



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(Deemed University)
(Declared Under Distinct Category by Ministry of Education, Government of India)



NAAC Accredited with A++ Grade

Department of Civil Engineering

Semester-Wise General Scheme Structure & Important Guidelines for Flexible Curriculum

(Batch admitted in Academic Session 2024-25 onwards)

Abbreviations Used

L	Lecture
T	Tutorial
P	Practical
HSMC	Humanities and Social Sciences including Management Courses
BSC	Basic Science Courses
ESC	Engineering Science Courses
DC	Departmental Core
DE	Departmental Elective
SPC	Specialization Courses
OC	Open Category
DLC	Departmental Laboratory Courses
MOOC	Massive Open Online Course
MWS	Mandatory Workshop
SP	Semester Proficiency
SIP	Skill Internship Program
SLP	Self-learning Presentation
PDC	Professional Development Component
PBL	Project Based Learning
PC	Professional Certification
MAC	Mandatory Audit Course
NEC	Novel Engaging Course



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
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Department of Civil Engineering

Scheme of Evaluation

B. Tech. I Semester (Civil Engineering)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block			L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/Assignment											
1.	11241101	DC	Civil Engineering Materials & Construction	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2.	11241102	ESC	Computer Programming	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
3.	11241103	DC	Engineering Mechanics	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	11241104	DC	Building Design & Drawing	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
5.	11241105	ESC	Basic Electrical & Electronics Engineering	20	20	30	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
6.	11241106	DLC	Computer Programming Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11241107	DLC	Electrical & Electronics Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	11241108	SP	Semester Proficiency [§]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	11241109	PBL	Micro Project-I [#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	11241110	ESC	Engineering Chemistry Lab ^{§§}	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
11.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
Total				100	100	150	150	380	120	1000	11	03	10	19	-	-	-
12.	11241111	MAC	Universal Human Values & Professional Ethics (UHVPE)	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
13.	11241112	MWS	Mandatory Workshop on Indian Constitution and Traditional Knowledge at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-

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.

Skill Internship Program (Soft Skill): Minimum 45 hours duration: To be credited in II Semester.

[§]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses.

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

^{§§} This course will be distributed in the I Year Group wise among the programmes where ever required.

[#] Micro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	3	3	0	0	0	2	1	1	0	0	0	1	1	1

Mode of Learning						Mode of Examination						Total Credits	
Theory		Lab		Lab		Theory		Lab		NEC			
Face to Face	Online	Interactive	Face to Face	Experiential	Experiential	PP	AO	MCQ	OB	SO	AO		SO
13		1	1	1	3	6		7		2	3	1	19
68.42%		5.26%	5.26%	5.26%	15.8%	31.6%		36.84%		10.52%	15.8%	5.26%	Credits %



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Department of Civil Engineering
Scheme of Evaluation

B. Tech. II Semester (Civil Engineering)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block			Practical Block				L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/Assignment											
1.	11241201	DC	Surveying	20	20	30	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
2.	11241202	DC	Strength of Material	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11241203	DC	Concrete Technology	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	11241204	DC	Fluid Mechanics – I	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
5.	11241205	BSC	Matrices & Calculus	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
6.	11241206	DLC	Building Materials & Construction Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11241207	DLC	Problem Solving through Python Programming	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	11241208	SP	Semester Proficiency ^{\$}	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	11241209	PBL	Micro Project-II [#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	11241210	ESC	Engineering Physics Lab ^{\$\$}	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
11.	11241211	HSMC	Language Lab	-	-	-	-	70	30	100	-	-	2	1	Blended	AO	-
12.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
13.	SIP1XXXX	SIP	Skill Internship Program (Soft Skills)	-	-	-	-	60	-	60	-	-	-	2**	Experiential	SO	-
Total				100	100	150	150	510	150	1160	12	04	12	24	-	-	-
14.	11241212	MAC	Sustainability & Environmental Science	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
15.	11241213	MWS	Mandatory Workshop on Indian Knowledge System at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-

Summer Semester of six-eight weeks duration will be conducted for makeup of I & II semester examination.

^{\$}Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

^{\$\$} This course will be distributed in the I Year Group wise among the programmes where ever required.

^{**} These credits will be transferred from Skill Internship Program (Soft Skills).

[#] Micro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	1	1	4	0	0	0	2	1	1	1	0	0	1	1	1

Mode of Learning							Mode of Examination							Total Credits
Theory		NEC	Lab				Theory			Lab		NEC		
Face to Face	Online	Interactive	Face to Face	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	SO	
15		1	1	1	3	3	6		9		4	4	1	24
62.5%		4.17%	4.17%	4.17%	12.5%	12.5%	25%		37.5%		16.67%	16.67%	4.17%	Credits %



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Department of Civil Engineering

Scheme of Evaluation

B. Tech. III Semester (Civil Engineering)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block			L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment											
1.	11242101	BSC	Transforms & Vector Calculus	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
2.	11242102	DC	Data Structures	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11242103	DC	Fluid Mechanics – II	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
4.	11242104	DC	Geotechnical Engineering	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	11242105	DC	Structural Analysis	20	20	30	30	-	-	100	2	1	-	3	Face to Face	OB	2 Hrs
6.	11242106	DLC	Fluid Mechanics Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11242107	DLC	Survey Practice Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	SO	-
8.	11242108	SP	Semester Proficiency [§]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	11242109	PBL	Macro Project-I [#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	11242110	SLP	Self-learning/Presentation ^{\$\$\$} (SWAYAM/NPTEL/MOOC)	-	-	-	-	40	-	40	-	-	2	1	Mentoring	SO	-
11.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
Total				100	100	150	150	350	90	940	11	05	10	21	-	-	-
12.	11242111	MAC	Cyber Security	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
13.	11242112	MWS	Mandatory Workshop on Internet of Things (IoT) at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-

Skill Internship Program (Institute Level) (Qualifier): Minimum 30 hours duration: To be credited in IV Semester

[§]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

[#] Macro Project-I will be presented and evaluated through an interdisciplinary project evaluation committee.

^{\$\$\$} Compulsory registration for one online course using SWAYAM/NPTEL/ MOOC, evaluation through attendance and presentation.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	1	0	4	0	0	0	2	1	1	0	1	0	1	1	1

Mode of Learning							Mode of Examination							Total Credits
Theory		NEC		Lab			Theory			Lab		NEC		
Face to Face	Online	Interactive	Face to Face	Mentoring	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	SO	
15		1	1	1	1	2	6		6	3	4	1	1	21
71.5%		4.76%	4.76%	4.76%	4.76%	9.5%	28.6%		28.6%	14.3%	19.05%	4.76%	4.76%	Credits %



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Department of Civil Engineering
Scheme of Evaluation
B. Tech. IV Semester (Civil Engineering)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted						Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block			L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/Assignment											
1.	11242201	DC	Highway Engineering	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	11242202	DC	Water Supply Engineering	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11242203	DC	Estimating Costing & Contracting	20	20	30	30	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
4.	11242204	DC	Foundation Engineering	20	20	30	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	11242205	DC	Structural Design & Drawing (RCC)	20	20	30	30	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
6.	11242206	DLC	Highway Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11242207	DLC	Geotechnical Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	11242208	DLC	Strength of Materials Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
9.	11242209	SP	Semester Proficiency [§]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	11242210	PBL	Macro Project-II [#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	11242211	PC	Professional Certification	-	-	-	-	50	-	50	-	-	2	1	Blended	SO	-
12.	NECXXXXX	NEC	Novel Engaging Course (Activity Based Learning)	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
13.	SIP2XXXX	SIP	Skill Internship Program (Institute Level)	-	-	-	-	60	-	60	-	-	-	2**	Experiential	SO	-
Total				100	100	150	150	490	120	1110	11	05	12	24	-	-	-
14.	11242212	MAC	Project Management, Economics & Financing	20	20	30	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
15.	11242213	MWS	Mandatory Workshop on Computer Vision at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-
16.	11242214	MWS	Mandatory Workshop on Life Skills at Department Level (Duration: Two Days)											GRADE	Interactive	MCQ	-

Summer Semester of six-eight weeks duration will be conducted for makeup of previous semester examination.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

[§]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

[#] Macro Project-II will be presented and evaluated through an interdisciplinary project evaluation committee.

^{**} These credits will be transferred from Skill Internship Program (Institute Level).

PC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
1	0	0	5	0	0	0	3	1	1	1	0	0	1	1	2

Mode of Learning							Mode of Examination							Total Credits
Theory		NEC			Lab		Theory			Lab		NEC		
Face to Face	Online	Interactive	Face to Face	Blended	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	SO	
15		1	1	1	3	3	6		9		5	3	1	
62.5%		4.17%	4.17%	4.17%	12.5%	12.5%	25%		37.5%		20.83%	12.5%	4.17%	
														24
														Credits %



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Department of Civil Engineering

Scheme of Evaluation

B. Tech. V Semester (Civil Engineering)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs			L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation	Assignment	Exam								
				Minor Evaluation I	Minor Evaluation II	Quiz/Assignment													
1.	11243101	DC	Waste Water Engineering	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	11243102	DC	Structural Design & Drawing (Steel)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
3.	11243103	DC	Data Science	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	112431XX	DE	Departmental Elective* (DE-1)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
5.	112431XX	SPC	Specialization Course (SPC-1)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
6.	11243104	DLC	Environmental Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
7.	11243105	DLC	Data Science Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
8.	11243106	SP	Semester Proficiency [§]	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	11243107	PBL	Cornerstone Project	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
Total				80	80	120	120	260	90	25	75	850	11	04	10	20	-	-	-
10.	11243108	MAC	Supply Chain Management	20	20	30	30	-	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	11243109	MWS	Mandatory Workshop on Blockchain at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

[§]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	3	1	1	0	2	0	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination					Total Credits	
Theory		Lab			Theory			Lab			
Face to Face	Online	Face to Face	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	
12	3	1	2	2	6		9		3	2	20
60%	15%	5%	10%	10%	30%		45%		15%	10%	Credits %



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Department of Civil Engineering

Scheme of Evaluation

B. Tech. VI Semester (Civil Engineering)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs			L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam								
				Minor Evaluation I	Minor Evaluation II	Quiz/Assignment													
1.	11243201	DC	Engineering Hydrology & Irrigation	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	11243202	DC	Artificial Intelligence & Machine Learning	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	112432XX	DE	Departmental Elective* (DE-2)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
4.	112432XX	OC	Open Category Course (OC-1)	20	20	30	30	-	-	-	-	100	2	1	-	3	Face to Face	PP	2 Hrs
5.	112432XX	SPC	Specialization Course (SPC-2)	20	20	30	30	-	-	-	-	100	3	-	-	3	Face to Face	PP	2 Hrs
6.	11243203	DLC	Civil Engineering Drawing Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	SO	-
7.	11243204	DLC	Artificial Intelligence & Machine Learning Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
8.	11243205	SP	Semester Proficiency [§]	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	11243206	PBL	Capstone Project	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
Total				80	80	120	120	260	90	25	75	850	12	03	10	20	-	-	-
10.	11243207	MAC	Disaster Management	20	20	30	30	-	-	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
11.	11243208	MWS	Mandatory Workshop on Intellectual Property Rights at Department Level (Duration: Two Days)	-	-	-	-	-	-	-	-	-	-	-	-	GRADE	Interactive	MCQ	-

Skill Enhancement Program/Research Internship/On Job Training for Four weeks duration

Summer Semester of six-eight weeks duration will be conducted for makeup of previous semester examination.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

[§]Semester Proficiency– includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses

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

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform.

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	2	1	1	1	2	0	1	0	0	0	1	1	1

Mode of Learning					Mode of Examination						Total Credits
Theory		Lab			Theory			Lab			
Face to Face	Online	Face to Face	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	
12	3	1	2	2	6		9		4	1	20
60%	15%	5%	10%	10%	30%		45%		20%	5%	Credits %



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Scheme of Evaluation

B. Tech. VII Semester (*Civil Engineering*)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs			L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation Lab Work & Sessional	Major Evaluation	Assignment	Exam								
				Minor Evaluation I	Minor Evaluation II	Quiz/Assignment													
1.	112441XX	DE	Departmental Elective # (DE-3)	20	20	30	30	-	-	-	-	100	3	-	-	3	Blended	PP	2 Hrs
2.	112441XX	DE	Departmental Elective* (DE-4)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
3.	112441XX	OC	Open Category Course* (OC-2)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
4.	112441XX	SPC	Specialization Course # (SPC-3)	20	20	30	30	-	-	-	-	100	2	1	-	3	Blended	MCQ	2 Hrs
5.	11244101	SEP	Skill Enhancement Program/Research Internship/On Job Training	-	-	-	-	-	50	-	-	50	-	-	2	1**	Experiential	SO	-
6.	11244102	DLC	Creative Problem Solving	-	-	-	-	-	50	-	-	50	-	-	2	1	Experiential	SO	-
Total				60	60	90	90	-	100	25	75	500	10	02	04	14	-	-	-

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

*Semester Proficiency- includes the weightage towards ability/ skill/ competency /knowledge level /expertise attained etc. in the semester courses.

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

* Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform.

** These credits will be transferred from Skill Enhancement Program/Research Internship/On Job Training

Course run through MITS-DU MOOCs

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SEP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	2	1	1	1	0	1	0	0	0	0	0	0

Mode of Learning					Mode of Examination				Total Credits	
Theory		Lab			Theory			Lab		
Blended	Online	Face to Face	Experiential	Experimental	PP	AO	MCQ	OB		SO
6	6		2		3		9		2	
43%	43%		14%		21.5%		64.5%		14%	
										Credits %



MADHAV INSTITUTE OF TECHNOLOGY & SCIENCE, GWALIOR
(Deemed University)
(Declared Under Distinct Category by Ministry of Education, Government of India)



NAAC Accredited with A++ Grade

Department of Civil Engineering

Scheme of Evaluation

B. Tech. VIII Semester (Civil Engineering)

(for batch admitted in academic session 2024-25)

S. No.	Course Code	Category Code	Course Name	Maximum Marks Allotted								Total Marks	Contact Hours per week			Total Credits	Mode of Learning	Mode of Major Evaluation	Duration of Major Evaluation
				Theory Block				Practical Block		MOOCs			L	T	P				
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam								
				Minor Evaluation I	Minor Evaluation II	Quiz/Assignment													
1.	112442XX	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
2.	112442XX	OC	Open Category Course* (OC-3)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
3.	11244201	PBL	Industry Internship/ Research Internship/ Innovation & Start-up	-	-	-	-	280	120	-	-	400	-	-	20	10	Experiential	SO	-
4.	11244202	PDC	Professional Development ^{###}	-	-	-	-	-	50	-	-	50	-	-	4	2	Interactive	SO	-
Total				-	-	-	-	280	170	50	150	650	06	-	24	18	-	-	-

Summer Semester of six-eight weeks duration will be conducted to complete any backlog courses.

Additional Course for Honours or Minor Degree: Permitted to opt for maximum two additional courses for the award of Honours or Minor Degree

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

*Course run through SWAYAM/NPTEL/ MOOC Learning Based Platform

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 programme (participation in professional chapter activities, club activities, cultural events, sports, personality development activities, collaborative events, MOOCs, technical events, institute/department committees, etc.)

HSMC	BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0

Mode of Learning					Mode of Examination				Total Credits	
Theory		Lab			Theory			Lab		
Face to Face	Online	Interactive	Experiential	Experimental	PP	AO	MCQ	OB		SO
	6	2	10				6		12	18
	33.33%	11.11%	55.56%				33.33%		66.67%	Credits %



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DEPARTMENT OF CIVIL ENGINEERING

<i>Departmental Elective Courses</i>
1. Hydraulic Structure
2. Railway Airport & Tunnel Engineering
3. Traffic Engineering & Design
4. Engineering Geology
5. Pavement Management System
6. Applied Stress Analysis
7. Green Buildings
8. Advanced Surveying
9. Bridge Engineering
10. Groundwater Development
11. River Hydraulics
12. Design of Earthquake Resistant Structures
13. Remote Sensing & GIS Applications in Civil Engineering
14. Ground Improvement Techniques
15. Rock Engineering
16. Building Information Modelling
17. Seismic Hazard Analysis
18. Watershed Management
19. Hydropower Engineering
20. Rehabilitation of Structures
21. Ecology and Stream Pollution
22. Finite Element Methods
23. Strategic Management in Construction
24. Energy Efficient Buildings



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25. Design of Bridges
26. Sustainable Construction & Practices
27. Lean Construction
28. Photogrammetry and UAV
29. Geodesy and GNSS
<i>Open Category Courses</i>
1. Maintenance Management
2. Integrated Waste Management System
3. Air Pollution & Noise Pollution
4. Sustainable Materials & Green Buildings
5. Safety & Quality Management
6. Ecology and Stream Pollution
7. Environmental Impact Assessment
8. Greenfield Projects
9. Engineering Economics and Project Appraisal
10. Entrepreneurship for Engineers



DEPARTMENT OF CIVIL ENGINEERING

Specialization in Structures					
Description		This module will help in providing in-depth knowledge of advanced topics like design of bridge, tall buildings etc. so that students can demonstrate their expertise in designing structural projects and also ensure development of safe, resilient, and Efficient structures.			
Courses and Credits required		3 courses and 9 credits			
Course Category	Course ID	Course Title	Contact Hours per week		
			L	T	P
SPC-1 (Core)		Advanced Structural Analysis	3	0	0
SPC-2 (Core)		Advanced Reinforced Concrete Design	3	0	0
SPC-3	Elective-1	Advanced Structural Design (Steel)	3	0	0
	Elective-2	Structural Dynamics	3	0	0

Specialization in Construction Management					
Description		This module will help in providing in-depth knowledge of various aspects of construction management like project scheduling, resource allocation, advanced equipment's etc. This specialization will help students to pursue careers as construction project managers.			
Courses and Credits required		3 courses and 9 credits			
Course Category	Course ID	Course Title	Contact Hours per week		
			L	T	P
SPC-1 (Core)		Contract Management	3	0	0
SPC-2 (Core)		Basic Scheduling Techniques	3	0	0
SPC-3	Elective-1	Infrastructure & Finance	3	0	0
	Elective-2	Building Services & Maintenance	3	0	0

Specialization in Environmental Engineering					
Description		This module will help in providing interdisciplinary knowledge and skills so that students can address environmental challenges, comply with environmental standards and contribute positively to society.			
Courses and Credits required		3 courses and 9 credits			
Course Category	Course ID	Course Title	Contact Hours per week		
			L	T	P
SPC-1 (Core)		Solid Waste Management	3	0	0
SPC-2 (Core)		Air Pollution & Control	3	0	0
SPC-3	Elective-1	Environmental Impact Assessment	3	0	0
	Elective-2	Industrial Waste Management	3	0	0



Course Code: 11241101

Course Name: Civil Engineering Materials & Construction

L	T	P	Credit
3	0	0	3

Course Objective:

The course aims to equip students with a fundamental understanding of various building materials, their properties, and construction techniques. It focuses on material selection, sustainable practices, and the application of standards to ensure quality and safety in construction projects.

SYLLABUS

Unit-I

Stones: General, classification of rocks, sources of stones, rock forming minerals, texture and structure of rock, fracture of rock, uses of stones, test for stones, qualities of a building stone, Stone quarrying, tools for blasting, materials for blasting, Process of blasting, dressing of stones, deterioration of stones, preservation of stones, common building stones in India.

Bricks: Properties and uses of good brick earth, harmful ingredients in brick earth, classification of brick earth, manufacture of bricks, comparison between clamp burning and kiln burning, Bricks (classification, characteristics, preparation of clay, manufacturing, testing, types).

Unit II

Timber: Timber, (Classification, Structure & characteristics, seasoning and its methods, defects & diseases, preservation & various treatment testing), wood products and their applications.

Ferrous metals, steel, non-ferrous metals & alloys: Iron ores, manufacture of pig iron, types of pig iron, cast iron, castings, wrought iron, manufacture of steel, uses of steel, factors affecting physical properties of steel, magnetic properties of steel, defects in steel, market forms of steel, mechanical treatment of steel, Aluminum (its alloys & uses). Copper (its alloys & uses), Ceramics (classification, properties, commercial forms).

Paints: Paint varnishes & enamels (types, composition, method of application, defects)

Unit III

Mortar: Definition, sand, natural sources of sand, classification of sand, bulking of sand, properties of good sand, function of sand in mortar, test for sand, substitutes for sand, classification of mortars, properties, preparation uses of mortar, selection of mortar and tests.

Cement: Definition, composition of ordinary Portland cement, function of cement ingredients, harmful constituents of cement, manufacture, physical tests, storage & uses.

Lime: Classification of binding materials, sources of lime, constituents of limestone, classification of limestone, classification of limes, comparison between fat lime and hydraulic lime, manufacture of fat lime, natural hydraulic lime & artificial hydraulic lime, test for limestone.

Unit IV

Masonry construction, masonry classification, stone V/s brick masonry, Terms & Definition in stone & brick masonry, Comparison of brickwork and stonework, joints in stone masonry, dressing of stone. Brick masonry (bonds in brick masonry, characteristics of bonds, type of bonds), typical structures in brickwork.



Unit V

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.

Industrial waste materials – fly ash, blast furnace slag, granite & marble polishing waste and their uses. Agro waste materials (rice husk, bagasse, coir fibers and their uses. Special processed construction materials- geosynthetic, ferrocrete, artificial timber, artificial sand and their uses.

Books

1. Building materials by: - M.L. Gambhir, Tata Mc-grawHil education Pvt. Ltd.
2. Building material by :- S.K. Duggal ,New Age Publishers
3. Building construction by :- S.P.Arora, Bindra, Dhanpat Rai & Sons
4. Building construction by:- B.C. Punamia, A.K.Jain, Laxmi Publishers New Delhi
5. Building material by:- B.C. Punmia, Laxmi Publishers New Delhi

Course Outcomes

Upon completion of the course, a student will be able to

CO1: Classify rocks, stones and bricks understand their properties, uses, and preservation techniques.

CO2: Describe the characteristics, seasoning, preservation, and applications of timber and wood products and understand the manufacturing, properties, and applications of ferrous and non-ferrous metals, alloys, ceramics, and paints

CO3: Explain the properties and preparation of mortar, cement & Lime including the function and testing of mortar, cement & lime.

CO4: Compare stone and brick masonry, and the construction techniques, bonds, and jointing methods.

CO5: Determine the causes and prevention techniques for dampness, including anti-termite and waterproofing treatments.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241102

Course Name: Computer Programming

L	T	P	Credit
2	0	0	2

Course Objective:

- To understand the fundamentals of C programming including keywords, data type, functions etc.
- To acquire the ability to write a computer program to solve specified problems.
- To familiar with program structure and debugging process.
- To implement basic programming solutions using array, pointer, structures and file handling.

SYLLABUS

Unit I: Introduction to C Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution, Translation Process and compiler Installation, Problem solving using Algorithms and Flowcharts, Identifiers, Data Types, Constants, Keywords, Input/output Instruction, Operators and Expressions, Precedence of operators, ASCII codes.

Unit II: Decision Control, if statement, if-else statement, Nested if else statements, if else ladder, The conditional expression, Switch statement, Loops, While loop, do-while loop, For loop, nesting of for loops, Break and continue statement.

Unit III: Array, type of array, One dimensional Arrays, 2D array, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, type of pointers, Application of pointers, Pointer to Pointer, Pointer to Array, Array of Pointers, Pointer to Strings.

Unit IV: Function Basics, Function Prototypes, Call by value, call by reference, passing string and array to function, Function returning address, Recursion, Structures, Dynamic memory allocation by malloc/calloc function, Union, Enumerators, typedef in c.

Unit V: File Handling, Defining and Opening a file, reading and writing in file, Closing Files, Input/output Operations on Files, Predefined Streams, Storage class, preprocessor commands, Command Line Arguments.

Recommended Books

1. Brian W. Kernighan and Dennis M. Ritchie, **The C Programming Language**, Prentice Hall of India.
2. Yashavant Kanetkar, **Let Us C**, BPB publication.
3. E. Balagurusamy, **Programming in ANSI C**, Tata McGraw-Hill.
4. Byron Gottfried, **Schaum's Outline of Programming with C**, McGraw-Hill.
5. Paul Deitel and Harvey M. Deitel, **How to Program**, Pearson Publication.

Course Outcomes

Upon completion of the course, a student will be able to

CO1: Define basic programming terms, syntax, algorithm and flow chart.

CO2: Solve computational problems using decision control and loops.

CO3: Design a program using the concept of Array, pointer and functions.



CO4: Explore file handling operations to work efficiently with files.

CO5: Apply programming concept to implement, debug and test any C program.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241103

Course Name: Engineering Mechanics

L	T	P	Credit
2	1	0	3

Course Objective:

The course intends to provide an understanding of the properties of areas and principles of statics and dynamics and its application for different engineering problems.

SYLLABUS

Unit-I

Forces and Equilibrium: Resolution and resultant of forces; Graphical and Analytical methods of concurrent and non-concurrent coplanar forces, free body Diagram, Introduction to force system in space; Applications of Equilibrium Concepts.

Unit-II

Friction: Laws of Coulomb friction, inclined plane; ladder friction; wedge friction, square threaded screws; belt friction; rolling resistance

Unit-III

Analysis of plane Trusses, method of joints, method of Sections. Shear force and bending moment diagram for statically determinate beams subjected to different types of loadings.

Unit-IV

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

Text book

1. R. C. Hibbeler, Engineering Mechanics (Statics and Dynamics), Pearson Education Asia Pvt. Ltd
2. R. S. 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.

Course Outcomes

Upon completion of the course, a student will be able to

CO1: Apply basic laws of Mechanics for different types of force systems.

CO2: Apply the Laws of friction in engineering problems.

CO3: Apply the concept of equilibrium in statically determinate beams and trusses.



CO4: Determine the properties of areas for different shapes.

CO5: Apply the concepts of Kinematics and Kinetics for engineering problems.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241104

Course Name: Building Design & Drawing

L	T	P	Credit
2	1	0	3

Course Objective:

Main objective of the subject is to introduce students about basic principles of Building planning & principles of Architectural composition to enable them to plan various types of buildings. The course is also designed to familiarize the students with fundamental of various features & details of the major components of the buildings. Subject study will impart drafting skill of engineering & building drawing and drafting, floor plan, elevation, section to reveal salient features, knowledge of study of town planning will guide students to follow rules & regulations of town planning while designing a building.

SYLLABUS

Unit-1 Concept of Engineering Drawing:

Basics of instruments, Plane geometrical constructions, Plain and diagonal scale, Unit conversion and Exercises based on linear, area, volume and speed, scale of chord, curved and Arches.

Unit-2 Isometric projections:

Introduction, isometric scale, isometric axis, isometric view and isometric projections from orthographic views, orthographic views from pictorial view and exercise. Computer Aided Drafting using Auto CAD: Introduction, software's basic commands.

Unit-3 Drawings of Building elements:

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

Unit-4 Building Planning:

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

Unit-5 Town Planning:

History & development of cities & towns, Rules & Regulation of town & country planning. Types of towns & cities i.e. Ribbon development, Satellite town, Centralized, Garden city etc, Problems of metro cities, case study – Chandigarh, Gandhi Nagar Pondicherry etc., planning of cities & amenities, smart city concept, Integrated facilities requirement for smart cities.

Reference Books

- i) Building Design and Drawing by Mallick and Mao
- ii) Building Drawing and Design by Sah, Kale and Pathi
- iii) Building Design and Drawing by Gurucharan Singh
- iv) Building Design and drawing by Y.S.Sane
- v) N.B.C. (Latest Edition).



vi) Auto cad Software & Manual.

Courses Outcomes

Upon completion of the course, a student will be able to

CO1: Apply the skill of engineering drawing & drawing of various building elements.

CO2: Implement the rules & regulations according by-laws & NBC provision.

CO3: Apply various techniques of perspective drawing.

CO4: Develop planning insight and make acquaintance with various town planning related exercises.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241105

Course Name: Basic Electrical & Electronics Engineering

L	T	P	Credit
2	0	0	2

Course Objectives:

- To impart basic knowledge of the DC and AC circuits and their applications.
- To familiarize the students with the basic knowledge of magnetic circuits, transformer, rotating electrical machine and its terminology.
- To make familiarize the students about the working of various electronic circuits and its importance.

SYLLABUS

Unit- I D.C. Circuits Analysis:

Voltage and Current Sources: Dependent and independent source, Source conversion, Kirchhoff's Law, Mesh and Nodal analysis. Network theorems: Superposition theorem, Thevenin's theorem & Norton's theorem and their applications.

Unit- II Single-phase AC Circuits:

Generation of sinusoidal AC voltage, definitions: Average value, R.M.S. value, Form factor and Peak factor of AC quantity, Concept of Phasor, analysis of R-L, R-C, R-L-C Series and Parallel circuit, Power and importance of Power factor.

Unit- III Magnetic Circuits & Resonance:

Magnetic Circuits: Concept of MMF, flux and magnetic reluctance, Self and mutual inductances, Dot convention, coefficient of coupling and coupled circuits. Resonance: Series and Parallel resonance, Bandwidth, Q-factor and selectivity.

Unit- IV Single-phase Transformer & Rotating Electrical Machines:

Single phase transformer, Basic concepts, construction and working principle, Ideal Transformer and its phasor diagram at No Load, Voltage, current and impedance transformation, Equivalent circuits and its Phasor diagram, voltage regulation, losses and efficiency, testing of transformers, Construction & working principle of DC and AC machine.

Unit –V Digital Electronics, Devices & Circuits:

Number systems used in digital electronics, decimal, binary, octal, hexadecimal, their complements, operation and conversion, Demorgan's theorem, Logic gates- symbolic representation and their truth table, Introduction to semiconductors, Diodes, V-I characteristic, Bipolar junction transistors and their working, Introduction to CB, CE & CC transistor configurations.

Recommened Books

1. Basic Electrical and Electronics Engineering, D.P. Kothari & I.J. Nagrath-Tata McGraw Hill
2. Basic Electrical and Electronics Engineering, V N Mittle & Arvind Mittal -Tata McGraw Hill
3. Basic Electrical and Electronics Engineering, S. K Bhattacharya -Pearson
4. Electrical Machinery- A.E. Fitzgerald, C. Kingsley and Umans - TMH
5. Principles of Electrical Engineering- Vincent Del Toro- Prentice Hall.



6. Basic Electrical Engineering -A,E. Fitzgerald, Higginbotham and Grabel -TMH
7. Integrated Electronics- Millmann & Halkias

Courses Outcomes

Upon completion of the course, a student will be able to

CO 1. Solve dc & ac circuits by applying fundamental laws & theorems

CO 2. Analyze magnetic circuits and resonance characteristics of ac electric circuits

CO 3. Describe the working principle, construction, applications of single phase transformer & rotating electrical machines

CO 4. Select the logic gates for various applications in digital electronic circuits.

CO 5. Explain the characteristics and parameters of Diode and Transistor.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241106

Course Name: Computer Programming Lab

L	T	P	Credit
0	0	2	1

Laboratory Objectives:

- To Develop a knowledge of Computer Programming
- To Enhance Practical programming Skills to solve real world problems.

LIST OF EXPERIMENT'S

1. Write a program to add two numbers and display its sum.
2. Write a Program to calculate and display the volume of a cylinder for height and radius parameters to be input from the user.
3. Write a program to take input of name, roll number and marks obtained by a student in 5 subjects of 100 marks each and display the name, roll number with percentage score secured.
4. Write a program to swap values of two variables with and without using the third variable.
5. Write a program to illustrate the use of unary prefix and postfix increment and decrement operators.
6. Write a program to find the largest of three numbers using ternary operators.
7. Write a program to find the roots of quadratic equation.
8. Write a Program to Check Whether a Number is Prime or not.
9. Write a program to compute the grade of students using if else ladder as per MITS norms.
10. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by 100 or 400.)
11. Write a program to print the sum of digits of a number using for loop.
12. Write a program to Display Fibonacci Sequence.
13. Write a program to display different kind of pyramid patterns using for loops.
14. Write a program to add two matrices of the same order.
15. Write a program to show the working of predefine functions in string.
16. Write a program to illustrate concept of function and different type of functions.
17. Write a program to find factorial of a number using recursion.
18. Write a program to find sum of natural numbers using recursion.
19. Write a program to illustrate concept of structure and union in c programming.
20. Write a program to show concept of file handling.

Course Outcomes:

Upon completion of the course, a student will be able to

- CO 1.** Write computer program in C language.
- CO 2.** Apply knowledge of programming to solve real-world problems



- CO 3. Apply programming syntax to implement program.
- CO 4. Acquire teamwork skill for working effectively in groups
- CO 5. Prepare an organized practical file on experiments conducted in the laboratory.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241107

Course Name: Electrical & Electronics Engineering Lab

L	T	P	Credit
0	0	2	1

LIST OF EXPERIMENT'S

1. To verify Kirchoff's Current Law & Kirchoff's Voltage Law.
2. To verify Superposition Theorem
3. To determine resistance & inductance of a choke coil.
4. To determine active & reactive power in a single phase A.C circuit.
5. To determine voltage ratio & current ratio of a single phase transformer.
6. To determine the polarity of a single phase transformer.
7. To perform open circuit & short circuit test on a single phase transformer.
8. To study multimeter & measure various electrical quantities
9. To study of constructional details of DC machine.
10. To determine the V-I characteristics of diode in forward bias & reverse bias condition.

Course Outcomes:

Upon completion of the course, a student will be able to

- CO 1. **Verify** circuit theorems.
- CO 2. **Perform** tests on transformer for determination of losses, efficiency & polarity.
- CO 3. **Acquire** teamwork skills for working effectively in groups
- CO 4. **Prepare** an organized technical report on experiments conducted in the laboratory

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241109

Course Name: Micro Project – I

L	T	P	Credit
0	0	2	1

LIST OF MICRO PROJECTS

1. Build a model of a common household item (e.g., a lamp or a fan) and analyze the forces and moments to ensure it is in equilibrium.
2. Build a model of a simply supported beam and analyze the forces due to self weight and support reactions
3. Model a crane arm and investigate how various loads affect its equilibrium. Students can use free body diagrams and solve for forces and reactions.
4. Prepare list of the documents required for obtaining permission for construction of residential building/apartment from competent authority and write report.
5. Prepare report on Provisions given in National Building Code 2005.
6. Construct an inclined plane with adjustable angles and measure the frictional force for different materials and inclinations
7. Analyze and measure the friction forces acting on a ladder leaning against a wall and identify the conditions for ladder stability
8. Design a small pulley system with belts and study the effects of friction on the transmission of force and motion.
9. Collect and study building Bye laws, rules and regulation for planning as per local competent authority.
10. Study of Sustainable Building Materials
11. Thermal Insulation Properties of Building Materials
12. Build a truss bridge model and use the method of joints and sections to analyze the internal forces in the truss members.
13. Construct a physical or virtual model of a beam under various loads and draw shear force and bending moment diagrams.
14. Create a truss structure (e.g., a small tower) and test its ability to carry different loads, analyzing the forces in each member.
15. Draw developed plan, Elevation, section, site plan of public building.
16. Prepare list of the documents required for obtaining permission for construction of commercial building from competent authority and write report.
17. Brick Masonry Bond Strength Study
18. Fire Resistance of Construction Materials
19. Use different geometric shapes (e.g., circles, rectangles) cut from cardboard or similar materials to experimentally determine their centroid.



20. Create composite shapes from simpler geometries and calculate their centroid and using both theoretical and experimental methods.
21. Verify the principal moment of inertia by measuring and computing of different geometrical shapes.
22. Prepare a model of a simple building using card board showing different components with suitable colour.
23. Draw the plan of 2BHK house with suitable plot size.
24. Plan an acoustic effects for an auditorium.
25. Construct a simple mass-spring system and measure its natural frequency and amplitude of oscillations.
26. Analyze the motion of a rolling ball down an inclined plane, studying its acceleration and the forces involved
27. Design and test a simple undamped single degree of freedom system to study its free vibration characteristics.
28. Identification of different rock minerals with their properties.
29. Deterioration of stones with their causes and remedies.
30. Common building stones used in India with proper reasoning.
31. Different types of brick bonds with their applications.
32. Different types of masonry joints with their applications.
33. Damp in building- causes and control.
34. Comparison of stone work and brick work with proper applications.
35. Study on the Use of agro waste materials in construction.
36. Waterproofing Techniques for Concrete Structures
37. Corrosion in reinforcement- causes and control measures.
38. Study of artificial sand for construction.

Course Outcomes:

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

CO1: Identify the characteristics of various building materials.

CO2: Develop plan and model of buildings.

CO3: Analyze the friction forces, shear force, bending moment and single degree of freedom system.

CO4: Cooperate to work within group.

CO5: Develop the writing skills to prepare reports.

CO6: Display lifelong learning.



Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	-	-	3	3	-	-	3	-	-	-	-	-
CO2	3	2	-	-	3	3	-	-	3	-	-	-	-	-
CO3	3	3	3	-	-	3	-	-	3	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	3	-	-	-	-
CO6	-	-	-	-	-	-	-	-	-	-	-	3	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241110

Course Name: Engineering Chemistry Lab

L	T	P	Credit
0	0	2	1

Course Objectives: The main objective of the course is to enable the students to become familiar with the concepts of Modern Engineering Chemistry, and impart knowledge on the fundamental concepts of chemistry involved in application of several important engineering materials that are used in the industry/day-to-day life.

Syllabus:

UNIT -I Water Analysis

Source and impurities, alkalinity, pH, hardness of water, interrelationship between alkalinity and hardness, degree of hardness, Boiler troubles, Methods of hardness removal, Standards of water for drinking purposes.

UNIT -II Lubricants & Lubrication

Introduction, functions of lubricants, types and classification of lubricants, mechanism of lubrication, physical & chemical properties, testing of lubricants, types of greases, application of lubricants.

UNIT- III Chemical Fuels

Definition and classification of chemical fuels, Requirements of a good fuel. Calorific Value – HCV and LCV. Coal and its Ranking. Proximate and Ultimate analysis of coal. Knocking & Octane and Cetane numbers.

UNIT -IV Polymeric Material

Introduction, types and classification of polymers, Types of polymerization: addition or chain polymerization, condensation polymerization and their mechanism, Preparation of Phenol formaldehyde, Urea formaldehyde Resin.

UNIT- V Analytical Methods

Chromatography- Introduction & Principle of Chromatography, Introduction of Column, Thin layer, paper. Separation of colour pigments by Paper chromatography experiment.

Spectroscopy-Principle Instrumentation and Applications of Ultra-Violet, and Visible Spectroscopy, Absorption law, Verification of Lambert Beer's law, determination of concentration of solute in sample, and determination of λ max of sample solution.

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

CO 1: Select the best technique for Industrial and domestic water treatment.

CO 2: Describe the types, properties and application of lubricants.

CO 3: Distinguish the chemistry of various fuels and their combustion.

CO 4: Describe types, classification properties and applications of polymers and mechanisms of polymerization.

CO 5: Explain the concept of chromatography and spectroscopy for various engineering application.



Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

LIST OF EXPERIMENT'S

At least 10 of the following experiments must be performed during the session.

S. No.	Aim of experiment
1	Determination of Total hardness by Complexometric titration.
2	Determination of temporary and permanent hardness by Complexometric titration.
3	Determination of alkalinity of given water sample by neutralization Titration. (a) OH^- & CO_3^{2-} (b) CO_3^{2-} & HCO_3^-
4	Determination of percentage of Fe in Iron alloy solution by redox titration.
5	Determination of percentage of Cr in Chromium alloy solution by back titration.
6	Determination of Cu in Copper alloys solution by Iodometric Titration.
7	Determination of Viscosity of given oil sample by Redwood viscometer No.1
8	Determination of Flash & fire points of given oil sample by Pensky Martin close cup Apparatus.
9	Determination of Flash & fire point of given oil sample by Cleveland's open cup Apparatus.
10	Determination of Moisture content, volatile matter content, Ash content and fixed Carbon of a given sample of coal by proximate analysis.
11	Separation of the colour pigment of spinach leaf by paper chromatography.
12	Preparation of phenol formaldehyde resin by condensation polymerization.
13	Preparation of urea formaldehyde resin by condensation polymerization.

Lab Course Outcomes: Upon completion of the course the student will be able to:

CO 1: Develop experimental skill required for application of chemistry in engineering.

CO 2: Operate different chemicals and instruments specified in course safely and efficiently.

CO 3: Analyse water sample, lubricants, fuel, alloys and ores for different properties.

CO 4: Function as a member of a team for problem solving.



Lab Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241111

Course Name: Universal Human Values & Professional Ethics

L	T	P	Credit
2	0	0	GRADE

Mode of teaching: The course is intended to be taught through lectures, discussions, case Studies, practice sessions, and assessment by self, peers, and instructor/teacher.

Course Objectives: The objective of the course is four fold:

1. Sensitization of student towards self, family (relationship), society and nature.
2. Understanding (or developing clarity) of nature, society and larger systems, on the basis of human relationships and resolved individuals.
3. Strengthening of self-reflection.
4. Development of commitment and courage to act.

Course Content:

1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education:

- Self-Exploration—what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
- Continuous Happiness and Prosperity- A look at basic Human Aspirations
- Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
- Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario

2: Understanding Harmony in the Human Being:

- Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
- Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility
- Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
- Understanding the harmony of ‘I’ with the Body

3: Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship:

- Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution,



Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

- Visualizing a universal harmonious order in society

4: Understanding Harmony in the Nature and Existence - existence as Coexistence:

- Understanding the harmony in the Nature
- Interconnectedness and mutual fulfilment among the four orders of nature recyclability and self-regulation innature
- Understanding Existence as Co-existence of mutually interacting units in all pervasive space
- Holistic perception of harmony at all levels of existence.

5: Holistic Understanding of Harmony on Professional Ethics:

- Natural acceptance of human values
- Definitiveness of Ethical Human Conduct
- Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order
- Competence in professional ethics:
 - a. Ability to utilize the professional competence for augmenting universal human order
 - b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems,
 - c. Ability to identify and develop appropriate technologies and management patterns for above production systems.
- Strategy for transition from the present state to Universal Human Order:
 - a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
 - b. At the level of society: as mutually enriching institutions and organizations

6: Gender Sensitization:

- Introduction to Sex, Gender & Culture
- Introduction to Women Studies and Socialisation, including man-woman relationship, work distribution
- A brief review of Feminism, Patriarchy, Feminist Studies, Feminist Ideologies.
- Women and Law Constitutional Provisions and Fundamental rights related to Women.

Course Outcomes: At the end of the course student will be able to

CO1. Become more aware of their surroundings, society, social problems and their sustainable solutions.

CO2. Become sensitive to their commitment towards what they believe in (humane values. humane relationships and humane society).

CO3. Apply what they have learnt to their own self in different day-to-day settings in real life.

CO4. Sustain human relationships and human nature in mind.



CO5. Have better critical ability.

CO6. Negotiate living in harmony with self and others.

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	1	1	-	-	-	-	2	-	1	1	-	1	-	-
CO2	-	1	-	-	-	-	1	-	1	1	-	1	-	-
CO3	1	-	-	-	-	-	-	-	1	2	-	1	-	-
CO4	-	-	-	-	-	-	2	-	1	1	-	2	-	-
CO5	2	1	-	-	-	-	-	-	2	2	-	2	-	-
CO6	-	-	-	-	-	-	2	-	2	1	-	2	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Text Book

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010

Reference Book

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. On Education - J Krishnamurthy
6. Siddhartha - Hermann Hesse
7. Old Path White Clouds - Thich Nhat Hanh
8. On Education - The Mother
9. Diaries of Anne Frank - Anne Frank
10. Life and Philosophy of Swami Vivekananda
11. Swami Vivekananda on Himself
12. Small is Beautiful - E. F Schumacher.
13. Slow is Beautiful - Cecile Andrews
14. Economy of Permanence - J C Kumarappa
15. Bharat Mein Angreji Raj - Pandit Sunderlal
16. Mahatma and the Rose
17. The Poet and the Charkha



18. Rediscovering India - by Dharampal
19. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
20. Swaraj by Arvind Kejriwal
21. India Wins Freedom - Maulana Abdul Kalam Azad
22. Ramakrishna ki jeevani - Romain Rolland (English)
23. Vivekananda - Romain Rolland (English)
24. Gandhi - Romain Rolland (English)
25. Autobiography of a Yogi – by Paramhansa Yogananda
26. Gandhi and Question of Science – Sahatsrabudhe



Course Code: 11241201

Course Name: Surveying

L	T	P	Credit
3	0	0	3

Course Objective:

The course aims to provide knowledge of surveying instruments, techniques for distance, direction, and elevation measurement, field surveying, setting out works, and the application of curves and specialized surveying methods.

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.

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



Course Outcomes:

Upon completion of the course, a student 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: Analyze various techniques of controlling points.

CO5: Evaluate various methods for curve setting.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241202

Course Name: Strength of Material

L	T	P	Credit
2	1	0	3

Course Objective:

To understand the concepts of simple and compound stress & strain; behavior of elastic material in bending, shear and torsion; behavior of column with different end condition; stress and strain in pressure vessel; determine deflection in statically determinate structure

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.

Unit-II:

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-III:

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-IV:

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-V:

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

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, Higdon Style, 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

Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Apply the concepts of simple stress and strain.

CO1: Apply the concepts of complex stress and strain.

CO3: Apply theory of simple bending in beams.

CO4: Apply the concept of pure torsion in shaft and determine the stresses in pressure vessels.

CO5: Evaluate columns & struts with different end conditions.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241203

Course Name: Concrete Technology

L	T	P	Credit
2	1	0	3

Course Objective:

The course intends to provide students with a comprehensive understanding of the materials, mix design, properties, testing, and applications of concrete in construction.

SYLLABUS

Unit-I Ingredients of Concrete:

Portland cement: Chemical composition of cement, Hydration of cement.

Cement: Types of Portland cement as per IS and ASTM classification, Fly ash; use of pozzolanas.

Aggregates: General classification of aggregates, natural and artificial aggregates, particle shape and texture, bond of aggregate, 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, organic impurities. Soundness of aggregates.

Admixtures: Introduction, functions of admixtures, classification of admixtures, Accelerators, Retarders, Water Reducing Agents, Super plasticisers.

Unit-II 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, Mixing of concrete, Vibration of concrete, Different types of mixers and vibrators.

Hardened Concrete: Mechanical properties of concrete, Stress and strain characteristics of concrete, drying shrinkage of concrete, Creep of concrete, Permeability and durability of concrete, Fire resistance of concrete, Thermal properties of concrete.

Unit-III Testing & Quality Control of Concrete:

(a) Compression tests-cube test, Cylinder test, effect of end conditions on specimen and capping. Flexure test, splitting test, influence of size of specimen on strength, rebound hammer test, penetration resistance test, Pull-out-test, ultrasonic pulse velocity test.

(b) Field control for Quality of Concrete, Advantages of Quality Control, Statistical quality control, Measure of variability & its applications, Quality management in concrete construction.

Unit-IV Concrete Mix Design:

Basic considerations, factors in the choice of mix proportions, design of standard concrete mixes by IS code methods.

Unit-V Special Concretes:

High strength concrete, High performance concrete, Fibre reinforced concrete, Ready mixed concrete, Pumped concrete, mass concreting composites, Ferro cement, Light weight concrete, High density concrete, Cellular foam concrete, recent advances in concrete manufacturing.



Books Recommended:

1. Neville M. Properties of Concrete, ELBS, PHI Publishers
2. M.S Shetty, Concrete Technology, S. Chand Publishers
3. M.L Gambhir, Concrete Technology, McGraw Hill Publications
4. Varshney, Concrete Technology, Oxford Publications
5. Nawy E.G., Concrete Construction Engineering Hand Book, CRC Press
6. D.F. Orchard, Concrete Technology, App Science Publishers

Course Outcomes

Upon completion of the course, a student will be able to

- CO1: Explain** the basic components of concrete.
- CO2: Analyze** properties of fresh and hardened concrete.
- CO3: Apply** quality control measures in concrete construction.
- CO4: Design** concrete mixes using standard guidelines.
- CO5: Evaluate** the use of special concretes for advanced applications.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241204

Course Name: Fluid Mechanics - I

L	T	P	Credit
2	1	0	3

Course Objective:

To provide a comprehensive understanding of fluid properties, fluid continuum, kinematics and dynamics of fluid flow, fluid measurement mechanisms, simulation and dimensional analysis methods, and the concepts of laminar flow, enabling students to apply these principles to various fluid flow problems.

SYLLABUS

Unit I

Review of Fluid Properties: Engineering units of measurement, density, specific weight, specific volume, specific gravity, surface tension, capillary, viscosity, bulk modulus of elasticity, pressure and vapour pressure.

Fluid Statics: Pressure at a point, pressure variation in static fluid, Absolute and gauge pressure, manometers, Forces on plane and curved surfaces (Problems – gravity dams and Tainter gates), buoyant force, Stability of floating and submerged bodies, Relative equilibrium.

Unit II

Kinematics of Flow: Types of flow-ideal & real, steady and unsteady, uniform & non-uniform, one, two and three dimensional flow, path lines, streamlines, streamlines and stream tubes, continuity equation for one and three dimensional flow, rotational & irrotational flow, circulation, stagnation point, separation of flow, sources & sinks, velocity potential, stream function, flownets-their utility & method of drawing flownets.

Unit III

Dynamics of Flow: Euler's equation of motion along a streamline and derivation of Bernoulli's equation, application of Bernoulli's equation, energy correction factor, linear momentum equation for steady flow, momentum equation, forces of fixed and moving vanes, velocity triangles.

Fluid Measurements: Velocity measurement, flow measurement (Orifices, nozzles, mouth pieces, orifice meter, Nozzle meter, venturimeter, weirs and notches).

Unit IV

Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham-pie theorem, calculation of dimensionless numbers, similarity laws, specific model investigations (submerged bodies, partially submerged bodies, weirs, spillways, etc.)

Unit V

Laminar Flow: Introduction to laminar, transition & turbulent flow, Reynolds experiment & Reynolds number, relation between shear & pressure gradient, laminar flow through circular pipes, laminar flow between parallel plates, laminar flow through porous media, stokes law, Bach wash processing, Instability of laminar flow to turbulent flow.



Text Books:

1. Fluid Mechanics, Modi & Seth, Standard Book House, Delhi, 21st edition, 2018.
2. Fluid mechanics, Girde & Mirazgaonkar, SCI Tech Publishers, 2019
3. Fluid Mechanics, R.K. Bansal, Laxmi Publishers, 2015

Reference Books:

1. Fluid Mechanics, A.K. Jain, Khanna Publishers, Delhi, 2014
2. Fluid Mechanics, Streeter, McGraw Hill Publishers, 9th edition, 2017

Courses Outcomes

Upon completion of the course, a student will be able to

CO 1: Explain fundamental fluid properties & concepts of fluid statics.

CO 2: Apply principles of fluid flow & dimensional analysis.

CO 3: Solve fluid flow problems.

CO 4: Analyze characteristics of fluid at rest, fluid at motion & dimensionless numbers.

CO 5: Discriminate different types of fluid flow, measurement techniques & principles.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241205

Course Name: Matrices & Calculus

L	T	P	Credit
3	0	0	3

Course Objectives:

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigen values and eigenvectors and to reduce the quadratic form to canonical form
- To expose the concept of ordinary and partial differentiation
- Evaluation of improper integrals using Beta and Gamma functions.
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

SYLLABUS

Unit I Matrices-I:

Types of Matrix, Hermitian and skew Hermitian matrix, unitary matrix, Matrix Rank of a matrix by Echelon Form and Normal Form, Inverse of Non-singular matrix by elementary transformation, solution of system of Homogeneous and non-homogeneous equations by elementary transformation, Consistency of equation.

Unit II Matrices-II:

Linear dependence of vectors, Eigen values and Eigenvectors with their properties, Cayley Hamilton theorem and its application to finding inverse of matrix, Diagonalization of a matrix

Unit III Differential Calculus –I:

nth Derivative, Leibnitz's theorem, Partial derivatives, Euler's theorem for homogeneous functions, Total derivatives, Change of variables.

Unit IV Differential calculus-II:

Taylor's and Maclaurin's Theorems, Expansion of function of several variables, Jacobian, properties of Jacobian, Approximation of errors, Extrema of functions of several variables (Maxima and Minima of function of one and two variables), Lagrange's method of multipliers (Simple applications).

Unit V Integral Calculus:

Beta and Gamma function and its properties, transformation of Beta function, Gamma functions, transformation of Gamma function, relation between Beta and Gamma function, Double and triple integrals, Change of order of integration, Application of Integration to Volumes and Surface areas.

Recommended Books:

1. E. Kreyszig: Advance Engineering Mathematics, John Wiley & Sons, 10th Edition (2011).
2. C.L Liu: Discrete Mathematics, 4th Edition 2012.



3. R. K. Jain, S. R. K. Iyengar: Advance Engineering Mathematics, Narosa Publishing House Pvt. Ltd, 5th Edition (2016).
4. F. B .Hildebrand: Advanced Calculus for application, Englewood Cliffs, N. J. Prentice- Hall, 2nd Edition (1980).
5. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Edition (2015).
6. B.V. Ramanna: Higher Engineering Mathematics, McGraw Hill Education, 1st Edition (2017).

Courses Outcomes:

Upon completion of the course, a student will be able to

- CO 1. Solve the problem of matrix.
- CO 2. Application of various matrix in engineering problems.
- CO 3. Use of differential calculus.
- CO 4. Apply differential calculus in basic engineering problems.
- CO 5. Use integration techniques to determine the solution of various complex problems.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241206

Course Name: Building Materials & Construction Lab

L	T	P	Credit
0	0	2	1

Laboratory Objectives:

To provide students the practical knowledge of testing and assessing the properties of various building materials.

LIST OF EXPERIMENT'S

I. TEST ON FINE AGGREGATES

1. Gradation of aggregates.
2. Test for specific gravity.
3. Compacted and loose bulk density of fine aggregate.

II. TEST ON COARSE AGGREGATE

1. Determination of impact value of coarse aggregate.
2. Determination of elongation index
3. Determination of flakiness index
4. Determination of aggregate crushing value of coarse aggregate

III. TEST ON CONCRETE

1. Test for Slump
2. Test for Compaction factor
3. Test for Compressive strength - Cube & Cylinder

IV. TEST ON BRICKS AND BLOCKS

1. Test for compressive strength of bricks and blocks
2. Test for Water absorption of bricks and blocks
3. Determination of Efflorescence of bricks
4. Test on tiles

Course Outcomes:

Upon completion of the course, a student will be able to

- CO 1.** Analyze the properties of fine and coarse aggregates
- CO 2.** Evaluate concrete workability and strength
- CO 3.** Assess the quality of bricks and blocks for construction.
- CO 4.** Understand the durability and performance of building materials
- CO 5.** Apply testing knowledge to construction practices



Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241207

Course Name: Problem Solving through Python Programming

L	T	P	Credit
0	0	2	1

Course Objectives:

- To apply various Python datatypes and Control Structure
- To Implement Classes and objects in Python
- To develop Python GUI.

Unit I

Introduction to Python: Setting up the Python environment (Anaconda, Jupyter Notebook), Basic syntax usage: variables, data types, and operators, First Python program, Control Structures: Conditional statements: if, elif, else, Looping constructs: for and while loops Nested control structures

Unit II

List/ Set/ Tuple operations: List, List Operations (Access, Slice, Append, Delete, Unpack, Loop etc), Tuple, Tuple operations (Access, Append, Delete, Unpack, Loop, etc.), Set, Set Operations (Access, Append, Delete, Method, Loop, etc.), Dictionary (Access, Append, Delete, Methods, Loop, etc.), Array (Access, Append, Delete, Methods, Loop, etc.) Strings: Reverse, Palindrome, Character count, Replacing Character

Unit III

Matrix and Array: Define matrix and print, Arithmetic operation between Matrix,

Functions and Modules implementation: Defining and calling functions, Function parameters and return values, Scope and lifetime of variables, Importing and using modules, In-Built Functions, Recursion, Lambda function

Unit IV

Classes, and Objects: Create class and object, Self-parameter, Attribute and methods, Implement Inheritance and polymorphism.

File Handling: Read and write to files, Working with CSV and JSON file, Implement try-except blocks, Debug a piece of code

Unit V

GUI: Work with Canvas, draw geometric shapes, Fill colour, Creating Simple GUI, GUI packages, Tkinter, Buttons, Labels, Entry Fields, Dialogs; Widget Attributes - Sizes, Fonts, Colours, Layouts, Nested Frames, Widget window – Bg, Bd, Cursor, font, Fg, Command, Minimal Application



Reference Books:

- “Python for Data Science For Dummies” by John Paul Mueller and Luca Massaron
- “Python Machine Learning” by Sebastian Raschka and Vahid Mirjalili
- “Python Web Scraping Cookbook” by Michael Heydt
- “Python GUI Programming Cookbook” by Burkhard A.
- “Python for Finance” by Yves Hilpisch.

List of Experiments:

1. Python Program to
 - a. Generate a Random Number
 - b. Convert Kilometers to Miles
 - c. Check if a Number is Positive, Negative or 0
 - d. Print the Fibonacci sequence
 - e. Find ASCII Value of Character
 - f. Shuffle Deck of Cards
 - g. Display Calendar
2. Python Program to
 - a. Display the Fibonacci Sequence Using Recursion
 - b. Find the Sum of Natural Numbers Using Recursion
 - c. Find the Factorial of Number Using Recursion
 - d. Convert Decimal to Binary Using Recursion
3. Python Program to Add Two Matrices, Transpose a Matrix, Multiply Two Matrices
4. Python Program to
 - a. Check Whether a String is Palindrome or Not
 - b. Remove Punctuations from a String
 - c. Sort Words in Alphabetic Order
5. Python Program to Illustrate Different Set, Tuple, and List operations.
6. Python Program to Iterate Over Dictionaries Using for Loop
7. Python Program to Catch Multiple Exceptions in One Line
8. Python Program to Copy a File
9. Python Program to Get Line Count of a File
10. Python Program to Find All Files with .txt Extension Present Inside a Directory
11. Python Program to Return Multiple Values from a Function
12. Write a Python program to create a person class. Include attributes like name, country, and date of birth. Implement a method to determine the person’s age
13. Write a Python program to create a class representing a bank. Include methods for managing customer accounts and transactions.
14. Write a Python program to create a class representing a shopping cart. Include methods for adding and removing items and calculating the total price.
15. Create Python GUI using Tkinter
 - a. Displaying Text and Images with Label Widgets
 - b. Displaying Clickable Buttons with Button Widgets
 - c. Getting User Input with Entry Widgets
 - d. Getting Multiline User Input with Text Widgets
 - e. Assigning Widgets to Frames with Frame Widgets
 - f. Adjusting Frame Appearance with Relief



Course Outcomes:

Upon completion of the course, a student will be able to

CO1: Implement Python built-in functions and control statements.

CO2: Implement Python user-defined functions and classes.

CO3: Create Python GUI.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241209

Course Name: Micro Project – II

L	T	P	Credit
0	0	2	1

LIST OF MICRO PROJECTS

1. Calculation of Area by offset with reference to chain line.
2. Determine height of an object by trigonometrical levelling.
3. Traversing by Theodolite and tape.
4. Determine the distance between two inaccessible points by Prismatic/compass and tape.
5. Establish a regular pentagonal traverse by tape and Prismatic compass.
6. Conduct a profile levelling and cross-sectioning for a portion of proposed road.
7. Conduct a fly levelling to transfer Bench mark from one station point to another proposed station point.
8. Traversing by using Total station.
9. Locate building with respect to chain line by taking offsets.
10. Traversing by chain and Prismatic compass.
11. Study of Eco friendly self-compacted concrete.
12. Study of Eco friendly self-curing concrete.
13. Effect of ground water on concrete properties.
14. Study of ready mix concrete.
15. Design Mix of M-25 grade of concrete.
16. Design Mix of M-30 grade of concrete.
17. Design Mix of M-20 grade of concrete.
18. Comparative study on workability of different grade of concrete.
19. Study of pervious concrete.
20. Study of permeable concrete.
21. Use of ferro cement in concrete preparation.
22. Study of silica fume concrete.
23. Study of green concrete.
24. Non-Destructive testing of concrete
25. Study of light weight concrete.
26. Study of curing free concrete structure.
27. Study of fiber reinforced concrete.
28. Study of concrete workability using super plasticizers.
29. Study on durability of concrete in aggressive environments.



30. Investigation of the stability of floating objects, create charts comparing metacentric heights.
31. Study hydraulic similitude and scale modeling for different types of submerged bodies
32. Perform dimensional analysis for fluid systems like flow over spillways or pipe flow.
33. Study and classify flow regimes (laminar, transitional, and turbulent) for different engineering applications.
34. Analyze the variation of viscosity with temperature for different fluids and its impact on pipeline design.
35. Prepare a case study or report on how specific fluid properties (e.g., viscosity, surface tension, vapor pressure) influence the design of engineering systems like pipelines, pumps, or hydraulic systems.
36. Computation of capillary rise for different liquids in tubes of various diameters.
37. Develop an understanding of flow types and streamline behavior by visualizing the flow patterns and drawing streamlines.
38. Determine the impact of different material using Charpy impact test.
39. Determine the impact of differential material using Izod impact test.
40. Determine the tensile strength of different grade of steel and draw stress-strain curve.
41. Determine the compression strength of different grade of steel.
42. Evaluate the buckling strength of columns with different end conditions.
43. Determine the flexural stress in steel beam.
44. Determine the bending strength of simply supported beam using one point loading.
45. Determine the bending strength of simply supported beam using two point loading.

Course Outcomes:

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

CO1: Develop proficiency in surveying techniques for Infrastructure Layout and Analysis

CO2: Analyze the properties and performance of various concrete types and design sustainable concrete mixes to meet specific construction requirements.

CO3: Evaluate the properties of different materials.

CO4: Analyze fluid properties and flow behavior for engineering systems

CO5: Develop the writing skills to prepare reports.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241210

Course Name: Engineering Physics Lab

L	T	P	Credit
0	0	2	1

Course Objective:

The main objective of the course is to enable the students to become familiar with the key areas of physics that are fundamental to emerging technologies and impart knowledge about Quantum mechanics, Lasers, Fiber Optics, Holography, Superconductor, Nano materials, Dielectric materials.

Syllabus:

Unit I Quantum mechanics:

Planck's quantum hypothesis, Wave-particle duality of radiation, de-Broglie matter waves, Compton effect, Phase and group velocity, Heisenberg uncertainty principle and its applications.

Unit II Lasers:

Properties of lasers, the basic process of lasers, Population-inversion, classification of lasers, working of He-Ne, Ruby, Nd: YAG and CO₂ lasers, Applications of Lasers in Communication, Medical and Industry.

Unit III Fiber Optics:

Light guidance through optical fibers, the qualitative idea of critical and acceptance angle, types of fibers, numerical aperture, V-Number, intermodal & material dispersions in fiber.

UNIT IV Semiconductors & Nanomaterials:

Semiconductor basics P type-N type, Fermi function, Junction Diodes, LED and its working principle, Transistor.

Nanomaterials: Basic principle of nanoscience and technology, Quantum confinement effect and applications and Properties of quantum dots and Carbon nanotubes, Two-dimensional materials, Metal nanoparticles.

UNIT-V Dielectrics Materials:

Polar and Non-Polar Dielectrics, Dipole moment and Polarization, Dielectric constant & Polarization, Relation between electric field vectors E, P and D. applications of dielectrics.

Course Outcomes:

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

CO 1: Explain the quantum physics and applies it to the behavior of a system at the microscopic level and solve the problems.

CO 2: Interpret the requirements classification, properties and application of laser.

CO 3: Describe the basic concepts about optical fibers.

CO 4: Explain the principle, types, properties and application of semiconductors and nano-materials.

CO 5: Apply the knowledge of characteristic of Dielectrics and Piezoelectric materials.



Course Articulation Matrix:

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

1 - Slightly; 2 - Moderately; 3 – Substantially

LIST OF EXPERIMENT'S

At least 10 of the following experiments must be performed during the session.

S. No.	Aim of experiment
1	To determine the specific charge (e/m) of an electron by Thomson method.
2	To measure the planks constant using light emitting diode.
3	To determine the energy band gap of a given sample material.
4	To measure the dielectric constant of a substance by resonance method.
5	To study and verify the outputs of various logic gates
6	To study the input and output characteristics of a transistor in common BASE/Emitter/collector (anyone) configuration
7	To study the V-I characteristics of semiconductor diode
8	To study V-I Characteristics of LED
9	To determine the numerical aperture of given optical fiber using optical fiber kit.
10	To determine the wavelength of laser light with laser educational kit.
11	To measure the optical power attenuation in the given optical fiber.
12	To determine the V-number of given optical fiber using optical fiber kit.

Lab Course Outcomes: Upon completion of the course the student will be able to:

CO 1: Develop experimental skill required for application of physics in engineering.

CO 2: Operate different instruments specified in course safely and efficiently.

CO 3: Demonstrate the working principles in optics, semiconductors, Quantum Physics.

CO 4: Function as a member of a team for problem solving.



Lab Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241211

Course Name: Language Lab

L	T	P	Credit
0	0	2	1

Course Objectives:

- The course intends to build the required communication skills of the students to communicate effectively in real-life situations like starting a talk and be comfortable using English language.
- It aims at teaching students to appreciate English language through the study of scientific, creative, and academic text.
- The course is designed to acquaint students with structure of English language used in literature, functional varieties, figurative language, and verbal concomitance.
- The students are expected to enrich their knowledge of language, culture, and ethics through this course.

Course Contents:

Unit I: Communication [CO1, CO2]

Communication: Approaches, Elements, Verbal and Nonverbal Communication; Barriers to Communication; Johari Communication Window.

Unit II: Listening [CO1, CO2]

Listening: Factors Affecting Listening and Improving Listening.

Unit III: Speaking: [CO2, CO3, CO5]

Public Speaking & Delivering Presentation.

Unit IV: Reading: [CO3, CO4, CO5]

Reading Passages & Comprehension: Steps and Methods.

Unit V: Writing: [CO4]

Writing: Essentials of good writing; Drafting CV/biodata/Résumé)

***Reading Material for story and poetry is to be selected by concerned teacher in class.**

Language Laboratory:

The objective of the language lab is to expose students to a variety of listening and speaking drills. This would especially benefit students who are deficient in English and it also aims at confidence building for interviews and competitive examinations.

The Lab is to cover following syllabus.

1. Communication lab exercises as specified in Lab Manual
2. Listening skills (using Marc Hancock, CUP).
3. Speaking skills
4. Oral presentation.



Laboratory Tasks:

Lab Exercise No. 1

Listening

Learning Objectives:

1. The student will learn the correct pronunciation and acquire knowledge English sound system.
2. The student will understand the need of learning proper pronunciation and its help in picking context and spellings.
3. He will get a pre hand knowledge of TOEFL and IELTS exams.
4. The student will learn to differentiate between hearing and listening.
5. The student will learn to listen and identify sound, pick context, infer meaning, and to retain the sound 'heard.'

Referred books and tools:

1. English Pronunciation in Use by Marc Hancock
2. Listening Exercises from English Pronunciation in Use by Marc Hancock or assigned by teacher taking class on spot.
3. Material will be selected by the teacher taking respective class and used as exercises. (A Sample exercise is appended at last)
4. Oxford Advanced Learner's Dictionary [free online version]

Lab Exercise No. 2

Vocabulary Exercise

Word for Word

Learning Objectives:

1. The student will learn to differentiate between words that look similar but are different in meaning and use.
2. The student will also learn to use such words in sentences so as to differentiate between these words.

Referred books and tools:

1. The exercise has been modelled on a book titled Word for Word by Clark Pointon published by OUP, India.
2. The students will also learn to form structures of a sentence.

Vocabulary Word for Word

Student is required to distinguish between these set of words on following basis:

- Part of speech
- Pronunciation



- Meaning
- Usage – using them in sentences
- Synonym
- Antonym

Lab Exercise No. 3

Speaking

Learning Objectives:

1. The student will get hands on practice on delivering a short speech or a talk.
2. The student will develop confidence while speaking.

Presentation: 01

Guidelines for delivering the Project:

Students will have to deliver a 10 Minute presentation preferably on Power Point.

1. He will be judged on basis of Presentation rubrics available in shared document folder for I Year students.
2. They can choose a topic of their choice but the same should be from the syllabi—from any paper under study in I/II Semester/I Year
3. The students will have to communicate the same to the teacher in advance before delivering the same, and get the topic approved. The teacher can change, modify, and suggest one instead.
4. The students will be allowed to share their screen and present the same online in laboratory sessions and in additional classes as called by the teacher.
5. The marks/grades for the same will be displayed on their moodle portal.
6. All students will also be required to submit the PPT (preferable uploading the same on google drive shared folder for the purpose).
7. The said activity has to be completed before the teaching ends.

Book Review: 02

Guidelines for delivering the Project:

Students will have to review a book namely, a novella, a travelogue, a memoir, Science text from short-listed books.

1. He will have to deliver a Presentation, Oral/PPT as per individual choice, in a prescribed format either online or offline as decided by the respective teacher.
2. Student will also have to submit a written report based on that.
3. There will be online sessions for each class by the teacher assigned to teach branch.
4. The students will be allowed to share their screen and present the same online in laboratory sessions and in additional classes as called by the teacher.
5. The marks/grades for the same will be displayed on their moodle portal.
6. All students will also be required to submit the PPT or the written assignment in doc/jpeg/pdf format (preferable uploading the same on google drive shared folder for the purpose).



7. The said activity has to be completed before the teaching ends.
8. The lists of books adopted by the students have to be one from the lists allocated for the purpose.

Rationale:

1. This will give students a practice how to deliver presentations on a variety of topics in his/her core stream.

Lab Exercise No. 4

Reading

Learning Objectives:

1. The student will get hands on practice on skimming and scanning.
2. The student will also learn role of language in communicating Meanings.

Referred books and tools:

1. The student will be provided passages to read. This will include:
 - a. A passage from Science/Engineering text
 - b. A short Story
 - c. A Poem
2. Material will be adapted in discussion with the student by the teacher.

Sample Examples Include:

1. Passage, The Language of Science (Open Source)
2. Story, Araby (James Joyce), The Fatalist (I B Singer), A Horse & Two Goats (R K Narayan) etc.
3. Poem / Song

Rationale:

1. The student will learn to differentiate how the use of words varies from a scientific to a literary text and how meanings are construed.

Course Outcomes:

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

CO 1: Speak clearly effectively and appropriately in a public forum to a variety of audiences and purposes. (LOT1)

CO 2: Prepare oral dialogues and arguments within the Engineering Profession effectively. (LOT2)

CO 3: Demonstrate knowledge and comprehension of major text and traditions in language as well as its social, cultural, and historical context. (LOT3)

CO 4: Read a variety of Text analytically to demonstrate in writing and/or speech the interpretation of texts. (HOT4)



CO 5: Interpret text written in English assessing the results in written and oral arguments using appropriate material for support. (LOT3)

Reference Books:

- Understanding Human Communication — By Ronald Alderman by OUP
- Communication Skills for Engineers — Pearson Education.
- Practical English Grammar by Thomson Martinet — Oxford University Press
- A Handbook of Language laboratory by P Sreekumar — Cambridge University Press.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially



Course Code: 11241212

Course Name: Sustainability & Environmental Science

L	T	P	Credit
2	0	0	GRADE

Course Objectives:

To equip students with a comprehensive understanding of environmental science, pollution control, sustainability, and global frameworks, enabling them to analyze environmental challenges and contribute to sustainable solutions through informed decision-making and responsible practices.

SYLLABUS

Unit I

Introduction to Environmental Science: definition, importance and its components. Ecosystem and its components. Water cycle, carbon cycle, food chain, energy flow in ecosystem. Current state of environment in India and world; Underlying reasons (root causes) of modern environmental degradation (social, psychological, cultural). Introduction to Environmental pollution: air, water, noise, soil, thermal and radioactive.

Unit II

Environmental Pollution and Management: air, water, noise, soil, thermal and radioactive. Causes, impacts, pollution control techniques and mitigation strategies. Solid waste management: Principles of waste management, different components of waste management system and introduction to management of hazardous waste like e-waste, plastic waste. Global environmental Issues: Climate change, global warming, ozone layer depletion, urban heat island.

Unit III

Environmental policies and laws in India: Environmental Protection Act, Water Act, Air Act. **Overview of global environmental policies and frameworks:** Kyoto protocol, Montreal protocol, COP summits. Introduction to clean development mechanism, carbon credit, carbon trading. Environmental audit.

Unit IV

Sustainability concepts: definition, importance, pillars of sustainability (economic, environmental, and social). Sustainable development. Overview of UN Sustainable Development Goals (SDGs) and their global relevance. Concept of circular economy, resource efficiency, energy conservation, green buildings and sustainable manufacturing.

Unit V

Sustainable Energy solutions: New energy sources: need of new sources, different types of new energy sources, application of hydrogen energy, ocean energy sources, and tidal energy conversion. Concept, origin and power plant of geothermal energy. Renewable energy sources like water, wind etc. Overview of sustainable materials and construction practices. Introduction to sustainable transportation systems and sustainable water infrastructure.



Course Outcomes:

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

CO 1: Explain the fundamental concepts of environmental science, including ecosystems and the causes of environmental degradation.

CO 2: Analyze the sources, causes, and impacts of air, water, and solid waste pollution and propose appropriate mitigation strategies.

CO 3: Evaluate the effectiveness of environmental policies and global frameworks in addressing environmental challenges.

CO 4: Explain the concepts of sustainability and sustainable development goals.

CO 5: Apply various solutions for achieving sustainable development.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Reference Book

1. D. K. Asthana, Meera Asthana, A Text Book of Environmental Studies, S Chand & Co., New Delhi.
2. S. K. Dhameja, Environmental Engineering & Management, S K Kataria & Sons, New Delhi
3. C. S. Rao, Environmental Pollution Control Engineering, C.S. Rao, New Age International Publishers
4. A. K. Gupta, Environmental Sustainability and Green Technologies, PHI Learning.