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***DEPARTMENT OF CIVIL
ENGINEERING***

***MINUTES OF BOARD OF
STUDIES MEETING,
DECEMBER 2022 ALONG WITH
ITS ANNEXURES***

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal)

DEPARTMENT OF CIVIL ENGINEERING

Summary of Board of Studies Meeting held on 14th December, 2022

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.
SDD (Steel)	110622	23-11-2019	14-12-2022	05% (removed)	5	4, 13
Surveying	2110221	12-04-2018	14-12-2022	05% (replaced)	13	5, 50

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DEPARTMENT OF CIVIL ENGINEERING

Summary of Board of Studies Meeting held on 14th December 2022

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.
Internship / Project	I10801	Working on field based projects	2	2, 8
Safety in Construction	I10851 / 510217	OSHA regulations, BIM, Safety practices in Construction	3,17	3,6,8, 82
Environmental Impact Assessment	H110604	Planning & developing of EIA reports	3,4	3,8
Digital Land Surveying & Mapping	H110804	Develop digital maps of data using total station	4	3
Air Pollution & Control	I10663	Developing air quality models, air pollution control techniques	7	4,10
Strategies for Sustainable Design	I10857/ M110801/ 510218/ 530216	To improve the managerial skill in sustainable design	3,4, 17	3,8,82,83
Retrofitting & Rehabilitation of Civil Infrastructure	H110803	Retrofitting of FRP composites & other structures, Repair & Strengthening of structures	4	3
Soil Structure Interaction	H110802	Use of FDM in solving soil structure interaction problems	4	3
Structural Dynamics	H110601	To understand about dynamic behavior of structure and design the structure dynamically stable	4	3
Geographic Information Systems	H110603	Applications of GIS for modelling	4	3
Concrete Technology	I10662	Mix Design of concrete	7	4,10

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DEPARTMENT OF CIVIL ENGINEERING

Summary of Board of Studies Meeting held on 14th December, 2022

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.
Engineering Mechanics	2110122	Shear force bending moment diagram	13	5, 38, 45
Environmental Engineering	3000003	Waste management, sustainability	13	5, 38, 46

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Minutes of Board of Studies Meeting held on 14th December 2022

The meeting of Board of Studies of the Civil Engineering department was held on Wednesday, 14th December 2022 Hybrid mode (online for external members). Following were present:

1. Dr. A. K. Nema (Expert nominated by V.C.)
Professor, Civil Engg., IIT Delhi
2. Prof. Brind Kumar (Subject Expert nominated by Academic Council)
Professor, Civil Engg., IIT BHU, Varanasi
3. Prof. Alok Verma (Subject Expert nominated by Academic Council)
Professor, Civil Engg., DTU Delhi
4. Er Atul Khare (Representative from Industry / Corporate Sector / Allied Area)
Principal Executive Director, Railway Board, Noida
5. Er. Alok Tiwari (Representative from Alumni)
Principal Chief Safety Officer, SW Railway, Hubli
6. Dr. M. K. Trivedi (Chairman BoS & Head of the department)
7. Prof. (Mrs.) Archana Tiwari (Member, BOS)
8. Dr. S. K. Jain (Member, BOS)
9. Dr. R. Kansal (Member, BOS)
10. Dr. S. Tiwari (Member, BOS)
11. Prof. A. K. Dwivedi (Member, BOS)
12. Prof. A. K. Saxena (Member, BOS)
13. Prof. G. Bhadoriya (Member, BOS)
14. Prof. Aditya K. Agarwal (Member, BOS)
15. Dr. Hemant Shrivastava (Member, BOS)
16. Dr. Jayvant Choudhary (Member, BOS)
17. Dr. Chayan Gupta (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 2022 Previous Board of Studies meeting minutes dated 30 th May 2022 are confirmed.
Item No. / CE - 2	To propose the scheme structure of VIII Semester with provision of ONE DE & ONE OC course to be offered in online mode with credit transfer for the batch admitted in 2019-2020. The finalized scheme of B.Tech VIII Semester for 2019-20 admitted batch is attached in Annexure - I.
Item No. / CE - 3	To propose the list of courses which the students can opt from SWAYAM/NPTEL/other MOOC platforms/ Institution (MITS) MOOC, to be offered in online mode under Departmental Elective (DE) category courses (DE-5) and open category (OC-4) for credit transfer in the VIII Semester under the flexible curriculum (Batch admitted in 2019-2020). 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 2019-20 admitted batch. 1. 110851, Safety in Construction 2. 110856, Rock Engineering

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	<p>3. 110857, Strategies for Sustainable Design, 11860 Nature & Properties of Materials</p> <p>Following courses are finalized as Open Category (OC-4) courses for VIII semester which will be offered in online mode through SWAYAM/NPTEL for credit transfer under the flexible curriculum for 2019-20 admitted batch.</p> <ol style="list-style-type: none">1. 900614, Natural Hazards2. 900634, Safety in Construction3. 900635, Geographic Information Systems
<p>Item No. / CE - 4</p>	<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 2019-20)] and for B.Tech. VI semester (for the batch admitted in 2020-21)]</p> <p>Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Minor Specialization during VIII semester for 2019-20 admitted batch.</p> <ol style="list-style-type: none">1. Strategies for Sustainable Design (M110801)2. Rural Water Resources Management (M110802) <p>Following SWAYAM/NPTEL courses were offered as additional courses for getting Minors during VI semester for 2019-20 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.</p> <ol style="list-style-type: none">3. Hydraulic Engineering (M110601)4. Water & Wastewater Treatment (M110602)5. Introduction to Civil Engineering Profession (M110603) <p>Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Honours during VIII semester for 2019-20 admitted batch.</p> <ol style="list-style-type: none">1. Probability Methods in Civil Engineering (H110801)2. Soil Structure Interaction (H110802)3. Retrofitting & Rehabilitation of Civil Infrastructure (H110803)4. Digital Land Surveying & Mapping (H110804) <p>Following SWAYAM/NPTEL courses were offered as additional courses for getting Honours during VI semester for 2019-20 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.</p> <ol style="list-style-type: none">5. Structural Dynamics (H110601)6. Geology & Soil Mechanics (H110602)7. Geographical Information Systems (H110604)8. Environmental Impact Assessment (H110605) <p>Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Minor Specialization during VI semester for 2020-21 admitted batch.</p> <ol style="list-style-type: none">1. Hydraulic Engineering (M110601)

11860 Nature & Properties of Materials
MK
15/12/23

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	<p style="text-align: center;">2. Water & Wastewater Treatment (M110602)</p> <p>Following SWAYAM/NPTEL courses are proposed as additional courses which can be opted for getting Honours during VI semester for 2020-21 admitted batch.</p> <ol style="list-style-type: none"> 1. Structural Dynamics (H110601) 2. Environmental Impact Assessment (H110605) 3. Construction Methods & Equipment Management (H110606)
Item No. / CE - 5	<p>To review and finalize the syllabus for all Departmental Core (DC) courses of VI Semester (for batch admitted in 2020-21) under 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 2020-2021) along with the syllabus is attached in Annexure – II and the same has been incorporated in the syllabus file for 2020 batch.</p>
Item No. / CE - 6	<p>To review and finalize the courses & syllabi to be offered (for batch admitted in 2020-21) under Departmental Elective (DE) course in VI Semester</p> <p>This Agenda Item is treated null and void as there is no Departmental Elective (DE) course in VI Semester scheme which is to be offered under traditional mode.</p>
Item No. / CE - 7	<p>To propose the list of courses from SWAYAM/NPTEL/MOOC platforms to be offered (for batch admitted in 2020-21) in online mode under Departmental Elective (DE) courses with credit transfer in VI Semester</p> <p>Following SWAYAM/NPTEL courses are offered as Departmental Elective (DE) courses in VI Semester for batch admitted in 2020-21 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) 4. 110664, Nature & Properties of Materials
Item No. / CE - 8	<p>To review and finalize the courses & syllabi to be offered (for batch admitted in 2020-21) 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 2020-21)</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 2020 batch.</p>
Item No. / CE - 9	<p>To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in VI semester (for batch admitted in 2020-21)</p> <p>The list of experiments for laboratory course to be offered in VI semester for 2020-21 admitted batch were finalized along with the syllabi of courses offered in B.Tech VI Semester as mentioned in agenda Item No. / CE – 5</p>
Item No. / CE - 10	<p>To review and finalize the Scheme & Syllabi of B. Tech. IV Semester (batch admitted 2021-22 Session) under the flexible curriculum along with the COs.</p>

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	<p>The Scheme & Syllabi for IV Semester for B.Tech Civil Engineering for batch admitted in 2021-2022 was discussed and finalized. The scheme as well as syllabus is being attached in Annexure – IV.</p>										
Item No. / CE - 11	<p>To review and finalize the Experiment list/ Lab manual for Laboratory Courses to be offered in IV semester (for batch admitted in 2021-22)</p> <p>The list of experiments for laboratory course to be offered in IV semester for 2021-22 admitted batch were finalized along with the syllabi of courses offered in B.Tech IV Semester as mentioned in agenda Item No. / CE – 10</p>										
Item No. / CE - 12	<p>To prepare and recommend the suggestive list of projects under the 'Skill based mini-project' category in various laboratory courses to be offered in B.Tech. IV 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 IV semester for 2021-22 admitted batch were finalized, the same is attached in Annexure – V.</p>										
Item No. / CE - 13	<p>To ratify the Scheme & Syllabi, list of experiments and skill based mini projects of First Semester & Second Semester B.Tech Programmes (admitted batch 2022-23 Session)</p> <p>The Scheme & Syllabi for First & Second Semester for B.Tech Civil Engineering for batch admitted in 2022-2023 was finalized. The list of experiments and skill based mini projects for lab courses offered in First & Second Semester were also discussed and finalized along with the syllabus of courses. The scheme as well as syllabus is being attached in Annexure – VI.</p>										
Item No. / CE - 14	<p>To review the CO attainments, to identify gaps and to suggest corrective measures for the improvement in the CO attainment levels for Jan June 2022.</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" style="width: 100%; border-collapse: collapse; margin-top: 10px;"> <thead> <tr> <th style="width: 25%;">Total No of Courses</th> <th style="width: 25%;">Total Number of COs</th> <th style="width: 25%;">No. of COs Not attained</th> <th style="width: 25%;">Percentage of COs not attained</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">20</td> <td style="text-align: center;">96</td> <td style="text-align: center;">21</td> <td style="text-align: center;">21.8%</td> </tr> </tbody> </table>			Total No of Courses	Total Number of COs	No. of COs Not attained	Percentage of COs not attained	20	96	21	21.8%
Total No of Courses	Total Number of COs	No. of COs Not attained	Percentage of COs not attained								
20	96	21	21.8%								
Item No. / CE - 15	<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 – VIII (a) & (b).</p>										
Item No. / CE – 16	<p>To review course outcomes (COs) feedback of various courses, its analysis and impact</p> <p>The course outcomes (COs) feedback of various courses running in the current semester has been taken. The compiled analysis report is attached in Annexure – IX.</p>										
Item No. / CE – 17	<p>Any other matter</p> <p>1. Approval of SWAYAM/NPTEL course for PG 2nd Semester (Batch Admitted in 2022-2023)</p> <p>Following courses which will be offered through SWAYAM/NPTEL in the</p>										

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upcoming 2 nd Semester of PG programme (Batch admitted in 2022-2023) as Departmental Elective Course (DE-2) with credit transfer facility. M.E. C.T.M. 2 nd Semester: (i) Safety in Construction (510217) (ii) Strategies for Sustainable Design (510218) M.Tech Environmental Engineering 2 nd Semester: (i) Biological Process Design for Wastewater Treatment (530219) In view of the above, the schemes of 2 nd 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. Chayan Gupta)
Member, BoS



(Dr. Jayvant Choudhary)
Member, BoS

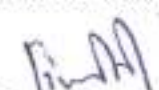

(Dr. Hemant Shrivastava)
Member, BoS

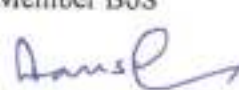

(Prof. Aditya K. Agarwal)
Member BoS

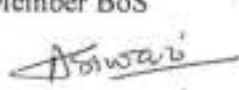

(Prof. G. Bhadoriya)
Member BoS

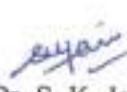

(Prof. A. K. Saxena)
Member BoS


(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

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

Digitally Approved
(Er Alok Tiwari)
Alumni Representative

Digitally Approved
(Er. Atul Khare)
Industry Representative

Digitally Approved
(Dr. A. K. Nema)
Expert Nominated By V.C


(Dr. M. K. Trivedi)
Head of Department & Chairman, BoS


DEAN (ACADEMICS)
M.I.T.S
GWALIOR

ANNEXURE – I

**(Scheme 8th Sem B.Tech Civil Engineering (2019
Admitted Batch))**

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Scheme of Examination

B. Tech. VIII Semester (Civil Engineering)

(For Batch Admitted in 2019-2020)

S. No.	Subject Code	Category 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. Assignment	Quiz / Assignment	End Sem.	Lab Work / Sessional	Assignment	Exam								
1.		DE	(DE-5)*	-	-	-	-	-	-	-	25	75	100	4	-	-	4	
2.		OC	(OC-4)*	-	-	-	-	-	-	-	25	75	100	2	-	-	2	
3.	110801	DLC	Internship / Project (DLC-9)	-	-	-	250	150	-	-	-	-	400	-	-	-	12	6
4.	110802	PD	Professional Development*	-	-	-	-	50	-	-	-	50	50	-	-	-	2	1
Total				-	-	-	250	200	75	225	750	6	-	-	14	13		
5.	Additional Courses for obtaining Honours or Minor Specialization by desirous students																	

* 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 - 4 (Through SWAYAM/NPTEL)
110851. Safety in Construction	900614. Natural Hazards
110856. Rock Engineering	900634. Safety in Construction
110857. Strategies for Sustainable Design	900635. Geographic Information Systems

110860. *Naam of Proficiency of*

15/11/20 *MLTS* *15/11/20*

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Civil Engineering Department, MITS Gwalior

ANNEXURE – II

**(Scheme & Syllabus 6th Sem B.Tech Civil
Engineering (2020-2021 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 2020 - 21 onwards

S. No.	Subject Code	Subject Category Code	Subject Name	Maximum Marks Allotted										Total Marks	Contact Hours per week			Total Credits	Mode of Teaching (Offline/Online)	Mode of Exam
				Theory Slot			Practical Slot			MOOCS					L	T	P			
				End Sem.	Mid Sem	Quiz/Assignment	End Sem	Lab Work & Sessional	Skill Based Mini Project	Assig nment	Exam									
				End Term Evaluation	Proficiency in subject /course															
1.	110620	MC	Artificial Intelligence & Machine Learning	50	10	20	20	20	60	20	20	-	-	200	3	-	2	4	Blended (2/1)	MCQ
2.	110621	DC	Wastewater Engineering(DC - 14)	50	10	20	20	-	-	-	-	-	100	2	1	-	3	Blended (2/1)	PP	
3.	110622	DC	Structural Design & Drawing (Steel) (DC - 15)	50	10	20	20	-	-	-	-	-	100	2	1	-	3	Blended (2/1)	PP	
4.	110623	DC	Estimating Costing & Contracting (DC - 16)	50	10	20	20	-	-	-	-	-	100	2	1	-	3	Blended (2/1)	PP	
5.	1106XX	DE	Departmental Elective - I (DE - 1)*	-	-	-	-	-	-	-	25	75	100	3	-	-	3	Online (0/3)	MCQ	
6.	910XXX	OC	Open Category Course - I (OC - 1)	50	10	20	20	-	-	-	-	-	100	3	-	-	3	Blended (2/1)	PP	
7.	110624	DLC	Minor Project - II (DLC - 4)	-	-	-	-	60	40	-	-	-	100	-	-	4	2	Offline (2/0)	SO	
8.	200XXX	CLC	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	MAC	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	Online	Mode of Teaching				Mode of Examination				Total Credits
		Blended		MOOC		Theory		Lab		
		Offline	Online	Online	Mentoring	A+O	MCQ	SO	SIP/SLP/NEC	
-	-	10	5	3	3	12	6	3	1	22
-	-	46%	23%	13%	13%	55%	27%	13%	5%	Credits %

Departmental Elective I (SWAYAM/NPTEL) (DE-1)

1. 110661, Geotechnical Engineering II - Foundation Engineering

2. 110662, Concrete Technology

3. 110663, Air Pollution & Control

4. 110664, Nature and Properties of Materials -

Open Category Course - I (OC-1)

1. 910111, Building Maintenance & Services

2. 910110, Sustainable Materials & Green Buildings

DEAN (ACADEMICS)
MLTS
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Civil Engineering Department, MLTS Gwalior

10/11/2023

ANNEXURE - II

SYLLABUS FOR DEPARTMENTAL ELECTIVE COURSES (DCs) TO
BEOFFERED 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, sludge drying beds, sludge disposal.

Unit-V

Advanced Waste Water treatment - Need of advanced treatment, Diatomaceous earth filters, Ultra filtration, Adsorption by activated carbon, Phosphorus removal, Nitrogen removal, Sewage treatment plants using MBBR and SBR technology.

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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

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, Lacings & 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.

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

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, essentials 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:

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

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

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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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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.

ANNEXURE – III

**(Syllabus OC 6th Sem B.Tech Civil Engineering (2020
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.

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.

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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, Willey Blackwell 2014.
2. Building Services Engineering by David V .Chadderton, Routledge 2013.

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 Energy consumption by optimal design, use of BIPV.
4. The course also intends to make student aware of ECBC, LEED, GRIHA etc.

Syllabus:

Unit-I

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

Unit-II

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

Unit-III

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

Unit-IV

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

Unit-V

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

Course Outcomes

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

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

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

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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

 Several handwritten signatures in blue ink are present at the bottom of the page, likely representing faculty members or department heads.

ANNEXURE – IV

(Scheme & Syllabus 4th Sem B.Tech Civil Engineering (2021-2022 Admitted Batch))

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DEPARTMENT OF CIVIL ENGINEERING
Scheme of Evaluation

B. Tech. IV Semester (Civil Engineering)

For batches admitted in academic session 2021-22 onwards

S. No.	Subject 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						L	T	P		
			End Term Evaluation		Continuous Evaluation		End Sem Exam	Continuous Evaluation		Lab Work & Sessional		Skill Based Mini Project						
			End Sem Exam	Proficiency in subject /course	Mid Sem	Quiz/ Assign ment		Lab	Work & Sessional									
1.	100028	BSC	Engineering Mathematics – III (BSC - 4)	50	10	20	20	-	-	-	-	2	1	-	3	Offline (3/0)	PP	
2.	110411	DC	Geotechnical Engineering - I (DC - 6)	50	10	20	20	60	20	20	20	2	1	2	4	Blended (2/1)	MCQ	
3.	110412	DC	Theory of Structure - I (DC - 7)	50	10	20	20	-	-	-	-	2	1	-	3	Offline (3/0)	PP	
4.	110413	DC	Transportation Engineering (DC - 8)	50	10	20	20	60	20	20	20	2	1	2	4	Blended (2/1)	MCQ	
5.	110414	DC	Water Resources Engineering (DC - 9)	50	10	20	20	-	-	-	-	2	1	-	3	Blended (2/1)	PP	
6.	110415	DLC	Civil Drawing Lab (DLC - 2)	-	-	-	-	60	20	20	20	-	-	2	1	Offline (1/0)	SO	
7.	100009	MC	Cyber Security	50	10	20	20	-	-	-	-	2	-	-	2	Online (0/2)	MCQ	
8.	200XXX	CLC	Novel Engaging Course (Informal Learning)	-	-	-	-	50	-	-	-	-	-	2	1	Interactive	SO	
Total				300	60	120	120	290	60	60	60	12	5	8	21	Grade	-	
9.	1000001	MAC	Indian Constitution & Traditional Knowledge	50	10	20	20	-	-	-	-	2	-	-	Grade	Online	MCQ	

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

Proficiency in course/subject – includes the weightage towards ability/ skill/ competence /knowledge level /expertise attained /attendance etc. in that particular course/subject
MCQ – Multiple Choice Questions, PP – Pen paper Mode, A+O – Assignment + Oral, SO – Submission + Oral

Mode of Teaching				Mode of Examination				Total Credits	
Theory		Lab	NEC	Theory		Lab	NEC		
Offline	Online	Offline	Interactive	PP	A+O	SO	SO		
6	2	3	1	9	-	3	1	21	
20%	10%	14%	4%	44%	-	14%	4%	Credits %	

MHO
02-10-2020


 DEAN (ACADEMICS)
 MITS Gwalior
 Civil Engineering Department, MITS Gwalior

DEPARTMENT OF CIVIL ENGINEERING

SYLLABUS B.Tech Civil Engineering

2021 ONWARDS ADMITTED BATCHES



SEMESTER-IV

[Handwritten signatures and initials in blue ink, including 'AKS', 'AKS', and 'AKS']

Course Code: 110411
Course Name: Geotechnical Engineering - I

L	T	P	Credit
2	1	2	4

Course Objectives:

- 1) The students will get the basic knowledge about natural material like rocks and get acquainted with natural dynamic processes and their actions.
- 2) The students will know the significance of geological investigations for civil engineering projects and site selection.
- 3) To inculcate the basic knowledge of soil such as its identification and classification, determination of various engineering properties and its suitability as a foundation/subgrade material.
- 4) To develop an understanding of the relationships between physical characteristics and mechanical properties of soils by experimentally measuring them.
- 5) To explain role of water in soil behavior and how soil stresses, permeability and quantity of seepage including flow net are estimated.
- 6) To determine shear parameters and stress changes in soil due to foundation loads & estimate the magnitude and time-rate of settlement due to consolidation.
- 7) To apply the principles of soil mechanics in stability analysis of slopes and settlement calculations.

Syllabus:

Unit-I Engineering geology & soil properties

Introduction to geology, mineralogy, petrology – Three-fold classification of rocks and their characteristic features. Structural geology - Types and classification of structures (Joints, Unconformities, Folds and faults) and their effect on civil engineering projects.

Introduction – Types of soils, their formation & deposition, basic definitions and relationships - Three phase system. Index properties of soil and their determination. Relationship between volume weight, void ratio-moisture content, moisture content-specific gravity, and unit weight- air voids etc.

Plasticity Characteristics of soil & indices and their determination, use of consistency limits, Classification of soil based on particle size and consistency limits, unified soil classification systems, Indian standard soil classification system, general characteristics of soil in different groups.

Unit-II Soil Water and Consolidation:

Permeability of soil: Darcy law and its validity, Determination of permeability in laboratory and in field using various methods like constant head method, pumping tests etc. factors affecting permeability of soil, Seepage analysis – introduction, stream & potential functions, flow nets, uses of a flow net, Introduction to effective, neutral and total stresses, effect of water table, fluctuations of effective stress, effective stress in soils saturated by capillary action, seepage pressure, quick sand condition.

Consolidation – Introduction, Compressibility and consolidation, comparison between compaction and consolidation, initial, primary & secondary consolidation, spring analogy for primary consolidation, interpretation of consolidation test results, Terzaghi's Theory of consolidation, final settlement of soil deposits, Determination of consolidation settlement and secondary consolidation.

Unit-III Stress Distribution in Soils:

Stresses in soil – Introduction, stresses due to point load, line load, strip load, uniformly loaded circular area, rectangular loaded area, influence factors, isobars, Boussinesq's equation, westergaard's analysis. Newmark's influence chart. Contact pressure under rigid & flexible area, computation of displacements from elastic theory.

Unit – IV Shear Strength of Soils:

Mohr Circle and its characteristics, principal planes, relation between major and minor principal stresses. Mohr-

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Coulomb's theory, types of shear tests, direct shear test, merits of direct shear test, Triaxial compression test, test behaviour of UU, CU and CD tests, pore-pressure measurements, computation of effective shear strength parameters, unconfined compression test, vane shear test, critical void ratio, Liquefaction.

Unit – V Stability of Slopes:

Introduction, Types of slopes and their failure mechanisms, factor of safety, analysis of Infinite and finite slopes, wedge failure, Swedish circle method, friction circle method, stability numbers and charts. Effect of ground water. Selection of shear strength parameters in slope stability analysis. Stability of Earth dams.

Course Outcomes:

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

- CO1: Evaluate different properties of rocks & soil and its classification.
- CO2: Examine the flow and shear parameters & their effects on various types of soil.
- CO3: Determine the stress distribution & shear failure by various methods.
- CO4: Evaluate the shear strength parameter of soil by various methods.
- CO5: Analyse the stability of slopes using various methods.

Text Books:

1. Soil Mech. & Found. Engg., Dr. K.R. Arora, Std. Publishers Delhi, 7th Edition, 2014
2. Soil Mech. & Foundation, Dr. B.C. Punmia, Laxmi Publications, Delhi, 16th Edition, 2017
3. Soil Mech. & Found Engg., S.K. Garg, Khanna Publishers, Delhi, 1st Edition, 2003
4. Basic & Applied Soil Mechanics, Gopal Ranjan, New Age International Publishers, 2016
5. Parbin Singh., "Engineering and General Geology", S. K. Kataria and Sons, 2009

Reference Books:

1. Modern Geotech Engg. Dr. Aram Singh, IBT Publishers, Delhi, 8th Edition, 2016
2. Geotech Engg., C. Venkatramaiah, New Age International Publishers, 16th Edition, 2018
3. Soil Testing for Engg., T.W. Lambe, John Wiley & Sons. Inc. 1969
4. Bangar, K.M, Principles of Engineering Geology, Standard Publishers Distributors, 1995, New Delhi

List of Experiment's:

1. Moisture Content Determination. Oven Drying Method.
2. Grain Size Analysis – Mechanical Method.
3. Grain Size Analysis – Hydrometer Method.
4. Liquid Limit, Plastic Limit, Shrinkage Limit Tests.
5. In-Place Density tests – Core Cutter Method, Sand Replacement Method.
6. Specific Gravity Tests.
7. Permeability Tests, Variable Head Method.
8. Compaction Test.
9. Unconfined Compression Test.
10. Direct Shear Test.
11. Triaxial Shear Test (UU)
12. Vane Shear Test.
13. Plate Load Test (Demonstration)
14. Consolidation Test.

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

- CO 1: Check physical properties of soil.
- CO 2: Check strength properties of soil.
- CO 3: Differentiate the flow properties and stresses of soil.
- CO 4: Check shear strength of soil.

Course Code: 110412

Course Name: Theory of Structure - I

L	T	P	Credit
2	1	0	3

Course Objectives:

- 1) To develop an understanding of the behavior of structure under serviceability load.
- 2) To understand the mechanics of the material behavior of different type of structures.
- 3) To understand the concepts of analysis of indeterminate structures by various classical methods.
- 4) To make student aware of different methods of structural analysis.

Syllabus:

Unit-I

Deflection of beams: Double Integration method. Area Moment Method and Slope - Deflection Method. Beam of variable cross section, M/EI diagram, Conjugate Beam Method.

Unit-II

Virtual work and Energy Principles: Principles of Virtual work applied to deformable bodies. Maxwell's Reciprocal theorems, Energy theorems, Application to pin jointed frames only.

Unit - III

Indeterminate Structures - I: Static and Kinematics indeterminacy, Analysis of Fixed and continuous beams by Theorem of three moments, Effect of sinking and rotation of supports.

Unit-IV

Indeterminate Structures - II: Analysis of beams and analysis of frames (with and without sway) by slope Deflection method.

Unit-V

Moment Distribution Method: Moment distribution method for analysis of beams and analysis of frames (without sway) Three hinged arches of different shapes, Eddy's Theorem. Two Hinged and Fixed Arches.

Course Outcomes:

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

- CO 1: Classify different type of structures based on support conditions.
- CO 2: Explain various methods & principles for analysis of structures.
- CO 3: Apply various methods & principles for structural analysis.
- CO 4: Analyse various structures using various methods, principles & theorems.
- CO 5: Evaluate different methods of structural analysis.

Text Books:

1. Basic Structural Analysis, Reddy C. S., Tata McGraw Hill Publishing Company, 2017
2. Theory of Structures, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publications, 9th edition, 2014
3. Theory of Structures, B.C. Punmia, Laxmi Publications, 2017

Reference Books:

1. Structural Analysis – A Unified classical and matrix Approach, Ghali A & Neville M,

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Chapman and Hall, New York, 6th edition, 2009

2. Intermediate structural analysis, Wang C.K., McGraw Hill, New York, 1984
3. Structural Analysis, Aslam Kassimali, C. L. Publisher, 2014
4. Structural Analysis, R. C. Hibbler, Pearson Publication, 2017

Course Code: 110413

Course Name: Transportation Engineering

L	T	P	Credit
2	1	2	4

Course Objectives:

- 1) To study the planning aspects of roads & highway.
- 2) To study the geometric design aspects of highway and road.
- 3) To know about pavement material and design.
- 4) To understand the construction process and methods of roads & highway.
- 5) To study about traffic characteristics and design of intersections.

Syllabus:

Unit – I Highway Development and Planning

Highway Development in India — Necessity for Highway Planning – Different Road Development Plans; Classification of Roads. Road Network Patterns — Highway Alignment-Factors affecting Alignment- Engineering Surveys.

Unit – II Highway Geometric Design

Importance of Geometric Design – Design controls and Criteria – Highway Cross Section Elements – Sight Distance Elements – Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance – Design of Horizontal Alignment – Design of Super elevation and Extra widening – Design of Transition Curves – Design of Vertical alignment - Gradients- Vertical curves.

Unit – III Traffic Studies

Spot Speed Studies and Volume Studies, Speed and Delay Studies purpose, causes of delay, methods of conducting speed and delay studies, Origin and destination Studies (O & D): Various methods, collection and interpretation of data, Traffic Capacity Studies: Volume, density, basic practical and possible capacities, level of service, Parking Studies: Methods of parking studies, design of intersections at grade & grade separated.

Unit -IV

Highway Materials & Construction: Aggregates and their types, physical and engineering properties, Fillers, Bitumen, Characteristics, Emulsions and cutbacks, Basic tests on all materials.

Design of Flexible & Rigid Pavements: Introduction, flexible pavement, factors affecting design and performance, stress in flexible pavement, design of flexible pavement as per IRC, rigid pavements – components & functions, factors affecting design & performance of CC pavements, stress in rigid pavement, type of joints, dowel bar, tie bar and its functionalities.

Unit – V Evaluation and Maintenance of Pavements

Pavement distress in flexible and rigid pavements, Pavement evaluation, structural evaluation, evaluation by deflection measurements, Strengthening of pavements, Types of maintenance, Importance of highway drainage, Surface and sub-surface drainage arrangements.

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Course Outcomes:

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

- CO 1: Explain the principles of highway planning & their geometrical design.
- CO 2: Evaluate physical properties of suitable highway engineering materials with drainage provisions.
- CO 3: Apply the concepts of traffic engineering in transportation planning.
- CO 4: Design pavements as per regulations.
- CO 5: Formulate the layers of pavement along with provisions of its drainage & maintenance.

Text Books:

1. Highway Engineering, S.K. Khanna & C.E.G. Justo, Nemchand Pub., 10th edition, 2018
2. Highway Engineering, Gurucharan Singh, Standard Publishers, 5th edition, 2006
3. Principles & Practices of Highway Engineering, L R Kadiyali, N B Lal, Khanna Publishers, 2016

Reference Books:

1. Principles of Pavement Design, E.J. Yoder & M.W. Witzsch, Wiley India, 2nd edition, 2011
2. Highway Engineering, O' Flaherty, Butterworth-Heinemann, 4th edition, 2002
3. Principles of Practice of Highway Engg., Sharma & Sharma, Asia Publishing House, 1965
4. Analysis and Design of Pavements, Haug, Pearson, 2nd edition, 2004

List of Experiments:

1. Aggregate Crushing Value Test
2. Determination of Aggregate Impact Value
3. Determination of Los Angeles Abrasion Value
4. Determination of flakiness index and elongation index of aggregates.
5. Determination of California Bearing Ratio Value
6. Determination of Penetration Value of Bitumen
7. Determination of Viscosity of Bituminous Material
8. Determination of Softening Point of Bituminous Material
9. Determination of Ductility of the Bitumen
10. Determination of Flash Point and Fire Point of Bituminous Material
11. Determination of Bitumen Content by Centrifuge Extractor
12. Determination of Stripping Value of Road Aggregate
13. Determination of Marshall Stability Value for Bitumen.

Course Outcomes:

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

- CO 1: Select suitable aggregate material by testing the physical properties.
- CO 2: Determine properties of bitumen and its grade.
- CO 3: Determine CBR value of material for subgrade and subsequent layers of pavement.
- CO 4: Design job mix formula for bituminous surface using Marshal Stability test



Course Code: 110414

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

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.

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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: 100415
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

110411, Geotechnical Engineering - I:

1. Use of locally available waste materials as a soil stabilizer.
2. Improvement of swelling properties of black cotton soil using agricultural waste.
3. Effectiveness of modern reinforcing materials such as coir fibers, jute fibers, rubber tyre chips etc. in California Bearing Ratio based Flexible pavement design.
4. Study the Stress-strain behavior of soil mixed with poly propylene fibers using direct shear test.
5. Examine the variation in A-line curve of stabilized cohesive soil along with all the Atterberg's limits.
6. Identify the Swelling pressure of Black cotton soil and observed its usefulness as a foundation material of any single-storey building.

110413, Transportation Engineering:

1. Identification of black spots.
2. Safety audit & rectification of black spots.
3. Use of local materials in rigid pavement
4. Effect of long term ageing on the performance of bituminous mix.
5. Identification of pavement distress and its remediation.
6. Traffic census of urban roads.
7. Analysing the effect of salinity of water on compressive strength of cement concrete.
8. Analyzing the effect of particle size of aggregates in compressive strength or pervious paver block.
9. Analyzing the effect of sugar as retarder on properties of OPC
10. Potential utilization of recycled aggregate waste on mechanical properties of cement concrete.

110415, Civil Drawing Lab:

1. Drawing sheet of residential building (single & multi-storey) containing detailed plan.
2. Drawing sheet of industrial building containing detailed plan.
3. Drawing sheet of residential building (single & multi-storey) using Auto CAD
4. Drawing sheet of institute building using Auto CAD
5. Drawing sheet of commercial building using Auto CAD

ANNEXURE – VI

**(Scheme & Syllabus 1st Sem & 2nd Sem B.Tech Civil
Engineering (2022-2023 Admitted Batch))**

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Civil Engineering Department, MITS Gwalior

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Department of Civil Engineering
Scheme of Evaluation

B. Tech. I Semester CIVIL ENGINEERING

(For batch admitted in academic session 2022-23)

No.	Subject Code	Subject Category Code	Subject Name	Maximum Marks Allotted										Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.		
				Theory Slot			Practical Slot			Total Marks		Contact Hours per week							
				End Term Evaluation		Continuous Evaluation	End Sem. Exam		Continuous Evaluation		Total Marks	L	T					P	
				End Sem. Exam	Proficiency in subject /course	Mid Sem. Exam.	Quiz/Assign ment	Lab Work & Sessional	Skill Based Mini Project										
1.	2100011	BSC	Engineering Mathematics - I (BSC-1)	50	10	20	20	-	-	-	-	100	3	1	-	4	Offline	PP	2 Hrs
2.	2160122	ESC	Computer Programming (ESC-1)	50	10	20	20	60	20	20	20	200	2	1	2	4	Blended	AO	2 Hrs
3.	2100014	ESC	Engineering Graphics (ESC-2)	50	10	20	20	-	-	-	100	1	2	-	3	Offline	AO	2 Hrs	
4.	2110121	DC	Building Materials & Construction (DC-1)	50	10	20	20	60	20	20	200	3	-	2	4	Blended	PP	2 Hrs	
5.	2110122	DC	Engineering Mechanics (DC-2)	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs	
6.	2100018	ESC	Engineering Graphics Lab (ESC-3)	-	-	-	-	60	20	20	100	-	-	2	1	Offline	SO	-	
Total				250	50	100	100	180	60	60	60	800	12	4	6	19	-	-	-
7.	3000003	Natural Sciences & Skills	Environmental Engineering	50	10	20	20	30	10	10	150	1	-	2	GRADE	Blended	MCQ	1.5 Hrs	

Induction programme of three weeks (MC): Physical activity, Creative Arts, Universal Human Values, Literary, Proficiency Modules, Lectures by Eminent People, Visits to local Areas, Familiarization to Dept./Branch & Innovations.

¹Proficiency 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		Theory		Lab		Total Credits
Offline	Online	Blended	Offline	PP	AO	MCQ	SO	
7		9	3	10	6	3	3	19
37%		49%	16%	51%	33%		16%	Credits %

MKS
02/08/2023
DEAN (ACADEMICS)

MITS
GWALIOR

Civil Engineering Department, MITS Gwalior
MKS
02/08/2023

02/08/2023
MKS



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

(for batch admitted in academic session 2022-23)

No.	Subject Code	Category Code	Subject Name	Maximum Marks Allotted						Contact Hours per week			Total Credits	Mode of Teaching	Mode of Exam.	Duration of Exam.			
				Theory Slot			Practical Slot			Total Marks	L	T					P		
				End Term Evaluation	Continuous Evaluation	End Sem. Exam	Lab Work & Sessional	Continuous Evaluation	Skill Based Mini Project										
1.	2110221	DC	Surveying (DC - 3)	50	10	20	20	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs	
2.	2110222	DC	Strength of Materials (DC - 4)	50	10	20	20	60	20	20	200	2	1	2	4	Blended	PP	2 Hrs	
3.	2100021	ESC	Basic Mechanical Engineering (ESC - 4)	50	10	20	20	-	-	-	100	2	1	-	3	Blended	MCQ	1.5 Hrs	
4.	2100022	ESC	Basic Electrical & Electronics Engineering (ESC - 5)	50	10	20	20	60	20	20	200	2	1	2	4	Blended	MCQ	1.5 Hrs	
5.	2160222	ESC	Python Programming (ESC - 6)	50	10	20	20	60	20*	20	200	2	1	2	4	Blended	AO	2 Hrs	
6.	2110223	DLC	Survey Practice Lab (DLC - 2)	-	-	-	-	60	20*	20	100	-	-	2	1	Offline	SO	-	
Total				250	50	100	100	180	60	60	400	11	4	8	19				
7.	3000004	Natural Sciences & Skills	Language	50	10	20	20	30	10	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 / 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	PP	AO	MCQ	SO
	15	4	4	6	3	6	4
	89%	21%	21%	32%	15%	32%	21%
				Credits %			
				M.I.T.S			
				TOPIC (ACADEMICS)			

Civil Engineering Department, MITS Gwalior

**DEPARTMENT OF CIVIL
ENGINEERING**

**SYLLABUS B.Tech Civil
Engineering**

**2022 ONWARDS ADMITTED
BATCHES**



SEMESTER-I & II



Course Code: 2110121

Course Name: Building Materials & Construction

L	T	P	Credit
3	0	2	4

Course Objectives:

1. To study the properties of concrete ingredients i.e. cement, Sand and coarse aggregate by conducting different tests.
2. To select of different types of admixtures to improve the properties of concrete for different field applications.
3. To conduct the field and laboratory tests on concrete in fresh and hardened state.
4. To provide knowledge about various types of bricks, stones, woods & timber, ferrous & nonferrous construction material & their applications.
5. To provide knowledge on design of foundation, including selection of appropriate foundation.
6. To understand laying & construction of brick & stone masonry and various methods of damp proofing etc.
7. To provide knowledge about stairs, floors & roofs in various types of buildings.

Syllabus:

Unit-I

Types of Foundation & its design: masonry construction, masonry classification, stone v/s brick masonry, joints in stone masonry, brick masonry (bonds in brick masonry, characteristics of bonds, type of bonds), typical structures in brickwork, Damp prevention (causes, effects, control & prevention techniques, material used for damp proofing), Anti termite treatment, water proofing treatment, Arches & lintels, stair & stair case, (types & design of stair case), Types of floor & flooring, Roof & roof covering.

Unit – II

Ingredients of Concrete: Portland cement Chemical composition of cement, Hydration of cement, setting of cement, tests on physical properties of cement. Types of Portland cement – Ordinary Portland cement – Rapid Hardening Portland cement – low heat Portland cement- Sulphate Resisting cement – Portland Blast furnace cement- Super Sulphated cement- Portland Pozzolana cement and Pozzolanas: Fly ash; use of pozzolanas, white cement, Expansive cements – High alumina cement.

Aggregates: General classification of aggregates, natural and artificial aggregates, particle shape and texture, strength of aggregate, Mechanical properties of aggregate, specific gravity, Bulk density, porosity and absorption of aggregate, moisture content of aggregate, Bulking of sand deleterious substances in aggregates, Soundness of aggregates, Alkali- aggregate reaction, Fineness modulus, Grading requirements.

Admixtures: Introduction, functions of admixtures, classification of admixtures, Accelerators, Retarders, Water Reducing Agents, Super plasticizers, air entraining admixtures.

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Unit-III

Fresh and Hardened Concrete: Fresh Concrete, Workability of concrete, factors affecting workability, measurement of workability using slump test, Compaction factor test, Flow test, Vee-Bee Test, Ball penetration test, Segregation and Bleeding of concrete, process of concrete manufacturing.

Hardened Concrete: Compressive & Flexural strength of concrete, drying shrinkage of concrete, Creep of concrete, Permeability and durability of concrete, Thermal properties of concrete.

Unit IV

Bricks (classification, characteristics, manufacturing, testing, and types). Stones (classification, Quarrying, seasoning characteristics, testing, selection & uses, preservation), Wood & Timber (Classification, Structure & characteristics, seasoning and its methods, defects & diseases, preservation & various treatment testing), wood products and their applications

Unit V

Mortar (Classification, characteristics, functions of ingredients). Types of mortar and their uses grout, guniting, ferrous material (Pig iron, CI, Mild steel, wrought iron, stainless steel, compositions & proposition). Reinforced steel bars (classification, types, designation), Aluminium (its alloys & uses). Copper (its alloys & uses), Ceramics (classification, properties, commercial forms), Paint varnishes & enamels (types, composition, method of application, defects)

Course Outcomes:

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

CO1: Explain the basic elements of buildings, engg. materials & construction.

CO2: Evaluate the properties of various materials like cement, aggregate, concrete, admixture, brick, stone etc.

CO3: Distinguish the suitability of building materials in the construction of elements of buildings.

CO4: Evaluate various types of concrete in building construction accordingly.

CO5: Apply various techniques for finishing & protection works of various elements of building.

Text Books:

1. Concrete Technology, M. L. Gambhir, Tata McGraw Hill education Pvt. Ltd., 5th edition 2013
2. Concrete Technology, M.S. Shetty, S. Chand Publications, 2006
3. Building Materials, M.L. Gambhir, Tata McGraw Hill education Pvt. Ltd., 2017
4. Building Construction, B.C. Punmia, A.K. Jain, Laxmi Publishers New Delhi, 2016

Reference Books:

1. Properties of Concrete, Neville, ELBS, Pearson Education, 5th edition 2012
2. Building Material, S.K. Duggal, New Age Publishers, 4th revised edition 2012

List of Experiments:

1. Determination of properties of cement.
2. Determination of properties of sand.
3. Determination of properties of aggregate.
4. Determination of Fineness of cement.
5. Determination of consistency of cement.
6. Determination of workability of concrete by slump test.

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7. Determination of workability of concrete by compacting factor apparatus.
8. Determination of workability by Vee Bee consistometer.
9. Determination of water absorption of bricks.
10. Determination of efflorescence of brick.
11. Field testing on bricks.
12. Determination of crushing strength of bricks.

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

CO 1: Determine the properties of cement, sand & aggregate as per IS code.

CO 2: Determine the workability of concrete for suitability of concrete mix in different construction works.

CO 3: Evaluate compressive strength of various concrete mixes.

CO 4: Determine physical properties of brick by experiment and practice accordingly.

CO 5: Examine the properties of the cement mortar for various elements of the buildings.

Suggestive List of Skill Based Mini Project:

1. Mix Design – (M20 & M25)
2. Fresh & Hardened Concrete Design.
3. Development of Innovative Building Materials like brick etc using waste materials.

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Course Code: 2110122

Course Name: Engineering Mechanics

L	T	P	Credit
3	0	0	3

COURSE OBJECTIVES:

1. To learn about basic laws of Mechanics and its application for different types of force systems.
2. To learn the Laws of friction and its applications
3. To study the applications of equilibrium concepts in Engineering problems.
4. To study about properties of areas like Centroid and Moment of Inertia.
5. To learn the basics of kinematics and Kinetics of particles and its applications in free vibration.

SYLLABUS

Unit-I

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent coplanar forces, free body Diagram, Force Diagram and Bow's notations, Introduction to force system in space; Equilibrium Concepts.

Unit-II

Equilibrium Problem involving Frictional forces, Friction: Laws of Coulomb friction, inclined plane; ladder friction; wedge friction, square threaded screws; belt friction; rolling resistance

Unit-III

Support Reactions, Analysis of plane Trusses, method of joints, method of Sections, Graphical method. Shear force and bending moment diagram for cantilever, simply supported and overhanging beam with concentrated, distributed load and Couple.

Unit-IV

Properties of areas: Centroid of plane areas, Moments of inertia, theorem of parallel axis and theorem of perpendicular axis; product of inertia of areas, polar moment of inertia, principal axes and principal moments of inertia.

Unit-V

Kinematics and Kinetics of particles: Particle dynamics; Free Vibrations of undamped Single Degree of Freedom system

COURSE OUTCOMES

On successful completion of teaching-learning and evaluation activities, a student would be able to

1. Apply basic laws of Mechanics for different types of force systems.
2. Apply the Laws of friction in engineering problems.
3. Apply the concept of equilibrium in statically determinate beams and trusses.
4. Determine the properties of areas for different shapes.
5. Apply the basics of Kinematics and Kinetics of particles in motion and undamped free vibration.

Text book:

1. R. C. Hibbeler, *Engineering Mechanics (Statics and Dynamics)*, Pearson Education Asia Pvt. Ltd
2. RS Khurmi and N Khurmi, *A Textbook of Engineering Mechanics*, S. Chand and Co. Ltd.
3. R. K. Rajput, *Engineering Mechanics*, Dhanpat Rai Publications (P) Limited
4. J. L. Meriam and L.G. Kraige, *Engineering Mechanics (Static & Dynamics)*, John Wiley

Reference books

1. F. P. Beer and E. R. Johnston, *Mechanics for Engineers (Static & Dynamics)*, McGraw Hill
2. S. P. Timoshenko, D. H. Young, and J. V. Rao, *Engineering Mechanics*, Tata-McGraw Hill.

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Course Code: 3000003

Course Name: Environmental Engineering

L	T	P	Credit	Mode of Teaching	Mode of End Sem Exam
1	0	2	GRADE	Blended	MCQ (1.5 Hrs)

Course Objectives:

1. To create awareness about various sources of energy and their applications.
2. To create awareness about various environmental issues and how to deal with those environmental issues.
3. To impart fundamental concepts in environmental engineering dealing with air, water and waste management.
4. To create awareness about sustainability concepts and need of sustainable development for development of society.
5. To create awareness about various environmental policies.

Syllabus:

Unit 1: Energy: Various forms of Renewable and non-renewable energy and their applications, Solar Energy, Hydro, wind, biomass, geothermal, tidal and nuclear energy, green energy, clean energy, role of energy in economic and social development.

Unit 2: Water Environment: Ecosystems & its components, Water Cycle, Water availability & uses, Water resources problems and its solutions, Water pollution problems, Water quality characteristics & standards, Introduction to water treatment mechanisms.

Unit 3: Air Environment: Air pollution, causes, global effects, climate change and its impact, Introduction to air pollution control measures, Carbon credit, Carbon trading, Clean Development Mechanism (CDM).

Unit 4: Waste Management: Introduction to management of municipal solid waste, E-waste and plastic waste, various initiatives in management of waste.

Unit 5: Sustainability: Introduction to the concept of sustainability & sustainable development, Sustainable development goals, TBM, Challenges for sustainable development.

Policies: Multilateral environmental agreements and Protocols – Kyoto Protocol, Montreal Protocol, Indian policies - Environment Protection Act 1986, Waste Management rules 2000.

Course Outcomes:

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

- CO 1. Explain the fundamental concepts of energy, ecosystems & environment.
- CO 2. Recognize various environmental problems and their effects.
- CO 3. Apply various air & water remediation methods.
- CO 4. Apply waste management techniques.
- CO 5. Apply the concepts of sustainability

Text Books:

1. D. K. Asthana, Meera Asthana, A Text Book of Environmental Studies, S Chand & Co., New Delhi.
2. P. Meenakshi, Elements of Environmental Science & Engineering, PHI, New Delhi

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3. M.M. Sulphery, M.M. Safer, Introduction to Environment Management, PHI, New Delhi
4. S K Dhameja, Environmental Engineering & Management, S K Kataria & Sons, new Delhi

Lab Work:

Basic Analysis of Water Quality Parameters: pH, Acidity, Alkalinity, Solids.

Skill Based Mini Project:

Students have to deliver a presentation in class preferably on power point and submit a write up of the same on following topics (preferably group project wherein students divided into group of 4):

1. Identification of potential water related problems in the vicinity of their residence and propose solutions for these problems.
2. Identification of potential air pollution issues in the vicinity of their residence and propose solutions for these problems.
3. Identify waste related issues in the vicinity of their residence and propose solutions for these issues.
4. Study of Solar Energy Panel in the Institute.
5. Study of Wind Mill in the Institute.

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Course Code: 2100020

Course Name: Basic Civil Engineering & Mechanics

L	T	P	Credit
3	0	0	3

Course Objectives:

1. To understand the utility of various types of building materials.
2. To understand the location, construction detail and suitability of various building elements.
3. To determine the location of object on ground surface.
4. To stabilize the position of various object.
5. To understand the effects of system of forces on rigid body in static conditions.
6. Analysis of determinate structure (beam & truss)

Syllabus:

Unit- I

Building Materials: Stones, bricks, cement, timber - types, properties, test & uses, Introduction of concrete properties & Laboratory tests on concrete, curing of concrete and mortar Materials.

Unit- II

Surveying & Positioning: Introduction to surveying, Survey stations, Measurement of distances-conventional and EDM methods, Measurement of directions by different methods, Measurement of elevations by different methods, reciprocal leveling.

Unit- III

Mapping & Sensing: Mapping details and contouring, Plane tables and related devices. Introduction of theodolite. Measurement of areas and volumes, application of measurements in quantity computations, Introduction of remote sensing and its applications.

Unit- IV

Forces and Equilibrium: Graphical and Analytical Treatment of Concurrent and non-concurrent coplanar forces, free body Diagram, Force Diagram and Bow's notations, Application of Equilibrium Concepts; Analysis of plane Trusses, method of joints, method of Sections. Frictional force in equilibrium problems.

Unit -V

Centre of Gravity and moment of Inertia: Centroid and Centre of Gravity, Moment of Inertia of Composite section, Radius of Gyration, Introduction to product of Inertia and Principle Axes. Support Reactions, Shear force and bending moment diagram for cantilever & simply supported beam with concentrated, distributed load and Couple.

Course Outcomes:

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

- CO1: Explain concepts and terminologies of building materials, surveying and mechanics.
- CO 2: Apply various methods for surveying and mechanics.
- CO 3: Determine the location, area and volume of objects on ground surface.

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CO4: Solve the problems of surveying and mechanics by using various methods.

CO5: Analyse the effects of system of forces on rigid bodies in static conditions.

Text Books:

1. Surveying, Vol. – 1, Punmia B.C., Laxmi Publications, 17th edition, 2016
2. Building Material, B. C. Punmia, Laxmi Publications, 2016
3. A textbook of Engineering Mechanics, D. S. Kumar, Katsons Publications, 2013

Reference Books:

1. Basic Civil Engineering, S. Ramamrutam & R. Narayan, Dhanpat Rai Pub., 3rd edition, 2013
2. Applied Mechanics, Prasad I.B., Khanna Publication 17th edition, 1996
3. Surveying, Duggal, Tata McGraw Hill New Delhi, 4th edition, 2013
4. Engineering Mechanics - Statics & Dynamics, R.C. Hibbler, Pearson Publications, 14th edition, 2015
5. Engineering Mechanics - statics dynamics, A. Boresi & Schmidt, Cengage learning, 1st edition, 2008.
6. Applied Mechanics, R.K. Rajput, Laxmi Publications, 3rd edition, 2016

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Course Code: 2110221

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.
- CO3: Apply various methods of surveying.
- CO4: Analyse various techniques of controlling points.
- CO5: Evaluate various methods for curve setting.

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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 Code: 2110223

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

Reference Books:

1. Surveying theory & Practice, R.E. Devise, 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

Course Code: 2110222
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.
- 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.

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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 for Jan June 2022 Session)

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ANNEXURE – VII

CO Attainment & Gap Analysis Jan – June 2022

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

Course Code & Name	Course Outcomes	Direct CO Attainment Level	Indirect CO Attainment Level	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
100020: Basic Civil Engineering & Mechanics (CE)	CO 1	1.48	3.00	1.79	2.5	0.71	Not Attained	More assignment, on concepts and terminologies of building materials, surveying and mechanics will be conducted
	CO 2	2.87	3.00	2.90	2.5	-0.40	Attained	Rubrics for the level can be modified
	CO 3	2.34	3.00	2.31	2.5	0.19	Not Attained	Calculation of area and volume of objects on ground Surface will be explained more.
	CO 4	0.00	3.00	0.60	2.5	1.90	Not Attained	More assignment, on survey measurements & techniques will be conducted.
	CO 5	0.00	3.00	0.60	2.5	1.90	Not Attained	Effects of system of forces on rigid bodies in static Conditions will be demonstrated more.
100026: Basic Civil Engineering Lab	CO 1	2.97	3.00	2.97	2.5	-0.47	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	2.97	3.00	2.97	2.5	-0.47	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	2.97	3.00	2.97	2.5	-0.47	Attained	Rubrics for the level can be modified
110211: Building Planning & Design	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	2.36	3.00	2.33	2.5	0.17	Not Attained	The law and codal provisions will be explained more.

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100020 Basic Civil Engineering & Mechanics (ME&AU)	CO 1	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 2	0.00	3.00	0.60	2.5	1.90	Not Attained	More assignment, on concepts and terminologies of building materials, surveying and mechanics will be conducted.
	CO 3	1.75	3.00	1.99	2.5	0.51	Not Attained	Calculation of area and volume of objects on ground surface will be explained more.
	CO 4	0.00	3.00	0.60	2.5	1.90	Not Attained	More assignment, on survey measurements & techniques will be conducted.
	CO 5	1.01	3.00	1.41	2.5	1.09	Not Attained	Effects of system of forces on rigid bodies in static conditions will be demonstrated more.
100020 Basic Civil Engineering & Mechanics (EE)	CO 1	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 2	2.83	3.00	2.87	2.5	-0.37	Attained	Rubrics for the level can be modified
	CO 3	2.47	3.00	2.57	2.5	-0.07	Attained	Rubrics for the level can be modified
	CO 4	2.57	3.00	2.65	2.5	-0.15	Attained	Rubrics for the level can be modified
	CO 5	2.84	3.00	2.87	2.5	-0.37	Attained	Rubrics for the level can be modified

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

Course Code & Name	Course Outcomes	Direct CO Attainment Level	Indirect CO Attainment Level	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
110411 Geotechnical Engineering - I	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	2.66	3.00	2.73	2.5	-0.23	Attained	Rubrics for the level can be modified.
	CO 5	2.39	3.00	2.51	2.5	-0.01	Attained	Rubrics for the level can be modified.
110411 Geotechnical Engineering (Practical)	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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110412: Theory of Structure -I	CO 1	2.52	3.00	2.62	2.5	-0.12	Attained	Rubrics for the level can be modified
	CO 2	1.87	3.00	2.10	2.5	0.40	Not Attained	Various methods & principles for analysis of structure will be explained more.
	CO 3	0.72	2.60	1.18	2.5	1.32	Not Attained	Various methods & principles for analysis of Structures will be elaborated more.
	CO 4	0.80	3.00	1.24	2.5	1.26	Not Attained	Structural Analysis methods based on practical hands on will be conducted more.
	CO 5	0.00	3.00	0.60	2.5	1.90	Not Attained	Methods of structural analysis will be evaluated more.
110413 Transportation Engineering	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	2.62	3.00	2.71	2.5	-0.21	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	2.24	3.00	2.39	2.5	0.11	Not Attained	The results regarding the design will be considered at practical level will be explained more.
110413 Transportation Engineering (Practical)	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	2.48	3.00	2.59	2.5	-0.09	Attained	Rubrics for the level can be modified
110414 Water Resources Engineering	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	2.53	3.00	2.62	2.5	-0.12	Attained	Rubrics for the level can be modified
	CO 5	2.96	3.00	2.92	2.5	-0.42	Attained	Rubrics for the level can be modified
	CO 6	2.69	2.69	2.69	2.5	-0.19	Attained	Rubrics for the level can be modified
110415 Civil Drawing Lab	CO 1	2.67	2.67	2.67	2.5	-0.17	Attained	Rubrics for the level can be modified
	CO 2	3.00	3.00	3.00	2.5	-1.10	Attained	Rubrics for the level can be modified
	CO 3	2.67	2.67	2.67	2.5	-0.17	Attained	Rubrics for the level can be modified
	CO 4	2.67	2.67	2.67	2.5	-0.17	Attained	Rubrics for the level can be modified

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

Course Code & Name	Course Outcomes	Direct CO Attainment Level	Indirect CO Attainment Level	Overall CO Attainment	Target Attainment	Gap in Attainment	Status of CO Attainment	Action Taken
110602 Structural Design & Drawing II (Steel)	CO 1	2.51	2.67	2.54	2.5	-0.04	Attained	Rubrics for the level can be modified
	CO 2	3.00	2.67	2.93	2.5	-0.43	Attained	Rubrics for the level can be modified
	CO 3	2.83	2.67	2.80	2.5	-0.30	Attained	Rubrics for the level can be modified
	CO 4	3.00	2.67	2.93	2.5	-0.43	Attained	Rubrics for the level can be modified
	CO 5	2.56	2.67	2.58	2.5	-0.08	Attained	Rubrics for the level can be modified
110612: Solid Waste Management	CO 1	2.68	3.00	2.74	2.5	-0.24	Attained	Rubrics for the level can be modified
	CO 2	2.60	3.00	2.68	2.5	-0.18	Attained	Rubrics for the level can be modified
	CO 3	2.46	3.00	2.56	2.5	-0.06	Attained	Rubrics for the level can be modified
	CO 4	2.30	3.00	2.44	2.5	0.06	Not Attained	Application related with various techniques in disposal of waste will be discussed more.
	CO 5	1.86	2.85	2.06	2.5	0.44	Not Attained	Planning of effective & efficient waste management system will be explained more.
110613 Construction Planning & Management	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	1.36	3.00	1.69	2.5	0.82	Not Attained	More problems to be given for solving network analysis in project
	CO 4	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 5	1.53	3.00	1.82	2.5	0.68	Not Attained	Concepts related to manpower & material management needs to be cleared more
110614 Railways, Airport & Tunnel Engineering	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
100007 Disaster Management	CO 1	2.72	3.00	2.78	2.5	-0.28	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

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	CO 3	2.99	3.00	2.99	2.5	-0.49	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	2.91	3.00	2.93	2.5	-0.43	Attained	Rubrics for the level can be modified
110607 Minor Project - II	CO 1	3.00	2.67	2.93	2.5	-0.43	Attained	Rubrics for the level can be modified
	CO 2	3.00	2.11	2.82	2.5	-0.32	Attained	Rubrics for the level can be modified
	CO 3	3.00	2.67	2.93	2.5	-0.43	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	2.67	2.93	2.5	-0.43	Attained	Rubrics for the level can be modified
900120 Building Services & Maintenance	CO 1	2.42	2.97	2.43	2.5	-0.03	Attained	Rubrics for the level can be modified
	CO 2	2.85	2.97	2.90	2.5	-0.40	Attained	Rubrics for the level can be modified
	CO 3	2.80	2.97	2.83	2.5	-0.33	Attained	Rubrics for the level can be modified
	CO 4	3.00	2.97	2.99	2.5	-0.49	Attained	Rubrics for the level can be modified
900121 Sustainable Materials & Green Buildings	CO 1	3.00	3.00	3.00	2.5	-0.50	Attained	Rubrics for the level can be modified
	CO 2	2.52	3.00	2.62	2.5	-0.12	Attained	Rubrics for the level can be modified
	CO 3	2.22	3.00	2.38	2.5	0.12	Not Attained	Application of various guidelines of ECBC, LEED, GRIHA while planning a building will be discussed more
	CO 4	2.13	3.00	2.30	2.5	0.20	Not Attained	Awareness for Use renewable energy sources in buildings will be enhanced among

ANNEXURE – VIII

(Curriculum Feedback Analysis)

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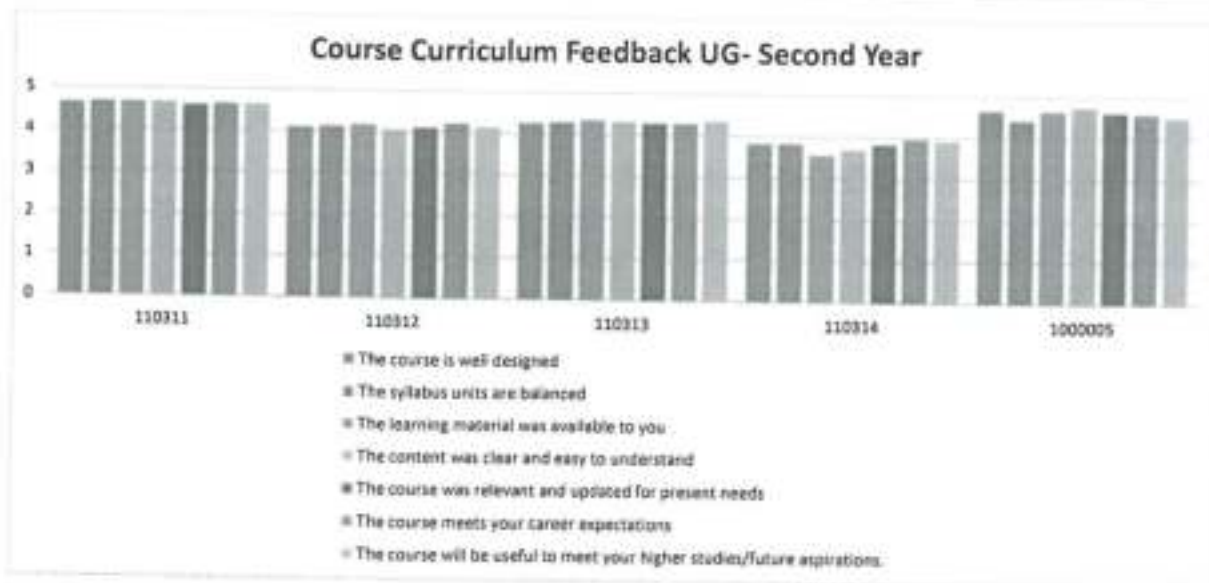
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CIVIL ENGINEERING DEPARTMENT

ANNEXURE – VIII (a)

CURRICULUM FEEDBACK ANALYSIS FROM STAKEHOLDERS

A1. CURRICULUM FEEDBACK ANALYSIS FROM STUDENTS – (UG Second Year) – Nov. 2022



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CIVIL ENGINEERING DEPARTMENT

	110311: Building Material & Constructions	110312: Fluid Mechanics-I	110313: Surveying	110314: Strength of Materials	1000005: Project Finance & Management
1. The course is well designed	4.642857	4.704478	4.258621	3.823529	4.657143
2. The syllabus units are balanced	4.678571	4.134328	4.275862	3.838235	4.428571
3. The learning material was available to you	4.678571	4.179104	4.344828	3.358824	4.657143
4. The content was clear and easy to understand	4.678571	4.074627	4.310343	3.691176	4.742857
5. The course was relevant and updated for present needs	4.607143	4.119403	4.275862	3.823529	4.628571
6. The course meets your career expectations	4.642857	4.238806	4.275862	3.955882	4.6
7. The course will be useful to meet your higher studies/future aspirations.	4.642857	4.149294	4.344828	3.911765	4.514286

Subjects	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?

A2. CURRICULUM FEEDBACK ANALYSIS FROM STUDENTS – (UG Third Year) – Nov. 2022



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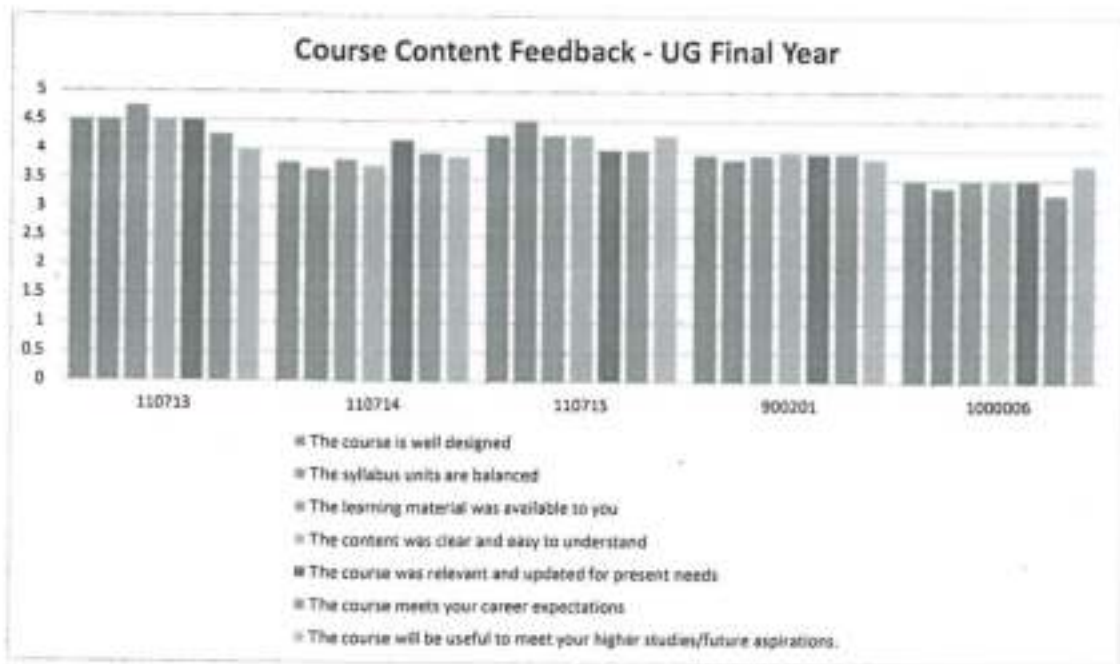
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CIVIL ENGINEERING DEPARTMENT

	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	4.43	3.92	4.2	4.3	4
2. The syllabus units are balanced	4.26	3.97	4.4	4.325	4.13
3. The learning material was available to you	4.17	3.78	4.4	4.35	4.18
4. The content was clear and easy to understand	4.13	3.83	4.4	4.225	3.94
5. The course was relevant and updated for present needs	4.22	3.89	4.4	4.525	4.06
6. The course meets your career expectations	4.36	4	4	4.35	4.06
7. The course will be useful to meet your higher studies/future aspirations.	4.13	3.89	4.4	4.275	3.94

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?	Choices for Honor/Minor/DE (SWAYAM)
			DE – Air Pollution & Control DE – Geotech Engg II Foundation Engg Honor – Structural Dynamics

A3. CURRICULUM FEEDBACK ANALYSIS FROM STUDENTS – (UG Final Year) – Nov 2022

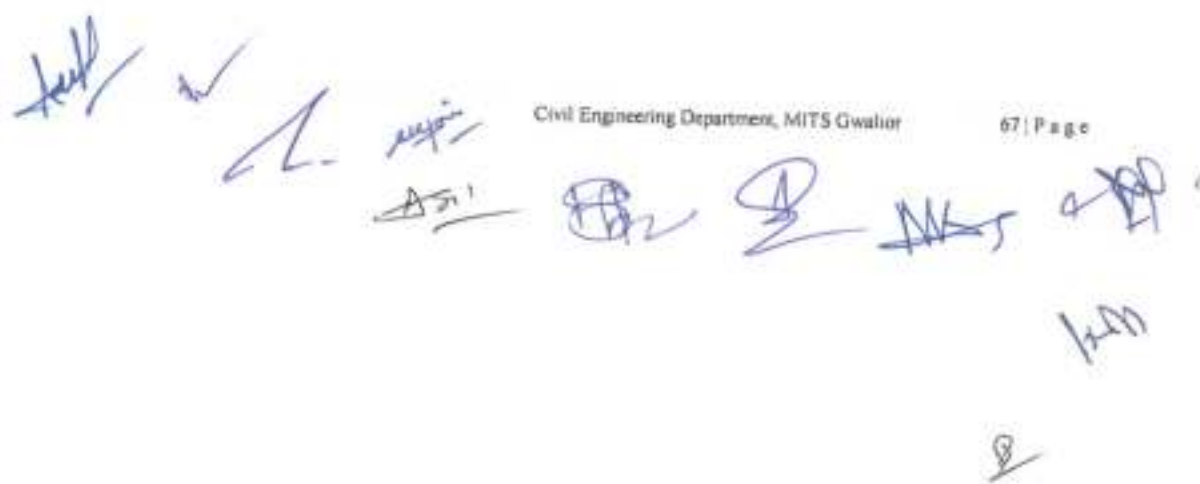


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	110713: Advanced Structural Design	110714: Hydraulic Structure	110715: Advance Structural Analysis	900201: Integrated Waste Management for Smart City	1000006: Disaster Management
1. The course is well designed	4.5	3.78	4.25	3.92	3.5
2. The syllabus units are balanced	4.5	3.67	4.5	3.84	3.38
3. The learning material was available to you	4.75	3.83	4.25	3.92	3.5
4. The content was clear and easy to understand	4.5	3.72	4.25	3.97	3.5
5. The course was relevant and updated for present needs	4.5	4.17	4	3.95	3.5
6. The course meets your career expectations	4.25	3.94	4	3.95	3.25
7. The course will be useful to meet your higher studies/future aspirations.	4	3.89	4.25	3.87	3.75

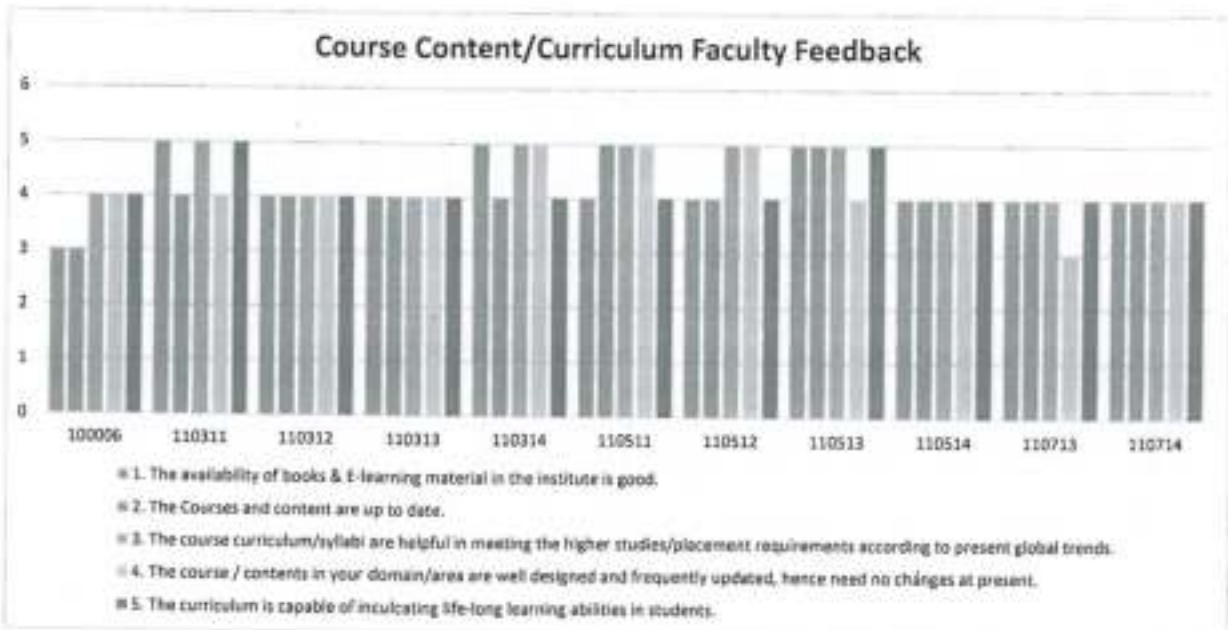
Mention the course / contents which in your opinion is outdated & needs to be removed.	Name course / contents which needs to be updated.	Is any new course required to meet current needs?	Choices for Honor/Monor/DE (SWAYAM)
			DE - Safety in Construction



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B. FACULTY FEEDBACK ANALYSIS ON COURSE CONTENT – Nov. 2022



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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 to date.	3. The course curriculum/syllabi are helpful in meeting the higher studies/placement requirements according to present global trends.	4. The course / contents in your domain/area are well designed and frequently updated, hence need no changes at present.	5. The curriculum is capable of inculcating life-long learning abilities in students.
B. Tech	110311- Building Material Construction	4	4	4	4	4
B. Tech	110312- Fluid Mechanics-I	4	4	4	4	4
B. Tech	110313- Surveying	4	4	4	4	4
B. Tech	110314- Strength of Materials	5	4	5	5	4
B. Tech	110511- Water Supply Engineering	4	5	5	5	4
B. Tech	110512- Theory of Structure-II	4	4	5	5	4
B. Tech	110513 - S.D.D. (R.C.C)	5	5	5	3	5
B. Tech	110514- Fluid Mechanics-II	4	4	4	4	4
B. Tech	110713- Advanced Structural Design (R.C.C)	4	4	4	3	4
B. Tech	110714- Hydraulic Structure	4	4	4	4	4

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Inputs received from Faculty:

Course level	Course	1. The availability of books & E-learning material in the institute is good. (Please give your opinion)	2. The Courses and content are up to date. Please suggest if you feel any new course(s) need to be introduced to meet current needs & technological changes?	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. (If you feel some changes (new content to be added or outdated content to be removed) are needed)	5. The curriculum is capable of inculcating life-long learning abilities in students.	6. The environment of department/institute is conducive for innovative teaching and research.	7. The institute supports you in your initiatives for updating your knowledge/skills and in achieving career growth.
B. Tech	110511- Water Supply Engg				not required for this course			
B. Tech	110714- Hydraulic Structure	this is basic course on fluid mechanics. wide range of books are available.						

(i) Honours:	(ii) Minor specialization:	(iii) Departmental electives:	(iv) Open electives:
Construction Methods And Equipment Management	Basic construction materials	Digital Land Surveying And Mapping (DLS&M)	Geographic Information Systems
Probability Methods In Civil Engineering	Introduction to Civil Engineering Profession	Energy Efficiency Acoustics and Daylighting in Building	Air Pollution & Control
Strategies for Sustainable Design	Maintenance and Repair of Concrete Structures	Safety in Construction	Rural Water Resources Management
Development and Applications of Special Concretes		Hydraulic engineering	
computational fluid dynamics; Structural Dynamics; ERD of foundations		Air Pollution & Control, Geotech Engg II	

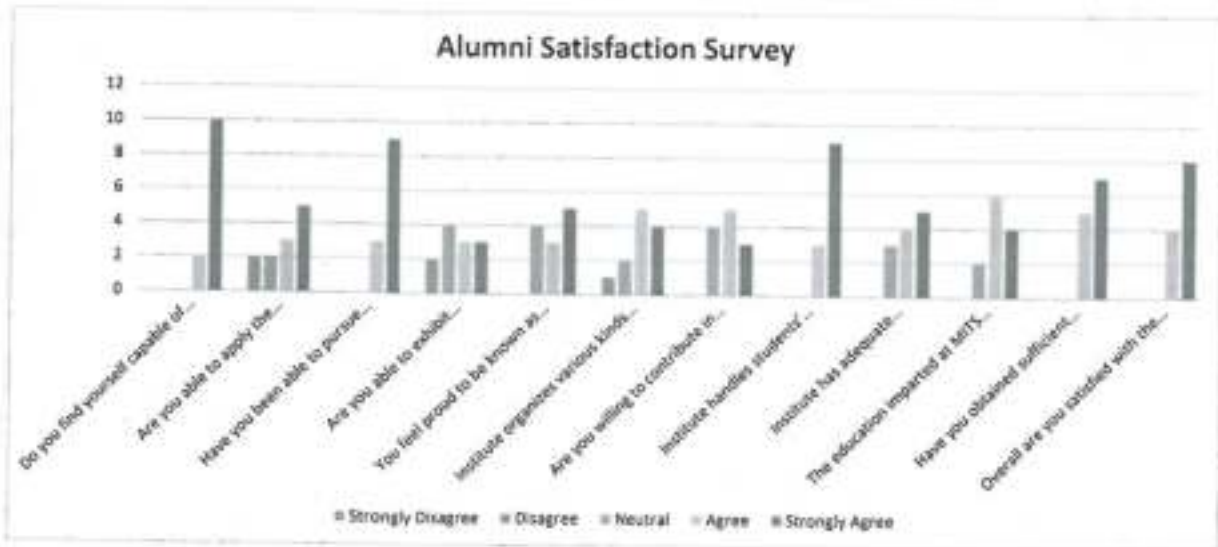
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C. ALUMNI SATISFACTION SURVEY – Nov 2022



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ALUMNI SATISFACTION SURVEY

Sample Size: 12

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	0	2	10	4.83
2	Are you able to apply the concepts of civil engineering in your profession?	0	2	2	3	5	3.91
3	Have you been able to pursue higher studies?	0	0	0	3	9	4.75
4	Are you able to exhibit leadership skills, team spirit & ethical practices while performing your duty?	0	2	4	3	3	3.58
5	You feel proud to be known as an MITS Alumnus	0	0	4	3	5	4.08
6	Institute organizes various kinds of activities for the overall development of students	0	1	2	5	4	4
7	Are you willing to contribute in the development of the Institute	0	0	4	6	3	3.91
8	Institute handles students' grievances properly	0	0	0	3	9	4.75
9	Institute has adequate laboratories and equipment for practical exposure to students	0	0	3	4	5	4.17
10	The education imparted at MITS is useful and relevant in your career and present job	0	0	2	6	4	4.17
11	Have you obtained sufficient technical knowledge (both in theory and practical) at MITS	0	0	0	5	7	4.58
12	Overall are you satisfied with the Faculty, Staff and Administration during Program	0	0	0	4	8	4.67

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ANNEXURE – VIII (b)

Action Taken Report based on Curriculum Feedback Received
from Stakeholders

A. Action taken based on Curriculum Feedback received from Students

S. No.	Comments /Suggestions Received during Feedback	Action Taken
1	Opinion regarding courses to be included as DE (Through SWAYAM) - Air Pollution & Control - Geotech Engg II Foundation Engg - Safety In Construction	The opinions of students were taken into consideration while finalizing the list of DE courses (SWAYAM)
2	Opinion regarding courses to be included as Honors (Through SWAYAM) - Development & Application of Special Concrete - Structural dynamics	The opinions of students were taken into consideration while finalizing the list of Honor courses (SWAYAM)

B. Action taken based on Curriculum Feedback received from Faculty

S. No.	Comments /Suggestions Received during Feedback	Action Taken
1	Opinion regarding courses to be included as DE (Through SWAYAM) - Safety in Construction - Digital land Survey & mapping - Air Pollution & Control - Geotech Engg II Foundation Engg - Hydraulic Engineering	The opinions of faculty members were taken into consideration while finalizing the list of DE courses (SWAYAM)
2	Opinion regarding courses to be included as Honors (Through SWAYAM) - Probability methods in Civil Engg - ERD of Foundations - Development & Application of Special Concrete - Computational fluid dynamics - Structural dynamics - Construction Methods & Equipment management	The opinions of faculty members were taken into consideration while finalizing the list of Honor courses (SWAYAM)
3	Opinion regarding courses to be included as Minor (Through SWAYAM) - Basic Construction Materials - Introduction to Civil Engg Profession - Maintenance & Repair of Concrete Structure - Hydraulic Engg	The opinions of faculty members were taken into consideration while finalizing the list of Minor courses (SWAYAM)

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4	Opinion regarding courses to be included as OC (Through SWAYAM) <ul style="list-style-type: none">- Geographic Information Systems- Rural Water Resources management- Air Pollution & Control	The opinions of faculty members were taken into consideration while finalizing the list of OC courses (SWAYAM)
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C. Action taken based on Feedback received from Alumni

S. No.	Comments /Suggestions Received during Feedback	Action Taken
1	Institute should have tie up with the industry for suitable employment of the students in time to come	MoU are already done with some of the Research Organizations like CRRI, NHAI and efforts are being done to get students placed in them after their internship and more MoU are planned in future specially with leading Industry like L&T etc.
2	More industry Academia interaction	A team is already constituted in the department to plan programs for student industry interaction etc.



ANNEXURE – IX

(CO Feedback Analysis)

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ANNEXURE - IX

Course Outcome Feedback Analysis & Impact (July - Dec 2022)

Review, Analysis, Impact & Action taken Report (ATR) of Course Outcome Feedback of JULY - DEC 2022 Semester							
Index Scale: <= 1 (Satisfactory), 1 - 1.5 (Good), > 1.5 (Very Good) & 3 (Excellent)							
Name of the Course & Code	Course Outcomes	Responses				Index (Scale of 1-3)	Comments/Impact & Action to be taken
		Strongly Agree	Agree	Average	Total		
11700 - Seminar Internship Project - III	CO1 Observe various activities of civil construction works	8	12	1	21	1.81	Good (Students have grasped the CO)
	CO2 Examine the utility of general and specific agreements for construction	10	10	1	21	1.43	Good (Students have grasped the CO)
	CO3 Differentiate the construction projects individually and in team	10	10	1	21	1.43	Good (Students have grasped the CO)
	CO4 Develop the writing and communication skills for various engineering problems	10	9	2	21	2.14	Good (Students have grasped the CO)
	CO5 Adopt lifelong learning for benefit of society	8	11	2	21	2.24	Good (Students have grasped the CO)
11070 - Creative Problem Solving	CO1 Identify various on field problems	18	11	1	30	2.47	Good (Students have grasped the CO)
	CO2 Practice various methods to solve problems	17	10	3	30	2.56	Good (Students have grasped the CO)
	CO3 Produce solutions to various problems	17	14	1	32	2.50	Very Good (Students have grasped the CO)
	CO4 Demonstrate various problem solving skills	18	10	3	31	2.60	Very Good (Students have grasped the CO)
118713 - Advanced Structural Design-I (RCC)	CO1 Explain behaviour of RCC and Prestressed concrete structure under loads	8	1	0	9	1.69	Very Good (Students have grasped the CO)
	CO2 Determine forces developed in RCC and Prestressed concrete structures under loads	1	2	0	3	1.78	Very Good (Students have grasped the CO)
	CO3 Compare design of RCC and Prestressed concrete structures for given loading	5	4	0	9	2.56	Very Good (Students have grasped the CO)
	CO4 Develop concrete and steel design of RCC and Prestressed concrete structures	5	3	1	9	2.44	Good (Students have grasped the CO)
110714 - Hydraulic Structures	CO1 Identify different components of be-lux project	9	11	1	21	2.36	Good (Students have grasped the CO)
	CO2 Explain basic principles of designing hydraulic plan & cross drainage works	8	11	2	21	2.39	Good (Students have grasped the CO)
	CO3 Solve problems of dam analysis, energy dissipators & cross drainage works	10	10	1	21	2.43	Good (Students have grasped the CO)
	CO4 Evaluate suitability of types of hydraulic structures	11	10	0	21	2.82	Very Good (Students have grasped the CO)
	CO5 Design various elements of hydraulic structures	9	11	1	21	2.38	Good (Students have grasped the CO)
118715 - Advanced Structural Analysis	CO1 Determine response of structures by classical methods	1	1	0	4	1.75	Very Good (Students have grasped the CO)
	CO2 Use approximate methods for analysis of statically indeterminate structure	2	1	1	4	2.25	Good (Students have grasped the CO)
	CO3 Determine response of structures by matrix force method	3	1	0	4	2.75	Very Good (Students have grasped the CO)
	CO4 Evaluate and draw the influence lines for reactions, shears, and bending moments in beams and girders due to moving loads	3	1	0	4	2.75	Very Good (Students have grasped the CO)

Semester VII

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Semester V	100906- Intellectual Property rights (IPR)	CO5 Model and analyze structural systems (building) with the aid of software	3	1	0	4	1.75	Very Good (Students have grasped the CO)
		CO1 Integrate the knowledge of Intellectual Property and its protection through various laws	9	9	0	18	1.50	Very Good (Students have grasped the CO)
		CO2 Apply the knowledge of IPR for professional development	11	7	0	18	1.61	Very Good (Students have grasped the CO)
		CO3 Develop a platform for protection and compliance of Intellectual Property Rights & copy knowledge	9	9	0	18	1.50	Very Good (Students have grasped the CO)
		CO4 Create awareness among students and industry of IPR and Copyright compliance	10	8	0	18	1.56	Very Good (Students have grasped the CO)
	CO5 Deliver the purpose and function of IPR and patenting	8	9	1	18	1.39	Good (Students have grasped the CO)	
	900201- Integrated Waste Management for Smart City (OC - 2)	CO1 Explain the principles & concepts of waste management	20	16	3	41	2.37	Good (Students have grasped the CO)
		CO2 Apply various techniques of handling the waste	21	14	6	41	1.37	Good (Students have grasped the CO)
		CO3 Apply various techniques of energy recovery from waste	20	16	5	41	2.37	Good (Students have grasped the CO)
		CO4 Plan an effective & efficient waste management system	22	14	5	41	2.41	Good (Students have grasped the CO)
	900202 - Project Planning & Control (OC - 2)	CO1 know the project planning and project control	32	40	4	76	2.37	Good (Students have grasped the CO)
		CO2 Analyze the network by CPM & PERT	33	39	4	76	1.36	Good (Students have grasped the CO)
		CO3 Analyze the project using precedence network	28	43	5	76	2.30	Good (Students have grasped the CO)
		CO4 Analyze the effect of resource planning on project	32	38	6	76	2.34	Good (Students have grasped the CO)
		CO5 Evaluate the cost of project during planning	31	38	7	76	1.32	Good (Students have grasped the CO)
	900213 - Urban Planning & Transportation Systems (OC - 3)	CO1 Explain the concepts the planning a city and land-use patterns	11	14	2	27	2.09	Good (Students have grasped the CO)
		CO2 Differentiate various diagrams used in urban planning	18	13	2	27	2.30	Good (Students have grasped the CO)
		CO3 Analyze various requirements for transportation systems	8	18	1	27	2.26	Good (Students have grasped the CO)
		CO4 Design alternatives in addressing the needs and concerns of urban environment through planning	12	13	2	27	2.17	Good (Students have grasped the CO)
		CO5 Plan strategies for any project with an urban planning perspective as a member and/or leader in a team of planning projects	9	16	2	27	2.21	Good (Students have grasped the CO)
	Water Supply Engineering (10021)	CO1 Explain the concepts of water supply engineering	12	10	1	23	1.48	Good (Students have grasped the CO)
		CO2 Determine the requirements for safe supply of water	15	6	2	23	2.57	Very Good (Students have grasped the CO)
		CO3 Apply available water treatment technique based upon the available data	14	7	2	23	2.42	Very Good (Students have grasped the CO)
		CO4 Analyze a given water supply scheme	13	6	2	23	2.57	Very Good (Students have grasped the CO)
		CO5 Design a water supply system based upon the needs of society	13	8	2	23	2.44	Good (Students have grasped the CO)
Water Supply Engineering (P) (10051)	CO1 Follow sampling procedure & other guidelines for sampling & analysis of water samples	12	4	2	18	2.56	Very Good (Students have grasped the CO)	
	CO2 Check various water quality parameters	10	7	1	18	2.52	Very Good (Students have grasped the CO)	
	CO3 Improve the water quality by suggesting suitable corrective measures	12	8	0	18	2.67	Very Good (Students have grasped the CO)	
	CO4 Trace various in various ways of improving the quality of water	11	6	1	18	2.56	Very Good (Students have grasped the CO)	
Theory of Structures - II (10052)	CO1 Explain various methods for analysis of structures and frames	20	11	5	36	2.42	Good (Students have grasped the CO)	
	CO2 Analyze various loads on structural members using code provisions	14	13	7	36	2.13	Good (Students have grasped the CO)	

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	CO1	Analyse different type of structure for various load conditions by different method.	18	15	3	36	1.31	Good (Students have grasped the CO)
	CO4	Draw influence line diagrams for statically determinate & indeterminate structure.	16	15	3	36	1.31	Good (Students have grasped the CO)
	CO5	Analyse beams & frames using plastic analysis.	12	17	7	36	1.14	Good (Students have grasped the CO)
Structural Design & Drawing (R.C.C.) 11813	CO1	Apply the concepts of different design philosophies for deriving basic expressions used in RC design.	4	9	1	14	1.21	Good (Students have grasped the CO)
	CO2	Determine the capacity of RC elements using IS456 guidelines.	3	8	1	14	1.19	Good (Students have grasped the CO)
	CO3	Analyse the RC elements for determining design variables as per IS456 & IS 875	6	6	2	14	1.29	Good (Students have grasped the CO)
	CO4	Design the RC elements as per IS 456 provisions.	7	6	1	14	1.43	Good (Students have grasped the CO)
	CO5	Develop the design sketches for RC elements as per IS456, IS11920 and SP24 provisions.	7	6	1	14	1.43	Good (Students have grasped the CO)
Fluid Mechanics – II 11814	CO1	Differentiate different types of fluid flow & fluid machinery.	17	7	1	25	1.94	Very Good (Students have grasped the CO)
	CO2	Describe principles of analysis of fluid flow problem.	17	7	1	25	1.94	Very Good (Students have grasped the CO)
	CO3	Explain basic principles for measurement of different forces acting on fluid body.	17	7	1	25	1.94	Very Good (Students have grasped the CO)
	CO4	Analyse pipe flow, open channel flow problems & various characteristics of hydraulic machines.	17	7	1	25	1.89	Satisfactory (Students have not grasped much about the CO) Action: Skill based project to be given.
	CO5	Design open & closed conduit systems.	18	6	1	25	1.68	Very Good (Students have grasped the CO)
Minor Project – I 11815	CO1	Recognize various engineering problems and techniques to solve them.	19	7	4	30	2.50	Very Good (Students have grasped the CO)
	CO2	Reproduce the solution of the problems upon the need of society.	18	11	1	30	2.57	Very Good (Students have grasped the CO)
	CO3	Cooperate to work within group.	17	9	4	30	1.43	Good (Students have grasped the CO)
	CO4	Develop the writing and communication skills for various engineering problems.	17	11	2	30	2.56	Very Good (Students have grasped the CO)
	CO5	Display lifelong learning.	19	9	2	30	1.57	Very Good (Students have grasped the CO)
Self Learning/ Presentation 11816	CO1	Analyse contemporary issues in civil engineering & its allied areas through literature survey.	8	3	1	12	1.58	Very Good (Students have grasped the CO)
	CO2	Distinguish value of art & relevance of the topic to national & international arena.	9	2	1	12	1.67	Very Good (Students have grasped the CO)
	CO3	Demonstrate good oral & written communication skills.	9	2	1	12	1.67	Very Good (Students have grasped the CO)
	CO4	Develop poster and power point presentation for effective communication.	7	4	1	12	1.44	Good (Students have grasped the CO)
	CO5	Display lifelong learning.	9	2	1	12	1.67	Very Good (Students have grasped the CO)
Data Science 11820	CO1	Define different Data Science techniques.	6	10	1	17	2.29	Good (Students have grasped the CO)
	CO2	Illustrate various tools used for Data Science technique.	3	3	3	17	1.24	Good (Students have grasped the CO)
	CO3	Apply data visualization techniques to solve real world problems.	9	9	2	17	1.11	Good (Students have grasped the CO)
	CO4	Build exploratory data analysis for Data Science methods.	3	9	3	17	1.12	Good (Students have grasped the CO)
	CO5	Apply Data Science techniques for solving real-world problems.	3	10	2	17	1.00	Satisfactory (Students have not grasped much about the CO) Action: Skill based project to be given.

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Project Management and Planning: 100005	CO8	Evaluate the performance of algorithms in data science.	8	8	3	17	2.18	Good (Students have grasped the CO)
	CO1	Know the attributes of project and its different phases	18	1	1	38	2.65	Very Good (Students have grasped the CO)
	CO2	Develop the project network based on work breakdown structure and estimation of activity durations	16	9	1	38	2.58	Very Good (Students have grasped the CO)
	CO3	Analyze the project network and make decisions in various situations	18	7	1	38	2.68	Very Good (Students have grasped the CO)
	CO4	Evaluate the optimum cost of project for assigned activities	15	10	1	38	2.84	Very Good (Students have grasped the CO)
11031: Building Materials & Construction	CO5	Understand the different options to arrange the materials to complete a work in stipulated time	17	9	0	38	2.65	Very Good (Students have grasped the CO)
	CO1	Explain the basic elements of building, e.g., materials & construction	39	28	1	88	2.56	Very Good (Students have grasped the CO)
	CO2	Evaluate the properties of various materials like carbon, aggregate, concrete, admixtures, brick, plaster etc.	43	34	1	88	2.62	Very Good (Students have grasped the CO)
	CO3	Distinguish the suitability of building materials in the construction of various types of buildings	44	33	2	88	2.67	Very Good (Students have grasped the CO)
	CO4	Evaluate various types of concrete in building construction	44	31	2	88	2.60	Very Good (Students have grasped the CO)
11031 (P): Building Materials & Construction	CO5	Apply various techniques for forming & protection work of various elements of building	41	34	2	88	2.54	Very Good (Students have grasped the CO)
	CO1	Determine the properties of cement sand & aggregate as per IS code	29	19	3	43	2.51	Very Good (Students have grasped the CO)
	CO2	Determine the workability of concrete for suitability of concrete mix in different construction work	34	16	3	43	2.49	Good (Students have grasped the CO)
	CO3	Evaluate compressive strength of various concrete grades	29	19	3	43	2.63	Very Good (Students have grasped the CO)
	CO4	Determine physical properties of brick by experiment and previous knowledge	26	14	3	43	2.51	Very Good (Students have grasped the CO)
11032: Fluid Mechanics-I	CO5	Examine the properties of the various fluids for various elements of buildings	25	14	4	43	1.91	Good (Students have grasped the CO)
	CO1	Define various fluid properties & units of fluid	43	23	3	71	2.54	Very Good (Students have grasped the CO)
	CO2	Apply principles of fluid flow & dimensional analysis	41	25	5	71	2.51	Very Good (Students have grasped the CO)
	CO3	Solve fluid flow problems	43	25	3	71	2.56	Very Good (Students have grasped the CO)
	CO4	Analyze characteristics of fluid in real fluid in terms of dimensional numbers	42	25	4	71	2.58	Very Good (Students have grasped the CO)
	CO5	Differentiate different types of fluid flow measurement techniques & instruments	44	21	6	71	2.56	Very Good (Students have grasped the CO)
11032: Fluid Mechanics-II (P)	CO6	Apply the concepts of boundary layer in solving various fluid flow problems	43	22	6	71	2.51	Very Good (Students have grasped the CO)
	CO1	Differentiate between different flow measurement devices	28	23	3	53	2.47	Good (Students have grasped the CO)
	CO2	Analyze flow through pipe & full orifice of pipe etc.	29	21	3	53	2.49	Good (Students have grasped the CO)
	CO3	Connect the theoretical errors	28	20	5	53	2.43	Good (Students have grasped the CO)
11033: Surveying	CO4	Apply Miller's five rule, when several values	27	21	5	53	2.42	Good (Students have grasped the CO)
	CO1	Explain the techniques used for level & angular measurements in surveying	38	23	2	61	2.56	Very Good (Students have grasped the CO)
	CO2	Analyze different geodetic methods/survey techniques, triangulation, traverse leveling, tachometry, photogrammetry & GPS	36	23	2	61	2.56	Very Good (Students have grasped the CO)
	CO3	Apply methods to control surveys	35	24	2	61	2.54	Very Good (Students have grasped the CO)

Semester III

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In Govt. Aided UGC Autonomous & NAAC Accredited Institute Affiliated to RGPV, Bhopal

11E114: Strength of Materials	CO4	Apply theory of torsion in problems	35	21	3	41	1.49	Good (Students have grasped the CO)
	CO5	Apply various methods for setting curves, area & volume computations	36	21	4	41	2.82	Very Good (Students have grasped the CO)
	CO1	Explain the concepts of stress, strain, bending, deflection, buckling & torsion	32	32	8	72	1.33	Good (Students have grasped the CO)
	CO2	Explain various theories for determining stress, buckling of columns & deflection of structures	33	27	12	72	2.29	Good (Students have grasped the CO)
	CO3	Apply various theories for determining stress, buckling of columns & deflection of structures	32	28	12	72	1.28	Good (Students have grasped the CO)
	CO4	Evaluate the stresses in bending, shear and torsion	31	29	12	72	1.26	Good (Students have grasped the CO)
11E115(P): Strength of Materials	CO1	Evaluate properties of material by impact test	33	38	7	68	2.38	Good (Students have grasped the CO)
	CO2	Evaluate properties of material by hardness test	31	31	6	68	1.37	Good (Students have grasped the CO)
	CO3	Evaluate properties of material by tensile test	29	31	8	68	1.31	Good (Students have grasped the CO)
	CO4	Determine compressive & flexural strength of materials	31	31	6	68	2.37	Good (Students have grasped the CO)
11E115 (P): Survey Practice Lab	CO1	Follow the guidelines for field surveying	27	14	0	41	2.66	Very Good (Students have grasped the CO)
	CO2	Follow the working principles of level by instrument for measurements	28	12	1	41	2.64	Very Good (Students have grasped the CO)
	CO3	Measure horizontal & vertical angles by theodolite for levelling and levelling	28	13	0	41	2.68	Very Good (Students have grasped the CO)
	CO4	Determine tachometric constants for level measurements by tachometer	26	14	1	41	2.61	Very Good (Students have grasped the CO)
	CO5	Create a simple control network by using Rankine's method for adjustment	26	15	0	41	2.63	Very Good (Students have grasped the CO)
	CO6	Develop control map by using tachometer & level station	26	14	1	41	1.41	Very Good (Students have grasped the CO)
11E116: Self Learning - Presentation	CO1	Analyze contemporary trends in civil engineering & its allied areas through literature survey	17	9	1	27	1.39	Very Good (Students have grasped the CO)
	CO2	Distinguish different soft & hard copy of the topic in national & international arena	18	8	1	27	1.63	Very Good (Students have grasped the CO)
	CO3	Demonstrate good oral & written communication skills	18	8	1	27	1.03	Very Good (Students have grasped the CO)
	CO4	Develop good and precise power presentation for effective communication	18	7	2	27	2.59	Very Good (Students have grasped the CO)
	CO5	Display linking learning	19	5	3	27	1.58	Very Good (Students have grasped the CO)
Project Management and Planning 11E117	CO1	Know the activities of project and its critical paths	34	22	2	58	2.53	Very Good (Students have grasped the CO)
	CO2	Develop the project network. List all work breakdown structure and activities of network diagram	33	21	2	56	2.87	Very Good (Students have grasped the CO)
	CO3	Analyze the project network and make a cycle the various activities	33	20	3	56	2.58	Very Good (Students have grasped the CO)
	CO4	Evaluate the optimum cost of project for assigned deadline	33	20	3	56	2.48	Good (Students have grasped the CO)
	CO5	Understand the different options in usage for duration to complete a work activity and cost	31	24	1	56	1.48	Good (Students have grasped the CO)

ANNEXURE – X

(Scheme PG Programme 2nd Semester)

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MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(A Govt. Aided UGC Autonomous & NAAC Accredited Institute affiliated to RGPV, Bhopal)

For batch admitted in academic session 2022 - 23

Master of Engineering in Construction Technology & Management (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.	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	-	-	-	-	25	75	-	100	3	-	-	3
4.		##Elective - II	-	-	-	-	-	-	-	-	-	-	100	3	-	-	3
5.		**Open Category Course (OC-2)	70	20	10	-	90	60	-	-	-	-	150	-	-	4	4
6.	510219	Computational Laboratory for Construction Management	-	-	-	-	-	100	-	-	-	-	100	-	-	-	2
7.	510220	\$ Self Learning / Presentation	-	-	-	-	90	160	-	25	75	-	750	15	-	6	21
		Total	280	80	40	-	90	160	-	25	75	-	750	15	-	6	21

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

510217. Safety in Construction

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

based on interdisciplinary aspects. This course may run through SWAYAM/NPTEL based platform (with credit transfer facility).

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)

DEAN (ACADEMICS)

Civil Engineering Department, MITS Gwalior

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For batch admitted in academic session 2022 – 23

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	750	15	6	21			

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

530219. Biological Process Design for Waste Water Treatment

**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 assignments)

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.

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DEAN (ACADEMICS)

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Signature
Civil Engineering Department, MITS Gwalior

MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE GWALIOR
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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

110620 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, IDE3 algorithms, applications and performance parameters. Random forest classifier. Case study on regression and classification for solving real world problems.

Unit – V:

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

RECOMMENDED BOOKS:

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



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DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

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.



A collection of handwritten signatures in blue ink, arranged in two rows. The top row contains five signatures, and the bottom row contains three. The signatures are stylized and vary in legibility, with some appearing to be initials or names like 'AS', 'NK', and 'S.M.'.