

***DEPARTMENT OF CIVIL
ENGINEERING***

***MINUTES OF BOARD OF
STUDIES MEETING, DEC 2023
ALONG WITH ITS ANNEXURES***

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous Institute Affiliated to RGPV, Bhopal)

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Minutes of Board of Studies Meeting held on 01st Dec 2023

The meeting of Board of Studies of the Civil Engineering department was held on Friday, 01st Dec 2023 in online mode. Following were present:

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

Leave of absence was granted to the 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 2023. Previous Board of Studies meeting minutes dated 02 nd June 2023 are confirmed.
Item No. / CE - 2	The examination committees constituted vide Dean Academics Notice no 1332 dated 20/4/2021 need to be reconstituted this year. The examination committee is reconstituted and attached in Annexure file
Item No. / CE - 3	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 2020-21. (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 2020-21 admitted batch is attached in Annexure - I.
Item No. / CE - 4	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 2020-21). 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 2020-21 admitted batch.

ASV
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	<ol style="list-style-type: none"> 1. 110861, Introduction to Civil Engineering Profession 2. 110862, Plastic Waste Management 3. 110863, Expansive Soil <p>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 flexible curriculum for 2020-21 admitted batch.</p> <ol style="list-style-type: none"> 1. 910xxx, Natural Hazards 2. 910xxx, Strategies for Sustainable Design 3. 910xxx, Plastic Waste Management
Item No. / CE - 5	<p>To propose the list of "Additional Courses" which can be opted for getting an</p> <p>(i) Honours (for students of the host department)</p> <p>(ii) Minor Specialization (for students of other departments)</p> <p>[These will be offered through SWAYAM/NPTEL/MOOC based Platforms for the B.Tech. VIII semester students (for the batch admitted in 2020-21)] and for B.Tech. VI semester (for the batch admitted in 2021-22)]</p> <p>Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Minor Specialization during VIII semester for 2020-21 admitted batch.</p> <ol style="list-style-type: none"> 1. Strategies for Sustainable Design (M110801) 2. Rural Water Resources Management (M110802) 3. Structural Analysis (M110803) 4. Concrete Technology (M11804) <p><i>Following SWAYAM/NPTEL courses were offered as additional courses for getting Minors during VI semester for 2020-21 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></p> <ol style="list-style-type: none"> 1. Hydraulic Engineering (M11601) 2. Water & Wastewater Treatment (M110602) <p>Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Honours during VIII semester for 2020-21 admitted batch.</p> <ol style="list-style-type: none"> 1. Geographical Information Systems (H110806) 2. Analysis and Design of Bituminous Pavements (H110807) <p><i>Following SWAYAM/NPTEL courses were offered as additional courses for getting Honours during VI semester for 2020-21 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></p> <ol style="list-style-type: none"> 3. Structural Dynamics (H110601) 4. Environmental Impact Assessment (H110605) 5. Construction Methods & Equipment Management (H11606) <p>Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Minor Specialization during VI semester for 2021-22 admitted batch.</p>

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	<ol style="list-style-type: none">1. Hydraulic Engineering (M110601)2. Water & Wastewater Treatment (M110602) <p>Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Honours during VI semester for 2021-22 admitted batch.</p> <p>TRACK-1: STRUCTURE ENGINEERING</p> <ol style="list-style-type: none">1. Structural Dynamics (H110601)2. Construction Methods & Equipment Management (H110606)3. Soil Structure Interaction (H110607) <p>TRACK-2: ENVIRONMENTAL ENGINEERING</p> <ol style="list-style-type: none">1. Environmental Impact Assessment (H110605)2. Applied Environmental Microbiology (H110608)3. Biological process design for wastewater treatment (H110609)
Item No. / CE - 6	<p>To review and finalize the scheme structure of B.Tech VI Semester under the flexible curriculum (Batch admitted in 2021-22)</p> <p>The finalized scheme of B.Tech VI Semester for 2021-22 admitted batch is attached in Annexure – II.</p>
Item No. / CE - 7	<p>To review & finalize the syllabi for all Departmental Core Courses (DC) and Mandatory Course (MC) of B. Tech VI Semester (for batch admitted in 2021-22) under the flexible curriculum along with their COs.</p> <p>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 2021-2022) along with the syllabus is attached in Annexure – II and the same has been incorporated in the syllabus file for 2021 batch.</p>
Item No. / CE - 8	<p>To propose the list of courses from SWAYAM/NPTEL/MOOC Platforms to be offered (for batches admitted in 2021-22) in online mode under Departmental Elective (DE-1) Course with credit transfer, in the VI Semester.</p> <p>Following SWAYAM/NPTEL courses are offered as Departmental Elective (DE) courses in VI Semester for batch admitted in 2021-22 with credit transfer.</p> <ol style="list-style-type: none">1. Geotechnical Engineering II – Foundation Engineering (110661)2. Concrete Technology (110662)3. Air Pollution & Control (110663)
Item No. / CE - 9	<p>To review and finalize the courses & syllabi to be offered (for batch admitted in 2021-22) under the Open Category (OC) Courses (in traditional mode) for VI semester students of other departments along with their COs.</p> <p>Following courses are going to be offered as Open Category (OC) courses for VI Semester students (for batch admitted in 2021-22)</p> <ol style="list-style-type: none">1. Building Services & Maintenance (910111)2. Sustainable Materials & Green Buildings (910110) <p>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 2021 batch.</p>

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Item No. / CE - 10	<p>To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses to be offered in B.Tech.VI semester (for batch admitted in 2021-22).</p> <p>The list of experiments for laboratory course to be offered in VI semester for 2021-22 admitted batch were finalized along with the syllabi of courses offered in B.Tech VI Semester as mentioned in agenda Item No. / CE - 7</p>
Item No. / CE - 11	<p>To review and finalize the suggestive list of projects which can be offered under the 'Skill based mini-project' category in various laboratory components based courses to be offered in B.Tech. VI Semester (for the batch admitted in 2021-22).</p> <p>A list of projects which can be assigned as 'Skill based mini project' in lab courses to be offered in VI semester for 2021-22 admitted batch were finalized, the same is attached in Annexure - II along with syllabus of these courses as per agenda Item No. / CE - 7.</p>
Item No. / CE - 12	<p>To review and finalize the scheme and syllabi of B. Tech. IV Semester (for batch admitted in 2022-23) under the flexible curriculum along with their COs.</p> <p>The Scheme & Syllabi for IV Semester for B.Tech Civil Engineering for batch admitted in 2022-2023 was discussed and finalized. The scheme as well as syllabus is being attached in Annexure - IV.</p>
Item No. / CE - 13	<p>To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses to be offered in Batch IV semester (for batch admitted in 2022-23)</p> <p>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 - 12</p>
Item No. / CE - 14	<p>To review and finalize the suggestive list of projects which can be offered under the 'Skill based mini-project' category in various laboratory components based courses to be offered in B. Tech IV Semester (for the batch admitted in 2022-23).</p> <p>A list of projects which can be assigned as 'Skill based mini project' in lab courses to be offered in IV semester for 2022-23 admitted batch were finalized, the same is attached in Annexure - V.</p>
Item No. / CE - 15	<p>To review and finalize the scheme and syllabi of B. Tech. II Semester (for batch admitted in 2023-24) under the flexible curriculum along with their COs.</p> <p>The Scheme & Syllabi for Second Semester for B.Tech Civil Engineering for batch admitted in 2023-2024 was finalized. The scheme as well as syllabus is being attached in Annexure - VI.</p>
Item No. / CE - 16	<p>To review and finalize the Experiment list/ Lab manual for all the Laboratory Courses to be offered in Batch II semester (for batch admitted in 2023-24)</p> <p>The list of experiments for lab courses offered in Second Semester (2023-24 admitted batch) were also discussed and finalized along with the syllabus of courses as mentioned in Agenda Item No. / CE - 15</p>
Item No. / CE - 17	<p>To review and finalize the suggestive list of projects which can be offered under the 'Skill based mini-project' category in various laboratory components based courses to be offered in B. Tech II Semester (for the batch admitted in 2023-24).</p> <p>The list of skill based mini projects for lab courses offered in Second Semester (2023-24 admitted batch) were also discussed and finalized along with the syllabus of courses</p>

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	as mentioned in Agenda Item No. / CE – 15.								
Item No. / CE – 18	<p>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 2023 Session.</p> <p>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:</p> <table border="1"><thead><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></thead><tbody><tr><td>23</td><td>114</td><td>37</td><td>32.5%</td></tr></tbody></table>	Total No of Courses	Total Number of Cos	No. of COs Not attained	Percentage of COs not attained	23	114	37	32.5%
Total No of Courses	Total Number of Cos	No. of COs Not attained	Percentage of COs not attained						
23	114	37	32.5%						
Item No. / CE – 19	<p>To review the PO attainment, CO-PO mapping matrix and action to be taken to improve PO attainment level.</p> <p>PO attainment calculations of 2018-2022 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.</p>								
Item No. / CE – 20	<p>To review curricula feedback from various stakeholders, its analysis and impact.</p> <p>The curricula feedback has been taken from various stakeholders. The compiled report along with its analysis & ATR is attached in Annexure – IX (a) & (b).</p>								
Item No. / CE – 21	<p>To discuss and recommend the scheme structure & syllabi of PG Programme (M.E./M.Tech./MCA/MBA) along with their Course Outcomes (COs)</p> <p>The Scheme & Syllabi for Second Semester for M.E/M.Tech Civil Engineering for batch admitted in 2023-2024 was finalized. The scheme as well as syllabus is being attached in Annexure – X.</p>								
Item No. / CE – 22	<p>To recommend the scheme structure and Syllabus of Ph.D. Course Work (specific to Doctoral Research Scholars, if any)</p> <p>This Agenda Item is treated null and void as there is no Ph.D. student is admitted in 2023-24.</p>								
Item No. / CE – 23	<p>Any other matter.</p> <p>1. Approval of SWAYAM/NPTEL course for PG 2nd Semester (Batch Admitted in 2023-2024)</p> <p>Following courses which will be offered through SWAYAM/NPTEL in the upcoming 2nd Semester of PG programme (Batch admitted in 2023-2024) as Departmental Elective Course (DE-2) with credit transfer facility.</p> <p>M.E. C.T.M. 2nd Semester:</p> <ul style="list-style-type: none">(i) Construction Methods and Equipment Management (510219)(ii) Strategies for Sustainable Design (510218) <p>M.Tech Environmental Engineering 2nd Semester:</p> <ul style="list-style-type: none">(i) Biological Process Design for Wastewater Treatment (530219)(ii) Applied Environmental Microbiology (530221)								


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In view of the above, the schemes of 2nd Semester M.E. C.T.M. & M.Tech Environmental Engineering are attached in Annexure - X.


The meeting ended with vote of thanks to the chair.



(Dr. Abhilash Shukla)
Member, BoS


(Dr. Prachi Singh)
Member, BoS

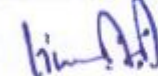

(Dr. Hemant Shrivastava)
Member, BoS

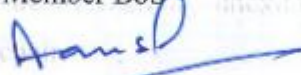

(Prof. Aditya K. Agarwal)
Member BoS

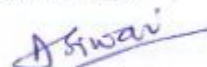

(Prof. G. Bhadoriya)
Member BoS



(Prof. A. K. Saxena)
Member BoS


(Prof. A. K. Dwivedi)
Member BoS


(Dr. S. Tiwari)
Member, BoS


(Dr. R. Kansal)
Member, BoS



(Prof. (Mrs.) A. Tiwari)
Member, BoS



(Dr. S. K. Jain)
Member, BoS

(Dr. Alok Verma) (Prof. Brind Kumar)
Subject Experts Nominated by Academic Council

on line present *on line present*

(Er Atul Khare)
Industry Representative
Digital present
on line


(Dr. M. K. Trivedi) 01/12/2023
Head of Department & Chairman, BoS


DEAN (ACADEMICS) 12/01/2024
M.I.T.S
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DEPARTMENT OF CIVIL ENGINEERING

Summary of Board of Studies Meeting held on 01st December, 2023

COURSES WHERE SYLLABUS REVISION WAS CARRIED OUT

(Session: Jan - June 2023)

(Course / Subject name)	Course Code	Year/Date of introduction	Year/Date of revision	Percentage of content added or replaced	Item No.	Page No.
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DEPARTMENT OF CIVIL ENGINEERING

Summary of Board of Studies Meeting held on 01st December, 2023

COURSES FOCUSING ON EMPLOYABILITY/ENTREPRENEURSHIP/ SKILL DEVELOPMENT (Session: Jan - June 2023)

(Course/subject name)	Course Code	Activities/contents which have a bearing on increasing skill and employability	Item No.	Page No.
Expansive Soil	110863	Behavior of expansive soil, treatment of expansive soil, applications	4	2,3,9
Soil Structure Interaction	H110607	Soil structure interaction for shallow foundation, plates on elastic foundation	5	3,4
Introduction to Civil Engineering Profession	110861	Career prospects and novel areas of Civil Engineering Profession	4	2,3,9
Applied Environmental Microbiology	530221/H110608	Microbial symbiosis, bioremediation	5,23	3,4,6,9 7
Internship/Project	110821	Working on field based projects	3	2,9
Plastic Waste Management	110862	Manage plastic waste in road construction	4	2,3,9
Environmental Impact Assessment	H110605	Planning & developing of EIA projects	5	3,4
Air Pollution & Control	110663	Develop air quality models, air pollution control techniques	8	4,11
Concrete Technology	M110804/110662	Mix design of concrete	5,8	3,4,11
Strategies for Sustainable Design	510218/910302	Improve the managerial skill in sustainable design	4,23	2,3,9, 81
Construction Method and Equipment Management	H110606/ 510221	Equipment life, replacement analysis	5,23	3,4,6,8 1
Biological Process design for waste water treatment	H110609/ 530219	Advanced biological treatment, sustainability in waste water treatment	5,23	3,4,6,9 7
Structural Dynamics	H110601	Understand about dynamic behavior of structure and design the structure dynamically stable.	5	3,4
Geographical Information System	H110806	Application of GIS	5	3
Analysis and Design of Bituminous pavements	H110807	Pavement design, traffic analysis	5	3

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DEPARTMENT OF CIVIL ENGINEERING

Summary of Board of Studies Meeting held on 01st December, 2023

NEW COURSES ADDED (Session: Jan - June 2023)

(Course/subject name)	Course Code	Activities/contents which have a bearing on increasing skill and employability	Item No.	Page No.
Expansive Soil	110863	Behavior of expansive soil, treatment of expansive soil, applications	4	2,3,9
Introduction to Civil Engineering Profession	110861	Career prospects and novel areas of Civil Engineering Profession	4	2,3,9
Applied Environmental Microbiology	530221/H110608	Microbial symbiosis, bioremediation	5,23	3,4, 6,97
Analysis and Design of Bituminous pavements	H110807	Pavement design, traffic analysis	5	3



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ANNEXURE – I

**(Scheme 8th Sem B.Tech Civil Engineering (2020
Admitted Batch))**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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Scheme of Evaluation

B. Tech. VIII Semester (Civil Engineering)

For batches admitted in academic session 2020 - 21

S. No.	Subject Category Code	Subject Name	Maximum Marks Allotted										Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam					
			Theory Slot			Practical Slot			MOOCs							Total Marks				
			End Term Evaluation	Mid Sem Proficiency in subject /course	Quiz/Assignment	End Sem. Work & Sessional	Lab	Skill Based Mini Project	Assig nment	Exam	L	T					P			
1.	1108XX DE	Departmental Elective - V (DE - 5) ^a	-	-	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online (03)	MCQ
2.	910XXX OC	Open Category Course - III (OC - 3) ^b	-	-	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online (03)	MCQ
3.	110821 DLC	Internship / Research Project / Innovation & Start-ups (DLC - 5) ^c	-	-	-	-	250	150	-	-	-	-	-	400	-	-	18	-	Interactive	SO
4.	110822 PD	Professional Development ^d	-	-	-	-	50	-	-	-	-	-	-	50	-	-	4	-	Interactive	SO
Total			-	-	-	-	300	150	-	-	-	50	150	650	6	-	22	17	-	-

Additional Courses for obtaining Honours or Minor Specialization

^aProficiency in course/subject - includes the weighting towards ability skill/ competence /knowledge level /exposure obtained /reference etc. to that particular course/subject

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

^cCourse will run through SWAYAMNPTEL MOOC with credit transfer

^dEvaluation will be based on the student's reports brought by the student to the institution in accordance to level required and other events during the complete tenure of the LC program (participation in professional club/inter activities, club activities, cultural events, sports and personality development activities, residential events, MOOCs and technical events)

^eCourse will run through SWAYAMNPTEL MOOC with credit transfer

^fCourse will run through SWAYAMNPTEL MOOC with credit transfer

^gCourse will run through SWAYAMNPTEL MOOC with credit transfer

Subject Code	Mode of Teaching			Mode of Examination				Total Credits					
	Offline	Online	Blended	SIP/Project	MOOC	PDC	Theory		SIP/Project				
-	-	-	-	9	6	2	PP	A+O	SO	SO	2	17	
-	-	-	-	5.5%	35%	12%	-	-	-	-	35%	53%	12%

SEMESTER - VIII

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	
110863. Expansive Soil		910303 Plastic Waste Management	
		910304 Project Management	

Corrected scheme
MS/MS

Civil Engineering Department, MITS Gwalior

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination

B. Tech. VIII Semester (Civil Engineering)

(For Batch Admitted in 2020-2021)

S. No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted										Total Marks	Contact Periods per Week			Total Credits
				Theory Slot		Practical Slot		MOOCS		Exam	L	T	P					
				End Sem.	Mid Sem. Assignment	End Sem.	Lab Work / Sessional	Assignment										
1.	1108XX	DE	(DE-5)*	-	-	-	-	-	-	-	25	75	100	3	-	-	3	
2.	910XXX	OC	(OC-3)*	-	-	-	-	-	-	-	25	75	100	3	-	-	3	
3.	110801	DLC	Internship / Project (DLC-7)	-	-	-	250	150	-	-	-	-	400	-	-	-	18	9
4.	110802	PD	Professional Development*	-	-	-	-	50	-	-	-	-	50	-	-	-	4	2
Total				-	-	-	250	200	-	-	75	235	650	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				

* These courses must be run through SWAYAM / NPTEL / MOOC.

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

DE - 5 (Through SWAYAM/NPTEL)	OC - 3 (Through SWAYAM/NPTEL)
110861. Introduction to Civil Engineering Profession	910XXX. Natural Hazards
110862. Plastic Waste Management	910XXX. Strategies for Sustainable Design
110863. Expansive Soil	910XXX. Plastic Waste Management

Civil Engineering Department, MITS Gwalior

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ANNEXURE – II

**(Scheme & Syllabus 6th Sem B.Tech Civil
Engineering (2021-2022 Admitted Batch))**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

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DEPARTMENT OF CIVIL ENGINEERING Scheme of Evaluation

B. Tech. VI Semester (Civil Engineering)

For batches admitted in academic session 2021-22

S. No.	Subject Code	Subject Name	Maximum Marks Allotted										Total Marks	Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam			
			Theory Slot			Practical Slot			MOOCS								Contact Hours per week		
			End Sem. Evaluation	Mid Sem in subject /course	Quiz/Assignment	End Sem	Lab Work & Sessional	Skill Based Mini Project	Assignment	Exam	L	T					P		
1.	110620	Artificial Intelligence & Machine Learning	50	10	20	20	60	20	20	20	20	-	3	-	2	4	Blended (2/1)	MCQ	
2.	110621	Wastewater Engineering(DC - 14)	50	10	20	20	-	-	-	-	-	-	2	1	-	3	Blended (2/1)	PP	
3.	110622	Structural Design & Drawing (Steel) (DC - 15)	50	10	20	20	-	-	-	-	-	-	2	1	-	3	Blended (2/1)	PP	
4.	110623	Estimating Costing & Contracting (DC - 16)	50	10	20	20	-	-	-	-	-	-	2	1	-	3	Blended (2/1)	PP	
5.	1106XX	Departmental Elective - I (DE - I)*	-	-	-	-	-	-	-	-	-	25	75	-	-	3	Online (0/3)	MCQ	
6.	910XXX	Open Category Course - I (OC - I)	50	10	20	20	-	-	-	-	-	-	3	-	-	3	Blended (2/1)	PP	
7.	110624	Minor Project - II (DLC - 4)	-	-	-	-	60	40	-	-	-	-	100	-	4	2	Offline (2/0)	SO	
8.	200XXX	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	-	-	-	50	-	2	1	Interactive	SO	
Total			250	50	100	100	170	60	20	25	75	-	850	15	3	8	22	-	-
9.	1000007	Intellectual Property Rights	50	10	20	20	-	-	-	-	-	-	100	2	-	-	Grade	Online	MCQ

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
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

Offline	Mode of Teaching			Mode of Examination			Total Credits	
	Theory		Lab	Theory		Lab		SIP/SLP/NEC
	Online	Blended	Offline	A+O	MCQ	SO		
-	-	10	3	13%	3	3	1	22
-	-	46%	23%	13%	-	27%	13%	5%

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

- 1.110661, Geotechnical Engineering II - Foundation Engineering
- 2.110662, Concrete Technology
- 3.110663, Air Pollution & Control

Open Category Course - I (OC-I)

- 1.910111, Building Maintenance & Services
- 2.910110, Sustainable Materials & Green Buildings

Civil Engineering Department, MITS Gwalior

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DEPARTMENT OF CIVIL ENGINEERING

ANNEXURE – II

SYLLABUS FOR DEPARTMENTAL ELECTIVE COURSES (DCs) TO BE OFFERED IN VI SEMESTER

Course Code: 110621

Course Name: Waste Water Engineering

L	T	P	Credit
2	1	0	3

Course Objectives:

- 1) To impart basic knowledge on sewerage system including estimation of sewage quantity & design of sewers.
- 2) To provide a broad knowledge on sewage composition & its characteristics.
- 3) To provide information on disposal standards of effluents & also about various methods of sewage disposal.
- 4) To provide broad knowledge on various techniques of sewage treatment including advanced processes.

Syllabus:

Unit – I

Sewerage schemes & sewerage system and their importance, collection & conveyance of sewage, Estimation of sewage & storm water quantity, fluctuation in sewage flow, Flow through sewer, Design of sewer, Construction & maintenance of sewer, testing of sewer, Sewer appurtenances.

Unit – II

Characteristics and analysis of wastewater (Physical, chemical & biological parameters). Oxygen demand i.e. BOD & COD, TOC, TOD, ThOD, relative Stability, Population equivalent, Natural methods of waste water disposal i.e. by land treatment & by dilution, Self-purification capacity of stream, Oxygen sag analysis (numerical problems).

Unit-III

Unit operations for waste water treatment, Preliminary treatment such as screens, grit chamber, floatation tank, sedimentation etc. and chemical clarification, Role of micro-organism in biological treatment, Sewage filtration – theory & design. Trickling filter its design & constructions, modifications in trickling filter.

Unit-IV

Methods of Biological Treatment (Theory & Design) – Activated Sludge Process, Oxidation ditch, Stabilization Ponds, Aerated Lagoon, Anaerobic Lagoons, Septic Tank & Imhoff tank, Rotating Biological contactor Sources & treatment of sludge, sludge thickening and digestion, sludgedrying beds, sludge disposal.

Unit-V

Advanced Waste Water treatment – Need of advanced treatment, Diatomaceous earth

Handwritten signatures and marks:
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DEPARTMENT OF CIVIL ENGINEERING

filters, Ultrafiltration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Sewage treatment plants using MBBR and SBR technology.

Course Outcomes:

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

CO 1: Explain the concepts of waste water engineering.

CO 2: Determine the requirements for safe disposal of sewage.

CO 3: Apply suitable techniques for sewage treatment & disposal based upon the available data.

CO 4: Analyse a given sewerage system.

CO 5: Design sewage system for safe disposal of sewage

Text Books:

1. Waste Water Engg., B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2016
2. Sewage Disposal and Air Pollution Engineering, S. K. Garg, Khanna Publishers, 2017

Reference Books:

1. Water Supply & Sanitary Engg., G.S. Birdie, Dhanpat Rai Publishing Company, 2014
2. Environmental Engg., Rowe, Peavy & Tchobanogolous Tata McGraw Hill Publication, 2017
3. Water & Waste Water Technology, Mark J Hammer, Prentice Hall of India, 6th edition 2008
4. Waste Water Engineering, Metcalf & Eddy, Mc Graw Hill Book Company New Delhi, 4th edition 2005
5. CPHEEO Manual on Sewage & Sewage Treatment System, GOI, 2013

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DEPARTMENT OF CIVIL ENGINEERING

Course Code: 110622

Course Name: Structural Design &
Drawing(Steel)

L	T	P	Credit
2	1	0	3

Course Objectives:

- 1) To learn IS 800-2007 code of practice for the design of Compression, Tension and Flexural members using various cross-sections.
- 2) To understand the behavior of steel structural components subjected to gravity loads.
- 3) To study the design of bolted and welded connections.
- 4) To study the behaviour and design of compression and tension members using simple and built up sections.
- 5) To understand behaviour of flexural members and the design laterally restrained & unrestrained beams.
- 6) To design plate girders & column bases.

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, Lacing & Battens. Codal provision.

Unit-IV

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

Unit-V

Introduction to plate girder. Design of plate girder. Design of slab bases for steel structures. 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 plate girder section and column bases.

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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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DEPARTMENT OF CIVIL ENGINEERING

Course Code: 110623

Course Name: Estimating Costing & Contracting

L	T	P	Credit
2	1	0	3

Course Objectives:

- 1) To work out the quantities of various items of civil works like buildings, culverts including steel girders etc.
- 2) To compute earthwork.
- 3) To understand detailed specifications and carry out analysis of rates.
- 4) To understand various methods of carrying out estimation.
- 5) To understand valuation process & fixation of rent.
- 6) To understand contracting procedures.

Syllabus:

Unit I Introduction of Estimating:

Purpose and importance of estimates, principles of estimating, methods of taking out quantities of items of work. Mode of measurement, measurement sheet and abstract sheet, bill of quantities. Types of estimate, plinth area rate, cubical content rate, preliminary, original, revised and supplementary estimates for different projects.

Unit II: Details of Items:

Specifications of materials and works: Types of Specifications, General specifications for Class A, B & C type of building, Detailed specifications of important items of work.

Rate Analysis: Task for average artisan, various factors involved in the rate of item, material and labour requirement for various trades, preparation for rates of important items of work, current schedule of rates (C.S.R)

Unit III: Estimates

Preparing detailed estimates of various types of buildings, R.C.C Works, Culverts, earth work calculations for roads and Canals, contingencies and work charge establishment, use of computational tools for preparing estimates.

Unit IV: Valuation

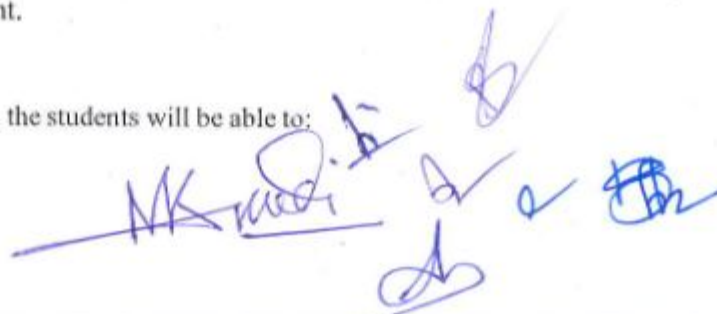
Purposes, depreciation, sinking fund, scrap value, year's purchase, gross and net income, dual rate of interest, methods of valuation, rent fixation of buildings

Unit V: Contracting

Contract, Types of engineering contract, essential documents of engineering Contract, Conditions of contract, Earnest Money Deposit, Security Deposit, Responsibility of Engineer, Contractor & Client.

Course Outcomes:

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



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CO 1: Explain the fundamentals of quantity estimation, costing & contracting.

CO 2: Apply methods to estimate area, volume & cost.

CO 3: Evaluate mathematical & numerical models for rate & quantity estimation.

CO 4: Determine rates & value.

CO 5: Classify different rates of items, contracts & measurement techniques.

Text Books:

1. Estimating & costing in civil engineering, B.N. Dutta, UBS Publishers, 28th revised edition 2016
2. Estimating & Costing, S.C. Rangwala, Charotar Publishing House, 17th edition 2017

Reference Books:

1. Estimating & Costing for Civil Engg., G.S. Birdie, Dhanpat Rai Publications, 6th edition 2014
2. Estimating & Costing specification & valuation in civil engineering, M. Chakraborti, 2006

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DEPARTMENT OF CIVIL ENGINEERING

Course Code:110624

Course Name: Minor Project - II

L	T	P	Credit
0	0	4	2

Course Objectives:

- 1) To develop an appreciation of civil engineering problems & have a feel of real life situations in planning & execution of projects.
- 2) To impart training of handling various types of civil engineering problems by use of conventional methods as well as software's.
- 3) To utilize the expertise in engineering to solve industry's technological problems.
- 4) To become innovative and professional in technology development, and system implementation.
- 5) To be able to function in their profession with social awareness and responsibility.
- 6) To be able to interact with their peers in industry and society as engineering professionals and leaders & inculcate a habit of working in a group.
- 7) Enable students to prepare professional reports for design projects and data presentation skill and to use computers and some computer graphics.

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.



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DEPARTMENT OF CIVIL ENGINEERING

Course Code:110620

Course Name: Artificial Intelligence & Machine Learning

COURSE OBJECTIVES:

1. To provide the fundamental knowledge of Artificial Intelligence, Neural Network and Machine Learning.
2. To present the basic representation and reasoning paradigms used in AI & ML.
3. To understand the working of techniques used in AI & ML.

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.

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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.

CO6: Build AI enabled intelligent systems for solving real world problems.




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ANNEXURE – III

**(Syllabus of OC 6th Sem B.Tech Civil Engineering
(2021 Admitted Batch))**



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:

1. To learn about building services required in a building.
2. To learn about fire fighting systems in buildings.
3. To understand planning and maintenance requirements of lifts in high rise buildings.
4. To understand water management and planning system in a building.
5. To learn maintenance of building services and management of related tasks.

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

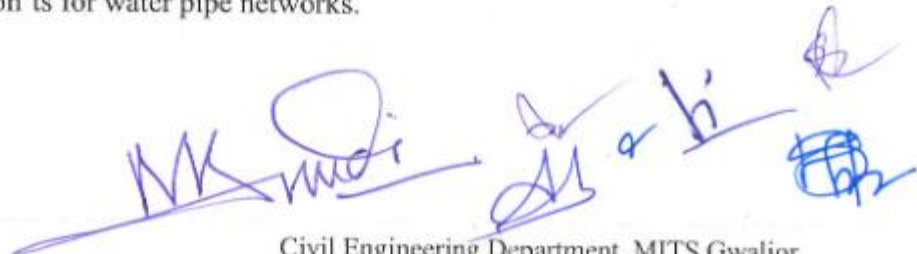
Fire Fighting: Standard fire, fire resistance, classification of buildings. Basic requirement of the works for fighting system, various components of the fire fighting system. Maintenance required of the system, fire fighting in high-rise buildings, commercial/industrial complexes. Public buildings,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



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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.

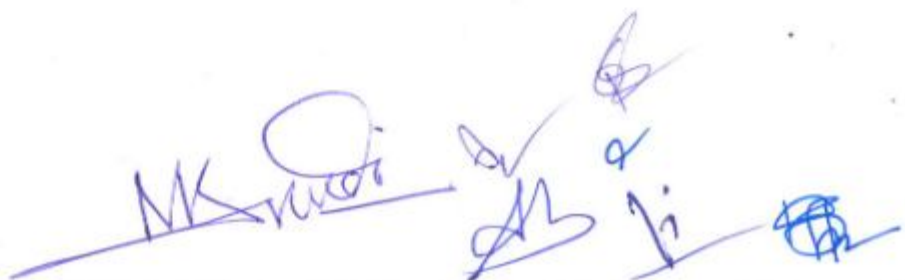
Course Outcomes:

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 Jackie Partman, Wiley Blackwell 2014.
2. Building Services Engineering by David V. Chadderton, Routledge 2013.



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Course Code: 910110

Course Name: Sustainable Materials & Green Buildings

L	T	P	Credit
3	0	0	3

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 Energyconsumption 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 forcements 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.

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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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ANNEXURE – IV

**(Scheme & Syllabus 4th Sem B.Tech Civil Engineering
(2022-2023 Admitted Batch))**

The image shows four handwritten signatures in blue ink, arranged horizontally. The first signature is the most prominent, followed by three smaller, more stylized signatures.



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Department of Civil Engineering

Scheme of Evaluation

B. Tech. IV Semester CIVIL ENGINEERING

for batch admitted in academic session 2022-23

No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted										Total Credits	Mode of Teaching	Mode of Exam	Duration of Exam	
				Theory Slot		Practical Slot			Total Marks		Hours per week		Total Credits					
				End Term Evaluation	Continuous Evaluation	End Sem. Exam	Lab Work & Sessional	Skill Based Mini Project	Total Marks	L	T	P						
1.	2100028	BSC	Engineering Mathematics - III (18C - 3)	50	10	20	20	-	-	-	100	3	1	-	4	Offline	PP	2 Hrs
2.	2110421	DC	Fluid Mechanics - II (18C - 9)	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
3.	2110422	DC	Theory of Structure - II (18C - 10)	50	10	20	20	-	-	-	100	2	1	-	3	Offline	PP	2 Hrs
4.	2110423	DC	Water Supply Engineering (18C - 11)	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs
5.	2110424	DC	Water Resources Engineering (18C - 12)	50	10	20	20	-	-	-	100	2	1	-	3	Blended	PP	2 Hrs
6.	2110425	DLC	Civil Drawing Lab (18C - 3)	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO	-
7.	2110426	MC	Cyber Security	50	10	20	20	-	-	-	100	2	-	-	2	Online	MCQ	1.5 Hrs
8.	200XXX	C.T.C	Novel Engaging Course (18C - 13) (Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO	-
Total				300	60	120	120	170	40	40	850	13	5	6	21			
9.	3000002	Natural Sciences & Skills	Engineering Chemistry	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs
10.	1000001	MAC	Indian Constitution & Traditional Knowledge	50	10	20	20	-	-	-	100	2	-	-	GRADE	Online	MCQ	1.5 Hrs

⁵Proficiency in course/subject – includes the weightage towards ability/ skill/ competency / knowledge level / expertise attained etc. in that particular course/subject
 Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language, Credits of natural Sciences & Skills will be added in VI Semester.
 MCQ: Multiple Choice Question. AO: Assignment + Oral. OB: Open Book. PP: Pen Paper. SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits			
Theory		Lab/SIP		Seminar		NEC		SIP/SIP/NEC			
Offline	Online	Blended	Offline	Online	Mentoring	Interactive	PP	AO	MCQ	SO	SO
7	2	9	2	1	16	7%	16	2	2	1	21
33%	9%	13%	9%	6%	7%	7%	16%	9%	9%	6%	63%

Corrected scheme
 Ms. Indu

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DEPARTMENT OF CIVIL ENGINEERING

Scheme of Evaluation

B. Tech. IV Semester (Civil Engineering)

For batches admitted in academic session 2022-23

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
				Theory Slot		Practical Slot		End Sem Exam	Total Credits	L	T	P					
				End Term Evaluation	Continuous Evaluation	Lab	Work & Sessional						Skill Based Mini Project				
1.	2100028	BSC	Engineering Mathematics - III (BSC - 3)	50	10	20	20	-	-	-	100	2	1	-	3	Offline (3/0)	PP
2.	2110411	DC	Fluid Mechanics - II (DC - 9)	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
3.	2110412	DC	Theory of Structure - II (DC - 10)	50	10	20	20	-	-	-	100	2	1	-	3	Offline (3/0)	PP
4.	2110413	DC	Water Supply Engineering (DC - 11)	50	10	20	20	60	20	20	200	2	1	2	4	Blended (2/1)	PP
5.	2110414	DC	Water Resources Engineering (DC - 12)	50	10	20	20	-	-	-	100	2	1	-	3	Blended (2/1)	PP
6.	2110415	DLC	Civil Drawing Lab (DLC - 3)	-	-	-	-	60	20	20	100	-	-	2	1	Offline (1/0)	SO
7.	100009	MC	Cyber Security	50	10	20	20	-	-	-	100	2	-	-	2	Online (0/2)	MCQ
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	50	-	-	2	1	Interactive	SO
Total				300	60	120	120	290	60	60	950	12	5	8	20	-	-
9.	3000002	Natural Science & Skills	Engineering Chemistry	50	10	20	20	30	10	10	150	1	-	2	Grade	Blended	MCQ
10.	1000001	MAC	Indian Constitution & Traditional Knowledge	50	10	20	20	-	-	-	100	2	-	-	Grade	Online	MCQ

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

⁵Proficiency 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

Mode of Teaching	Mode of Examination				Total Credits
	Theory		Lab		
	Interactive	PP	MCQ	SO	
Offline	6	2	3	1	21
29%	10%	29%	14%	4%	21
Blended	6	3	8	1	21
29%	10%	38%	14%	4%	21
Online	3	9	3	1	21
10%	44%	38%	4%	4%	21

Civil Engineering Department, MITS Gwalior

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DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS B.Tech Civil Engineering

**2022 ONWARDS
ADMITTED BATCHES**

SEMESTER-IV

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Course Code: 2110411

Course Name: Fluid Mechanics – II

L	T	P	Credit
2	1	0	3

Course Objectives:

- 1) To develop an understanding of fluid flows patterns and learnt to use boundary layer theory and drag.
- 2) To apply theories of laminar & turbulent flow to solve typical pipe flow problems in the field.
- 3) To apply boundary layer theory to estimate drag & lift for various shapes of the objects.
- 4) To classify the types of flows in open channel and also to design open channel sections in a most economical fashion with minimum wetted perimeter and learn about critical flows.
- 5) To study about non uniform flows in open channel and longitudinal slopes in open channel and also learn about the characteristics of hydraulic jump.
- 6) To understand design philosophy of various types of pumps & turbines.

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.

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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.

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 Code: 2110412

Course Name: Theory of Structure - II

L	T	P	Credit
2	1	0	3

Course Objectives:

- 1) To understand the analytical procedure related to the analysis of building frame by some classical methods viz. Kani's methods and approximate methods of analysis.
- 2) To study the multi storey frames subjected to gravity loads and lateral loads
- 3) To understand matrix method and its application for computer based analysis of structure.
- 4) To understand the influence line concepts for indeterminate structures
- 5) To develop the skill to deal with the problems of moving loads in the structures & their analysis techniques.
- 6) To understand the concepts of plastic analysis of structures.

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

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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

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 Code: 2110413
Course Name: Water Supply Engineering

L	T	P	Credit
2	1	2	4

Courses Objectives:

Students will be able to understand

- 1) The structure of drinking water supply systems, including water transport, treatment and distribution.
- 2) Water quantity and water quality criteria and standards, and their relation to public health.
- 3) Operation and maintenance of water supply system components.
- 4) How to estimate water requirement of a city
- 5) How to design water treatment plant for urban & rural areas
- 6) How to design water distribution network including pipe & appurtenances.

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 clarifloculator, 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,

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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: Determine the requirements for safe supply of water.
- CO 3: Apply suitable water treatment technique based upon the available data.
- CO 4: Analyse a given water supply scheme.
- CO 5: Design a water supply system based upon the needs of society.

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, Rowc & 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 watersample.
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.

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.
- CO 4: Train others on various ways of improving the quality of water.

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.

Course Code: 2110414

Course Name: Water Resources Engineering

L	T	P	Credit
2	1	0	3

Course Objectives:

- 1) To understand the water requirements of various types of crops.
- 2) To understand the different types of irrigation systems.
- 3) To plan the reservoir systems as per the requirements.
- 4) To understand the concepts of Khosla's and Bligh's theory & its applications.
- 5) To understand the concepts of Lacey's and Kennedy theory for design of canal systems.
- 6) To develop an understanding of various components of hydrological cycle, their behaviors & factors affecting it & solve problems on measurement on rainfall, infiltration, evaporation.
- 7) To understand concepts of Hydrometry & ground water hydrology.
- 8) To discuss the importance of estimation of runoff, analysis of rainfall data and various hydrographs and analyze various problems off runoff using various hydrograph theories.
- 9) To develop an understanding of various methods of flood estimation in general & flood frequency.

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

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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: Explain the concept of hydrology and hydrograph

CO 2: Apply basic principles for measurement & forecasting of rainfall & runoff.

CO 3: Analyse runoff hydrograph by various methods.

CO 4: Analyse various requirements for an efficient irrigation project.

CO 5: Design different components of irrigation system using different theories.

CO 6: 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 Code: 2110415

Course Name: Civil Drawing Lab

L	T	P	Credit
0	0	2	1

Course Objectives:

- 1) To draw plan, elevation & section of various components of a building.
- 2) To prepare sketches of various components of building like doors, windows etc.
- 3) To expose students to use software's like AutoCAD in civil engineering drawing.

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

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

ANNEXURE – V

**(Suggestive List of Skill Based Mini Projects for B.Tech
IVth Semester Civil)**

ANNEXURE – V

Suggestive List of Skill Based Mini Projects for B.Tech IVth Semester

2110413, Water Supply Engineering:

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.

ANNEXURE – VI

**(Scheme & Syllabus 2nd Sem B.Tech Civil Engineering
(2023-2024 Admitted Batch))**





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Department of Civil Engineering

Scheme of Evaluation

B. Tech. II Semester (CIVIL ENGINEERING)

(For batch admitted in academic session 2023-24)

No.	Subject Code	Category Code	Subject Name	Maximum Marks Allowed						Contact Hours per week		Total Credits	Mode of Exam.	Mode of Teaching	Duration of Exam.		
				Theory Slot		Practical Slot		Total Marks	L	T	P						
				End Term Evaluation	Continuous Evaluation	End Sem. Exam	Continuous Evaluation									Lab Work & Sessional	Skill Based Mini Project
1.	3110221	DC	Surveying (DC - 2)	50	10	20	20	-	-	100	3	-	-	3	Blended	PP	2 Hrs
2.	3110222	DC	Strength of Materials (DC - 4)	50	10	20	20	40	30	200	2	1	2	4	Blended	PP	2 Hrs
3.	3100021	ESC	Basic Mechanical Engineering (ESC - 4)	50	10	20	20	-	-	100	2	1	-	3	Blended	MCQ	1.5 Hrs
4.	3100022	ESC	Basic Electrical & Electronics Engineering (ESC - 5)	50	10	20	20	40	30	200	2	1	2	4	Blended	MCQ	1.5 Hrs
5.	3110224	ESC	Python Programming (ESC - 6)	50	10	20	20	40	30	200	2	1	2	4	Blended	AO	2 Hrs
6.	3110223	DI.C	Survey Practice Lab (DI.C - 2)	-	-	-	-	40	30	100	-	-	2	1	Online	SO	-
Total				250	50	100	100	160	120	900	11	4	8	19			
7.	3000004	Natural Sciences & Skills	Language	50	10	20	20	30	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs

Summer Internship Project - I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.

Proficiency in course/subject - includes the weightage towards ability, skill, competency/knowledge level/expertise attained etc. in that particular course/subject
Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Languages, Credits of natural Sciences & Skills will be added in VI Semester.

MCQ: Multiple Choice Question AO: Assignment - Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Lab		Theory		Lab			
Offline	Online	Blended		PP	AO	MCQ	SO		
15		89%	4	6	3	6	4	32%	15%
		21%		32%		21%		19	
								Credits %	

Corrected scheme
Maximidi



Department of Civil Engineering
Scheme of Evaluation
B. Tech. II Semester

(for batch admitted in academic session 2023-24)

No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Mode of Teaching	Mode of Exm.	Duration of Exam.	
				Theory Slot			Practical Slot				Total Credits	L	T				P
				End Term Evaluation		Continuous Evaluation	End Sem. Exam	Lab Work & Sessional	Skill Based Mini Project								
				End Sem. Exam	Proficiency in subject /course												
1.	3110221	DC	Surveying (DC -3)	50	10	20	20	-	-	-	100	3	-	-	Blended	PP	2 Hrs
2.	3110222	DC	Strength of Materials (DC -4)	50	10	20	20	40	30	30	200	2	1	2	Blended	PP	2 Hrs
3.	3100021	ESC	Basic Mechanical Engineering (ESC -4)	50	10	20	20	-	-	-	100	2	1	-	Blended	MCQ	1.5 Hrs
4.	3100022	ESC	Basic Electrical & Electronics Engineering (ESC -5)	50	10	20	20	40	30	30	200	2	1	2	Blended	MCQ	1.5 Hrs
5.	3100224	ESC	Python Programming (ESC -6)	50	10	20	20	40	30	30	200	2	1	2	Blended	AO	2 Hrs
6.	3110223	DLC	Survey Practice Lab (DLC-2)	-	-	-	-	40	30	30	100	-	-	2	Offline	SO	-
Total				250	50	100	100	160	120	120	900	14	4	8	19		
7.	3000004	Natural Sciences & Skills	Language	50	10	20	20	30	10	10	150	1	-	2	Blended	MCQ	1.5 Hrs

Summer Internship Project - I (Institute Level) (Qualifier): Minimum two-week duration: Evaluation in III Semester.
 *Proficiency in course/subject - includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in that particular course/subject
 Natural Sciences & Skills: Engineering Physics / Engineering Chemistry / Environmental Engineering / Language, Credits of natural Sciences & Skills will be added in VI Semester.
 MCQ: Multiple Choice Question AO: Assignment + Oral OB: Open Book PP: Pen Paper SO: Submission + Oral

Mode of Teaching						Mode of Examination						
Theory			Lab			Theory			Lab			
Offline	Online	Blended	Blended	Offline	Lab	PP	AO	MCQ	AO	MCQ	SO	
		15	89%	4	21%	6	3	6	3	6	4	
						32%	15%	32%	15%	32%	21%	
											19	Credits %

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(Signatures and Date)
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**DEPARTMENT OF
CIVIL ENGINEERING**

**SYLLABUS B.Tech Civil
Engineering**

**2023 ONWARDS
ADMITTED BATCHES**

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SEMESTER-II

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NAAC Accredited with A++ Grade

Course Code:

3110221 Course

Name: Surveying

L	T	P	Credit
3	0	0	3

Course Objectives:

- 1) To understand the working of Theodolite, Tacheometer and Total Station.
- 2) To understand the determination of distances, direction and elevation.
- 3) To understand the surveying techniques and their application in various fields.
- 4) To provide knowledge on setting out civil engineering works & detailed field surveying.
- 5) To understand various types of curves used in practice and concepts of hydrographic & photographic surveying.

Syllabus:

Unit I: Surveying Measurements

Introduction to surveying, their classification, methods and principles, Measurement of distance and direction. Introduction to Remote Sensing & LiDAR technology in Survey, Global Positioning System (GPS) and its application.

Unit II: Levelling & Contouring

Method of levelling, methods of reduction of level, Reciprocal and trigonometric levelling, Contouring and Plotting, Use of Contour maps, Measurement of area and volume.

Unit III: Tachometry & Traversing

Principles and Instruments used in Tachometry, Methods of Theodolite traversing, Plotting and Adjustment, Omitted measurement in traverse, Plane Table Surveying.

Unit IV: Curves

Curve surveying, their use, elements of circular curves, Methods of setting out curves, obstacles and special problems, compound curves, reverse curves, transition curves, vertical curve, computation and setting out.

Unit V: Surveying Techniques

Systems and Principles of Triangulation, Baseline measurement and its extension, Total Station and its application in surveying, Introduction to Aerial Survey using UAV/ Drones, Introduction to photogrammetry and hydrographic survey.

Course Outcomes:

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

CO1: Explain the techniques used for linear and angular measurements in surveying.

CO2: Explain the various concepts of levelling, contours and its application.

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CO3: Apply various methods of surveying.

CO4: Analyse various techniques of controlling points.

CO5: Evaluate various methods for curve setting.

Text Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2016
2. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 13th edition 2016
3. Surveying Volume – I & II, S. K. Duggal, McGraw Hill Publication, 2015

Reference Books:

1. Surveying theory & Practice, R.E. Devise, McGraw Hill, New York, 4th revised edition 2001
2. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition, 1999
3. Surveying & Levelling, N N Basak, McGraw Hill Publications, 2015
4. Plane & Geodetic surveying Vol. I & II, David Clark & J Clendinning, Constable & C.London, 2017

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Course Name: Survey Practice Lab

L	T	P	Credit
0	0	2	1

Syllabus:

List of Experiments:

1. Measurement of distance using chain & tape of given survey area.
2. Measurement of direction by prismatic compass & surveyor's compass.
3. Exercise of flying levelling by dumpy level.
4. Profile Levelling & Cross Sectioning of Road using dumpy level.
5. Determination of R.L. of a point whose base is accessible & inaccessible by Trigonometrical levelling.
6. Prepare Contour map by using Grid Pattern & Tachometric Method.
7. Preparation of contour map by total station.
8. Determination of horizontal & vertical position of a point by Total Station & measurement of area.
9. Traversing by Total Station.
10. Measurement of horizontal and vertical angle by Vernier Theodolite.
11. Determination of height & distance by using Stadia method & Tangential tachometry
12. Preparation of map of given survey field by Radiation and intersection method using Plane table.
13. Resection by Two point problem & Three point problem.
14. Setting out of a simple circular curve by using Rankine's method.
15. Setting out of a simple circular curve by using Offset from the chord produced or deflection distance.
16. Measurement of base line by using Substance Bar.

Course Outcomes:

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

CO 1: Follow the guidelines for field surveying.

CO 2: Follow the working principles of survey instruments for measurements.

CO 3: Measure horizontal & vertical angle by theodolite for traversing and levelling.

CO 4: Determine tachometric constants for linear measurements by tachometry. **CO 5: Create** a simple circular curve by using Rankine's method for alignment **CO 6: Develop** contour map by using tachometer & total station.

Suggestive List of Skill Based Mini Project:

1. Development of contour map using Total Station.
2. Setting out of Horizontal Curve using Total Station & Theodolite.
3. Area Volume calculations using Total Station.

Text Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2016
2. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition, 1999

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Reference Books:

1. Surveying theory & Practice, R.E. Devis, McGraw Hill, New York, 4th revised edition 2001
2. Surveying Volume –II, S. K. Duggal, McGraw Hill Publication, 2015
3. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 13th edition 2016

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Course Code: 3110222

**Course Name: Strength of
Materials**

L	T	P	Credit
2	1	2	4

Course Objectives:

- 1) To understand the concepts of simple and compound stresses and strains.
- 2) To understand the behaviour of elastic materials in bending, shear and torsion.
- 3) To understand the stability behaviour of long columns under axial load.
- 4) To understand the power transmission by shaft.
- 5) To understand stresses & strain developed in storage vessels
- 6) To calculate stresses / strain in statically indeterminate structures.

Syllabus:

Unit-I

Stress and Strains: Concept of Elastic body, stress and strain. Hooke's law various types of stress and strains. Elastic constants and their relation Stresses in compound bars, composite and tapering bars, temperature stresses.

Two-dimensional stress system. Normal and tangential stresses, Principal Planes, Principal Stresses and strains. Mohr's circle of stresses. Strain energy and theories of failure.

Unit - II

Theory of simple bending: Concept of pure bending and bending stress, equation of bending, Neutral axis, Section-Modulus, Bending stress distribution across a section, Shear Stresses in Beams, beams of uniform strength, shear centre.

Unit-III

Torsion of Shafts: Concept of pure torsion, Torsion equation, Determination of shear stress and angle of twist of shafts of circular section, Hollow circular shafts. Combined bending and torsion.

Pressure Vessels: Thin cylinders and spheres. Stress due to internal pressure. Change in diameter and volumes.

Unit-IV

Columns and Struts: Euler's buckling load for uniform section, various end conditions. Slenderness Ratio. Merchant Ranking formulae, Eccentric loading on columns.

Unit-V

Deflection of statically determinate structure by Geometrical methods & Introduction of method of virtual work.

Course Outcomes:

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

CO 1: Apply the concepts of stress and strain.

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CO 2: Apply theory of simple bending in beams.

CO 3: Apply the concept of pure torsion in shaft and determine the stresses in pressure vessels.

CO 4: Evaluate columns & struts with different end conditions.

CO 5: Analyse the structure using geometrical methods and virtual work to determine the deflection.

Text Books:

1. Strength of Materials, Sadhu Singh, Khanna Publishing, 1st edition 2016
2. Strength of Materials, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publishing Company, 18th edition 2014
3. Strength of Materials, R. K. Bansal, Laxmi Publication; 6th edition 2018

Reference Books:

1. Strength of Materials, Timoshenko, Publisher CBS, 3rd edition 2004
2. Strength of Materials, HigdonStyle, Publisher Wiley, 3rd edition 1978
3. Strength of Materials Vol. I & II, B.C. Punmia, Laxmi Publication, 10th edition 2018
4. Mechanics of Materials, R.C. Hibbler, Pearson Publication, 2016
5. Mechanics of Materials, J. M. Gere & B.J. Goodno, Cengage Publisher, 8th edition 2014

List of Experiments:

1. Impact Test
2. Brinell Hardness Test
3. Behaviour of columns with Different End Conditions
4. Tensile test
5. Compression test
6. Flexure test
7. Shear test
8. Spring test
9. Torsion test
10. Verification of Maxwell's Reciprocal Theorem.
11. Bending of Beam (One Point loading only).
12. Bending of Beam (Two Point loading only).

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

CO1: Evaluate properties of material by impact test.

CO2: Evaluate properties of material by hardness test.

CO3: Evaluate properties of material by tensile test.

CO4: Determine compressive & flexural strength of materials.

Suggestive List of Skill Based Mini Project:

1. Determination of unsymmetrical bending & shear center.
2. Beam Deflection
3. Determination of Stress Strain curve for steel.

ANNEXURE – VII

(CO Attainment Jan-June 2023)

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ANNEXURE – XI

CO Attainment & Gap Analysis Jan – June 2023

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

Course Code & Name	Faculty Assigned	Course Outcomes	Direct CO Attainment	Indirect CO Attainment	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken	
2110221: Surveying	Prof. A. K. Dwivedi	CO 1	2.24	3.00	2.39	2.5	0.11	Not Attained	More assignments given on Linear & angular measurements	
		CO 2	2.34	3.00	2.47	2.5	0.03	Not Attained	More assignments given to analyse different survey problem	
		CO 3	2.40	3.00	2.52	2.5	-	0.02	Attained	Rubrics for the level can be modified
		CO 4	2.39	3.00	2.51	2.5	-	0.01	Attained	Rubrics for the level can be modified
		CO 5	2.19	3.00	2.35	2.5	0.15	Not Attained	More assignments given on curve	
2110222: Strength of Materials	Dr. Sanjay Tiwari	CO 1	2.10	3.00	2.28	2.5	0.22	Not Attained	More demonstration and assignments given	
		CO 2	2.15	3.00	2.32	2.5	0.18	Not Attained		
		CO 3	1.98	3.00	2.18	2.5	0.32	Not Attained		
		CO 4	1.88	3.00	2.10	2.5	0.40	Not Attained		
		CO 5	1.95	3.00	2.16	2.5	0.34	Not Attained		
2110222: Strength of	Dr. Hemant Shrivastava &	CO 1	3.00	1.50	2.70	2.5	-	Attained	Rubrics for the level can be	
							0.20			

Dr. Hemant Shrivastava

Materials (Lab)	Dr. Abhilash Shukla	CO 2	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 3	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 4	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 5	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 1	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
2110223: Survey Practice Lab	Prof. Gautam Bhadoriya & Prof. Shailendra Harioudh	CO 2	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 3	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 4	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 5	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 1	3.00	1.50	2.70	2.5	-0.20	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	Faculty Assigned	Course Outcomes	Direct CO Attainment	Indirect CO Attainment	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
110411: Geotechnical Engineering-I	Prof. Shailendra Hariouh & Prof. Deepanshu Agrawal	CO 1	2.44	3.00	2.56	2.5	-0.06	Attained	Rubrics for the level can be modified
		CO 2	2.32	3.00	2.46	2.5	0.04	Not Attained	More assignments given to examine the shear parameters
		CO 3	2.28	3.00	2.42	2.5	0.08	Not Attained	More assignments given to determine the stress and shear failure
		CO 4	2.35	3.00	2.48	2.5	0.02	Not Attained	More assignments given to evaluate the shear strength
		CO 5	2.27	3.00	2.42	2.5	0.08	Not Attained	More assignments given to analyse the stability of slopes
110411: Geotechnical Engineering-I (Lab)	Prof. Shailendra Hariouh & Prof. Deepanshu Agrawal	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

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110413: Transportation Engineering (Lab)	Dr. M. K. Trivedi & Prof. A. K. Dwivedi	CO 1	3.00	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	3.00	2.5	-0.50	Attained	Rubrics for the level can be Modified
		CO 3	3.00	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
		CO 4	3.00	3.00	2.70	1.50	2.5	-0.20	Attained	Rubrics for the level can be Modified
		CO 5	3.00	3.00	2.70	1.50	2.5	-0.20	Attained	Rubrics for the level can be Modified
110415: Civil Engineering Drawing Lab	Prof. Gautam Bhadoriya & Dr. Hermant Shrivastava	CO 1	2.78	2.52	1.50	2.5	-0.02	Attained	Rubrics for the level can be modified	Rubrics for the level can be modified
		CO 2	2.88	2.60	1.50	2.5	-0.10	Attained	Rubrics for the level can be Modified	Rubrics for the level can be Modified
		CO 3	2.89	2.61	1.50	2.5	-0.11	Attained	Rubrics for the level can be modified	Rubrics for the level can be modified
		CO 4	2.71	2.77	3.00	2.5	-0.27	Attained	Rubrics for the level can be Modified	Rubrics for the level can be Modified



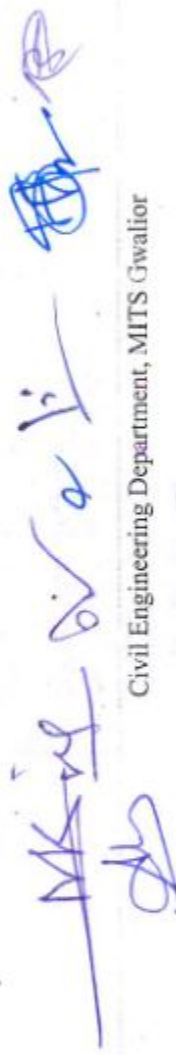



Table.3: CO Attainment & Gap Analysis of III Year, VI SEM

Course Code & Name	Faculty Assigned	Course Outcomes	Direct CO Attainment	Indirect CO Attainment	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
110620: Artificial Intelligence & Machine Learning	Dr. Hemant Shrivastava & Dr. Abhilash Shukla	CO 1	2.48	3.00	2.58	2.5	-0.08	Attained	Rubrics for the level can be Modified
		CO 2	2.55	3.00	2.64	2.5	-0.14	Attained	Rubrics for the level can be modified
		CO 3	2.50	3.00	2.60	2.5	-0.10	Attained	Rubrics for the level can be Modified
		CO 4	2.60	3.00	2.68	2.5	-0.18	Attained	Rubrics for the level can be Modified
		CO 5	2.57	3.00	2.65	2.5	-0.15	Attained	Rubrics for the level can be modified
110620: Artificial Intelligence & Machine Learning (Lab)	Dr. Hemant Shrivastava & Dr. Abhilash Shukla	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
	Prof. A. K.	CO 1	2.41	3.00	2.53	2.5	-0.03	Attained	Rubrics for the level can be modified

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110621: Waste Water Engineering	Saxena & Prof. Deepanshu Agrawal	CO 2	2.38	3.00	2.50	2.5	0.00	Attained	Rubrics for the level can be Modified
		CO 3	2.40	3.00	2.52	2.5	-0.02	Attained	Rubrics for the level can be modified
		CO 4	2.31	3.00	2.45	2.5	0.05	Not Attained	More assignments on problems Analysis
		CO 5	2.33	3.00	2.46	2.5	0.04	Not Attained	More assignments on design problems
		CO 1	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
110621: Waste Water Engineering (Lab)	Prof. A. K. Saxena & Prof. Deepanshu Agrawal	CO 2	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be Modified
		CO 3	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be Modified
		CO 4	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 5	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be Modified
		CO 1	2.24	3.00	2.39	2.5	0.11	Not Attained	More assignments
110623: Estimate Costing & Contract	Prof. A. K. Dwivedi & Prof. Ashutosh Singh Yadav	CO 2	2.34	3.00	2.47	2.5	0.03	Not Attained	More assignments
		CO 3	2.40	3.00	2.52	2.5	-0.02	Attained	Rubrics for the level can be Modified
		CO 4	2.39	3.00	2.51	2.5	-0.01	Attained	Rubrics for the level can be Modified
		CO 5	2.19	3.00	2.35	2.5	0.15	Not Attained	More assignments



110624: Minor Project-II	Dr. Hemant Shrivastava	CO 1	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be modified
		CO 2	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be Modified
		CO 3	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be Modified
		CO 4	3.00	1.50	2.70	2.5	-0.20	Attained	Rubrics for the level can be Modified
910111: Building Maintenance & Services	Prof. Gautam Bhadoriya	CO 1	2.47	3.00	2.57	2.5	-0.07	Attained	Rubrics for the level can be modified
		CO 2	2.54	3.00	2.63	2.5	-0.13	Attained	Rubrics for the level can be modified
		CO 3	2.75	3.00	2.80	2.5	-0.30	Attained	Rubrics for the level can be Modified
		CO 4	2.50	3.00	2.60	2.5	-0.10	Attained	Rubrics for the level can be modified
		CO 5	2.53	3.00	2.62	2.5	-0.12	Attained	Rubrics for the level can be Modified



Table.4: CO Attainment & Gap Analysis of IV Year, VIII SEM

Course Code & Name	Faculty Assigned	Course Outcomes	Direct CO Attainment	Indirect CO Attainment	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
110811: Internship/Major Projects	Dr. Abhijash Shukla	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



 Dr. Abhijash Shukla

ANNEXURE – VIII

(PO ATTAINMENT for 2018-2022 Batch)



ANNEXURE – VIII
PO ATTAINMENT FOR 2018-2022 BATCH


OVERALL PO ATTAINMENT CALCULATION (2018-2022) along with Action taken

Program Outcome (PO)	Direct PO Attainment Level	Indirect PO Attainment Level	Overall PO Attainment Level (80% of Direct Attainment + 20% of Indirect Attainment)	Target Attainment Level	Gap in Attainment	Status of PO Attainment	Action Taken
PO 1	2.64	2.13	2.54	2.5	-0.04	Attained	<ol style="list-style-type: none"> Extra practice problems are to be given for courses like Strength of Materials, Fluid Mechanics, Surveying, Structural Analysis and solutions are discussed in the tutorial class. Revision sessions are to be conducted of Engineering Mechanics prerequisite for the subject Strength of Materials. Assignments based on Bernoulli's equation, Fluid Flow problems, Trigonometry, Theodolite traversing, Stress-Strain Analysis, Torsion etc. are to be given at second year level.
PO 2	2.70	2.42	2.65	2.5	-0.15	Attained	<ol style="list-style-type: none"> Students are encouraged to observe their surroundings to gain insight into real life engineering problems and think of possible solutions for these problems. Field/Technical visits are carried out so that student can gain knowledge on complex engineering problems and their solutions.

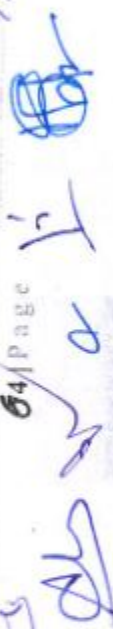
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								<p>3. Incorporating more numerical problems and conducting tutorials during regular lectures in courses like Surveying, Structural Analysis, Fluid Mechanics etc.</p>
PO 3	2.27	2.36	2.29	2.5	0.21	Not Attained	<p>1. Design problems are given to students in tutorial classes of courses like R.C.C. design, Steel design, Hydraulic Structures, Highway Engineering.</p> <p>2. Practical implementation of engineering systems was done through third year minor projects and final year B. Tech projects.</p> <p>3. Projects are undertaken which are based on environmental and social needs.</p>	
PO 4	2.53	2.42	2.51	2.5	-0.01	Attained	<p>1. For projects, students are asked to refer technical literature like Journal Papers, product catalogues and suggest solution by comparing various available techniques.</p> <p>2. Students are encouraged to participate in national level conferences for paper presentations.</p> <p>3. Workshops are conducted so that students gain knowledge on investigation of complex problems.</p>	
PO 5	2.44	2.29	2.41	2.5	0.09	Not Attained	<p>1. Students are asked to perform the experiments and projects using simulation software's like Virtual Lab, AutoCAD, STAAD Pro, MATLAB.</p> <p>2. Industry experts are also invited to conduct the hands-on training on MATLAB, AutoCAD, STAAD-Pro.</p> <p>3. The students get acquainted, with modern tools which are added to the lab like Roadpod VT</p>	



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PO 6	2.32	2.46	2.35	2.5	0.15	Not Attained	meter, Noise level meter, Total Station etc. 1. Industry visits are conducted to understand the various safety and legal issues and expand their practical knowledge. 2. Students undertake major and minor projects based on safety issues. 3. Information about safety facilities available in laboratories was given to students. Demonstration of safety equipments like fire extinguisher was given to understand personal and equipment safety
PO 7	2.45	2.33	2.42	2.5	0.08	Not Attained	1. Students gain knowledge in environmental and sustainable issues through Industry visits conducted to Water Treatment and Sewage Treatment Plants in the city. 2. Students undertake major and minor projects based on environmental and sustainability issues. 3. Students study various courses on Environmental Engineering like Water Supply, Waste Water, Waste Management.
PO 8	2.14	2.50	2.21	2.5	0.29	Not Attained	1. Courses like Human Values and Professional Ethics, and Professional Communication are included in the curriculum. 2. Topics related to professional ethics are covered in course PTIME. 3. Students are motivated to write the project, seminar reports and lab write-ups in their own words avoiding "copy-paste" practices by using Turnitin software. 4. Lectures/sessions/awareness programs are conducted on career readiness by T&P cell.

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PO 9	2.24	2.34	2.26	2.5	0.24	Not Attained	<ol style="list-style-type: none"> 1. Students are encouraged to work in team during practical classes in course of Surveying. 2. Students are encouraged to work in team during practicals like SPT test, Triaxial test, Plate load test etc.
PO 10	2.22	2.34	2.25	2.5	0.25	Not Attained	<ol style="list-style-type: none"> 1. In-house Soft skill training is imparted to students after completion of Second Year. 2. Department arrange Guest lectures for overall personality development of students. 3. Extra sessions are conducted by the institute faculty under the subject of Professional Communications to improve communication skills of weak students. 4. Technical and HR Mock orals are arranged for Final Year B.Tech students by T&P Cell. 5. Students are asked to prepare report more critically after completion of B.Tech project, Internship and Seminars.
PO 11	2.19	2.34	2.22	2.5	0.28	Not Attained	<ol style="list-style-type: none"> 1. The courses relevant to management principles need to be revised and regularly updated. 2. Students are encouraged to undertake projects using principles of construction management.
PO 12	2.54	2.56	2.55	2.5	-0.05	Attained	<ol style="list-style-type: none"> 1. New experiments are designed based on latest trends. 2. Lectures by industry experts are arranged to understand the current trends in industry. Curriculum is updated based on latest trends.
PSO 1	2.20	2.39	2.24	2.5		Not Attained	<ol style="list-style-type: none"> 1. The assignments and tutorials are designed in such a way that students are able to practice the use of standard codes.

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					0.26				<ol style="list-style-type: none">2. A wide awareness of use of codes like IS, IRC, NBC, CPHEEO to the students are given.3. Students utilize the guidelines of IS codes, IRC, NBC, CPHEEO during B. Tech projects.
PSO 2	2.41	2.57	2.44	2.5	0.06	Not Attained			<ol style="list-style-type: none">1. In the curriculum, multi decision criteria methods and determination of uncertainty are to be added.2. Students utilize the knowledge acquired during Internship in industry to critically analyse a problem and subsequently plan for solutions.3. Students are given insight in the critical issues which involve decision making through expert lectures from industry persons.

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ANNEXURE – IX

(Curriculum Feedback Analysis)

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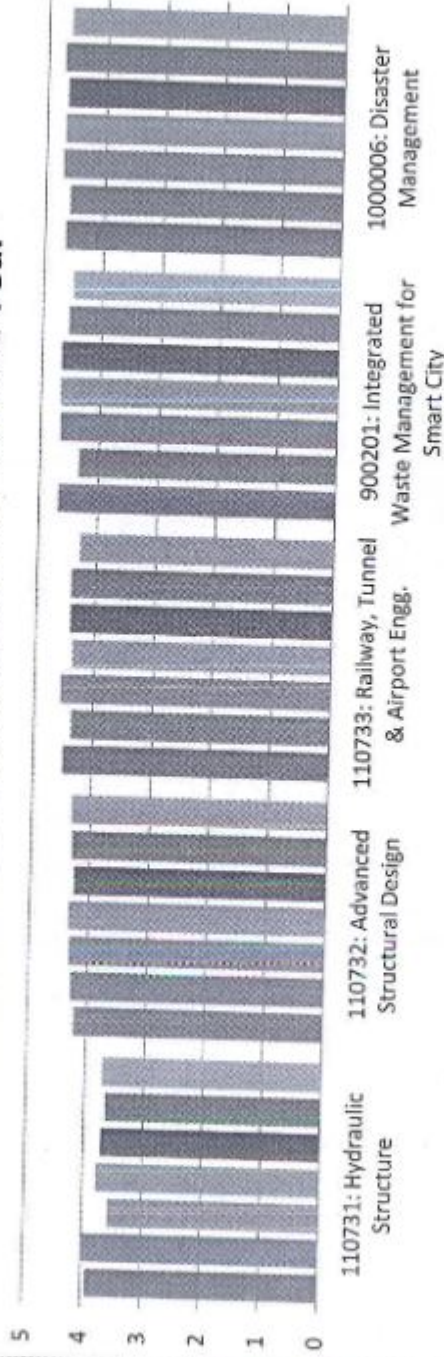
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A1. CURRICULUM FEEDBACK ANALYSIS FROM STUDENTS – (UG Second Year) – Dec 2023

Action Taken Based on Curriculum Feedback Analysis from UG Second Year Students

1. Based on the feedback received for the second year, no significant action needs to be taken.

Course Curriculum Feedback UG- 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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	2110321: Fluid Mechanics-I	2110322: Theory of Structures-I	2110323: Geotechnical Engg	2110324: Transportation Engg.	1000005: Project Finance & Management
1. The course is well designed	4.2	3.77	4		
2. The syllabus units are balanced	4	3.83	4.17	3.69	3.89
3. The learning material was available to you	4.07	3.71	4.17	3.77	3.97
4. The content was clear and easy to understand	4.13	3.71	4.17	4.02	4.03
5. The course was relevant and updated for present needs	4.13	3.83	4.0	3.81	3.75
6. The course meets your career expectations	4.33	3.97	4.06	3.84	3.97
7. The course will be useful to meet your higher studies/future aspirations.	4.4	3.88		3.84	3.69
			4.22	3.98	4.03
Mention the course / contents which in your opinion is outdated & needs to be removed.	Name course / contents which needs to be updated.			Is any new course required to meet current needs?	





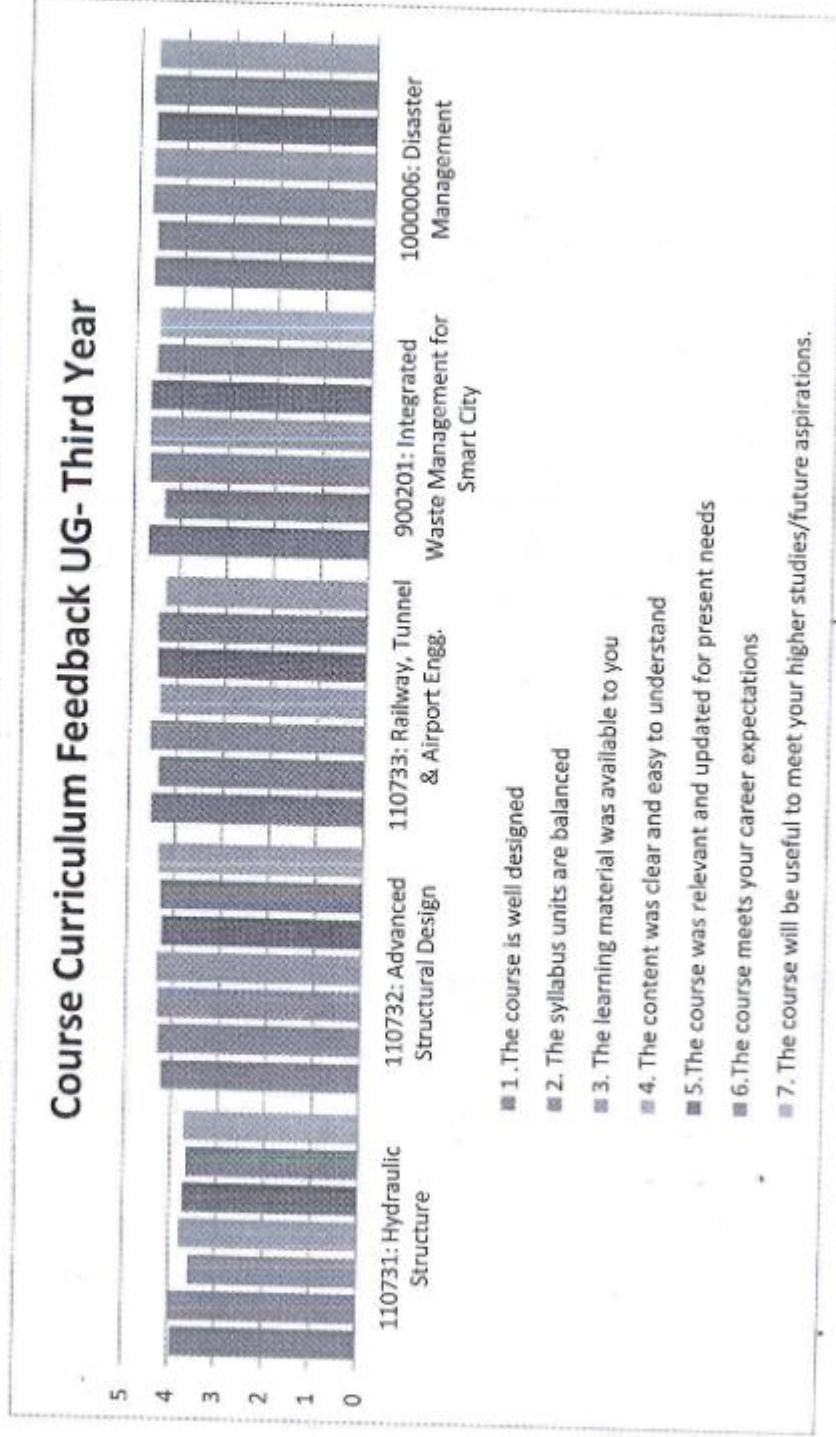

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A2. CURRICULUM FEEDBACK ANALYSIS FROM STUDENTS – (UG Third Year) – Dec 2023

Action Taken Based on Curriculum Feedback Analysis from UG Third Year Students

1. Based curriculum feedback analysis form UG Third Year, no significant action needs to be taken



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	110511: Water Supply Engineering	110512: Theory of Structures-II	110513: S.D.D (R.C.C)	110514: Fluid Mechanics-II	110520: Data Science
1. The course is well designed	4.57	4.31	4.64	4.33	4.38
2. The syllabus units are balanced	4.5	4.39	4.5	4.13	4.31
3. The learning material was available to you	4.5	4.37	4.64	4.13	4.38
4. The content was clear and easy to understand	4.46	4.39	4.54	4.27	4.36
5. The course was relevant and updated for present needs	4.61	4.39	4.61	4.2	4.4
6. The course meets your career expectations	4.61	4.33	4.54	4.4	4.25
7. The course will be useful to meet your higher studies/future aspirations.	4.68	4.37	4.64	4.47	4.29

Mention the course / contents which in your opinion is outdated & needs to be removed.	Name course / contents which needs to be updated.	Is any new course required to meet current needs?

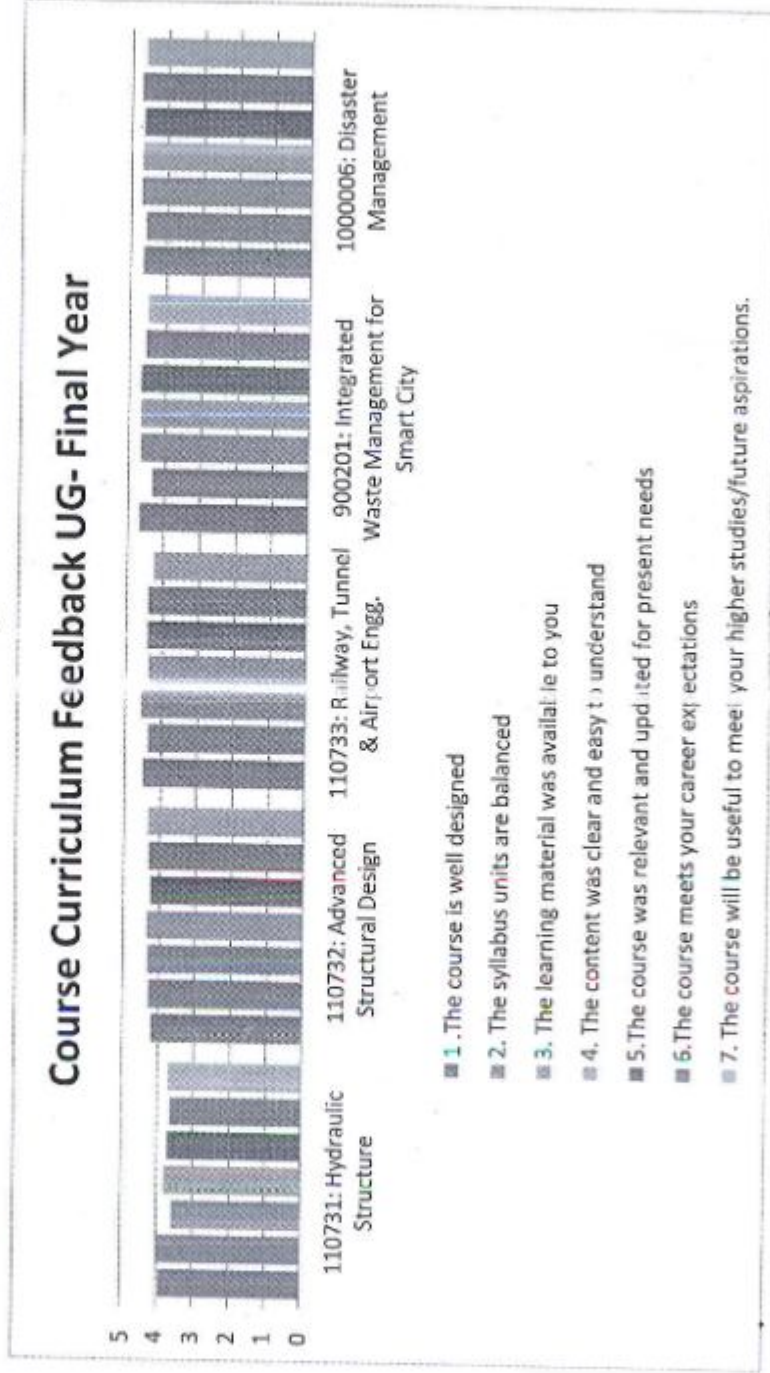
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A2. CURRICULUM FEEDBACK ANALYSIS FROM STUDENTS – (UG Final Year) – Dec 2023

Action Taken Based on Curriculum Feedback Analysis from UG Final Year Students

1. Based curriculum feedback analysis form UG Third Year, no significant action needs to be taken



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	110731: Hydraulic Structure	110732: Advanced Structural Design	110733: Railway, Tunnel & Airport Engg.	900201: Integrated Waste Management for Smart City	1000006: Disaster Management
1. The course is well designed	3.93	4.21	4.5	4.67	4.65
2. The syllabus units are balanced	4.0	4.28	4.36	4.33	4.58
3. The learning material was available to you	3.57	4.31	4.55	4.66	4.71
4. The content was clear and easy to understand	3.78	4.34	4.36	4.67	4.68
5. The course was relevant and updated for present needs	3.71	4.25	4.41	4.67	4.65
6. The course meets your career expectations	3.64	4.29	4.41	4.55	4.71
7. The course will be useful to meet your higher studies/future aspirations.	3.71	4.32	4.27	4.50	4.61

Mention the course / contents which in your opinion is outdated & needs to be removed.	Name course / contents which needs to be updated.	Is any new course required to meet current needs?

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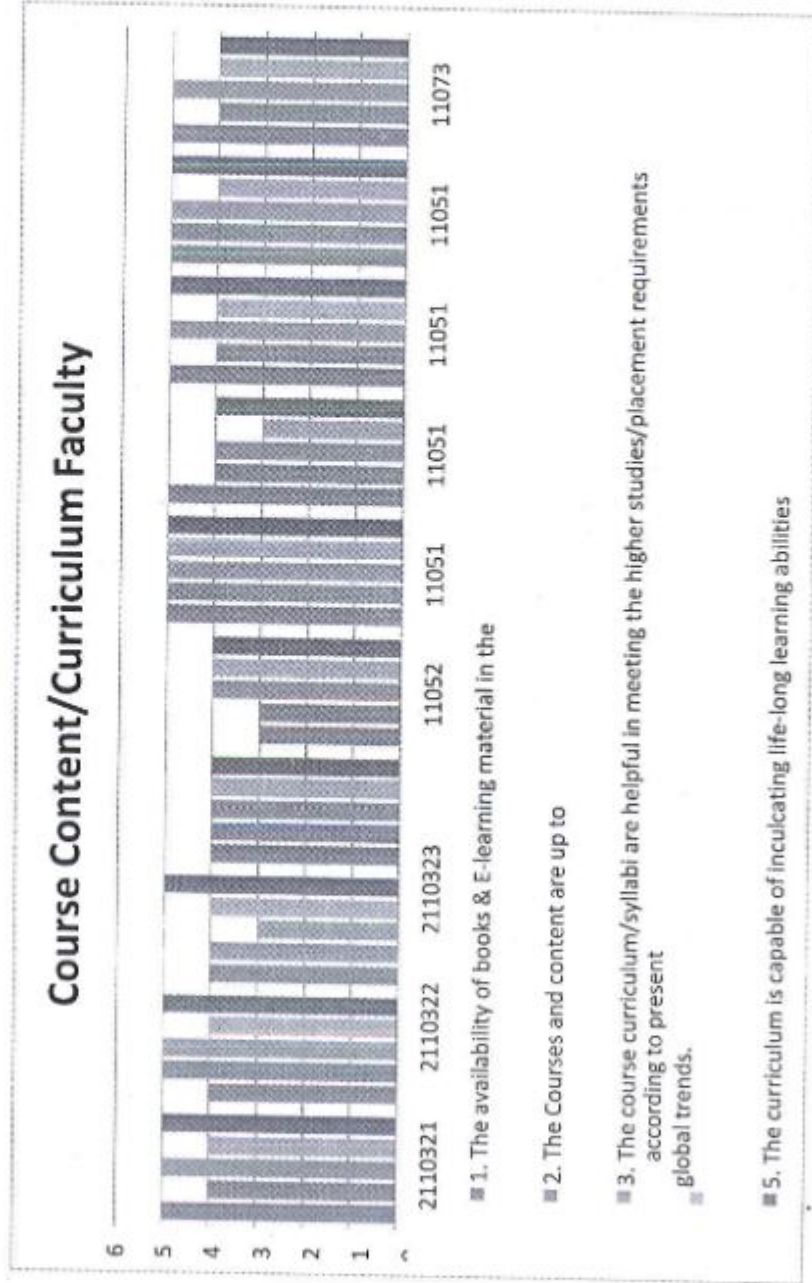
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B. FACULTY FEEDBACK ANALYSIS ON COURSE CONTENT – Dec 2023

Action Taken Based on Curriculum Feedback Analysis from Faculty Members

1. While finalizing the list of Courses for honours, Minor, Departmental electives inputs given by the faculty were considered.



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Select your course	Select your Subject	1. The availability of books & E-learning material in the institute is good.	2. The Courses and content are up todate.	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	2110321- Fluid Mechanics-I	5	4	5	4	5
B. Tech	2110322- Theory of Structures-I	4	5	5	4	5
B. Tech	2110323- Geotechnical Engg.-I	4	4	3	4	5
B. Tech	2110324- Transportation Engg.	4	4	4	4	4
B. Tech	110520- Data Science	3	3	4	4	4
B. Tech	110511- Water Supply Engineering	5	5	5	5	5
B. Tech	110512- Theory of Structure-II	5	4	4	3	4
B. Tech	110513 - S.D.D. (R.C.C)	5	4	5	4	5
B. Tech	110514: Fluid Mechanics-II	5	5	5	4	5
B. Tech	110733: Railway, Tunnel & Airport Engg.	5	4	5	4	4

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(i) Honours:	(ii) Minor specialization:	(iii) Departmental electives:	(iv) Open electives:
Development and Applications of Special Concretes;; Maintenance and Repair of Concrete Structures Modern Construction Materials	Introduction to Civil Engineering Profession	Earthquake Resistant Design of Foundations	Geographic Information Systems Air Pollution & Control Rural Water Resources Management

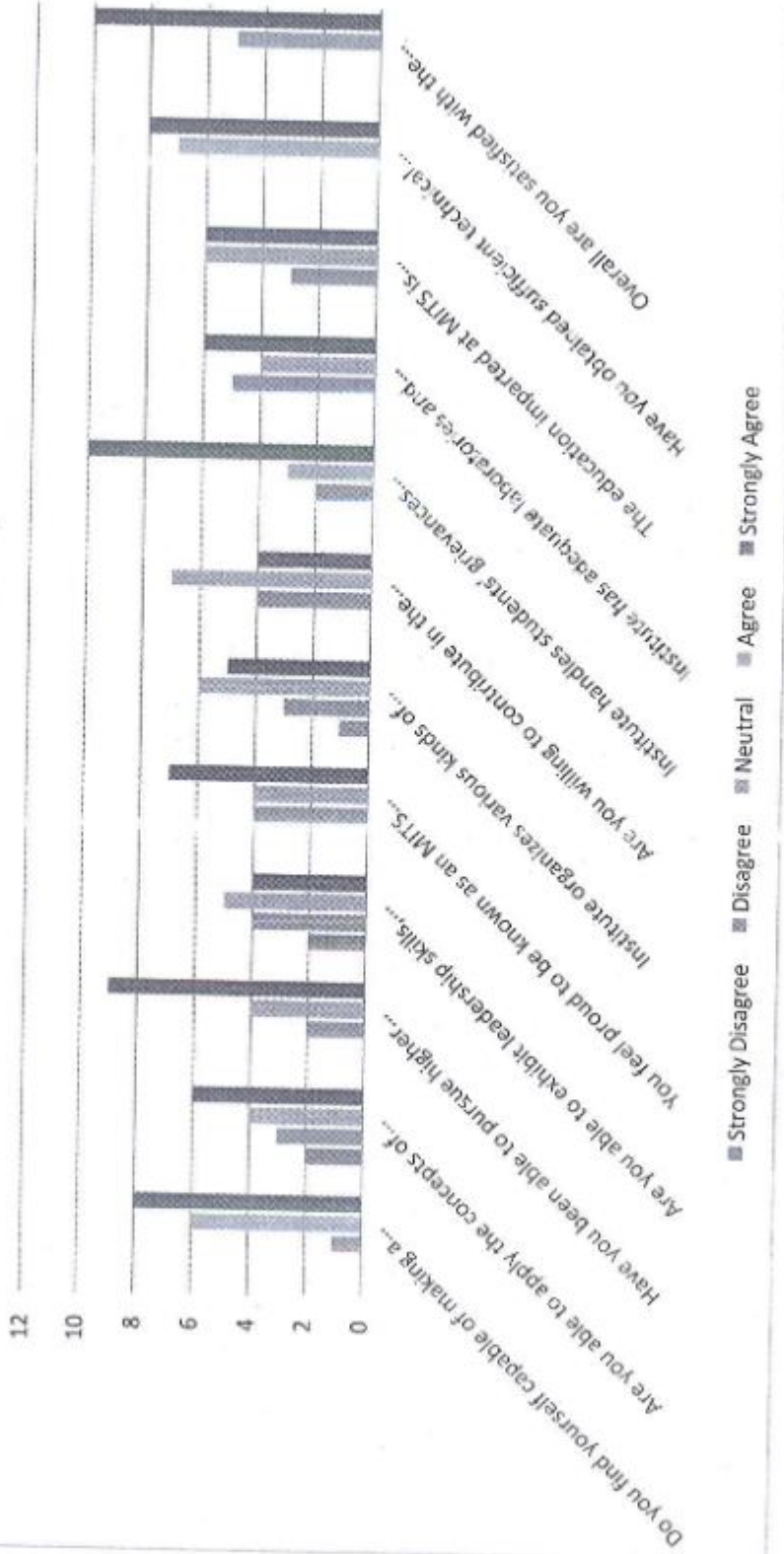
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ALUMNI SATISFACTION SURVEY

Alumni Satisfaction Survey



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Sample Size: 15

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	8	4.47
2	Are you able to apply the concepts of civil engineering in your profession?	0	2	3	4	6	3.93
3	Have you been able to pursue higher studies?	0	0	2	4	9	4.47
4	Are you able to exhibit leadership skills, team spirit & ethical practices while performing your duty?	0	2	4	5	4	3.73
5	You feel proud to be known as an MITS Alumnus	0	0	4	4	7	4.2
6	Institute organizes various kinds of activities for the overall development of students	0	1	3	6	5	4.0
7	Are you willing to contribute in the development of the Institute	0	0	4	7	4	4.0
8	Institute handles students' grievances properly	0	0	2	3	10	4.53
9	Institute has adequate laboratories and equipment for practical exposure to students	0	0	5	4	6	4.07
10	The education imparted at MITS is useful and relevant in your career and present job	0	0	3	6	6	4.20
11	Have you obtained sufficient technical knowledge (both in theory and practical) at MITS	0	0	0	7	8	4.53
12	Overall are you satisfied with the Faculty, Staff and Administration during Program	0	0	0	5	10	4.67

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ANNEXURE – X

(Scheme PG Programme 2nd Semester)

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For batch admitted in academic session 2023 -24

Master of Engineering in Construction Technology & Management (Semester - II)

Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted										Total Credits				
			Theory Slot			Practical Slot			MOOCs					Total Marks	Contact Periods per week		
			End Sem	Mid Sem	Quiz/Assignment	End Sem	Lab Work / Sessional	Assignment	Exam	L	T	P					
1.	510211	Project Economics & Financing	70	20	10	-	-	-	-	-	-	100	3	-	-	3	
2.	510212	Construction Cost Management	70	20	10	-	-	-	-	-	-	100	3	-	-	3	
3.	510213	Construction Project Management	70	20	10	-	-	-	-	-	-	100	3	-	-	3	
4.		##Elective - II	-	-	-	-	-	-	-	-	25	75	3	-	-	3	
5.		**Open Category Course (OC-2)	70	20	10	-	-	-	-	-	-	100	3	-	-	3	
6.	510219	Computational Laboratory for Construction Management	-	-	-	90	60	-	-	-	-	150	-	-	4	4	
7.	510220	S Self Learning / Presentation	-	-	-	100	160	-	-	-	-	100	-	-	2	2	
		Total	280	80	40	90	160	25	75	15	6	750	15	6	21		

##Elective-II (Through SWAYAM / NPTEL / MOOC based learning platform (with credit transfer facility))

510219. Construction Methods and Equipment Management

510218. Strategies for Sustainable Design

****Open Category Course (OC-2)** will have to be opted from the pool of open courses (Student can opt from parent department and other department) and based on interdisciplinary aspects. This course may run through SWAYAM/NPTEL based platform (with credit transfer facility).

800208. Sustainable Materials and Green Buildings

During labs, students have to perform practical/assignments/ minor projects/theoretical concepts of respective semester using recent technologies / languages / tools etc.

***Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students bus assessment will be based on internal seminar presentation)**

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Civil Engineering Department, MITS Gwalior

SIP 2023

Master of Engineering in Construction Technology & Management (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	
1.	510405	Dissertation Part-II	-	-	300	200	-	-	14	14	14
		Total	-	-	300	200	-	-	14	14	14

Syllabus

w.e.f. July 2020 Admitted onward batches

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Semester-

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Course Code: 510211

Course Name: Projects Economics & Financing

L	T	P	C
3	-	-	3

Course Objectives:

1. To understand managerial economics.
2. To understand demand analysis and forecasting in construction industry.
3. To understand Time value of money and Cost of Capital.
4. To understand budgeting of construction projects.
5. To understand selection and evaluation of construction projects.
6. To understand project financing and risk.
7. To understand the accounting processes in construction industry.

Syllabus:

Unit-I

Basic Economic Theories: Principles of managerial economics. Economic theories. Demand analysis and forecasting. Demand elasticity. Cost and production analysis. Production function. Pricing decisions. Policies & practice.

Unit-II

Money: Time value of money. Different methods & comparisons. Cash flow, discounted cash flow, cash flow forecasting. Financial ratios and statements. Cost of Capital.

Unit-III

Capital Budgeting: Working capital. Capital budgeting and performance budgeting. Break even analysis. Project selection. Project appraisals

Unit-IV

Project Financing: Means of Finance, Financial institutions in India, Policies of financial institutions, Financial assistance, Special schemes, Project risk

Unit-V

Financial Accounting: Book keeping processes of construction industry. Accountancy cycle. Journals. Forms and ledgers etc. for accounting and monitoring labour, equipment and material costs. PWD accounting procedure and types of financial statements in Government.

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Course Outcomes:

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

CO1: Apply principles of managerial economics.

CO2: Perform demand analysis in construction sector.

CO3: Workout time value of money and cost of capital.

CO4: Analyze break-even point and appraisal of projects.

CO5: Determine appropriate means of financing a project.

CO6: Monitor the various cost components of construction projects by using accounting procedures.

Reference Books:

1. Project Planning, Analysis, Selection, Financing, Implementation & Review by Prasanna Chandra, Publisher Tata McGraw-Hill Education.
2. Engineering Economics & Analysis, by Donald G Newnan, Publisher Oxford University Press.
3. Economic Theory and The Construction Industry by P. Hillebrandt, Publisher Palgrave Macmillan UK
4. Construction Economics: A New Approach by Danny Myers, Publisher Routledge
5. Construction and Project Management Theory And Practices by K.N. Jha, Publisher Pearson Education India
6. Construction Project Management: Planning, Scheduling and Controlling by K.K. Chitkara, Publisher Tata McGraw-Hill Education

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Course Code: 510212

Course Name: Construction Cost Management

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Course Objectives:

1. To know about the trade-offs in construction projects.
2. To explore the time cost trade-off.
3. To understand the multi-objective optimization techniques.
4. To discuss the MCDM methods.
5. To apply the value engineering and productivity in construction.

Syllabus:

Unit-I

Trade off Analysis in construction project: Development of Network. Time-cost trade off curves. Non – convex discontinuous and discrete cost time trade – off curves. Crashing of projects. Resource-constrained project scheduling. Multi-objective trade-off problems. Introduction to deterministic, heuristic and meta-heuristics methods for making multi-objective trade-off. Siemen's method of project cost curve.

Unit – II

Multi criteria Decision Making Methods: Analytical Hierarchy Process, and its application in planning and management, Introduction to Fuzzy Set Theory and its Application in MCDM.

Unit-III

Multi-objective optimization methods: Single and multi-objective optimization problems. Pareto- optimality. Introduction to NSGA. Selection. Crossover. Mutation. Non-dominated Sorting. Differences among GA, MOGA, NSGA, NSGA-II. Particle Swarm Optimization. Particle and its position. Local best and global best position. Updating the position of particle. Multi-objective PSO.

Unit-IV

Productivity in Construction: Definition of Productivity. Productivity measurements. Productivity of production components, Labors, Equipment and Material Capital Productivity. Need for Productivity Planning – Short term and long term productivity planning. Productivity improvement approaches, Productivity Improvement techniques – Technology based, Material based, Employee based and Product based



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Unit-V

Value Engineering: Principles of value engineering in Project Management, Value engineering team, Value engineering technique, Job Plans, Role of value engineering in productivity, Life cycle costing and its applications.

Course Outcomes:

After completing this course, the students will be able to:

CO1: Explain the concept of trade-off in construction.

CO2: Analyze the trade-off phenomenon in construction using MCDM.

CO3: Evaluate the multi-objective trade-off problems using metaheuristic methods.

CO4: Apply the value engineering and LCC in construction projects.

CO5: Evaluate the labour, material and equipment in construction productivity.

Recommended Books:

1. **Golden**, Bruce L., **Wasil**, Edward A., **Harker**, Patrick T. (Eds.) The Analytic Hierarchy Process, Springer.
2. Joseph J. Moder., PROJECT MANAGEMENT with CPM, PERT and Precedence Diagramming.
3. S. Rajasekaran. and G.A. Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic, and Evolutionary algorithms". Eastern Economic edition.
4. Kalyanamoy Deb, "Multi-objective optimization using evolutionary algorithms". Wiley.
5. Sumanth, D.J, Productivity Engineering and Management, TMH, New Delhi, 1990
6. Sudit, Ephraim F., "Productivity Based Management", Springer 1984
7. Alphonse Dell'Isola, "Value Engineering: Practical Applications for Design, Construction, Maintenance & Operations", R S Means Co., 1997.
8. Richard Park, "Value Engineering: A Plan for Invention", St. Lucie Press, 1999.

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Course Code: 510213

Course Name: Construction Project Management

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Course Objectives:

1. To know about the basic of project management and project organization.
2. To understand the project planning process, project networks and its analysis through CPM.
3. To understand the method of PERT and Precedence Network analysis for scheduling of const.
4. To plan and manage the resources and discuss the cost control in project's perspective.
5. To discuss the material, inventory and risk management in construction.

Syllabus:

Unit-I

Project Management: Construction Project and its phases. Importance of construction and construction Industries. Construction Project Management and its Relevance. Stakeholders of construction project. Management Information System and its Application in Construction.

Project Organization: Construction Organizations and its forms. Structure of Construction Organization. Management Levels. Traits of a Project Manager. Ethical Conduct for Engineers. Factors behind the success of construction projects and construction organizations. Introduction to Claim, Dispute and Project Closure.

Unit – II

Project Planning and Network Analysis: Introduction to Project Planning Process. Types of Project Plans. Network techniques- Gantt Chart, Mile stone Chart, Work Breakdown structure, AOA & AON networks. Event and Activities. Numbering of events. Event times – Earliest events time and latest event time. Slack, critical events. Activity times – Earliest start time, Latest finish time, Float and critical activities. Network critical path and its significance. Network analysis by CPM – Defining scope of work, determining activities, preparation of network logic program and draft network. Development of structured network using network drawing rules, Numbering of events and computation of critical path. Numerical problems.

Unit-III

PERT: Introduction to PERT. Difference between CPM and PERT. Uncertainty in project duration estimation. Three time estimate in PERT. Frequency distribution

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curves for activity duration. Computation of expected time, standard deviation and variance. Critical limit theorem and critical path determination. Event time, slack and computation of completion probability of project.

Precedence Network (PN): Introduction to PN. Precedence relationship between activities. Precedence Network Analysis – Modeling procedure analysis of time in PN. Use of PN in repetitive works network. Difference between PN and CPM.

Unit-IV

Resource Planning: Planning construction Manpower, Scheduling Construction site workers. Planning Construction Materials quantity estimation. Constrained and unconstrained resource scheduling. Resource usage profile, Resource smoothing, Resource leveling.

Cost Control: Project cost, Direct and indirect, slope of direct cost curve, Total project cost and optimum duration, Contracting the network for cost optimization. Escalate & Variation in prices.

Unit-V

Materials & Inventory Management: Introduction to Material management. Material Procurement Process. Material Management Functions. Inventory management in construction.

Risk and Insurance in Construction: Introduction to Risk and Risk Management in construction. Risk Identification Process. Risk Analysis and Evaluation Process. Risk Treatment Strategies. Different Insurances in Construction Companies.

Course Outcomes:

After successful completion of the course, the students will be able to:

- CO1: Identify** the various approaches of project management and organization structure.
- CO2: Classify** the various project network techniques and its applicability in project management.
- CO3: Analysis and schedule** the project using PERT and PN method.
- CO4: Determine** the applicability of resources and finding the optimum cost and optimum project duration.
- CO5: Apply** the concepts of material, inventory and risk management tools in construction project.

Reference Books:

1. Construction Project Management by K.N Jha
2. C.P.M & PERT by L.S. Srinath.
3. Construction Management by Sen & Gupta.
4. Project Planning and control with PERT and CPM by BC Punmia, K. K. Khandelwal.
5. CPM & PERT by Weist & Levy
6. DDOT Construction management Manual.



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7. Project Management and design administration manual by Design construction division.

8. Construction Project Management Handbook: Federal Transit Administration -US

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Course Code: 800208

Course Name: Sustainable Material & Green Building

L	T	P	C
3	-	-	3

Course Objectives:

1. To study the properties of various types of sustainable materials in construction.
2. To learn the code of practice and guidelines for green buildings.
3. To select of different types of sustainable construction practices.
4. To understand the alignment of the current practices with the sustainable development goals.
5. To learn the field problems of sustainability in the construction sector.

Syllabus:

Unit-I

Sustainable Materials: Sources, methods of production and environmental Implications of building materials; Embodied Energy in Building Materials; Transportation Energy for Building Materials; Maintenance Energy for Buildings; Material cycles in construction, life Cycle impacts of materials and products, life cycle assessment of buildings; Resources for Sustainable Building Materials.

Unit-II

Green Buildings: Concept of Green building, Principles of green buildings, Bureau of energy efficiency: Functions, policies, guidelines, Energy Conservation Building Code; Certification systems

– Green Rating for Integrated Habitat Assessment (GRIHA) and Leadership in Energy and Environmental Design (LEED), transforming the existing buildings to sustainable buildings based on GRIHA EB Manual: Criteria and their weightage, site parameters, maintenance and housekeeping, energy, water efficiency, human health and comfort.

Unit-III

Green Construction Practices & Technologies: Comparative analysis between the traditional and sustainable construction practices, Concrete versus steel technology suitability; Life cycle analysis of technologies; Sustainable Construction Technologies; Waste-based /recycled materials and technologies.

Unit-IV

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Sustainable Development Goals and Policies: Sustainable consumption and production (Goal 12), Sustainability issues for concrete, Operational energy in building role of materials and thermal conductivity, Recycling of Industrial and Buildings Wastes, Biomass Resources for buildings, Need and framing of Policies and action plans to reduce construction and demolition waste.

Unit-V

Recent trends and Case studies:

Case studies and examples: Study of existing green buildings-Energy auditing; Green building approaches on field through case studies; Performance rating systems; Environmental impact studies of building projects.

Recent Trends: Introduction to softwares used in green buildings, carbon calculators, Role of Building Automation and performance enhancement, Integrated building management system.

Course Outcomes:

After this course, students will be able to:

- CO 1: Explain** the properties of various types of sustainable materials used in construction industry accordingly.
- CO 2: Distinguish** the suitability of sustainable and green practices in construction sector.
- CO 3: Perform** the environmental impact assessment (EIA) for construction projects towards quality.
- CO 4: Assess** an existing building on the norms available by GRIHA for transforming existing buildings to sustainable buildings.
- CO 5: Examine** the impact of building materials choices by auditing the resources used to maintain the materials in their building and discussing the economic, environmental, and health impacts.
- CO 6: Identify** the potential of construction and demolition wastes in order to meet the sustainable development goals.

Reference Books:

1. Green Rating for Integrated Habitat Assessment (GRIHA) guidelines
2. Energy Conservation Building Codes: www.bee-india.nic.in
3. Tom Woolley, Sam Kimmins, Paul Harrison and Rob Harrison, Green Building, Handbook, Volume I, Spon Press, 2003
4. Kibert, C. "Sustainable Construction: Green Building Design and Delivery", John Wiley & Sons, 2005
5. Chaturvedi, Swati, and John Ochsendorf. "Global Environmental Impacts due to Cement and Steel." *Structural Engineering International* (August 2004)

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6. Jerry Yudelson Green building Through Integrated Design. McGraw Hill, 2009.
7. Fundamentals of Integrated Design for Sustainable Building by Marian Keeler, Bill Burke
8. Renewable Energy and Environment -A Policy Analysis for India, H, Ravindranath, KUsha Rao, B Natarajan, P Monga, Tata McGraw Hill, 2000
9. Gambhir M.L., Neha Jamwal, Building Materials: Products, Properties and Systems, McGraw Hill Education (India) Private Limited, 2014.
10. Varghese P.C., Building Materials, PHI Learning Pvt. Ltd., Delhi, 2015.
11. Advances in Building Materials and Construction, Central Building Research Institute, Roorkee, 2004.
12. Duggal S.K., Building Materials, New Age Publishers, 2012
13. Rangwala, Engineering Materials, Charotar Publishers, 2015

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Course Code: 510219

Course Name: Computational Laboratory For Construction Management

L	T	P	C
-	-	4	2

Course Objectives:

1. To know and apply the use of software in construction projects such as MATLAB, Primavera, BIM 4D, MS PROJECT and Excel

List of Experiments:

1. Introduction to MATLAB and its application.
2. MS Project and its application.
3. Primavera and its application in networking and scheduling.
4. Basics of BIM 4D.
5. Excel and its application.
6. Case study analysis using Primavera, BIM 4D and MS Project.

Course Outcomes:

After completing this course, the students will be able to:

CO1: Apply MATLAB in Construction Projects

CO2: Apply Primavera and MS project in Construction Projects.

CO3: Apply BIM 4D in Construction Projects.

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Course Code: 510220

Course Name: Self Learning / Presentation

L	T	P	Credit
0	0	2	1

Course Objectives:

- 1) To encourage students to read, study & understand different topics of CTM published in articles, literatures.
- 2) To help in presenting different topics of CTM and related subjects to supplement theoretical knowledge gained in class.
- 3) To make student acquire good oral & written communication skills.
- 4) To promote the habit of lifelong learning.
- 5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

Any relevant topic related to civil engineering/CTM from within or beyond the syllabus through Swayam / NPTEL/MOOC.

Course Outcomes:

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

CO 1: Analyze contemporary issues in civil engineering/CTM & its allied areas through literature survey.

CO 2: Distinguish state of art & relevance of the topic in national & international arena.

CO 3: Demonstrate good oral & written communication skills.

CO 4: Develop poster and power point presentations for effective communication.

CO 5: Display lifelong learning.

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NAAC Accredited with A++ Grade

For batch admitted in academic session 2023 – 24

Master of Technology in Environmental Engineering (Semester – II)

Scheme of Examination

S. No.	Subject Code	Subject Name	Maximum Marks Allotted										Total Marks	Contact Periods per week			Total Credits
			Theory Slot			Practical Slot			MOOCs					L	T	P	
			End Sem	Mid Sem	Quiz/ Assignment	End Sem	Lab Work / Sessional	Assignment	Exam								
1.	530211	Air Pollution & Noise Pollution	70	20	10	-	-	-	-	-	-	-	100	3	-	-	3
2.	530212	Advanced Treatment Process– II (Water Supply Engineering)	70	20	10	-	-	-	-	-	-	-	100	3	-	-	3
3.	530213	Environmental Impact Assessment & Ethics	70	20	10	-	-	-	-	-	-	-	100	3	-	-	3
4.		##Elective – II	-	-	-	-	-	-	-	-	-	25	100	3	-	-	3
5.		**Open Category Course (OC-2)	70	20	10	-	-	-	-	-	-	-	100	3	-	-	3
6.	530217	Advanced Environmental Engineering Lab	-	-	-	90	60	-	-	-	-	-	150	-	-	4	4
7.	530218	S Self Learning / Presentation	-	-	-	-	100	-	-	-	-	-	100	-	-	2	2
		Total	280	80	40	90	160	25	75	75	15	6	21				

##Elective-II (Through SWAYAM / NPTEL / MOOC based learning platform (with credit transfer facility))

530219. Biological Process Design for Waste Water Treatment

530221 Applied Environmental Microbiology

**Open Category Course (OC-2) will have to be opted from the pool of open courses (Student can opt from parent department and other department) and based on interdisciplinary aspects. This course may run through SWAYAM/NPTEL based platform (with credit transfer facility).

800209. Global Climatic Changes & Disaster Management

During labs, students have to perform practical/assignments/ minor projects related to theory subjects/theoretical concepts of respective semester using recent technologies / languages / tools etc.

Self learning / presentation through SWAYAM / NPTEL (Registration in a course will be compulsory for students bus assessment will be based on internal seminar presentation)

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W.E.F JULY 2020

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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Syllabus

w.e.f. July 2020 Admitted onward batches

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Semester-

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Course Code: 530211

Course Name: Air Pollution & Noise Pollution

L	T	P	Credit
3	0	0	3

Course Objectives:

- 1) To provide a broad knowledge on various sources & effects of air pollution.
- 2) To understand the techniques to control air pollution and apply them.
- 3) To provide knowledge on air quality standards, monitoring of air quality.
- 4) To provide a basic knowledge on sources, effects of noise pollution & also how to reduce the pollution.

Syllabus:

Unit I Introduction:

Definition of Air Pollution, Sources and classification of air pollutants – Man made – Natural sources

– Type of air pollutants – Pollution due to automobiles, Units of measurements of pollutants, Air quality criteria - emission standards – National ambient air quality standards – Air pollution indices – Air quality management in India, Air pollution survey, Air pollution from major industrial operations, Air pollution in Indian cities, Major Air pollution episodes, Air Act.

Unit II Effects of Air Pollution:

Analysis of air pollutants – Chemical, Instrumental and biological methods, Air pollution and its effects on human beings, plants and animals – Economic effects of air pollution – Effect of air pollution on meteorological conditions – Changes on the Meso scale, Micro scale and Macro scale, Global Warming, Acid Rain, Ozone Layer Depletion, Indoor Air Pollution & Occupational Diseases.

Unit III Sampling, Meteorology and Air Quality Modeling:

Sampling and measurement of particulate and gaseous pollutants – Ambient air sampling – Stack sampling. Environmental factors – Meteorology – temperature lapse rate and stability – Adiabatic lapse rate – Wind Rose – Inversion – Wind velocity and turbulence – Plume behavior – Dispersion of air pollutants- Air Quality Modeling.

Unit IV Air Pollution Control Measures:

Control – Source correction methods – Control equipments – Particulate control methods – Bag housefilter – Settling chamber – cyclone separators – inertial devices – Electrostatic precipitator – scrubbers – Control of gaseous emissions – Absorption – Absorption equipments – adsorption and combustion devices (Theory and working of equipments only), odour and its control, stack monitoring kit, auto exhaust analyser.

Unit V Noise Pollution & its Control

Sources of noise – Units and Measurements of Noise – Noise Standards, Noise rating

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR

(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to R.G.P.V., Bhopal MP) system, Characterization of Noise from Construction, Mining, Transportation and Industrial Activities, Airport Noise – General Control Measures – Effects of noise pollution – auditory effects, non - auditory effects. Noise Menace– Prevention and Control of Noise Pollution – Control of noise at source, control of transmission, protection of exposed person – Control of other types of Noise Sound Absorbent, Sound level meter.

Course Outcomes:

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

CO 1: Explain the concepts of air & noise pollution.

CO 2: Illustrate the effects of air & noise pollution on environment.

CO 3: Apply various techniques to measure air & noise pollution.

CO 4: Solve air and noise pollution problems by devising solutions to the identified problems

CO 5: Apply various techniques used in reducing the environmental pollution.

Text Books:

1. Air pollution & Control, M. N. Rao & H. V. N Rao, Tata McGraw Hill Publications., 2017
2. Air Pollution and Control Technologies, Dr. Y. Anjaneyulu, Allied publishers Pvt. Ltd., 2002.

Reference Books:

1. Sewage Disposal & Air Pollution Engineering, S.K. Garg, Khanna Publishers, 31st edition, 2008
2. Environmental Pollution Control Engineering, C. S. Rao, New Age Intl Pub., 3rd edition, 2018
3. Environmental Engineering, Rowe, Peavy & Tchobanogolous, Tata McGraw Hill Publication, 2017

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Course Code: 530212

Course Name: Advance Treatment Process – II (Water Supply Engg.)

L	T	P	Credit
3	0	0	3

Courses Objectives:

- 1) To understand the concepts of planning a distribution system & subsequently design the water distribution system.
- 2) To understand the operation & maintenance of water supply systems.
- 3) To determine the water quality parameters and also have knowledge on various standards of water quality.
- 4) To understand the concepts of various water treatment techniques.
- 5) To be able to plan & design water treatment plant for a city.

Syllabus:

Unit I:

Water supply, Components of distribution system, Principles and design of distribution system, Equivalent pipe method, Hardy Cross and Section method, Electrical network analogy method, Construction and maintenance of distribution system, Corrosion and methods of control, Computer applications in distribution network analysis.

Unit II:

Quality of water: Factors affecting water quality in various sources, Protection of water quality, Classification of natural water with reference to the best use, Bacteriological quality of water, Effect on health, Standards of water for various uses, Water quality index, Minimal National Standards (MINAS), their significance in relation to Industrial pollution control.

Unit III:

Preliminary Treatment and Sedimentation: Degree of treatment required, various operation and flow sheet, Preliminary treatment methods such as screening, coagulation, perikinetic and orthokinetic, flocculation, Coagulants and coagulants aids, Polyelectrolyte, Sedimentation, Class I and Class II clarification, Column settling test, zone and compression settling, Design of sedimentation tank – various types and their working, Tube settlers and their design.

Unit IV:

Filtration and Disinfection: Slow and rapid sand filters, Theory of filtration, Design, Operation, Performance and evaluation of filters, Pressure filter, Multi-media filter, Diatomaceous earth filter, Disinfection of water kinetics, Amount of chemicals required for disinfection, Free and combined chlorine, Fixed end disinfectors.

Unit V:

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Non – Conventional treatment units: Water softening, Methods of softening, Application of Membrane process, Reverse osmosis, Electro-dialysis, Various practices, Removal of fluorides, iron and manganese, Taste and odour removal, Industrial water conditioning, Langliar saturation index, Management of water treatment plant residues, Design of complete treatment scheme.

Courses Outcomes:

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

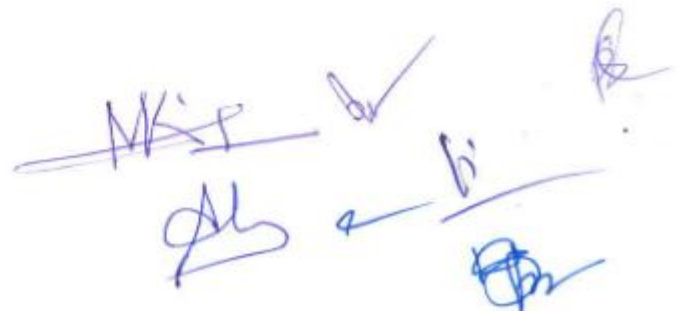
- CO 1: **Explain** the concepts of water distribution systems including its operation & maintenance.
- CO 2: **Design** a water distribution scheme for an area / city.
- CO 3: **Evaluate** the water quality of an area / city with the help of available standards & guidelines.
- CO 4: **Explain** the concepts of various water treatment techniques.
- CO 5: **Design** a water treatment scheme for an area / city.

Text Books:

1. Water Supply Engg., S. K. Garg, Khanna Publishers New Delhi, 2017
2. Environmental Engineering, Peavy, Rowe & Tchobanoglous, McGraw Hill Publication, 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. Manual of Water Supply and Treatment by CPHEEO, GOI, 2009
4. Water Supply Engg., B. C. Punmia, Laxmi Publication (P) Ltd. New Delhi, 2016
5. Water Supply & Sanitary Engineering By S.K. Husain (Oxford & IBH Publishing Co. NewDelhi, India)



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Course Code: 530213

Course Title: Environmental Impact Assessment & Ethics

L	T	P	Credit
3	0	0	3

Course Objectives:

- 1) To develop an understanding about the requirements of environment impact assessment in modern day.
- 2) To provide a broad knowledge on the process of environmental impact assessment.
- 3) To provide a broad knowledge on various methods used in impact assessment.
- 4) To provide a practical knowledge on how to carry out environmental impact assessment process through various case studies.
- 5) To provide an insight into various existing environmental laws in India

Syllabus:

Unit I: Environment and its components, Concept of Ecological imbalances, Carrying capacity and Sustainable development, EIA: Definitions, Necessity of EIA, Historical Evolution of EIA: Indian EIA rules 1994 & 2006, Environmental clearance process, Procedure for carrying out EIA in India, Post project monitoring, EIA documentation, EMP, EIS, Life Cycle Assessment, Risk Assessment.

Unit II: Environmental Impact Assessment Methodologies: Characteristics of EIA Methods, Ad-hoc method, Checklist, Matrices, Networks, Overlays, Environmental Quality Index, Predictive Models, Comparative study of EIA Methodologies.

Unit III: Prediction and assessment of impact on water & air environment: Basic information of air & water quality, Data requirements for impact assessment, Existing standards for air & water quality (surface & subsurface), Identification of impacts, Prediction & assessment of impacts, Mitigation measures. Case Studies - Environmental Impacts of Road, Rail, Dam and thermal power projects or any other major projects on water & air environment.

Unit IV: Prediction and assessment of impact on cultural & socio-economic environment: Basic information on cultural resources like archaeological, historical structures, Cultural system, Basic information of socio-economic environment, Description of existing socio-economic environment, Identification of impacts, Prediction & assessment of impacts, Mitigation measures, R & R study.

Unit V: Environmental Legislations: List of prevalent environmental acts in India, Brief about provisions in Water Act 1974, Air Act 1981, EPA 1986, International Environmental Laws & Protocols like Montreal Protocol, Rio Earth Summit, Kyoto Protocol, Objective of Ethics, Importance of Ethics, Code of Ethics, Environmental ethics in India, Environmental Audit: Introduction, Necessity, Types, and Process of

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Course Outcomes:

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

CO1: Illustrate the concepts of EIA.

CO2: Apply various methodologies for carrying out EIA. & laws used in EIA studies.

CO3: Analyse impacts on various components of environment.

CO4: Apply various laws & ethical practices in environmental management.

CO5: Plan for mitigation of impact & accordingly monitor the mitigation measures through environmental audit.

Text Books:

- 1) Y. Anjaneyulu & Valli Manickam, Environmental Impact Assessment Methodologies, B S Publishers.
- 2) R. R. Barthwal, Environmental Impact Assessment, New Age International Publishers.

Reference Books:

- 1) L.W. Canter, Environmental Impact Assessment, Mc Graw Hill International Publishers International Edition.
- 2) O. V. Nandimath, Handbook of Environmental Decision Making in India: An EIA Model, Oxford University Press.
- 3) Ministry of Environment and forest, Government of India Environmental Impact Assessment Notification, New Delhi, 2006.

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Course Code: 800209

**Course Name: Global Climatic Changes & Disaster
Management**

L	T	P	Credit
3	0	0	3

Course Objectives:

- 1) To understand the effects of climate change.
- 2) To get knowledge of various protocols & policies on global climate changes.
- 3) To understand various natural disasters.
- 4) To understand various techniques of disaster monitoring.
- 5) To plan for management of disasters and emergency situations.

Syllabus:

Unit-I

Climate, weather and Climate Change; Overview of Earth's Atmosphere; Layers of Atmosphere; Greenhouse Gases, Aerosols, Impact of CO₂ increase on climate change, Temperature, Radiation and Variation; Heat- Balance of Earth Atmosphere System; Temporal Variation of Air temperature; Hydrologic cycle; Climate Variability like Floods, Droughts, Drought Indicators, Heat waves, Climate Extremes.

Recent Climate Change impact at local and global scale, Ecological Impacts of Climate change: Anthropogenic activities and climate change, Rising of sea level and consequences, Impact on biodiversity and extinction of endemic species, Changing of food chain, Agricultural shifts. Impact of climate change on health.

Unit-II

Policy and Legislative issues in Climate Change: The UNFCCC, The Montreal Protocol, From Kyoto to Copenhagen, Towards COP21, ICMR, ICAR & IARI.

Introduction to Climate Modeling (GCM and RCM Models) IPCC Scenarios, difference between climate change and climate variability Carbon trading and clean development mechanism, Role of countries and citizens in containing in global warming. The Role of Technology Roadmaps and Roundtables,

Unit-III

Overview of disaster, major natural disasters – flood, tropical cyclone, droughts, landslides, heat waves, earthquakes, fire hazards, tsunami, etc. – Factors for disaster – climatic change and global sea rise, erosion, environmental degradation, large dams and earthquakes, road building and landslides, Chemical and Biological weapons – case studies.

Unit-IV

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Techniques of monitoring and design against the disasters, Management issues related to

Disaster, Mitigation through capacity building, legislative responsibilities of disaster management; Disaster mapping, assessment, pre-disaster risk and vulnerability reduction, post disaster recovery and rehabilitation; disaster related infrastructure development. Disaster management plan, national crisis management committee, state crisis management group.

Unit-V

Water supply preparedness and protection, emergency water supply strategy, rural and urban emergencies. Assessment of damage. Emergency water supply schemes – Sources, quality, treatment, storage and distribution, operation and maintenance. Sanitation – Human waste and health, strategy for excreta disposal in emergencies, techniques for excreta disposal, disposal of wastewater, management of refuse.

Courses Outcomes:

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

- CO 1: Explain** the basic concepts of climate change, the causes of climate change and its effect on environment.
- CO 2: Determine** the important climate variables and the predictions of the changes in the climate system.
- CO 3: Analyse** policy issues and mitigation strategies in response to climate change and other disasters.
- CO 4: Design** an emergency water supply and sewage system.

Reference Books:

1. Climate Change and India – Vulnerability Assessment and Adaptation; Edited by P. R. Shukla, Subodh K. Sharma, N. H. Ravindranath, Amit Garg, Sumana Bhattacharya, Universities Press, 2003
2. Global Warming – The Complete Briefing, third edition; John Houghton, Cambridge University Press, 2004,
3. Climate Change- Causes Effects and Solutions; John T. Hardy, Wiley
4. Alexander D, Principles of emergency planning and management, Oxford University Press, 2002.
5. Hallow G. and Bullock J. Introduction to Emergency Management: Elsevier, 2002.
6. Anil Markandya, Climate Change and Sustainable Development: Prospects for Developing Countries, Routledge, 2002.
7. Jepma, C.J., and Munasinghe, M., Climate Change Policy - Facts, Issues and Analysis, Cambridge University Press, 1998.
8. R.B. Singh, Disaster Management, Rawat Publication, New Delhi, 2000
9. H.K. Gupta, Disaster Management, University's Press, India, 2003
10. M.C. Gupta Manuals on Natural Disaster management in India, National Centre for Disaster Management, IIPA, New Delhi, 2001

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Course Code: 530217

**Course Name: Advanced Environmental Engineering
Lab**

L	T	P	Credit
0	0	4	4

Course Objectives:

- 1) To acquire knowledge of sampling of air samples, solid waste samples & waste water samples.
- 2) To acquire skills to determine various characteristics of waste water.
- 3) To acquire skills to determine various characteristics of solid waste.
- 4) To acquire skills to determine various air pollutants.
- 5) To acquire skills to determine noise levels.

Syllabus:

1. Introduction to waste water sampling procedure.
2. Introduction to air sampling procedure.
3. Introduction to solid waste sampling procedure.

List of Experiments:

1. Determination of Solids (TS, TSS, VSS, FS) in waste water sample.
2. Determination of settling velocity of suspended solids in waste water sample.
3. Determination of D.O. in waste water sample.
4. Determination of B.O.D. in waste water sample.
5. Determination of C.O.D. in waste water sample.
6. Determination of Nitrates in waste water sample.
7. Determination of Oil & Grease in waste water sample.
8. Determination of Heavy Metals in waste water sample.
9. Analysis of solid waste sample (Proximate & Elemental).
10. Determination of calorific value of solid waste sample.
11. Determination of SPM, SO_x & NO_x in air using RSPM/HVS.
12. Monitoring of ambient & traffic noise levels using noise level meters.
13. Study of Stack Monitoring Kit.
14. Characterization of wastes from different industries.

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Course Outcomes:

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

CO 1: Follow sampling procedure & other guidelines for sampling & analysis of waste water, air & solid waste samples.

CO 2: Check various waste water quality parameters.

CO 3: Analyze various solid waste characteristics.

CO 4: Analyze the level of pollutants in air.

CO 5: Analyze noise levels in an area / city.

Reference Books:

1. BIS 3025: Methods of Sampling & Test for Water & Waste Water.
2. BIS 10158, 9234, 9235: Analysis of Solid Wastes.
3. BIS 5182: Measurement of Air Pollution.
4. APHA Standard Methods for Examination of Water & Waste water, 2012.
5. Sawyer C.N., McCarty P. L., and Parkin G.F., Chemistry for Environmental Engineers, McGraw-Hill, New Delhi, 1994.
6. Water Supply Engineering, S.K. Garg, Khanna Publishers, New Delhi, 2017.

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Course Code: 530218

Course Name: Self Learning / Presentation

L	T	P	Credit
0	0	2	2

Course Objectives:

- 1) To encourage students to read, study & understand different topics of Environmental Engineering published in articles, literatures.
- 2) To help in presenting different topics of Environmental Engineering and related subjects to supplement theoretical knowledge gained in class.
- 3) To make student acquire good oral & written communication skills.
- 4) To promote the habit of lifelong learning.
- 5) To prepare students develop adequate soft skills to be able to present their topic effectively to listeners.

Syllabus:

Any relevant topic related to Environmental Engineering from within or beyond the syllabus through Swayam / NPTEL/MOOC.

Course Outcomes:

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

- CO 1: Analyze** contemporary issues in Environmental Engineering & its allied areas through literature survey.
- CO 2: Distinguish** state of art & relevance of the topic in national & international arena.
- CO 3: Demonstrate** good oral & written communication skills.
- CO 4: Develop** poster and power point presentations for effective communication.
- CO 5: Display** lifelong learning.

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