedam*, Bhartiya Vidyabhawan
6. V. Shivramakrishnan (Ed.), *Cultural Heritage of India*, Bhartiya Vidyabhawan, Mumbai Fifth Edition, 2014.
7. Yoga sutra of Patanjali, Ramakrishnan Mission, Kolkata.
8. Panini Shiksha, Motilal Banarsidas
9. VN Jh, *Language, Thought and Reality*
10. Krishna Chaitanya. *Arts of India*, Abhinav Publications, 1987.
11. SC Chatterjee and DM Datta, *An Introduction to Indian Philosophy*, university of Calcutta, 1984
12. A L Basham, *The Wonder That was India*

Course Outcomes:

1. Gain knowledge about the Indian tradition and Indian constitution.
2. Recognize the basic concepts of ethics and morality pertaining to Indian culture and tradition.
3. Employ the knowledge of the constitutional norms as laid in the constitution and abide by the practices stated therein.
4. Connect itself with traditional Indian philosophy with their everyday conduct and practices.
5. Appraise the utility and significance of tradition and its working in the light of more radical thought of the modern times.
6. Create a better society and living standards for themselves as well as for the generations for the others to come.

Course Articulation Matrix

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

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ANNEXURE – V

(Skill Internship Project (SIP) module to be offered
in Dec 2024)

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DEPARTMENT OF CIVIL ENGINEERING

Course Content of SIP-1 for 2023 Admitted Batch

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Module Name: Elementary Planning & Design of Building.

Name of Module coordinators: Prof. Gautam Bhadoriya

Course Objectives:

- 1) To prepare students with the knowledge and understanding of Details of various building components.
- 2) To make students understand different types of flooring, materials of floor finishes and method of construction.
- 3) To facilitate students learn different types of stairs and roof systems.
- 4) To expose students to the building services and cost – effective construction.
- 5) To Expose students regarding building bye-laws, rules & regulation of Building planning.
- 6) To make student understand salient principles of planning & architectural composition.

Syllabus:

Module I: Drawings of Building elements: Free-hand drawings of various building elements like, Various types of footings, Open foundations, grillage, pile, R.C.C. and Well foundations, Drawing & detailing of reinforcement in Building components, Drawings of door-Window frames, Various types of doors windows and ventilators, Lintels and Arches, Stairs and stair cases, Trusses, Floorings, Roofing, etc.,

Module II: Building Planning: Provision of NBC, Building by-laws, Rules and regulations, Open area, Setbacks. F.A.R. Terminology, Principle of Architectural Composition (i.e. Unity, contrast, symmetry, Rhythm, Mass composition. etc.), Principles of planning, Orientation.

Module III: Sustainable development: Natural Environment & Built environment, Ecology, Ecosphere - sustainable development, Dimensions of sustainability. Built Environment & livability, Integrated approach in design, challenges in sustainable development. Green environment, expectations from green building, IGBC, USGBC, LEED- GRIHA, SVA, GRIHA.

Module IV: Drawings of Buildings: Detailed drawings using Auto Cad Software (2D & 3D Plan, Front elevation, Side elevations, Sectional elevations) of Residential building, Institutional building and Commercial building, Detailing of doors, windows, ventilators, stairs etc. (School building, commercial complexes, Rest house / guest house, Health Centers, Institutional building, Residential building.

Module V: Thermal insulation, Heat transfer in building, Thermal insulation materials, and methods of thermal insulation ventilation: natural & artificial, necessity & functional requirement of ventilation, system of ventilation, types of mechanical ventilation, air conditioning, functional requirement of air conditioning, Essentials of air conditioning, acoustic and sound insulation, Behavior of sound acoustical defects. Sabine formula, acoustical design of various spaces, sound insulation methods & materials, illumination (natural & artificial).

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Course Outcomes:

Upon completion of the course, the students will be able to:

- 1: Explain & basics of building planning & design.
- 2: Describe sustainability principle, by laws & characteristics of thermal and sound insulation.
- 3: Apply sustainability concepts & principles in planning & design of buildings.
- 4: Evaluate environmental, sustainable & safety aspects of a building.
- 5: Plan different types of buildings as per by laws & codal provisions.

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Module Name: Introduction to Sustainable Engineering.

Name of Module coordinators: Dr. Abhilash Shukla

Course Objectives:

1) The objective of this module is to provide information and training to the students for the core issues in areas of sustainability. To understand the role of engineering and technology within sustainable development, know the methods, tools, and incentives for sustainable product-service system development, establish a clear understanding of the role and impact of various aspects of engineering and engineering decisions on environmental, Societal, and economic problems.

Syllabus:

Module 1: Module 1: Introduction to Sustainability. Sustainable development concepts and challenges. Nexus between Technology and Sustainability.

Module 2: Multilateral agreements and Protocols–CDM, Environment legislations in India.

Module 3: Global environmental issues, Climate change, Global warming, Ozone layer depletion, Carbon credits and carbon trading, carbon foot print.

Module 4: Life Cycle Analysis(LCA), Bio-mimicking, Environment Impact Assessment (EIA).

Module 5: Concepts of sustainable habitat, Green buildings, green materials for building construction

Module 6: Methods for increasing energy efficiency of buildings. Sustainable cities, Sustainable transport.

Module 7: Green Engineering, Sustainable Urbanization, industrialization and poverty reduction; Social and technological change

Course Outcomes:

Upon completion of the course, the students will be able to:

1: Able to understand the different types of environmental pollution problems and their sustainable solutions,

2: Able to work in the area of sustainability for research and education and Having a broader perspective in thinking for sustainable practices by utilizing the engineering knowledge and principles



Module Name: Elements of Waste Management.

Name of Module coordinators: Dr. Shyamveer Singh Chauhan

Course Objectives:

1. Provide broad knowledge on various aspects of planning & implementation of waste management system.
2. To make student understand the principles applied in waste management.
3. Provide knowledge on various ways to collect, treat & disposal of waste.

Syllabus:

Module 1. Introduction to waste management, principles of integrated waste management, 3R policy, role of various agencies in planning of waste management system, brief on swachh bhara mission and implementation.

Module 2. Municipal solid waste – generation, composition, handling of waste at source, collection, transfer and transportation of waste.

Module 3. Disposal of waste in landfills and its management.

Module 4. Techniques for Energy recovery from waste.

Course Outcomes:

Upon completion of the course, the students will be able to:

1. The students will be able to explain the principles & concepts of waste management.
2. Students will be able to apply various strategies for cleanliness and waste management.
3. Students will be able to plan effective waste management system.

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ANNEXURE – VI

(Course Content of the courses identified for MITS-
MOOC development)

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ANNEXURE – VI

Course Content of the courses identified for MITS-MOOC development

Integrated Waste Management System

Course objectives: To provide a comprehensive understanding of planning, implementing, and managing waste including waste collection, treatment, disposal, energy recovery, and handling hazardous, electronic, and biomedical waste.

Course Contents:

Unit 1: Introduction to waste management, classification of solid waste, objective of solid waste management, principles of integrated waste management, 3R policy, role of various agencies in planning of waste management system, swachh bhara mission and smart cities program.

Unit 2: Municipal solid waste – generation, composition, characterization, handling of waste at source, collection of waste – collection system, collection routes, collection equipments, transportation of waste, transfer stations, segregation and recycling of waste, disposal of waste through landfills– types of landfills, planning & operation of landfills, leachate management & control of gases in landfills, environmental monitoring of landfills.

Unit 3: Energy recovery from municipal solid waste - thermal conversion technologies, incineration, pyrolysis, gasification, environmental control system, biological & chemical conversion technologies, aerobic composting, anaerobic digestion, refuse derived fuels, other biological and chemical transformation methods.

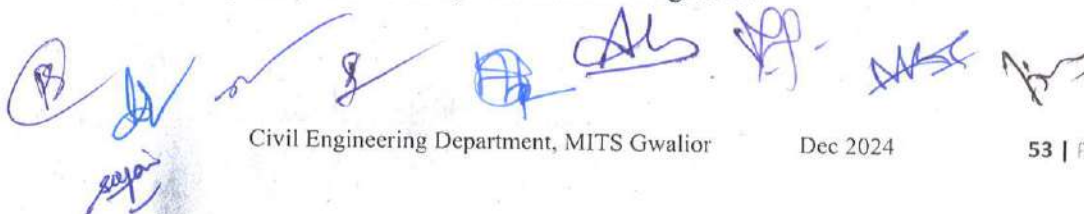
Unit 4: Hazardous waste management – characteristics, source, health effects, physiochemical treatment methods of hazardous waste, disposal of hazardous waste, Biomedical waste management – sources, health effects, issues in India, challenges, handling of biomedical waste.

Unit 5: E-waste management – sources, health effects, issues in India, challenges, handling of E-waste. Plastic waste management – types of plastics, sources of plastic waste, impacts of plastic waste, plastic waste management practices.

Course Outcomes

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

CO 1: Explain the principles & concepts of waste management.





CO 2: Apply various techniques of handling the waste.

CO 3: Apply various techniques of energy recovery from waste.

CO 4: Plan an effective & efficient waste management system.

Text Books:

1. Text Book of Solid Wastes Management, Iqbal H. Khan and Naved Ahsan, CBS Publishers, 1st edition, 2012
2. Integrated Solid Waste Management, Hilary Theisen and Samuel A. Vigil, George Tchobanoglous, McGraw Hill Yew York, 1993

Reference Books:

1. Environmental Engineering, Rowe, Peavy & Tchobanoglous, Tata McGraw Hill Publications, 2017
2. CPHEEO, Manual on Municipal Solid Waste management, Central Public Health and Environmental Engineering organization, Government of India, New Delhi, 2016
3. Solid Waste Engineering, Vesilind P.A., Worrel H. W. and Reinhard, Thomson Learning Inc, 2003

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

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Course Name: Design Earthquake Resistant Structures

Course Objectives:

To understand the causes of earthquakes, characteristics of earthquake, dynamics of Single Degree of Freedom System and Multi Degree of Freedom System, Seismic analysis method, Earthquake resistant design of RC structures and masonry structures

Syllabus:

Unit-I

Internal structure of earth; Causes of earthquakes; Seismic waves; Magnitude, Intensity and Energy released; Characteristics of Earthquakes

Unit-II

Dynamics of Single Degree of Freedom System, Equation of motion, Free vibration and Forced vibration, Dynamics of Multi Degree of Freedom System.

Unit-III

Design Earthquake Loads, Equivalent Lateral Force Method, Response Spectrum Analysis, Time History Method, Torsion

Unit-IV

Principle of Earthquake resistant design of RC structures, Ductility, Strong Column- Weak Beam, Soft story, Ductile detailing of reinforcement, Design of shear wall

Unit-V

Behaviour of unreinforced and reinforced masonry walls, Codal provisions, Design of Bands

Course Outcomes:

Upon completion of the course, the students will be able to:

CO1: Explain the causes and characteristics of earthquakes.

CO1: Apply the dynamics of SDOF and MDOF systems.

CO3: Apply the seismic analysis method to earthquake load.

CO4: Design the earthquake resistant design of RC structures.

CO5: Design the masonry structures.

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Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

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Course Name: Sustainable Materials & Green Buildings

Course Objectives:

1. To expose the students to the concepts of sustainability in the context of building and conventional engineered building materials, such as Concrete, Bricks, and achieving the same through lower Carbon cements, Superior brick kilns and Recycled aggregate minimizing consumption of natural resources including water
2. To study the concepts of VOC and indoor air quality.
3. Exposing the student to concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV.
4. The course also intends to make student aware of ECBC, LEED, GRIHA etc.

Syllabus:

Unit-I

Embodied energy, Operational energy in Building and Life cycle energy. Ecological foot print, Bio-capacity and calculation of planet equivalent.

Unit-II

Role of Material: Carbon from Cement, alternative cements and cementitious material, Alternative fuel for cements for reduction in carbon emission. Sustainability issues for concrete. Role of quality, minimization of natural resource utilization, High volume fly ash concrete, geo-polymer concrete etc. concrete with alternative material for sustainability.

Unit-III

Reduction in water consumption in concrete, Recycled aggregate, Energy for grinding crushing of cement aggregate etc. and reduction. Operational energy in building role of materials and thermal conductivity. Clay Bricks, Types kilns, Comparative energy performance emission performance and financial performance, Indoor air quality.

Unit-IV

Paints, Adhesive and sealants for use in building, Volatile organic content (VOC) emission issues and indoor air quality for Sustainability and Health hazard. Operational energy reduction and net zero building, Optimization for design of building for energy efficiency and example of optimization through use of Evolutionary genetic algorithm.

Unit-V

Radiation budget, Surface water balance, Effects of trees and microclimatic modification through greening, Use of Building Integrated Photo Voltaic (BIPV) and other renewable energy in buildings, basic concepts and efficiency. Energy codes ECBC requirement,



Concepts of OTTV etc, Green Performance rating, requirements of LEED, GRIHA.

Course Outcomes

Upon completion of the course, the students will be able to:

CO1: Apply the concepts of sustainability in the context of building and conventional engineered building materials.

CO2: Explain the Concepts of VOC and indoor air quality.

CO3: Apply the concepts of embodied, Operational and Life Cycle Energy, Minimizing Energy consumption by optimal design, use of BIPV.

CO4: Apply the guidelines of ECBC, LEED, GRIHA while planning a building.

CO5: Use renewable energy sources in buildings.

Text Book:

1. Sustainable Construction: Green Building Design and Delivery, John Wiley & Sons, 2005.
2. Building Reuse: Sustainability, Preservation, and the Value of Design by Kathryn Rogers Merlino, University of Washington Press, 2018.

Reference Books:

1. Natural Design, Organic Architecture: Lessons for Building Green by Frank Lloyd Wright, Rizzoli; Illustrated edition

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Course Name: Advanced Reinforced Concrete Design

Introduction: History of Reinforced Concrete (RC), advantages of RC, load paths, introductions to different structural systems used in modern concrete construction

Materials: Stress-Strain Behaviour of concrete and steel under Compression and Tension, Behaviour of concrete under multi-axial stress, High strength concrete, lightweight concrete, Failure theories for concrete under Combined stress state, Tension-stiffening of Concrete, Effects of creep, shrinkage and temperature on material and structural behaviour

Durability Aspects in Reinforced Concrete Design: Deterioration mechanisms of concrete, Alkali silica reaction, Sulphate attack, corrosion of steel, durability considerations in concrete mix design, methods to check loss of durability in concrete. Cover to reinforcement, Cracking and spalling of concrete, Periodic maintenance and its cost, Breakdown of concrete due to Freezing and thawing effect.

Behaviour under Pure Axial Loads: Basic Laws of Mechanics, Load displacement behaviour of RC members under pure axial compression and tension, Role of concrete and steel in compression and tension; differences in Behaviour of high strength and normal strength concrete

Behaviour and Design under Flexure: Analysis at ultimate; Moment-curvature and load-deflection relationships, Effect of reinforcement ratios and concrete strength on moment-curvature Behaviour; Flexural design aspects using IS Code,

Analysis and Design for Shear: Relationship between flexure and shear, Effect of shear span to depth ratio, Definition of nominal shear, critical sections for shear, concept of Mohr circle; different failure modes in shear; Internal resisting mechanisms under shear

Analysis and Design for Torsion: Behaviour of reinforced concrete members subjected to Torsion, Design methods of Torsion, Difference between equilibrium and compatibility torsion; concepts behind the derivation of code equations; concept of equivalent shear and bending; design examples, Design for combined loading (Torsion + Bending + Shear)

Design of Shear Walls, Design of Curved beams, Moment redistribution in continuous beams; bond and development length, curtailment of reinforcing steel

Introduction to Strut and Tie Method; Design of Deep beams and corbels, Design of Footings: isolated and combined footings; Beam-column joints.

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Books and references:

1. S. Unnikrishna Pillai and Devdas Menon, Reinforced Concrete Design, 3rd Edition, 2009, Tata McGraw Hill
2. J. Wight and J.G. MacGregor, Reinforced Concrete - Mechanics & Design, 6th Edition, Prentice-Hall, 2011
3. A Nilson, D Darwin, C Dolan Design of Concrete Structures, McGraw-Hill Education; 14 edition (16 August 2009), 816 pages.

Codes and Standards:

1. IS 456: 2000 — Plain and reinforced concrete – Code of practice (fourth revision)
2. SP 16: 1980 — Design Aids (for Reinforced Concrete) to IS 456: 1978.
3. IS 875 (Parts 1-5): 1987 — Code of practice for design loads (other than earthquake) for buildings and structures (second revision)
4. SP 24: 1983 — Explanatory Handbook on IS 456: 1978
5. SP 34: 1987 — Handbook on Concrete Reinforcement and Detailing

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ANNEXURE – VII

(CO Attainment July- Dec 2024)

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ANNEXURE – VII

CO Attainment & Gap Analysis July – December 2024

Table.1: CO Attainment & Gap Analysis of I Year, II SEM

Course Code & Name	Course Outcomes	Direct CO Attainment	Indirect CO Attainment	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
3110221: Surveying	CO 1	1.28	3.00	1.62	2.5	0.88	Not Attained	More explain linear & angular measurements
	CO 2	0.44	3.00	0.95	2.5	1.55	Not Attained	More explain leveling & contours
	CO 3	0.45	3.00	0.96	2.5	1.54	Not Attained	More assignments on surveying
	CO 4	0.43	3.00	0.94	2.5	1.56	Not Attained	More explain techniques of controlling points
	CO 5	0.44	3.00	0.95	2.5	1.55	Not Attained	More explain the methods for curve setting
3110222: Strength of Material (Lab)	CO 1	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 2	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 3	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 4	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 5	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
3110222: Strength of	CO 1	0.42	3.00	0.93	2.5	1.57	Not Attained	More assignments and numerical

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Material	CO 2	0.42	3.00	0.94	2.5	1.56	Not Attained	problems to be given
	CO 3	0.41	3.00	0.92	2.5	1.58	Not Attained	
	CO 4	0.41	3.00	0.93	2.5	1.57	Not Attained	
	CO 5	0.40	3.00	0.92	2.5	1.58	Not Attained	
	CO 1	3.00	3.00	3.00	2.5	-0.50	Attained	
3110223: Surveying Practice Lab	CO 2	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 3	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 4	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 5	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 1	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified

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Table.2: CO Attainment & Gap Analysis of II Year, IV SEM

Course Code & Name	Course Outcomes	Direct CO Attainment	Indirect CO Attainment	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
2110421: Fluid Mechanics-II	CO1	0.44	3.00	0.95	2.5	1.55	Not Attained	More explain types of fluid flow & machinery
	CO2	0.46	3.00	0.97	2.5	1.53	Not Attained	More explain principles of fluid flow
	CO3	0.44	3.00	0.95	2.5	1.55	Not Attained	More explain measurement of different forces
	CO4	0.43	3.00	0.95	2.5	1.55	Not Attained	More assignments on fluid flow problems
	CO5	0.45	3.00	0.96	2.5	1.54	Not Attained	More explain design of open & closed conduit system
2110422: Theory of Structures-II	CO1	0.42	3.00	0.93	2.5	1.57	Not Attained	More explain methods for analysis of structures
	CO2	0.43	3.00	0.94	2.5	1.56	Not Attained	More assignments for structural analysis
	CO3	0.42	3.00	0.94	2.5	1.56	Not Attained	
	CO4	0.42	3.00	0.93	2.5	1.57	Not Attained	
	CO5	0.42	3.00	0.94	2.5	1.56	Not Attained	
2110423: Water Supply Engineering	CO1	2.10	3.00	2.28	2.5	0.22	Not Attained	More explain concept of water supply

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	CO2	0.46	3.00	0.96	2.5	1.54	Not Attained	More explain the requirements for water
	CO3	0.44	3.00	0.95	2.5	1.55	Not Attained	More explain water treatment technique
	CO4	0.45	3.00	0.96	2.5	1.54	Not Attained	More assignment to analyze water supply scheme
	CO5	0.45	3.00	0.96	2.5	1.54	Not Attained	More assignments to design water supply system
	CO1	0.00	3.00	0.60	2.5	1.90	Not Attained	More explain concept of hydrology
	CO2	0.00	3.00	0.60	2.5	1.90	Not Attained	More explain the measurements of rainfall
2110424: Water Resource Engineering	CO3	0.00	3.00	0.60	2.5	1.90	Not Attained	More assignments to analyse hydrograph
	CO4	0.00	3.00	0.60	2.5	1.90	Not Attained	More assignments on irrigation project
	CO5	0.00	3.00	0.60	2.5	1.90	Not Attained	More assignments on design of irrigation system
	CO6	0.00	3.00	0.6	2.5	1.90	Not Attained	More explain planning of irrigation system
	CO 1	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 2	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
2110425: Civil Drawing Lab								

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CO 3	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
CO 4	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
CO 5	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified

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Table.3: CO Attainment & Gap Analysis of III Year, VI SEM

Course Code & Name	Course Outcomes	Direct CO Attainment	Indirect CO Attainment	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
110621: Waste Water Engineering	CO 1	0.49	3.00	0.99	2.5	1.51	Not Attained	More explain waste water engineering
	CO 2	0.31	3.00	0.85	2.5	1.65	Not Attained	More explain the requirements for safe disposal of water
	CO 3	0.71	3.00	1.16	2.5	1.34	Not Attained	More explain sewage treatment technique
	CO 4	0.33	3.00	0.87	2.5	1.63	Not Attained	More assignments to analyze sewerage system
	CO 5	0.56	3.00	1.04	2.5	1.46	Not Attained	More explain the design of sewerage system
110622: S. D. D. (Steel)	CO 1	2.14	3.00	2.32	2.5	0.18	Not Attained	More assignments on connections
	CO 2	0.45	3.00	0.96	2.5	1.54	Not Attained	More assignments on design of tension members
	CO 3	0.44	3.00	0.95	2.5	1.55	Not Attained	More assignments on design of compression

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											members
	CO 4	0.46	3.00	0.97	2.5	1.53	Not Attained	More assignments on design of flexure members			
	CO 5	0.46	3.00	0.97	2.5	1.53	Not Attained	More assignments on design of plate girder & column base			
110623: Estimating Costing & Contract	CO 1	1.78	3.00	2.02	2.5	0.48	Not Attained	More explain quantity estimation, costing & contracting			
	CO 2	0.36	3.00	0.88	2.5	1.62	Not Attained	More assignments to estimate area, volume & cost			
	CO 3	0.37	3.00	0.90	2.5	1.60	Not Attained	More assignments on rate & quantity estimation			
	CO 4	0.37	3.00	0.90	2.5	1.60	Not Attained	More assignments to determine rates & value			
	CO 5	0.38	3.00	0.91	2.5	1.59	Not Attained	More explain rates if item & contracts			
910110: Sustainable Materials &	CO 1	2.48	3.00	2.58	2.5	-0.08	Attained	Rubrics for the level can be modified			

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Green Building	CO 2	2.26	3.00	2.41	2.5	0.09	Not Attained	More explain the indoor air quality
	CO 3	0.98	3.00	1.38	2.5	1.12	Not Attained	More explain the life cycle energy, BIPV
	CO 4	1.93	3.00	2.14	2.5	0.36	Not Attained	More explain the guidelines of ECBC, LEED, GRIHA
	CO 5	2.26	3.00	2.41	2.5	0.09	Not Attained	More explain the renewable energy sources in buildings
	CO 1	2.59	3.00	2.67	2.5	-0.17	Attained	Rubrics for the level can be modified
910111: Building Service & Maintenance	CO 2	1.48	3.00	1.79	2.5	0.71	Not Attained	More explain fire fighting system
	CO 3	1.77	3.00	2.01	2.5	0.49	Not Attained	More explain maintenance of building services
	CO 4	2.25	3.00	2.40	2.5	0.10	Not Attained	More explain sustainable building services plan
	CO 1	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
110624: Minor Project-II	CO 2	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 3	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified

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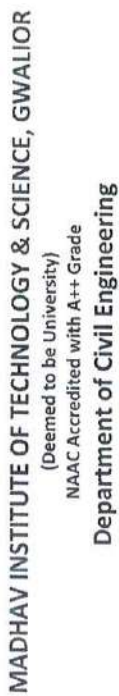


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	CO 4	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 5	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified

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Course Code & Name	Course Outcomes	Direct CO Attainment	Indirect CO Attainment	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
110821: Internship/Research Project	CO 1	3.0	3.0	3.0	2.5	-0.5	Attained	More explain different components of hyro project
	CO 2	3.0	3.0	3.0	2.5	-0.5	Attained	More explain designing hydropower plant & cross drainage works
	CO 3	3.0	3.0	3.0	2.5	-0.5	Attained	More assignments on dam analysis, energy dissipaters & cross drainage works
	CO 4	3.0	3.0	3.0	2.5	-0.5	Attained	More explain tyoes of hydraulic structures
	CO 5	3.0	3.0	3.0	2.5	-0.5	Attained	More assignments on design of hydraulic structures

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ANNEXURE – VIII

(CO-PO mapping matrix and PO ATTAINMENT
for 2020-2024 Batch)

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ANNEXURE – VIII

CO-PO mapping matrix and PO Attainment

Subjects & Course Code	Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
100015: Energy, Environment, Ecology & Society	CO1 Describe various energy resources, their conversion to electrical power and role in technological & economic development		3	3	3					2					
	CO2 Update with national/international power status and renewable power development targets & missions						3	3							
	CO3 Recognize the impact of pollution on the ecosystem and control policies adopted at national/international levels							3				3	2		
	CO4 Illustrate the concepts of ecosystems and their conservation							3	3	2			2		
	CO5 Solve practical problems of society in a sustainable and ethical manner							3	3	3			2		
	CO6 Fulfill professional duties keeping in mind the environmental safety, health, and welfare of public												2		
110211: Building & Design	CO1 Explain basics of building planning & design.	2		1		1	1	2	2				1	2	2
	CO2 Illustrate sustainability principle, by laws & characteristics of thermal and sound insulation in building planning & design.	2		1	1	1	3	3	2			2	3	3	2



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	CO3	Apply sustainability concepts & principles in planning & design of buildings.	2	1	2	1	2	2	2	1	2	2	3	2	2
	CO4	Evaluate environmental, sustainable & safety aspects of a building.	2	2	1	2	1	3	3	2	2	2	3	2	2
	CO5	Plan different types of buildings as per by laws & codal provisions.	2	1	1	1	1	2	2	3	2	2	3	3	2
	CO1	Explain concepts and terminologies of building materials, surveying and mechanics	2	2					1	1	1		2		1
	CO2	Illustrate various methods for surveying and mechanics	2	2		2	1			1	1	1	2		1
100020: Basic Civil Engineering & Mechanics	CO3	Determine the location, area and volume of objects on ground surface	3	3		3	2						2		
	CO4	Solve the problems of surveying and mechanics by using various methods	3	3	1	2	2	1			1		2		1
	CO5	Analyse the effects of system of forces on rigid bodies in static conditions	3	3	1	2	2	1			1		3		2
	CO1	Follow the guidelines for field surveying.	2	1		2	1				3	3	2	1	2
	CO2	Follow the working principles of survey instruments for measurements.	3	1		2	1				3	3	2	1	2
100026: Basic Civil Engineering Lab	CO3	Measure the horizontal distances, difference in elevation and angles of various points	3	3		3	2						2		2
	CO4	Detect measurement errors and accordingly suggest corrections	3	3		3	2	1					2		2
	CO5	Interpret survey data and compute areas	3	3	1	3	3				2	3	2		2
	CO1	Explain the basic elements of buildings, engg. materials & construction.	2	1		1			1				1		
	CO2	Evaluate the properties of various materials like cement, aggregate, concrete, admixture, brick, stone etc.	2	1		3	2	2	2				2	2	1
110311: Building Material & Construction															

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	CO3	Distinguish the suitability of building materials in the construction of elements of buildings.	2	2	1	2	1	2	2	1							2		1
	CO4	Evaluate various types of concrete in building construction accordingly.	2	2	1	2	1			1							2	2	1
	CO5	Apply various techniques for finishing & protection works of various elements of building.	2		1	1		2	1	1							2		
	CO1	Determine the properties of cement, sand & aggregate as per IS code	2	1	1	3	2	2	2	2	2	3					2	2	1
	CO2	Determine the workability of concrete for suitability of concrete mix in different construction works	2	1	1	3	2	2	2	2	2	3					2	3	2
110311: Building Material & Construction (Lab)	CO3	Evaluate compressive strength of various concrete mixes	3	2	2	3	2	2	2	2	2	3					2	3	2
	CO4	Determine physical properties of brick by experiment and practice accordingly	1			3	2	2	2	1	2	3					2	1	1
	CO5	Examine the properties of the cement mortar for various elements of the buildings	1	1		3	2	2	2	1	2	3					2	1	1
	CO1	Define various fluid properties & states of fluid	1					1									1		
	CO2	Apply principles of fluid flow & dimensional analysis	2	1	1	2	1	1	1	1							2		1
110312: Fluid Mechanics-I	CO3	Solve fluid flow problems	2	2	1	2	2	2	2	2							2		2
	CO4	Analyze characteristics of fluid at rest, fluid at motion & dimensionless numbers	2	3	1	2	1	2	2	2							2		2
	CO5	Discriminate different types of fluid flow, measurement techniques & principles	2	2		2	2	2	2	2							2		

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	CO6	Apply the concepts of laminar flow in solving various fluid flow problems	2	2	1	2	1	1	1	1	2	2	2
			2	2		3	2	2		2	2	2	2
110312: Fluid Mechanics-I (Lab)	CO1	Differentiate between different flow measurement devices	2	2			3	2	2		2	2	2
	CO2	Notice flow through pipes & fall velocity of particle	2		1	3	2	2	2		2	2	2
	CO3	Correct the instrumental errors	2	2		2	2	2			2	2	
	CO4	Apply Stoke's law to calculate terminal velocity	2	2	1	3	2	2		2	2	2	2
110313: Surveying	CO1	Explain the techniques used for linear & angular measurements in surveying.	2	2		2	2	1				2	1
	CO2	Analyse different geodetic methods of survey such as triangulation, trigonometric levelling, tachometry, photographic & GIS.	2	3		2	2	2		2	2	2	1
	CO3	Apply methods in control surveys.	2	3		3	2				1	1	2
	CO4	Apply tachometry in traverse computations.	3	3		3	2				1	1	2
110314: Strength of Material	CO5	Apply various methods for setting curves, area & volume computations.	2	3		3	2				1	1	2
	CO1	Explain the concepts of stress, strains, bending, deflection, buckling & torsion.	2	1		2	1	1				1	1
	CO2	Explain various theories for determining stress, buckling of columns & deflections of structures.	2	1		2	1	1		2		2	1
	CO3	Apply various theories for determining stress, buckling of columns & deflections of structures.	3	3	2	3	2	2	1			2	2
	CO4	Evaluate the stresses in bending, shear and torsion.	3	3	2	3	2	2				2	2

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		CO5	Analyze various sections for stresses, strain, bending, torsion, buckling & deflections.	3	3	2	3	2	2	2							2	2
110314: Strength of Material (Lab)	CO1	Evaluate properties of material by impact test	2	2			3	2	2	2	2	2	3				2	2
	CO2	Evaluate properties of material by hardness test	2	2			3	2	2	2	2	2	3				2	2
	CO3	Evaluate properties of material by tensile test	2	2			3	2	2	2	2	2	3				2	2
	CO4	Determine compressive & flexural strength of materials	2	2			3	2	2	2	2	2	3				2	2
	CO1	Observe topographical characteristics	2			1	1	1	1				2	2			2	1
110315: Survey Practice Lab	CO2	Differentiate methods to perform ground survey	2	1			2	1				1	2	2			2	1
	CO3	Prepare longitudinal & cross section profiles	2	2		1	3	2	1			2	2	3			3	2
	CO4	Develop contour map by using tachometer & total station	2	2		1	3	3				2	3	3			3	2
	CO5	Prepare the details of features using Plane table surveying	2	2		1	3	2				2	2	3			2	2
	CO6	Produce a simple circular curve by using Rankine's method for alignment	2	2		1	3	2	1			2	2	3			2	2
110316: Self-Learning/ Presentation	CO1	Analyze contemporary issues in civil engineering & its allied areas through literature survey	1	1			2	1	2	2	1	2	2	1	2	1	2	2
	CO2	Distinguish state of art & relevance of the topic in national & international arena	1				2	1	2	2	1	2	2	1	2	1	2	1
	CO3	Demonstrate good oral & written communication skills											3	3			2	

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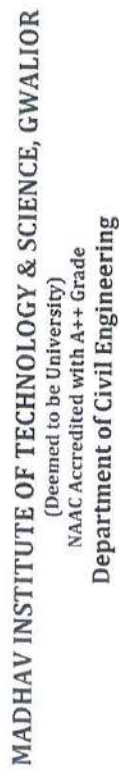


	CO5	Evaluate different methods of structural analysis.	2	2	1	3	1	2								2	2
110413: Transportation Engineering	CO1	Explain the principles of highway planning & their geometrical design.	2		1			1	1							1	1
	CO2	Evaluate physical properties of suitable highway engineering materials with drainage provisions	2			1		1	1							2	1
	CO3	Apply the concepts of traffic engineering in transportation planning.	2	2	1	2		2	2	2						2	2
	CO4	Design pavements as per regulations.	2			2	2	2	2							2	2
	CO5	Formulate the layers of pavement along with provisions of its drainage & maintenance.	2	1		2	2	2	2	2	2	2	2	2		2	2
110413: Transportation Engineering (Lab)	CO1	Select suitable aggregate material by testing the physical properties	2	1		3	2	2	2	2	2	2	3			2	1
	CO2	Determine properties of bitumen and its grade	2	2		3	2	2	2	2	2	2	3			2	2
	CO3	Determine CBR value of material for subgrade and subsequent layers of pavement.	2	2		3	2	2		2	2	2	3			2	1
	CO4	Design job mix formula for bituminous surface using Marshal Stability test.	2	2		3	2	2		2	2	2	3			2	2
110414: Water Engineering Resource	CO1	Analyse various requirements for an efficient irrigation project	1			1		1	1							1	2
	CO2	Design different components of irrigation system using different theories	1			2		1	1	1	1					1	2
	CO3	Plan an efficient, economical & safe irrigation system	2	2		2	1	1	1	2						2	3

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11051: Water Supply Engineering	C01	Explain the concepts of water supply engineering.	2			2		2	2	2						2	2	1
	C06	Evaluate the performance of algorithms in Data Science	2	2		2	2	2	1							2		
	C05	Apply Data Science techniques for solving real world problems	2	2	1	2	2	1								2		
	C04	Build exploratory data analysis for Data Science methods	2	2		2	2	1								2		
	C03	Apply data visualization techniques to solve real world problems	2	2		2	2	1								2		
	C02	Illustrate various tools used for Data Science technique	2	2		1	1	1								2		
110520: Data Science	C01	Define different Data Science techniques	2	2		1	1	1								2		
	C04	Prepare drawing sheets of various types of buildings like residential, institutional, Commercial etc.	2	1	2			1	1	2	2	3					2	
	C03	Use AutoCAD software in civil engineering drawing	2	2	2	2	3				1	3	3			3	1	
	C02	Produce plan, elevation & section of various components of a residential and institutional building	2	1	2	2	1	1	1	2	2	3				2		
	C01	Attempt to draw different components of a building	2			1	1	1	1	2	2	3				2		
	C06	Analyse runoff hydrograph by various methods	2	3	2	3	2	2	2	2	2	1	1			3	1	3
110415: Civil Drawing Lab	C05	Apply basic principles for measurement & forecasting of rainfall & runoff	2	3	1	3	2	2	2	2						2		2
	C04	Explain the concept of hydrology and hydrograph	2	3	1	3	1	2	2	2								2
	C01	Attempt to draw different components of a building	2			1	1	1	1	2	2	3				2		
	C02	Produce plan, elevation & section of various components of a residential and institutional building	2	1	2	2	1	1	1	2	2	3				2		
	C03	Use AutoCAD software in civil engineering drawing	2	2	2	2	3				1	3	3			3	1	
	C04	Prepare drawing sheets of various types of buildings like residential, institutional, Commercial etc.	2	1	2				1	1	2	2	3					

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	CO2	Determine the requirements for safe supply of water.	2	2	2	2	3	3	2	2	2	2	2
	CO3	Apply suitable water treatment technique based upon the available data.	2	2	3	1	3	3				2	2
	CO4	Analyse a given water supply scheme.	3	3	2	3	2	3	3	1	2	3	2
	CO5	Design a water supply system based upon the needs of society.	3	3	3	2	2	3	3	2	1	3	2
	CO1	Follow sampling procedure & other guidelines for sampling & analysis of water samples.	2	1	3	2	2	2	2	2	3	2	1
110511: Water Supply Engineering (Lab)	CO2	Check various water quality parameters.	2	2	3	2	2	2	2	2	3	2	2
	CO3	Improve the water quality by suggesting suitable corrective measures.	2	2	3	2	2	2	2	2	3	2	1
	CO4	Train others on various ways of improving the quality of water.	2	2	3	2	2	2	2	2	3	2	2
	CO1	Explain various methods for analysis of structures and frames	3	3	3	3	2	2				2	1
110512: Theory of Structures-II	CO2	Analyse various loads on framed structures using codal provisions.	3	3	3	3	2	2				2	1
	CO3	Analyse different type of structures for various load conditions by different methods.	3	3	3	3	2	2				2	1
	CO4	Draw influence line diagrams for statically determinate & indeterminate structure.	3	3	3	3	2	2				2	1
	CO5	Analyse beams & frames using plastic analysis.	3	3	3	3	2	2				2	1

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110513: S. D. D. (RCC)	CO1	Apply the concepts of different design philosophies for deriving basic expressions used in RC design	3	3	2	2	1	2	2	3	1
	CO2	Determine the capacity of RC elements using IS456 guidelines.	3	3	2	2	1	2	2	3	1
	CO3	Analyze the RC elements for determining design variables as per IS456 & IS 875	3	3	2	2	2	2	2	3	2
	CO4	Design the RC elements as per IS 456 provisions.	3	3	3	2	2	2	3	3	2
	CO5	Develop the design sketches for RC elements as per IS456; IS13920 and SP34 provisions.	3	3	3	2	2	2	3	3	2
110514: Fluid Mechanics-II	CO1	Differentiate different types of fluid flow & fluid machinery.	2	1	2	2	2	1	2	2	1
	CO2	Describe principles of analysis of fluid flow problem.	2	2	2	2	1	1	2	2	1
	CO3	Explain basic principles for measurement of different forces acting on fluid body.	2	2	2	2	1	1	2	2	1
	CO4	Analyse pipe flow, open channel flow problems & various characteristics of hydraulic machines.	3	3	2	3	2	2	2	2	2
	CO5	Design open & closed conduit systems.	3	3	3	3	2	2	2	2	2
110515: Minor Project-I	CO1	Recognize various engineering problems and techniques to solve them.	2	2	2	3	2	2	2	3	2
	CO2	Reproduce the solution of the problems upon the need of society.	3	3	3	3	3	3	3	3	2
	CO3	Cooperate to work within group.			2	2			3	2	
	CO4	Develop the writing and communication skills for various engineering problems.							3	3	2
	CO5	Display lifelong learning.	2	2	2	2	2	2	2	3	2

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110516: Self Learning/ Presentation	CO1	Analyze contemporary issues in civil engineering & its allied areas through literature survey	1	1		2	2	2	1	2	1	2	1	2	1	2
	CO2	Distinguish state of art & relevance of the topic in national & international arena	1						2	2	2	1	2	2	1	2
	CO3	Demonstrate good oral & written communication skills											3	3	2	
	CO4	Develop poster and power point presentations for effective communication											3	3	2	
	CO5	Display lifelong learning	2	2	2	2	2	2	2	2	2	1	3	2	2	2
100005: Project Management & Financing	CO1	Know the attributes of project and its different phases.	2	2	1	1	2	1							2	1
	CO2	Develop the project network based on work breakdown structure and estimation of activity durations.	3	3	2	2	2	2	1					1	2	1
	CO3	Analyze the project network and make decide the various alternates	3	3		3	3	2						1	2	1
	CO4	Evaluate the optimum cost of project for assigned deadlines.	3	3		2	2	2						1	2	1
	CO5	Understand the different options to arrange the finances to complete it within stipulated time.	2	1		1	1	1						1	2	1
110620: Artificial Intelligence & Machine Learning	CO1	Define basic concepts of Artificial Intelligence & Machine Learning.	3	2		3	2	2							2	
	CO2	Illustrate various techniques for search and processing.	3	2		3	2	2							2	
	CO3	Identify various types of machine learning problems and techniques.	3	2		3	2	2							2	

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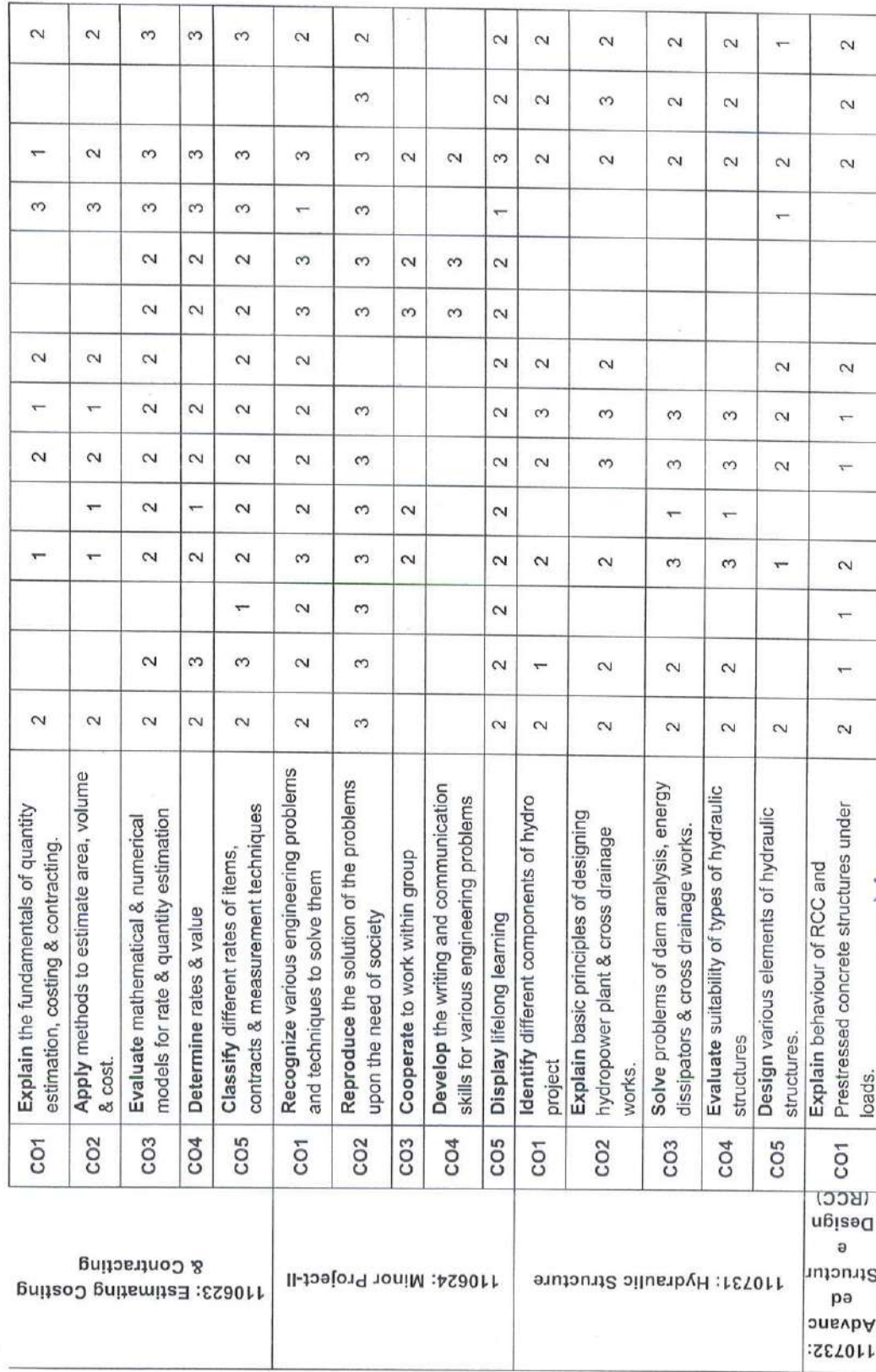
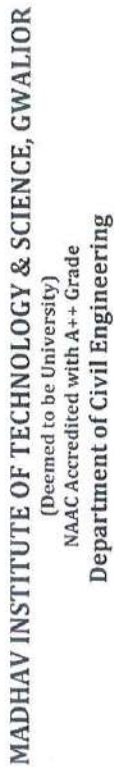
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	CO2	Determine forces developed in RCC and Prestressed concrete structures under loads.	3	3	2	2	1	2	2					2	3	1
	CO3	Compare designs of RCC and Prestressed concrete structures for given loadings.	3	3	2	2	1	2	2					2	3	1
	CO4	Develop economic and safe designs of RCC and Prestressed concrete structures.	3	3	2	2	2	2	2	1	2			3	3	2
	CO1	Explain the elements of airport planning, bridges & tunnels.	2		1			1	1					1		1
	CO2	Design runway & taxiway system as per regulations.	2			1		1	1					2		1
110733: Railway, Airport & Tunnel Engineering	CO3	Explain various elements of railway tracks, signalling, yards, bridges & tunnels.	2	2	1	2		2	2	2				2	3	2
	CO4	Illustrate various gauge, signals, fasteners, turnouts, crossing etc.	2			2	2	2	2					2		2
	CO5	Apply construction methods of railway tunnels.	2	1		2	2	2	2	2	2	2	2	2		2
	CO1	Explain the principles & concepts of waste management.	1			2		1						1		1
	CO2	Apply various techniques of handling the waste.	2	2		3	1	3	3					2	2	2
9110211: Integrated Waste Management for Smart City	CO3	Apply various techniques of energy recovery from waste.	2	2		3	1	3	3					2	2	2
	CO4	Plan an effective & efficient waste management system.	2	1	1	1	1	2	2	3	2	2	2	3	3	2

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9110212: Safety & Quality management	CO1	Explain the quality management systems and utilize the ISO 9000 family of standards.	2	2							1					2	2	2	
	CO2	Improve the quality of the project through tools and techniques.	2	2					2	1							2		
	CO3	Perform the environmental impact assessment (EIA) for construction projects towards quality.	2	2				2			1	2					2		
	CO4	Analyse the quality assurance and quality control, quality improvement tools and techniques.	2	2				3			1						2		
	CO5	Evaluate the contract and inspection procedures.	2	2			3				1						2		
	CO6	Identify the safety management practices in construction industry.	2	2							1					2	2		
110716: Software Application for Solving Civil Engineering Problems	CO1	Design various beams, slabs & multistorey building's using various software's.	1				2				1	1	1				1		2
	CO2	Design water supply & sewer networks using various software's.	1					2			1	1	1				1		2
	CO3	Practice MS Excel in estimation works.	2	2	1	2	2	2	2	2	2	2	2	1	1	2	2	2	2
	CO4	Produce land use land cover maps and geo contour maps using various software's.	2	1	2	2	1	1	1	1				3			2		
	CO5	Practice Primavera and MS-Project softwares.	2	2	2	2	2	2	2	2	2	2	2	2	1	3	2	2	2
110717: Creative Problem Solving	CO1	Identify various on field problems.	1	1							1	1					2		1
	CO2	Practice various methods to solve problems.	2	2	1	2	2	2	2	2	2	2	2	1	1	2	2	2	2
	CO3	Produce solutions to various problems.	2	1	2	2	1	1	1	1			3			2			



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110821: Internship/Project	CO4	Demonstrate various problems solving skills.	1		1													
	CO1	Observe various activities of civil engineering works.	3	3	3		2	2	1	2	1	2	3	2	2			
	CO2	Recognize various engineering problems and techniques to solve them.	3	3	3	2	2	2	1	2	1	2	3	2	2			
	CO3	Reproduce to solution of the problem upon the need of society.	3	3	3	2	2	2	1	2	1	2	3	2	2			
	CO4	Develop the writing and communication skills for various engineering problems	3	3	1		1	2	2	1	2	2	1	3	2			
	CO5	Adapt lifelong learning for benefit of society	3	3	3	2	1	2	2	1	2	2	3	2	2			

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Course Wise PO Attainment of Batch Admitted 2020-2024

DIRECT PO ATTAINMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
100015: Energy, Environment, Ecology & Society		3.00	3.00	3.00		3.00	2.94	2.91	2.29		2.94	1.96		
110211: Building Planning & Design	1.83	1.25	1.10	1.16	1.10	2.02	2.20	2.04	1.55	1.85	1.83	2.38	2.19	1.83
110311: Building Materials & Construction	2.00	1.50	1.00	1.80	1.33	2.00	1.40	1.50				1.80	2.00	1.00
110311 (P): Building Materials & Construction	1.80	1.25	1.33	3.00	2.00	2.00	1.60	2.00	2.00	3.00		2.00	2.00	1.40
110312: Fluid Mechanics-I	1.57	1.62	0.78	1.57	1.12	1.32	1.32					1.57		1.37
110312 (P): Fluid Mechanics-I	1.89	1.90	0.96	2.60	1.89	1.85		1.91	1.89	1.89		1.89		1.59
110313: Surveying	1.80	2.29		2.15	1.48			1.44	1.01	1.01		1.63		1.33
110314: Strength of Materials	1.70	1.42	1.28	1.70	1.04	1.04	0.60	1.40				1.18		1.04
110314 (P): Strength of Materials	1.66	1.66	1.90	2.49	1.66	1.66	1.66	1.66	1.66	2.49		1.66	1.66	1.66
110315: Surveying Practice Lab	1.83	1.65	0.92	2.29	1.68	0.91		1.65	1.99	2.44		2.14		1.53
110316: Self Learning / Presentation	1.33	1.50	2.00	1.99	1.33	1.99	1.99	1.33	2.38	2.38	0.99	2.18	1.50	1.66
110411: Geotechnical Engineering - I	1.90	2.28	0.92	2.25	1.62	1.90	1.73	0.95				1.90	0.97	1.90

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110411 (P): Geotechnical Engineering - I	2.00	1.75		3.00	2.00	2.00	2.00	2.00	2.00	2.00	3.00		2.00			1.50
110412: Theory of Structures - I	0.89	0.82	0.31	1.15	0.47	0.70	0.41	0.50					0.89			0.89
110413: Transportation Engineering	1.88	1.30	0.95	1.60	1.80	1.48	1.48	1.70	1.59	1.59	1.59	1.59	1.68	2.70		1.48
110413 (P): Transportation Engineering	1.93	1.68		2.90	1.93	1.93	2.00	1.93	1.93	1.93	2.90		1.93			1.43
110414: Water Resources Engineering	1.58	2.56	1.21	2.21	1.40	1.41	1.41	1.50	0.90	0.90	0.90		1.73	0.90		2.23
110415: Civil Drawing Lab	1.84	1.22	1.85	1.56	1.52	0.93	0.93	1.61	2.06	2.75			2.06	0.89		
110520: Data Science	1.53	1.48	0.67	1.11	1.23	0.74							1.26			
110511: Water Supply Engineering	1.01	1.04	0.98	1.03	0.68	1.19	1.19	0.85	0.39	0.79	0.38		1.01	1.10		0.76
110511 (P): Water Supply Engineering	1.75	1.57	0.98	2.53	1.68	1.79	1.68	1.72	1.63	2.48	0.38		1.75	1.10		1.31
110512: Theory of Structures-II	0.97	0.97		0.97		0.65							0.65			0.32
110513: S.D.D (RCC)	1.07	1.07	0.85	0.71	0.56	0.71	0.60	0.85	0.34	0.69			0.92	1.07		0.56
110514: Fluid Mechanics-II	0.83	0.76	0.82	0.83	0.66	0.48	0.51	0.71					0.70			0.48
110515: Minor Project - I	2.26	2.26	2.26	2.42	2.18	2.26	2.26	1.94	2.71	2.52	1.62		2.52	2.43		1.94
110516: Self Learning Presentation	0.50	0.26	0.36	0.89	0.50	0.89	0.89	0.50	1.22	1.22	0.44		1.02	0.26		0.56
110620: Artificial Intelligence & Machine Learning	2.62	1.75		2.62	1.75	1.75							1.75			
110621: Waste Water Engineering	1.99	2.06	2.46	1.99	1.37	2.32	2.32	1.67	0.82	1.64	0.82		1.99	2.16		1.49

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110622: Structural Design & Drawing (Steel)	1.81	1.68	1.51	1.29	1.38	1.16	0.99	1.64	0.69	1.38		1.81	1.81	1.29
110623: Estimating Costing & Contracting	1.63	2.18	0.78	1.31	1.23	1.63	1.31	1.62	1.64	1.64	2.45	1.96		2.12
110624: Minor Project – II	2.33	2.33	2.33	2.50	2.25	2.33	2.33	2.00	2.80	2.60	1.67	2.60	2.50	2.00
110731: Hydraulic Structure	0.65	0.57		0.72	0.33	0.85	0.92	0.66			0.31	0.65	0.74	0.59
110732: Advanced Structure Design (RCC)	0.86	0.78	0.54	0.62	0.41	0.54	0.32	0.62	0.31	0.62		0.70	0.86	0.47
110733: Railway, Airport & Tunnel Engineering	1.83	1.36	0.96	1.49	1.61	1.36	1.36	1.76	1.61	1.61	1.61	1.59	2.88	1.36
900211- Integrated Waste Management for Smart City (OC - 2)	0.97	0.70	0.84	1.16	0.49	1.13	1.20	1.72	1.67	1.67	1.67	1.18	1.26	0.97
900212 - Safety & Quality Management	1.20	1.20		1.27	0.62	0.60	1.59				1.59	1.20	1.58	
110716- Software Application for Solving Civil Engineering Problems	1.60	1.67	1.67	2.00	1.67	1.40	1.40	1.60	2.00	2.00	1.00	1.80	2.00	2.00
110718 - Summer Internship Project – III	2.00	2.00	1.67	2.00	2.00	2.00	1.75	2.00	1.60	1.80	1.33	2.40	1.80	1.80
110717 - Creative Problem Solving	1.50	1.33	1.50	1.67	1.50	1.33	1.33	2.00	2.00	2.00	1.00	2.00	2.00	1.50
110821 Internship/Project	3.00	3.00	2.60	2.75	1.50	2.00	2.00	1.00	2.00	1.25	1.80	3.00	2.00	2.00
DIRECT PO ATTAINMENT	1.59	1.53	1.27	1.78	1.34	1.45	1.44	1.53	1.60	1.88	1.31	1.64	1.61	1.33

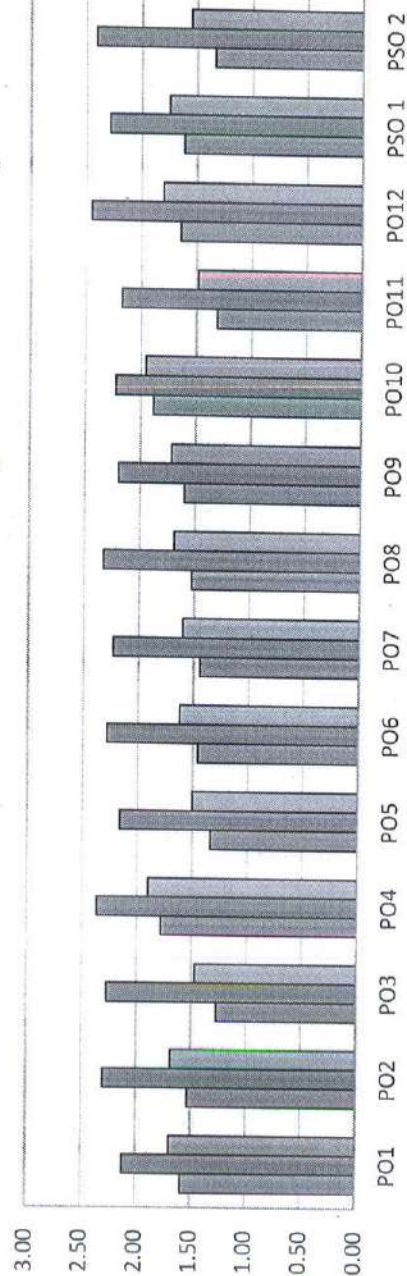
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PO Attainment

PO ATTAINMENT	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
DIRECT PO ATTAINMENT	1.59	1.53	1.27	1.78	1.34	1.45	1.44	1.53	1.60	1.88	1.31	1.64	1.61	1.33
AVERAGE INDIRECT PO ATTAINMENT	2.12	2.30	2.27	2.36	2.16	2.28	2.23	2.33	2.19	2.22	2.17	2.45	2.29	2.41
OVERALL PO ATTAINMENT	1.69	1.68	1.47	1.90	1.50	1.62	1.60	1.69	1.72	1.95	1.48	1.80	1.75	1.55

PO ATTAINMENT (2020-2024)



■ DIRECT PO ATTAINMENT ■ AVERAGE INDIRECT PO ATTAINMENT ■ OVERALL PO ATTAINMENT

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Action Taken Report for PO Attainment

POs	Target Level	Attainment Level	Observations
PO1: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	2.5	1.69	Engineering basics/fundamentals should be given more attention.
Action1: Extra practice problems are to be given for courses like Mathematics, Building Material & Construction, Strength of Materials, Surveying, Theory of Structures, Structural Design & drawing and solutions are discussed in the class.			
Action2: Revision sessions are to be conducted of prerequisite for the subject Strength of Materials and Theory of Structures.			
PO2: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
PO2	2.5	1.68	Problem solving and analyzing skills gained through courses will help the students to apply in real-time applications
Action1: Incorporating more numerical problems and conducting tutorials sessions in courses like Engineering Mechanics, Strength of Material, Fluid Mechanics, Geotechnical Engineering etc.			
PO3: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
PO3	2.5	1.47	Approach of converting the theory into practical applications needs to be developed.
Action1: Practical implementation of engineering systems should be given through skill based mini projects, minor projects & major projects.			





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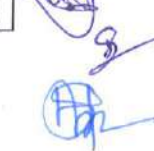
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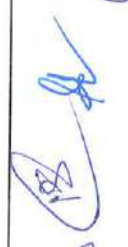
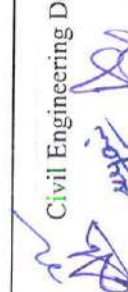
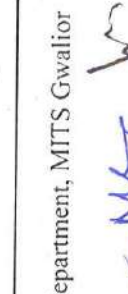
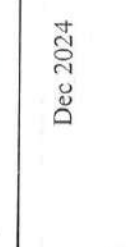
PO4: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.		
PO4	2.5	1.90
Knowledge gained through various courses help students in conducting investigations of complex problems.		
Action 1: More focus emphasis on such courses which involve experimentation.		
PO5: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.		
PO5	2.5	1.50
Awareness and usage of modern tools should be increased substantially.		
Action1: Students are asked to perform the experiments and projects using simulation software's like Virtual Lab.		
Action2: More experiments to be introduced in various courses which shall enable students to get exposure to modern tools.		
PO6: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.		
PO6	2.5	1.62
Awareness of health, safety and legal issues needs to be improved among students.		
Action1: Information about safety facilities available in laboratories is given to students.		
Action2: Demonstration of safety equipment's like fire extinguisher is given to understand personal and equipment safety.		
PO7: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.		
PO7	2.5	1.60
Few courses are addressing the issues of environmental concern.		
Action1: Students gain knowledge in environmental and sustainable issues through Environmental Engineering course.		
Action3: Issues of global and environmental awareness among the students need to be improved.		
PO8: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering		


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practice.		
PO8	2.5	1.69
Introduction to the practices followed in professional environment should be given.		
Action 1: Students get acquainted with professional ethics in induction program.		
Action2: Students are motivated to write lab reports in their own words avoiding "copy-paste" practices.		
PO9: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.		
PO9	2.5	1.72
Emphasis is given on how to work in a team to achieve the common goals.		
Action1: Students are encouraged to work in team during practical classes in course of Surveying, Strength of Material, Fluid Mechanics, Transportation Engineering etc..		
Action2: Various modules in Summer Internship Program are designed in such a way to address the need to work effectively in groups.		
PO10: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.		
PO10	2.5	1.95
Communication, Presentation and Report Writing skills are to be improved among students.		
Action1: Extra sessions are conducted by the faculty under the courses of Technical English and Language Lab to improve communication skills.		
Action2: Various sessions are conducted during the Student Induction Program which is focused on improving the communication skills.		
PO11: Demonstrate knowledge of management and financial principles to civil engineering projects.		
PO11	2.5	1.48
Managerial skills should be improved.		
Action1: Students are encouraged to participate in technical competitions which enhance their experience to work in multidisciplinary environment.		
PO12: Engage in lifelong learning & adapt to rapid changes in civil engineering and its allied areas.		



PO12	2.5	1.80	More efforts are required to understand technology change.
Action1: New experiments are designed based on latest trends.			
Action2: Curriculum is updated based on latest trends.			
PSO1: The graduate will be able practice codal provisions like IRC, IS, NBC, CPHEEO manuals for planning & designing of civil infrastructures.			
PSO1	2.5	1.75	More efforts are required to understand codal provisions in planning and design
Action 1: Extra problems are given to students in courses like Structural Design & Drawing, Building Planning & Design etc.			
PSO2: The graduate will be able to understand the importance of uncertainty & risk involved in infrastructure projects and subsequently propose the solutions.			
PSO2	2.5	1.55	More efforts are given on uncertainty & risk through various problems
Action 1: More problems given to students in courses like structural analysis, Structural Design etc. to propose solutions to various problems encounter risk & uncertainty.			

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ANNEXURE – IX CURRICULUM FEEDBACK

Analysis and Action Taken Report of Feedback on Course Curriculum

Based on the feedback data received from students following points have been analysed

- For DE course: Foundation engineering, Environmental Impact Assessment

Based on the feedback data received from faculty following points have been analysed

- More updated materials need to be available.
- Course contents may be reduced so that all the topics cover in full details.
- For Honours course: Advanced Concrete Technology, Bridge Engineering, Applied Environmental Biotechnology
- For DE courses: Air Pollution & Control, Plastic waste management, Introduction to civil engineering profession

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Course wise Analysis of Curriculum Feedback by Students

II Year						
	3110321: Fluid Mechanics-I	3110322: Theory of Structures-I	3110323: Geotechnical Engg	3110324: Transportation Engg.	1000005: Project Finance & Management	3000005: Environmental Engineering
1 .The course is well designed	4.32	4.16	4.14	4.14	3.9	3.86
2. The syllabus units are balanced	4.25	4.11	4.07	4.12	4.05	3.90
3. The learning material was available to you	4.13	4.03	4.21	4.14	3.95	4.05
4. The content was clear and easy to understand	4.42	4.21	4.07	4.12	4	4.08
5.The course was relevant and updated for present needs	4.34	4.32	4.10	4.07	4	3.98
6.The course meets your career expectations	4.21	4.26	4.00	4.12	3.85	3.81
7. The course will be useful to meet your higher studies/future aspirations.	4.34	4.42	4.03	4.17	3.9	3.80

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III Year						
	2110520: Data Science	2110511: Waste Water Engineering	2110512: Estimating Costing & Contracting	2110513: S.D.D (R.C.C)	2110514: Railway, Airport & Tunnel Engineering	1000006: Disaster Management
1 .The course is well designed	3.95	3.88	3.65	3.90	4.33	4.29
2. The syllabus units are balanced	4.12	4.05	3.88	4.10	4.17	4.18
3. The learning material was available to you	4.15	4.26	4.24	3.95	4.33	4.00
4. The content was clear and easy to understand	3.98	3.79	3.59	3.65	4.44	4.24
5.The course was relevant and updated for present needs	3.93	3.87	3.82	3.80	4.33	4.47
6.The course meets your career expectations	3.93	3.95	3.76	4.05	4.33	4.29
7. The course will be useful to meet your higher studies/future aspirations.	3.88	3.87	3.76	3.85	4.17	4.12

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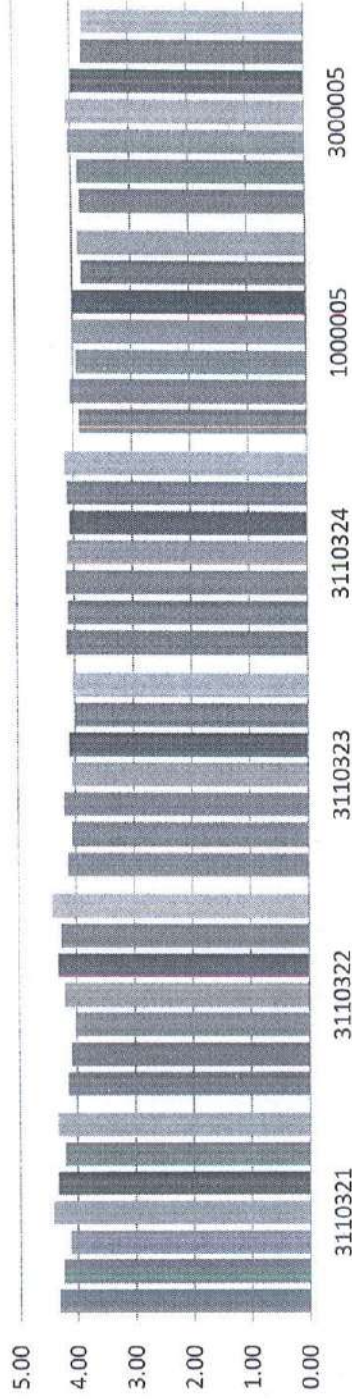


Final year					
	110731: Hydraulic Structure	110732: Advanced Structural Design	110734: Industrial Waste Management	910211: Integrated Waste Management for Smart City	910212: Safety Quality & Management
1 .The course is well designed	4.18	4.31	4.38	4.19	4.28
2. The syllabus units are balanced	4.26	4.43	4.45	4.12	4.60
3. The learning material was available to you	4.28	4.35	4.52	4.23	4.43
4. The content was clear and easy to understand	4.36	4.04	4.45	4.19	4.22
5.The course was relevant and updated for present needs	4.31	4.13	4.34	4.04	4.34
6.The course meets your career expectations	4.18	4.22	4.55	4.04	4.10
7. The course will be useful to meet your higher studies/future aspirations.	4.15	4.25	4.52	4.08	4.15

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Course Curriculum Feedback- Second Year

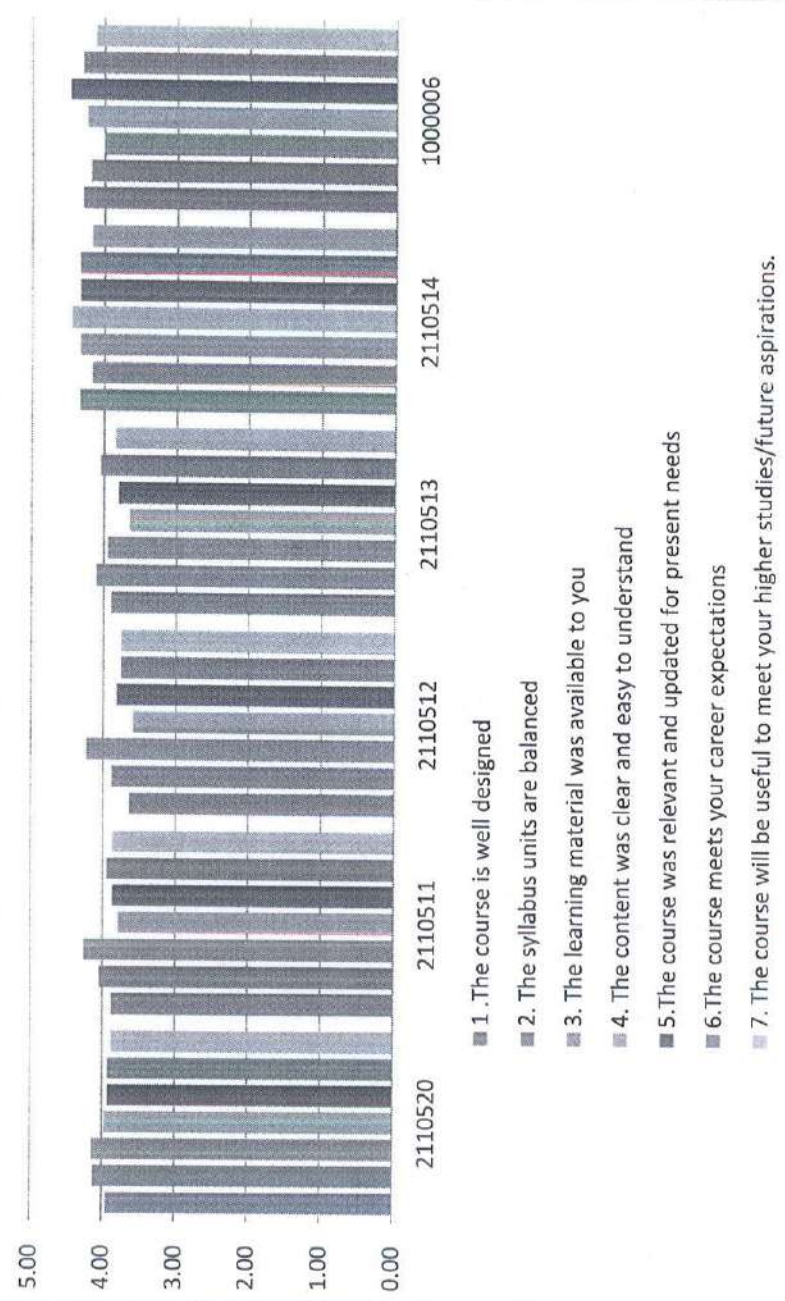


- 1. The course is well designed
- 2. The syllabus units are balanced
- 3. The learning material was available to you
- 4. The content was clear and easy to understand
- 5. The course was relevant and updated for present needs
- 6. The course meets your career expectations
- 7. The course will be useful to meet your higher studies/future aspirations.

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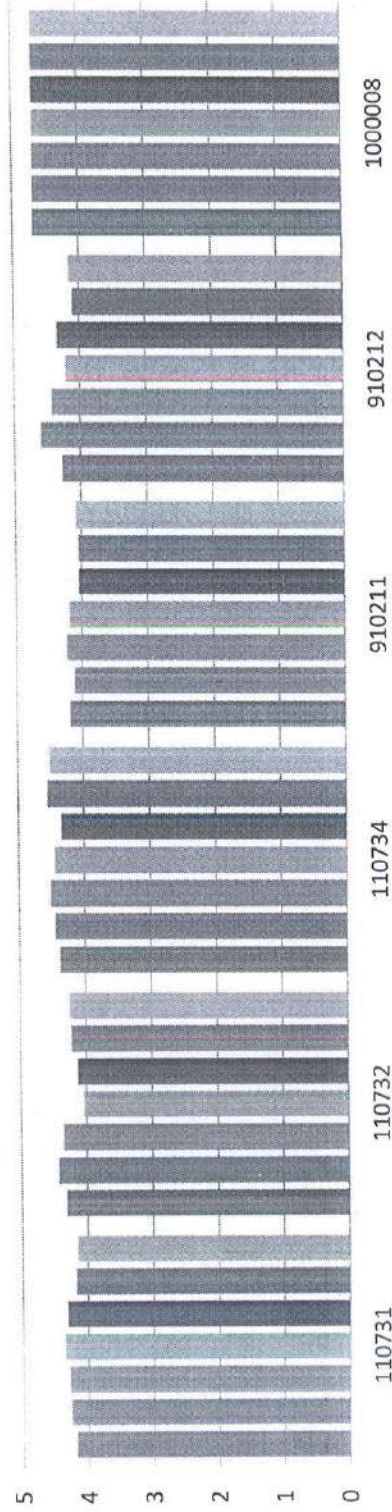
Course Curriculum Feedback-Third Year



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Course Curriculum Feedback-Final Year



- 1. The course is well designed
- 2. The syllabus units are balanced
- 3. The learning material was available to you
- 4. The content was clear and easy to understand
- 5. The course was relevant and updated for present needs
- 6. The course meets your career expectations
- 7. The course will be useful to meet your higher studies/future aspirations.

Signature of the Head of Department, Civil Engineering Department, MITS Gwalior



Course Curriculum Feedback by Faculty

course	Course Code & Name	1. The availability of books & E-learning material in the institute is good.	2. The Courses and content are up to date.	3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	5. The curriculum is capable of inculcating life-long learning abilities in students.
B. Tech	3110321- Fluid Mechanics-I	5	4	5	4	5
B. Tech	3110322- Theory of Structures-I	4	5	5	4	5
B. Tech	3110323- Geotechnical Engg.-I	4	4	3	4	5
B. Tech	3110324- Transportation Engg.	4	4	4	4	4
B. Tech	2110520- Data Science	3	3	4	4	4
B. Tech	2110511- Waste Water Engineering	5	5	5	5	5
B. Tech	2110512- Estimating Costing & Contracting	5	4	4	3	4
B. Tech	2110513 - S.D.D. (R.C.C)	5	4	5	4	5
B. Tech	2110514: Railway, Airport & Tunnel Engineering	5	5	5	4	5
B. Tech	110731: Hydraulic Structures	5	4	5	4	4
B. Tech	110732: Advanced Structural Design (RCC)	5	4	5	4	5
B. Tech	110734: Industrial Waste Management	5	4	5	5	5

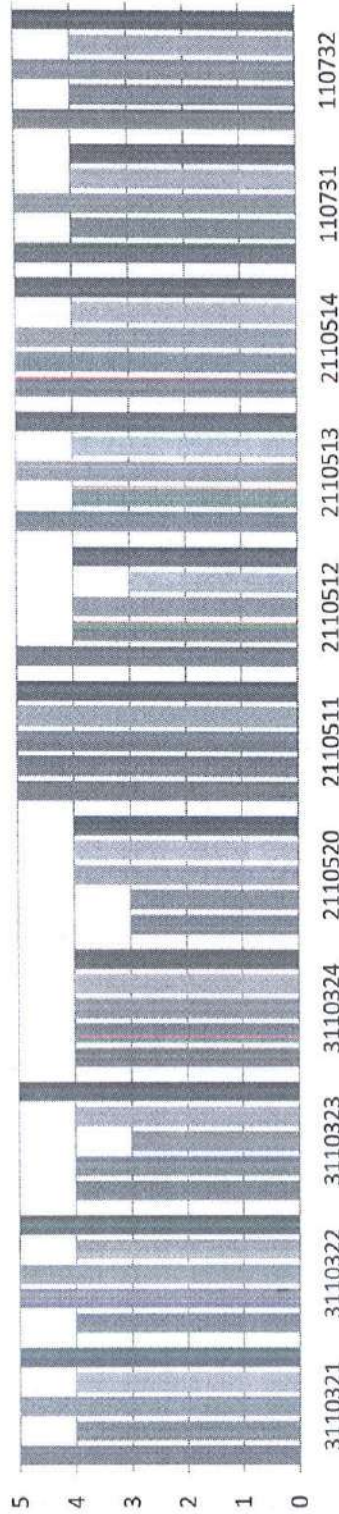
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Course Content/Curriculum Faculty Feedback



- 1. The availability of books & E-learning material in the institute is good.
- 2. The Courses and content are up to date.
- 3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.
- 4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.
- 5. The curriculum is capable of inculcating life-long learning abilities in students.

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ALUMNI SATISFACTION SURVEY

Sample: 14

S. No.	Parameter	Poor	Fair	Good	Very Good	Excellent	Alumni Satisfaction Index
1	Do you find yourself capable of making a good career?	0	0	1	6	7	4.43
2	Are you able to apply the concepts of civil engineering in your profession?	0	0	3	5	6	4.21
3	Have you been able to pursue higher studies?	0	0	1	4	9	4.57
4	Are you able to exhibit leadership skills, team spirit & ethical practices while performing your duty?	0	0	4	6	4	4.0
5	You feel proud to be known as an MITS Alumnus	0	0	2	4	8	4.43
6	Institute organizes various kinds of activities for the overall development of students	0	1	2	6	5	4.07
7	Are you willing to contribute in the development of the Institute	0	0	3	7	4	4.07
8	Institute handles students' grievances properly	0	0	2	3	9	4.50
9	Institute has adequate laboratories and equipment for practical exposure to students	0	0	4	4	6	4.14
10	The education imparted at MITS is useful and relevant in your career and present job	0	0	2	6	6	4.28
11	Have you obtained sufficient technical knowledge (both in theory and practical) at MITS	0	0	0	6	8	4.57
12	Overall are you satisfied with the Faculty, Staff and Administration during Program	0	0	0	5	9	4.64

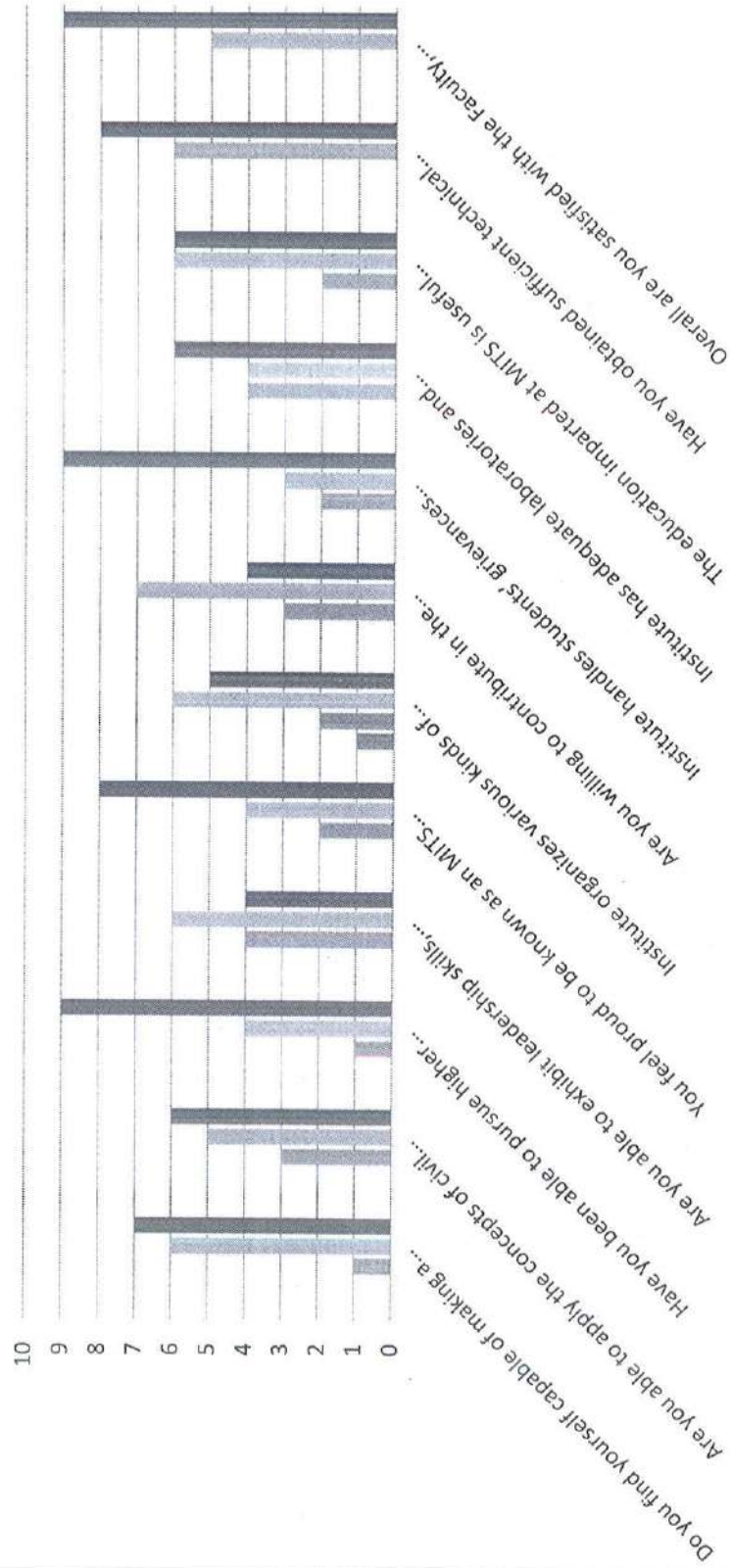
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Alumni Satisfaction Survey



Strongly Disagree Disagree Neutral Agree Strongly Agree

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ANNEXURE – X

(Scheme PG Programme 4th Semester)

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Department of Civil Engineering



For batch admitted in academic session 2023 – 24

Master of Engineering in Construction Technology & Management (Semester – CX)

Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
			Theory Slot		Practical Slot				L	T	P	
			End Sem.	Mid Sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation					
1.	510405	Dissertation Part-II	-	-	-	300	200	-	-	14	14	
		Total	-	-	-	300	200	-	-	14	14	

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(Deemed to be University)

NAAC Accredited with A++ Grade

Department of Civil Engineering



For batch admitted in academic session 2023 – 24

Master of Technology in Environmental Engineering (Semester – IV)

Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted					Total Marks	Contact Hours per week			Total Credits
			Theory Slot		Practical Slot				L	T	P	
			End Sem.	Mid Sem.	Quiz/ Assignment	End Sem. /Practical Viva	Sessional Work/ Practical Record/ Assignment/ Quiz/ Presentation					
1.	530405	Dissertation Part-II	-	-	-	300	200	500	-	-	14	14
		Total	-	-	-	300	200	500	-	-	14	14

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