



Established: 1999

Annasaheb Dange College of Engineering and Technology

Ashta - 416301, Dist.: Sangli, Maharashtra
(An Empowered Autonomous Institute)



F.Y. B.Tech. - Civil Engineering

[Level 4.5, UG Certificate] Semester - I

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)					
										Theory		Laboratory			
										MSE	TA	ESE	CIA	ESE	
01	BS	LIT2	3CVBS101	Applied Physics	3	-	2	3	4	40	20	40	50	-	
02	BS	T1	3CVBS102	Applied Mathematics – I	3	1	-	4	4	40	20	40	-	-	
03	ES	T1	3CVES103	Fundamentals of Civil Engineering	3	-	-	3	3	40	20	40	-	-	
04	VS	T1	3CVVS104	Introduction to Emerging Technologies	2	-	-	2	2	40	20	40	-	-	
05	IKS	T2	3CVHS105	Indian Knowledge System	2	-	-	2	2	-	50	-	-	-	
06	ES	L2	3CVES106	Programming for Problem Solving (C)	1	-	2	1	2	-	-	-	50	-	
07	ES	L2	3CVPC107	Engineering Graphics and Computer Aided Drafting	2	-	2	2	3	-	-	-	50	-	
08	ES	L2	3CVPC108	Design Thinking Laboratory	-	-	2	-	1	-	-	-	50	-	
09	CC	L2	3BSCCXXX	Liberal Learning Course – I	-	-	2	-	1	-	-	-	50	-	
Total					16	1	10	17	22						
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination															
Minimum Passing Criteria					TA (Theory) : ≥ 8 / 20			MSE + ESE (Theory) : ≥ 32 / 80			TA (Theory) / CIA (Lab) : ≥ 20 / 50			ESE (Lab) : ≥ 20/50	

CC Bouquet:

3BSCC121 - Introduction to Yoga and Mindfulness	3BSCC123 - Six-Sigma Happiness and Mind Mechanics	3BSCC125 - Community Engagement through NSS
3BSCC122 - Physical Fitness and Lifestyle Management	3BSCC124 - Creativity through Visual Arts	3BSCC126 - Cultural Exploration & Heritage
3BSCC127- Leadership and Team management	3BSCC128- Self Management and Purposeful Living,	3BSCC129- Business Communication
3BSCC130- Mathematical Reasoning	3BSCC131- Introduction to Dance and Movement	3BSCC132- Introduction to Music and Singing
3BSCC133-Happiness and Well-Being	3BSCC134- Financial Literacy & Investment Awareness	3BSCC135-Cyber Awareness and Ethics

Member Secretary-BoS

Chairman-BoS

Member Secretary-AC

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F.Y. B.Tech. – Civil Engineering

[Level 4.5, UG Certificate] Semester - II

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	BS	LIT2	3CVBS109	Applied Chemistry	3	-	2	3	4	40	20	40	50	-
02	BS	T1	3CVBS110	Applied Mathematics – II	3	1	-	3	4	40	20	40	-	-
03	ES	LIT2	3CVES111	Engineering Mechanics	3	-	2	4	4	40	20	40	50	-
04	PC	LIT2	3CVPC112	Building Planning and Drawing	2	-	2	2	3	40	20	40	50	-
05	ES	T1	3CVPC113	Construction Materials	2	-	-	2	2	40	20	40	-	-
06	HS	L2	3CVHS114	Communication Skill	-	-	4	0	2	-	-	-	50	-
07	VS	L2	3CVVS115	IDEA Laboratory	-	-	4	1	2	-	-	-	50	-
08	CC	L2	3BSCCXXX	Liberal Learning Course – II	-	-	2	-	1	-	-	-	50	-
					Total	13	1	16	15	22				
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria					TA (Theory) : $\geq 8 / 20$		MSE + ESE (Theory) : $\geq 32 / 80$			TA (Theory) / CIA (Lab) : $\geq 20 / 50$		ESE (Lab) : $\geq 20/50$		

CC Bouquet:

3BSCC121 - Introduction to Yoga and Mindfulness	3BSCC123 - Six-Sigma Happiness and Mind Mechanics	3BSCC125 - Community Engagement through NSS
3BSCC122 - Physical Fitness and Lifestyle Management	3BSCC124 - Creativity through Visual Arts	3BSCC126 - Cultural Exploration & Heritage
3BSCC127- Leadership and Team management	3BSCC128- Self Management and Purposeful Living,	3BSCC129- Business Communication
3BSCC130- Mathematical Reasoning	3BSCC131- Introduction to Dance and Movement	3BSCC132- Introduction to Music and Singing
3BSCC133-Happiness and Well-Being	3BSCC134- Financial Literacy & Investment Awareness	3BSCC135-Cyber Awareness and Ethics

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Exit after F.Y. B.Tech. - Civil Engineering

Additional Credits to qualify for UG Certificate

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory		Laboratory		
										MSE	TA	ESE	CIA	ESE
01	VS	L2	3CVVS116	Basic Surveying	-	-	8	2	4	-	-	-	50	-
02	VS	L2	3CVVS117	Planning and Design of Residential Building	-	-	6	2	3	-	-	-	50	-
03	VS	L2	3CVVS118	Building Material Testing Laboratory	-	-	6	1	3	-	-	-	50	-
Total					-	-	20	5	10	-				
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria			TA (Theory) : $\geq 8 / 20$		MSE + ESE (Theory) : $\geq 32 / 80$		TA (Theory) / CIA (Lab) : $\geq 20 / 50$		ESE (Lab) : $\geq 20/50$					

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S.Y. B. Tech. - Civil Engineering [Level 5, UG Diploma] Semester - III

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory		Laboratory		
										MSE	TA	ESE	CIA	ESE
01	PC	LIT2	3CVPC201	Mechanics of Solids	3	-	2	3	4	40	20	40	50	-
02	PC	T1	3CVPC202	Construction Management and Economics	3	-	-	3	3	40	20	40	-	-
03	PC	LIT1	3CVPC203	Surveying and Geomatics	3	-	2	3	4	40	20	40	50	50
04	PC	T1	3CVPC204	Hydrology and Water Resource Engineering	3	-	-	3	3	40	20	40	-	-
05	ES	T1	3CVES205	Differential Equation and Calculus	2	-	-	2	2	40	20	40	-	-
06	VS	L1	3CVVS206	Computer Aided Public Building Design and Drawing	-	-	4	2	2	-	-	-	50	50
07	HS	T2	3CVHS2XX	Foreign Language	2	-	-	1	2	-	50	-	-	-
08	HS	T2	3CVHS209	Indian Constitution	1	-	-	1	1	-	50	-	-	-
09	HS	T2	3CVHS210	Universal Human Values	2	-	-	1	2	-	50	-	-	-
10	MA	T2	3CVMA211	Aptitude and Reasoning – I	2	-	-	-	-	-	50	-	-	-
Total					21	-	08	19	23	-				
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria		TA (Theory) : $\geq 8 / 20$			MSE + ESE (Theory) : $\geq 32 / 80$			TA (Theory) / CIA (Lab) : $\geq 20 / 50$			ESE (Lab) : $\geq 20/50$			

Foreign Language Bouquet:

3CVHS207 - Foreign Language - German	3CVHS208 - Foreign Language - Japanese
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S.Y. B. Tech. - Civil Engineering [Level 5, UG Diploma] Semester -IV

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory		Laboratory		
										MSE	TA	ESE	CIA	ESE
01	PC	T1	3CVPC212	Structural Analysis	2	1	-	2	3	40	20	40	-	-
02	PC	LIT1	3CVPC213	Concrete Technology	2	-	2	3	3	40	20	40	50	50
03	PC	LIT1	3CVPC214	Fluid Mechanics	2	-	2	3	3	40	20	40	50	50
04	PE	T1	3CVPE2XX	Professional Elective- I	3	-	-	2	3	40	20	40	-	-
05	MM	LIT2	3CVxx2XX	Multidisciplinary Minor - I	3	-	2	3	4	40	20	40	50	-
06	OE	T2	3CVOE2XX	Open Elective - 1	2	-	-	2	2	-	-	100	-	-
07	HS	T2	3CVHS225	Psychology	1	-	-	1	1	-	-	-	-	-
08	HS	T2	3CVHS226	Environment Studies	2	-	-	2	2	-	50	-	-	-
09	RM	L2	3CVRM227	Research Methodology	-	-	2	1	1	-	-	-	50	-
10	EL	L2	3CVEL228	Innovation and Product Development	-	-	2	1	1	-	-	-	50	-
11	MA	T2	3CVMA229	Aptitude and Reasoning - II	-	-	2	-	-	-	50	-	-	-
Total					17	1	12	20	23	-				

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria TA (Theory): $\geq 8 / 20$ MSE + ESE (Theory): $\geq 32 / 80$ TA (Theory) / CIA (Lab): $\geq 20 / 50$ ESE (Lab): $\geq 20 / 50$ ESE (Theory): $\geq 40 / 100$

Summer Internship (in Industry, R&D organization, or Academic Institute) shall be undertaken after the IV Semester during the summer vacation. The evaluation of the internship will be conducted during of the V Semester

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Exit Criteria after S. Y. B.Tech. – Civil Engineering

(As per AICTE Guidelines)

Eligibility Criteria

- All conditions applicable to the Exit Option After First Year shall also apply. In addition, the following criteria must be met:
- Students will have the option to exit the Mechanical Engineering Program after successfully completing the second year.
- To qualify this exit option students must complete Internship of minimum 8 weeks in Mechanical Engineering related field, aimed at enhancing practical knowledge and industry exposure. Students must submit **internship** report in accordance with the schedule and guidelines provided.

Outcome:

- Upon exit, they will be awarded an **Undergraduate Diploma in Civil Engineering**.

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Chairman -BoS

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Member Secretary-AC

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T.Y. B. Tech. - Civil Engineering

[Level 5.5, UG B. Voc. Certificate] Semester - V

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)			
										Theory			Laboratory
										MSE	TA	ESE	
01	PC	T1	3CVPC301	Design of Steel Structures	3	1	-	3	4	40	20	40	-
02	PC	LIT1	3CVPC302	Geotechnical Engineering	3	-	2	3	4	40	20	40	50
03	PC	T1	3CVPC303	Theory of Structures	2	1	-	3	3	40	20	40	-
04	PE	LIT1	3CVPE3XX	Professional Elective - II	3	-	2	3	4	40	20	40	50
05	MM	T1	3CVxx3XX	Multidisciplinary Minor - II	3	-	-	2	3	40	20	40	-
06	OE	T2	3ILOE3XX	Open Elective - II	2	-	-	1	2	-	-	100	-
07	PC	L2	3CVPC314	Software for Civil Engineering	-	-	2	1	1	-	-	-	50
08	HS	L2	3CVHS315	Entrepreneurship	-	-	2	1	1	-	-	-	50
08	EL	L2	3CVEL316	Summer Internship	-	-	-	1	1	-	-	-	50
09	MA	T2	3CVMA317	Aptitude and Reasoning - III	2	-	-	-	-	-	50	-	-
Total					18	2	8	18	23				

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory): $\geq 8 / 20$	MSE + ESE (Theory): $\geq 32 / 80$	TA (Theory) / CIA (Lab): $\geq 20 / 50$	ESE (Lab): $\geq 20 / 50$	ESE (Theory): $\geq 40 / 100$
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Member Secretary-BoS

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Member Secretary-AC

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T.Y. B. Tech. - Civil Engineering

[Level 5.5, UG B. Voc. Certificate] Semester - VI

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	PC	T1	3CVPC318	Design of Reinforced Concrete Structures	3	-	-	3	3	40	20	40	-	-
02	PE	LIT1	3CVPE319	Environmental Engineering	3	-	2	3	4	40	20	40	50	50
03	PC	T1	3CVPC320	Earthquake Engineering	2	-	-	2	2	40	20	40	-	-
04	PE	LIT2	3CVPE3XX	Professional Elective - III	2	-	2	3	3	40	20	40	50	-
05	MM	T1	3CVxx3XX	Multidisciplinary Minor - III	3	-	2	3	4	40	20	40	50	-
06	OE	T1	3ILOE3XX	Open Elective - III	2	-	-	2	2	--	-	100	-	-
07	PC	L1	3CVVS331	Structural Design and Drawing-I	-	-	2	1	1	-	-	-	50	50
08	HS	T2	3CVHS332	Project Management and Finance	2	-	-	2	2	-	50	-	-	-
09	CEA	L2	3CVCE333	Community Engagement Activity - (Mini Project)	-	-	4	-	2	-	-	-	50	-
10	MA	T2	3CVMA334	Aptitude and Reasoning - IV	2	-	-	-	-	-	50	-	-	-
Total					19	-	10	17	23	-				
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria			TA (Theory): $\geq 8 / 20$		MSE + ESE (Theory): $\geq 32 / 80$		TA (Theory) / CIA (Lab): $\geq 20 / 50$		ESE (Lab): $\geq 20/50$		ESE (Theory): $\geq 40/100$			

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria	TA (Theory): $\geq 8 / 20$	MSE + ESE (Theory): $\geq 32 / 80$	TA (Theory) / CIA (Lab): $\geq 20 / 50$	ESE (Lab): $\geq 20 / 50$	ESE (Theory): $\geq 40 / 100$
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Member Secretary-BoS

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Exit Criteria after T. Y. B. Tech. –Civil Engineering **(As per AICTE Guidelines)**

Eligibility Criteria:

- Completion of all core courses in the first three years of the engineering curriculum.
- Demonstration of both theoretical understanding and practical application through:
 - Industry-Relevant Practical Training: Including internships or apprenticeships.
 - Advanced Skill-Based Course: Aligning with current industry needs.
 - Internship/Apprenticeship: At least 8 weeks in a relevant engineering field.
 - Community Engagement Project: Real-world problem-solving with societal benefit.
 - Capstone Project (Optional): Integration and application of learning outcomes across three years.

Outcome:

Students will be awarded a **B. Voc. Degree in Civil Engineering**, signifying a strong foundation in engineering concepts, technical proficiency, and vocational readiness.

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Final Year B. Tech. - Civil Engineering [Level 6, UG B. Tech. Certificate] Semester - VII

LEVEL 09/08/2018: Final Certificate Semester - V II														
Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory		Laboratory		
										MSE	TA	ESE	CIA	ESE
01	PC	LIT1	3CVPC401	Estimation & Costing	3	-	2	3	4	40	20	40	50	50
02	PC	LIT2	3CVPC402	Transportation Engineering	2	-	2	2	3	40	20	40	50	-
03	PE	LIT2	3CVPE4XX	Professional Elective - IV	3	-	-	3	3	40	20	40	50	-
04	PE	T1	3CVPE4XX	Professional Elective -V	3	-	-	2	3	40	20	40	-	-
05	MM	T1	3CVxx4XX	Multidisciplinary Minor - IV	3	-	-	3	3	40	20	40	-	-
06	SS	T2	3CVSS418	Self-Study Course - I	-	-	-	-	2	-	-	100	-	-
07	PC	L1	3CVAC417	Structural Design and Drawing-II	-	-	2	1	1	-	-	-	50	50
08	EL	L1	3CVEL419	Project	-	-	8	-	4	-	-	-	50	50
					Total	14	-	14	14	23	---			
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria		TA (Theory): ≥ 8 / 20		MSE + ESE (Theory): ≥ 32 / 80		TA (Theory) / CIA (Lab): ≥ 20 / 50		ESE (Lab): ≥ 20/50		ESE (Theory): ≥ 40/100				

Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination

Minimum Passing Criteria		TA (Theory): $\geq 8 / 20$	MSE + ESE (Theory): $\geq 32 / 80$	TA (Theory) / CIA (Lab): $\geq 20 / 50$	ESE (Lab): $\geq 20/50$	ESE (Theory): $\geq 40/100$
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Final Year B. Tech. - Civil Engineering

[Level 6, UG B. Tech. Certificate] Semester - VIII

Level of C&B: Tech. Certificate Semester - VIII														
Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MSE	TA	ESE	CIA	ESE
01	PC	T1	3CVPE4XX	Professional Elective - VI	3	-	-	3	3	40	20	40	-	-
02	SS	T2	3CVPE426	Self-Study Course - II	-	-	-	-	2	-	-	100		
03	PC	L2	3CVEL427	Internship	-	-	-	-	12	-	-	-	50	-
Total					5	-	-	3	17	-				
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria			TA (Theory): $\geq 8 / 20$		MSE + ESE (Theory): $\geq 32 / 80$		TA (Theory) / CIA (Lab): $\geq 20 / 50$			ESE (Lab): $\geq 20/50$		ESE (Theory): $\geq 40/100$		

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Professional Electives/Honor's Track (20 Credits):

Track / Specialization	Program Elective –I (3 - 0 - 0)	Program Elective –II (3 - 0 - 2)	Program Elective –III (3 - 0 - 2)	Program Elective –IV (3-0 -0)	Program Elective –V (3 -0 -0)	Program Elective –VI (3 -0 -0)
Class	S.Y.B. Tech.	T.Y.B. Tech.	T.Y.B. Tech.	Final Year. B. Tech.	Final Year. B. Tech.	Final Year. B. Tech.
Semester	IV	V	VI	VII	VII	VIII
Structural Engineering	3CVPE215 Composite Materials	3CVPE304 Structural Audit	3CVPE321 Repairs and Rehabilitation of Structures	3CVPE403 Advanced Reinforced Concrete Design	3CVPE409 Prestressed Concrete Structures	
Construction Management	3CVPE216 Investment Planning and Management	3CVPE305 Safety Aspects in Civil Engineering	3CVPE322 Advanced Construction Techniques	3CVPE404 Total Quality Management	3CVPE410 Valuation Engineering	
Environmental Engineering	3CVPE217 Public Health Engineering	3CVPE306 Advanced Water Treatment Processes	3CVPE323 Industrial Wastewater Treatment	3CVPE405 Air Pollution and Control	3CVPE411 Solid and Hazardous Waste Management	3CVPE420-425 MOOC Courses offered by NPTEL/SWAYAM only
Geology & Irrigation Engineering	3CVPE218 Advanced Remote Sensing	3CVPE307 Engineering Geology	3CVPE324 Dynamic Geology and Disaster Management	3CVPE406 Advanced Irrigation Engineering	3CVPE412 Site Investigation Methods and Practices	
Geo-informatics & Geotechnical Engineering	3CVPE219 Advanced Surveying Techniques	3CVPE308 Applications of GPS and Digital Photogrammetry	3CVPE325 Coastal & Hydrographical Surveying	3CVPE407 Photogrammetry & LiDAR	3CVPE413 Advanced Geotechnical Engineering	
Infrastructure Engineering	3CVPE220 Introduction to Infrastructure Engineering	3CVPE309 Highway Engineering and Rural Road Development	3CVPE326 Railway and Airport Engineering	3CVPE408 Bridge Engineering	3CVPE414 Infrastructure Construction Management	

• Students may choose Professional Elective courses from a single track or across multiple tracks, based on their academic interests and career aspirations.

• Only one Professional Elective course may be selected from a given column in a semester. Additional courses from the same column may be taken in subsequent semesters, but not concurrently.

• Students opting for the Honors Degree shall complete all Honors courses from a single track, which shall be different from the track chosen for their Professional Elective courses.

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Multidisciplinary Minor (14 Credits)

Minor Stream: Surveying and its Applications (SA)

Sr. No.	SEM	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
											Theory		Laboratory		
											MSE	TA	ESE	ESE	
01	IV	MM	LIT2	3CVSA221	Satellite Geodesy	3	-	2	3	4	40	20	40	50	--
02	V	MM	T1	3CVSA310	Global Navigation Satellite System	3	-	-	3	3	40	20	40	--	--
03	VI	MM	LIT2	3CVSA327	Remote Sensing and GIS	3	-	2	3	4	40	20	40	50	--
04	VII	MM	T1	3CVSA426	DGPS Survey	3	-	-	3	3	40	20	40	--	--
Total						12	-	04	12	14					
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination, CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination															
Minimum Passing Criteria						TA (Theory) : $\geq 8/20$		MSE + ESE(Theory): $\geq 32/80$		TA (Theory) / CIA (Lab) : $\geq 20/50$		ESE (Lab) : $\geq 20/50$			

Minor Stream: Environmental Engineering (EN)

Sr. No.	SEM	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)					
											Theory		Laboratory			
											MSE	TA	ESE	CIA	ESE	
01	IV	MM	LIT2	3CVEN222	Air Pollution and Control	3	-	2	3	4	40	20	40	50	--	
02	V	MM	T1	3CVEN311	Water and Wastewater Engineering	3	-	-	3	3	40	20	40	--	--	
03	VI	MM	LIT2	3CVEN328	Solid Waste Management	3	-	2	3	4	40	20	40	50	--	
04	VII	MM	T1	3CVEN427	Environmental Impact Assessment	3	-	-	3	3	40	20	40	--	--	
Total						12	-	04	12	14						
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - TeachersAssessment, ESE-End-Semester Examination																
Minimum Passing Criteria			TA (Theory) : $\geq 8/20$			MSE + ESE(Theory): $\geq 32/80$			TA (Theory) / CIA (Lab) : $\geq 20/50$			ESE (Lab) : $\geq 20/50$				

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Emerging Specialization Minor (18 Credits)

Minor Stream: Structural Engineering (ST)

Sr. No.	SEM	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)					
											Theory			Laboratory		
											MSE	TE	ESE		ISE	ESE
01	IV	SM	LIT2	3CVST240	Foundation Engineering	3	-	2	3	4	40	20	40	50	-	
02	V	SM	LIT2	3CVST340	Bridge Engineering	3	-	2	3	4	40	20	40	50	-	
03	VI	SM	T1	3CVST345	Finite Element Analysis	3	-	-	3	3	40	20	40	-	-	
04	VII	SM	T1	3CVST430	Structural Dynamics	3	-	-	3	3	40	20	40	-	-	
05	VIII	SM	L2	3CVST435	Project		-	8	-	4	-	-	-	50	-	
Total						12	0	12	12	18						
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination																
Minimum Passing Criteria						TA (Theory) : $\geq 8/20$			MSE + ESE(Theory): $\geq 32/80$			TA (Theory) / CIA (Lab) : $\geq 20/50$			ESE (Lab) : $\geq 20/50$	

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Honors with Research (20 Credits)

Sr. No.	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Marks)				
										Theory			Laboratory	
										MS E	TA	ESE		
VII	EL	L1	3CVEL432	Research Project - I	-	-	20	-	10	--	--	50	50	
VIII	EL	L1	3CVEL437	Research Project - II	-	-	20	-	10	--	--	50	50	
Total					-	-	40	-	20	--				
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
Minimum Passing Criteria			TA (Theory) : $\geq 8/20$		MSE + ESE (Theory): $\geq 32/80$		TA (Theory) / CIA (Lab) : $\geq 20/50$			ESE (Lab) : $\geq 20/50$				

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Bridge Course: DSY - Lateral Entry Students

Sr. No.	Semester	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)			
											Theory			Laboratory
											MSE	TA	ESE	CIA ESE
01	I	VS	T1	3CVVS104	Introduction to Emerging Technologies	2	-	-	2	2	--	--	100	--
02	I	ES	L2	3CVES106	Programming for Problem Solving (C)	1	-	2	1	2	-	-	-	50
03	II	BS	T1	3CVBS110	Applied Mathematics - II	3	1	-	3	4	--	--	100	--
04	II	VS	L2	3CVVS115	IDEA Laboratory	-	1	4	1	2	--	--	--	50
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
						Minimum Passing Criteria			CIA (Lab) : $\geq 20/50$		ESE (Theory) : $\geq 40/100$			

*Note:

- All Direct Second Year students admitted to the B.Tech. Civil Engineering programme shall compulsorily undergo the prescribed bridge courses. Students admitted from diploma programmes other than the parent discipline shall additionally complete bridge courses as prescribed by the designated committee.
- Students shall complete the prescribed Semester I Bridge Courses during Semester III (Odd Semester) and the prescribed Semester II Bridge Courses during Semester IV (Even Semester).

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Bridge Course: Change in Curriculum Revision (R2 to R3)

Sr. No.	Semester	Course Category	Course Type	Course Code	Course Name	L	T	P	S	Cr	Evaluation Scheme (Weightages in %)			
											Theory		Laboratory	
											MSE	TA	ESE	CIA ESE
01	I	VS	T1	3CVVS104	Introduction to Emerging Technologies	2	-	-	2	2	--	--	100	--
02	I	ES	L2	3CVPC108	Design Thinking Laboratory	-	-	2	-	1	--	--	--	50
03	II	VS	L2	3CVVS115	IDEA Laboratory	-	-	4	1	2	--	--	--	50
Legends: L-Lecture, T-Tutorial, P-Practical, S-Self Study, Cr-Credits, MSE - Mid-Semester Examination. CIA-Continuous Internal Assessment, TA - Teachers Assessment, ESE-End-Semester Examination														
						Minimum Passing Criteria			CIA (Lab) : $\geq 20/50$		ESE (Theory) : $\geq 40/100$			

***Note:**

- All Curriculum revision change students of B.Tech. Civil Engineering programme shall compulsorily undergo the prescribed bridge courses.
- Students shall complete the prescribed Semester I Bridge Courses during Semester III (Odd Semester) and the prescribed Semester II Bridge Courses during Semester IV (Even Semester).

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**Department**

: Civil Engineering

Programme

: B.Tech. – Civil Engineering

Curriculum Revision

: Revision 03, with effect from the AY 2025 - 26 to the students of UG Programme.

Course Category	Acronym	I	II	III	IV	V	VI	VII	VIII	Total	% of Category
Basic Science Course	BS	8	8	2	-	-	-	-	-	18	10.22
Engineering Science Course	ES	9	9	-	-	-	-	-	-	18	10.22
Programme Core Course	PC	-	-	16	9	12	6	9	-	52	29.54
Professional Elective Course	PE	-	-	-	3	4	4	6	3	20	11.37
Open Elective (other than particular program)	OE	-	-	-	2	2	2	-	-	6	3.40
Multidisciplinary Minor	MDM	-	-	-	4	3	4	3	-	14	7.95
Vocational and Skill Enhancement Course	VSEC	-	2	2	-	1	1	-	-	6	3.40
Humanities Social Science and Management	HSSM	-	2	5	3	1	-	-	-	15	8.52
Indian Knowledge System	IKS	2	-	-	-	-	-	-	-	2	
Value Education Course	VEC	2	-	-	-	-	-	-	-	2	
Research Methodology	RM	-	-	-	2	-	-	-	-	2	
Experiential Learning (Internship, Project)	EL	-	-	-	-	1	-	4	12	19	10.79
Community Engagement Activity / Field Project	CEA	-	-	-	-	-	2	-	-	2	1.13
Co-curricular & Extracurricular Activities	CCA	1	1	-	-	-	-	-	-	2	1.13
Self-Study	SS	-	-	-	-	-	2	-	2	4	2.27
Total	Total	22	22	23	23	23	23	23	17	176	100

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Course Information:								
Class, Semester		FY. B. Tech, Semester - I					Category	BS
Course Code, Course Title		3CVBS101, Applied Physics					Type	LIT2
Prerequisites		----						
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self-Study	Credits	
		3	-		2	2	4	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	--
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Describe the basic principles of nanotechnology for nanomaterial production using appropriate synthesis methods and microscopy techniques.							
CO2	Use fundamental principles of mechanics, heat transfer, and fluid properties to solve problems related to motion, energy, and material behavior in civil engineering applications.							
CO3	Apply optics concepts to analyze diffraction, polarization, lasers, and fiber optic transmission in engineering contexts.							
CO4	Apply theoretical and practical knowledge to solve engineering problems in architectural acoustics and ultrasonic using appropriate formulas and experimental methods.							
CO5	Interpret crystal structures and X-ray diffraction results to determine lattice parameters and interplanar spacing using Bragg's law and Miller indices							
Syllabus:								
Module	Contents							Lecture Hours
I	Interference, Diffraction & Polarization: Interference -Introduction, Constructive and destructive interference, Newton's rings. Diffraction - Introduction, Diffraction grating, Plane diffraction grating –construction and theory, Determination of wavelength of light using plane diffraction grating, Resolving power of grating, Numericals. Polarization: - Introduction, Polarization of light, Polarization by double refraction, Positive and Negative crystals, Laurent's half shade Polarimeter, Numericals.							7
II	Laser and Fibre Optics: Laser: Introduction, Principle of laser, Pumping and Population inversion, Characteristics of laser, Ruby Laser, Applications of laser in mechanical engineering. Optical fibre: Introduction, Total internal reflection, Structure of optical fibre, Propagation mechanism of optical fibre, Numerical aperture, Acceptance angle, Skip distance, Attenuation, Types of optical fibre, Applications of optical fibre in mechanical engineering.							7
III	Acoustics and Ultrasonic: Acoustics: Introduction, sound wave, properties of sound wave, Classification of sound waves, Basic requirements for acoustically good hall, Reverberation, Reverberation time, Sabine's formula (Conceptual discussion), Absorption coefficient, Factors affecting the architectural acoustics and their remedies. Ultrasonic: Ultrasonic waves, Magnetostriction effect and Oscillator, Determination of wavelength and velocity of ultrasonic waves, Detection of ultrasonic waves, applications of ultrasonic waves in field of mechanical engineering, Numericals.							8
IV	Crystallography: Unit cell, Space lattice, seven crystal system, Bravais space lattices, Properties of cubic unit cell, Relation between lattice constant and density, Interplanar spacing for cubic system, Miller indices, Symmetry elements in cubic crystal, X-ray diffraction, Bragg's law, Braggs X-ray spectrometer, X-ray spectra (Continuous and characteristics), Numericals.							7
V	Fundamentals of Physical Quantities: Fundamental and derived quantities, Laws of motion, projectile motion, circular motion, work-energy theorem, impulse-momentum principle, Stress-strain curve, Conduction, convection, radiation, Surface tension, viscosity, capillary rise, basic principles of resistivity method, Applications in civil engineering, Numericals.							9


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VI	Nanophysics: Introduction, Nanotechnology, nano-materials, Top-down and Bottom-up synthesis approach, Ball milling method, Sol-gel synthesis method, Carbon nanotubes, Properties and applications of carbon nanotubes, Scanning Electron Microscopy (SEM) and Atomic Force Microscopy (AFM), Properties and applications of nano-materials in mechanical engineering.	7
Total Lecture Hours		45
List of Experiments with CO Mapping		
Sr. No.	Title / Topic of the Experiment	CO Mapped
1	Plane Diffraction Grating- Determine the wavelength of light using plane diffraction grating.	3
2	Laurent's Half shade Polarimeter - Determination of specific rotation of optically active material.	3
3	Laser - Determination of wavelength of He-Ne laser light using diffraction grating.	3
4	Laser - Determination of divergence of He-Ne laser light	3
5	Numerical aperture of optical fibre: To calculate NA of optical fibre by laser diode.	3
6	Inverse Square Law- Verify inverse square law.	3
7	Band gap energy: To determine band gap energy of given semiconductor.	2
8	Ultrasonic interferometer- To determine the velocity of ultrasonic waves in given liquid and to determine the compressibility of the liquid	4
9	Kund's tube for determination of velocity of sound	4
10	Newton's Rings-To determine the wavelength of the given monochromatic source of light by Newton's ring method	3
11	BH Curve Tracer	3
12	Hall Effect	3
13	Determination of Miller Indices of a given plane and models	5
14	Crystal Symmetry-23 Symmetries in cubic crystal	5
Total Practical Sessions		15
Total Practical Hours		30
Minimum TEN experiments should be performed from the above list		
Text Books		
1. M.N. Avadhanulu & P. G. Kshirsagar, A Text Book of Engineering Physics, 12 th Edition, S. Chand Publication, 2018		
2. P. K. Palanisamy, Engineering Physics, 2 nd Edition, Sci Tech pub. (P) Ltd. 2018		
3. G Vijayakumari, Engineering Physics, 3 rd Edition, Vikas Pub. House (P) Ltd, 2009		
4. K K. Chattopadhyay and A.N. Banerjee, Introduction to Nano Science and Nanotechnology, 3 rd , PHI Learning, 2009		
References:		
1. David Halliday, Robert Resnick & Jearl Walker, Fundamentals of Physics, 12 th Edition, 2021.		
2. Resnick Halliday, Krane, Engineering Physics, 8 th Edition, John Wiley & Sons Pub., 2008.		
3. R. K. Gaur & Gupta S. L, Engineering Physics, 8 th Edition, Dhanapatrai Publication, 2008		
4. Sulbha K. Kulkarni, Nanotechnology Principles and Practices, 4 th Edition, Springer, 2007		
5. Charles Kittel, Introduction to Solid State Physics, 7 th Edition, Wiley India Pvt. Ltd, 2008		
6. V. Raghavan, Materials Science and Engineering, 5 th Edition, PHI Learning, 2006.		
Online Learning Resources		
1. For optics- https://nptel.ac.in/courses/122/107/122107035/		
2. For Quantum Physics - https://nptel.ac.in/courses/122/106/122106034/		
3. For Ultrasonic - https://freevideolectures.com/course/3531/engineering-physics-i/8		
4. For Solid State Physics - https://nptel.ac.in/courses/115/105/115105099/		
Experiments that may be performed through virtual labs:		
Sr. No.	Experiment Name	Experiments Links
1.	Photoelectric Effect	https://mp-amrt.vlabs.ac.in/exp/photoelectric-effect/index.html
2.	Numerical Aperture of Optical Fiber	https://lo-amrt.vlabs.ac.in/exp/numerical-aperture-optical-fiber/
3.	LASER Beam divergence and spot size	https://lo-amrt.vlabs.ac.in/exp/laser-beam-divergence/


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Course Information:								
Class, Semester		FY. B. Tech, Semester - I				Category	BS	
Course Code, Course Title		3CVBS102, Applied Mathematics-I				Type	T1	
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	1	-	2	4		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Determine the consistency of systems of linear equations using Echelon form of matrix							
CO2	Compute Eigen values, Eigen vectors, powers and inverse of a square matrix using characteristic equation							
CO3	Apply the concepts of complex number to solve the equations using De Moivre's theorem and hyperbolic identities							
CO4	Calculate partial derivatives, Jacobians, and extreme values of function of two variables using concept of partial differentiation							
CO5	Solve ordinary differential equation of order one and degree one using analytical method and numerical techniques.							
Syllabus:								
Module		Contents					Lecture Hours	
I		Solution of System of Linear Equations: Definition of system of linear equations, Classification of system of linear equations, Rank of matrix: Concept and computation using Echelon form and Normal form, Roueche-Capelli Theorem (Statements only), Solution of non-homogeneous system of linear equations, solution of Homogeneous system of linear equations, Applications in engineering.					7	
II		Eigen Values and Eigen Vectors: Definition of vectors in R^n , Linear Dependence and Independence of Vectors, Characteristic Equation of Matrix, Cayley-Hamilton theorem (statement only), Applications of Cayley-Hamilton theorem, Eigen Values and Properties, Eigen Vectors and Properties.					7	
III		Complex Number: Definition of complex number, Polar and exponential form of complex number, De Moivre's Theorem and Simple Applications, Power and Roots of complex numbers, Applications in solving equations. Hyperbolic Functions: Definitions, Identities of hyperbolic functions, Relation between Circular functions and hyperbolic functions, Inverse hyperbolic functions,					8	
IV		Partial Differentiation and Applications: Functions of several variables, partial derivatives of first order, Higher order partial derivatives, Homogeneous functions, Euler's Theorem on homogeneous function: statement and verification, Jacobians and Properties, Maxima and minima of functions of two variables.					8	
V		Ordinary Differential Equation of first order and first degree: Linear differential equation, exact differential equation, reducible to exact differential equation, reducible to linear differential equation, Applications of engineering (branch oriented)					8	
VI		Numerical Solution of Ordinary differential equation of First Order & First Degree: Euler's method, Modified Euler's method, Runge-Kutta third order, Runge-Kutta Method of order four, Taylor Series method.					7	
Total Lecture Hours							45	

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List of Tutorial with CO Mapping		
Sr. No.	Title of Tutorial	CO Mapped
1	Rank of matrix and Solution of Homogeneous System of Linear Equations	1
2	Solution of Non-Homogeneous System of Linear Equations	1
3	Eigen Value, Eigen vectors and Properties	2
4	Cayley-Hamilton theorem and Applications	2
5	De Moivre's Theorem, Applications and Hyperbolic functions	3
6	Partial differentiations and Euler's theorem	4
7	Jacobians and Maxima-Minima of Two Variable Functions	4
8	Euler's and Modified Euler's Methods for Solving Initial Value Problems	4
9	Runge-Kutta Methods and Taylor series method	4
10	Ordinary differential equations of first order and first degree	5
Total Tutorial Hours		30
Text Books		
1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8th Edition, Laxmi Publications ,2011.		
2. H. K. Das, Advanced Engineering Mathematics, 22th Edition, S. Chand ,2018.		
3. B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010		
4. Dr. B. S. Grewal, Numerical Methods, 9th Edition, Khanna Publishers., 2010		
References:		
1. Dr. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers ,2018.		
2. N. P. Bali, Manish Goyal, Advanced Engineering Mathematics, 7th Edition, Infinity science press ,2010.		
3. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-I, 9th Edition Pune Vidyarthi Griha Prakashan,1984		
4. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-II, 7th Edition Pune Vidyarthi Griha Prakashan,1988.		
Online Learning Resources		
1. NPTEL Course on Engineering Mathematics-I, by Prof. Jitendra Kumar, IIT Kharagpur https://nptel.ac.in/courses/111105121		
2. NPTEL Course on Numerical Methods, by Prof. Ameeya Kumar Nayak, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107105		
3. NPTEL Course on Matrix Analysis with Application, by Prof. S. K. Gupta, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107112		
4. NPTEL Course on Mathematics-III, by Prof. Durga C Dalal, Dr. M. Guru Prem Prasad, IIT Guwahati https://nptel.ac.in/courses/122103012		

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Department of Civil Engineering

**Course Information:**

Class, Semester	FY. B. Tech, Semester - I				Category	ES
Course Code, Course Title	3CVES103, Fundamentals of Civil Engineering				Type	T1
Prerequisites	---					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	3	-	-	2	3	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		40	20	40		---

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Classify branches and applications of civil engineering for real-world infrastructure development using key functional roles and major infrastructural domains.
CO2	Explain substructure and super-structure elements in standard buildings referencing their functions in load transfer and building stability.
CO3	Demonstrate surveying and levelling methods using modern instruments following standard procedures.
CO4	Select masonry types and bond patterns for construction projects considering structural requirements.
CO5	Analyze infrastructure system components for transportation and water management comparing pavement and hydraulic structures.
CO6	Evaluate sustainable practices and smart city concepts in civil engineering projects considering environmental impact.

Syllabus:

Module	Contents	Lecture Hours
I	Introduction to Civil Engineering Branches & applications of civil engineering, Role of civil engineer, Types of structure, types of loads. Principles of planning, Building bye laws - building line, Height of building, open space requirements, FSI.	8
II	Building Components Sub-structure: Elements of sub structure and their functions, types of soil and rocks, concept of bearing capacity, types of foundations i.e., shallow and deep and their suitability. Super-structure: Elements of super-structures and their functions	7
III	Surveying Principles & Classification of surveys, Dumpy level, Auto Level, Theodolite, Terms used in levelling, levelling instruments, methods of reduction of levels, types of levelling. Contours: Characteristics of contours, use of contour maps. Introduction to EDM and Total station.	8
IV	Masonry Stone masonry - Random Rubble, Uncoursed Rubble, Coursed Rubble and Ashlar Masonry, Brickwork and Brick Bonds - English, Flemish, and Rat trap bond, Composite masonry, various types of composite masonry walls	7
V	Introduction to Transportation, Environmental and Irrigation Engineering Components of rigid & flexible pavement, Cross section of road in cutting & filling. Components of railway track types of Gauges, Bridge, Components of water supply scheme (flow diagram), Introduction to Gravity and Earthen Dam.	8
VI	Sustainable Development and Smart Cities Role of Civil Engineering in sustainability, Green Building – Introduction & rating system, Smart cities, Sustainability, Carbon footprint., Smart city concepts, disaster-resilient structures	7
Total Lecture Hours		45


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Text Books		
1. N. Basak, "Surveying," 1st Edition, Tata McGraw Hill Publications, 2016. 2. K. Subramanya, "Engineering Hydrology," 4th Edition, McGraw Hill Publications, 2013. 3. G. K. Hiraskar, "Basic Civil Engineering," 1st Edition, Dhanpatrai Publications, 2008. 4. S. S. Bhavikatti, "Basic Civil Engineering," 2nd Edition, New Age International Publications, 2003. 5. B. C. Punmia, "Surveying Vol. I, II, III," 2nd Edition, Laxmi Publications, 2001.		
References:		
1. Mackenzie Davis and David Cornwell, "Introduction to Environmental Engineering," 6th Edition, McGraw Hill Education, 2020. 2. Sandeep Mantri, "The A To Z of Practical Building Construction and its Management," 1st Edition, Satya Prakashan, 2010. 3. Schofield W., "Engineering Surveying," 6th Edition, Taylor and Francis, 2007. 4. Satheesh Gopi, R. Sathikumar, N. Madhu, "Advanced Surveying: Total Station, GIS and Remote Sensing," 1st Edition, Pearson Education India, 2006. 5. A. Bannister, S. Raymond, R. Baker, "Surveying," 7th Edition, Pearson, 2002.		
Online Learning Resources		
1. Dr. B. Bhattacharjee, "Building Materials and Construction," NPTEL, IIT Delhi, 2012 Link: https://nptel.ac.in/courses/105102088		
2. NPTEL, "Surveying," Prof. S.K. Gupta, IIT Delhi, NPTEL, 2018. Link: https://nptel.ac.in/courses/105104101		
Experiments that may be performed through virtual labs:		
Sr. No	Experiment Name	Experiments Links
1.	Surveying Virtual Lab	https://sl-iitr.vlabs.ac.in/

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 Department of Civil Engineering

**Course Information:**

Class, Semester	FY. B. Tech, Semester - I				Category	VS
Course Code, Course Title	3CVVS104, Introduction to Emerging Technologies				Type	T1
Prerequisites	---					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	2	-	-	-	2	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		40	20	40		---
						ESE

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Describe the key characteristics of emerging technologies such as AI, IoT, AR/VR, Quantum Computing, and Blockchain.
CO2	Apply the concepts of AI, IoT, CPS, and Blockchain to real-world case studies to identify their disruptive impact on digital transformation initiatives
CO3	Explain the role of robotics, additive manufacturing, and green technologies in supporting sustainability and ethical technology deployment
CO4	Implement innovative solutions using autonomous systems and green technologies to address sustainability challenges

Syllabus:

Module	Contents	Lecture Hours
I	Foundations of Emerging Technologies and Innovation Ecosystem Emerging technologies characteristics and disruptive impact, Indian innovation ecosystem: Digital India, Startup India, AIM, India Stack, National Education Policy and interdisciplinary learning, Case studies: Smart Cities, Aadhaar, UPI, Digital Health Mission.	5
II	Artificial Intelligence, Machine Learning & Data Science AI basics: history, goals, types of AI (Narrow, General, Super AI), Machine learning: supervised, unsupervised, reinforcement learning, Introduction to data science: lifecycle, Big Data (5Vs), visualization, Human-centered AI and ethical concerns: bias, privacy, responsible AI.	5
III	IoT, Cyber-Physical Systems, Edge Computing & Cybersecurity IoT: architecture, sensors, communication, cloud, Cyber-physical systems: smart grid, autonomous vehicles, industrial automation, Edge & fog computing: real-time applications and use cases, Cybersecurity basics: CIA triad, malware, phishing, digital hygiene.	5
IV	AR/VR, Quantum Technologies and Blockchain AR/VR/XR. definitions, tools, applications in gaming, education, healthcare, Metaverse and immersive computing, Introduction to quantum computing: qubits, entanglement, potential impact. Blockchain, Smart Contracts, DApps, DeFi, NFTs,	5
V	Robotics, Autonomous Systems & Additive Manufacturing Robotics: types, sensors, actuators, applications in healthcare, defense, logistics, Autonomous systems: drones, driverless vehicles, swarm robotics, 3D/4D printing: additive manufacturing, materials, future directions, Design thinking for innovation in robotics & manufacturing.	5
VI	Green Technologies, Sustainability & Tech Ethics Emerging technologies for solving climate/environmental challenges, Smart grids, clean energy systems, climate tech, e-waste, Sustainable design and SDGs: tech for social good, Tech ethics: inclusivity, equity, digital divide, societal impact.	5
Total Lecture Hours		30

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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist.: Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Civil Engineering								
Course Information:									
Class, Semester		FY. B. Tech, Semester – I					Category	HS	
Course Code, Course Title		3CVHS105, Indian Knowledge System					Type	T2	
Prerequisites		---							
Teaching Scheme (per week)		Lecture		Tutorial		Practical		Self-Study	Credits
		2		-		-		-	2
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			-	50	-		-	-	
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:									
CO1		Explain the historical context and evolution of the Indian Knowledge System (IKS) and its relevance to modern engineering.							
CO2		Analyze ancient Indian mathematical, astronomical, and technological methodologies and compare them with contemporary engineering practices.							
CO3		Apply concepts from Ayurveda and ancient biological sciences to modern problem-solving in healthcare and related fields.							
CO4		Evaluate traditional Indian architecture, materials, and construction principles as early forms of sustainable engineering design.							
CO5		Integrate philosophical and scientific logic from Indian thought into ethical decision-making and sustainable engineering practices.							
CO1		Explain the historical context and evolution of the Indian Knowledge System (IKS) and its relevance to modern engineering.							
Syllabus:									
Module		Contents						Lecture Hours	
I		Introduction & Historical Context 1. Overview of the Indian Knowledge System: Philosophy and Scope 2. Historical timelines and key epochs 3. Geographical and cultural influences on ancient Indian science 4. Interdisciplinary approaches in ancient India. 5. Comparative analysis with other ancient civilizations						5	
II		Mathematics & Astronomy in Ancient India 1. Foundations of Vedic Mathematics and its modern applications 2. Concepts of zero, decimal system, and number theory 3. Astronomical instruments and observational techniques 4. Calendrical systems and time measurement in ancient India 5. Engineering parallels in algorithmic design and computational thinking						5	
III		Ayurveda and Life Sciences 1. Introduction to Ayurveda: Philosophy, doctrines, and methodologies 2. Medicinal systems and their chemical/pharmacological principles 3. Human physiology and surgical techniques in ancient texts (e.g., Sushruta Samhita) 4. Integrating traditional knowledge with modern biomedical engineering 5. Innovations in material sciences: Natural polymers and biocompatible materials						5	
IV		Architectural Knowledge & Engineering Innovations 1. Ancient Indian architecture: Principles, materials, and techniques 2. Urban planning and infrastructure in historical Indian kingdoms 3. Structural innovations: Temples, forts, and water management systems 4. Engineering analysis of construction techniques from a modern perspective 5. Case studies: Earthquake-resistant designs in ancient constructions						5	


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V	Philosophy, Science & Ethics 1. Indian philosophical schools and their perspectives on science 2. The concept of Rta (cosmic order) and its engineering analogies 3. Early scientific inquiry and epistemology in classical texts 4. Ethics, sustainability, and social responsibility in engineering 5. Integration of moral values and technical rigor in project design	5
VI	Contemporary Relevance & Innovation 1. Bridging ancient wisdom with modern technology 2. Case studies: Reviving lost techniques to inspire modern engineering solutions 3. Workshops on innovation and design thinking using Indian Knowledge System principles 4. Integration of cultural heritage in sustainable product design	5
Total Lecture Hours		30
Text Books		
1. Indian Knowledge Systems: An Introduction by Dr. Vivek Ramaswamy, Oxford University Press, 2nd, 2005. 2. Traditions of Indian Science: A Textbook by Dr. Shyam R. Jha, Cambridge University Press, 1st, 2010. 3. Contemporary Perspectives on Ancient Indian Wisdom by Dr. Arvind Sharma, Routledge, 1st, 2013. 4. Foundations of the Indian Knowledge System by Dr. Meera Nair, Sage Publications, 3rd, 2015. 5. Indian Thought and Science: Bridging the Past and Present by Dr. Ram Prasad, Springer, 2nd, 2008.		
References:		
1. Encyclopedia of Indian Intellectual Heritage by Dr. Anil Kumar, Oxford University Press, 1st, 2012. 2. Indian Philosophy and Science: A Reference Guide by Dr. Lalit Singh, Cambridge University Press, 2nd, 2014. 3. The Vedic and Post-Vedic Traditions: A Reference Book by Dr. Pradeep Kumar, Routledge, 1st, 2003. 4. Handbook of Indian Knowledge Systems by Dr. Sunita Reddy, Sage Publications, 1st, 2016. 5. Traditional Indian Sciences: An Annotated Bibliography by Dr. Kavita Menon, Springer, 1st, 2020.		
Online Learning Resources		
1. https://onlinecourses.swavam2.ac.in/imb23_mg53/preview 		

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 Department of Civil Engineering

**Course Information:**

Class, Semester	F.Y. B. Tech – Semester I				Category	ES
Course Code, Course Title	2CVES106-Programming for problem solving (C)				Type	L2
Prerequisites	--					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	1	-	2	-	2	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	-	-		50
						ESE
						-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Prepare an algorithm and draw a flowchart to solve various mathematical problems by using structured approach.
CO2	Apply the fundamental concepts like data types, operators to solve mathematical problems by using the C language
CO3	Apply the decision and looping constructs to solve the problems related to decision, repetitive statements for real time problem statement using C language.
CO4	Develop C program to demonstrate the modular approach by using the concept of function, structure and pointer
CO5	Develop C program to demonstrate concepts of file handling

Syllabus:

Module	Contents	Lecture Hours
I	Basics of Programming: The meaning of algorithms, Flowcharts, Pseudo codes, writing algorithms and drawing flowcharts for simple exercises, Memory concepts, C Program development environments.	2
II	Control statements & Looping Constructs: Importance of 'C' Language, History, Structure of 'C' Program, Sample 'C' Program, Constants, variables and data types, Enumeration, Operators and expressions, managing input / output operations, Control Statements-Decision making, Case control & Looping Constructs.	2
III	Array & Structure: The meaning of an array, one dimensional and two-dimensional arrays, declaration and initialization of arrays, reading, writing and manipulation of above types of arrays. Strings -Declaring and initialing character array, reading and writing string to/from terminal, putting strings together, string handling functions Structure - Defining a structure, declaring and accessing structure variables, structure initialization, array of structures.	4
IV	Function: Need of user defined functions, elements of user defined functions Defining functions, return values and their types, function calls, function declaration, methods of parameter passing, Scope rule of functions, user defined and library functions.	2
V	Pointers: Understanding pointers, accessing the address space of a variable, declaring and initialization pointer variables, accessing a variable through its pointer, Void pointer and generic pointer, null pointer. Dynamic memory allocation malloc (), calloc (), realloc (), free ().	3
VI	File Handling: Defining and opening a file, closing a file Input output operations on files, error handling during I/O operations, command line arguments	2
Total Lecture Hours		15


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List of Experiments with CO Mapping			
Sr. No.	Title / Topic of the Experiment		CO Mapped
1	Write an algorithm and Draw flowchart for given problem statement		1
2	Implement program using different data types in C.		2
3	Implement program using different types operators in C.		2
4	Implement C program using Decision control statement (if & if else)		3
5	Implement a C program using Switch case statement		3
6	Implement C program using looping constructs (While & for loops)		3
7	Implement Program to demonstrate 1D Array.		4
8	Implement Program to demonstrate 2D Array.		4
9	Implement Program to demonstrate structure in C.		4
10	Implement Program to demonstrate array of structure in C.		4
11	Implement Program to demonstrate string handling function in c		4
12	Implement Program to demonstrate user defined function in c		4
13	Implement Program to demonstrate recursion function in c		4
14	Implement program to demonstrate pointer in C.		4
15	Implement program to demonstrate file handling in C.		5
Total Practical Sessions		15	Total Practical Hours
			30
Text Books			
1. Yashwant Kanetkar, "Let Us C" 5 th Edition, BPB Publication, 2020.			
2. E. Balguruswamy, "Programming in ANSI C" 4 th Edition Tata Mc-Graw Hill publication, 2008.			
References:			
1. Yashwant Kanetkar, "Test your C Skills" 5 th Edition, BPB Publications, 2013.			
2. Venkateswarlu N.B, Prasad E.V., "C And Data Structures", Chand Publication, 2010.			
Online Learning Resources			
1. https://onlinecourses.nptel.ac.in/noc22_cs40/preview			


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Course Information:								
Class, Semester		FY. B. Tech, Semester - I				Category	PC	
Course Code, Course Title		3CVPC107, Engineering Graphics and Computer aided Drafting				Type	L2	
Prerequisites		---						
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self-Study	Credits	
		2	-		2	2	3	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	-	-		50	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Execute lettering techniques and symbol conventions for civil drawings following standard practices.							
CO2	Construct orthographic and isometric, Perspective views of objects and building components using projection principles.							
CO3	Analyze and draw structural layouts for building components with proper annotations and details.							
CO4	Demonstrate architectural plans and sections of building circulation using drawing conventions.							
CO5	Illustrate simple plan layouts and site arrangements using appropriate CAD layering techniques.							
Syllabus:								
Module		Contents					Lecture Hours	
I		Fundamental of engineering graphics & Orthographic projection Introduction to drawing instrument and their uses. Different types of lines used in drawing practice, the Types of lines, lettering, dimensioning techniques, Orthographic projection definition, principles, Projection methods: First-angle and Third-angle projection (as per BIS standard) Conventions and symbols used in civil drawings (door, window, wall, column, stair, reinforcement bars, materials), Preparation of orthographic views: top/front/side of structural members like RCC column, slab section, lintel					08	
II		Sections of Solids Prisms, Pyramids, Cylinders and Cones in simple positions and inclined to one reference plane and parallel to other. Auxiliary views to determine visibility and complex alignments, Concepts of full section, half section, offset section; hatching conventions Drawing sectional views to reveal internal components of staircases, columns, beams					07	
III		Isometric Projection & Perspective Views Isometric axes, scale, and box method for isometric construction, Conversion of orthographic views into isometric projections, Isometric representation of civil components like T-beams, slabs with openings, stairs, Isometric of simple structural combinations (e.g., column with footing, two-way slab with beams) Perspective Views Introduction, Simple Objects for Perspective Drawing.					08	
IV		Computer-Aided Drafting for Civil Applications Interface, command structure, workspace setup, Basic draw commands: line, polyline, circle, rectangle, arc, modify commands: move, copy, trim, extend, offset, fillet, mirror, Layers: layer creation, naming conventions for civil drawings (wall layer, door/window layer, dimension layer), Annotation: text styles, dimensions, hatching with material symbols (brickwork, RCC, etc.) Plotting: paper size setup, printing with proper scale, layout configuration.					07	
Total Lecture Hours							30	


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List of Experiments with CO Mapping

Sr. No.	Title / Topic of the Experiment	CO Mapped
1	To draw lettering and prepare a standard symbol chart	1
2	To sketch orthographic and isometric views of a chair	2
3	To draw orthographic views of doors and windows as per NBC	2
4	To draw a column and beam layout with proper annotations	3
5	To draw sectional details of a slab and lintel support system	3
6	To draw a detailed plan and section of an isolated footing	3
7	To draw plan, section, and elevation of a staircase	4
8	To create basic geometric drawings using AutoCAD commands	5
9	To draw a simple single room, plan using AutoCAD	5
10	To create a CAD-based site layout for a residential plot	5
Total Practical Sessions		15
Total Practical Hours		30

Text Books

1. M. Chakraborti, "Civil Engineering Drawing," 4th Edition, Laxmi Publications, 2013.
2. Virendra Kumar & S.K. Roy, "Textbook of Building Drawings," 6th Edition, Standard Publishers Distributors, 2009.
3. N.D. Bhatt, "Engineering Drawing," 53rd Edition, Charotar Publishing House, 2016.
4. K. R. Arora, "A Textbook of Engineering Drawing," 3rd Edition, Dhanpatrai & Co., 2009.
5. D.N. Ghose, "Civil Engineering Drawing and Design," 2nd Edition, CBS Publisher's, 2011. V.B. Sikka, "A Course in Civil Engineering Drawing," 5th Edition, S. K. Kataria & Sons, 2012.

References:

1. Bureau of Indian Standards, "National Building Code of India," 2016 Edition, BIS, New Delhi, 2016.
2. M.G. Shah, C.M. Kale, & S.Y. Patki, "Building Drawing with an Integrated Approach to Build Environment," 8th Edition, Tata McGraw Hill, 2014.
3. S.C. Rangwala & P.S. Rangwala, "Building Drawing," 7th Edition, Charotar Publishing House, 2014.
4. K. Venugopal, "Engineering Drawing and Graphics + AutoCAD," New Age International Publishers, 2011.
5. B.P. Verma, "Civil Engineering Drawing and House Planning," 3rd Edition, Khanna Publishers, 2007.

Online Learning Resources

1. NPTEL, "Engineering Graphics and Design," Prof. B. Bhattacharyya, IIT Kharagpur, NPTEL, 2022.
https://onlinecourses.nptel.ac.in/noc21_me128/preview
2. NPTEL, "Engineering Drawing and Computer Graphics," Prof. M.S. Sivakumar, IIT Madras, NPTEL, 2020.
<https://nptel.ac.in/courses/112103019>
3. Design Handbook: Engineering Drawing and Sketching Free guides and tutorials on engineering sketching, orthographic and isometric projection, and drawing conventions
<https://ocw.mit.edu/courses/2-007-design-and-manufacturing-i-spring-2009/pages/related-resources/drawing-and-sketching/>
4. Prof. A.S. Khanna, "Engineering/Architectural Graphics – Part I," NPTEL, IIT Bombay, 2021.
Link: https://onlinecourses.nptel.ac.in/noc21_ar01/preview

Experiments that may be performed through virtual labs:

Sr. No.	Experiment Name	Experiments Links
1.	Engineering Drawing Virtual Lab	https://eg-nitk.vlabs.ac.in/


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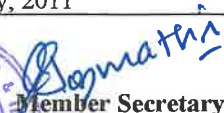

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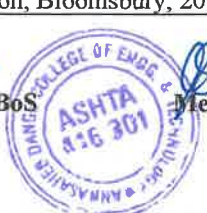

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 Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist.: Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Civil Engineering			
Established: 1999			
Course Information:			
Class, Semester	F. Y. B. Tech – Semester I		Category
Course Code, Course Title	3CVPC108 - Design Thinking		PC
Prerequisites	---		Type
Teaching Scheme (per week)	Lecture	Tutorial	Credits
	--	--	1
Examination Scheme (Marks)	Theory	MSE	ESE
	--	--	--
Course Outcomes (COs):			
Upon successful completion of this course, the student will be able to:			
CO1	Explain the principles and process of Design Thinking and its application in problem-solving.		
CO2	Identify and define real-world problems using user-centric observation and empathy techniques.		
CO3	Conduct user research through surveys, interviews, and persona building to derive user needs and insights.		
CO4	Apply ideation techniques to generate innovative and feasible solutions for identified problems.		
CO5	Develop and present prototypes and communicate their solutions effectively using charts, posters, and model presentations.		
Syllabus:			
Module	Contents		
I	Introduction to Design Thinking, Design Thinking Process		
II	Empathize Phase: Empathy and Ethics, User Perspective, Activities – Empathy Map, Planning, Persona building.		
III	Customer Journey Mapping, Observation of stakeholders, Defining and Conceptualization of problem		
IV	Ideation, Activities – 5 Whys & 1 How, Story boarding, Brainstorming.		
V	Prototype – Types, Mindsets, Tools.		
VI	Testing – Scenario, Methods, Refinements & Recommendations.		
List of Experiments with CO Mapping			
Sr. No.	Title / Topic of the Experiment		CO Mapped
1	Introduction to Design Thinking		1,2
2	Identification of Problems		1,2
3	Selection of Problems		1,2
4	Designing of Empathy Map		1,3
5	Customer Survey and Analysis		1,3
6	Persona Building		1,3
7	Customer Journey Map		1,3
8	Defining the problem		1,3
9	Poster Presentation		1,2,3
10	Ideation		1,4
11	Prototype Building		1,5
12	Testing		1,5
13	Refinement & Recommendation		1,5
Total Practical Sessions		15	Total Practical Hours
			30
Text Books			
1. E Bala Guruswamy, Developing Thinking Skills (The way to Success), First Edition, Khanna Book Publishing Company, 2023			
2. Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation, First Edition, Harvard Business Review, 2008			
3. R T Krishnan & V Dabholkar, 8 steps to Innovation, First Edition, Collins Publishing, 2013			
References:			
1. Nigel Cross, Design Thinking, First Edition, Bloomsbury, 2011			


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2. Idris Mootee, Design Thinking for Strategic Innovation, First Edition, Wiley, 2013

Online Learning Resources

1. NPTEL Design Thinking - A Primer
<https://youtu.be/AamBSYPJlcA?si=wJDNT4L9q1NB-6T9>
2. Design Thinking and Innovation
<https://www.coursera.org/learn/designthinkingandinnovation>

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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist.: Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Civil Engineering							
Course Information:								
Class, Semester		FY. B. Tech, Semester - II			Category	BS		
Course Code, Course Title		3CVBS109, Applied Chemistry			Type	LIT2		
Prerequisites		---						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	-	2	2	4		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1		Explain the properties and applications of engineering materials for industrial and societal use based on their chemical compositions.						
CO2		Discuss methods for preventing corrosion in metals by relating them to corrosion types and environmental conditions using basic chemical principles.						
CO3		Solve the domestic and industrial problems related to water quality parameters using theoretical knowledge and laboratory experiments.						
CO4		Apply the principles of analytical instruments in the analysis of samples with help of foundational practical chemistry knowledge.						
CO5		Compute the calorific values of fuels for domestic and industrial applications using standard fundamental chemical equations.						
Syllabus:								
Module		Contents				Lecture Hours		
I		Water Technology and Management: Introduction, impurities in natural water and it's removal, Water Testing: Acidity, alkalinity, chlorides and hardness of water (definition, causes and significance), WHO Standards. Scales and sludges: Introduction, Formation in boilers and removal, Disinfection of water, Waste water treatment. Treatment of hard water by: Ion- exchange process, Zeolite process, Desalination of brackish water by Reverse osmosis (RO), Numerical on temporary, permanent and total hardness of water.				8		
II		Chemical and Analytical Techniques: Chemical analysis, its types, Different ways to express concentration of solution. Numerical problems. A) p^H-metry: Introduction, pH measurement using glass electrode and its applications. B) Spectrometry: Introduction, Laws of spectrometry (Lamberts and Beer-Lambert's laws). Instrumentation and applications of UV-Visible spectrophotometer. C) Chromatography: Introduction, principle, instrumentation and applications of Thin-Layer chromatography (TLC) and Gas-Liquid chromatography (GLC).				8		
III		Polymers and Composites for Engineering Applications: A) Polymers: Introduction, plastics, thermo-softening and thermosetting plastics, industrially important plastics like urea-formaldehyde, Conducting polymers, Biodegradable polymers. B) Composites: Introduction, Constituents, Fibre-reinforced plastics (FRP) and Glass reinforced plastics (GRP), Cement: Introduction, Manufacture of Portland Cement by wet process, Compositions of Portland Cement, Setting and hardening of cement, Retardants and accelerators, Construction Chemicals.				7		
IV		Energy Technology: A) Batteries: Introduction, Types, Lithium-ion batteries (LIBs), Sodium- ion batteries (Instrumentation, advantages, disadvantages and applications). B) Fuels: Introduction, classification, characteristics of good fuels, types of calorific value (higher and lower), Bomb calorimeter and Boy's calorimeter. Numericals on Bomb and Boy's calorimeter, Introduction to Bitumen. C) Fuel Cells: Introduction, Classification, Alkaline fuel cells: Hydrogen -Oxygen fuel cells (Construction, working and applications).				7		

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V	Corrosion & it's Prevention: Corrosion: Introduction, causes, types of corrosion, Electrochemical corrosion (hydrogen evolution and oxygen absorption mechanisms), Factors affecting rate of corrosion. Prevention of corrosion by: Hot dipping (Galvanizing and tinning), Cathodic protection methods, Electroplating process, Metal cladding, Prevention by organic coatings (Paints and varnishes).	8
VI	Engineering Materials and Green Chemistry: Introduction, classification of engineering materials. Alloys: Types of alloys, purposes of making alloys, Ferrous alloys: Plain carbon steels (mild, medium and high). Nonferrous alloys: Aluminum alloy (Duralumin and Alnico), Nickel alloy (Nichrome), Tin alloys (Solders). Green Chemistry: Definition, Twelve principles of green chemistry, Research and industrial applications, Greenhouse effect and it's remedies.	7
Total Lecture Hours		45

List of Experiments with CO Mapping

Sr. No.	Title / Topic of the Experiment	CO Mapped
1	Determination of acidity of water sample. (Neutralization Titration)	3
2	Determination of alkalinity of water sample. (Acid- Base Titration).	3
3	Determination of chloride content of water by Mohr's method. (Precipitation Titration).	3
4	Determination of total hardness of water sample by EDTA method.	3
5	Preparation of Urea-formaldehyde resin.	1
6	Preparation of Phenol-formaldehyde resin.	1
7	Determination of rate of corrosion of Aluminum in acidic and basic medium	2
8	Estimation of copper in brass solution (Displacement Titration)	1
9	Estimation of zinc in brass solution (Displacement Titration)	1
10	Determination of pH of industrial waste water by using pH meter	4
11	Demonstration of bomb calorimeter to calculate calorific value of fuels.	5
12	Demonstration of Photo-colorimeter.	4
13	Determination of strength of acid/base by using conductivity meter.	4
Total Practical Sessions		15
Total Practical Hours		30

Text Books:

1. S. S. Dara, A Text Book of Engineering Chemistry, 11th Edition, S. Chand & Co. New Delhi, 2008.
2. Shashi Chawla, A Text book of Engineering Chemistry 3rd Edition, Dhanpat Rai Publishing Co. New Delhi, 2007
3. Ziyauddin D. Sande, Vijayalaxmi M. Vairat, Pratap Singh V. Gaikwad, A Text book of Applied Chemistry, 1st Edition, Wiley Publications, 2018

References:

1. Jain & Jain, Engineering Chemistry, 16th Edition, Dhanpatrai Publishing Co., New Delhi, 2015.
2. Wiley India, Engineering Chemistry, 1st Edition, Wiley India Pvt. Ltd., New Delhi, 2012.
3. Chatwal and Anand, Instrumental Methods of Chemical Analysis, 5th Edition, Himalaya Publishing House, Mumbai,
4. B. K. Sharma, Industrial Chemistry, 10th Edition, Goel publication (P) Ltd., 1999
5. S. K. Singh, Fundamentals of Engineering Chemistry, 1st, New Age International (P) Ltd, New Delhi, 2009

Online Learning Resources:

1. Water Technology-- https://youtu.be/dKWJzp_rriE
2. For lithium-ion batteries (LIBs): <https://www.youtube.com/watch?v=DBLHaLhyo2w>

Experiments that may be performed through virtual labs:

S. No.	Experiment Name	Experiments Links
1.	Water analysis-Determination of Chemical parameters	https://inoc-amrt.vlabs.ac.in/exp/water-analysis-chemical-parameters/index.html
2.	Demonstration of Photo-colorimeter	https://pcvamrt.vlabs.ac.in/exp/spectrophotometry/index.html


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 Department of Civil Engineering

**Course Information:**

Class, Semester	FY. B. Tech, Semester - II				Category	BS
Course Code, Course Title	3CVBS110, Applied Mathematics-II				Type	T1
Prerequisites	3CVBS102, Applied Mathematics-I					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	3	1	--	2	4	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		40	20	40		ESE
						-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Determine equation of a curve and compute statistical measures to analyze data using statistical techniques
CO2	Express functions in series form Using Maclaurin's and Taylor's expansion
CO3	Use appropriate methods to solve integrals using special functions
CO4	Determine unknown values from tabulated data using finite difference and interpolation techniques.
CO5	Compute Area and Mass of a region using multiple integrals

Syllabus:

Module	Contents	Lecture Hours
I	Curve fitting and Statistics: Method of Least Squares, Fitting of Straight Line, Fitting of Parabola, Fitting of exponential curves, Lines of Regression.	8
II	Expansion of Functions and Indeterminate Forms: Maclaurin's series Taylor's series, Standard expansions, Expansion of function using Standard series, Indeterminate forms.	7
III	Special Functions: Introduction to special function, Gamma function, Properties of Gamma function, Beta function, Properties of Beta function, Relation between Beta and Gamma functions, error function and its properties.	7
IV	Statistical Measures: Introduction, Arithmetic Mean, Geometric Mean, Harmonic Mean, Median, Mode, Partition values: Quartiles, Deciles and Percentiles, Concept of dispersion, Range, Quartile Deviation, Mean Deviation, Mean Square Deviation, Variance and Standard Deviation.	8
V	Finite Differences and Interpolation: Finite differences, Forward and Backward Difference Newton's forward Interpolation formula, Newton's backward Interpolation formula, Stirling Interpolation formula, , Newton's Divided Difference, Lagrange's interpolation formula.	8
VI	Multiple Integral and Its Applications: Double Integrals, Triple integral, Change of Order of Integration, Change to polar coordinates, Applications to Area and Mass of plane lamina.	7
Total Lecture Hours		45

List of Tutorial with CO Mapping

Sr.No	Title of Tutorial	CO Mapped
1	Fitting of straight line and Second-degree parabola	1
2	Fitting of exponential curves and lines of regression	1
3	Expansions of functions using Maclaurin's and Taylor series	2
4	Indeterminate forms.	2
5	Gamma and Beta functions	3
6	Measures of Central tendency	1
7	Measures of dispersion	1
8	Interpolation with equal intervals	4
9	Interpolation for unequal intervals	4
10	Evaluation of multiple integrals	5
Total Practical Sessions	15	Total Tutorial Hours
		30


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Text Books	
1.	N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8th Edition, Laxmi Publications ,2011.
2.	H. K. Das, Advanced Engineering Mathematics, 22th Edition, S. Chand ,2018.
3.	B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010
4.	Dr. B. S. Grewal, Numerical Methods, 9th Edition, Khanna Publishers, 2010
References:	
1.	Dr. B. S. Grewal, Higher Engineering Mathematics, 44th Edition, Khanna Publishers ,2018.
2.	N. P. Bali, Manish Goyal, Advanced Engineering Mathematics, 7th Edition, Infinity science press ,2010.
3.	P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-I, 9th Edition Pune Vidyarthi GrihaPrakashan,1984
4.	P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-II, 7th Edition Pune Vidyarthi Griha Prakashan,1988.
5.	S. C. Gupta, V. K. Kapoor, Fundamental of Mathematical Statistics, 10th Edition Sultan Chand and Sons Publisher,2000.
Online Learning Resources	
1.	NPTEL Course on Engineering Mathematics-I, by Prof. Jitendra Kumar, IIT Kharagpur https://nptel.ac.in/courses/111105121
2.	NPTEL Course on Numerical Methods, by Prof. Ameeya Kumar Nayak, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107105
3.	NPTEL Course on Matrix Analysis with Application, by Prof. S. K. Gupta, Prof. Sanjeev Kumar, IIT Roorkee https://nptel.ac.in/courses/111107112
4.	NPTEL Course Business Statistics, by Prof. Mukesh Kumar Barua, IIT Roorkee https://nptel.ac.in/courses/110107114



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 Department of Civil Engineering

**Course Information:**

Class, Semester	FY. B. Tech, Semester - I				Category	ES
Course Code, Course Title	3CVES111, Engineering Mechanics				Type	LFT2
Prerequisites	---					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	3	-	2	2	4	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	ESE
		40	20	40	CIA 50	-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Demonstrate force and moment equilibrium laws for force systems using resolution and experimental validation.
CO2	Compute beam reactions and Construct SFD-BMD for determinate beams using equilibrium principles.
CO3	Calculate the forces in members of roof truss under point load by using experimental and analytical methods.
CO4	Determine centroid and moment of inertia for composite plane laminas using parallel and perpendicular axis theorems.
CO5	Analyze particle motion and impact for rectilinear motion using D'Alembert's principle.

Syllabus:

Module	Contents	Lecture Hours
I	Introduction to Engineering mechanics Basic concept - Particle, rigid body, force system, types of force system, law of transmissibility of force, resolution of a force, composition of forces, resultant force, moment of force,	07
II	Equilibrium Concept of Equilibrium, Conditions of equilibrium, Lami's Theorem Beam: Types of beams, types of support for beam, types of loads acting on beam, reactions at support. shear force and bending moment diagram for statically determinate beam (simply supported, cantilever, overhanging beam)	08
III	Analysis of Truss Introduction of truss, types of trusses, determinacy of a truss, assumption for analysis of truss, Analysis of truss using method of joint and method of section.	08
IV	Centroid Introduction to Centroid and Centre of Gravity, Centroid of standard figures, Centroid of composite figures, Friction	07
V	Moment of Inertia Moment of Inertia, Moment of Inertia of Standard shapes, Parallel and perpendicular axis theorem, Moment of Inertia of plain and composite figures, Radius of Gyration.	08
VI	Dynamics Introduction of dynamics, Kinetics and Kinematics, Rectilinear motion, Kinetics of linear motion, D'Alembert's principle and its applications, Impact and momentum, Collision of elastic bodies	07
Total Lecture Hours		45

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List of Experiments with CO Mapping		
Sr. No.	Title / Topic of the Experiment	CO Mapped
1	To verify law of polygon of forces using force table.	1
2	To verify lami's theorem using force table.	1
3	To verify law of moments by Bell crank lever.	1
4	To calculate support reactions of beam.	2
5	To compute centroid of plain lamina.	4
6	To calculate coefficient of friction of different material surfaces.	1
7	To Solve numerical on force system and beam.	1, 2
8	To calculate forces in member of truss with their nature.	3
9	To find out support reactions of a beam using software.	2
10	To calculate forces in member of truss using software.	3
Total Practical Sessions		15
Total Practical Hour		30
Text Books		
1. S. Ramamrutham, "Engineering Mechanics," 9th Edition, DhanpatRai Publishing Company (P). Ltd, 2010. 2. R. K. Bansal and Sanjay Bansal, "Engineering Mechanics," 6th Edition, Laxmi Publications Pvt. Ltd., 2013. 3. K. L. Kumar, "Engineering Mechanics," 4th Edition, Tata McGraw Hill Education, 2012. 4. S. B. Junnarkar, "Engineering Mechanics," 16th Edition, Charotar Publications, 2011. 5. S.S. Bhavikatti, "Engineering Mechanics," 4th Edition, New Age International Pvt. Ltd., 2012.		
References:		
1. S. P. Timoshenko and D. H. Young, "Engineering Mechanics," 3rd Edition, McGraw Hill Publishers, 2006. 2. F. P. Beer and E. R. Johnson, "Vector Mechanics for Engineers Vol.-I and II," 6th Edition, Tata McGraw Hill Education, 2011. 3. Ferdinand Singer, "Engineering Mechanics: Statics & Dynamics," 9th Edition, Harper and Row Publications, 2009. 4. S. Rajasekaran, "Fundamentals of Engineering Mechanics," 3rd Edition, Vikas Publishing House Pvt. Ltd., 2005. 5. Irving H. Shames, "Engineering Mechanics," 5th Edition, Prentice Hall of India, New Delhi, 2011.		
Online Learning Resources		
1. NPTEL, "Engineering Mechanics," Prof. U.K. Saha, IIT Guwahati, NPTEL, 2015. https://nptel.ac.in/courses/112103108		
2. NPTEL, "Engineering Mechanics," Prof. U.K. Saha, IIT Guwahati, NPTEL, 2015. https://nptel.ac.in/courses/112103108		
3. MIT Open Course Ware, "Statics and Materials," Prof. Simona Socrate, MIT, 2007. https://ocw.mit.edu/courses/1-050-solid-mechanics-fall-2004/pages/lecture-notes/		
4. Skyciv Software: https://skyciv.com/free-beam-calculator/ , https://skyciv.com/free-truss-calculator/		
Experiments that may be performed through virtual labs:		
Sr. No.	Experiment Name	Experiments Links
1.	Basic Engineering Mechanics and Strength of Materials Virtual Lab	https://eerc01-iirth.vlabs.ac.in/





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Course Information:

Class, Semester	FY. B. Tech, Semester - II				Category	PC
Course Code, Course Title	3CVPC112, Building Planning and Drawing				Type	LIT2
Prerequisites	----					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	2	-	2	2	3	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		40	20	40		50
						ESE
						-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Explain procedure for building permission and interpret drawings for residential and public buildings using municipal and working drawings.
CO2	Apply planning and design principles to various residential and public building types meeting functional and circulation requirements.
CO3	Classify staircases, doors, and windows based on types, materials, and construction requirements to ensure functional building design.
CO4	Describe plumbing systems, electrification types, and fire resistance requirements for buildings essential for safety and functionality.
CO5	Prepare site visit reports and produce building plans and working drawings for residential buildings including foundation, furniture layout, electrification, and water supply and drainage systems.

Syllabus:

Module	Contents	Lecture Hours
I	Openings & Staircase: Stairs: Technical terms, requirements of a good stair, uses, types, Materials for construction. Ramps, lifts and escalator. Design of stairs (Dog Legged, quarter turn and Open Well). Doors - Classification, Teak wood Paneled Door, Flush Door, Aluminum Glazed Doors, Steel Doors, fixtures and fastening. Windows - Classification, Teakwood Glazed Windows, Aluminum, Glazed Windows, Steel Windows, UPVC Windows, fixtures and fastening	8
II	Planning of Residential Building: Procedure of Building Permission Understanding of municipal drawings and working drawing Bungalows, Row Bungalows, and Twin Bungalows Hostels, apartments, Farmhouses, cottages	7
III	Design of Public Building: Principles of planning for functionality, circulation, Procedure for Building Permission, Understanding approval process Design of Educational Buildings, Design of Healthcare Buildings, Design of Commercial Buildings, Design of Institutional Buildings	7
IV	Plumbing & Electrification & Fire resistance in building: Plumbing: Plumbing system, Materials used for plumbing work. Various types of traps, Fittings, Chambers, Septic Tank, and Concept of Plumbing & Drainage plan. Electrification: Types of wiring and materials, Requirements & Location of various points. Concept of Earthing. Fire resistance: Fire resistant construction and fire safety requirements for buildings	8
Total Lecture Hours		30

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List of Experiments with CO Mapping		
Sr. No.	Title / Topic of the Experiment	CO Mapped
1	Draw the plan of existing residential building by taking measurements on site and prepare a site visit report	5, 1
2	Draw plan of bungalow	2, 5
3	Draw Municipal Submission drawing of proposed residential building	1, 5
4	Draw working drawing of Foundation / Center Line of designed building	5
5	Draw working drawing of Furniture layout plan of designed building	5
6	Draw working drawing of Electrification plan of designed building	4, 5
7	Draw working drawing of Water supply and drainage plan of designed building	4, 5
Note: Draw first plan on drawing sheet manually. Prepare all other drawings using AutoCAD software.		
Total Practical Sessions	15	Total Practical Hours
		30
Text Books		
1. N. Kumara Swamy and A. Kameswara Rao, Building Planning and Drawing, 9th Revised Edition, Charotar Publishing House Pvt. Ltd., 2023. 2. S. S. Bhavikatti and M. V. Chitawa, Building Planning and Drawing, I.K. International Publishing House, 2018. 3. M. G. Shah, C. M. Kale, and S. Y. Patki, <i>Building Drawing</i>, 5th Edition (Reprint), Tata McGraw-Hill Publications Pvt. Ltd., 2011. 4. D. N. Ghose, <i>Civil Engineering Design & Drawing</i>, 2nd Edition, CBS Publications & Distributors Pvt. Ltd., 2010. 5. Dr. B. C. Punmia and Ashokkumar Jain, <i>Building Construction</i>, 12th Edition, Laxmi Publications Pvt. Ltd., 2025. 6. S. P. Bindra and S. P. Arora, <i>Building Construction</i>, 5th Edition, Dhanpat Rai Publications Pvt. Ltd., 2005		
References:		
1. B.I.S. New Delhi, SP 7 – National Building Code Group 1 to 5 2. B.I.S. New Delhi, I.S. 962 – 1989 Code of Practice for Architectural and Building Drawings 3. V. B. Sikka, <i>Civil Engineering Drawing</i>, 5th Edition, S. K. Kataria & Sons, 2008. 4. Sandeep Mantri, <i>Practical Building Construction & Its Management</i>, 10th Edition, Satya Prakashan, 2011–12. 5. B. P. Verma, <i>Civil Engineering Drawing and House Planning</i>, Khanna Publishers, 2017. 6. S. K. Duggal, <i>Building Materials</i>, 5th Edition, New Age International, 2017. 7. S. Kaleem A. Zaidi, <i>Drawing and Design of Residential and Commercial Buildings</i>, CBS Publishers, 2018.		
Online Learning Resources		
1. NPTEL, "Fundamentals of Building Construction," Dr. P.K. Ghosh and Mr. Gaurav Kumar Agrawal, Chhattisgarh Swami Vivekanand Technical University, Bhilai, NPTEL, 2015. https://nptel.ac.in/courses/112103108 2. NPTEL, Construction Materials, Prof. Ashutosh Kumar, IIT Roorkee, 2020. https://nptel.ac.in/courses/105106149		

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**Course Information:**

Class, Semester	FY. B. Tech, Semester - II				Category	PC
Course Code, Course Title	3CVPC113, Construction Materials				Type	T1
Prerequisites	---					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	2	-	-	2	2	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		40	20	40		ESE
						-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Classify construction materials into natural, artificial, traditional, and modern categories for Indian civil engineering projects using relevant material properties and IS code criteria.
CO2	Analyze the composition, hydration reactions, and quality test results of OPC, PPC, and lime per IS standards for real-world cementitious applications.
CO3	Evaluate structural, aesthetic, and durability properties of common building materials—bricks, steel, aggregates, plastics, wood, and glass using Indian construction case studies.
CO4	Compare formwork and scaffolding systems (timber, steel, aluminum, plastic, modular) for economy, reuse potential, and safety in typical infrastructure projects.
CO5	Summarize the criteria for selecting bricks, blocks, aggregates, and stones based on their properties and construction needs in civil engineering projects.
CO6	Describe the environmental benefits and performance characteristics of alternative materials such as fly ash, GGBS, silica fume, recycled aggregates, bamboo, stabilized mud blocks, and geopolymers in Indian construction.

Syllabus:

Module	Contents	Lecture Hours
I	Introduction to Construction Materials Introduction to various types of construction materials used in civil engineering works. Engineering properties of construction materials such as strength, durability, density, thermal conductivity, and permeability. Cement and Lime Types of cement including OPC, PPC, and other special cements; IS codes and their importance. Composition of Portland cement, Bogue compounds, hydration process, and the role of water. Standard tests for cement quality.	07
II	Applications and Properties of Building Materials Applications and essential properties of commonly used building materials such as bricks, steel, cement, aggregate, plastic, aluminium, water, mild steel (M.S.), stainless steel (S.S.), FRP sheets, gypsum, wood, glass, stone, tiles, bitumen, and ceramic. Bricks, Blocks, Aggregates, and Stones Classification and properties of burnt clay bricks and AAC blocks with IS standards. Aggregates: Classification, physical and mechanical properties. Stones: Types, selection criteria, and uses in foundation, cladding, and aesthetics.	08
III	Formwork and Scaffolding Formwork: Requirements, types, materials used (timber, steel, aluminium, plastic), and their applications. Factors affecting formwork economy, reuse, and removal time. Introduction to scaffolding systems, types, stability considerations, and safety aspects in construction. Modern trends in modular formwork and prefabricated systems.	08
IV	Sustainable Building Materials Introduction to sustainable and eco-friendly construction materials. Use of industrial waste materials like fly ash, GGBS, silica fume, and recycled aggregates. Introduction to smart materials and green building products. Study of bamboo, stabilized mud blocks, and geopolymers as alternative construction materials. Relevance of sustainability in modern construction and environmental impact.	07
Total Lecture Hours		30

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Text Books

1. S.P. Bindra and S.P. Arora, A Text-Book of Building Construction, 5th Edition, Dhanpat Rai Publications, 2023.
2. G.C. Sahu and Joygopal Jena, Building Materials and Construction, 1st Edition, McGraw Hill Education, 2019.
3. P.C. Verghese, Building Materials and Building Construction, 2nd Edition, PHI Learning, 2009.
4. S.K. Sharma, A Textbook of Building Construction, 5th Edition, S. Chand Publishing, 2018.

References:

1. B.C. Punmia, Building Construction, 12th Edition, Laxmi Publications, 2025.
2. G.C. Sahu and Joygopal Jena, Building Materials and Construction, 1st Edition, McGraw Hill Education, 2019.
3. Sandeep Mantri, "The A To Z of Practical Building Construction and its Management," 1st Edition, Satya Prakashan, 2010.
4. Michael S. Mamlouk and John P. Zaniwski, Materials for Civil and Construction Engineers, 4th Edition, Pearson, 2021.

Online Learning Resources

1. NPTEL, Basic Construction Materials, Swayam, 2021.
https://onlinecourses.nptel.ac.in/noc21_ce10/preview
2. NPTEL, Modern Construction Materials, 2020.
https://onlinecourses.nptel.ac.in/noc20_ce05/preview



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Department of Civil Engineering

**Course Information:**

Class, Semester	FY. B. Tech, Semester - II					Category	HS
Course Code, Course Title	3CVHS114, Communication Skills					Type	L2
Prerequisites	---						
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits		
	-	--	4	-	2		
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
	-	-	-	-	-	50	-

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Demonstrate the Listening, Speaking, Reading and Writing (LSRW) skills considering the frame of English language rules accurately for effective and sound communication in academic and profession contexts.
CO2	Exhibit their portfolio and career choices confidently, considering corporate expectations by using digital tools convincingly.
CO3	Write letters, reports, Emails and Blogs proficiently by following required techniques that help in getting acquainted with professional correspondence.
CO4	Attain professional skill while convincingly presenting on allotted topics using MS PowerPoint and AI techniques.
CO5	Justify own role in communicative events in well-organized manner with balanced zeal.

List of Experiments with CO Mapping

Sr. No	Title / Topic of the Experiment	CO Mapped
1	Self - Introduction	1
2	SWOT Analysis	1
3	Basics of English Pronunciation	1
4	Rapid Review of Grammar	1
5	Diagnosing Listening and Speaking Skills	1
6	Diagnosing Reading and Writing Skills	1
7	Introduction to MS Office (Word, Excel, PPT)	1,4
8	Presenting my career choices	1,2
9	Preparing Portfolio	1,2
10	Describing Technical Charts, Image, and Processes	1,4
11	Using Language Learning Apps and Tools	1,4
12	Presenting Portfolio	1,2
13	Effective Presentation Skills	1,4
14	Delivering Power Point Presentation	1,4,5
15	Job Application and Resume Writing	1,3
16	Email Writing	1,3
17	Group Discussion	1,5
18	Public Speaking	1,5
19	Report Writing	1,3
20	Organizing an Event	1,5
21	Technical Writing	1,3
22	Blog Writing	1,3
23	Mock Interview	1,2,5
24	Achievement Test	1
Total Practical Sessions	30	Total Practical Hours
		60

Text Books

1. The Professional: Defining the New Standard of Excellence at Work Subroto Bagchi Penguin Books India Pvt. Ltd. Revised Edition, 2011.
2. Cambridge Guide to IELTS. Pauline Cullen, Amanda French, Cambridge University Press, Reprint, 2017.
3. A Practical Course in Effective English-Speaking Skills. J. K. Gangal, PHI Learning Private Limited, New Delhi,


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Print, 2012
4. English For Engineers. Dr. Shyamji Dubey, Dr. Manish Kumar. Vikas Publication House Pvt. Ltd. New Delhi, Print, 2020.
5. Personality Development and Soft Skills. Barun K. Mitra, Oxford University Press, New Delhi, 7 th impression, 2012.
References:
6. High-school English Grammar and Composition. Wren and Martin, S. Chand and Co., New Delhi, 1 st edition, 2015.
2. The Ace of Soft Skills. Ajai Chowdry, Bala Balchandran, Pearson Publication, Delhi, 8 th edition, 2017.
3. Effective Technical Communication. M. Ashraf Rizvi, McGraw Hill Education, Chennai, 2 nd edition, 2017.
4. Business Communication. Horry Sankar Mukerjee, Oxford University Press, New Delhi, 2 nd edition, 2013.
5. Communicative English for Engineers and Professionals. Nitin Bhatnagar, Mamta Bhatnagar, Pearson Publication, Delhi, 1 st edition, 2013.
Online Learning Resources
5. Software: Pronunciation apps (e.g., ELSA Speak, Speak English), grammar checkers (e.g., Grammarly).
6. Online Platform Coursera (for basic English courses), Duolingo, BBC Learning English.



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 Department of Civil Engineering

**Course Information:**

Class, Semester	F. Y. B. Tech, Semester - II				Category	VSEC
Course Code, Course Title	3CVVS115, IDEA Laboratory				Type	L2
Prerequisites	--					
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	1	-	4	-	2	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
	--	--	--	--		50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Operate basic workshop tools for material processing and assembly
CO2	Make simple 2D and 3D designs using CAD software and prepare them using 3D printing, laser cutting, or CNC machining
CO3	Build basic electronic circuits using sensors, LEDs, motors, and microcontrollers
CO4	Apply fundamental programming concepts in embedded C (Arduino IDE) for controlling hardware and automating simple tasks.
CO5	Integrate mechanical parts and electronics to design and build working models or prototypes.

Syllabus:

Module	Contents	Lecture Hours
I	Overview of IDEA Lab Introduction to the IDEA Lab: Vision, objectives, National Innovation Ecosystem (IIC, Atal Innovation Mission, NISP), Importance of multi-disciplinary, project-based learning Inspirational case studies from IDEA Labs, Safety protocols, Do & Don'ts in IDEA Lab.	1
II	Fundamentals of Design & Prototyping Design Thinking Basics: Problem identification, ideation, prototyping, testing, and iteration, Introduction to CAD Software: Concepts of 2D and 3D modeling for various applications, File Formats for Fabrication: Understanding STL, DXF, G-Code, SVG, and their uses, Tolerances, fits, and design constraints for manufacturing.	2
III	Digital Fabrication Technologies 3D Printing: Principles, types of 3D printers, materials, slicing software, and applications. Laser Cutting & Engraving: Principles, types of lasers, materials, design considerations, and safety. CNC Router: Introduction to CNC Router and Mini Desktop Lathe cum Milling operations, G-code fundamentals, material removal processes. 3D Scanning: Principles of 3D scanning, applications in reverse engineering and quality control. PCB Fabrication: Introduction to PCB Milling Machine and PCB Prototype Machine for custom circuit boards.	3
IV	Fundamentals of Embedded Systems & IoT Basic Electrical and Electronic Concepts: Voltage, current, resistance, Ohm's Law, and fundamental components (resistors, capacitors, diodes, LEDs, sensors, actuators), Measuring Instruments Overview of microcontrollers: Overview of Arduino, ESP32, Node MCU, and their applications in controlling hardware. Circuit simulation using Tinker CAD or Proteus. IoT Basics: Basic networking (Bluetooth/Wi-Fi/Ethernet), cloud integration	3
V	Programming for automation Arduino IDE and Embedded C Programming: Setup, basic syntax (setup(), loop()), digital and analog I/O control. Basic Control Systems: Concepts of open-loop and closed-loop control with simple examples. Introduction to Python.	3


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VI	Project Planning and IPR	3
	Innovation Process: From idea generation to concept validation	
	Project Planning & Management: Defining scope, setting timelines, budgeting, and resource allocation.	
	Documentation and Presentation: Writing a concept note, creating innovation posters, and effective pitching techniques.	
	Intellectual Property Rights (IPR): Basics of Patents, Copyrights, and Trademarks relevant to innovation.	
Total Lecture Hours		15

List of Experiments with CO Mapping

Sr. No.	Title / Topic of the Experiment	CO Mapped
1	Introduction, Lab Safety & Tool Familiarization	1
2	Handas on practice of Mechanical Workshop Tools	1
3	3D Printing of simple parts	2
4	Laser Cutting	2
5	CNC Routing/ Engraving	2
6	Basic Electronics circuit	3
7	PCB Design and Prototyping	3
8	Microcontroller Programming and Sensor Interfacing	4
9	Mini Project	5
Total Practical Sessions		30
Total Practical Hours		60

Text Books

1. Veeranna D.K., AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual), 1st Edition, Khanna Book Publishing Company, 2022
2. Saji T. Chacko, Susan S. Mathew, AICTE's Prescribed Textbook: Fundamentals of Electrical and Electronics Engineering (with Lab Manual), 1st Edition, Khanna Book Publishing Company, 2024
3. Mehta S.D., Electronic Product Design Volume - I (Basics of PCB Design), 1st Edition, S Chand & Company, 2011
4. Mehta-Gupta, Y.P.Mehta, Vishal Mehta, Workshop Calculation and Science, 1st Edition, Dhanpat Rai Publications, 2020

References:

1. A. K. Maini, Nakul Maini, All-in-One Electronics Simplified, 1st Edition, Khanna Book Publishing Company, 2021
2. J.G. Joshi, Electronics Measurements & Instrumentation, 1st Edition, Khanna Book Publishing Company, 2025
3. Dr. Sabrie Soloman, 3D Printing & Design, 1st Edition, Khanna Book Publishing Company, 2020
4. Kaushik Kumar, Hridayjit Kalita, Workshop/Manufacturing Practices, 5th Edition, S Chand & Company, 2011

Online Learning Resources

1. NPTEL Course on 3D Printing and Design for Educators, By Dr. Sharad K. Pradhan, NITTTR Bhopal
https://onlinecourses.swayam2.ac.in/ntr24_ed17/preview
2. NPTEL Course on Electronic Systems Design: Hands-on Circuits and PCB Design with CAD Software, By Prof. Ankur Gupta, IIT Delhi https://onlinecourses.nptel.ac.in/noc24_ee127/preview

Experiments that may be performed through virtual labs:

S. No	Experiment Name	Experiments Links
1.	3D Printing Virtual Simulation Lab	https://3dp-dei.vlabs.ac.in/
2.	Digital Fabrication of Flexible Circuit board	https://fab-coep.vlabs.ac.in/exp/digital-fabrication/
3.	Embedded System Design with 8051 and PIC Microcontroller	https://esd-coep.vlabs.ac.in/



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(An Empowered Autonomous Institute)

Department of Civil Engineering

**Course Information:**

Class, Semester	FY. B. Tech, Semester - I				Category	CC
Course Code, Course Title	3BSCC121, Introduction to Yoga and Mindfulness				Type	L2
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	-	-	02	-	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	-	-		50
						ESE

Course Outcomes (COs) :

Upon successful completion of this course, the student will be able to:

CO1	Describe the significance and practical applications of yoga for holistic well-being under guided classroom sessions, ensuring coverage of physical, mental, and spiritual aspects.
CO2	Explain the role of subtle energy systems (chakras, Nadi's) in health enhancement using yogic practices, showing linkage to at least two health benefits.
CO3	Compare different paths of yoga (Bhakti, Jnana, Karma, Raja) through readings and discussions, citing at least one key practice and outcome for each.
CO4	Demonstrate the Eight Limbs of Yoga in practical sessions, reflecting personal integration of at least four limbs in daily habits or behavior.
CO5	Apply yoga and mindfulness techniques in real-life stress situations to improve emotional resilience, showing measurable improvement in two or more psycho-somatic areas.

Practice Session

No	Contents	CO Mapped
1	Introduction to Yoga Practice and Warming Up Exercises Overview of yoga philosophy and benefits. Practice basic stretching and warm-up routines. Introduction to breath awareness and mindfulness.	1,5
2	Omkar, Prathana and types of Asanas, Surya Namaskar. Practice of Chant Omkar and opening prayer for mental centering. Perform Surya Namaskar and learn its 10-step sequence. Explore basic asana types: standing, sitting, supine.	1,4
3	Sleeping position Asanas Practice of Setubandhasana, Pawanmuktasana, ChakrasaSetuBandhasana, Understand the effects on back, digestion, and spine.	1, 2
4	Opposite sleeping position Practice of Bhujangasana, shalbasana, Dhanurashan, Makrasana Focus on strengthening the back and improving posture.	1, 2
5	Seating Position Practice of Padmaasana, Vajrasana, Gaumukhasana, Vakrasana Learn their benefits for digestion and meditation readiness.	1, 4
6	Standing Position Practice of Tadasana, Vruksasana, Trikonasana, Virasana. Emphasize balance, posture, and muscular endurance.	1, 4
7	Meditation Guided practice of breath-based (Anapan) and insight (Vipassana) meditation. Focus on observation without judgment.	4, 5
8	Mantra meditation Practice chanting and internal repetition of mantras. Use traditional mantras for focus and mental calm.	4, 5
9	Yognidra Perform deep relaxation technique (guided Yoga Nidra). Experience body awareness and mental stillness.	4, 5
10	Pranayam 1 Practice Anulom Vilom (alternate nostril), Bhramari (humming bee), and Sheetali (cooling breath). Focus on breath control and emotional regulation.	2, 5
11	Pranayam 2 Practice Sitkari and Kapalabhati. Learn their effects on metabolism, energy, and clarity.	2, 5
12	Tratak	4, 5

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	Perform Tratak (candle gazing) for concentration. Understand through demonstration or video.			
	Total Practical Sessions	15	Total Practical Hours	30
Text Books				
1. Yog Jeevan. Dr. Chakote Riya 1st Edition 2016				
2. Yog Parchichaya Mandlik Guruji Nashik Mandlik Guruji Second Edition 2020				
References:				
1. Yoga for Modern Age Vethathiri Edition 16 th 2023				
2. Maharishi, Simplified Physical Exercises Vethathiri Edition I - 2014				



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 Department of Civil Engineering

**Course Information:**

Class, Semester	FY. B. Tech, Semester - I				Category	CC
Course Code, Course Title	3BSCC122, Physical Fitness and Lifestyle Management				Type	L2
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	-	-	02	--	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	-	-		50
						ESE
						-

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Explain the fundamentals of physical education and its role in developing holistic well-being.
CO2	Demonstrate appropriate fitness practices and techniques to improve cardiovascular endurance, strength, and flexibility.
CO3	Apply principles of wellness, including nutrition, sleep, and stress management, to maintain a healthy lifestyle.
CO4	Integrate yoga, mindfulness, and relaxation techniques to promote mental well-being and emotional balance.
CO5	Design a personalized lifestyle management plan based on fitness assessment, health goals, and Behaviour change strategies.

Practice Session

No	Contents	CO Mapped
1	Introduction to Physical Education Understand the meaning and objectives of physical education. Learn its role in promoting health, fitness, and overall well-being. Explore career options and importance in daily life.	1
2	General Warm up Practice dynamic warm-up routines before workouts. Increase heart rate and blood circulation to muscles. Prevent injuries and improve workout performance.	2
3	Limbering down exercises, Free hand exercises, Cooling down exercises Perform safe cool-down techniques post activity. Reduce muscle soreness and stiffness. Bring heart rate back to normal gradually.	2
4	Stretching exercises / Flexibility exercises Improve range of motion in joints. Reduce muscle tension and prevent injuries. Learn static and dynamic stretching methods.	2
5	Fitness Evaluation 1 mile run and walk, Push-ups, seat ups, Seat and reach and BMI. Assess personal fitness using 1-mile run, push-ups, sit-ups, etc. Calculate BMI to understand body composition. Set personalized fitness goals based on results.	5
6	Aerobic activities Perform rhythmic activities to improve cardiovascular health. Engage in exercises like jogging, skipping, or dance aerobics. Enhance lung capacity and endurance.	2
7	Sports and games (Cricket, Volleyball, basketball, Kho-Kho, Kabaddi, Athletics) Play team games like Cricket, Volleyball, Kabaddi, etc. Develop teamwork, coordination, and sportsmanship. Improve motor skills and physical agility.	2
8	Sports and games (Badminton, Table Tennis, Chess) Participate in games like Table Tennis, Badminton, Chess. Improve reflexes, concentration, and decision-making. Promote mental sharpness and social interaction.	4
9	Circuit Training, Strength Activities Perform multiple exercises in a sequence (circuit). Focus on building muscular strength and stamina. Use minimal equipment for maximum benefit.	2
10	Agility and Coordinative activities Practice quick movement drills to improve reflexes. Enhance body coordination and balance. Develop speed and reaction time.	2
11	Body weight exercises Do exercises like push-ups, squats, lunges, and planks. Improve strength using your own body resistance. No need for gym equipment.	2
12	Functional training Mimic real-life movement patterns (bending, lifting, reaching). Improve daily functional strength and flexibility. Prevent posture-related problems.	3

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Total Practical Sessions	15	Total Practical Hours	30
Text			
Test, Measurement and Evaluation in Sports and Physical Education. 5 th ed., Friends Publications, 2023.			
Rules of Games and Sports Updated version, Khel Shaitya Kendra, 2023.			
References:			
1 Beashel, Paul, and John Taylor. <i>Physical Education: Essential Issues</i> . Hodder Stoughton, 1997.			
2 Sodhi, H. S., and S. K. Sidhu. <i>Physique and Selection of Sportsmen</i> . Punjab Publishing House, 1984.			



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 Department of Civil Engineering

**Course Information:**

Class, Semester	FY. B. Tech, Semester - I				Category	CC
Course Code, Course Title	3BSCC123, Six Sigma Happiness and Mind Mechanics				Type	L2
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	-	-	02	--	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	-	-		50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Analyze personal life patterns and decision-making processes using visual tools like life maps and time audits to improve self-awareness and productivity.
CO2	Identify and modify recurring behavioral or emotional challenges using root cause analysis and habit-tracking techniques
CO3	Apply reflective and psychological tools such as the Gratitude Journal, PERMA Wheel, and mindfulness meditation to enhance emotional well-being.
CO4	Utilize creative thinking and visualization techniques such as mind mapping, personal development canvas, and flow activities to enhance planning and motivation.
CO5	Formulate and monitor measurable personal goals using SMART criteria and Six Sigma strategies to construct a structured self-improvement and lifestyle plan.

Practice Session

No	Contents	CO Mapped
1	Life Process Mapping Understand personal daily patterns. Identify meaningful and unproductive activities. Improve decision-making awareness. Build a visual blueprint of life routines.	1
2	Time Audit Diary Track hourly usage of time. Identify time-wasters and focus zones. Increase productivity through reflection. Learn prioritization techniques.	1,2
3	Root Cause Analysis Find root causes behind repeated problems. Use cause-effect diagrams (Fishbone). Develop problem-solving skills. Prevent recurring emotional or behavioral setbacks.	1
4	Habit Tracker Creation Monitor progress of personal habits. Encourage accountability and consistency. Recognize triggers and patterns. Reinforce good habits using visual tools.	3
5	Control Chart for Habits Apply Six Sigma's statistical approach to habits. Track habit frequency over time. Identify variation in behavior patterns. Improve self-control and discipline.	3
6	Gratitude Journal Practice daily reflection on positive moments. Enhance emotional well-being. Reduce stress and negativity. Cultivate a habit of appreciation.	4
7	PERMA Wheel Self-Assessment. Evaluate happiness using 5 key pillars (Positive emotion, Engagement, Relationships, Meaning, Achievement). Identify strengths and gaps in life satisfaction. Build awareness of emotional and social well-being. Create a personalized improvement plan.	4
8	Flow Activity Practice Engage in high-focus enjoyable activity. Understand the "flow" mental state. Boost intrinsic motivation. Reduce distractions and increase creativity.	4
9	Mind Mapping the Brain Visually organize thoughts and plans. Stimulate right and left brain together. Enhance memory, planning, and clarity. Strengthen problem-solving and goal-setting.	1, 5
10	Guided Mindfulness Meditation Practice breath work and awareness techniques. Reduce anxiety and mental fatigue. Increase present-moment awareness. Build emotional balance.	4
11	Personal Development Canvas Create a visual profile of strengths, values, and aspirations. Encourage strategic self-	5

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	improvement. Connect life areas (career, personal, social). Track personal growth visually.	
12	SMART Goal Setting + Six Sigma Define Specific, Measurable, Achievable, Relevant, Time-bound goals. Integrate Six Sigma process for goal monitoring. Improve consistency in self-development. Align actions with purpose and metrics.	5
Total Practical Sessions		12
Total Practical Hours		15
References:		
1 S. Radhakrishnan, An Idealist View of Life, 2015, HarperCollins.		
2. Yogi Kochhar, Six Sigma Happiness (English Edition).		
3 An idealist way of Life – S Radhakrishnan		



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**Course Information:**

Class, Semester	FY. B. Tech, Semester - I					Category	CC
Course Code, Course Title	3BSCC124, Creativity through Visual Arts					Type	L2
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits		
	-	-	02	--	1		
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	-	-		50	

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Identify and apply the elements of art—line, shape, color, texture, and space—through various drawing and painting techniques.
CO2	Demonstrate creativity and technical skills in using different mediums such as pastels, pen & ink, and water-based paints.
CO3	Create original prints using simplified printmaking techniques such as relief, intaglio, and monoprint methods.
CO4	Design visually appealing digital artwork such as posters, icons, and layouts using basic digital tools.
CO5	Analyze and reflect on personal artwork and peer creations to improve visual communication and aesthetic understanding.

Practice Session

No	Contents	CO Mapped
1	Fundamentals of Visual arts Introduction to elements of art: line, shape, colour, texture, space. Practice drawing with pencil and charcoal using simple objects and shapes. Explore light and shade for 3D effects.	1
2	Basic Graphic Design Learn principles of alignment, contrast, hierarchy, and balance. Create a basic visual composition using text and image elements. Use sketching or digital tools for layout planning.	2
3	Typography & Font Design Study of typefaces: serif, sans-serif, script, decorative. Draw custom fonts and stylized letters. Create a short phrase using hand-drawn typography.	2
4	Logo Design Understand logo types: symbolic, text-based, combination marks. Design a logo for a fictional company or cultural event. Focus on clarity, colour choice, and relevance.	4
5	Poster Design Choose a theme: social message, event, awareness, culture. Develop layout and imagery using water colour, pen & ink, or digital tools. Apply principles of visual hierarchy and focal point.	4
6	Photography Task: Lines & Angles Capture photographs focusing on geometric lines, angles, and symmetry. Submit 3–5 original photographs with a short description of each. Discuss visual impact and framing.	1, 5
7	Digital Infographic Design Choose a topic (e.g., Indian innovations, clean energy, internet safety). Create a digital infographic using free tools like Canva or PowerPoint. Combine icons, minimal text, and visuals to communicate clearly.	4
8	Visual Metaphor Drawing Select a concept (e.g., freedom, growth, technology) and represent it visually. Use drawing techniques to convey metaphor without text. Encourage creativity and symbolic thinking.	3,5
9	Calligraphic strokes of Devnagari Practice traditional and artistic Devanagari calligraphy. Use ink pens or brush pens to form characters. Create a short meaningful phrase in decorative calligraphy.	2
10	Collage on Innovation in India Use newspapers, magazines, or printed material. Prepare a collage on topics like ISRO, start-ups, or digital India. Emphasize arrangement, contrast, and theme clarity.	3,5
11	Modern Arts Introduction and fundamental of modern art, Study abstract and modern Indian Artists Create an abstract or modern art piece using acrylics, pastels, or digital tools. Focus on expression and experimentation.	3,5

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12	Geometric Pattern Design Create a detailed design using compass, ruler, or digital drawing. Highlight symmetry, color, and repetition	1,2
Total Practical Sessions		12
Total Practical Hours		15
References:		
1. The New Drawing on the Right Side of the Brain. Archer Perigee, 2012.		
2. Digital Illustration: A Master Class in Creative Image-making. Roto vision, 2010.		
3. A History of Indian Painting: The Modern Period. Abhinav Publications, 1994.		
4. Basics of Visual Art. New Academic Publishing, 2015.		

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Department of Civil Engineering

**Course Information:**

Class, Semester	FY. B. Tech, Semester - I				Category	CC
Course Code, Course Title	3BSCC125, Community Engagement through NSS				Type	L2
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	-	-	02	--	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	-	-		ESE
						50

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Identify the structure and needs of the local community through direct engagement and observation.
CO2	Analyze community issues and participate in collaborative problem-solving activities.
CO3	Demonstrate social and civic responsibility by applying engineering knowledge in real-world social contexts.
CO4	Develop teamwork, leadership, and democratic values through community mobilization and shared responsibility.
CO5	Respond effectively to emergencies and promote national integration, unity, and social harmony through participation in relevant campaigns and awareness programs.

Practice Session

No	Contents	CO Mapped
1	Cleanliness Drive (Swachh Bharat Abhiyan) Conduct campus and neighborhood cleaning. Raise awareness about hygiene and waste segregation.	1,2,3
2	Tree Plantation Plant saplings in college or public areas. Educate the community on environmental benefits.	1,3
3	Road Safety Campaign Conduct rallies, skits, or poster campaigns. Spread awareness about traffic rules and safe driving.	2,3,5
4	Health Check-up Camp Organize basic health screening with medical professionals. Promote hygiene, nutrition, and disease prevention.	1,2,5
5	Literacy Drive Teach basic reading and writing to underprivileged children or adults. Distribute learning materials and encourage regular attendance.	1,3,5
6	Voter Awareness Campaign (SVEEP) Inform citizens about voter rights and the election process. Promote ethical voting through posters and street plays.	2,3,5
7	Plastic-Free Campus Initiative Educate peers on the harmful effects of plastic. Conduct collection drives and promote reusable alternatives.	2,3
8	Cultural and Heritage Promotion Organize folk art, dance, and storytelling sessions. Engage the community in preserving local culture.	3,5
9	Yoga and Wellness Sessions Conduct yoga and mindfulness sessions for students and locals. Promote physical and mental health through regular practice.	3,4
10	Self-Defense Training for Girls Organize practical training on basic self-defense techniques. Empower girls with safety awareness and confidence.	4,5
11	Social Contribution Orphanage/ Old age home visit Hold discussions or exhibitions on gender, caste, and social equality. Encourage inclusive behavior and respect for diversity.	3,4,5
12	Digital Literacy Program Teach basic smartphone and internet use to the elderly or untrained groups. Promote safe and	2,3,5

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	productive use of digital tools		
	Total Practical Sessions	15	Total Practical Hours 30
References:			
1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.			
2. Government of Karnataka, NSS cell, activities reports and its manual.			
3. Government of India, NSS cell, Activities reports and its manual.			

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**Course Information:**

Class, Semester	FY. B. Tech, Semester - I				Category	CC
Course Code, Course Title	3BSCC126, Cultural Exploration & Heritage				Type	L2
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits	
	-	-	02	--	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA
		-	-	-		50
						ESE

Course Outcomes (COs):

Upon successful completion of this course, the student will be able to:

CO1	Identify and describe key elements of cultural heritage including tangible, intangible, and natural heritage with real-life examples.
CO2	Demonstrate understanding of regional and national cultural practices through participation in experiential activities.
CO3	Analyze the significance of preserving cultural heritage in the context of globalization and modernization.
CO4	Collaborate in group projects to creatively document and present cultural themes using various mediums.
CO5	Reflect critically on personal and collective cultural identities through journals, discussions, and presentations.

Practice Session

No	Contents	CO Mapped
1	Introduction to Cultural Exploration and Heritage Understand the meaning of tangible, intangible, and natural heritage, Discuss real-life examples of cultural elements. Reflect on how culture shape's identity.	1,5
2	Heritage Mapping/ Case Study on a Heritage Site Choose a local region or community. Identify and locate key cultural sites (temples, festivals, crafts). Create a visual or digital heritage map. Present findings in written or visual format	1,3,4
3	Vaidik Tal Vadya Songs and Music tradition Introduction to Vedic Music, Demonstration of Vaidik Tal Vadya, Listening Session of Vedic Chants & Samagana, Group Singing of a Vedic Verse or Traditional Bhajan	2, 5
4	Folk Dance Watch or participate in folk dance. Discuss the significance, costumes, and music of each. Compare cultural roots and evolution.	2, 4
5	Traditional Music Dholki, Tabala, Dhol, Lezim Listen to selected regional or classical music samples. Identify the instruments, lyrics, and cultural setting.	2, 4
6	Traditional Instrumental Taal, Tritaal, Tabala Observe or perform simple rhythms or melodies. Explore the cultural and ceremonial use of instruments.	1, 2
7	Singing Types of singing, Vocal Singing Introduction to music fundamentals	2, 4
8	Drama Introduction, Types, Information about acting, Stage information, Present / performance on stage	4,5
9	Classical dance, Western dance Introduction to classical, and western dance demonstrations. Different types	2, 4
10	Karaoke Singing Introduction, Types, Basic music information	2, 4
11	Short film Prepare short film, Present / performance on stage, Topic concern with Indian Cultural heritage	3, 4, 5
12	Final Showcase Present all your work in a class exhibition. Explain the cultural significance of each project. Receive peer and teacher feedback.	4, 5

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Total Practical Sessions	15	Total Practical Hours	30
Text Books			
1. Nrutasaurabha Manjiri Shriram Dev XII 2015			
2. Indian Art and Culture, Nitin Singhanian McGraw Hill Education IV 2022			
3. The Wonder That Was India Picador India Second 2004			
4. The National Culture of India National Book Trust (NBT), India Second 2016			
References:			
1. Bhattacharyya, Haridas, editor. <i>The Cultural Heritage of India</i> . The Ramakrishna Mission Institute of Culture, multiple volumes, revised ed.			
2. Singhanian, Nitin. <i>Indian Art and Culture</i> . 4th ed., McGraw Hill Education, 2022.			
3. Basham, A. L. <i>The Wonder That Was India</i> . Picador India, 2004.			
4. Joki Lehto, Jukka. <i>A History of Architectural Conservation</i> . 2nd ed., Routledge, 2017.			

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Course Information:													
Class, Semester		S.Y.B. Tech, Semester - III					Category	PC					
Course Code, Course Title		3CVPC201, Mechanics of Solids					Type	LIT2					
Prerequisites		-----											
Teaching Scheme (per week)		Lecture		Tutorial		Practical		Self-Study		Credits			
		3		--		2		3		4			
Examination Scheme (Marks)		Theory	MSE		TA		ESE		Practical	CIA		ESE	
			40		20		40			50		--	
Course Outcomes (COs):													
Upon successful completion of this course, the student will be able to:													
CO1		Apply the concepts of mechanics to calculate stress and strain in different types of bars using standard analytical relations.											
CO2		Construct shear force and bending moment diagrams for determinate beams using analytical methods.											
CO3		Analyze torsional behavior in different sectional configurations using torsion equations and compatibility conditions.											
CO4		Determine bending and shear stresses in different beam sections using theory of pure bending.											
CO5		Assess the elastic stability of columns to predict buckling loads using Euler's and Rankine's theories.											
CO6		Apply experimental methods to determine mechanical properties of materials using suitable laboratory instruments.											
Syllabus:													
Module		Contents										Lecture Hours	
I		Stress and strain Introduction to elasticity, plasticity, brittleness and strength of materials, types of stresses and strains, stress-strain diagrams, Hooke's law, Behavior of composite sections, Compound bar and temperature stresses, Elastic constants and their relationships.										7	
II		Bending moment and shear force in beams Introduction, relationship between loading, shear force and bending moment, shear force and bending moment equations, identification of point of contraflexure, SFD and BMD with salient values for cantilever beams, simply supported beams and overhanging beams considering point loads, UDL, UVL and couple, calculate reactions and loadings from SFD and BMD (Reverse Method).										8	
III		Torsion Stresses, strains and deformation in determinate and indeterminate shafts of hollow and solid sections of homogeneous and composite materials subjected to torque, power transmitted through shaft										7	
IV		Bending stresses in beams Theory of pure bending, curvature of a beam, Assumptions, flexure formula, moment of resistance of cross section, flitched beam, bending stress distribution diagrams for symmetrical and unsymmetrical sections.										8	
V		Shear stresses in beams Shear stresses in beams of various commonly used sections such as rectangular, triangular, T, circular and I section, Average and maximum shear stress, Concept of shear center.										7	
VI		Elastic stability of columns Introduction – short and long columns, Euler's theory on columns, Effective length, Slenderness ratio, Radius of gyration, Buckling load, Assumptions, Derivations of Euler's buckling load for different end conditions, Limitations of Euler's theory, Rankine's formula and problems.										8	
Total Lecture Hours											45		

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Laboratory Work with CO Mapping:

Sr. No.	Title of Lab Work	CO Mapped
1	Tension test on mild steel and tor steel	6
2	Compressive strength test on timber	6
3	Compressive strength and water absorption test on bricks	6
4	Compressive strength and water absorption test of different construction materials	6
5	Abrasion Test on Flooring Tiles	6
6	Brinell and Rockwell hardness test on different metals	6
7	Impact test on different metals	6
8	Bending test on timber	6
9	Shear test on different bars	6
10	Shear center test for channel section	6
11	Assignments: One assignment per unit	1,2,3,4,5
Total Practical Sessions		10
Total Tutorial Hours		0

Text Books:

1. Singh, D.K., *Strength of Materials*, Springer International Publishing, 2021.
2. Bansal, R.K., *Strength of Materials*, Laxmi Publications, New Delhi – 110002, India, 2018.
3. Ramamrutham, S. and Narayan, R., *Strength of Materials*, Dhanpat Rai Publishing Co. Pvt. Ltd., 2017.
4. Rajput, R.K., *Strength of Materials*, S. Chand Publishing, New Delhi – 110002, India, 2016.
5. Junnarkar, S.B., *Strength of Materials*, Charotar Publishing House Pvt. Limited, 2015.

References:

1. Raghu Kumar, B., *Strength of Materials*, CRC Press (Taylor & Francis Group), London, 1st Edition, 2022.
2. Beer, F.P. and Johnston, E.R., *Mechanics of Materials*, Tata McGraw-Hill Publishing Company, 7th Edition, 2014.
3. Pytel, A. and Kiusalaas, J., *Mechanics of Materials*, Cengage Learning, USA, 2nd Edition, 2011.
4. Timoshenko, S. and Young, D.H., *Strength of Materials*, McGraw-Hill Book Company, 4th Edition, 2006.
5. Gere, J.M. and Timoshenko, S.P., *Mechanics of Materials*, CBS Publishers and Distributors, 2nd Edition, 2004.

Online Learning Resources

1. <https://youtu.be/MzZMPZzS1NY?si=FMriO1IShdYQid9J>
2. https://youtu.be/IcQiaXheQJI?si=AkmBGQOd_0Meh2Wl
3. <https://youtu.be/EkcgtgVNfxg?si=bbkTVNAVLmn98UkF>
4. <https://youtu.be/uprNzNRcPTg?si=woHzjmbSrHe9l1XO>
5. <https://youtu.be/nNcfzNjJlU?si=hmJc2xItm299MogH>
6. <https://youtu.be/5aDa30ym8RI?si=d6NKjVeuzy7-5sY6>
7. nptel.ac.in/courses/105101085


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Course Information:									
Class, Semester		S.Y.B. Tech, Semester - III					Category	PC	
Course Code, Course Title		3CVPC202, Construction Management and Economics					Type	T1	
Prerequisites		-----							
Teaching Scheme (per week)		Lecture		Tutorial		Practical		Self-Study	Credits
		3		--		--		3	3
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			40	20	40		--	--	
Course Outcomes (COs):									
Upon successful completion of this course, the student will be able to:									
CO1		Apply the principles of management for decision making by using the management theories.							
CO2		Make use of ABC and EOQ technique for optimizing inventory of construction project.							
CO3		Compare the most feasible solution or investment option for a construction project using appropriate economic techniques.							
CO4		Apply industrial legislations and basic financial statements for given construction scenarios, with correct legal compliance and financial understanding.							
CO5		Analyze quality management concepts and tools in construction projects, by selecting suitable methods to ensure effective quality improvement.							
Syllabus:									
Module		Contents						Lecture Hours	
I		Elements of Management Definitions of management, Principle of management (Henry Fayol), Functions of management, Decision Making: Process, Decision Tree, Management theories-Neoclassical theory and Maslow's theory. Role of management agencies and stakeholders in construction projects.						7	
II		Inventory Management Objectives, Need for Inventory Control, EOQ Analysis, ABC analysis, Safety Stock, Purchase Procedure, Stores Record. (Introduction to material management software and digital tracking)						7	
III		Industrial Act- Workman Compensation Act, Minimum Wages Act, Child Labour Act, The Contract Labour Act, Contract Labour (Regulation and Abolition) Act. Financial management: Introduction to standard forms of financial statements, balance-sheet, profit and loss, and income statement. (Use of AI and digital tools in planning and cost control)						8	
IV		Economics: Importance, Time Value of Money, Equivalence Present Worth Method, Equivalent Uniform Annual Cost method (EUAC), Future worth method.						8	
V		Economic Comparison Methods: Linear Break Even Analysis, Net Present Value, Rate of Return, Payback Period Method, Benefit- Cost Ratio						8	
VI		Quality Management: Quality Circle, difference between Quality control & Quality Assurance (QA/QC), Total quality control (TQC) and Total Quality Management (TQM), Need for TQM in construction industry, monitoring for quality - PDCA Cycle, 360° feedback for quality, Concept of Six Sigma.						7	
Total Lecture Hours							45		
Text Books:									
1. K.K. Chitkara, Construction Project Management: Planning, Scheduling and Controlling, 4 th Edition, Tata McGraw-Hill Education, 2026.									
2. K.K. Ahuja, S.P. Dozzi, & S.M. AbouRizk, Project Management: Techniques in Planning and Controlling Construction Projects, 3 rd Edition, John Wiley & Sons, 2021.									
3. P.K. Chatterjee, Construction Management and Accounts, 2nd Edition, Tata McGraw-Hill, 2016.									
4. Raghuvanshi & Ahuja, Construction Planning and Management, 3 rd Edition, S. Chand & Company, 2024.									
5. H. Kerzner, Project Management: A Systems Approach to Planning, Scheduling, and Controlling, 14 th Edition (2024), Wiley.									

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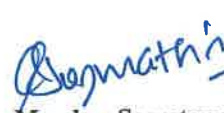
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References:

1. **S.S. Bhavikatti**, *Construction Project Management*, **3rd Edition** (2022), New Age International
2. **Prasanna Chandra**, *Financial Management: Theory & Practice*, **11th Edition** (2023), McGraw-Hill Education.
3. **Dale H. Besterfield, et al.**, *Total Quality Management*, **5th Edition** (2020), Pearson Education.
4. **S. Anil Kumar & N. Meenakshi**, *Materials Management: An Integrated Approach*, Latest Edition, PHI Learning.
5. **R. Girishankar**, *Construction Management & Accounts*, **3rd Edition** (2023), Tata McGraw-Hill.
6. **I.M. Pandey & A. Pandey**, *Financial Management*, **12th Edition** (2024), Vikas Publishing House.

Online Learning Resources

1. <https://www.coursera.org/learn/construction-project-management>
2. <https://www.coursera.org/learn/construction-scheduling>
3. <https://www.coursera.org/specializations/construction-management>
4. <https://www.nptelprep.in/courses/105103093>
5. <https://www.nptelprep.in/courses/105104161/videos>


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Course Information:								
Class, Semester	S.Y.B. Tech, Semester - III						Category	PC
Course Code, Course Title	3CVPC203, Surveying and Geomatics						Type	LIT1
Prerequisites	3CVES103							
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits			
	3	--	2	3	4			
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE	
		40	20	40		50	50	
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Apply fundamental surveying concepts for field measurements and preparation of survey outputs under standard working conditions.							
CO2	Utilize levelling and contouring principles for elevation and related computations with systematic procedure.							
CO3	Examine measurement data for establishing and adjusting survey networks with identification of possible errors.							
CO4	Analyze geospatial data using suitable digital tools for map development and spatial analysis.							
CO5	Implement satellite-based positioning methods for accurate coordinates under field survey conditions.							
CO6	Evaluate integrated survey information for project requirements using modern geospatial technologies							
Syllabus:								
Module	Contents							Lecture Hours
I	Fundamentals of Surveying Basic Principle of Surveying, Types of surveying, Classification of Survey, Scale, Types of Scale, Errors and Type of Errors, Levelling and Contouring Introduction of Levelling, Study and use of various levels, types of levelling, Temporary and Permanent adjustment of dumpy level, Contours: Contour intervals, characteristics of contours, methods of contouring, Interpolation of contours, drawing contours, uses of contour maps. Area and Volume Calculation: Area- Trapezoidal, Simpson's rule, Volume –Trapezoidal, and Prismoidal rule for Earthwork							8
II	Theodolite Surveying Various parts and axis of transit, technical terms, horizontal and vertical angles, methods of repetition and reiteration, Trigonometrical Levelling, Introduction to Theodolite Traversing, Gales traverse Table. Tacheometry Surveying Principle, Uses of tacheometry, Instruments used in tacheometry, Determination of tacheometric constants, Systems of tacheometric surveying - stadia system fixed hair method.							8
III	Geographical Information Systems (GIS) Overview of GIS, Definitions, Components, Applications GIS Data, Models Projections and Coordinate Systems, Digitizing, Attribute Data, Spatial Data, Spatial Analysis, Implementation. Issues and the Future of GIS, Introduction to any GIS Software.							6
IV	Curves Significance of curves and curve setting, Classification of curves, Elements of simple, compound, reverse, transition, combined curve, setting out of curves Hydrographic Surveying Introduction, Purpose of hydrographic survey, Methods of hydrographic survey, mean sea level, tide gauges, location of soundings, equipment for taking soundings							9
V	Remote Sensing (RS) Definition, Physics of Remote Sensing, Electromagnetic Radiation and its Interactions with atmosphere, Aerial Photographs, Active and Passive Sensors, Drone Surveying Introduction to Drone Surveying, Drone Technological Survey, Data processing.							7

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VI	GNSS, Global Navigation Satellite Systems (GNSS), Overview of satellite navigation systems: GPS, GLONASS, Galileo, BeiDou, Basic concepts of positioning: coordinate systems, ellipsoid, geoid, datum, GNSS system segments: space, control, and user segments Global Positioning System (GPS) Concept and need of Differential GPS (DGPS), Working principle of DGPS, Types of DGPS: local DGPS, wide-area DGPS, real-time DGPS, Introduction to RTK GNSS and SBAS, Applications of GNSS and DGPS in surveying and civil engineering	7
Total Lecture Hours		45
Laboratory Work with CO Mapping:		
Sr. No.	Title of Lab Work	CO Mapped
1	Study and Use of Advanced Surveying Instruments: Study of Dumpy level, Auto level, Digital level, Study of Theodolite, Total Station, GNSS receiver	1
2	Digital / Auto Level Survey: Levelling using Auto or Digital level	1,2
3	Contouring Using Total Station: Spot level data collection using Total Station, Generation of contour map using software	1,2
4	Area and Volume Computation Using Software: Area computation from Total Station data Earthwork volume calculation using trapezoidal and prismoidal rules	3
5	Measurement of Horizontal and Vertical Angles Using Theodolite: Precise angle measurement, Repetition and reiteration methods	3
6	Traversing Using Total Station: Closed traverse using Total Station, Data downloading and coordinate computation, and Traverse adjustment and plotting	3
7	Tacheometric Survey Using Total Station: Distance and elevation measurement, Comparison between stadia and electronic methods	2, 3
8	GIS-Based Mapping and Spatial Analysis: Import of Total Station / GNSS data into GIS, Digitization and attribute creation, Basic spatial analysis and map generation	4
9	Hydrographic Survey – Instrument-Based Demonstration: Use of echo sounder / depth measurement techniques	2
10	GNSS Survey Using Handheld / Survey-Grade Receiver: Static or rapid static GNSS observation, Coordinate determination	5
11	DGPS / RTK GNSS Survey Project: (Mini Project – Group Work) DGPS or RTK-based survey	5, 6
12	Drone Surveying Project (Capstone Practical – Group Work), Flight planning and mission execution, Data acquisition using UAV,	5, 6
Text Books:		
1. Bannister, A., Raymond, S., & Baker, R., <i>Surveying</i> , 8th Edition, Pearson Education, 2022.		
2. Punmia, B.C., Jain, A.K., & Jain, A.K., <i>Surveying and Levelling</i> , Vol. I & II, 19th Edition, Laxmi Publications, 2021.		
3. Duggal, S.K., <i>Surveying</i> , Vol. I & II, 6th Edition, Tata McGraw-Hill Education, 2020.		
4. Hofmann-Wellenhof, B., Lichtenegger, H., & Collins, J., <i>GPS: Theory and Practice</i> , 7th Edition, Springer, 2019.		
5. Wolf, P.R., & Ghilani, C.D., <i>Elementary Surveying: An Introduction to Geomatics</i> , 15th Edition, Pearson, 2020.		
6. Campbell, J.B., & Wynne, R.H., <i>Introduction to Remote Sensing</i> , 5th Edition, Guilford Press, 2019.		
References:		
1. Kanetkar, T.P., & Kulkarni, S.V., <i>Surveying and Levelling</i> , Vol. I & II, 3rd Edition, Pune Vidyarthi Griha Prakashan, 2010.		
2. Arora, K.R., <i>Surveying</i> , Vol. I, II & III, 10th Edition, Standard Book House, 2013.		
3. Wolf, P.R., Ghilani, C.D., & Baugh, L.M., <i>Elementary Surveying: An Introduction to Geomatics</i> , 14th Edition, Pearson Education, 2014.		
4. Kaplan, E.D., & Hegarty, C.J., <i>Understanding GPS/GNSS: Principles and Applications</i> , 2nd Edition, Artech House, 2006.		
5. Lillesand, T.M., Kiefer, R.W., & Chipman, J.W., <i>Remote Sensing and Image Interpretation</i> , 7th Edition, Wiley, 2015.		

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Online Learning Resources	
1.	https://geodesy.noaa.gov/web/science_edu/online_lessons/index.shtml
2.	https://gisrsstudy.com/meaning-of-gis/
3.	https://onlinecourses.swayam2.ac.in/aic20_ge05/preview
4.	https://questgis.co.in/
5.	https://onlinecourses.nptel.ac.in/noc26_ce12/preview


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Course Information:							
Class, Semester	S.Y.B. Tech, Semester - III					Category	PC
Course Code, Course Title	3CVPC204, Hydrology and Water Resource Engineering					Type	T1
Prerequisites	-----						
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits		
	3	--	-	3	3		
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		40	20	40		-	-
Course Outcomes (COs):							
Upon successful completion of this course, the student will be able to:							
CO1	Analyze hydrological processes such as precipitation, infiltration, and rainfall-runoff relationships for water resource assessment using observed data.						
CO2	Evaluate surface water resources, runoff characteristics, and flood estimation methods for effective water resource planning and management.						
CO3	Assess groundwater systems, aquifer properties, and sustainable groundwater management practices under varying field conditions.						
CO4	Analyze irrigation systems, reservoir operations, and agricultural water management strategies for optimal water utilization.						
CO5	Apply modern tools such as GIS, software, and AI-based techniques for water resource analysis, planning, and decision-making.						
Syllabus:							
Module	Contents						Lecture Hours
I	Hydrological Processes for Water Resource Assessment: Precipitation - types, measurement, and analysis, Mass curve, IDF curves, and rainfall frequency analysis, Depth-area-duration analysis.						7
II	Surface Water Resources, Runoff Analysis, and Flood Management: Runoff processes and rainfall-runoff relationship, Hydrograph analysis and base flow separation, Unit hydrograph applications in water resource projects, Flood estimation methods and flood forecasting concepts, AI-based flood prediction and reservoir inflow forecasting.						8
III	Streamflow Measurement and Surface Water Resource Evaluation: Stream gauging and discharge measurement methods, Flood estimation and design flood concepts, Role of streamflow data in water resource projects, Introduction to GIS for surface water assessment, Watershed delineation and yield estimation using GIS and AI tools.						7
IV	Groundwater Resources and Sustainable Management: Occurrence and movement of groundwater, Aquifer properties and groundwater potential, Groundwater balance and resource estimation, Water logging, land drainage, and reclamation.						8
V	Irrigation Water Management and Agricultural Water Resources: Role of irrigation in water resource development, Crop water requirement and irrigation efficiencies, Command area planning and irrigation scheduling, Assessment of irrigation water demand, AI-based decision support systems for irrigation water management						8
VI	Reservoirs, Dams, and Integrated Water Resource Systems: Role of reservoirs in water resource engineering, Classification and components of dams, Seepage, stability, and safety of dam structures, Reservoir operation and flood moderation concepts, Minor water resource structures: percolation tanks, KT weirs, lift irrigation, AI-based reservoir operation and dam safety monitoring systems						7
Total Lecture Hours						45	

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Text Books:	
1.	Subramanya, K., <i>Engineering Hydrology</i> , 4th Edition, Tata McGraw-Hill, New Delhi, 2017
2.	Reddy, P. Jaya Rami, <i>Hydrology</i> , 3rd Edition, Laxmi Publications, New Delhi, 2016.
3.	Raghunath, H.M., <i>Engineering Hydrology</i> , 3rd Edition, New Age International Publishers, New Delhi, 2016.
4.	Garg, S.K., <i>Irrigation Engineering</i> , Vol. I, 2nd Edition, Khanna Publishers, New Delhi, 2012.
References:	
1.	Sharma, R.K., <i>Hydrology and Water Resources</i> , 4th Edition, Dhanpat Rai & Sons, New Delhi, 2018
2.	Michael, A.M., <i>Irrigation Theory and Practice</i> , 2nd Edition, Vikas Publishing House, New Delhi, 2015
3.	Varshney, R.S., Gupta, S.C., & Gupta, S.C., <i>Theory and Design of Irrigation Structures</i> , Vols. I, II & III, 2nd Edition, New Chand & Brothers, New Delhi, 2015
Online Learning Resources	
https://www.youtube.com/watch?v=-xvYLEttdpM&list=PLk7ptZcI9vmjfCu_XR0XxdhGnPZRf0EAI	


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Course Information:								
Class, Semester		S. Y. B. Tech, Semester - III				Category	ES	
Course Code, Course Title		3CVES205, Differential Equations and Calculus				Type	T1	
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self-Study	Credits	
		2	-		-	2	2	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:								
CO1		Solve differential equations using appropriate mathematical methods to analyze beam deflection and column buckling problems.						
CO2		Utilize vector calculus concepts under given field conditions to solve civil engineering problems involving gradients, divergence, and flow analysis.						
CO3		Analyze probability distributions under uncertain conditions to solve civil engineering reliability and risk-related problems.						
CO4		Apply partial differential equations and Fourier series using standard solution techniques to model and solve engineering phenomena such as heat transfer and wave propagation.						
Syllabus:								
Module		Contents					Lecture Hours	
I		Higher Order Linear Differential Equations and Applications: Linear Differential Equation with constant coefficients-Definition, Rules to find complementary function, Methods to find Particular Integrals Applications: Deflection of beam, Column Buckling (Stability of Structures)					8	
II		Vector Calculus: Vector function, Differentiation of vector function, Vector differential operator, Gradient of scalar point function, Curl and Divergence of vector point function, Directional derivatives. Applications in Civil engineering: Fluid flow analysis, heat transfer in concrete, groundwater/seepage analysis, stress-strain analysis in structures, wind flow around buildings, and slope analysis in surveying.					7	
III		Probability Distribution: Discrete Probability Distribution: Binomial Distribution, Poisson Distribution, Continuous Probability Distribution: Exponential Distribution, Uniform Distribution, Normal Distribution. Applications in Civil engineering: Reliability analysis of structures, traffic flow modeling, rainfall and flood prediction, service life estimation of materials, and analysis of waiting times in construction processes.					7	
IV		Applications of Partial Differential Equations: Partial differential equations, Separation of variables, introduction to Fourier series (Euler's formulae only), Solutions of one dimensional diffusion (heat) equation; first and second order one-dimensional wave equation and two-dimensional Laplace equation.					8	
						Total Lecture Hours	30	
Text Books								
1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, 8th Ed., Laxmi Publications ,2011.								
2. H. K. Das , Advanced Engineering Mathematics , 22th Edition, S. Chand ,2018.								
3. B. V. Ramana, Higher Engineering Mathematics, 6th Edition, Tata McGraw Hill Publ., 2010								
4. S. C. Gupta & V. K. Kapoor, Fundamentals of Mathematical Statistics, Khanna Publishers, 12th Edition, 2020								

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References:

1. Dr. B. S. Grewal , Higher Engineering Mathematics , 44th Edition, Khanna Publishers ,2018.
2. N. P. Bali, Manish Goyal , Advanced Engineering Mathematics , 7th Edition, Infinity science press ,2010.
3. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-I, 9th Edition Pune Vidyarthi GrihaPrakashan,1984
4. P. N. Wartikar and J. N. Wartikar, A text book of Applied Mathematics Vol-II, 7th Edition Pune Vidyarthi Griha Prakashan,1988.

Online Learning Resources

1. <https://www.youtube.com/playlist?list=PLvOAhlnL7H4D199DRFipx5Zem4SY75w-C>
2. <https://www.youtube.com/playlist?list=PLbRMhDVUMngflrZCNOyPZwHUU1pP66vQW>
3. https://www.youtube.com/playlist?list=PLU6SqDYcYsfLRq3tu-g_hvkHDcorrtcBK
4. https://www.youtube.com/watch?v=RtVE2Gt-KQ4&list=PL3xPXGtUXh7ctk8B_-jhEVT74oM0MSxf


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Course Information:								
Class, Semester		S.Y.B. Tech, Semester - III					Category	VS
Course Code, Course Title		3CVVS206, Computer-Aided Public Building Design and Drawing					Type	L1
Prerequisites		3CVES103, 3CVPC107						
Teaching Scheme (per week)		Lecture	Tutorial	Practical		Self-Study		Credits
		–	--	4		2		2
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			--	--	--		50	50
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1		Apply Unified Development Control and Promotion Regulations (UDCPR) provisions to design line plans of public buildings with functional efficiency and regulatory compliance.						
CO2		Prepare the plan, elevation and section of existing and proposed public building in accordance with the provisions of Unified Development Control and Promotion Regulations (UDCPR) and the National Building Code (NBC) of India.						
CO3		Develop the working drawing of public building considering foundation, furniture, electrification, water supply and drainage						
CO4		Develop a site visit report for a public building by evaluating its merits and demerits based on site observations, submission drawings, and working drawings, with reference to the provisions of the UDCPR and the NBC.						
CO5		Draw the municipal drawing of public building by using AutoCAD software with the reference to UDCPR.						
Laboratory Work with CO Mapping:								
Sr. No.		Title of Lab Work					CO Mapped	
1		Prepare a study report on prerequisites for planning of public buildings with reference to Unified Development Control and Promotion Regulations (UDCPR), types of public buildings, and their specifications using AutoCAD software.					1	
2		Prepare a site visit report of a public building including building units and areas, principles of planning, building bye-laws, staircase details, water supply system, drainage system, septic tank, and water tank along with merits & demerits using AutoCAD software.					4	
3		Draw four different line plans of public buildings based on UDCPR provisions and planning principles & building byelaws using AutoCAD software.					1	
4		Draw the measured plan of an existing public building based on site measurements and observations using AutoCAD software.					2	
5		List and design functional units of a proposed public building with area calculations (300–1000 m ²) using AutoCAD software.					2	
6		Draw the plan of the proposed public building considering functional requirements and UDCPR provisions using AutoCAD software.					1,2	
7		Prepare municipal drawings of the proposed public building as per local authority submission requirements using AutoCAD software.					5	
8		Draw the working drawing of the proposed public building showing foundation plan and Centre-line drawing as per IS- 962: 1989 using AutoCAD software.					3	
9		Draw the working drawing of the proposed public building showing furniture layout as per IS- 962: 1989 using AutoCAD software.					3	
10		Draw the working drawing of the proposed public building showing electrification layout as per IS- 962: 1989 using AutoCAD software.					3	
11		Draw the working drawing of the proposed public building showing water supply and drainage layout as per IS- 962: 1989 using AutoCAD software.					3	
Total Practical Sessions		11			Total Practical Hours			22

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Text Books:

1. D. N. Ghose, Civil Engineering Design & Drawing, 2nd Edition, CBS Publications, Distributors (P) Ltd, 2010.
2. M. G. Shah, C. M. Kale, S. Y. Patki, Building Drawing, 5th Edition, Tata McGraw-Hill Publications (P) Ltd, 2011
3. Sandeep Mantri, Practical Building Construction & it's Management, 10th Edition, Satya Prakashan, 2012
4. V. B. Sikka, A Course in Civil Engineering Drawing, 7th Edition, S. K. Kataria and Sons, 2013
5. Dr. N. Kumara Swamy and A. Kameswara Rao, Building Planning And Drawing, Charotar publications, 2024/2025

References:

1. V. B. Sikka, Civil Engineering Drawing, 5th Edition, S. K. Kataria & Sons, 2018
2. S. 962-1989 code for practice for Architectural and Building Drawing, B. I. S. New Delhi, last reaffirmed in 2022.
3. Francis D.K. Ching and Steven R. Winkel, Building Codes Illustrated: A Guide to Understanding International Building Code, 8th Edition, 2024.
4. Unified Development Control and Promotion Regulations (UDCPR) for Maharashtra as of 2025/2026
5. National Building Code of India (NBC) to a new 2025 edition

Online Learning Resources

1. https://www.youtube.com/watch?v=QuR-VKis3jU&list=PLu_C7oK7LrjqWLLjDNzjZvNHtlGCXPup3
2. <https://www.youtube.com/watch?v=esyzDmkn8qs>
3. <https://www.youtube.com/watch?v=Pyaw8ivOz6Q>
4. <https://www.youtube.com/watch?v=jNvqZrxelUc>
5. <https://www.youtube.com/watch?v=Lf-X5vMk3Vg>
6. <https://dtp.maharashtra.gov.in/>
7. <https://bpams.midcindia.org/bpamsclient/>
8. <https://www.coa.gov.in/>
9. <https://archive.org/details/gov.in.is.962.1989>

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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Computer Science and Engineering							
Course Information:								
Class, Semester		S. Y. B. Tech. Semester - III				Category	HS	
Course Code, Course Title		3CVHS207, Foreign Language - German				Type	T2	
Prerequisites		----						
Teaching Scheme (per week)		Lecture 02	Tutorial -	Practical -	Self-Study 1	Credits 2		
Examination Scheme (Marks)		Theory	MSE -	TA 50	ESE -	Practical	CIA -	ESE -
Course Outcomes (Cos):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain basic German vocabulary, grammar, pronunciation, and common expressions used in everyday communication.							
CO2	Apply basic German language skills to communicate in familiar situations through listening, speaking, reading, and writing activities.							
CO3	Apply appropriate German vocabulary, sentence structures, and grammar to engage in simple conversations and respond to routine personal and social situations.							
CO4	Prepare simple written texts such as emails, messages, and short paragraphs in German using appropriate vocabulary and grammatical structures.							
Syllabus:								
Module	Contents						Lecture Hours	
PRE TERM SECTION								
1	Introduction to German Language Introduction to German language and culture German alphabets Pronunciation and phonetics Greetings and farewells Classroom expressions Basic vocabulary						10	
2	Self-Introduction and Basic Communication Personal pronouns Verbs Haben and Sein Verb conjugation Introducing oneself and others Numbers (0-1000) Days of the week Basic sentence structure W-Fragen (Question Words)						10	
3	Countries, Languages and Daily Communication Countries and nationalities Languages Asking and answering simple questions Yes/No questions Articles (Definite and Indefinite) Simple conversations						10	
IN TERM SECTION								
4	Friends, Family and Hobbies Talking about friends and colleagues Family members Hobbies and interests Daily routine Possessive articles Describing people						10	
5	Time, Dates and Appointments Days, months and seasons Telling time Dates and birthdays							

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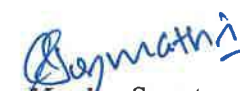
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	Making appointments Invitations Apologizing Modal verbs	10 hrs
6	Work and Workplace Communication Occupations and professions Workplace vocabulary Talking about studies and work Telephone conversations Job advertisements Expressing opinions about jobs	10 hrs
7	City, Transport and Directions Places in a city Means of transport Asking for and giving directions Enquiring information Imperative forms Negation Definite and indefinite articles	10 hrs
Self-Study Section		
8	Food, Shopping and Restaurants Food and beverages Shopping conversations Ordering food Paying bills Akkusativ case Verbs with Akkusativ Restaurant communication	10 hrs
9	Home, Communication and Writing Skills Describing home and surroundings Understanding advertisements Likes and dislikes Letters and emails Understanding texts Dativ case Dativ prepositions Wechselpräpositionen	10 hrs
10	Social Life, Past Events and Fashion Planning activities with friends Event information and radio announcements Separable verbs Personal pronouns Präteritum of Haben and Sein Perfekt tense and Partizip II Conjunctions (und, oder, aber) Clothes and fashion Demonstrative and interrogative articles Verbs with Dativ	10 hrs
	Total Lecture Hours	100
Text Books:		
Netzwerk neu A1 Kursbuch Goyal publishers & Distributors Pvt. Ltd. First Indian reprint 2020 Reprinted 2023		
Netzwerk neu A1 Übungsbuch Goyal publishers & Distributors Pvt. Ltd. First Indian reprint 2020 Reprinted 2023		
References:		
Fit fürs Goethe -Zertifikat A1 Start Deutsch 1 Hübner		


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Course Information:							
Class, Semester	S. Y. B. Tech. Semester - III					Category	HS
Course Code, Course Title	3CVHS208, Foreign Language - Japanese					Type	T2
Prerequisites	----						
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits		
	2	-	-	1	2		
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	50	-		-	-
Course Outcomes (Cos):							
Upon successful completion of this course, the student will be able to:							
CO1	Explain basic Japanese vocabulary, grammar, pronunciation, and common expressions used in everyday communication.						
CO2	Apply basic Japanese language skills to communicate in familiar situations through listening, speaking, reading, and writing activities.						
CO3	Apply appropriate Japanese vocabulary, sentence structures, and grammar to engage in simple conversations and respond to routine personal and social situations.-----						
CO4	Apply appropriate Japanese vocabulary and grammatical structures to compose simple written texts such as emails, messages, and short paragraphs.						
Syllabus:							
Module	Contents					Lecture Hours	
MODULE 1 - PRE-TERM							
I	Introduction to Japanese Language and Culture Overview of Japanese language and culture Japanese writing systems: Hiragana, Katakana, Kanji Basic pronunciation and phonetics Greetings according to time of day Classroom and workplace expressions Asking for repetition and clarification Basic etiquette and manners					10	
II	Self-Introduction and Personal Information Introducing oneself and others Name, nationality, occupation, and residence Family members Languages spoken Basic sentence patterns Introduction to Hiragana writing practice					10	
III	Hiragana and Katakana Mastery Complete Hiragana characters Complete Katakana characters Reading and writing practice Simple words and phrases Listening and pronunciation exercises Everyday vocabulary development					10	
MODULE 2 - IN-TERM							
IV	Food and Dining Food and beverage vocabulary Expressing likes and dislikes Reading simple menus Ordering food and drinks Restaurant conversations Japanese dining etiquette					10	
V	Home, Family and Surroundings Describing houses and rooms Household objects and furniture Family relationships Location expressions					10	
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	Counting objects and people Describing surroundings	
VI	Daily Life and Time Expressions Telling time Days, dates, and months Daily routines Operating hours and schedules Borrowing and lending items Making simple appointments	10
VII	Hobbies, Interests and Social Interaction Hobbies and leisure activities Sports, movies, music, manga, and anime Inviting friends Accepting and declining invitations Expressing preferences and interests Social conversations	10
MODULE 3 - SELF STUDY		
VIII	Transportation and Navigation Public transportation vocabulary Trains, buses, stations, and landmarks Asking for directions Giving simple directions Understanding signs and notices Travel-related conversations	10
IX	Shopping and Everyday Transactions Shopping vocabulary Asking for products and prices Quantities and measurements Locating items in stores Purchasing goods Customer-service interactions	10
X	Holidays, Experiences and Future Plans Talking about past weekend activities Introduction to simple past tense Expressing wishes and desires Travel plans and future intentions Introduction to frequently used Kanji Course review and consolidation Speaking role-plays and presentations Reading and writing assessment	10
Text Books:		
Irodori: Japanese for life in Japan (A1), The Japan Foundation, 2020		
Reference Books:		
Marugoto Starter (A1) Katsudoo + Rikai (2 Books set) https://amzn.in/d/07fApBbW		
Genki: An Integrated Course in Elementary Japanese Vol. 1 [3rd Edition] https://amzn.in/d/0gXGM2Ef		
Minna no Nihongo 1-1&1-2 Main Textbook elementary +Translation & Grammatical with downloadable CDs. https://amzn.in/d/0dyQ9ips		


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Course Information:								
Class, Semester		S.Y. B. Tech, Semester –III					Category	HS
Course Code, Course Title		3CVHS209, Indian Constitution					Type	T2
Prerequisites		-						
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self-Study	Credits	
		1	-		-	1	1	
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	50	-		-	-
Course Outcomes (COs): Upon successful completion of this course, the student will be able to:								
CO1	Describe the evolution and salient features of the Indian Constitution using the Government of India Acts of 1935 and 1947.							
CO2	Illustrate the philosophy of the Indian Constitution using the Preamble, Fundamental Rights, Fundamental Duties, and Directive Principles of State Policy							
CO3	Explain the constitutional amendment process, principles of the Basic Structure, and emergency provisions under the Indian Constitution							
CO4	Summarize the structure and functioning of the Union and State Governments using the parliamentary and legislative systems.							
CO5	Describe the evolution and salient features of the Indian Constitution using the Government of India Acts of 1935 and 1947.							
Syllabus:								
Module	Contents							Lecture Hours
I	Constitution: Basic Structure & Making of Constitution Meaning of the constitution law and constitutionalism, Historical perspective of the constitution of India, Government of India Act of 1935 and Indian Independence Act of 1947, Enforcement of the Constitution, Meaning and importance of Constitution, Making of Indian Constitution – Sources, Salient features of Indian Constitution, Preamble.							04
II	Fundamental Rights & Fundamental Duties Fundamental Rights – Features and characteristics, Right to Equality, Right to Freedom, Right against Exploitation, Right to Freedom of Religion, Cultural and Educational Rights, Right to Constitutional Remedies, Directive Principles-Definition and Meaning, 42 nd Constitutional Amendment Act, List and Importance of Fundamental Duties.							06
III	Amendments of Constitution and Emergency Provisions: Meaning and need of Constitutional Amendments, Procedure of Amendment under Article 368, Types of Amendments, Important Constitutional Amendments (42 nd , 44 th , 73 rd , 74 th , 86 th and 101 st Amendments), Basic Structure Doctrine. Emergency Provisions – Meaning and Objectives, National Emergency (Article 352), State Emergency/President’s Rule (Article 356), Financial Emergency (Article 360), Effects of Emergency on Fundamental Rights and Centre-State Relations, Safeguards introduced by 44 th Constitutional Amendment.							03
IV	Government of The Union and States: President of India – Election and Powers, Prime Minister of India - Election and Powers, Lok Sabha - Structure, Rajyasabha – Structure, Governor of State, Chief Minister and Council of Ministers in a state.							02
Total Lecture Hours							15	

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Text Books:

1. M. Laxmikanth, *Indian Polity*, 7th Edition, McGraw Hill Publications Delhi, 2023.
2. P. M. Bakshi, *The Constitution of India*, 19th Edition, Lexis Nexis, 2023.
3. Durga Das Basu, *Introduction to the Constitution of India*, 26th Edition, Lexis Nexis, 2022.
4. M. Laxmikanth, *Governance in India*, 3rd Edition, McGraw Hill Publications Delhi, 2021.
5. J. N. Pandey, *The Constitutional Law of India*, 59th Edition, Allahabad: Central Law Agency, 2022.

References:

1. V. N. Shukla, *Constitution of India*, 14th Edition, EBC, 2022.
2. V. N. Tripathi, *Constitution of India*, 9th Edition, Premier Publishing Company, 2021.
3. M. V. Pylee, *India's Constitution*, 18th Edition, S. Chand Publications, New Delhi, 2020.

Online Learning Resources

<https://legislative.gov.in/constitution-of-india/>
nptel.ac.in/courses/129106003?utm

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Course Information:									
Class, Semester		SY. B. Tech, Semester - III					Category	HS	
Course Code, Course Title		3CVHS210, Universal Human Values					Type	T2	
Prerequisites		--							
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self-Study	Credits		
		2	-		-	1	2		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			-	50	-		-	-	
Course Outcomes (COs):									
Upon successful completion of this course, the student will be able to:									
CO1		Explain the evolution, need, and significance of Universal Human Values in the context of global developments, societal challenges, and professional life.							
CO2		Apply the understanding of self, harmony, and human relationships to improve personal behavior and interpersonal interactions.							
CO3		Demonstrate the principles of social and environmental responsibility by relating human actions to sustainable and ethical living.							
CO4		Analyze ethical issues in engineering and emerging technologies such as Artificial Intelligence and Robotics using appropriate ethical frameworks.							
CO5		Evaluate value-based decisions and approaches for personal growth and professional practice through reflection and case analysis.							
Syllabus:									
Unit		Contents						Lecture Hours	
I		Evolution and Need of Universal Human Values: Meaning and concept of Universal Human Values, Historical evolution of value systems, Impact of Industrial Revolution on society and lifestyle, Consequences of World War II and global conflicts, Emergence of global value frameworks, Role of United Nations and UNESCO, Introduction of UHV in Indian education system by AICTE, Present-day challenges: stress, lack of purpose, environmental issues						05	
II		Understanding the Human Being: Human being as a combination of self and body, Distinction between self (consciousness) and body (physical entity), Needs of self vs needs of body, Happiness vs physical pleasure, Harmony in the self (thoughts, feelings, actions), Self-exploration and self-awareness						05	
III		Harmony in Relationships: Meaning and importance of relationships, Values in relationships (Trust, Respect, Affection, Care, Guidance, Reverence, Love), Mutual fulfillment in relationships, Role of family in value development, Interpersonal conflicts and resolution, Relationship in professional environment						05	
IV		Harmony in Society and Nature: Individual → Family → Society → Nation → World, Concept of undivided society, Social harmony and responsibility, Coexistence in nature, Human-nature relationship, Environmental degradation and its causes, Sustainable living and resource utilization, Local and global environmental issues						05	
V		Universal Human Values in Engineering and Technology: Professional ethics in engineering, Role of engineers in society, Guidelines by IEEE, Ethical issues in modern technology, Role of institutions like OpenAI, Core Framework to Assess Values: Self-Reflection Model, Value-Action Gap Model, Emotional Intelligence (EQ) Framework (The Nine Values (Bhavas) Assessment Model)						05	
VI		Application of UHV in Personal and Professional Life: Self-reflection and personal development, Value-based decision making, Goal setting with values, Fulfilling Basic Human Aspirations Application of UHV in career and workplace, Development of holistic and responsible lifestyle, Core Framework to Assess Values: Emotional Intelligence (EQ) Framework, (Human-AI Value Alignment) Ikigai Model						05	
Total Lecture Hours								30	

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Text Books
1. Human Values and Professional Ethics: R. R. Gaur, R. Sangal, G. P. Bagaria, Excel Books, New Delhi, 2010
2. Engineering Ethics: Charles E. Harris Jr., Michael S. Pritchard, Michael J. Rabins, Cengage Learning, 2013
3. Understanding Human Being, Nature and Existence Comprehensively: UHV Team, UHV, 2022.
4. Life 3.0, Max Tegmark, Knopf, 2017
References:
1. AICTE Universal Human Values Course Material, 2017 onwards
2. IEEE Code of Ethics
3. Engineering Ethics: Charles E. Harris Jr., Michael S. Pritchard, Michael J. Rabins, Cengage Learning, 2013
Online Learning Resources
1. TED Talks on ethics, happiness, human behaviour
2. NPTEL Courses on UHV and Engineering Ethics
3. MIT: AI Ethics lectures (Open Course Ware)


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Course Information:			
Class, Semester	S. Y. B. Tech. Semester – III		Category
Course Code, Course Title	3CVMA211, Aptitude and Reasoning -I		MA
Prerequisites	--		Type
Teaching Scheme (per week)	Lecture	Tutorial	Credits
	02	-	--
Examination Scheme (Marks)	Theory	MSE	ESE
	-	50	-
Course Outcomes (COs):			
Upon successful completion of this course, the student will be able to:			
CO1	Solve problems based on HCF & LCM Vedic Math Ages		
CO2	Solve problems based on Number Series, Alphabet Series (Quant) Percentage		
CO3	Solve problems based on Profit & Loss Coding-Decoding Cubes & Dice		
CO4	Apply SWOT Analysis Engineering Ecosystem Email writing, Essay writing Logical Thinking Basics for personality development		
Syllabus:			
Module	Contents		Lecture Hours
I	HCF & LCM Vedic Math		4
II	Number Series, Alphabet Series (Quant) Percentage		4
III	Profit & Loss Coding-Decoding		4
IV	Cubes & Dice SWOT Analysis		4
V	Introduction to Engineering Ecosystem Ages		4
VI	Email writing, Essay writing Logical Thinking Basics		4
Total Lecture Hours			24
Text Books:			
Quantitative Aptitude R.S. Agarwal, S Chand 2019			
Verbal & Non-verbal Reasoning R.S. Agarwal, S Chand 2019			
Wren & Martin (Verbal, Grammar) P.C. Wren S Chand 2017			
Reference Books:			
APTIPEDIA (Quantitative, Logical, Verbal Aptitude) Face Wiley 2017			
Wiley (Quantitative Aptitude) P.A. Anand Maestro 2015			
Arun Sharma (Verbal Ability) Meenakshi Upadhyay McGraw Hill 2020			


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Course Information:								
Class, Semester		S.Y.B. Tech, Semester - IV				Category	PC	
Course Code, Course Title		3CVPC212, Structural Analysis				Type	T1	
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		2	1	--	2	3		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		--	--
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Identify structural systems and determinacy using equilibrium and energy concepts for correct classification and indeterminacy evaluation.							
CO2	Determine beam slopes and deflections using standard analytical methods with accurate displacement results.							
CO3	Calculate structural deflections using energy and unit load methods with correct strain energy and displacement values.							
CO4	Develop influence line diagrams by applying Muller-Breslau's principle with accurate force and reaction variations.							
CO5	Evaluate combined stresses under eccentric and lateral loads using analytical methods to determine accurate stress distribution.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Structural Systems and Determinacy Types of structures (trusses, beams, frames, arches); equilibrium and compatibility conditions; statically determinate and indeterminate structures; static and kinematic degree of indeterminacy; introduction to energy concepts; principle of virtual work; law of conservation of energy; principle of minimum potential energy. Numerical on SDI & KDI						7	
II	Analytical Methods for Beam Slope and Deflection Relationship between load, shear force, bending moment, slope and deflection; double integration method; Macaulay's method.						8	
III	Theorem-Based Methods for Beam Deflection Moment-area theorems; conjugate beam method; application to statically determinate beams under various loading and support conditions.						7	
IV	Energy Methods for Structural Deflection Strain energy due to axial force, bending moment, shear force and torsion; strain energy and complementary energy; Castigliano's first and second theorems; unit load method; deflection of beams, trusses, frames, arches and curved members; Maxwell-Betti reciprocal theorem.						8	
V	Influence Line Diagrams Concept and importance of influence lines; Muller-Breslau principle; influence line diagrams for reactions, shear force and bending moment in statically determinate beams; influence lines for member forces in statically determinate trusses; application to moving load problems.						7	
VI	Combined Stresses in Structural Members Combined direct and bending stresses; eccentric loading on short columns; kern of a section; eccentric loading about both principal axes; chimneys subjected to wind load; stresses in dams and retaining walls; practical design-oriented numerical problems.						8	
Total Lecture Hours						45		

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Text Books:

1. S. Ramamrutham, *Theory of Structures*, Dhanpat Rai Publications, Latest Edition 2024
2. Bansal R.K., *Strength of Materials*, Laxmi Publications, 2018.
3. C.S. Reddy, *Basic Structural Analysis*, 3rd Edition, McGraw Hill Education, 2017
4. S.S. Bhavikatti, *Structural Analysis – Vol. I & II*, New Age International, 2016
5. S. C. Arya and S. S. Ajmani, *Structural Analysis*, 3rd Edition, Nem Chand & Bros., 2021.

References:

1. R.C. Hibbeler, *Structural Analysis*, 10th Edition, Pearson Education, 2020
2. Devdas Menon, *Structural Analysis*, 3rd Edition, Narosa Publishing House, 2019
3. S.P. Timoshenko & J.M. Gere, *Mechanics of Materials*, Cengage Learning, 2014
4. P. C. Varghese, *Advanced Structural Analysis*, PHI Learning, 2020.

Online Learning Resources

1. <https://www.youtube.com/watch?v=Vqgk4mXU-M8>
2. <https://nptel.ac.in/courses/105106126>
3. <https://ocw.mit.edu>

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Course Information:								
Class, Semester		S. Y. B. Tech, Semester-IV				Category	PC	
Course Code, Course Title		3CVPC213, Concrete Technology				Type	LFT1	
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		2	--	2	2	3		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	50
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Determine the properties of ingredients used for concrete manufacturing with the help of various laboratory and field tests.							
CO2	Prepare a fresh concrete for various grades using IS code or standard practices.							
CO3	Design concrete mixes for different Civil Engineering Structures by using appropriate mix design methods and available materials.							
CO4	Determine the quality of a concrete used for Civil Engineering construction projects by conducting different physical or nondestructive tests.							
CO5	Select the appropriate types of special concrete for specific civil engineering applications by analyzing structural needs and climatic conditions.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Ingredients of Concrete: Cement: - Chemical composition, Hydration of cement, Types of cement, Tests on cement. Aggregate: - Classification, requirements, Tests for coarse aggregates and fine aggregate. Water: General requirements, Quality of water.						6	
II	Fresh Concrete: Admixtures in concrete: Chemical admixtures, Mineral admixtures Manufacturing of concrete: Batching, Mixing, Transportation, Placing, compaction, finishing, curing of concrete. Workability: Factors affecting workability, Measurement of workability with different tests. Segregation.						5	
III	Hardened concrete: Strength of concrete: w/c ratio, Gel/space ratio, Gain of strength with age, Maturity concept of concrete, Effect of maximum size of aggregate on strength, Relation between compressive and tensile strength, Modulus of elasticity of concrete, creep and shrinkage. Test on hardened concrete - Flexural strength, Compressive strength of cube, cylinder test, Schmidt's rebound hammer, Ultrasonic pulse velocity method.						5	
IV	Concrete Mix Design: Objectives of mix design, Different methods of Mix design, Factors affecting mix proportions, Quality control of concrete, Statistical methods, Acceptance criteria. Mix design by IS 10262-2019, IS 456, Mix design of fly ash concrete by IS 10262, 2019 and manufactured sand concrete, Mix design by ACI 211.1- 91 for high strength concrete.						6	
V	Durability of concrete: Strength and Durability relationship, Effect of w/c on durability, Exposure conditions as per IS 456, Minimum and maximum cement content, Effect of Permeability, Chemical attack, Sulphate attack, Methods of controlling sulphate attack. Durability of concrete in sea water.						6	
VI	Special concrete: Lightweight concrete, No-fines concrete, High density concrete, self-compacting concrete, Fiber reinforced concrete, High strength concrete, High performance concrete, Manufacturing of ready mix concrete, Cold weather concreting, Hot weather concreting.						5	
Total Lecture Hours						30		

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Laboratory Work with CO Mapping:

Sr. No.	Title of Lab Work	CO Mapped
01	Determination of fineness of cement by Sieve analysis.	1
02	Determination of the standard consistency of cement using Vicat's apparatus.	1
03	Determination of soundness of cement by Le-Chatelier's apparatus.	1
04	Determination of initial and final setting time of cement using Vicat's apparatus.	1
05	Determination of compressive strength of cement mortar cube using compression testing machine.	1
06	Determination of impact value of coarse aggregate by using impact testing machine.	1
07	Determination of workability of fresh concrete by using a slump cone.	4
08	Determination of compaction factor for the workability of fresh concrete.	2,4
09	Determination of flow percentage of fresh concrete by using flow table apparatus.	2,4
10	Determination of mix proportions of ingredients of concrete using IS10262- 2009, IS 456 methods	2,4
11	Making of concrete cubes as per mix design and testing it for compressive strength using compression testing machine.	3
12	Nondestructive test on concrete using Rebound Hammer and Ultrasonic test.	4
Total Practical Sessions		12
Total Tutorial Hours		—

Text Books:

1. M. S. Shetty & A.K. Jain, Concrete Technology-Theory and Practice, 8th Edition, S. Chand & Company Ltd, New Delhi, 2022.
2. M. L. Gambhir, Concrete Technology-Theory and Practice, 5th Edition, Tata McGraw-Hill publishing Company Ltd, New Delhi, 2025.
3. Santakumar A.R. Concrete Technology, 2nd Edition, Oxford University Press, 2018
4. P.D. Kulkarni & R.K. Ghosh, Textbook of Concrete Technology, 3rd Edition, Newage International, 2025.
5. Dr. Aminul Islam, Concrete Technology, 2nd Edition, Laxmi Publication, 2017.
6. S.S. Bhavikatti, Concrete Technology, 2nd Edition, Wiley, 2019

References:

1. J.J. Brooks A. M. Neville, Concrete Technology, 2nd Edition, Pearson Publication, 2025.
2. P. Kumar Mehta & Paulo J. M. Monteiro, Concrete: Microstructure, Properties, and Materials, 3rd Edition, McGraw-Hill, 2018.
3. Kambiz Janamian & José Aguiar — Concrete Materials and Technology: A Practical Guide, 1st Edition, CRC Press (Taylor & Francis), 2023.
4. Zongjin Li, Xiangming Zhou, Hongyan Ma, Dongshuai Hou, Advanced Concrete Technology, 2nd Edition, John Wiley & Sons, 2022.
5. Mark Alexander, Arnon Bentur, Sidney Mindess, Durability of Concrete: Design and Construction, 1st Edition, CRC Press, 2017.

Online Learning Resources

1. <https://www.youtube.com/watch?v=gAX25DitMtc>
2. <https://www.youtube.com/watch?v=MbcZg30qbUo>
3. <https://www.youtube.com/watch?v=rE2Fur7Kje>
4. <https://www.youtube.com/watch?v=sJDoPAV63kA>
5. https://www.youtube.com/watch?v=cx5gPKp9QEc&list=PLbMVogVj5nJQU7M0LdA77p_XaaWBjNiNc
6. https://www.youtube.com/watch?v=HshCd-3XChQ&list=PLbMVogVj5nJQU7M0LdA77p_XaaWBjNiNc&index=15
7. https://www.youtube.com/watch?v=KPi4tR3Ddk&list=PLbMVogVj5nJQU7M0LdA77p_XaaWBjNiNc&index=19
8. https://www.youtube.com/watch?v=I_CR25CS_Tw&list=PLOpZR_L7EDHJP8A1207BFmHWLHinzup0W
9. https://www.youtube.com/watch?v=RiWOyRhRCck&list=PLOpZR_L7EDHIEevz_EJkYPM6jBCI736qq
10. <https://www.youtube.com/watch?v=AAwNVkQnevs>
11. https://www.youtube.com/watch?v=9E4_D5lqHRI

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Course Information:									
Class, Semester		S.Y.B. Tech, Semester - IV				Category	PC		
Course Code, Course Title		3CVPC214, Fluid Mechanics				Type	LIT1		
Prerequisites		3CVES111							
Teaching Scheme (per week)		Lecture	Tutorial		Practical	Self-Study	Credits		
		2	--		2	3	3		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			40	20	40		50	50	
Course Outcomes (COs):									
Upon successful completion of this course, the student will be able to:									
CO1		Apply basic fluid property relations for problems involving density, viscosity, compressibility, and surface tension using given data.							
CO2		Analyze hydrostatic pressure distribution for forces on submerged surfaces under static conditions.							
CO3		Utilize fluid kinematics for velocity and acceleration in different flow situations.							
CO4		Examine flow in pipes for discharge, energy changes, and head losses using standard equations.							
CO5		Implement open channel flow equations for flow characteristics under given channel conditions.							
CO6		Investigate non-uniform flow behaviour for flow profiles and hydraulic jump conditions.							
Syllabus:									
Module		Contents						Lecture Hours	
I		Properties of Fluid: Physical Properties of Fluids (Mass Density, Specific Weight, Specific Volume, Specific Gravity, Viscosity: Dynamic and Kinematic Viscosity, Compressibility, Surface Tension, Capillary Effect, Vapour Pressure and Cavitation), Effect of Temperature on Viscosity, Newton's Law of Viscosity, Types of Fluids.						8	
II		Fluid Statics: Types of Pressure, Pascal's Law, Hydrostatic Law, Pressure Measurement, Devices, Concept of Pressure Diagram, Centre of Pressure, Forces on Plane and Curved Surfaces.						8	
III		Fluid Kinematics: Description of Fluid Motion, Velocity and Acceleration of Fluid Particles, Types of Flows						7	
IV		Fluid Dynamics: Euler's Equation along a Streamline, Bernoulli's Theorem, Assumptions and Limitations, Bernoulli's Applications: Venturimeter (Horizontal and Vertical), Orificemeter, Discharge Derivation, Orifices, Time required for Emptying the Tank, Hydraulic Coefficients of Orifices, Concept of HGL and TEL.						7	
V		Uniform Flow in Open Channel: Introduction, Types of Open Channels and flows, Velocity Distribution, Measurement of Velocity - Chezy's and Manning's Formula, Uniform Flow Computations, Hydraulically Efficient Section, Specific Energy & Specific Force. Notches & Weirs , Types, Discharge Equations.						7	
VI		Non-Uniform Flow in Open Channel (GVF & RVF): Gradually Varied Flow (GVF): Classification of Channel Slopes & GVF Profiles, Dynamic Equation of GVF, Hydraulic Jump - Phenomenon, Conjugate Depth Relationship, Uses and Types of Hydraulic Jump, Hydraulic Jump as an Energy Dissipater.						8	
						Total Lecture Hours		45	

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Laboratory Work with CO Mapping:		
Sr. No.	Title of Lab Work	CO Mapped
1	Determination of Viscosity of Fluids: To determine dynamic and kinematic viscosity of a given fluid and study the effect of temperature.	1
2	Determination of Specific Gravity and Density: To determine density, specific weight, specific volume, and specific gravity of liquids.	1
3	Verification of Hydrostatic Law: To verify that pressure intensity increases linearly with depth.	2
4	Calibration of Measuring Tank and Discharge Measurement	2
5	Discharge Measurement using Venturimeter To determine discharge and coefficient of discharge.	3, 4
6	Discharge Measurement using Orificemeter: To determine discharge and coefficient of discharge.	3
7	Verification of Bernoulli's Theorem: To verify Bernoulli's theorem along a streamline.	4
8	Determination of Reynolds Number	4
9	Verification of Chezy's and Manning's Formula: To determine Chezy's and Manning's constants.	5
10	Study of Notches and Weirs: To determine discharge over notches and weirs.	5
11	Gradually Varied Flow Profiles: To study GVF profiles in open channels.	6
12	Hydraulic Jump: To study characteristics of hydraulic jump and verify conjugate depth relation.	6
13	Study and analysis of various hydraulic structures through an industrial visit to understand their design, components, and real-time functioning in fluid flow systems.	6
Text Books:		
1. Munson, B.R., Young, D.F., & Okiishi, T.H., Fundamentals of Fluid Mechanics, 8th Edition, Wiley, 2021.		
2. Cengel, Y.A., & Cimbala, J.M., Fluid Mechanics: Fundamentals and Applications, 4th Edition, McGraw-Hill Education, 2020.		
3. White, F.M., Fluid Mechanics, 9th Edition, McGraw-Hill Education, 2022.		
4. Kundu, P.K., Cohen, I.M., & Dowling D.R., Fluid Mechanics, 6th Edition, Academic Press, 2021.		
5. Fox, R.W., McDonald, A.T., & Pritchard P.J., Introduction to Fluid Mechanics, 10th Edition, Wiley, 2020		
References:		
1. Fluid Mechanics, Shames, I.H., 4th Edition, McGraw-Hill, 2003		
2. Applied Fluid Mechanics, Mott, R.L., 7th Edition, Pearson Education, 2015.		
3. Introduction to Fluid Mechanics, Fox, R.W., McDonald, A.T., & Pritchard, P.J., 6th Edition, John Wiley & Sons, 2004.		
4. Fluid Mechanics, Som, S.K., & Biswas, G., Tata McGraw-Hill, 2005.		
5. Fluid Mechanics, Nagaraj, D.L., Tata McGraw-Hill, 2008.		
6. Fluid Mechanics, Modi, P.N., & Seth, S.M., Standard Book House, 2012.		
Online Learning Resources		
1. https://nptel.ac.in/courses/112/105/112105171		
2. https://ocw.mit.edu/courses/2-25-advanced-fluid-mechanics-fall-2013/		
3. https://www.coursera.org/learn/fluid-mechanics		
4. https://www.edx.org/learn/fluid-mechanics		
5. https://engineeringexplained.com/fluid-mechanics/		
6. https://www.youtube.com/@nptelhrd		

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Course Information:								
Class, Semester		S.Y.B. Tech, Semester - IV					Category	PE
Course Code, Course Title		2CVPE215, Composite Materials					Type	T1
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	--	--	2	3		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		--	--
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Identify the properties of various composite materials used in civil engineering field by given supplementary materials.							
CO2	Evaluate the characteristics & performance of composite materials used in civil engineering field by analyzing standard testing data.							
CO3	Justify integrity of composite materials by using various destructive & non-destructive tests used in civil engineering.							
CO4	Utilize composite materials in civil engineering applications based on their material properties.							
CO5	Analyze performance of advanced composite materials by using smart, nano and sustainable technologies in civil engineering applications.							
Syllabus:								
Module	Contents							Lecture Hours
I	Composites Concept of Composite, Basic Definitions and Classifications of Composites– Organic Matrix Composites- Based on Reinforcements and Matrices, Basic Constituent materials in Composites, Fibre Reinforced Composites (FRP) and laminated Composites,							7
II	Characteristics and Performance of Composite Materials Stress and Strain Concept, Plane stress concept, Mechanical properties, Thermal properties, Electrical properties, Chemical properties.							8
III	Composite Material Evaluation and Fabrication Destructive testing: tensile testing, compressive testing, and impact testing, Non-destructive testing: ultrasonic testing, radiography, acoustic emission testing, Composite bonding techniques.							7
IV	Applications of Composite Materials in Civil Engineering Structural applications: beams, columns, plates, shells, and bridges, Non-structural applications: pipes, tanks, vessels, and other infrastructure components, Case studies highlighting the selection of materials for specific applications							8
V	Smart and Advanced Composite Systems Smart composites and self-healing materials, shape memory polymers and fibre reinforced smart systems, nano-composites including carbon nanotube (CNT) and nano-engineered materials, hybrid composites and functionally graded materials, smart sensing materials used for structural health monitoring (SHM).							7
VI	Sustainable and Digital Composite Technologies Green and bio-based composites, life cycle assessment (LCA) and durability considerations, recyclable composite systems, additive manufacturing (3D printing) of composites, AI-based material selection and BIM integration in civil engineering applications.							8
Total Lecture Hours							45	

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Text Books:	
1.	Jones, R.M., Mechanics of Composite Materials, 2nd Edition (Reprint), CRC Press, 2023.
2.	Kaw, A.K., Mechanics of Composite Materials, 3rd Edition, CRC Press, 2022.
3.	Daniel, I.M., & Ishai, O., Engineering Mechanics of Composite Materials, 2nd Edition (Updated), Oxford University Press, 2023.
4.	Agarwal, B.D., Broutman, L.J., & Chandrashekhara, K., Analysis and Performance of Fiber Composites, 3rd Edition, Wiley, 2022.
5.	Mallick, P.K., Fiber-Reinforced Composites: Materials, Manufacturing, and Design, 3rd Edition (Revised), CRC Press, 2021.
References:	
1.	Jones, R.M., Mechanics of Composite Materials, 2nd Edition (Reprint), CRC Press, 2023.
2.	Kaw, A.K., Mechanics of Composite Materials, 3rd Edition, CRC Press, 2022.
3.	Daniel, I.M., & Ishai, O., Engineering Mechanics of Composite Materials, 2nd Edition (Updated), Oxford University Press, 2023.
4.	Agarwal, B.D., Broutman, L.J., & Chandrashekhara, K., Analysis and Performance of Fiber Composites, 3rd Edition, Wiley, 2022.
5.	Mallick, P.K., Fiber-Reinforced Composites: Materials, Manufacturing, and Design, 3rd Edition (Revised), CRC Press, 2021.
Online Learning Resources	
1.	NPTEL, "Composite Materials", Prof. K.T. Kashyap, IISc Bangalore, NPTEL, 2024. https://nptel.ac.in/courses/113108073
2.	NPTEL, "Mechanics of Composite Materials", Prof. S. Gopalakrishnan, IISc Bangalore, NPTEL, 2023. https://nptel.ac.in/courses/101106031
3.	MIT Open Course Ware, "Mechanics of Composite Materials", Massachusetts Institute of Technology, 2024. https://ocw.mit.edu/courses/materials-science-and-engineering
4.	Coursera, "Composite Materials Overview", University of Colorado Boulder, 2024. https://www.coursera.org/learn/composite-materials
5.	edX, "Advanced Materials and Manufacturing", Delft University of Technology, 2024. https://www.edx.org/learn/materials-science


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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist.: Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Civil Engineering							
Course Information:								
Class, Semester		S.Y.B. Tech, Semester - IV					Category	PE
Course Code, Course Title		2CVPE216, Investment Planning and Management					Type	T1
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	--	–	2	3		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		--	--
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Describe various investment products and markets by classifying them according to risk, return, and liquidity characteristics under structured financial scenarios.							
CO2	Apply asset allocation principles to construct diversified portfolios for specified financial goals in simulated planning exercises.							
CO3	Analyze goal-based investment plans by evaluating risk measures and return metrics using provided financial information.							
CO4	Describe investment risks and asset allocation strategies given various investment options, by correctly identifying types of risks and strategies.							
CO5	Develop appropriate investment and ethical decision strategies to manage infrastructure and sustainable investment cases under given market conditions.							
Syllabus:								
Module	Contents							Lecture Hours
I	Investment Products and their Applications Fixed Income Instruments, Mutual Fund Products, Equity Market, Derivatives and Commodities, Foreign Exchange Market, Real Estate and other Investments, Types of Real Estate Investments (Residential, Commercial, Industrial)							7
II	Risk Profiling of Products and Investors- Asset Allocation Determination, Types of Investment Risks, Product Profiling in terms of inherent Risk and Tenure, Risk Profiling of Investors, Asset Allocation- Financial Assets, Types of Asset Allocation Strategies, Real Estate Specific Risks (Liquidity Risk, Legal Risk, Market Risk, Construction Risk)							8
III	Goal-based Investment Planning, Measuring and Managing Risks, Analysis of Returns Investment Planning to achieve Financial Goals, Measuring Risk, Diversification Strategies, Analysis of Returns, Retirement Planning and Employee Benefits,							7
IV	Investment Strategies and Portfolio Management Active Investment Strategies, Passive Investment Strategies, Investment Portfolio Management, Revision of Portfolio, Tax Planning and Estate Planning							8
V	Behavioural Finance and Ethical Practices in Investment Introduction to Behavioural Finance, Common Investor Biases (Overconfidence, Herding, Loss Aversion), Emotional vs Rational Investment Decisions, Ethical Issues in Financial Advisory, Regulatory Framework and Role of SEBI, Code of Conduct in Investment Management							7
VI	Infrastructure and Sustainable Investment Planning Infrastructure Investment Concepts, Public-Private Partnership (PPP) Models, Project Financing Basics, Green Bonds and Sustainable Investing, ESG (Environmental, Social, Governance) Investing, Green Buildings and Sustainable Real Estate Development, Role of Investment Planning in Infrastructure Development							8
Total Lecture Hours							45	
Text Books:								
1. Reilly, F.K., & Brown, K.C., <i>Investment Analysis and Portfolio Management</i> , 11th Edition, Cengage Learning, 2023.								
2. Bodie, Z., Kane, A., & Marcus, A.J., <i>Investments</i> , 12th Edition, McGraw-Hill Education, 2024.								
3. Prasanna Chandra, <i>Investment Analysis and Portfolio Management</i> , 2nd Edition, Standard Publishers and Distributors, 2019.								

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4. Sanjiv Bajaj & Indranil Sarkar, *Risk Analysis & Insurance Planning*, 16th Edition, Mc Graw Hill Publications Pvt Ltd, 2015.
5. Indian Institute of Banking and Finance, *Investment Planning Tax Planning and Estate Planning*, 5th Edition, Indian Institute of Banking and Finance, 2017.

References:

1. Pompian, M.M., *Behavioural Finance and Wealth Management*, 2nd Edition, Wiley, 2020.
2. Krosinsky, C., *Sustainable Investing: Revolutions in Theory and Practice*, Latest Edition, Routledge, 2020.
3. Dalton, *Insurance Planning*, 7th Edition, Gillice and Langdon from Money Education, 2016.
4. Thomas P. Langdon, E. Vance Grange & Michael A. Dalton, *Income Tax Planning*, 14th Edition, International Edition, 2016.
5. Carolyn Tomin & Colleen Carcone, *Principles of Estate Planning*, 3rd Edition, International Edition, 2015.

Online Learning Resources

1. <https://www.youtube.com/watch?v=Zq2R9jZf0e4>
2. <https://www.youtube.com/watch?v=QHh9zUjlfYg>
3. <https://www.youtube.com/watch?v=X4WCEcOYp3o>
4. <https://www.youtube.com/watch?v=6hxS5IDc2U0>
5. <https://www.youtube.com/watch?v=Vqgk4mXU-M8>
6. https://www.youtube.com/watch?v=jYz0nE_5D6U
7. <https://www.youtube.com/watch?v=L7F0OY6IulM>
8. <https://www.youtube.com/watch?v=H6rR6EBiZJc>
9. <https://www.youtube.com/watch?v=jWdn7cG6uh0>
10. <https://www.youtube.com/watch?v=R5UeeWZg8q8>


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Course Information:								
Class, Semester		S.Y.B. Tech, Semester - IV					Category	PE
Course Code, Course Title		3CVPE217, Public Health Engineering					Type	TI
Prerequisites		---						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	--	-	2	3		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		-	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1		Explain the principles of water supply and wastewater treatment systems with respect to quality parameters, standards, and treatment processes under typical environmental engineering scenarios.						
CO2		Analyze wastewater characteristics and treatment methods based on BOD, COD, and other key parameters using standard engineering approaches and data interpretation.						
CO3		Apply modern tools and emerging technologies such as AI, IoT, SCADA, and advanced treatment methods for monitoring and optimization of water, wastewater, solid waste, and air systems in real-world or simulated conditions.						
CO4		Develop sustainable solutions for solid waste and air pollution management considering environmental impacts, regulations, and case studies under practical and urban environmental conditions.						
Syllabus:								
Module		Contents						Lecture Hours
I		Fundamentals of Water Supply Engineering: Water sources, demand & distribution systems, Drinking water quality parameters & standards, Importance of water quality in public health. Conventional treatment methods: Aeration, Sedimentation, Filtration, Disinfection						7
II		Fundamentals of Wastewater Treatment: Sources & characteristics of wastewater, Parameters: BOD, COD, solids Objectives of treatment. Conventional treatment methods: Physical, Chemical Biological processes						7
III		Emerging Trends in Water & Wastewater Treatment Systems: Advanced treatment technologies including membrane filtration (UF/RO) and UV disinfection; SCADA systems in water supply and wastewater treatment; IoT sensors for flow, pressure, leakage, and real-time monitoring of BOD, COD, and DO; application of AI and machine learning for water demand forecasting, wastewater quality prediction, and process optimization in treatment plants.						8
IV		Solid Waste Management: Types, sources and composition of solid waste; waste generation rates and trends; functional elements of solid waste management system (collection, transportation, processing, disposal); environmental and health impacts; conventional treatment methods including composting, recycling and sanitary landfilling. Case Study: Solid waste management model of a leading Indian city (e.g., Indore).						8
V		Air Pollution & Control: Sources and types of air pollutants (PM, SO _x , NO _x , CO, VOCs); health and environmental impacts; air quality standards and AQI; principles of air quality monitoring and sampling techniques; conventional air pollution control devices including gravity settlers, electrostatic precipitators, scrubbers, and fabric filters; introduction to air quality modelling. Case Study: Urban air pollution scenario (e.g., Delhi smog / industrial area study).						7

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VI	Emerging Trends in Solid Waste Management & Air Pollution Control: Smart solid waste management systems including IoT-enabled bins and AI-based route optimization; waste-to-energy technologies and circular economy concepts; advanced plastic and e-waste management methods. Real-time air quality monitoring using sensors and satellite data; AI-based air quality prediction models; introduction to dispersion modelling using AI tools.	8
Total Lecture Hours		45
Text Books:		
1. Pachdhare Kajal, Water and Wastewater Treatment: Environmental Engineering, 1 st Edition, Orange Books Publication, 2025.		
2. Verma Subhash., Water and Wastewater Engineering Technology, Taylor & Francis, 1 st Edition, 2023.		
3. Metcalf & Eddy, Wastewater Engineering: Treatment and Resource Recovery, 5 th Edition, McGraw-Hill, 2014.		
4. Volodymyr Ivanov, Environmental Microbiology for Engineers, 3 rd Edition, Routledge, 2020.		
5. Mallick, P.K., Fiber-Reinforced Composites: Materials, Manufacturing, and Design, 3rd Edition (Revised), CRC Press, 2021.		
References:		
1. Angelo Basile et al., Advanced Technologies in Wastewater Treatment, 1 st Edition, Elsevier, 2024.		
2. Pathak, Patel, Jadhav, Advances in Water and wastewater treatment, 1 st Edition, Apple Academic Press, 2023.		
3. Debik E., Wastewater Management and Technologies, 1 st Edition, Springer, 2022.		


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Course Information:								
Class, Semester		S.Y.B. Tech, Semester - IV				Category	PE	
Course Code, Course Title		3CVPE218, Advanced Remote Sensing				Type	T1	
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	--	--	2	3		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		--	--
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain the fundamental principles of remote sensing for conceptual clarity and correct technical terminology by using theoretical content, diagrams, and EM spectrum data							
CO2	Identify modern positioning and advanced remote sensing technologies for engineering applications by using accuracy, suitability and engineering relevance.							
CO3	Summarize satellite imagery, visual and digital image interpretation techniques for given satellite images, FCCs and ground truth data on the basis of appropriate image processing methods and validation techniques.							
CO4	Classify various remote sensing platforms and sensors used for data acquisition based on characteristics, geometry and applications.							
CO5	Apply remote sensing and GIS techniques to solve civil engineering problems on the basis of given spatial datasets, DEMs and field-based inputs.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Fundamentals of Remote Sensing Definition and history of remote sensing, Components of remote sensing system, Electromagnetic spectrum, Energy interactions with atmosphere, Energy interactions with earth surface features, Spectral reflectance curves, Spatial, spectral, temporal and radiometric resolution						7	
II	Platforms and Sensors Aerial photography – types and geometry, Satellite platforms – polar & geostationary, Types of sensors – active & passive, Multispectral, hyperspectral sensors, Indian Remote Sensing Satellites (IRS series), Landsat series, LiDAR and RADAR systems, Data products and formats						8	
III	Image Interpretation & Analysis Elements of visual image interpretation, Digital image processing – introduction, Image enhancement techniques, Image classification – supervised & unsupervised, Ground truth verification, Accuracy assessment, False Color Composite (FCC), Change detection techniques						8	
IV	Applications in Civil Engineering Land use & land cover mapping, Urban planning and smart cities, Watershed management, Groundwater prospect mapping, Flood mapping & drought assessment, Soil mapping, Route alignment (highways, canals, pipelines), Disaster management						8	
V	GPS and Modern Surveying Global Positioning System: Segments (Space, Control, User), signals, and codes., Accuracy: Sources of error and Differential GPS (DGPS), Integration: Linking GPS data with GIS layers for real-time field mapping.						7	
VI	Advanced Techniques & Emerging Trends GPS and GNSS, Drone/UAV-based remote sensing, Microwave remote sensing, Thermal remote sensing, Google Earth Engine, AI & Machine learning in remote sensing, Case studies in civil engineering						7	
Total Lecture Hours						45		


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Text Books:

1. B. Bhattacharya, Remote Sensing and GIS, 3rd Edition, Oxford University Press, India, 2022
2. George Joseph, Fundamentals of Remote Sensing, Universities Press (India), 3rd Edition, 2018
3. M. Anji Reddy, Remote Sensing and Geographical Information Systems, BS Publications / BS Learning, 4th Edition, 2018
4. Thomas M. Lillesand, Ralph W. Kiefer, Jonathan W. Chipman, Remote Sensing and Image Interpretation, Wiley India / John Wiley & Sons, 7th Edition, 2015
5. Pratap Misra & Per Enge, Global Positioning System: Signals, Measurements and Performance, Ganga-Jamuna Press, 2nd Edition, 2012

References:

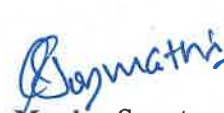
1. Gustau Camps-Valls, Devis Tuia, Xiao Xiang Zhu, Deep Learning for Remote Sensing Data, MDPI / Elsevier (Academic Press), 1st Edition, 2021
2. Paul A. Longley, Michael F. Goodchild, David J. Maguire, David W. Rhind, Geographic Information Systems and Science, Wiley, 4th Edition, 2020
3. James B. Campbell & Randolph H. Wynne, Introduction to Remote Sensing, Guilford Press, 6th Edition, 2019
4. George Joseph, Fundamentals of Remote Sensing, Universities Press (India), 3rd Edition, 2018
5. Pratap Misra & Per Enge, Global Positioning System: Signals, Measurements and Performance, Ganga-Jamuna Press, 2nd Edition, 2012.

Online Learning Resources

1. <https://www.youtube.com/watch?v=Z6o1ICcKDZY>
2. <https://www.youtube.com/watch?v=JUElJsd6UBE>
3. https://www.youtube.com/watch?v=D39j5d_Tp8U
4. <https://www.youtube.com/watch?v=X7MxlAIsW1g>
5. <https://www.youtube.com/watch?v=X02g3AWIWPw>
6. <https://www.youtube.com/watch?v=QUBnIXjVK08>
7. <https://www.youtube.com/watch?v=irf6WtibEPw>
8. <https://www.youtube.com/watch?v=4saOfSuAkJI>
9. <https://www.youtube.com/watch?v=nPAhJr0HS18>
10. https://www.youtube.com/watch?v=GwNHMLR9_tk
11. <https://www.youtube.com/watch?v=WHKrFwfAMDo>
12. <https://www.youtube.com/watch?v=tCDjgrhs5uQ>


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Course Information:								
Class, Semester		S.Y.B. Tech, Semester - IV				Category	PE	
Course Code, Course Title		3CVPE219, Advanced Surveying Techniques				Type	T1	
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	--	—	2	3		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		--	--
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Apply construction surveying principles to execute building stake-out operations with required dimensional accuracy under standard site conditions.							
CO2	Analyze control and alignment data to support bridge and highway construction surveys with logical interpretation of field measurements using modern survey instruments.							
CO3	Execute surveying procedures for tunnel and underground construction to establish reference control with acceptable positional reliability under constrained site environments.							
CO4	Examine hydrographic survey data to interpret depth profiles and flow characteristics using appropriate sounding techniques and positioning systems.							
CO5	Evaluate coastal and offshore survey information to interpret shoreline, creek, and marine features in compliance with project specifications using integrated geospatial technologies.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Building Stake-Out Survey (Residential & Multi-Storey) Principles of construction layout, Transfer of building lines and benchmarks, Grid layout for multistorey buildings, Column positioning and plinth control, Vertical transfer of points, Use of Total Station and GNSS in building layout						7	
II	Bridge Construction Survey Alignment fixing and control establishment, River cross-section survey, Pier and abutment location, Bearing and span control, Monitoring during construction, Use of GNSS and precise levelling.						8	
III	Highway Construction Survey Route alignment and profile survey, Curve setting (horizontal and vertical), Earthwork control and grade verification, Setting out culverts and drainage, Machine guidance systems						8	
IV	Tunnel Construction Survey Surface and underground control, Transfer of alignment underground, Shaft plumbing and orientation, Breakthrough error analysis, Laser alignment systems						7	
V	Hydrographic Survey (Rivers, Canals & Lakes) Principles of hydrographic surveying, Sounding methods and equipment, Current measurement techniques, River cross-sections, Canal alignment surveys, Use of echo sounders and DGPS						7	
VI	Coastal Surveying (Onshore / Offshore / Creek) Shoreline mapping, Tidal datum and mean sea level, Coastal control surveys, Offshore positioning systems, Integration of UAV, GNSS, and GIS, Coastal monitoring applications.						8	
Total Lecture Hours						45		


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Text Books:

1. Bannister, A., Raymond, S., & Baker, R., *Surveying*, 8th Edition, Pearson Education, 2022.
2. Punmia, B.C., Jain, A.K., & Jain, A.K., *Surveying and Levelling*, Vol. I & II, 19th Edition, Laxmi Publications, 2021.
3. Duggal, S.K., *Surveying*, Vol. I & II, 6th Edition, Tata McGraw-Hill Education, 2020.
4. Hofmann-Wellenhof, B., Lichtenegger, H., & Collins, J., *GPS: Theory and Practice*, 7th Edition, Springer, 2019.
5. Wolf, P.R., & Ghilani, C.D., *Elementary Surveying: An Introduction to Geomatics*, 15th Edition, Pearson, 2020.
6. Campbell, J.B., & Wynne, R.H., *Introduction to Remote Sensing*, 5th Edition, Guilford Press, 2019.

References:

1. Kanetkar, T.P., & Kulkarni, S.V., *Surveying and Levelling*, Vol. I & II, 3rd Edition, Pune Vidyarthi Griha Prakashan, 2010.
2. Arora, K.R., *Surveying*, Vol. I, II & III, 10th Edition, Standard Book House, 2013.
3. Wolf, P.R., Ghilani, C.D., & Baugh, L.M., *Elementary Surveying: An Introduction to Geomatics*, 14th Edition, Pearson Education, 2014.
4. Kaplan, E.D., & Hegarty, C.J., *Understanding GPS/GNSS: Principles and Applications*, 2nd Edition, Artech House, 2006.
5. Lillesand, T.M., Kiefer, R.W., & Chipman, J.W., *Remote Sensing and Image Interpretation*, 7th Edition, Wiley, 2015.

Online Learning Resources

1. <https://www.youtube.com/watch?v=Z6o1ICcKDZY>
2. <https://www.youtube.com/watch?v=JUElJsd6UBE>
3. https://www.youtube.com/watch?v=D39j5d_Tp8U
4. <https://www.youtube.com/watch?v=X7MxlAIsW1g>
5. <https://www.youtube.com/watch?v=X02g3AWIWPw>
6. <https://www.youtube.com/watch?v=QUBnIXjVK08>
7. <https://www.youtube.com/watch?v=irf6WtibEPw>
8. <https://www.youtube.com/watch?v=4saOfSuAkJI>
9. <https://www.youtube.com/watch?v=nPAhJr0HS18>
10. https://www.youtube.com/watch?v=GwNHMLR9_tk
11. <https://www.youtube.com/watch?v=WHKrFwfAMDo>
12. <https://www.youtube.com/watch?v=tCDjgrhs5uQ>


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Course Information:								
Class, Semester		S.Y.B. Tech, Semester – IV				Category	PE	
Course Code, Course Title		3CVPE220, Introduction to Infrastructure Engineering				Type	T1	
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	--	–	2	3		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		--	--
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain various transportation systems, given transportation scenarios, with correct identification of their role in infrastructure development.							
CO2	Describe highway geometric design elements and road construction principles, given highway design data, in accordance with standard engineering practices.							
CO3	Apply traffic engineering concepts, given traffic data, to analyze traffic characteristics and control systems accurately.							
CO4	Explain bridge and tunnel engineering concepts, given engineering layouts, with correct identification of components and functional requirements.							
CO5	Describe railway engineering components and geometric design principles, given railway design data, in accordance with standard engineering practices.							
CO6	Explain airport planning concepts and runway orientation, given airport planning data, with reference to standard planning principles.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Highway Development and Construction Modes of transportation: characteristics and suitability, Highway development plans and organizations (IRC, NHAI – basic idea), Materials: aggregates, soil, bitumen (basic properties & tests – overview), Construction methods of flexible and rigid pavements, Drainage, repair and maintenance concepts						7	
II	Geometric Design of Highways Cross-sectional elements, Sight distance: SSD, OSD (concept + simple numericals), Reaction time and safe stopping distance, Horizontal, vertical and transition curves, Super elevation and widening, IRC recommendations, Basic idea of pavement design.						8	
III	Traffic Engineering Traffic studies: volume, speed, density, Peak hour factor and basic analysis, Microscopic and macroscopic parameters, Traffic signs and signals, Basic signal design (concept of Webster's method – no derivation), Types of intersections, Introduction to traffic safety.						7	
IV	Bridge and Tunnel Engineering (Basics) Bridge Engineering: Classification of bridges, Components of bridge (substructure & superstructure), Site selection and basic design considerations, Aesthetics (introductory). Tunnel Engineering: Introduction and classification, Methods of tunneling, Basic concepts: lining, ventilation, drainage, safety.						7	
V	Railway Engineering Introduction to Indian Railways, Components of permanent way, Rails, sleepers and ballast (functions), Coning of wheels and tilting of rails, Geometric design: alignment, gradients, curves, Points and crossings, Modern trends in railways.						8	
VI	Airport Engineering Importance of air transportation, Airport planning and components, Airport layout and zoning, Runway orientation (wind rose concept), Introduction to runway length, Basic airport features and facilities						8	
Total Lecture Hours						45		

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Text Books:

1. Khanna, S.K., Justo, C.E.G., & Veeraragavan, A., Highway Engineering, 11th Edition, Nem Chand & Bros., 2021.
2. Kadiyali, L.R., Traffic Engineering and Transport Planning, 9th Edition, Khanna Publishers, 2022.
3. Saxena, S.C., A Course in Railway Engineering, 8th Edition, Dhanpat Rai & Co., 2021.
4. Khanna, S.K., Arora, M.G., & Jain, S.S., Airport Planning and Design, 7th Edition, Nem Chand & Bros., 2021.
5. Rangwala, S.C., Engineering Materials, 44th Edition, Charotar Publishing House, 2021
6. Papacostas, C.S., & Prevedouros, P.D., Transportation Engineering and Planning, 4th Edition, Pearson Education, 2021.

References:

1. Wright, P.H., & Ashford, N.J., Transportation Engineering: Planning and Design, 5th Edition, Wiley India, 2021.
2. Garber, N.J., & Hoel, L.A., Traffic and Highway Engineering, 6th Edition, Cengage Learning, 2022.
3. Mundrey, J.S., Railway Track Engineering, 11th Edition, McGraw-Hill Education, 2021.
4. Horonjeff, R., McKelvey, F.X., Sproule, W.J., & Young, S.B., Planning and Design of Airports, 6th Edition, McGraw-Hill, 2021.
5. O'Flaherty, C.A., Transport Planning and Traffic Engineering, 3rd Edition, Elsevier, 2020.

Online Learning Resources

1. <https://nptel.ac.in/courses/105104098>
2. <https://nptel.ac.in/courses/105101008>
3. https://swayam.gov.in/nd1_noc20_ce01/preview
4. <https://morth.nic.in>
5. <https://www.irc.nic.in>
6. <https://smartcities.gov.in>
7. <https://www.youtube.com/watch?v=Vqgk4mXU-M8>
8. https://www.youtube.com/watch?v=jYz0nE_5D6U
9. <https://www.youtube.com/watch?v=L7F0OY6IulM>
10. <https://www.youtube.com/watch?v=R5UeeWZg8q8>
11. <https://nptel.ac.in/courses/105102089>


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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist.: Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Civil Engineering							
Course Information:								
Class, Semester		S.Y.B. Tech, Semester - IV					Category	MM
Course Code, Course Title		3CVSA221, Satellite Geodesy					Type	LIT2
Minor Stream		Surveying and its Applications (SA)						
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	--	2	3	4		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		.50	--
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain the geometry of the Earth and fundamental concepts of geodesy using standard Earth models and reference system descriptions, with correct identification of Earth shape models and reference system elements.							
CO2	Apply geodetic coordinate systems and datum transformations using given coordinate data and transformation parameters to achieve accurate coordinate conversion and correct datum transformation.							
CO3	Describe geodetic measurement techniques and modern surveying instruments using standard instruments and observation data, demonstrating correct explanation of working principles and measurement procedures.							
CO4	Explain satellite-based positioning systems and satellite geodetic observation techniques using GNSS system architecture and satellite observation datasets, accurately interpreting positioning principles and satellite-derived observations.							
CO5	Apply geodetic datums and national coordinate systems in mapping and surveying given real-world project scenarios, producing correct coordinate referencing and mapping outputs as per national standards.							
Syllabus:								
Module	Contents							Lecture Hours
I	Fundamentals of Geodesy Definition, historical development and importance of geodesy in surveying and mapping. Shape of the Earth: geoid, spheroid, ellipsoid and Earth's gravity field concepts. Basic geodetic terms, objectives and modern scope of geodesy.							7
II	Geodetic Reference Systems Geodetic datums: concept, classification and evolution of local, regional and global datums. Terrestrial and celestial reference frames and their realization. Datum transformation techniques and parameters.							8
III	Coordinate Systems and Map Projections Geodetic, Cartesian and projected coordinate systems and their interrelationship. Map projections: types, properties and selection for geodetic applications. Coordinate transformation and conversion methods.							7
IV	Geodetic Measurements and Instruments Basic geodetic measurements: angles, distances and heights. Survey instruments: theodolite, total station, digital levels and GNSS receivers. Errors in geodetic measurements and correction techniques.							8
V	Satellite Geodesy Global Navigation Satellite Systems: GPS, GLONASS, Galileo, BeiDou and IRNSS. Satellite orbits, positioning principles and observation techniques. Satellite altimetry, gravimetry and InSAR based Earth observation.							7

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VI	National Coordinate Systems and AI Applications		8
	Local, regional and global coordinate systems with Indian national reference frame. Applications of coordinate systems in mapping and surveying practices. Artificial Intelligence and Machine Learning in geodesy: GNSS error prediction, deformation monitoring and automated geospatial analysis.		
Total Lecture Hours			45
Laboratory Work with CO Mapping:			
Sr. No.	Title of Lab Work	CO Mapped	
1	Study of Earth models: Geoid, Spheroid and Ellipsoid using charts, models and GIS visualization	CO1	
2	Study of Geodetic Datums and Coordinate Reference Systems used in India (WGS84, UTM, Everest Datum etc.)	CO1, CO2	
3	Conversion of Geodetic Coordinates into Cartesian and UTM Coordinates using standard procedures/software	CO2	
4	Coordinate plotting and map projection practice using QGIS/Google Earth software	CO2, CO5	
5	Study and handling of Total Station and Digital Level for geodetic measurements	CO3	
6	Measurement of horizontal angle, vertical angle and distance using Total Station	CO3	
7	DGPS/GNSS receiver setup and observation of satellite parameters (SNR, DOP, satellite visibility)	CO4	
8	Static GNSS survey for determination of coordinates of control points in campus area	CO4	
9	RTK/PPK survey and comparison of obtained coordinates with conventional survey methods	CO4, CO5	
10	Preparation of coordinate-based mapping output using GNSS data and GIS software	CO5	
Total Practical Sessions		10	Total Tutorial Hours
Text Books:		--	
1. Bhattacharya, B.B., Geodesy and Map Projections, 2nd Edition, Oxford University Press, 2019.			
2. Seeber, G., Satellite Geodesy, 2nd Edition (Reprint), Walter de Gruyter, 2018.			
3. Torge, W. & Müller, J., Physical Geodesy, 4th Edition, Walter de Gruyter, 2012.			
4. Torge, W., Geodesy, 3rd Edition, Walter de Gruyter, 2001.			
5. Bomford, G., Geodesy, 3rd Edition, Nabu Press, 2010.			
6. Smith, J.R., Introduction to Geodesy, 3rd Edition, John Wiley & Sons, 1997.			
References:			
1. Xu, G., GPS – Theory, Algorithms and Applications, 2nd Edition, Springer, 2016.			
2. Kaplan, E.D. & Hegarty, C.J., Understanding GPS/GNSS: Principles and Applications, 3rd Edition, Artech House, 2017.			
3. Leick, A., Rapoport, L. & Tatarnikov, D., GPS Satellite Surveying, 4th Edition, John Wiley & Sons, 2015.			
4. Montenbruck, O. & Gill, E., Satellite Orbits: Models, Methods and Applications, 3rd Edition, Springer, 2000.			
5. Kaula, W.M., Theory of Satellite Geodesy, 3rd Edition, Dover Publications, 2000.			
6. Vaníček, P. & Krakiwsky, E., Geodesy: The Concepts, 2nd Edition, Elsevier, 1986.			
Online Learning Resources			
1. https://www.youtube.com/watch?v=TZzsU2Whi-A			
2. https://www.youtube.com/playlist?list=PLd8uIwM4FQUBB7AngazJH19PUREfAC1yA			
3. https://www.youtube.com/watch?v=BUjaEYfmNFM			
4. https://www.youtube.com/watch?v=5PumD3ojvaw			
5. https://www.youtube.com/playlist?list=PLKWrAz84fcUUEQRaZxzIjD1uwoOKKQ-sJ			
6. https://www.youtube.com/watch?v=w6TwpsnFkis			
7. https://www.youtube.com/watch?v=WjAAvaBwoxQ			
8. https://www.youtube.com/watch?v=Cj1vgmXr5M			
9. https://www.youtube.com/playlist?list=PL7bQ0ROARuNXmbAjTnfzom80WuZJmNzOF			

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NPTEL / SWAYAM Courses**Remote Sensing and GIS – NPTEL (IIT Guwahati)**

State-of-the-art concepts and practices of remote sensing and GIS useful for satellite geodesy applications in mapping and spatial analysis.

https://onlinecourses.nptel.ac.in/noc22_ce84/preview

GPS Surveying – NPTEL / SWAYAM (IIT Roorkee)

Comprehensive course focused on the **principles and methods of GPS for land surveying**, including GPS architecture, observables, positioning, data processing and field procedures — ideal for Units IV & V on GNSS and positioning.

https://onlinecourses.nptel.ac.in/noc23_ce93/preview


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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist.: Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Civil Engineering							
Course Information:								
Class, Semester		S.Y.B. Tech, Semester - IV				Category	MM	
Course Code, Course Title		3CVEN222, Air Pollution and Control				Type	LIT2	
Minor Stream		Environmental Engineering (EN)						
Prerequisites		---						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		3	--	2	3	4		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			40	20	40		50	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1		Identify and classify conventional and emerging air pollutants under given environmental conditions.						
CO2		Explain dispersion and transformation of air pollutants using meteorological data and atmospheric conditions.						
CO3		Select and analyze suitable air pollution control strategies for industrial, transportation, and emerging sources.						
CO4		Calculate Air Quality Index (AQI) and use basic software and AI-assisted tools to interpret air quality data.						
Syllabus:								
Module		Contents						Lecture Hours
I		Fundamentals in Air Pollution: Scope, significance, and classification of air pollutants, Primary and secondary pollutants, Indoor air pollution, Effects of air pollution, Delhi severe smog episodes, Pollution due to data centres and generative AI						7
II		Atmospheric Processes: Meteorological variables affecting air pollution, Environmental lapse rate and inversions, Atmospheric stability, Stack plume behaviour. Use of AI-based forecasting models for air quality prediction						8
III		Control of Air Pollutants: Sustainability and mitigation strategies, Air pollution control devices: settling chambers, cyclones, fabric filters, scrubbers, ESPs. (Selection criteria, Equipment details & Process)						7
IV		Transportation Systems & Electric Mobility: Brief overview of emissions from conventional vehicles, Air pollution related to electric vehicles, Non-exhaust emissions and indirect emissions, Sustainable transportation strategies.						8
V		Air Quality Monitoring, AQI Calculation, and Regulation: Objectives and methods of ambient air quality monitoring, Air quality monitoring networks in India. Air Quality Index (AQI): Concept, pollutants, and standards, Calculation. Overview of air quality standards and legislation.						7
VI		Software Tools in air pollution: Role of software in air pollution studies, Use of spreadsheets for AQI calculation and trend analysis, Introduction to GIS-based air quality mapping, Wind rose diagram.						8
Total Lecture Hours							45	

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Sr. No.	Title of Lab Work	CO Mapped
1	Assessment of Indoor vs. Outdoor Air Quality	1
2	Meteorological Data Analysis for Atmospheric Stability	2
3	Construction and Interpretation of Wind Rose Diagrams	2
4	Particulate Matter Monitoring using a High-Volume Sampler	3
5	Industrial Visit to understand Air pollution Control device	3
6	Design and Selection of Advanced Air Pollution Control Devices	3
7	Life-Cycle Emission Estimation of Conventional vs. Electric Vehicles	4
8	AQI Calculation and Trend Analysis using Spreadsheets	4
9	Spatial Mapping of Air Quality using GIS Software	4
10	Introduction to AI-Based Air Quality Forecasting	4
Total Practical Sessions		10
Total Tutorial Hours		--
Text Books:		
1. Keshav Kant & Rajni Kant, Air Pollution and Control, Khanna Publishing House, 2019		
2. Yerramilli, A., Air Pollution: Prevention and Control Technologies, 2nd Edition, BS Publications, 2020		
3. S. K. Garg, Sewage disposal and air pollution engineering, 33rd Edition, Khanna Publishers, New Delhi, 2015		
4. Rao M.N. and Rao H. V, Air pollution, 2nd Edition, Tata McGraw Hill, 1990		
References:		
1. K. V. S. G. Murali Krishna, Air pollution and control, 1st Edition, USP, 2017		
2. C David Cooper, Air pollution control: A design approach, 4th Edition, 2015		
Online Learning Resources		
1. https://www.youtube.com/watch?v=5dukz1UOtA&list=PLLy_2iUCG87BwOQUbS7WSdMVWHDXByk-w		
2. https://www.aqi.in/in		
3. https://www.who.int/health-topics/air-pollution#tab=tab_1		


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Course Information:									
Class, Semester		S. Y. B. Tech. Semester – IV					Category	HS	
Course Code, Course Title		3CVHS225, Psychology					Type	T2	
Prerequisites		--							
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits			
		1	-	-	1	1			
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE	
			-	50	-		-	-	
Course Outcomes (COs):									
Upon successful completion of this course, the student will be able to:									
CO1	Identify the basic concepts of decision making, emotional intelligence, and procrastination from given real-life situations with appropriate accuracy.								
CO2	Differentiate between effective and ineffective thinking patterns, emotional responses, and time-management behaviors in structured scenarios with logical reasoning.								
CO3	Apply suitable psychological strategies for decision making, emotional regulation, and task management in case-based scenarios.								
CO4	Analyze the influence of cognitive biases, emotions, distractions, and mindset on personal and academic performance.								
CO5	Select appropriate behavioral and self-management techniques from given practical situations to effectively improve focus, interpersonal understanding, and productivity								
Syllabus:									
Module	Contents							Lecture Hours	
I	Smart Thinking & Decision Making - What is decision making - Importance in engineering/management - Common mistakes (3 biases only) - Fast vs Slow thinking - Good enough vs perfect decision - Six Thinking Hats (application) - Individual vs group decision making - Growth Mindset vs Fixed Mindset Decision making in real-life situations							5	
II	Understanding Emotional Intelligence - Understanding emotions and importance - EI vs IQ 5 Domains of EI - Emotional Intelligence and Personality							3	
III	Emotional Regulation & Interpersonal Skills - Impulse control (self-regulation) - Handling criticism (self-management) - Empathy and altruism (social awareness) - Assertiveness (relationship management)							3	
III	Procrastination - Introduction and definition of procrastination - Why do we procrastinate - Time management myths - Distractions and attention - Techniques to beat procrastination							4	
Total Lecture Hours							15		

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Reference Books	
●	“Thinking, Fast and Slow”, Daniel Kahneman, Penguin Books, 2011
●	Emotional Intelligence: Why It Can Matter More Than IQ”, Daniel Goleman, Bantam Books, 1995
●	“Atomic Habits: An Easy & Proven Way to Build Good Habits & Break Bad Ones”, James Clear, Avery, 2018
●	“Deep Work: Rules for Focused Success in a Distracted World”, Cal Newport, Grand Central Publishing, 2016
●	“The Power of Habit: Why We Do What We Do in Life and Business”, Charles Duhigg, Random House, 2012
●	“Nudge: Improving Decisions About Health, Wealth, and Happiness”, Richard H. Thaler & Cass R. Sunstein, Penguin Books, 2008
●	“The 7 Habits of Highly Effective People”, Stephen R. Covey, Free Press, 1989
NPTEL and Onljne Resources	
Youtube Channel:	
1)	https://www.youtube.com/watch?v=O2y1QGCIzMw
2)	https://www.youtube.com/watch?v=33d61cpRfog
3)	https://www.youtube.com/watch?v=b6FpfGiENPo
4)	https://www.youtube.com/watch?v=YLhGgef7SvA
5)	https://www.youtube.com/watch?v=TOFjyi0tg5w


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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist.: Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Civil Engineering							
Course Information:								
Class, Semester		S.Y.B. Tech, Semester - IV				Category	HS	
Course Code, Course Title		3CVHS226, Environmental Studies				Type	T2	
Prerequisites		-----						
Teaching Scheme (per week)		Lecture	Tutorial	Practical	Self-Study	Credits		
		2	--	-	2	2		
Examination Scheme (Marks)		Theory	MSE	TA	ESE	Practical	CIA	ESE
			-	50	-		-	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain environmental systems and resource use in relation to population growth and sustainability using basic environmental science concepts.							
CO2	Describe the Sustainable Development Goals by identifying goals and targets relevant to engineering practice in global and national contexts.							
CO3	Apply pollution concepts to identify sources, impacts, and basic control measures for air, water, soil, and noise pollution in given situations.							
CO4	Explain climate change and renewable energy systems by outlining mitigation, adaptation, and clean energy options using standard terminology.							
CO5	Apply principles of circular economy, waste management, and environmental governance to illustrate responsible engineering practices in simple contexts.							
Syllabus:								
Module	Contents						Lecture Hours	
I	Environmental Systems, Population, and Resource Use: Components of environment and earth systems, Population growth, urbanization, and industrial development, Natural resources: water, energy, land, minerals, Resource depletion, carrying capacity, and environmental stress, Human–environment interactions and sustainability challenges						5	
II	Sustainable Development Goals (SDGs) and Engineering Responsibility: Evolution of sustainable development concept, Overview of 17 Sustainable Development Goals and key targets, Interlinkages among SDGs (water–energy–food–climate nexus), SDGs relevant to engineering disciplines (SDG 6, 7, 9, 11, 12, 13), Role of engineers in achieving SDGs						5	
III	Pollution Science and Environmental Quality: Air pollution: sources, types, impacts, and control overview, Water pollution: indicators, standards, reuse and recycling, Soil pollution: contamination sources and remediation concepts, Noise pollution: sources, measurement, impacts, and mitigation.						5	
IV	Climate Change – Science, Mitigation, and Adaptation: Greenhouse effect and climate change science, Evidence of climate change and observed impacts, Mitigation strategies: technology, energy transition, efficiency, Adaptation strategies: climate-resilient infrastructure and planning, Role of engineers in climate action.						5	
V	Renewable Energy and Sustainable Technologies: Overview of renewable energy technologies, Solar energy (PV and thermal systems), Wind energy systems, Hydropower, geothermal, ocean energy, Bioenergy and waste-to-energy, Comparative assessment of renewable technologies.						5	
VI	Circular Economy, Waste Management, and Environmental Governance: Industrial ecology and circular economy principles, Solid waste management and E-waste management, Life Cycle Assessment (LCA): concept and applications, Environmental policies and legislation (India and global overview), Environmental Impact Assessment (EIA), Ethics and professional responsibility of engineers						5	
Total Lecture Hours						30		

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Text Books:	
1.	Cunningham, W.P., & Cunningham, M.A., Environmental Science: A Global Concern, 15th Edition, McGraw-Hill Education, New Delhi, 2020.
2.	Rathoure, V.C., Fundamentals of Environmental Studies, 2nd Edition, Tata McGraw-Hill Education, New Delhi, 2019
3.	Singh, J.S., & Singh, S.P., Environmental Science: An Integrated Approach, 5th Edition, Jones & Bartlett Learning, 2019
4.	Kaushik, A., & Kaushik, C.P., Perspectives in Environmental Studies, 5th Edition, New Age International Publishers, New Delhi, 2018.
References:	
1.	Trivedi, R.K., & Goel, P.K., An Introduction to Environmental Biology, 1st Edition, University Book House, Jaipur, 2018.
2.	Odum, E.P., Fundamentals of Ecology, 5th Edition, Cengage Learning, 2017.
3.	Dash, M.C., Fundamentals of Ecology, 4th Edition, McGraw-Hill Education, New Delhi, 2016.
Online Learning Resources	
1.	https://www.youtube.com/watch?v=MtpxOdtS9KU&list=PL3qvHcrYGy1u2egw2tipHWODV6elVC2Gg


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 Established: 1999	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Civil Engineering							
Course Information:								
Class, Semester	S. Y. B. Tech. Semester - IV						Category	RM
Course Code, Course Title	3CVRM227, Research Methodology						Type	L2
Prerequisites	--							
Teaching Scheme (per week)	Lecture	Tutorial		Practical		Self-Study	Credits	
	-	-		2		1	1	
Examination Scheme (Marks)	Theory	MSE	TA	ESE		Practical	CIA	ESE
		-	-	-			50	-
Course Outcomes (COs):								
Upon successful completion of this course, the student will be able to:								
CO1	Explain fundamental concepts of research, research problems, literature sources, and research methodologies for engineering applications under given research scenarios.							
CO2	Apply appropriate research design, sampling techniques, and data collection methods to conduct systematic research studies under given problem statements.							
CO3	Analyze research data using qualitative, quantitative, statistical, and hypothesis testing techniques under given research scenarios.							
CO4	Prepare technical reports and research publications using proper documentation, referencing styles, publication ethics, journal indexing knowledge, and research tools under standard practices.							
Syllabus:								
Module	Contents							Lecture Hours
I	Research Fundamentals Meaning and objectives of research, Significance of research, Types of research, Research process, Criteria of Good Research, Importance of Research in Engineering							4
II	Research Problem & Literature Review Meaning of Research Problem, Identification & Formulation of research Problem, Techniques for defining Research Problem, Literature Sources: Journals, Conferences, Patents, Use of Digital Libraries, Literature Review techniques and gap identification.							5
III	Research Design & Methodology Need & Features of Good Research Design, Types of Research Design: Exploratory, Descriptive, Experimental, Sampling Techniques. Data Collection: Types of Data: Primary, Secondary, Methods of Data Collection: Survey, Questionnaire, Interview, Observation, Experimentation							6
IV	Data Analysis & Testing of Hypothesis Types of data: Qualitative and Quantitative, Basic statistical tools: Mean, Median, Standard Deviation, Data representation: Tables, Graphs, Charts, Introduction to analysis tools, Interpretation of results, Hypothesis, Basic concepts concerning testing of hypothesis, Procedure for hypothesis testing, Flow diagram of hypothesis testing, Test of hypothesis, Hypothesis testing of Means, Hypothesis testing for differences between Means.							5
V	Report Writing Introduction Technical Report Writing and tools (Latex), Significance of report writing, Steps in writing report, Types of reports, Layout and structure of reports, Documentation and Referencing Styles, Presentation Tools & Techniques: Zotero & Mendeley.							4
VI	Research Journals and Publication Ethics Research Journals, Types of Journals, Research Publication Process, Journal Indexing: Meaning and Importance of Journal Indexing, Benefits of Indexed Journals, Major Indexing Databases, (Scopus, Web of Science, Google Scholar, SCI, ESCI, and PubMed), Journal Metrics and Quality Indicators: Impact Factor, h-index, i10-index, CiteScore, SNIP and SJR, Types of Publications, Ethics in Research Publication: Plagiarism and Similarity Index (Turnitin Software), Copyright and Authorship, Duplicate Publication, Clone, Predatory, and Fake Journals, Researcher Profiles and Identifier (ORCID, Researcher ID)							6
							Total Lecture Hours	30
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Text Books
1. Research Methodology–Methods and Techniques by C. R. Kothari, Second Edition, New Age International Publishers
2. Dr. Santosh M Nejakar, Dr. Harish Bendigeri “Research Methodology and Intellectual Property Rights”, ISBN 978-93-5987-928-4, Edition: 2023-24
Reference Books
1. Research Methodology Concept and cases By Deepak Chawala and Neena Sondhi
2. Research Methodology: Step by step guide for beginners, Ranjeet Kumar, 5 th Edition, SAGE Publications
3. How to Write and Publish a Scientific Paper, Robert A. Day, Barbara Gastel, 8 th Edition: 8th Edition, Cambridge University Press
NPTEL and Online Resources
1. https://onlinecourses.swayam2.ac.in/e-learning/preview/ntr26_ed28
2. https://onlinecourses.swayam2.ac.in/e-learning/course/nou26_ge46

ISE Activities

1. Literature Review Presentation & Documentation on Given Topic
2. Research Survey Paper Draft & Presentation
3. Technical Report Writing


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	Annasaheb Dange College of Engineering and Technology Ashta - 416301, Dist. : Sangli, Maharashtra (An Empowered Autonomous Institute) Department of Civil Engineering						
Established: 1999							
Course Information:							
Class, Semester	S. Y. B. Tech. Semester - IV				Category	EL	
Course Code, Course Title	3CVEL228, Innovation and Product Development				Type	L2	
Prerequisites	---						
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits		
	-	-	2	1	1		
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	-	-		50	-
Course Outcomes (COs):							
Upon successful completion of this course, the student will be able to:							
CO1	Analyze real-world problems to identify innovative product or prototype concepts using creative thinking.						
CO2	Evaluate the feasibility and utility of innovative ideas through validation and expert feedback.						
CO3	Develop functional prototypes/models/products using suitable materials, tools and design thinking methods.						
CO4	Assess prototype performance, cost estimation, and preliminary production planning for scalability.						
CO5	Develop intellectual property, commercialization, or startup-oriented documentation for transforming innovative prototypes into viable entrepreneurial solutions.						
Syllabus:							
The Innovation Prototype course is designed to provide students with experiential learning in innovation, prototyping, product development, and commercialization. The course focuses on identifying real-world problems and transforming innovative ideas into functional prototypes/models/products through systematic design and development processes. Students will learn techniques for validating innovative concepts, assessing feasibility and utility, selecting suitable materials, along with design thinking approach and developing prototypes/models/products through iterative improvement and performance testing. The course also emphasizes expert reviews, prototype assessment, cost estimation, pricing strategies, and preliminary production planning for scalability. Further, students will gain exposure to Intellectual Property Rights (IPR), commercialization processes, and startup development, enabling them to prepare draft proposals for patenting, commercialization, or entrepreneurial ventures based on their innovative solutions.							

Member Secretary-BoS

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INNOVATION PROTOTYPE ACTIVITY PLAN

Sr. No	Innovation Prototype Course Activities	Planned Week
01	Introduction to Innovation and Prototyping	Week 1
02	Revising Design Thinking Approach	Week 2
03	Identifying Innovative Problems (Students & Faculty)	Week 3
04	Validating Innovation: Assessing Utility of a Proposed Concept	Week 4
05	Review No. 1 – by Guides - Innovativeness Assessment - (Final Idea Presentation)	Week 5
06	Planning and Designing the Prototype	Week 6
07	Choosing and Testing Materials for the Prototype	Week 7
08	Building the working Prototype / Model/ Product	Week 8
09	Improving working Prototype / Model/ Product	Week 9
10	Testing the Prototype / Model/ Product Performance	Week 10
11	Review No. 2 – by Expert Panel - Prototype/Model/Product Assessment along with poster	Week 11
12	Estimating Costs & Formulating a Pricing Strategy for Product	Week 12
13	Creating a Preliminary Production Plan for Scaling the Prototype	Week 13
14	Formulating IPR or Commercialization or Start up	Week 14
15	Review No. 3 – Submission of Draft Copy for IPR or Commercialization or start up	Week 15


 Member Secretary-BoS


 Chairman -BoS


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Course Information:							
Class, Semester	S. Y. B. Tech. Semester – IV		Category	MA			
Course Code, Course Title	3CVMA229, Aptitude and Reasoning -II		Type	T2			
Prerequisites	---						
Teaching Scheme (per week)	Lecture	Tutorial	Practical	Self-Study	Credits		
	-	-	2	--	-		
Examination Scheme (Marks)	Theory	MSE	TA	ESE	Practical	CIA	ESE
		-	50	-		-	-
Course Outcomes (COs):							
Upon successful completion of this course, the student will be able to:							
CO1	Solve problems based on Partnership Average Syllogism.						
CO2	Solve problems based on Seating Arrangements Puzzles Direction .						
CO3	Apply Presentation Skills Grooming & Body Language Group Discussion Interview techniques for hiring process						
CO4	Apply Resume Writing LinkedIn Cold Calling for internship and job opportunity						
Syllabus:							
Module	Contents						Lecture Hours
I	Partnership Average						4
II	Seating Arrangements Puzzles						4
III	Syllogism Direction						4
IV	Presentation Skills Grooming & Body Language						4
V	Resume Writing LinkedIn Cold Calling						4
VI	Group Discussion Interview						4
Total Lecture Hours						24	
Text Books:							
Quantitative Aptitude R.S. Agarwal, S Chand 2019							
Verbal & Non-verbal Reasoning R.S. Agarwal, S Chand 2019							
Wren & Martin (Verbal, Grammar) P.C. Wren S Chand 2017							
Reference Books:							
APTIPEDIA (Quantitative, Logical, Verbal Aptitude) Face Wiley 2017							
Wiley (Quantitative Aptitude) P.A. Anand Maestro 2015							
Arun Sharma (Verbal Ability) Meenakshi Upadhyay McGraw Hill 2020							


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