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

(Batch admitted in Academic Session 2025-26 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
PSC	Professional Skills & Competencies
PDC	Professional Development Component
PBL	Project Based Learning
PC	Professional Certification
MAC	Mandatory Audit Course
NEC	Novel Engaging Course

Course Category wise Credit Distribution
(Batch admitted in Academic Session 2025-26)

Category Code	Name of Course Category	Total Credits allotted in Scheme	% Distribution of Credit
HSMC	Humanities and Social Sciences including Management Courses	01	1%
BSC	Basic Science Courses	06	4%
ESC	Engineering Science Courses	06	4%
DC	Departmental Core	69	42%
DE	Departmental Elective	15	10%
PSC	Professional Skills & Competencies	04	3%
OC	Open Category	08	5%
DLC	Departmental Laboratory Courses	14	9%
MWS	Mandatory Workshop	Audit Course	Audit Course
SP	Semester Proficiency	06	4%
SIP	Skill Internship Program	04	3%
SLP	Self-learning Presentation	01	1%
PDC	Professional Development Component	02	1%
PBL	Project Based Learning	18	11%
PC	Professional Certification	01	1%
MAC	Mandatory Audit Course	Audit Course	Audit Course
NEC	Novel Engaging Course	04	3%
SEP	Skill Enhancement Program	01	1%

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Department of Civil Engineering

Scheme of Evaluation

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

(for batch admitted in academic session 2025-26)

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									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional			L	T	P				
1.	11251101	DC	Civil Engineering Materials & Construction	25	25	20	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
2.	11251102	ESC	**Computer Programming**	25	25	20	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
3.	11251103	DC	Engineering Mechanics	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	11251104	DC	Building Design & Drawing	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	11251105	ESC	**Basic Electrical & Electronics Engineering**	25	25	20	30	-	-	100	2	-	-	2	Face to Face	MCQ	2 Hrs
6.	11251106	DLC	**Computer Programming Lab**	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11251107	DLC	**Electrical & Electronics Engineering Lab**	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	11251108	SP	**Semester Proficiency**[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	11251109	PBL	**Micro Project-I**[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	11251110	ESC	**Engineering Foundation**	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
11.	NECXXXXX	NEC	**Novel Engaging Course (Activity Based Learning)**	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
Total				**125**	**125**	**100**	**150**	**380**	**120**	**1000**	**11**	**03**	**10**	**19**	-	-	-
12.	11251111	MAC	**Universal Human Values & Professional Ethics (UHVPE)**	25	25	20	30	-	-	100	2	-	-	GRADE	Blended	MCQ	1.5 Hrs
13.	11251112	MWS	Mandatory Workshop on Report Writing at Department Level											GRADE	Interactive	MCQ	-
14.	11251113	MWS	Mandatory Workshop on Indian Constitution and Cultural Values at Department Level											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

[#] 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	2

Mode of Learning						Mode of Examination							Total Credits
Theory		NEC	Lab			Theory				Lab		NEC	
Face to Face	Online	Interactive	Face to Face	Experiential	Experimental	PP	AO	MCQ	OB	SO	AO	SO	
13		1	1	1	3			13		2	3	1	19
68.42%		5.26%	5.26%	5.26%	15.8%			68.42%		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 2025-26)

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									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional			L	T	P				
1.	11251201	DC	Surveying	25	25	20	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
2.	11251202	DC	Strength of Material	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11251203	DC	Concrete Technology	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	11251204	DC	Fluid Mechanics – I	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	11251205	BSC	Matrices & Calculus	25	25	20	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
6.	11251206	DLC	Building Materials & Construction Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11251207	DLC	**Problem Solving through Python Programming**	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	11251208	SP	**Semester Proficiency[$]**	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	11251209	PBL	**Micro Project-II[#]**	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	11251210	ESC	**Engineering Foundation**	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
11.	11251211	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				**125**	**125**	**100**	**150**	**510**	**150**	**1160**	**12**	**04**	**12**	**24**	-	-	-
14.	11251212	MAC	**Sustainability & Environmental Science**	-	-	-	-	100	-	100	-	2	-	GRADE	Blended	SO	-
15.	11251213	MWS	Mandatory Workshop on Career Planning & Goal Setting at Department Level											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

[**] 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			15		4	4	1	24
62.5%		4.17%	4.17%	4.17%	12.5%	12.5%			62.5%		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 2025-26)

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									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation								
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional			L	T	P				
1.	11252101	BSC	**Transforms & Vector Calculus**	25	25	20	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
2.	11252102	DC	Data Structures	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11252103	DC	Fluid Mechanics – II	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	11252104	DC	Geotechnical Engineering – I	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	11252105	DC	Structural Analysis – I	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
6.	11252106	DLC	Fluid Mechanics Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11252107	DLC	Survey Practice Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	SO	-
8.	11252108	SP	**Semester Proficiency**[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
9.	11252109	PBL	**Macro Project-I**[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
10.	11252110	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				**125**	**125**	**100**	**150**	**350**	**90**	**940**	**11**	**05**	**10**	**21**	-	-	-
12.	11252111	MAC	**Cyber Security**	-	-	-	-	100	-	100	-	2	-	**GRADE**	Blended	SO	-
13.	11252112	MWS	Mandatory Workshop on Indian Knowledge System at Department Level											**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			15		4	1	1	21
71.5%		4.76%	4.76%	4.76%	4.76%	9.5%			71.5%		19%	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 2025-26)

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									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional									
1.	11252201	DC	Transportation Engineering – I	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	11252202	DC	Water Supply Engineering	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11252203	DC	Estimating Costing & Contracting	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	11252204	DC	Geotechnical Engineering – II	25	25	20	30	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	11252205	DC	Structural Analysis - II	25	25	20	30	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
6.	11252206	DLC	Transportation Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
7.	11252207	DLC	Geotechnical Engineering Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	AO	-
8.	11252208	DLC	Civil Engineering Drawing Lab	-	-	-	-	70	30	100	-	-	2	1	Experimental	SO	-
9.	11252209	SP	**Semester Proficiency**[$]	-	-	-	-	50	-	50	-	-	2	1	Face to Face	SO	-
10.	11252210	PBL	**Macro Project-II**[#]	-	-	-	-	70	30	100	-	-	2	1	Experiential	SO	-
11.	NECXXXXX	NEC	**Novel Engaging Course (Activity Based Learning)**	-	-	-	-	50	-	50	-	1	-	1	Interactive	SO	-
12.	SIP3XXXX	SIP	**Skill Internship Program**	-	-	-	-	60	-	60	-	-	-	2**	Experiential	SO	
Total				**125**	**125**	**100**	**150**	**440**	**120**	**1060**	**11**	**05**	**10**	**23**	-	-	-
13.	11252211	MAC	**Project Management, Economics & Financing**	-	-	-	-	100	-	100	-	2	-	GRADE	Blended	SO	-
14.	11252212	MWS	Mandatory Workshop on Intellectual Property Rights at Department Level											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.

BSC	ESC	DC	DE	SPC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	5	0	0	0	3	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		3	3			15		5	2	1	23
65.2%		4.35%	4.35%		13.05%	13.05%			65.2%		21.74%	8.71%	4.35%	Credits %

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Department of Civil Engineering

Scheme of Evaluation

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

(for batch admitted in academic session 2025-26)

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									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	11253101	DC	Waste Water Engineering	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	11253102	DC	Structural Design & Drawing (RCC)	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11253103	DC	**Data Science**	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
4.	11253104	DC	Transportation Engineering - II	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
5.	112531XX	DE	**Departmental Elective* (DE-1)**	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
6.	11253105	DLC	Environmental Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
7.	11253106	DLC	**Data Science Lab**	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
8.	11253107	SP	**Semester Proficiency$**	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	11253108	PSC	Professional Skills & Competencies - I	-	-	-	-	70	30	-	-	100	-	-	4	2	Face to Face	MCQ	2Hrs
10.	11253109	PBL	**Cornerstone Project**	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
Total				**100**	**100**	**80**	**120**	**330**	**120**	**25**	**75**	**950**	**11**	**04**	**14**	**22**	-	-	-
11.	11253110	MAC	**Supply Chain Management**	-	-	-	-	100	-	-	-	100	-	2	-	GRADE	Blended	SO	-
12.	11253111	MWS	Mandatory Workshop as per Annexure at Department Level													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

BSC	ESC	DC	DE	OC	DLC	NEC	SP	SIP	SLP	PDC	PSC	PBL	MAC	MWS
0	0	4	1	0	2	0	1	0	0	0	1	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	MCQ	AO	
12	3	3	2	2			15		3	2	2	22
54.6%	13.6%	13.6%	9.1%	9.1%			68.1%		13.6%	9.1%	9.1%	Credits %

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Department of Civil Engineering

Scheme of Evaluation

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

(for batch admitted in academic session 2025-26)

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									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	11253201	DC	Engineering Hydrology & Irrigation	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
2.	11253202	DC	Structural Design & Drawing (Steel)	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
3.	11253203	DC	Artificial Intelligence & Machine Learning	25	25	20	30	-	-	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
4.	112532XX	DE	**Departmental Elective* (DE-2)**	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
5.	112532XX	OC	**Open Category Course (OC-1)**	25	25	20	30	-	-	-	-	100	2	1	-	3	Face to Face	MCQ	2 Hrs
6.	11253204	DLC	Structure Engineering Lab	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
7.	11253205	DLC	**Artificial Intelligence & Machine Learning Lab**	-	-	-	-	70	30	-	-	100	-	-	2	1	Experimental	AO	-
8.	11253206	SP	**Semester Proficiency$**	-	-	-	-	50	-	-	-	50	-	-	2	1	Face to Face	SO	-
9.	11253207	PC	Professional Certification	-	-	-	-	50	-			50	-	-	2	1	Blended	SO	-
10.	11253208	PSC	Professional Skills & Competencies - II	-	-	-	-	70	30	-	-	100	-	-	4	2	Face to Face	MCQ	2Hrs
11.	11253209	PBL	**Capstone Project**	-	-	-	-	70	30	-	-	100	-	-	4	2	Experiential	SO	-
Total				**100**	**100**	**80**	**120**	**380**	**120**	**25**	**75**	**1000**	**12**	**03**	**16**	**23**	-	-	-
12.	11253210	MAC	**Disaster Management and Preparedness**	-	-	-	-	100	-	-	-	100	-	2	-	GRADE	Blended	SO	-
13.	11253211	MWS	Mandatory Workshop as per Annexure at Department Level													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	PC	OC	DLC	NEC	SP	SIP	SLP	PDC	PBL	PSC	MAC	MWS
0	0	0	3	1	1	1	2	0	1	0	0	0	1	1	1	1

Mode of Learning						Mode of Examination						Total Credits
Theory		Lab				Theory			Lab			
Face to Face	Online	Face to Face	Experiential	Bended	Experimental	PP	AO	MCQ	MCQ	SO	AO	
12	3	3	2	1	2			15	2	4	2	23
52.2%	13%	13%	8.7%	4.4%	8.7%			65.2%	8.7%	17.4%	8.7%	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. VII Semester *(Civil Engineering)*

(for batch admitted in academic session 2025-26)

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									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment		Lab Work & Sessional											
1.	112541XX	DE	Departmental Elective # (DE-3)	25	25	20	30	-	-	-	-	100	3	-	-	3	Face to Face	MCQ	2 Hrs
2.	112541XX	DE	Departmental Elective* (DE-4)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
3.	112541XX	OC	Open Category Course* (OC-2)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
4.	11254101	SEP	Skill Enhancement Program/Research Internship/ On Job Training	-	-	-	-	-	50	-	-	50	-	-	-	1**	Face to Face	SO	-
5.	11254102	DLC	Creative Problem Solving	-	-	-	-	-	50	-	-	50	-	-	2	1	Experiential	SO	-
Total				**25**	**25**	**20**	**30**	**-**	**100**	**50**	**150**	**400**	**09**	**-**	**02**	**11**	**-**	**-**	**-**
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.

** 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	OC	DLC	NEC	SEP	SIP	SLP	PDC	PBL	MAC	MWS
0	0	0	0	2	1	1	0	1	0	0	0	0	0	0

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	
3	6	1	1				9		2	11
27.3%	54.5%	9.1%	9.1%				81.8%		18.2%	Credits %

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Department of Civil Engineering

Scheme of Evaluation

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

(for batch admitted in academic session 2025-26)

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									
				Continuous Evaluation			Major Evaluation	Continuous Evaluation	Major Evaluation	Assignment	Exam		L	T	P				
				Minor Evaluation I	Minor Evaluation II	Quiz/ Assignment													
1.	112542XX	DE	Departmental Elective* (DE-5)	-	-	-	-	-	-	25	75	100	3	-	-	3	Online	MCQ	3 Hrs
2.	112542XX	OC	Open Category Course* (OC-3)	-	-	-	-	-	-	25	75	100	2	-	-	2	Online	MCQ	3 Hrs
3.	11254201	PBL	Industry Internship/ Research Internship/ Innovation & Start-up	-	-	-	-	280	120	-	-	400	-	-	20	10	Experiential	SO	-
4.	11254202	PDC	Professional Development##	-	-	-	-	-	50	-	-	50	-	-	4	2	Interactive	SO	-
Total				-	-	-	-	**280**	**170**	**50**	**150**	**650**	**05**	**-**	**24**	**17**	-	-	-

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	
	5	2	10				5		12	17
	29.42%	11.76%	58.82%				29.42%		70.58%	Credits %

Annexure

Suggested topics of MWS	Semester
Minimum one Mandatory Workshop to be conducted in V and VI semester, from the list below: • Writing Research Articles: Idea to Publication • Internships: Explore, Apply and Excel • Placement Readiness: Building Resume and Mastering Interview • Mastering Competitive Success **OR/And** On any **emerging technological advancements in the domain**. *MWS should be conducted by either an external or internal resource person, preferably during the regular teaching hours.*	V semester and VI semester

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DEPARTMENT OF CIVIL ENGINEERING

Departmental Elective Courses
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

25. Design of Bridges
26. Sustainable Construction & Practices
27. Lean Construction
28. Photogrammetry and UAV
29. Geodesy and GNSS
Open Category Courses
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

Course Code: 11251101

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

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

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

Glasses: Classification, composition and properties of glass, types of glass, manufacturing of glass, treatment of glass

Unit II

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 and composites). Copper (its alloys & uses), Ceramics (classification, properties, commercial forms).

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, manufacturing, physical tests, storage & uses, setting action (hydration) of cement, cement concrete, composition of cement concrete, properties of cement concrete, Ferro cement, advantages and application of Ferro cement

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. Arches & lintels, stair & stair case, (types & design of stair case), Types of floor & flooring, Roof & roof covering.

Unit V

Material used for damp proofing, Anti termite treatment, water proofing treatment, Industrial waste materials – fly ash, blast furnace slag, FAL-G bricks. Agro-waste materials-rice husk, bagasse, coir fibers and their uses. Special processed construction materials- ferrocrete, Fiber Reinforced Polymer (FRP), geosynthetics, artificial timber and superplasticizers.

Recommended Books:

1. Rangwala, S. C., Engineering materials, 44th edition, Charotar Publishing House Pvt. Ltd, 2024.
2. Gambhir, M. L., Jamwal, N. Building materials: Products, properties and systems. 1st Edition, Tata McGraw-Hill Education, 2017.
3. Duggal, S. K. Building materials, 5th Edition, New Age International Publishers, 2019
4. Arora, S. P., & Bindra, S. P. The text book of building construction 11th Edition, Dhanpat Rai & Sons, 2010.
5. Punmia, B. C., Jain, A. K., & Jain, A. K. Building construction 12th Edition, Laxmi Publications 2025.

Course Outcomes

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

CO1: **Describe** timber, wood products, paints, enamels and glass types with their properties and uses.

CO2: **Explain** types, properties, manufacturing, and uses of ferrous, non-ferrous metals, and alloys.

CO3: **Identify** types and properties of sand, mortar and cement with their applications and tests.

CO4: **Compare** stone and brick masonry, bonds, and structural components.

CO5: **Identify** materials used for damp proofing, waterproofing, termite protection, and innovative construction materials including industrial/agro-waste and advanced composites.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251102

Course Name: Computer Programming

L	T	P	Credit
2	0	0	2

Course Objective:

- To develop the understanding of algorithms, programming approaches and program documentation techniques.
- To design and implement programming solutions for problem solving.

SYLLABUS

Unit I: Introduction to Programming, Machine Level Languages, Assembly Level Languages, High Level Languages, Program Execution and Translation Process, Problem solving using Algorithms and Flowcharts. Introduction to C Programming: Data Types, Constants, Keywords, Operators & Expressions, Precedence of operators and input/output functions.

Unit II: Control Statements and Decision Making: The goto statement, the if- else statement, Nesting of if statements, The conditional expression, The switch statement, The loop, The nesting of for loops, The break and continue statement.

Unit III: Arrays, Strings & Pointers: One dimensional Arrays, Passing Arrays to Functions, Multidimensional Arrays, Strings, Basics of Pointers & Addresses, Pointer to Pointer, Pointer to Array, Array of Pointers, Types of pointers, Pointer to Strings.

Unit IV: Functions & Structures: Function Basics, Function Prototypes, Passing Parameter by value and by reference, Passing string to function, Passing array to function, Function returning address, Recursion, Structures & Union, Dynamic memory allocation, Storage Classes.

File Handling: Defining and Opening a file, Closing Files, Input/output Operations on Files, Predefined Streams, Error Handling during I/O Operations, Command Line Arguments.

Unit V: Macro, Types of Macros, Function-like Macros, Multi-line Macros , enum. Basic Syntax of enum, Assigning Custom Values.

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: Understand different programming paradigms and the role of translators in program execution.

CO2: Use the goto, if-else, switch, break, and continue statements effectively.

CO3: Implement and manipulate arrays, strings, and pointers in C programs. Use one-dimensional and multi-dimensional arrays,

CO4: Understand the use of recursion, structures, unions, storage classes, and dynamic memory allocation for efficient program design.

CO5: Demonstrate the ability to handle file input/output operations. Use command-line arguments, predefined streams, and error handling mechanisms.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251103

Course Name: Engineering Mechanics

L	T	P	Credit
2	1	0	3

Course Objective:

The course intends to provide an understanding of the fundamental concepts of forces, equilibrium, motion, and structural analysis, with applications in robotics and automation.

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. Friction: Laws of Coulomb friction, Equilibrium problems involving friction.

Unit-II

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-III

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-IV

Kinematics and Kinetics of particles: Particle dynamics; Free Vibrations of undamped Single degree of Freedom system. Damping and Types of Damping.

Unit-V

Mechanics in Robotics & Automation: Application of statics and dynamics in robotic arm design, Force and torque calculations in manipulators, Use of sensors and actuators in mechanical systems.

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: **Solve** problems involving force systems in equilibrium, including friction, using graphical and analytical techniques.

CO2: **Analyze** axial force members and bending in beams using shear force and bending moment diagrams.

CO3: **Calculate** centroid, moment of inertia, and principal moments for plane sections using standard theorems.

CO4: **Interpret** and model particle dynamics and vibration behavior for single degree-of- freedom systems.

CO5: **Integrate** principles of statics and dynamics for force and torque computations in robotic mechanisms and evaluate the role of sensors and actuators.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251104

Course Name: Building Design & Drawing

L	T	P	Credit
2	1	0	3

Course Objective:

Main objective of the course is to introduce students to basic principles of building planning and design to help them create plans for different buildings. The course also teaches students about key building components, drafting skills for floor plans, elevations, and sections, and modern tools like CAD and BIM. It guides students to follow building bye-laws and explore sustainable design practices. Students will learn to sketch structural elements like beams and columns and understand town planning rules to design safe and efficient buildings.

SYLLABUS

Unit-1 Architectural Drawing Techniques:

Use of drawing instruments, scales, line types, and their application in architectural drawings, Orthographic projections (first and third angle), isometric views, and sectional drawings for building representation, Standard symbols for materials, fixtures, and structural elements in civil engineering drawings, Techniques for creating floor plans, elevations, cross-sections, and site plans for residential buildings, Standards for dimensioning, labeling, and creating title blocks for accurate drawings.

Unit-2 Fundamentals of Building Design and Planning:

Types of buildings (residential, commercial, industrial, institutional) and their functional and aesthetic requirements, Study of foundations (shallow, deep), walls, floors, roofs, doors, windows, and staircases, emphasizing their roles, Planning Principles: Orientation, ventilation, lighting, aspect, prospect, privacy, circulation, and zoning for efficient design., Building Bye-Laws: Overview of local municipal regulations, National Building Code (NBC), and zoning laws for site planning, Site Analysis: Importance of topography, soil conditions, climate, and accessibility in site selection and planning.

Unit-3 Introduction to Structural Components:

Overview of load-bearing and RCC framed structures, including beams, columns, slabs, and staircases, focusing on their roles and basic configurations, Introduction to reinforced cement concrete (RCC), purpose of reinforcement, and typical placement patterns (e.g., main and secondary bars), Study of simplified drawings for footing, column, beam, and slab, emphasizing layout and basic annotations, Overview of IS 456 (Plain and Reinforced Concrete) and IS 875 (Design Loads) as introductory guidelines, Basic concepts of load transfer and stability in building design, avoiding complex calculations.

Unit-4 Computer-Aided Design (CAD) Applications:

Role of CAD in civil engineering, overview of AutoCAD interface, and its applications in design, Drawing tools (line, polyline, circle), editing tools (move, copy, trim), and annotation features in AutoCAD, Techniques for creating floor plans, elevations, and sections using layers, scales, and dimensioning, Use of blocks, hatching, dimension styles, and exporting drawings in PDF/DWG formats, Standards for file organization, layer management, and professional drawing presentation.

Unit-5 Introduction to Sustainable Design and Visualization Basic concepts of sustainable design:

Basics of automation and IoT applications in buildings (lighting, HVAC, and security systems), integration of BIM for efficient building management and decision-making.

Use of passive design strategies such as day lighting, insulation, orientation, and cross ventilation, use of

smart and recycled materials for enhanced energy efficiency.

Basic 3D modeling using free tools like SketchUp or AutoCAD 3D, and introduction to BIM- based visualization using BIMx or Revit viewer tools. Development of conceptual physical models using cardboard/wood and digital representations to visualize energy-efficient and smart building layouts.

Textbooks

1. Shah, M.G., Kale, C.M., and Patki, S.Y., "Building Planning and Drawing," 8th Edition, 2023, Tata McGraw-Hill Education
2. Chakrabarti, A., "Building Design and Drawing," 5th Edition, 2022, Allied Publisher.
3. Rangwala, S.C., "Civil Engineering Drawing," 7th Edition, 2024, Charotar Publishing House

Reference Books

1. Mallick, S.K. and Mao, A., "Building Design and Drawing," 6th Edition, 2021, New Age International Publishers
2. Shah, M.G., Kale, C.M., and Patki, S.Y., "Building Drawing and Design," 4th Edition, 2020, Tata McGraw-Hill Education
3. Singh, Gurucharan, "Building Design and Drawing," 5th Edition, 2023, Standard Publishers Distributors
4. National Building Code of India (NBC), Latest Edition (2020), Bureau of Indian Standards
5. Autodesk, "AutoCAD 2025 Software & User Manual," 2025 Edition, Autodesk Inc., Available at: https://www.autodesk.com/products/autocad

Courses Outcomes

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

CO1: Create accurate architectural drawings using drafting techniques and standard symbols.

CO2: Apply building design principles, bye-laws, and site analysis to support effective planning.

CO3: Develop basic structural drawings for building components, adhering to Indian standards

CO4: Produce precise 2D building drawings using CAD tools and presentation standards.

CO5: Implement basic sustainable design and visualization techniques to address societal needs in building projects

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251105

Course Name: Basic Electrical & Electronics Engineering

L	T	P	Credit
2	0	0	2

Course Objectives:

- Impart foundational knowledge in Electrical and Electronics Engineering.
- Enable students to analyze electric circuits, understand electrical machines, and implement digital systems.
- Explore emerging applications in industrial automation, smart grids, and renewable systems.

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 Transformer & Electrical Machines:

Magnetic Circuits and Electromagnetism, Transformers: Construction, principle, types, losses & efficiency, OC & SC test DC Machines: Motor and Generator working Principles, Characteristics, Introduction to Induction Motors and Synchronous Machines.

Unit- IV Digital Electronics, Devices & Circuits:

Number Systems, Logic Gates and Truth Tables, Diodes, Transistors (BJT), Multiplexers, Demultiplexers.

Unit –V Emerging Trends and Applications:

Introduction to Smart Grids, Smart Meters, and Renewable systems. Types of earthing, Sensors and Basic IoT Applications.

Reccomended Books

1. Basic Electrical and Electronics Engineering, D.P. Kothari and I.J. Nagrath, 2nd Edition, McGraw-Hill Education, 2020.
2. Basic Electrical and Electronics Engineering, S.K. Bhattacharya, 2nd Edition, Pearson Education, 2017.
3. Basic Electrical Engineering, V.N. Mittle and Arvind Mittal, 2nd Edition, McGraw-Hill Education, 2005.
4. Basic Electrical Engineering, A.E. Fitzgerald, David E. Higginbotham, and Arvin Grabel, 5th Edition, McGraw- Hill Education, 1981.
5. Principles of Electrical Engineering and Electronics, V.K. Mehta and Rohit Mehta, Revised Edition, S. Chand Publishing, 2019.

Courses Outcomes

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

CO 1. Apply fundamental laws and network theorems to analyze DC circuits

CO 2. Analyze single-phase series & parallel AC circuits for calculation of power, power factor, and resonance conditions.

CO 3. Explain the working principles, construction, and operational characteristics of transformers, DC machines, and induction motors.

CO 4. Design basic digital logic circuits using logic gates, flip-flops, and counters

CO 5. Discuss the concepts of smart meter, smart grids, earthing, and IoT systems to emerging industrial applications in automation and renewable energy systems.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251111
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 theprocess 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 ofevery 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 valuesin 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	2	-	1	1	-	1	-	-
CO2	-	1	-	-	-	1	1	-	1	1	-	1	-	-
CO3	1	-	1	-	-	1	-	1	1	2	1	1	-	1
CO4	-	-	-	-	-	1	2	1	1	1	-	2	-	-
CO5	2	1	1	1	1	-	-	-	2	2	1	2	1	1
CO6	-	-	-	-	-	1	2	1	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: 11251106
Course Name: Computer Programming Lab

L	T	P	Credit
0	0	2	1

LIST OF EXPERIMENT'S

1. Write a program to display the use of all data types, constants, and keywords in C.
2. Develop a calculator using operators and expressions to perform +, -, *, /, and % operations based on user input.
3. Convert a flowchart or algorithm (e.g., finding the area of a circle or simple interest) into a working C program using proper input/output functions.
4. Write a program to find the largest of three numbers using if-else and nested if statements.
5. Write a menu-driven program using switch statement (e.g., calculator or student grade system).
6. Write a program to display a number pattern using nested for loops and demonstrate use of break and continue.
7. Write a program to input and sort an array using any sorting algorithm (e.g., bubble sort).
8. Write a program that performs string manipulation without using built-in string functions (e.g., strlen, strcpy).
9. Demonstrate use of pointers: Write a program using pointer to array, pointer to pointer, and array of pointers.
10. Write a program to calculate factorial using recursion and another version using iteration.
11. Define a structure for student details and write a program to input and display data for multiple students.
12. Demonstrate dynamic memory allocation using malloc() and free() for creating an array during runtime.
13. Write a program to read and write student records to a file, then display all records from the file.
14. Create a program that uses function-like and multi-line macros to perform arithmetic operations.
15. Define an enum for weekdays and write a program to display the name of the day based on user input.

Course Outcomes:

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

CO 1. **Apply** the concepts of memory addressing and pointer manipulation.

CO 2. **Demonstrate** how conditional statements influence the control flow of a program.

CO 3. **Understand** how data is represented and stored in external memory.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251107

Course Name: Electrical & Electronics Engineering Lab

L	T	P	Credit
0	0	2	1

LIST OF EXPERIMENT'S

1. To verify Kirchhoff's Current Law & Kirchhoff'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.
11. To determine phase and line quantities in three phase star and delta connection
12. To study of effect of open and short circuits in simple circuits
13. To plot Transistor CB characteristics (Input and Output)
14. To plot Transistor CE characteristics (Input and Output)
15. Study the output characteristics of a solar PV panel under varying conditions
16. Develop a simple IoT system to monitor temperature and humidity using sensors.

Course Outcomes:

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

CO 1. **Demonstrate** the ability to operate lab equipment and instruments relevant to the electrical engineering field.

CO 2. **Collect** experimental data accurately and effectively.

CO 3. **Integrate** theoretical knowledge from coursework into practical applications and experiments

CO 4. **Communicate** experimental results effectively through oral presentations and written documentation.

CO 5. **Demonstrate** responsibility and professionalism in the completion of lab tasks and assignments**.**

CO 6. **Show** willingness to learn new techniques, tools, or methods to enhance practical engineering skills

Course Articulation Matrix

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	2	-	3	3	3	1	-	-	-	-	2	-	-
CO2	2	3	-	3	2	3	-	3	-	2	-	2	-	-
CO3	3	3	-	3	2	2	-	2	2	3	-	3	-	-
CO4	1	2	-	3	-	2	-	3	3	3	-	2	-	-
CO5	-	-	-	2	-	3	-	3	3	3	1	3	-	-
CO6	2	2	-	2	3	3	-	2	3	3	-	3	-	1

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251109

Course Name: Micro Project – I

L	T	P	Credit
0	0	2	1

LIST OF MICRO PROJECTS (Civil Engineering Materials & Construction)

1. Investigate thermal insulation properties by constructing a small insulated box using foam or straw and measuring heat retention.
2. Brick masonry bond strength study
3. Fire resistance of construction materials
4. Identification of different rock minerals with their properties.
5. Deterioration of stones with their causes and remedies.
6. Common building stones used in India with proper reasoning.
7. Different types of brick bonds with their applications.
8. Different types of masonry joints with their applications.
9. Comparison of stone work and brick work with proper applications.
10. Study the use of agro-waste materials (e.g., rice husk, bagasse) in construction.
11. Waterproofing techniques for concrete structures
12. Effect of superplasticizer on workability of concrete mix
13. Comparative study of artificial timber and natural wood for indoor use

Course Outcomes:

The students will be able to:

CO1: **Identify** various traditional and modern construction materials based on their properties and applications.

CO2: **Demonstrate** an understanding of material processing techniques, testing methods, and performance characteristics.

CO3: **Analyze** the behavior and suitability of masonry types, bonding patterns, and joints in construction.

CO4: **Apply** knowledge of materials and techniques for developing solutions for damp proofing, waterproofing, and corrosion control.

CO5: Evaluate the sustainability and innovative use of industrial/agro-waste materials in civil engineering construction.

CO-PO Matrix

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

CO3	3	3	3	2	-	-	-	-	1	1	-	2	1	1
CO4	3	3	3	2	2	2	3	-	2	1	2	2	2	2
CO5	2	2	3	2	1	2	3	2	2	1	1	3	1	2

1 - Slightly; 2 - Moderately; 3 – Substantially

LIST OF MICRO PROJECTS (Engineering Mechanics)

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. Construct an inclined plane with adjustable angles and measure the frictional force for different materials and inclinations
5. Analyse and measure the friction forces acting on a ladder leaning against a wall and identify the conditions for ladder stability.
6. Design a small pulley system with belts and study the effects of friction on the transmission of force and motion.
7. Build a truss bridge model and use the method of joints and sections to analyse the internal forces in the truss members.
8. Construct a physical or virtual model of a beam under various loads and draw shear force and bending moment diagrams.
9. Create a truss structure (e.g., a small tower) and test its ability to carry different loads, analysing the forces in each member.
10. Use different geometric shapes (e.g., circles, rectangles) cut from cardboard or similar materials to experimentally determine their centroid.
11. Create composite shapes from simpler geometries and calculate their centroid and using both theoretical and experimental methods.
12. Verify the principal moment of inertia by measuring and computing of different geometrical shapes.
13. Construct a simple mass-spring system and measure its natural frequency and amplitude of oscillations.
14. Analyse the motion of a rolling ball down an inclined plane, studying its acceleration and the forces involved
15. Design and test a simple undamped single degree of freedom system to study its free vibration characteristics.
16. To determine the coefficient of static friction between two surfaces using an inclined plane experiment.
17. To experimentally verify Lami's Theorem for a system in static equilibrium.
18. Analyze the forces in members of a simple truss bridge using the method of joints.

Course Outcomes:

The students will be able to:

CO1 **Apply** fundamental concepts of force systems and equilibrium to analyse real-world objects and structures.

CO2 **Analyse** the effects of friction in various mechanical systems and structural applications.

CO3 **Determine** support reactions and internal forces in beams and trusses, and construct shear force and bending moment diagrams.

CO4 **Calculate** the centroid and moment of inertia for simple and composite plane areas using theoretical and experimental methods.

CO5 **Apply** principles of kinematics and kinetics to analyse motion and vibrations in mechanical systems.

CO-PO Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

LIST OF MICRO PROJECTS (Building Design & Drawing)

1. Prepare a document required for obtaining construction permission for a residential building from the local authority.
2. Prepare report on provisions given in National Building Code 2016 relevant to residential building design.
3. Collect and summarize building bye-laws and zoning regulations from the local municipal authority.
4. Study sustainable building materials (e.g., bamboo, recycled concrete) and prepare a report on their use in green buildings.
5. Draw a developed plan, elevation, section and site plan of a public building by applying NBC 2016.
6. Prepare a report on documents required for obtaining construction permission for a commercial building from the local authority.
7. Prepare a model of a simple building using cardboard, showing components like walls, roof, and windows with suitable colours.
8. Draw a 2BHK house plan for a 30m x 20m plot, including site plan and elevation, applying NBC 2016.
9. Study dampness in buildings, identifying causes and control methods.

10. Study corrosion in reinforcement, identifying causes and control measures.
11. Analyze the use of artificial sand in construction, submitting a report on its properties and benefits.

Course Outcomes:

The students will be able to:

CO1: **Create** architectural drawings and site plans, applying drafting techniques and building bye-laws.

CO2: **Develop** models of building components, adhering to planning and construction standards.

CO3: **Analyze** sustainable design practices and building regulations through case studies and reports.

CO4: **Evaluate** building materials and techniques for effective design and construction.

CO5: **Collaborate** in teams to execute micro projects and communicate findings through technical reports.

CO-PO Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251110
Course Name: Engineering Foundation

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

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

UNIT- III Paints & Enamels

Engineering properties & physical properties of paints & enamels.

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: **Determine** different properties of paints & enamels.

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	1	1	3	-	1	1	1	2	1	1
CO2	2	-	-	-	-	-	1	-	-	-	-	1	-	-
CO3	2	-	-	-	-	-	2	-	-	-	-	2	-	-
CO4	2	-	-	-	-	-	2	-	-	-	-	2	-	-
CO5	3	2	2	2	2	-	1	-	-	-	-	2	1	1

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-} & $HCO3^-$
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	Assessing quality test of paints a) drying time test, b) opacity test, c) adhesion test, d) Flexibility test
9	Separation of the colour pigment of spinach leaf by paper chromatography**.**
10	Preparation of phenol formaldehyde resin by condensation polymerization.
11	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, alloys and paints 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	-	1	2	-	2	-	-
CO2	1	-	-	-	-	2	-	1	2	2	1	1	-	1
CO3	2	1	1	2	1	2	2	-	2	2	1	2	1	1
CO4	-	-	-	-	-	1	-	-	3	-	-	-	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251201

Course Name: Surveying

L	T	P	Credit
3	0	0	3

Course Objective:

The course aims to provide knowledge of surveying instruments and techniques for measuring distance, direction, and elevation; to develop skills in field surveying and setting-out works; and to introduce the application of curves and specialized surveying methods.

SYLLABUS

Unit I Fundamentals of Surveying

Introduction to surveying, their objectives, classification, methods and principles, measurement of distance and angle. Types of scales, linear measurement and their methods, errors in measurements.

Unit II Levelling & Contouring

Method of Levelling- differential, fly, profile, cross-section, reciprocal & trigonometric levelling. Contour lines and their characteristics, contour interval, horizontal equivalent, contour gradient, grade contours. 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, elements of Total Station traversing and data adjustment.

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 Modern Surveying Techniques

Geographic Information System (GIS) and Global Positioning System (GPS), aerial surveying technique: UAV-based LiDAR survey, thermal & multispectral survey, use of Differential GPS in surveying, smart surveying technologies.

Text Books:

1. Surveying Vol. I, II, III, B.C. Punmia, Laxmi Publications New Delhi, 2023
2. Surveying Vol. I & II, K.R. Arora, Standard book House, New Delhi, 2019
3. Surveying Volume – I & II, S. K. Duggal, McGraw Hill Publication, 2020
4. Advanced Surveying: Total Station, GPS, GIS, Remote Sensing, Drone and Hydrographic Surveying, Satheesh Gopi, R. Sathikumar & N. Madhu, Pearson India, 2025.

Reference Books:

1. Surveying theory & Practice, R.E. Devise, McGraw Hill, New York, 4th revised edition 2001
2. Surveying & Levelling, N N Basak, McGraw Hill Publications, 2015
3. Fundamentals of surveying, S.K. Roy, Prentice Hall of India New Delhi, 2nd edition, 1999

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 basic concepts, methods and measurements in surveying.

CO2: Apply levelling techniques and generate contour maps with area/volume estimation.

CO3: Perform tachometric and theodolite traversing and adjust traverse data.

CO4: Analyze and set out different types of horizontal and vertical curves.

CO5: Evaluate modern geospatial surveying techniques for their effectiveness in accurate data acquisition and mapping.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251202

Course Name: Strength of Materials

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 and plasticity.

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, Theories of failure.

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

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, strain energy.

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.

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

Unit-V:

Plasticity: Concept of Plasticity, Stress-strain diagram for Elastic-Plastic, Plastic bending, Plastic modulus, Yield deformation.

Text Books:

1. Strength of Materials, Sadhu Singh, Khanna Publishing, 11th edition 2024
2. Strength of Materials, S. Ramamrutham, R. Narayanan, Dhanpat Rai Publishing Company, 2025
3. Strength of Materials, R.K. Bansal, Laxmi Publication; 7th edition 2024

Reference Books:

1. Strength of Materials, Timoshenko, Publisher CBS, 3rd edition 2004
2. Strength of Materials Vol. I & II, B.C. Punmia, Laxmi Publication, 10th edition 2025
3. Mechanics of Materials, R.C. Hibbler, Pearson Publication, 11th edition, 2023
4. Mechanics of Materials, J.M. Gere & B.J. Goodno, Cengage Publisher, 2023

Course Outcomes

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

CO1: Apply the concepts of stress and strain.

CO2: Apply the concept of two dimensional stresses.

CO3: Apply the theory of simple bending and shear stresses in beams.

CO4: Evaluate the pure torsion in shaft and columns & struts with different end conditions.

CO5: Apply the concept of plasticity.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251203

Course Name: Concrete Technology

L	T	P	Credit
2	1	0	3

Course Objective:

To equip students with a comprehensive understanding of the properties, production, testing, and mix design of concrete, enabling them to specify, produce, and control the quality of concrete for durable and sustainable construction.

SYLLABUS

Unit-I Components of Concrete:

Cement: Chemical composition of cement, Hydration of 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 plasticizers.

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:

Vacuum Dewatering– Underwater Concrete, Special Form Work, Polymer Concrete, Plum Concrete, Self-Compacting Concrete, Light weight concrete.

Text Books:

1. M.L Gambhir, Concrete Technology, McGraw Hill Publications, 6th edition, 2025.
2. M.S Shetty & A K Jain, Concrete Technology Theory & Practice, S. Chand Publishers, 8th edition, 2019
3. Neville M., Properties of Concrete, ELBS, PHI Publishers, 1999
4. 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 concrete for advanced applications.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251204

Course Name: Fluid Mechanics – I

L	T	P	Credit
2	1	0	3

Course Objective:

To develop a strong foundational understanding of fluid properties, fluid statics, kinematics, and dynamics, enabling students to analyze basic fluid behavior in engineering systems. The course aims to build competency in applying continuity, momentum, and energy principles, understanding laminar flow, and using dimensional analysis and similitude for model studies. It also introduces students to modern flow visualization techniques and IoT-based flow, pressure, and level monitoring, preparing them for advanced hydraulic analysis.

SYLLABUS

Unit - I

Fluid Properties: Introduction and scope of Fluid Mechanics, Engineering units of measurement, density, specific weight, specific volume, specific gravity, surface tension, capillary, viscosity, bulk modulus and pressure.

Fluid Statics: Pressure at a point, Pascal's law, Hydrostatic law, Absolute and gauge pressure, manometers: simple & differential manometers, Hydrostatic forces on plane surfaces (basic), Buoyancy, center of buoyancy, metacentric height, stability of floating/ submerged bodies.

Unit-II

Fluid Kinematics: Types of fluid flow: ideal & real, steady/unsteady, uniform/non-uniform, one, two and three-dimensional flow, Flow descriptions: pathlines, streamlines, streaklines, stream tubes, Continuity equation, rotational/irrotational flow, velocity potential, stream function, circulation, stagnation point.

Unit-III

Fluid Dynamics: Equations of motion, Euler's equation, Bernoulli's equation-derivation & applications, Velocity and flow measurement: Orifices, mouth pieces, orifice meter, venturimeter, weirs and notches.

Momentum Principles: Momentum equation and applications: pipe bends, nozzles, and elementary vane problems with simple velocity triangles

Unit-IV

Dimensional Analysis and Hydraulic Similitude: Dimensional analysis, dimensional homogeneity, use of Buckingham- π theorem, dimensionless numbers. Similarity laws: geometric, kinematic, dynamic (essentials only).

Laminar Flow: Introduction to fluid flow, Reynolds experiment, concept of laminar–transition–turbulent regimes, Reynolds number, laminar flow through circular pipes and between parallel plates (basic relations only). ~~Laminar flow through porous media, stokes law, Bach wash processing, Instability of laminar flow to turbulent flow.~~

Unit – V

Modern Visualization: Basics of flow visualization: principles and simple applications of Particle Image Velocimetry (PIV) and ultrasonic methods.

Smart Fluid Monitoring: Introduction to smart monitoring in fluid systems: need for real-time flow, level, and pressure monitoring. Basic working principles of modern sensors: pressure sensors, ultrasonic level sensors, electromagnetic flow meters.

Text Books

1. Hydraulics & Fluid Mechanics including Hydraulic Machines, Modi & Seth, Standard Book house, Delhi, 22nd edition, 2019
2. Fluid Mechanics: Fundamentals and Applications, Yunus A. Cengel, John M. Cimbala, McGraw Hill Education India, New Delhi, 4th edition, 2019

Reference books

1. Fluid Mechanics and Hydraulic Machines, R.K. Bansal, Laxmi Publications, New Delhi, 11th edition, 2025
2. Fluid Mechanics including Hydraulic Machine, A.K. Jain, Khanna Publishers, Delhi, 12th edition 2024

Courses Outcomes

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

CO1: Explain fundamental fluid properties, hydrostatic laws, pressure measurement principles, and stability of floating and submerged bodies.

CO2: Illustrate various types of fluid flow using kinematic descriptions such as streamlines, pathlines, continuity equation, velocity potential, stream function, and flow nets.

CO3: Apply Euler's and Bernoulli's equations along with momentum principles to compute flow parameters and evaluate discharge using standard flow-measurement devices**.**

CO4: Analyze dimensionless terms, similarity criteria, and laminar flow solutions in pipes and between plates to predict flow behavior under varied hydraulic conditions**.**

CO5: Demonstrate modern flow visualization techniques and IoT-based smart sensing systems for monitoring flow, pressure, and level in hydraulic applications.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251205

Course Name: Matrices & Calculus

L	T	P	Credit
3	0	0	3

Course Objective:

- To learn types of matrices and their properties
- To learn the concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form
- To expose the concept of ordinary and partial differentiation
- To find maxima and minima of function of two and three variables.
- To evaluate 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, Eigenvalues 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: (i) By Double integrals compute the area of irregular shapes and bounded regions, (ii) By Triple integrals compute work done by non-uniform force fields.

Recommended Books:

1. E. Kreyszig: Advanced 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: Advanced Engineering Mathematics, Narosa Publishing House Pvt. Ltd, 5th Edition (2016).

4. B. S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 43rd Edition (2015).
5. B.V. Ramana: Higher Engineering Mathematics, McGraw Hill Education, 1st Edition (2017).

Courses Outcomes

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

CO1: Demonstrate the applications of matrices.

CO2: Apply various matrix in engineering problems.

CO3: Solve problems of differential calculus.

CO4: Deduce applications of differential calculus in basic engineering problems

CO5: 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	PSO1	PSO2
CO1	3	1	1	1	-	-	-	-	-	1	-	-	-
CO2	3	2	1	1	1	-	-	-	1	1	1	-	-
CO3	3	1	1	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	1	-	-	-	-	-	1	-	-	-
CO5	3	1	-	-	1	-	-	-	1	1	1	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251212
Course Name: Sustainability & Environmental Science

L	T	P	Credit
0	2	0	GRADE

Course Objective:

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.

Recommended Books:

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.

Course Outcomes:

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

CO1. **Explain** the fundamental concepts of environmental science, including ecosystems and the causes of environmental degradation.

CO2. Analyze the sources, causes, and impacts of air, water, and solid waste pollution and propose appropriate mitigation strategies.

CO3. Evaluate the effectiveness of environmental policies and global frameworks in addressing environmental challenges.

CO4. Explain the concepts of sustainability and sustainable development goals.

CO5. Apply various solutions for achieving sustainable development.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251206

Course Name: Building Materials & Construction Lab

L	T	P	Credit
0	0	2	1

LIST OF EXPERIMENT'S

I. TEST ON FINE & COARSE AGGREGATES

1. Gradation of aggregates.
2. Determination of specific gravity.
3. Bulking of sand.
4. Compacted and loose bulk density of fine aggregate.

II. TEST ON CEMENT

1. Determination of fineness modulus of cement.
2. Determination of specific gravity.
3. Determination of Consistency.
4. Determination of Initial & Final setting time.
5. Soundness Test of Cement.
6. Compressive strength test of Cement.

III. TEST ON CONCRETE

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

IV. TEST ON BRICKS

1. Test for compressive strength of bricks.
2. Test for Water absorption of bricks.
3. Determination of Efflorescence of bricks.

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 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	PSO1	PSO2
CO1	1	1	1	2	2	2	-	2	2	2	1	2	1
CO2	2	1	-	3	2	2	1	2	2	2	2	2	1
CO3	1	1	-	2	2	2	-	2	2	2	1	1	1
CO4	1	1	1	2	2	2	-	2	2	2	1	1	1
CO5	1	-	1	2	2	2	1	2	2	2	1	2	1

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251207

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, Attribut 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 EXPERIMENT'S

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	PSO1	PSO2
CO1	1	2	1	2	3	-	-	-	2	1	-	-	-
CO2	1	2	1	2	3	-	-	-	2	1	-	-	-
CO3	2	2	2	3	3	-	1	-	2	3	2	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251209

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. Conduct a profile levelling and cross-sectioning for a portion of proposed road.
5. Conduct a fly levelling to transfer Bench mark from one station point to another proposed station point.
6. Traversing by using Total station.
7. Locate building with respect to chain line by taking offsets.
8. Campus Mapping Using Total Station / Auto Level
9. Levelling and Contour Map of a Playground
10. Study of ready mix concrete
11. Comparative study on workability of different grade of concrete
12. Study of green concrete
13. Study of light weight concrete
14. Study of concrete workability using super plasticizers
15. Study on durability of concrete in aggressive environments
16. Effect of Water-Cement Ratio on Concrete Strength
17. Use of Chemical Admixtures (Water Reducers) in Concrete
18. Partial Replacement of Cement with Fly Ash
19. Non-Destructive Testing of Concrete using Rebound Hammer
20. Influence of Aggregate Size and Shape on Concrete Strength
21. Study of Concrete Workability using Different Tests
22. Concrete Mix Design Using IS 10262:2019
23. Investigation of the stability of floating objects, create charts comparing metacentric heights.
24. Study hydraulic similitude and scale modeling for different types of submerged bodies
25. Perform dimensional analysis for fluid systems like flow over spillways or pipe flow.
26. Study and classify flow regimes (laminar, transitional, and turbulent) for different engineering applications.
27. Analyze the variation of viscosity with temperature for different fluids and its impact on pipeline design.
28. 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.

29. Computation of capillary rise for different liquids in tubes of various diameters.
30. Develop an understanding of flow types and streamline behavior by visualizing the flow patterns and drawing streamlines.
31. Determination of energy losses in pipes
32. Design and calibration of a simple U-tube manometer for pressure measurement
33. Design and testing of a small-scale Venturi meter using PVC pipes
34. Demonstration of IoT-based water level monitoring using ultrasonic sensor + Arduino
35. Measurement of flow using an ultrasonic sensor and comparison with theoretical discharge
36. Smart water supply monitoring using basic sensors (flow/pressure)
37. Determination of deflection of beams under various load conditions
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.

CO2: Design conventional and special concrete mixes for desired properties.

CO3: Analyze fluid properties and flow behavior through experiments and modelling.

CO4: Evaluate mechanical properties of different materials.

CO5: Develop the skills to prepare & present projects.

Course Articulation Matrix

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

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251210
Course Name: Engineering Foundation

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 CO_2 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.

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	PSO1	PSO2
CO1	2	1	1	2	2	1	-	-	-	2	-	-	-
CO2	1	-	-	1	2	1	-	-	-	2	-	-	-
CO3	2	-	-	2	2	-	-	-	-	2	-	-	-
CO4	-	-	-	-	-	-	-	-	3	2	-	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially

Course Code: 11251211
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	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	1	3	-	-	-
CO2	-	-	-	-	-	-	-	-	1	3	-	-	-
CO3	-	-	-	-	-	-	-	-	1	3	-	-	-
CO4	-	-	-	-	-	-	-	-	1	3	-	-	-
CO5	-	-	-	-	-	-	-	-	1	3	-	-	-

1 - Slightly; 2 - Moderately; 3 – Substantially