|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)

SJB Institute of Technology

An AUTONOMOUS INSTITUTION UNDER VISVESVARAYA TECHNOLOGICAL UNIVERSITY

Approved by AICTE, 2(f) and 12(B) recognized by UGC, New Delhi
Accredited by NAAC, Accredited by NBA, Certified by ISO 9001 - 2015

B.E.

Autonomous Scheme & Syllabus

CIVIL ENGINEERING

ACADEMIC YEAR 2024-2025

III & IV Semesters

2023-2027 Batch

SERVICE TO MANKIND IS SERVICE TO GOD

His Divine Soul Padmabhushana

Sri Sri Sri Dr. Balagangadharanath MahaSwamiji

Founder President, Sri Adichunchanagiri Shikshana Trust®

Belief in God is not ignorance or illusion. It is a belief that there is an unseen, ineffable Power that transcends all our powers of muscles, mind and lives.

His Holiness Parama Pujya

Sri Sri Sri Dr. Nirmalanandanatha MahaSwamiji

President, Sri Adichunchanagiri Shikshana Trust ®

True richness is the generosity of heart. Cultivate it and work to help the less fortunate ones in life.

Revered Sri Sri Dr. Prakashanatha Swamiji

Managing Director, BGS & SJB Group of Institutions & Hospitals

People and prosperity follow the path which the leaders take. So the elders and leaders should make sure that they give the right lead and take the right path.

SJB Institute of Technology

VISION:

To become a recognized technical education center with a global perspective.

MISSION:

To provide learning opportunities that foster students' ethical values, intelligent development in science technology and social responsibility so that they become sensible and contributing members of society.

Department of Civil Engineering

VISION

To produce high quality Civil Engineering graduates to suit the ever-dynamic infrastructure industry.

MISSION

M1: To establish as a state of art learning center to meet the demands of future through conducive learning programs.

M2: To develop as a recognized consultancy and research centre to cater the needs of the industry and society.

M3: To contribute towards the country's infrastructure growth by encouraging creativity in aspiring civil engineers.

2023 Scheme – UG

Syllabus for 3rd & 4th Semester

The syllabus, scheme and guidelines are provided in detail.
The syllabus, scheme and guidelines are subjected to changes if any needed.
The updates will be done timely.
Regularly access the institution website for the updated information.

The Syllabus book is available on	www.sjbit.edu.in
For any queries, please write to	academicdean@sjbit.edu.in

UPDATES

Release / Revision	Date	Remarks
Release	03/09/2024	First release

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Autonomous Scheme of Teaching & Examinations (ST&E) (Tentative) UG - BE 2nd Year Civil Engineering

SCHEME: 2023 **SEM: III** **Revision date: 8/24/2024**

S. #	Course Type	Course type Series	Course Code	Course Title	Teaching Dept.	QP setting dept	Credits	Teaching Hrs/Week				Examinations				
								L	T	P	O	CIE Marks	SEE (Dur. & Marks)			
								Lecture	Tutorial	Practical	PBL/ABL / SL/etc.		Dur.	Th.	Lab	Tot.
1	IBSC	3	23CVI301	Transformation and Statistical Method	Maths	Maths	4	2	2	2	@	50	03	50	-	100
2	PCC	1	23CVT302	Fluid Mechanics and Hydraulics	CV	CV	3	2	2	0		50	03	50	-	100
3	IPCC	1	23CVI303	Earth Resources and Construction Materials	CV	CV	4	3	0	2	@	50	03	50	-	100
4	IPCC	2	23CVI304	Strength of Materials	CV	CV	4	2	2	2		50	03	50	-	100
5	PCCL	1	23CVL305	Computer Aided Building Planning & Drawing	CV	CV	1	0	0	2		50	03	-	50	100
6	ETC	1	23CVE31y	Emerging Technology Course - 1	CV	CV	3	3	0	0	@	50	03	50	-	100
7	AEC	3	23CVAE31	3DS Max	I.E.	I.E.	1	1	0	0	3	50	02	50	-	100
8	NCMC	3	23PDSN03	Skilful futures: Empowering Aptitude and Soft skills	I.E.	I.E.	**PP/NP**	0	0	0	2	50	-	-	-	50
9	NCMC	4	23PASN01	Physical Education - Sports and Athletics	PED	PED	**PP/NP**	-	-	-	2	50	-	-	-	50
			23YOGN02	Yoga	PED	PED										
			23NSSN03	NSS - National Service Scheme	NSS	NSS										
			23NCCN04	NCC - National Cadet Corps	NCC	NCC										
			23IKSN05	Indian Knowledge System	HSS	HSS										
						Total	**20**	**13**	**6**	**8**	**7**	**450**		**300**	**50**	**800**

BSC: Basic Science Course; PCC: Professional Course; IPCC: Integrated Professional Core Course; PCCL: Professional Core Course Laboratory; AEC: Ability Enhancement Course;
{I.E.-Industry Experts};
{@ - Compulsory one activity}.
PBL: project Based learning; ABL: Activity Based Learning; SL: Self-Learning

ETC (Emerging Technology Course):

For ETC (L:T:P:O) can be plaanned by the depts considering practicality & possibility of conduction, same shall be indicated along with course title in the list, if altered than above. If planned altering the prescription, the same shall be approved at the department BOS & authorities. Atleast one activity is mandatory during the delivery of the course. The guidelines is applicable to all the semesters III to VI semesters (ETC-1 to ETC-4).

NCMC (Non Credit Mandatory Course): The following guidelines are applicable for the course type series-4 as mentioned above.

1) All students must register for any one of the course with the department during the first week of the III semester.
2) Once registered for a course in the III semester, the student shall continue and complete the same course in the remaining semesters. No provision for changing the courses after registration.
3) Activities shall be carried out by the students between III semester to VI semester (for 4 semesters).
4) The activities shall be organized, executed and monitored by the concerned department as mentioned above in coordination with the department level course coordinators. The same shall be reflected in the calendar of events of the above concerned departments.
5) Successful completion of the registered course and requisite CIE score (PP) is mandatory for the award of degree.
6) These courses are not considered for vertical progression, calculation of SGPA & CGPA, however it is mandatory for the award of degree.
7) The guidelines is applicable to all the remaining IV to VI semesters.

Additional courses for Lateral Entry students:

1) The lateral entry students getting admitted from the 2nd year of programme, shall register, study and complete additional courses prescribed & offered time to time.
2) Successful completion of the registered course and requisite CIE score (PP) is mandatory for the award of degree.
3) These courses are not considered for vertical progression, calculation of SGPA & CGPA, however it is mandatory for the award of degree.

Self-Learning Courses (SLC) as per the VIII Semester ST&E:

1) Offering and Registration of Self-learning Courses will commence from 3rd Semester itself and continues till the end of the duration of study.
2) Both regular & lateral entry students shall start registering for the self learning courses and complete as per the guidelines published separately. (Refer to the Self Learning Courses guidelines published).
3) These courses are not considered for vertical progression.
4) Calculation of SGPA & CGPA is considered for VIII Semester, irrespective of period or time of completion of the course.

Emerging Technology Course - 1	
Course Code	**Course Title**
23CVE311	Construction Equipment, Plants and Machinery
23CVE312	Environmental Protection and Management
23CVE313	Geospatial Techniques in Civil Engineering
23CVE314	Disaster Management

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AUTONOMOUS SCHEME (Tentative) UG - BE 2nd Year

SCHEME: 2023 **Date of release: 29/06/2024**

SEM: III **Additional courses for Lateral Entry students**

Note:

1) For the fulillment of successful completion of degree, lateral entry students, shall study & complete additional courses as per the guidelines released time to time.
2) Regular courses (SL No 1 to 8) are same as applicable to all defined in the scheme of teaching & examinations (ST&E).
3) The below prescribed courses has to be registered whenever they are offered and successfully completed before the end of Seventh Semester End Examinations.

SL No	Course Type	Course type Count	Course Code	Course Title	Teaching Dept.	QP setting dept	Credits	Teaching Hrs/Week				Examinations				
								L	T	P	O	CIE Marks	SEE			Tot. Marks
								Lecture	Tutorial	Practical	PBL/ABL/ SL/othrs.		Dur.	Th. Mrks	Lab. Mrks.	
For CS stream (CSE/ISE/AIML/CSE(DS))																
9	BSC	-	23MAT31A	Additional mathematics-1	Maths	Maths	PP/NP	2	0	0	@	50	-	-	-	50
For EE stream (ECE & EEE)																
9	BSC	-	23MAT31B	Additional mathematics-1	Maths	Maths	PP/NP	2	0	0	@	50	-	-	-	50
For CV stream (Civil)																
9	BSC	-	23MAT31C	Additional mathematics-1	Maths	Maths	PP/NP	2	0	0	@	50	-	-	-	50
For ME stream (Mechanical)																
9	BSC	-	23MAT31D	Additional mathematics-1	Maths	Maths	PP/NP	2	0	0	@	50	-	-	-	50

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Self Learning course list for UG- Civil Engineering

SCHEME: 2023

Release date: 29-06-2024

Self-Learning course - 1 (NPTEL) (23CVS1yy)			Self-Learning course - 2 (NPTEL) (23CVS1yy)		
Course Code	Course Title	NPTEL Code	Course Code	Course Title	NPTEL Code
23CVS101	Geosynthetics and Reinforced Soil Structures	noc24-ce63	23CVS201	Remote Sensing and GIS	noc24-ce60
23CVS102	Geotechnical Earthquake Engineering	noc24-ce64	23CVS202	Municipal Solid Waste Management	noc24-ce77
23CVS103	Advanced Concrete Technology	noc24-ce104	23CVS203	Bridge Engineering	noc24-ce79
23CVS104	Underground Space Technology	noc24-ce86	23CVS204	Introduction to Multimodal Urban Transportation Systems (MUTS)	noc24-ce80
23CVS105	Environmental Chemistry	noc24-ce87	23CVS205	Rock Mechanics and Tunneling	noc24-ce93
23CVS106	Sustainable Transportation Systems	noc24-ce65	23CVS206	Ground Improvement	noc24-ce94
23CVS107	Environmental Modeling and Simulation	noc24-ce88	23CVS207	Wastewater Treatment and Recycling	noc24-ce105
23CVS108	Modern Indian Architecture	noc24-ar24	23CVS208	Sustainable Engineering Concepts and Life Cycle Analysis	noc24-ce61
23CVS109	Urban Land use and Transportation Planning	noc24-ar19	23CVS209	Earthquake Geotechnical Engineering	noc24-ce75
23CVS110	River Engineering	noc24-ce58	23CVS210	Plate Tectonics	noc24-ce69
23CVS111	Optimization Methods for Civil Engineering	noc24-ce92	23CVS211	Advanced Reinforced Concrete Design	noc24-ce99
23CVS112	Subsurface Exploration importance & Techniques Involved	noc24-ce59	23CVS212	An Introduction to Climate Dynamics, Variability and Monitoring	noc24-ce100

HOD
Head of Department
Department of Civil Engineering
S J B Institute of Technology
Uttarahalli Road, Kengeri

Academic Dean

Dr. BABU. N.V
Prof. & Academic Dean
SJB Institute of Technology
BGS Health & Education City

Principal
Principal
SJB Institute of Technology
67, BGS Health & Education City

Guidelines for Self-learning courses – Under Graduation (UG)

1) All the UG students to earn totally 06 credits by studying and completing 02 NPTEL/SWAYAM courses of 12 weeks each earning 03 credits.
2) The credits so earned by successful completion of the courses will be credited in the 8th SEM grade card.
3) The successful completion of the courses means earning of the course completion certificates from NPTEL/SWAYAM.
4) The courses shall be studied and completed starting from 3rd Semester and shall be completed before the announcement of 8th Semester End Examinations. However, it is advised to complete both the courses before the 7th SEM of their graduation.
5) The respective department BOS shall identify the professional courses related to the respective discipline either core or multidisciplinary from the list of courses released by NPTEL/SWAYAM every season. At least ten such courses shall be identified and finalized after the discussions in the respective BOS meetings, and the list shall be approved by the Academic Dean.
6) The approved list shall be published by the departments to the students at the beginning of the 3rd SEM itself and the student shall be given an option to choose up to 02 courses for the study and earn certificates of completion.
7) The practicing of studying and completion of NPTEL/SWAYAM courses starting from 3rd SEM itself has multi-fold effect:
   i) Enhances the self-learning ability of the students.
   ii) Study of self-learning courses will have impact on the learning of other courses in the scheme of teaching & examinations.
   iii) Will address the real time challenges/difficulties/differences in the calendars of NPTEL/SWAYAM & Institution.
8) The respective departments shall make holistic efforts to bring awareness to the students about the objectives and importance of self-learning courses. The departments shall thrive towards fulfilment of the objectives.
9) The departments shall continuously monitor & track the progress of the accomplishment of the courses by the students.
10) The departments shall assign course mentors as per the guidelines of the NPTEL/SWAYAM.

11) The departments shall take care that the registered courses and the examinations shall be under the local chapter of the Institution.
12) Every care must be taken by the departments to guide, motivate, to help the students in completing the courses as the academic calendar of the institution and the calendar of the NPTEL/SWAYAM doesn't match.
13) Every season new courses may be added to the identified list and a fresh list of courses shall be prepared based on the list announced by the NPTEL/SWAYAM every season. However, the courses published from the first list shall be maintained if the NPTEL/SWAYAM list has the courses.
14) An option for making fresh choice shall be given to the students until the successful completion of the courses and earning of required number of credits within the defined time.
15) The list of students registered for the courses and completion of the courses shall be submitted to the dean office on completion of every season.
16) The performance of the students in the assignments and the certification exam of the NPTEL/SWAYAM shall be considered for awarding the grade points to the students in the self-learning courses.
17) The students unable to complete the self-learning courses and earn the required credits will not be awarded the degree. Degree shall be awarded only after successful completion and earning of credits.

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Autonomous Scheme of Teaching & Examinations (ST&E) (Tentative) UG - BE 2nd Year Civil Engineering

SCHEME: 2023 **SEM: IV** **Revision date: 8/24/2024**

S. #	Course Type	Course type Series	Course Code	Course Title	Teaching Dept.	QP setting dept	Credits	Teaching Hrs/Week				Examinations				
								L	T	P	O	CIE Marks	SEE (Dur. & Marks)			
								Lecture	Tutorial	Practical	PBL/AB L/ SL/etc.		Dur.	Th.	Lab	Tot.
1	BSC	4	23CVT401	Sampling Distributions,Complex Variable & Integral	Maths	Maths	**3**	2	2	0	@	50	03	50	-	100
2	PCC	2	23CVT402	Structural Analysis	CV	CV	**3**	3	0	0		50	03	50	-	100
3	IPCC	3	23CVI403	Surveying	CV	CV	**4**	3	0	2		50	03	50	-	100
4	IPCC	4	23CVI404	Concrete Technology	CV	CV	**4**	3	0	2		50	03	50	-	100
5	PCCL	2	23CVL405	Fluid Mechanics and Hydraulics Lab	CV	CV	**1**	0	0	2		50	03	-	50	100
6	ETC	2	23CVE42y	Emerging Technology Course - 2	CV	CV	**3**	3	0	0	@	50	03	50	-	100
7	HSMC	5	23SFHH06/ 23UHVH07	Bioscience (or) UHV - Universal Human Values	any dept	any dept	**1**	0	2	0	@	50	02	50	-	100
8	AEC	4	23CVAE41	Revit Architecture	I.E.	I.E.	**1**	1	0	0	3	50	02	50	-	100
9	NCMC	5	23PDSN04	Mindful Mastery: Aptitude and soft skill integration	I.E.	I.E.	**PP/NP**	0	0	0	2	50	-	-	-	50
10	NCMC	4	23PASN01	Physical Education - Sports and Athletics	PED	PED	**PP/NP**	-	-	-	2	50	-	-	-	50
			23YOGN02	Yoga	PED	PED										
			23NSSN03	NSS - National Service Scheme	NSS	NSS										
			23NCCN04	NCC - National Cadet Corps	NCC	NCC										
			23IKSN05	Indian Knowledge System	HSS	HSS										
Total							**20**	**15**	**4**	**8**	**7**	**500**		**350**	**50**	**900**

BSC: Basic Science Course; PCC: Professional Course; IPCC: Integrated Professional Core Course; PCCL: Professional Core Course Laboratory; AEC: Ability Enhancement Course; HSMC: Humanities, Social Sciences & Management Course; NCMC: Non Credit Mandatory Course;
{@ - Compulsory one activity during the semester}
{I.E.-Industry Experts}.
PBL: project Based learning; ABL: Activity Based Learning; SL: Self-Learning

ETC (Emerging Technology Course):

For ETC (L:T:P:O) can be plaanned by the depts considering practicality & possibility of conduction, same shall be indicated along with course title in the list, if altered than above. If planned altering the prescription, the same shall be approved at the department BOS & authorities. Atleast one activity is mandatory during the delivery of the course. The guidelines is applicable to all the semesters III to VI semesters (ETC-1 to ETC-4).

Bioscience & UHV-Universal Human Values:

1) Any one of the course will be offered by the departments in each semester of IV & VI based on the institutional planning.
2) Both the courses shall be studied and completed by the students registering each in the two semesters. For example, if Bioscience is offered in the IV semester, UHV-Universal Human Values is offered in the V semester.

NCMC (Non Credit Mandatory Course) for course type series-4: Refer to guidelines in III SEM.

Emerging Technology Course - 2	
Course Code	**Course Title**
23CVE421	Data Analytics using MS Excel (L:T:P:O :: 2:0:2:0)*
23CVE422	Sustainable Design Concept for Building Services
23CVE423	Sustainable Building Materials
23CVE424	Watershed Management

Table of Content

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Semester:	03	**Course Type:**	IBSC		
Course Title: Transformation and Statistical Method					
Course Code:	**23CVI301**			**Credits:**	4
Teaching Hours/Week (L: T: P: O)			2:2:2: @	**Total Hours:**	50+ lab slots
CIE Marks:	50	**SEE Marks:**	100	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	3

I. Course Objectives:

- To develop proficiency in solving ordinary and partial differential equations arising in engineering applications, using numerical methods.
- Analyze and Solve programming Module of real-life situations learn about applications transportation and assignment problems
- Vector integration and calculus of variations.

II. Teaching-Learning Process (General Instructions):

1. In addition to the traditional lecture method, innovative teaching methods shall be adopted.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Grading assignments and quizzes and documenting student's progress.
4. Encourage the students for group learning to improve their creative and analytical skills.

III. COURSE CONTENT

Module-1: Numerical Solution of Partial Differential Equations	Hrs: 8

Classification of second –order partial differential equations, finite difference approximations to derivatives, Solution of Laplace's equation using standard five –point formula. Solution of Heat equation by Schmidt explicit formula and Crank-Nicholson method, Solution of the Wave equation. Problems.

Textbook: Chapter: Chapter 33-[Section 33.3 , 33.4 ,33.7 , 33.8 ,33.10 to 33.13]of Text Book 1

Self-Learning: Solution of Poisson equations using standard five-point formula.

RBT Levels: L1, L2 and L3

Module-2: Numerical Differentiation and Numerical Integration:	Hrs: 8
Newton –Cotes and Guass Quadrature Integration formulae, Integration of Equations, Romberg integration, Numerical Differentiation Applied to Engineering problems, High Accuracy differentiation formulae. **Textbook: Chapter: -30[Section 30.1, 30.5] of Textbook 1 Chapter: 4[Page 220 to 229] of Textbook 3**	
Self-Learning: Optimum choice of step-length	
RBT Levels: L1, L2 and L3	
Module-3: Linear Transformation:	Hrs: 8
Introduction to Linear Transformation, The matrix of Linear Transformation, Linear Models in Science and Engineering Orthogonality and Least Squares: Inner product, length and orthogonality, orthogonal sets, Orthogonal projections, The Gram-Schmidt process, Least Square problems, Inner product spaces. **Textbook: Chapter: 2-[Section :2.11] of Text Book 1 and Chapter 6-[Page 340 to 385] of Textbook 2**	
Self-Learning: Application of Inner Product spaces	
RBT Levels: L1, L2 and L3	
Module-4: Vector integration & Calculus of Variations	Hrs:8
Line integrals-definition and problems, surface and volume integrals definition, Green's theorem in a plane, Stokes theorem(without proof) and problems. Calculus of Variations: Variation of function and Functional, variational problems. Euler's equation, Geodesics, hanging chain, problems. **Textbook: Chapter: 8-[sections:8.10 to 8.17] of Text Book 1 Chapter 35-[35.2 to 35.5] of Text Book 1**	
Self-Learning: Gauss-divergence	
RBT Levels: L2 and L3	
Module-5: Statistical methods	Hrs:8
Principles of least squares, Curve fitting by the method of least squares in the form $y = a$ + bx , $y = a + bx + cx^2$, and $y = ax^b$. Correlation, Coefficient of correlation, Lines of regression, rank correlation. **Textbook: Chapter: 24[sections:24.5 , 24.6] of Text Book 1 Chapter 25[Section:25.12 to 25.14 , 25.16] of Text Book 1**	
Self-Learning: Angle between two regression of lines and problems.	
RBT Levels: L1, L2 and L3	

IV. COURSE OUTCOMES

CO1	To solve mathematical models represented by initial or boundary value problems involving partial differential equations
CO2	Find the roots of polynomials in Science and Engineering problems.
CO3	Model some simple mathematical models of physical Applications.
CO4	Learn Techniques to solve Transportation and assignment problems.
CO5	Make use of Correlation and regression analysis to fit a suitable Mathematical Model for statistical data.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2	1		1							1				
CO2	3	2	1		1							1				
CO3	3	2	1		1							1				
CO4	3	2	1		1							1				
CO5	3	2			1							1				

VI. Assessment Details (CIE & SEE)

General Rules: Refer Annexure section 2

Semester End Examination (SEE): Refer Annexure section 2

Continuous Internal Evaluation (CIE): Refer Annexure section 2

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Name of the publisher	Edition and Year
1	**"Higher Engineering Mathematics",**	**B.S. Grewal**	**Khanna publishers**	**44th Ed 2018**
2	**Linear Algebra and its applications**	**David. C. Lay**	**Pearson Education**	**3rd edition**
3	**Numerical methods for Scientific and Engg. computation**	**M K Jain, , S.R.K Iyengar, R K. Jain**	**New Age International**	**2003**

VII(b): Reference Books:

1	Higher Engineering Mathematics	B.V.Ramana	Tata Mc Graw-Hill	11th Ed., 2017
2	"A textbook of Engineering Mathematics"	N.P Bali and Manish Goyal	Laxmi Publications,	Latest edition
3	Fundamentals of Engineering Numerical Analysis	Pervez Moin	Cambridge	2010
4	**Introductory Methods of Numerical Analysis**	**S.S.Sastry**	**PHI Learning**	**Ed., 2005**

VII(c): Web links and Video Lectures (e-Resources):

1. https://en.wikipedia.org/wiki/Numerical_methods_for_partial_differential_equations
2. https://www.youtube.com/watch?v=lA-LVn5Rczo
3. https://www.cambridge.org/core/books
4. https://docs.google.com/file/d/0B8qx1_Linnf3Q1BSX0lhYWxNeVU
5. VTU EDUSAT programme-20

VIII: Activity Based Learning

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Civil Engineering

Semester:	III	**Course Type:**	**PCC**		
Course Title: Fluid Mechanics and Hydraulics					
Course Code:	**23CVT302**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**2:2:0:0**	**Total Hours:**	50
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Understand the Fundamentals of properties of fluids, fluid pressure measurement and hydrostatic law.
- Learn the Principles of kinematics, hydrodynamics and its applications.
- Study the Flow measurements and design of pipes.
- Understand the design of open channels and energy concepts.
- Understand the Working principles of hydraulic turbines and pumps.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations.

III. COURSE CONTENT

Module-1: Fluids and their properties	10 Hrs

Fluids and their properties – compressibility, surface tension, capillarity, Pascal's law, hydrostatic law, fluid pressure measurement using simple and differential manometers, Total pressure and centre of pressure on vertical and inclined plane surfaces.

Textbook: Chapter 1,2,3- **R.K. Bansal**

Self-Learning: Problems

RBT Levels: L1 L2

Module-2: Kinematics	10 Hrs

Kinematics- Types of flow, continuity equation in Cartesian coordinates, velocity potential, stream function, flow nets, Dynamics-Euler's equation of motion, Bernoulli's equation, Application Venturi meter, Orifice meter, Pitot tube.

Textbook: Chapter 5,6- R.K. Bansal

Self-Learning: Problems

RBT Levels: L1 L2 L3

Module-3: Hydraulics Devices	10 Hrs

Classification of orifice and mouthpiece, hydraulic coefficients, discharge over rectangular, triangular and Cipoletti notch, Flow through pipes- major and minor losses, pipes in series and parallel, equivalent pipe, concept of water hammer and surge tanks.

Textbook: Chapter 7,8- R.K. Bansal

Self-Learning: Problems

RBT Levels: L1 L2 L3

Module-4: Open channel hydraulics	10 Hrs

Open channel hydraulics- classification of flow, Most economical channel sections-rectangular, triangular, trapezoidal, circular, Uniform flow, specific energy-rectangular channels, on-uniform flow, hydraulic jump-equation and applications, GVF equation-types.

Textbook: Chapter 16- R.K. Bansal
Self-Learning: Problems
RBT Levels: L1 L2 L3

Module-5: Turbine and Pumps	10 Hrs

Momentum equation, impact of jet on stationary and moving curved vanes Turbines-types, Pelton wheel-working proportions, velocity triangles Francis turbine- working proportions, velocity triangles Centrifugal pumps-work done, efficiency, multi-stage pumps.

Textbook: Chapter 18,19- R.K. Bansal
Self-Learning: Problems
RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Explain the fundamental properties of fluids and solve problems on fluid pressure and hydrostatics.
CO2	Apply the principles of kinematics and dynamics of fluid flow to solve problems on velocity and pressure.
CO3	Compute the discharge through pipes, notches and weirs.
CO4	Design the turbines and open channels of different sections and to estimate the energy loss in hydraulic jump.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2						2	1				1		1		
CO2	3	2										1		1		
CO3	3	2										1		1		
CO4	3	2										1		1		

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Hydraulics and Fluid Mechanics, including Hydraulic machines,	P.N. Modi and S.M. Seth	2015	standard Book House, New Delhi
2	Fluid Mechanics and Hydraulic Machines	K Subramanya	2018	Tata McGraw-Hill, New Delh
3	A text book of Fluid Mechanics and Hydraulic Machines	R.K. Bansal	2018	Laxmi Publications, New Delhi

VII(b): Reference Books:

1	Fluid Mechanics	Victor L. Streeter, Benjamin Wyile E and Keith W. Bedford	1987	Tata McGraw Hill publishing Co Ltd, New Delhi
2	Fluid Mechanics	J.F. Douglas. M. Gastric, John Warfield, Lynne Jack	2019	Pearson

VII(c): Web links and Video Lectures (e-Resources):

https://archive.nptel.ac.in/content/storage2/105/103/105103192/MP4/mod01lec01.mp4
https://youtu.be/mI6bBT2laMI
https://youtu.be/qie6UCJqM_Q
https://youtu.be/VCz8a-2jmug
https://youtu.be/wdAKGUKNdFk

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Visit to hydro- electric power plant
- Visit to sites to visualise the flow measuring devices, viz., weirs, spillways, etc.

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SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	III	**Course Type:**	**IPCC**		
Course Title: Earth Resources and Construction Materials					
Course Code:	**23CVI303**			**Credits:**	04
Teaching Hours/Week (L:T:P:O)			**3:0:2:@**	**Total Hours:**	40+lab slots
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To inculcate the applications of Geology in various civil engineering practices.
- To create awareness among Civil engineers regarding the resources of the earth and their uses.
- To develop skillsets to understand and employ techniques for subsurface investigations.
- To educate on ground water management and to practice applications of Remote Sensing and GIS in civil engineering projects.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, Field visits

III. COURSE CONTENT

Module-1: Scope of earth science in Engineering. — 8 Hrs

Earth's internal structure and composition, internal dynamics and Plate tectonics, Earthquakes- types, causes, so-seismic lines, seismic zonation, seismic proof structures. Volcanic eruption -types, causes. Landslides-causes types, preventive measures; Tsunami – causes, consequences, mitigation. Cyclones - causes and management.

Textbook: Principle of Engineering Geology by K.M. Bangar.

Self-Learning: Tsunami – causes, consequences, mitigation. Cyclones - causes and management.

RBT Levels: L1 L2

Module-2: Earth Materials in Construction — 8 Hrs

Minerals -Industrial, rock-forming and ore minerals. Physical properties, composition. Rocks Types, structure/Texture, mineral composition occurrence, properties. Decorative (facing/polishing), railway ballast, rocks for masonry work, monumental/architecture, Dressing of stones, Requirement of good building stones.

Textbook: Principle of Engineering Geology by K.M. Bangar

Self-Learning: Requirement of good building stones

RBT Levels: L1 L2 L3

Module-3: Surface and sub-surface investigations — 8 Hrs

Dip and strike, and outcrop problems (numerical problem geometrical/ simple trigonometry based), Borehole data (and problems), Faults, folds, unconformity, joints, types, recognition and their significance in Civil engineering projects like tunnel project, dam project, Reservoir site.

Rocks as aquifers, Electrical Resistivity method, Seismic survey, Remote Sensing and GIS, Role of GPS and GPR, Artificial Groundwater recharging techniques. Rainwater harvesting.

Textbook: A textbook of Engineering Geology by Chenna Kesavulu.

Self-Learning: Soil Classification by Grain Size.

RBT Levels: L1 L2 L3

Module-4: Basic Building Materials	8 Hrs

Aggregate: Classification, Physical and mechanical properties, soundness, Bricks and Masonry Blocks: Lime: classification, properties; Cement: types, Portland cement: Building stone: classifications, properties and structural requirements; Wood and Wood products: wood macrostructure, sap wood and heart wood, defects and decay of timber, seasoning and preservation of timber, fire resisting treatment, introduction to wood products- veneers, plywood, fibre board, particle board, block board, batten boards.

Metals: Steel: Important properties and uses of Iron (Cast iron, wroght iron and steel), Important tests on steel rebar, aluminium and copper. Glass: types and uses, gypsum: source, properties, uses; plastic: properties and uses, paint: types, distemper, varnish, Adhesive: Types, Bitumen: types, properties and tests.

Textbook: S. K. Duggal

Self-Learning: Properties of aggregate, bitumen

RBT Levels: L1 L2 L3

Module-5: Basic Building Constructions	8 Hrs

Foundation: purpose, types of foundation- shallow, deep, pile, raft, grillage foundation. Masonry: Brick Masonry: types of bonds, relative merits and demerits of English, Single Flemish and Double Flemish bond. Stone Masonry: General principles, classification of stone masonry and their relative merits and demerits, Cavity wall: components and construction, Arches: Terminology and classifications, Doors and Windows: Types, materials used Wall Finishes: Plastering, pointing, distempering and painting: Purpose, methods, defects and their solutions. Vertical communication: Stairs: Terminology, requirements of good staircase, classification; ramps, lifts and escalators. Damp proofing: causes, effects, prevention and treatments.

Textbook: S. K. Duggal

Self-Learning: Components of Building

RBT Levels: L1 L2 L3

IV. PRACTICAL COMPONENT OF IPCC

1	Physical properties of minerals: Identification of Rock Forming and ore forming minerals.
2	Physical properties of Rocks: Identification Igneous, Sedimentary and Metamorphic rocks.
3	Borehole problems: Determination of subsurface behavior of rocks, their attitude related to foundation, tunnels, reservoirs and mining. Triangular method.
4	Dip and Strike problems. Determine Apparent dip and True dip.
5	Calculation of Vertical, True thickness and width of the outcrops
6	Study of Toposheets and Interpretation, Extraction of Drainage Basin and its Morphometric Analysis. (3 Toposheets)
7	Interpretation and drawing of sections for geological maps showing tilted beds, faults, unconformities etc. (10 Maps)
8	Interpretation of Satellite Images. (2 Satellite images)
9	Field work– To identify Minerals, Rocks, Geomorphology and Structural features with related to the Civil Engineering projects.
10	Moisture content, Specific gravity, Bulking of sand, Bulk density of Fine Aggregates.
11	Sieve analysis of Coarse Aggregates, Moisture content, specific gravity, Bulk density of Coarse Aggregates.
12	Tests on Bricks
13	Test on Tiles

V. COURSE OUTCOMES

CO1	Apply geological knowledge in different civil engineering practice

CO2	Acquire knowledge on durability and competence of foundation rocks, and will be able to use the best building materials.
CO3	Provide decision support on the nature of the basic raw materials used in construction
CO4	Develop skillsets to understand and employ techniques for subsurface investigations.
CO5	Apply GIS, GPS and Remote sensing as a latest tool in different civil engineering for safe and solid construction.

VI. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2					3	2					1		2		
CO2	3					2	2					1		2		
CO3	3				2	2	2					1		2		
CO4	3				2	2	2	2				1		2		

VII. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure section 2

Semester End Examination (SEE): Refer Annexure section 2

VIII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	A textbook of Engineering Geology	Chenna Kesavulu,	1st, 1993	Mac Millan India Ltd.
2	Principle of Engineering Geology	K.M. Bangar,	1st, 2020	Standard publishers
3	Building Materials and construction	Sushil Kumar	20th,2015	Standard Publishers
VII(b): Reference Books:				
1	Introduction to Environmental Geology	Edward A Keller	5th, 2017	Pearson publications.
2	Principles of Engineering Geology and Geotechnics	Krynine and Judd	1st, 2018	CBS Publications
3	Building Materials	S. K. Duggal	4th, 2016	New Age International (P) Limited

VII(c): Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=aTVDiRtRook&list=PLDF5162B475DD915F
- https://www.youtube.com/watch?v=EBiLLJAxBuU&index=2&list=PLDF5162B475DD915F
- https://www.youtube.com/watch?v=sTY-ao4RZck&list=PLDF5162B475DD915F&index=3
- https://nptel.ac.in/courses
- https://youtu.be/fvoYHzAhvVM
- https://youtu.be/aTVDiRtRook
- https://serc.carleton.edu/NAGTWorkshops/hazards/events/12262004.html?serc_source=recommendation
- https://serc.carleton.edu/NAGTWorkshops/visualization/examples/CBezanson.html?sercsource=recommendation
- https://serc.carleton.edu/NAGTWorkshops/coursedesign/goalsdb/14712.html
- https://www.earthsciweek.org/classroom-activities

- NPTEL materials

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Field Visits
- Quiz/Assignments/Open book test to develop skills
- Encourage collaborative learning in the class
- Demonstration of Geological models and animations
- Hands on experiments with Rock and Minerals.

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	III	**Course Type:**	**IPCC**		
Course Title: STRENGTH OF MATERIALS					
Course Code:	**23CVI304**			**Credits:**	04
Teaching Hours/Week (L:T:P:O)			**2:2:2:0**	**Total Hours:**	50+lab slots
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Understand the simple stresses, strains, and compound stresses in various structural components.
- Understand the bending moments and shear forces in different types of beams under various loading conditions.
- Know the bending stress, shear stress, and torsional stress in beams and shafts with different cross sections.
- Understand the deflection in beams and the stability of columns under different loading conditions.
- Understand the behaviour and strength of structural elements subjected to compound stresses and stresses in thin and thick cylinders.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations.

III. COURSE CONTENT

Module-1: Simple Stresses and Strains — 10 Hrs

Introduction, Properties of Materials, Stress, Strain, Hooke's law, Poisson's Ratio, Stress – Strain Diagram for structural steel, Principles of superposition, Total elongation of tapering bars of circular and rectangular cross sections. Composite section, Volumetric strain, expression for volumetric strain, Elastic constants, relationship among elastic constants.

Textbook: S S Bhavikatti**: Chapter-2: sections-2**
Self-Learning: Elongation due to self-weight.
RBT Levels: L1 L2 L3

Module-2: Bending moment and shear force diagrams in beams — 10 Hrs

Introduction to types of beams, supports and loadings. Definition of shear force and bending moment, sign convention, Relationship between loading, shear force and bending moment, Shear force and bending moment equations, development of Shear Force Diagram (SFD) and Bending Moment Diagram (BMD) with salient values for cantilever, simply supported and overhanging beams for point loads, UDL (Uniformly Distributed Load), UVL (Uniformly Varying Load), Couple and their combinations.

Textbook: S S Bhavikatti**: Chapter 3 : Sections 3**

Self-Learning: Calculation of support reactions in beams.
RBT Levels: L1 L2 L3

Module-3: Bending and Shear Stresses in Beams and Torsion in Circular Shaft	10 Hrs

Bending and Shear Stresses in Beams: Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity. Expression for transverse shear stress in beams, Bending and shear stress distribution diagrams for circular, rectangular, 'I', and 'T' sections.

Torsion in Circular Shaft: Introduction, pure torsion, Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus Power transmitted by a shaft.

Textbook: S S Bhavikatti**: Chapter 4 & 6: Sections 4 & 6**

Self-Learning: Calculation of Moment of inertia different sections.

RBT Levels: L1 L2 L3

Module-4: Deflection of Beams and Columns and Struts	10 Hrs

Deflection of Beams: Definition of slope, Deflection and curvature, Sign conventions, Derivation of moment- curvature equation. Double integration method and Macaulay's method: Slope and deflection for standard loading cases and for determinate prismatic beams subjected to point loads, UDL, UVL and couple.

Columns and Struts: Introduction, short and long columns. Euler's theory; Assumptions, Derivation for Euler's Buckling load for different end conditions, Limitations of Euler's theory. Rankine-Gordon's formula for columns.

Textbook: S S Bhavikatti**: Chapter 5 & 9: Sections 5 & 9**

Self-Learning: Deflection of beam for various load condition.

RBT Levels: L1 L2 L3

Module-5: Compound Stresses and Thin and Thick Cylinders	10 Hrs

Compound Stresses: Introduction, state of stress at a point, General two-dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses.

Thin and Thick Cylinders: Introduction, Thin cylinders subjected to internal pressure; Hoop stresses, Longitudinal stress and change in volume. Thick cylinders subjected to both internal and external pressure; Lame's equation, radial and hoop stress distribution.

Textbook: S S Bhavikatti**: Chapter 7 & 8: Sections 7 & 8**

Self-Learning: Compound stress for 2D stress system.

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Evaluate the simple stresses, strains.
CO2	Calculate the Bending moments, shear force and draw BMD, SFD for various types of beams and loadings
CO3	Analyse the bending stress, shear stress and torsional stress in beams and shafts with different cross sections
CO4	Evaluate the deflection in beams and determine the stability of the columns.

CO5	Evaluate the behaviour and strength of structural elements under the action of compound stresses and stresses in thin and thick cylinders.

V. PRACTICAL COMPONENT OF IPCC

1	Tension test on Mild steel and HYSD bars.
2	Compression test on HYSD, Cast iron.
3	Bending Test on Wood under two-point loading.
4	Shear Test on Mild steel – single and double shear.
5	Impact test on Mild Steel (Charpy& Izod).
6	Torsion test on mild steel circular sections.
7	Hardness tests on ferrous and non-ferrous metals- Brinell's and Rockwell.

VI. CO-PO-PSO MAPPING

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2	2	2								1				
CO2	3	2	2	2								1				
CO3	3	2	2	2								1				
CO4	3	2	2	2								1				

VII. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure section 2

Semester End Examination (SEE): Refer Annexure section 2

VIII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Strength of Materials	S S Bhavikatti	5th Edition	Vikas Publications
2	Strength of materials	R.K. Rajpu	6th Edition	S. Chand Publications
3	Strength of Materials	B.C Punmia Ashok Jain, Arun Jain	10th Edition-2018	Laxmi Publications

VII(b): Reference Books:

1	Strength of Materials	R. Subramanyam	3rd Edition -2016	Oxford University Press
2	Elements of Strength of Materials	Timoshenko and Young	5th edition 2003	East West Press
3	Strength of Materials	S.S. Rattan	2nd Edition (Sixth reprint2013)	McGraw Hill Education (India) Pvt. Ltd

VII(c): Web links and Video Lectures (e-Resources):

1. Strength of Materials web course by IIT Roorkee https://nptel.ac.in/courses/112107146/
2. Strength of Materials video course by IIT Kharagpur https://nptel.ac.in/courses/105105108/
3. Strength of Materials video course by IIT Roorkee.
   https://nptel.ac.in/courses/112107147/18
4. All contents organized http://www.nptelvideos.in/2012/11/strengthof-materials-prof.html

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:
Assignments, quiz, self-study activities, group discussions, etc

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Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

(Civil Engineering)

Semester:	III	**Course Type:**	**PCCL**		
Course Title: Computer Aided Building Planning & Drawing					
Course Code:	**23CVL305**			**Credits:**	01
Teaching Hours/Week (L:T:P:O)			**0:0:2:0**	**Total Hours:**	26
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	Practical			**Exam Hours:**	03

I. Course Objectives:

1. Gain drafting knowledge, visualize the various components of a building and design a building.
2. This will enable students to design and draw the various types of buildings based on the given functional requirements and electrical water supply and sanitary services make graphical representation using CAD

II. Teaching-Learning Process (General Instructions):

Chalk & Talk, ppt and Videos

III Practical Part

Sl. No.	Experiments / Programs / Problems
1	**Using Auto CAD software**: Prepare working drawing of components of building like 1. SSM footing 2. Fully Paneled and flush doors 3. Partly Paneled and Partly glazed window. 4. Doglegged & open well stairs **Functional design of buildings (Residential, public and industrial) – orientation and positioning of various components of buildings- Building standards – Bye laws- set back distances- calculation of carpet area, plinth area and FAR**
2	**Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following buildings** 1. Primary health center 2. Primary school building 3. College canteen 4. Office building.
3	**Using Auto-CAD software: Development of Plan, Elevation, section, North Line and Schedule of Openings for following building. (with or without line diagram)** 1. Single Storey building. 2. Two Storey building.
4	**Using AUTO-CAD software, DRAW simple residential building (plan being given)**. 1. Plumbing, sanitary layouts 2. electrical layouts

Instructions for conduction of practical part: Refer Annexure section 3.

IV COURSE OUTCOMES

CO1	Use of modern tools like AutoCAD for building planning and drawing
CO2	Explain Building bye-laws, floor area, plinth area, carpet area. Floor area ratio
CO3	Prepare drawings of various components of buildings
CO4	Design and develop residential building drawings from given line diagram
CO5	Develop drawings showing the functional components of buildings along with service layouts, including electrical, water supply and sanitary details

V CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1																
CO2																
CO3																
CO4																
CO5																

VI Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure section 5

Semester End Examination (SEE): Refer Annexure section 5

VII Learning Resources

VII(a)Reference Books:

1	Building Planning and Drawing	S. S. Bhavikatti	2014	I K International Publishing House Pvt. Ltd
2	Building Drawing	Shah M.H., Kale C.M, and Patki S.Y.,	2002	Tata Mcgraw Hill, 5th Ed., New Delhi

VII(b): Web links and Video Lectures (e-Resources):

(2785) Civil Engineering Drawing | Introduction to Civil Engineering Drawing | Lecture 1 YouTube Civil Engineering Drawing | Elements and Principle of Planning of Residential. Lecture 2 (youtube.com**)**

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Seminar, assignments, quiz, case studies, mini projects, industry visit, self-study activities, group discussions, etc

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SJB Institute of Technology
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	III	**Course Type:**	**ETC**		
Course Title: Construction Equipment Plant and Machinery					
Course Code:	**23CVE311**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- . To provide insight on the different functions and operations of different equipment and techniques during construction.
- To impart knowledge on the various maintenance and safety to be considered during construction.
- To acquire knowledge on the life cycle of a construction equipment.
- To adopt mechanization in the Construction industry.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations.

III. COURSE CONTENT

Module-1: Introduction to Construction equipment — 8 Hrs

Construction Equipment: Earthmoving Equipment-Power shovels, Back hoe, Dragline, Clam shell; tunnelling machine types
Excavating Equipment: Scraper, Bulldozer
Compacting Equipment: Smooth wheel roller sheep-foot roller – Pneumatic typed rollers, paving technology, slip form technique
Textbook: Peurifoy, R.L.
Self-Learning: Equipment used for construction.
RBT Levels: L1 L2

MODULE-2: Hoisting equipment — 8 Hrs

Hoisting equipment–such as hoist winch, hoisting chains, hooks and slings, various types of cranes – Tower crane, mobile crane and derric crane, performance and safety in operation.
Hauling Equipment: Transit mixers and dumpers.
Conveying Equipment: Belt Conveyors, Screw conveyor, Bucket conveyor
Textbook: Peurifoy, R.L.
Self-Learning: Major equipment required for construction
RBT Levels: L1 L2

Module-3: Concrete production equipment — 8 Hrs

Equipment Life Cycle Management: Life Cycle of an Equipment- Equipment Performance Parameters - Introduction to Maintenance- Types of Maintenance- Maintenance Practices
Textbook: Velumani. P
Self-Learning: Performance of equipment
RBT Levels: L1 L2

MODULE-4: Tunnelling equipment / piling equipment	8 Hrs

Introduction to Tunnel Boring Machines- Details and Operation of a Hard-Rock TBM Details of Earth Pressure Balance (EPB) TBM- Details and operation of Slurry TBM & Components- Hydraulic Grabs- Piling Rig

Textbook: Velumani. P

Self-Learning: Method of lifting operation in construction

RBT Levels: L1 L2

MODULE-5: Safety in construction equipment	8 Hrs

Mechanization and Digitalization in Construction and Safety in Construction Equipment:

Importance of Digital Analytics- Digital Solution in Construction Projects- Importance of Mechanization - Railway Track Construction- Rebar Processing Machine- Operation of Mechanized Equipment- Introduction to 3D Concrete Printer- Importance of Safety- Various PPE & Purpose- Safety of Men & Machines at Work- Safety During Construction Activities Safety with Tools & Tackles

Textbook: **Peurifoy, R.L**

Self-Learning: Digitalization in Construction and Safety in Construction

RBT Levels: L1 L2

IV. COURSE OUTCOMES

CO1	Evaluate equipment and techniques required during construction
CO2	Understand the operation of a batching plant.
CO3	Analyse the equipment life cycle management.
CO4	Comprehend mechanization and digitalisation in construction

V. CO-PO-PSO MAPPING (H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2				2									2		
CO2		2		2										2		
CO3							2							2		
CO4						2	2				2			2		

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE):Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Construction Techniques and Practices	Velumani. P	2020	SIA Publishers & Distributers Pvt Ltd, 2020
2	Construction Planning, Equipment and Methods	Peurifoy, R.L	2nd Edition, 1996	

VII(b): Reference Books:

1	Construction Equipment and management	S.C.Sharma	2019	E-Book
2	Advanced Construction Techniques and Equipment	Dr. Manoranjan Samal	2019	S.K. Kataria & Sons

VII(c): Web links and Video Lectures (e-Resources):

E-learning content on L&T EdTech Platform.

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
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Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	**III**	**Course Type:**	**ETC**		
Course Title: Environmental Protection and Management					
Course Code:	**23CVE312**			**Credits:**	**3**
Teaching Hours/Week (L:T:P:O)			**3:0:0:@**	**Total Hours:**	**40**
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	**100**
SEE Type:	**Theory**			**Exam Hours:**	**3**

I. Course Objectives:

To impart an understanding of systems approach to Environmental Management as per ISO 14001 and skills for environmental performance in terms of legal compliance, pollution prevention and continual improvement.

II. Teaching-Learning Process (General Instructions):

1. The online courses available should be shared with students
2. YouTube videos
3. Power point presentations

III. COURSE CONTENT

Module-1:	8 hours

Environmental Management Standards: Unique Characteristics of Environmental Problems - Systems approach to Corporate environmental management - Classification of Environmental Impact Reduction Efforts - Business Charter for Sustainable Production and Consumption – Tools, Business strategy drivers and Barriers - Evolution of Environmental Stewardship. Environmental Management Principles - National policies on environment, abatement of pollution and conservation of resources - Charter on Corporate responsibility for Environmental protection.

Textbook: Christopher Sheldon and Mark Yoxon

Self-Learning: Environmental problems in Industries.

RBT Levels: L1 L2

Module-2:	8 hours

Environmental Management Objectives: Environmental quality objectives – Rationale of Environmental standards: Concentration and Mass standards, Effluent and stream standards, Emission and ambient standards, Minimum national standards, environmental performance evaluation: Indicators, benchmarking. Pollution control Vs Pollution Prevention - Opportunities and Barriers – Cleaner production and Clean technology, closing the loops, zero discharge technologies.

Textbook: Christopher Sheldon and Mark Yoxon

Self-Learning: Green Audit

RBT Levels: L1 L2

Module-3:	8 hours

Environmental Management System: EMAS, ISO 14000 - EMS as per ISO 14001– benefits and barriers of EMS – Concept of continual improvement and pollution prevention - environmental policy – initial environmental review – environmental aspect and impact analysis – legal and other requirements- objectives and targets – environmental management programs – structure and responsibility – training awareness and competence- communication – documentation and document control – operational control – monitoring and measurement – management review.

Textbook: ISO 14001/14004: Environmental management systems – Requirements and Guidelines – International Organisation for Standardisation, 2004

Self-Learning: ISO Standards

RBT Levels: L1 L2

Module-4:	8 hours

Environmental Audit: Environmental management system audits as per ISO 19011- – Roles and qualifications of auditors - Environmental performance indicators and their evaluation – Non-conformance – Corrective and preventive actions -compliance audits – waste audits and waste minimization planning – Environmental statement (form V) - Due diligence audit.

Textbook: Guidelines for quality and/or Environmental Management System auditing, ISO 19011: 2002

Self-Learning: Quality Audit.

RBT Levels: L1 L2 L3

Module-5:	8 hours

Applications: Applications of EMS, Waste Audits and Pollution Prevention Control: Textile, Sugar, Pulp & Paper, Electroplating, Tanning industry. Hazardous Wastes - Classification, characteristics Treatment and Disposal Methods, Transboundary movement, disposal.

Textbook: Guidelines for quality and/or Environmental Management System auditing, ISO 19011: 2002

Self-Learning: Industrial waste.

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Appreciate the elements of Corporate Environmental Management systems complying to international environmental management system standards.
CO2	Lead pollution prevention assessment team and implement waste minimization options.
CO3	Develop, Implement, maintain and Audit Environmental Management systems for Organizations.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3											2		2		
CO2	3	2	2				2		2			2		2		
CO3	3						2		2					2		

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	**Title of the Book**	**Name of the author**	**Edition and Year**	**Name of the publisher**

1	Installing Environmental management Systems – a step by step guide	Christopher Sheldon and Mark Yoxon	**1999**	Earthscan Publications Ltd, London.
2	ISO 14001/14004: Environmental management systems – Requirements and Guidelines –, 2004	-	**2004**	International Organisation for Standardisation
3	ISO 19011: 2002, "Guidelines for quality and/or Environmental Management System auditing, 2002	-	**2002**	Bureau of Indian Standards, New Delhi,
VII (b): Reference Books:				
1	Pollution Prevention: Fundamentals and Practice	Paul L Bishop	Boston, 2000	McGraw- Hill International
2	Environmental Management Systems:	An Implementation Guide for Small and Medium-Sized Organizations	Second Edition,2001	NSF International, Ann Arbor, Michigan,

VII(c): Web links and Video Lectures (e-Resources):
https://www.youtube.com/watch?v=BYqLRGawoH0 https://www.youtube.com/watch?v=xDcXaALK4yc
VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

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Civil Engineering

Semester:	III	**Course Type:**	**ETC**		
Course Title: Geospatial Techniques in Civil Engineering					
Course Code:	**23CVE313**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Introduce the concept of various geospatial technologies used in the industry
- To acquire basic idea about the processing and mapping with modern surveying equipment.
- Elaborate proven concepts, business practices and applications of geospatial technology.
- Explain learners understand how geospatial concepts are leveraged in handling real world business challenges of engineering and construction industry.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations.

III. COURSE CONTENT

Module-1: **Need of Geospatial technology in Industry**	8 Hrs

Geospatial in Day-to-Day Life, Spatial thinking, Evolution of location technology and importance of geography and maps. Need for spatial information, Terminologies, logic, language and formats of spatial technology. Location perspective of construction industry, Overview of Geospatial technology in tenders, Design and execution and Construction lifecycle management. Fundamentals and components of Geospatial Engineering, Surveying and Conventional survey equipment Vs Modern surveying equipment Components. Digital Land Surveying Needs.

Textbook:

RBT Levels: L1 L2

Module-2 Total Station and Global Navigation Satellite System	8 Hrs

Basics of Surveying, Introduction to Survey and Mapping, Geospatial Surveying Equipment, Demo of Total Station Equipment, Setting out and mapping, Advanced geospatial solutions, GNSS Overview of components, working and signal structure of Global navigation System.

Textbook:

RBT Levels: L1 L2

Module-3: **Geospatial Engineering and technology**	8 Hrs

Remote Sensing Technologies, Types of remote sensing, Sensors and its types, Application of sensors & platforms, Image Acquisition, Applications of Remote Sensing. 3D scanning, Principles and the science behind photogrammetry, LiDAR, RADAR and SONAR. Introduction to Platforms and working.

Textbook:

RBT Levels: L1 L2

Module-4: **Geographical Information System**	8 Hrs

Basics of GIS, Vector & Raster data models, Types and components of a Map. Hardware for GIS, DEM and TIN Data products, Attribute Data Types.
Basic GIS data conversions, conversions from non-spatial formats to spatial formats. Demo of Conversion of Excel to GIS, Demo of Conversion of CAD TO GIS, Demo of Downloading and Geo-referencing Topo sheets and Raster files.

Textbook:

RBT Levels: L1 L2

Module-5: Applications and Future trends of Geospatial Technologies	8 Hrs

Application of GIS – Spatial Analysis, Catchment Area delineation, Overlay Analysis, Cluster Analysis, Hotspot Analysis and View shed Analysis. Future Trends of Geospatial Technologies.
Case Study 1 -Benefit Realization
Case Study 2 Advancements in Modern Survey & Mapping Technologies,
Advancements in Spatial Analytics – Geo Intelligence, Future Trends, Geospatial Technology -Way Forward.

Textbook:

RBT Levels: L1 L2

IV. COURSE OUTCOMES

CO1	Comprehend different geospatial techniques in the Construction Industry.
CO2	Understand the application of geospatial equipment like Total Station, GNSS, LIDAR, UAV (Drones).
CO3	Evaluate the various spatial analysis operations by using GIS Environment
CO4	Create a map layout with all essential cartographic elements in GIS Environment.
CO5	Illustrate the various geospatial emerging trends of GIS in Industry.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3				1								1	1		
CO2	3			1									1	1		
CO3		2		1	1								1	1		
CO4			1		1									1		
CO5			1										2	2		

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer appendix section 1.

Semester End Examination (SEE): Refer appendix section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Advanced Surveying, Total Station GPS and Remote Sensing	Satheesh Gopi, R. Sathikumar, N. Madhu,	2nd, 2017	Pearson education
2	Textbook of Remote Sensing and Geographical Information systems	M. Anij Reddy	2012	BS Publications

VII(b): Reference Books:

1	Fundamentals of Remote Sensing	George Joseph and C. Jeganathan	2018	Universities Press (India) Private limited

2	Advanced Surveying, Total Station GPS and Remote Sensing	Satheesh Gopi, R. Sathikumar, N. Madhu	2nd, 2017	Pearson education,

VII(c): Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=nG6Eu5u3qc4

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- ArcGIS Online Open source
- QGIS Open source
- GPS co-ordinates app Open source
- Total Station Demo
- GNSS Demo

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	III	**Course Type:**	**ETC**		
Course Title: DISASTER MANAGEMENT					
Course Code:	**23CVE314**			**Credits:**	03
Teaching Hours/Week (L: T:P:O)			**3:0:0:@**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To explain disaster management, its planning, the occurrence of cyclones and their hazard potential
- To explain the role of IMD, cyclone prediction and cyclone warning system in India
- To explain the role of different institutions, defence and other services in natural disaster management.
- To explain the role of the Central Water Commission in river water sharing, Draught, its assessment and draught management plan
- To explain reasons for the occurrence of earthquakes, Tsunamis and thunderstorms.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations.

III. COURSE CONTENT

Module-1: Disaster Management Plan (DMP)	8 Hrs

Cyclones and their Hazard Potential: Classification of Low-Pressure Systems, Statistics of Cyclonic Storms Over Indian Seas, Movement of Cyclones in Indian Seas, Storm Surges.

Textbook: Disaster Management" by R. B. Singh

Self-Learning: General ideas on Disaster and its Management

RBT Levels: L1 L2

Module-2: India Meteorological Department and Cyclone Warnings in India	8 Hrs

India Meteorological Department and Cyclone Warnings in India: Hazard Potential of Cyclonic Storms, Cyclone Prediction and Dissemination of Warnings, Dissemination of Cyclone Warnings, Cyclone Warnings through INSAT, Port Warnings with Day and Night hoisting Signals. Cyclones Disaster Management – Plan: Hazard Potentials Associated with Cyclones, Vulnerability Reduction, Early Warning.

Textbook: Disaster Management" by R. B. Singh

Self-Learning: knowledge on Disaster warnings

RBT Levels: L1 L2 L3

Module-3: Action Plan for Cyclone Disaster Management	8 Hrs

Action Plan for Cyclone Disaster Management. Role of Different Institutions in Natural Disaster Management: Role of Zilla Parishad, Role of PRA Groups in Disaster Management, Role of NGOs, Self Help Groups in Disaster Management, Role of Red Cross in Disaster Management. The Role of Defence and other Services in Disaster Management: Role of Air Force in Disaster

Management, Role of Medical and Health Department in Cyclone disaster management, National Disaster Response Force (NDRF), Role of Remote Sensing in Disaster Management, Role of Broadcast, Educational Media in disaster management.

Textbook: Disaster Management" by R. B. Singh

Self-Learning: Role of engineer in disaster management

RBT Levels: L1 L2 L3

Module-4: Floods and Drought	8 Hrs

Floods: Water Wealth of India, Definition of Flood, Role of Central Water Commission, Monsoons, Flood Warning Signals and Precautionary Actions, Water Purification Technologies in Flood Affected Areas. Drought: Meteorological Drought, breaks in the Monsoon, Drought Management Plan, Drought Years for Different Met Subdivision of India, Drought Assessment, Drought Parameters, Role of Banking, Insurance, Microfinance in drought mitigation, Drought Monitoring, Drought Research Unit (IMD), Rainwater harvesting.

Textbook: Disaster Management" by R. B. Singh

Self-Learning: Floods and Drought

RBT Levels: L2 L3

Module-5: Earthquakes	8 Hrs

Earthquakes: Interior Structure of the Earth, Plate Techtronic's, Seismicity of India, Earthquake Forecast and disaster management, Tsunamis, Landslides and Avalanches, Volcanoes. Hazards associated with Convective Clouds: Climatology of World Thunderstorms, Lightning, Some Effects of Electric Shock, Favours and Frowning's of Thunderstorms, Hailstorms, Tornadoes, Waterspouts, Dust- Devils, now casting, Summer Thunderstorms over India, Cold Waves and Heat Waves - Cold Waves in India, Heat Waves in India.

Textbook: Disaster Management" by R. B. Singh

Self-Learning: Earthquakes and Thunderstorms

RBT Levels: L2 L3

IV. COURSE OUTCOMES

CO1	Discuss disaster management plan, cyclones, and their hazard potential
CO2	Understand the role of IMD and cyclone prediction and cyclone warning systems in India.
CO3	Understand the role of different institutions' defence and other services in natural disaster management.
CO4	Understand the role of the Central Water Commission in river water sharing, Draught, its assessment and draught management plan
CO5	Understand occurrence of earth quake, Tsunamis and thunderstorms.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2					2						1		1		
CO2	2	1				2						1		1		
CO3	2	2									2	1		1		
CO4	2	1									2	1		1		
CO5	2	2				2					2	1		1		

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure section 1

Semester End Examination (SEE): Refer Annexure section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	**Title of the Book**	**Name of the author**	**Edition and Year**	**Name of the publisher**

1	Text book of Disaster Management	A. K. Shrivastava	2021	Scientific Publishers
2	Text book of Disaster Management	S.C. Sharma	2021	Khanna Publishing
3	Disaster Management	R. B. Singh	2000	Rawat Publications
VII(b): Reference Books:				
1	Disaster Management	Ashish Malik	2018	Disha Publication
2	Disaster Management	M. Meyyappan	2000	Bluerose Publishers Pvt. Ltd.
3	Natural Disaster Management	Soumitra Roy	2004	Abhijeet Publications

VII(c): Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=9WIwlljva_s
https://www.youtube.com/watch?v=2B823bEBKGU
https://www.youtube.com/watch?v=BaWnRznp1AU
https://www.youtube.com/watch?v=JlCJ9g1cmBs
https://www.youtube.com/watch?v=D8MfWpQbwJg
https://www.youtube.com/watch?v=uA_OLKfQpYA
https://www.youtube.com/watch?v=17kBVfGjI8c

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

https://www.youtube.com/watch?v=UcWBQ6QhA_Y
https://www.youtube.com/watch?v=UcWBQ6QhA_Y
https://www.youtube.com/watch?v=R_pDKyg5YKY
https://www.youtube.com/watch?v=jfdX1nW-14A
https://www.youtube.com/watch?v=T3BT-cnHjik

|| Jai Sri Gurudev ||
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Recognized by UGC, New Delhi with 2(f) & 12 (B)
Department of Civil Engineering

Semester:	III	**Course Type:**	AEC		
Course Title: 3DS Max					
Course Code:	**23CVAE31**			**Credits:**	1
Teaching Hours/Week (L:T:P:O)			1:0:0:3	**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	02

I. Course Objectives:

1. Master the interface and navigation controls of 3ds Max.
2. Learn basic and advanced modelling techniques for creating 3D objects.
3. Understand materials, texturing, and UV mapping principles.
4. Explore lighting setups, rendering techniques, and animation principles.
5. Gain proficiency in dynamics, simulations, and particle effects.
6. Develop a portfolio showcasing skills in modelling, animation, and visualization.

II. Teaching-Learning Process (General Instructions):

1. Introduce 3ds Max interface and tools through demonstrations.
2. Facilitate hands-on practice sessions for modelling, texturing, and animation.
3. Provide guidance and feedback during project-based learning activities.
4. Encourage self-directed learning through exploration of advanced techniques and industry workflows.

III. COURSE CONTENT

III(a). Theory PART

Module-1: Draw and Modify Objects	Hrs:08
Create basic drawing objects, Draw polylines, Select and deselect objects, Manage layers and Work with blocks	
Pre-requisites (Self Learning)	
RBT Levels: L1, L2	
Module-2: Draw with Accuracy	Hrs:08
Apply basic object snaps and identify and use coordinates	
Pre-requisites (Self Learning)	
RBT Levels: L1, L2	
Module-3: Basic Editing	Hrs:08

Modify object properties, Use basic editing commands to modify objects, Trim, extend, or lengthen objects, Create rectangular and polar arrays, Offset objects at a specific distance and Apply a fillet or chamfer to objects
Pre-requisites (Self Learning)
RBT Levels: L1, L2

Module-4: Annotation	Hrs:08

Create and modify text, Add and modify leaders and/or multileader, Create and edit dimensions and Apply hatches or fill patterns.
Pre-requisites (Self Learning)
RBT Levels: L1, L2

Module-5: Layouts and Printing	Hrs:08

Work with layouts and viewports, Manage output formats
Pre-requisites (Self Learning)
RBT Levels: L1, L2

IV. COURSE OUTCOMES

CO1	Master the interface and tools of 3ds Max for efficient navigation and operation.
CO2	Develop proficiency in 3D modelling, texturing, and animation techniques.
CO3	Understand principles of lighting, rendering, and creating realistic materials.
CO4	Explore dynamics, simulations, and particle effects for dynamic visualizations.
CO5	Create high-quality 3D assets and animations for various industries and applications.
CO6	Compile a portfolio showcasing diverse skills in 3D modelling, animation, and visualization.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1																
CO2																
CO3																
CO4																
CO5																
CO6																

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure-1 Section 5

Semester End Examination (SEE): Refer Annexure-1 section 5

VII. Learning Resources

VII(a): Textbooks: (Insert or delete rows as per requirement)

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Autodesk 3ds Max 2025 Basics Guide	Kelly L. Murdock	2024	SDC Publications

2	Autodesk 3ds Max 2022 Fundamentals	ASCENT	August 30, 2021	ASCENT
3	Autodesk 3ds Max 2016 Complete Reference Guide	Kelly L. Murdock	August 7, 2015	SDC Publications

VII(c): Web links and Video Lectures (e-Resources):

1. 3ds Max Courses on LinkedIn Learning
2. 3ds Max Courses on Udemy
3. 3ds Max Courses on Plural sight
4. 3ds Max Tutorials on C G Cookie
5. 3ds Max Learning Paths on Autodesk Learning Centre
6. Autodesk 3ds Max Channel
7. Chaos Group (V-Ray Tutorials)

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

1. Modelling Challenges: Engage students in hands-on modelling tasks to recreate real-world objects or scenes, fostering creativity and problem-solving skills.
2. Texturing Workshops: Conduct practical workshops focusing on texturing and material creation, encouraging experimentation with different textures and materials.
3. Animation Exercises: Assign animation tasks to practice key frame animation and character movement, providing opportunities for students to refine their animation skills.
4. Simulation Projects: Challenge students with dynamic simulation projects, such as particle effects or cloth dynamics, allowing them to explore and experiment with 3ds Max's simulation capabilities.

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Department of Civil Engineering

Semester:	III	**Course Type:**	NCMC		
Course Title: Skilful Futures: Empowering Aptitude and Soft skills					
Course Code:	**23PDSN03**			**Credits:**	PP/NP
Teaching Hours/Week (L: T: P: O) {O – Other pedagogies, mention @}			0:0:0:2	**Total Hours:**	24
CIE Marks:	50	**SEE Marks:**	NA	**Total Marks:**	50
SEE Type:	-			**Exam Hours:**	02

I. Course Objectives:

- To strengthen logical and analytical thinking skills required to solve quantitative problems.
- To discuss the importance of ethical considerations in leadership and negotiation, emphasizing integrity, fairness, and accountability in decision-making and interactions.
- To apply problem-solving strategies to real-world situations.
- To crafting Effective Openings and Closings.
- To develop a systematic approach to creative problem solving

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
2. **Visual Aids**: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

□ Chalk & Talk □ Stud. Assignment □ Web Resources □ LCD/Smart Boards □ Stud. Seminars

III. COURSE CONTENT

Module-1: Quantitative Aptitude-1	6 Hrs
Problems on Permutation and Combination. Problems on Surds and Indices **Text book: Textbook (b) -1: Section –I Page no: 308-373; page no 375-408**	
Prerequisites: Basic knowledge of Mathematics	
Module-2: Visualize Leadership and Negotiation skills	4 Hrs
Leadership skills, Persuasion Skills, Negotiation Skills and Conflict Resolving Skills **Text book: Textbook 5: Chapter-1**	

Module-3: Quantitative Aptitude – 02	6 Hrs
Problems on Percentage, Problems on Profit and Loss, Problems on cubes and Dices. **Text book: Textbook (b) -1 Section –I Page no: 308-373; page no 375-408**	
Prerequisites: Basic Calculation Knowledge.	
Module-4: Letter and Writing Skills	4 Hrs
Writing Skills, Formal, Informal Letters, Sample Letters, Business Professional writings and Adaptability in writing style **Text book: Textbook 4: Chapter-1**	
Module-5: Logical Reasoning	4 Hrs
Syllogism Concepts and Logical Deduction **Text book: Textbook 3; Chapter1 to 3**	
Prerequisites: Basic concepts of Set theory/ Venn diagrams	
COURSE OUTCOMES: At the end of this course, students will be able to	
CO1	Solve complex problems related to Arithmetic, algebra, geometry, Statistics Permutation and Combination, demonstrating a strong understanding of the concepts.
CO2	Apply Surds and Indices concepts proficiently to solve mathematical problems with precision.
CO3	Develop leadership skills, including effective communication, persuasion, negotiation, and conflict resolution techniques.
CO4	Demonstrate proficiency in solving Percentage, Profit and Loss, and cubes and Dices problems, showcasing quantitative aptitude.
CO5	Enhance writing skills by effectively composing formal and informal letters, business professional writings, and adapting writing styles to different contexts.

IV. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2						2				1	1		2	1
CO2								2	2			2		2		
CO3	2	2						2				2			1	
CO4										2		2				2
CO5	2	2										1	1	1		1

V. Assessment Details (CIE & SEE)

General Rules: Refer Annexure-1 section 8

Continuous Internal Evaluation (CIE): Refer Annexure-1 section 8

Semester End Examination (SEE): Refer Annexure-1 section 8

VI. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Fastrack Objective Arithmetic	Rajesh verma	2022	Arihant Publications
2	Algebra Booster	Rejaul Markshud	2017	Mcgraw Hill Education
3	Sense and Syllogism	Aparna Tulpule	2019	Whitefalcon
4	A Handbook on letter writing	S.C Gupta	2018	Arihant publications
5	"Leadership Theory and practice"	Peter.G Northouse	2021	SAGE

VII(b): Reference Books:

1	Quantitative Aptitude for Competitive examination	R S Agarwal	2017	S Chand
2	Are we leading?	Kaushik Mahaputhra	2020	Notion press
4	A modern approach to logical reasoning	R S Agarwal	2019	S Chand

VII(c): Web links and Video Lectures (e-Resources):
• https://youtu.be/6B-dvOMTeV8?si=Mx0GqAVqjh6VtDRP • https://youtu.be/MFj7QIXn-mM?si=AQlxLi086k1GrJuk •
VIII: Activity Based Learning / Practical Based Learning/Experiential learning:
Assignments, Quizzes and Seminar, group discussions etc.

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	IV	**Course Type:**	BSC		
Course Title: Sampling Distributions, Complex Variable and Integral					
Course Code:	**23CVT401**			**Credits:**	3
Teaching Hours/Week (L: T: P: O)			2:2:0:@	**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	100	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	3

I. Course Objectives:

- Apply the knowledge of theory of probability in the study of uncertainties
- Understand the concepts of sampling distributions.
- Use probability and sampling theory to solve random physical phenomena and implement appropriate distribution models
- Understand theory of complex variables.

II. Teaching-Learning Process (General Instructions):

1. In addition to the traditional lecture method, innovative teaching methods shall be adopted.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Grading assignments and quizzes and documenting students' progress.
4. Encourage the students for group learning to improve their creative and analytical skills.

III. COURSE CONTENT

Module-1 Probability Distributions	8 Hrs

Review of basic probability theory. Random variables (discrete and continuous), probability mass and density functions. Mathematical expectation, mean and variance. Binomial, Poisson, and normal distributions- Illustrative examples.

Textbook: Chapter: 26-[Section 26.7 to 26.10, 26.14 to 26.16] of Text book 1.

Self Learning: Exponential distribution

RBT Levels: L1, L2 and L3

Module-2 Joint probability distribution & Markov Chain	8 Hrs

Joint probability distribution: Joint Probability distribution for two discrete random variables, expectation, covariance and correlation.
Markov Chain: Introduction to Stochastic Process, Probability Vectors, Stochastic matrices, Regular stochastic matrices, Markov chains, Higher transition probabilities, Stationary distribution of Regular Markov chains and absorbing states.
Textbook: Chapter:31-[sections:31.1 & 31.2] of Text book 3

Self Learning: Point estimation & Interval estimation.

RBT Levels: L1, L2 and L3

Module-3: Sampling Theory	8 Hrs

Sampling, Sampling distributions, standard error, test of significance for large samples: test of hypothesis for means and proportions, Test of Significance for means of two Large samples: students 't' distribution, Chi-square distribution as a test of goodness of fit. F Distribution.

Textbook: Chapter:27-[sections 27.1 to 27.7 , 27.12 to 27.19] of Text book 1

Self-Learning: Test of Significance for means of two Large samples

RBT Levels: L1, L2 and L3

Module-4: Complex Variable	8 Hrs

Basic definitions**,** Elementary function, Analytic function, Cauchy-Riemann equations in Cartesian and polar coordinates, Analyticity of given function, Harmonic function , Construction of analytic functions (with application problem), Milne-Thompson method. Application Problems

Textbook: Chapter:20-[sections 20.1 to 20.6] of Text book 1

Self-Learning: Residue, Residue theorem.

RBT Levels: L1, L2 and L3

Module-5: Transformations & Complex integrals	8 Hrs

Conformal transformations: Introduction. Discussion of transformations:
$w = e^z$, $w = z^2$ $and w = z + \frac{1}{z}$. Bilinear transformations- Problems.) 0≠z (, z Complex integration:
Line integral of a complex function-Cauchy's theorem and Cauchy's integral formula and problems.

Textbook: Chapter: 20-[sections:20.8 , 20.9 , 20.12 to 20.24]

Self-Learning: Bilinear transformation.

RBT Levels: L1, L2 and L3

IV. COURSE OUTCOMES

CO1	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field.
CO2	Construct a Joint probability Distribution and demonstrate the validity of testing the hypothesis. Describe and calculate with discrete time/space Markov chains, including the calculation of absorption probabilities
CO3	Use the concepts of sampling to make decision about the hypothesis.
CO4	Use the concepts of analytical function and complex potentials to solve the problems arising in electromagnetic theory.
CO5	Use the concepts of analytical function and complex potentials to solve the problems in aero foil theory, fluid flow visualization and imaging process.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	2	1		1							1				
CO2	3	2	1		1							1				
CO3	3	2	1		1							1				
CO4	3	2	1		1							1				
CO5	3	2	1		1							1				

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure Section 1

Semester End Examination (SEE): Refer Annexure Section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Name of the publisher	Edition and Year
1	**"HigherEngineering Mathematics",**	**B.S.Grewal**	**Khannapublishers**	**44th Ed 2018**
2	**Advanced Engineering Mathematics**	**E. Kreyszig**	**John Wiley & Sons**	**10th Ed., 2016**
3	Higher Engineering Mathematics	B.V.Ramana	Tata Mc Graw-Hill	11th Ed., 2017

VII(b): Reference Books:

1	Operation research	S D Sharma	Kedarnath Publishers	Ed., 2012
2	Advanced Engineering Mathematics	C. Ray Wylie, Louis C. Barrett	McGraw – Hill Book Co.,	6th Ed., 2017
3	Probability & Statistics for Engineers & Scientists	Ronald E. Walpole, Raymond H Myers, Sharon L Myers & Keying Ye	Pearson Education	9th Ed., 2023.

VII(c): Web links and Video Lectures (e-Resources):

1. http://nptel.ac.in/courses.php?disciplineID=111
2. https://qcpages.qc.cuny.edu/
3. https://www.youtube.com/watch?v=WMmqxcgvo4Y
4. VTU EDUSAT programme-20

VIII: Activity Based Learning

Assignments, Quiz, Presentation.

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
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Civil Engineering

Semester:	**IV**	**Course Type:**	**PCC**		
Course Title: Structural Analysis					
Course Code:	**23CVT402**			**Credits:**	**03**
Teaching Hours/Week (L:T:P:O)			**3:0:0:0**	**Total Hours:**	**40**
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	**100**
SEE Type:	**Theory**			**Exam Hours:**	**03**

I. Course Objectives:

- Understand the Different Forms of Structural Systems.
- Determine the Strain Energy and Slope and Deflection of Beams, Trusses and Frames.
- Analyse arches and cable structures.
- Analyse different types of beams and frames using slope deflection method.
- Analyse different types of beams and frames using moment distribution method.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations, assignments

III. COURSE CONTENT

Module-1: Introduction and Analysis of Plane Trusses	8 Hrs

Structural forms, Conditions of equilibrium, Compatibility conditions, Degree of freedom, Linear and nonlinear analysis, Static and kinematic indeterminacies of structural systems, Types of trusses, Assumptions in analysis, Analysis of determinate trusses by method of joints and method of sections.

Textbook: Basic structural analysis by K U Muthu; **Chapter 1 & 2**

Self-Learning: Graphical Solutions - Force Diagrams

RBT Levels: L1, L2, L3, L4

Module-2: Deflection of Beams	8 Hrs

Moment area and Conjugate beam methods: Mohr's theorems, sign convention; Application of moment area method to determinate prismatic beams, beams of varying cross section; Use of moment diagram by parts. Conjugate beam theorems; Applications to determinate prismatic beams. **Strain Energy:** Principle of virtual displacements, Principle of virtual forces, Strain energy and complimentary energy, Strain energy due to axial force, bending, shear and torsion (No numerical). Castigliano's theorems, application of Castigliano's theorems to calculate deflection of beams and frames.

Textbook: Basic structural analysis by K U Muthu; **Chapter 4, 5 & 6**

Self-Learning: Merits and De-merits of the above methods

RBT Levels: L1, L2, L3, L4

Module-3: Arches and Cable Structures	8Hrs

Three hinged parabolic arches with supports at the same and different levels. Determination of normal thrust, radial shear and bending moment. Analysis of cables under point loads and UDL. Length of cables for supports at same and at different levels- Stiffening trusses for suspension cables.

Textbook: Basic structural analysis by K U Muthu; **Chapter 8 & 9**

Self-Learning: Temperature Effect in Arches; Types of support on the Bridge Pier.

RBT Levels: L1, L2, L3

Module-4: Slope Deflection Method	8 Hrs

Introduction, sign convention, development of slope deflection equation; Analysis of continuous beams including settlement of supports; Analysis of orthogonal rigid plane frames including sway frames with kinematic indeterminacy up to 3

Textbook: Analysis of Indeterminate structures by K U Muthu; **Chapter 1**

Self-Learning: Temperature Effect in continuous beams and orthogonal Frames

RBT Levels: L1, L2, L3, L4

Module-5: Moment Distribution Method	8 Hrs

Introduction, Definition of terms, Development of method, Analysis of continuous beams with support yielding, Analysis of orthogonal rigid plane frames including sway frames with kinematic indeterminacy up to 3

Textbook: Analysis of Indeterminate structures by K U Muthu; **Chapter 2**

Self-Learning: Comparison of Moment Distribution Method and Kani's Method

RBT Levels: L1, L2, L3, L4

IV. COURSE OUTCOMES

CO1	Identify the different forms of structural systems and analyse plane trusses.
CO2	Evaluate the slope and deflection in beams and frames using moment area method and Energy principle.
CO3	Analyse and determine the stress resultants in arches and cables.
CO4	Analyse continuous beams and orthogonal rigid frames and construct BMD and SFD using slope deflection and moment distribution methods.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3	3											2			
CO2	3	3											2			
CO3	3	3											2			
CO4	3	3											2			
CO5	3	3											2			

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure 2 section 1

Semester End Examination (SEE): Refer Annexure 2 section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	**Title of the Book**	**Name of the author**	**Edition and Year**	**Name of the publisher**
1	Basic Structural Analysis	K U Muthu et.al.	Third Edition 2019	I K International
2	Analysis of Indeterminate Structures	K U Muthu et.al.	Third Edition 2020	I K International
3	Structural Analysis-Vol-1 and Vol-2	S S Bhavikatti	Third Edition 2016	Vikas Publications

VII(b): Reference Books:

1	Structural Anaysis Vol-1 and Vol-2	Dr. R Vaidyanathan and Dr. Perumal	Second Edition 2015	Laxmi Publications

2	Basic Structural Analysis	C S Reddy	Third Edition 2016	McGraw Hill Publications
3	Structural Analysis	R C Hibbeler	Second Edition 2014	Wiley

VII(c): Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/105105166
https://nptel.ac.in/courses/105105166
https://nptel.ac.in/courses/105105166
https://nptel.ac.in/courses/105105109
https://nptel.ac.in/courses/105105109
https://nptel.ac.in/courses/105105109

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Seminars /Quiz (to assist in GATE preparations)
- Demonstrations in using Softwares
- Self-Study on simple topics
- Simple problems solving by Etabs/Staad pro.

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Civil Engineering

Semester:	IV	**Course Type:**		**IPCC**
Course Title: SURVEYING				
Course Code:	**23CVI403**		**Credits:**	04
Teaching Hours/Week (L: T:P:O)		**3:0:2:0**	**Total Hours:**	40+lab slots
CIE Marks:	**50**	**SEE Marks:** **50**	**Total Marks:**	100
SEE Type:	**Theory**		**Exam Hours:**	03

I. Course Objectives:

- Ability to understand principles of both traditional and modern surveying applying knowledge of mathematics.
- Ability to handle surveying equipment's and software tools to carry out field surveying, plot topographical Drawings and construction drawing.
- Ability to use Total station for data capture, data storage, data transfer.
- Ability to prepare construction drawing and setting out

II. Teaching-Learning Process (General Instructions):

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.

1. Apart from conventional lecture methods various types of innovative teaching techniques through videos, animation films may be adopted so that the delivered lesson can progress the students in theoretical, applied, and practical skills.
2. Arrange field visits to give brief information about the water and wastewater treatment plant. 3. Encourage collaborative (Group Learning) Learning in the class.
3. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking and enhance the knowledge of treatment processes.
4. Adopt Problem Based Learning (PBL), which fosters students, Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
5. Seminars, surprise tests and Quizzes may be arranged for students in respective subjects to develop skills.

III. COURSE CONTENT

MODULE-1	**Introduction & Distance Measurement**	8 Hrs

Engineering surveying – Definition & importance of surveying for Civil Engineers. Surveying types- Control survey, Topographical surveying, Construction Survey, Cadastral survey, Hydrographic survey, and Underground Survey. Surveying through the ages- Chain surveying, Compass surveying and Plane Table Surveying (concepts and limitations only).

Measurement of Distance- Various types of tapes, Laser distance meter, Distance measuring wheel, Electronic Distance measurement, GPS.

Textbook: Surveying Volume-1, Dr. B C Punmia: **Chapter-3,4,5**

Self-Learning: chain surveying and its types

RBT Levels: L1 L2 L3

MODULE-2	Vertical Control & Theodolite Surveying	8 Hrs

Vertical Control- Concepts of various types of Datum – Mean Sea level, Benchmarks – Temporary and Permanent. Levelling- Terms used in levelling, Setting up of Dumpy level. Differential levelling by plane of collimation method using Dumpy level.

Theodolite Surveying – Terms used in Theodolite surveying. Setting up a Theodolite. Measurement of horizontal and vertical angles with Theodolite.

Total Station Surveying – Features, parts, accessories, and advantages of Total Station. Surveying with total station – Measurement of Horizontal angle, vertical angle, distance, slope, vertical distance, multiple angles with Total station. Using Total station for Area measurement and Volume calculation.

Textbook: Surveying Volume-1, Dr. B C Punmia: **Chapter-6,9**

Self-Learning: single plane and double plane methods in theodolite surveying

RBT Levels: L1 L2 L3

MODULE-3	Contours, L/S C/S & Coordinate survey with Total station	8 Hrs

Contours - Definition, terms used, characteristics of contours and applications of contours in civil engineering practice. Contouring using level, theodolite, and total station. Plotting of contours in CAD.

Longitudinal and cross sectioning – Definition, importance of L/S & C/S. L/S & C/S using level, theodolite, and Total station. Plotting of L/S & C/S in CAD.

Coordinate survey with Total station - Measurement of coordinates using total station. Creating Job files, importance of back sight data, coordinate data recording. Data transferring, data refinement and plotting in CAD.

Textbook: Surveying Volume-1, Dr. B C Punmia: **Chapter-9,10**

Self-Learning: plotting contours for complex hill stations

RBT Levels: L1 L2 L3

MODULE-4	Curves & Areas and Volumes	8 Hrs

Curves –Types of Curves- Application of curves in civil engineering. Setting out of Horizontal curve by Theodolite (Rankine's method) and using Total Station. Components of Compound, Reverse curve. Transition Curve and Combined curve. Various types of vertical curves and its applications.

Areas and Volumes- Methods of determining areas by trapezoidal and Simpsons' rule. Measurement of volume by prismoidal and trapezoidal formula. Earthwork volume calculations from spot levels and from contour maps; Earthwork calculation in Embankments. Construction Surveying - Setting out works using Total Station, Setting out buildings by Centre line method.

Textbook: Surveying Volume-1, Dr. B C Punmia: **Chapter-12,13**

Self-Learning: basic design of curves

RBT Levels: L1 L2 L3 L4

MODULE-5	GPS Surveying & Surveying with Drone	8 Hrs

GPS Surveying – Introduction. Overview of GPS system- space, control and user segments. Reference co- ordinate systems. Absolute and Differential positioning with GPS. Gagan system in India. Types of GPS Receivers. Engineering survey using Differential GPS.

Surveying with Drone – Introduction, applications, and advantages. Features of photogrammetric mapping method. Drone surveying requirements- Drone platform, Flight planning software, Sensor DGPS equipment and Image processing software. Types of drones and sensors.

Process of drone surveying – flight planning, DGPS markers, capturing images, post processing of images using photogrammetry software and output maps. Application and uses of Remote sensing and GIS in engineering surveying.

Textbook: GPS Surveying by Dr. Jayanta Kumar Ghosh **Chapter-2,3**
Self-Learning: flight path planning for drones
RBT Levels: L1 L2 L3 L4

IV. PRACTICAL COMPONENT OF IPCC

Sl. No	EXPERIMENTS
1.	Use of Various types of tapes, Laser distance meter, Distance measuring wheel.
2.	Differential levelling by Dumpy level by plane of collimation method
3.	Measurement of horizontal and vertical angles by Theodolite. Method of repetition
4.	Setting out simple curve using Rankine's method using Theodolite
5.	Setting out central line of a small residential building.
6.	Setting up of Total station. Features and components of Total station
7.	Measurement of Distance, slope, vertical distance, horizontal and vertical angles using Total station
8.	Coordinate measurement with Total station
9.	Longitudinal sectioning and cross sectioning using Total station
10.	Contouring and plotting with Total station
11.	Demonstration of Equipment's used for chain, compass, and plane table surveying

V. COURSE OUTCOMES

CO1	Summarize various types of surveying and carry out distance measurement using various equipment's
CO2	Illustrate the use and applications of levelling and theodolite
CO3	Plot contours, longitudinal and cross sections for construction projects.
CO4	Set curves for construction works and carry out estimation of areas and volumes.
CO5	Demonstrate the necessary skills to carry out GPS and DRONE Surveying

VI. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1																
CO2																
CO3																
CO4																
CO5																

VII. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure 2 section 2

Semester End Examination (SEE): Refer Annexure 2 section 2

VIII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher

1	Surveying	Dr. B C Punmia	17th Edition, Vol. 1	Laxmi Publications
2	Surveying	Dr. K.R. Arora	17th Edition, Vol. 1	Standard Book House
3	Surveying	Charles D. Ghilani.	2019	Technical Publications
VII(b): Reference Books:				
1	Surveying – Vol – I	S.K.Duggal	1987	Tata McGraw Hill Book Co
2	GPS Surveying	Dr. Jayanta Kumar Ghosh	2016	Amazon Publications (paperback)

VII(c): Web links and Video Lectures (e-Resources):

1. https://enterprise.dji.com/surveying/land-surveying
2. https://www.gps.gov/applications/survey/
3. https://www.constructionplacements.com/total-station-in-surveying-types-uses-and-applications/
4. https://www.youtube.com/watch?v=bbs5AEPstl4
5. https://www.youtube.com/watch?v=KHI4TEeexuM&list=PLLy_2iUCG87DwNVc3Mz1yYlRA42jSQ1tB&index=28
6. https://www.youtube.com/watch?v=Iu9vrE48_I4&list=PLLy_2iUCG87DwNVc3Mz1yYlRA42jSQ1tB&index=30
7. https://www.youtube.com/watch?v=RXUi2cX4CkU
8. https://www.youtube.com/watch?v=SVa66vO08So

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning.

1. Hand on use of various surveying instruments
2. Surveying Civil engineering block and plotting with instruments of student's choice
3. Setting out a single bedroom house plan in field

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Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	IV	**Course Type:**	**IPCC**		
Course Title: Concrete Technology					
Course Code:	**23CVI404**			**Credits:**	04
Teaching Hours/Week (L:T:P:O)			**3:0:2:0**	**Total Hours:**	40+lab slots
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To recognize material characterization of ingredients of concrete and its influence on properties of concrete
- To study the properties of fresh concrete and hardened concrete Proportion ingredients of Concrete to arrive at most desirable mechanical properties of Concrete.
- Ascertain various types of special concrete with their properties.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations.

III. COURSE CONTENT

III.(a) Theory

Module-1: Concrete Ingredients	8 Hrs

Cement manufacturing process, chemical composition and their importance, hydration of cement, types of cement. Testing of cement, steps to reduce carbon footprint.
Fine aggregate: Functions, requirement, Alternatives to River sand, M-sand introduction, and manufacturing.
Coarse aggregate: Importance of size, shape and texture. Grading and blending of aggregate. Testing on aggregate, requirement. Recycled aggregates Water – qualities of water.
Chemical admixtures – plasticizers, accelerators, retarders, and air entraining agents. Mineral admixtures –Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Metakaolin and rice husk ash.
RBT Levels: L1 L2

Module-2: Fresh Concrete	8 Hrs

Factors affecting workability. Measurement of workability–slump, Compaction factor and Vee-Bee Consistometer tests, flow tests. Segregation and bleeding. Process of manufacturing of concrete- Batching, Mixing, Transporting, Placing and Compaction. Curing – Methods of curing – Water curing, membrane curing, steam curing, accelerated curing, self- curing. Good and Bad practices of making and using fresh concrete and Effect of heat of hydration during mass concreting at project sites.
RBT Levels: L1 L2 L3

Module-3: Hardened Concrete	8 Hrs

Factors influencing strength, W/C ratio, gel/space ratio, Maturity concept, testing of hardened concrete, Creep – factors affecting creep. Shrinkage of concrete – plastic shrinking and drying shrinkage, Factors affecting shrinkage. Definition and significance of durability. Internal and external factors influencing durability, Mechanisms- Sulphate attack – chloride attack, carbonation, freezing and thawing. Corrosion, Durability requirements as per IS-456, In situ testing of concrete-

Penetration and pull-out test, rebound hammer test, ultrasonic pulse velocity, core extraction – Principal, applications and limitations

RBT Levels: L2, L3

Module-4: Concrete Mix Design	8 Hrs

Principles of concrete mix design, Parameters and factors influencing mix design, Concept of Mix Design with and without admixtures, variables in proportioning and Exposure conditions, Selection criteria of ingredients used for mix design, Procedure of mix proportioning. Numerical Examples of Mix Proportioning using IS10262:2019.

RBT Levels: L1 L2 L3

Module-5: Special Concrete	8 Hrs

RMC-manufacture and requirement as per QCI-RMCPCS, properties, advantages, and disadvantages. Self-Compacting concrete- concept, materials, tests, properties, application and typical mix Fiber reinforced concrete- types of fibres, properties, application of FRC. Light weight concrete-material properties and types. Typical light weight concrete mix proportion and applications, materials, requirements, mix proportion and properties of Geo polymer Concrete, High Strength Concrete and High-Performance Concrete.

RBT Levels: L1 ,L2 & L3

III.(b) Practical

Sl.No.	**Experiments**
1	Testing of cement: Consistency, fineness, setting time,
2	Specific Gravity, Soundness and strength of cement
3	Testing of fine aggregate: Specific Gravity, sieve analysis and zoning, bulking of fine aggregate, bulk density, silt content
4	Testing of coarse aggregate: Specific Gravity, sieve analysis, bulk density, flakiness index, elongation index, water absorption & moisture content, soundness of aggregate.
5	Concrete Mix design by IS code method as per 10262- 2019 & 456-2000, DOE method.
6	Demonstration of Testing of concrete cube of specified strength
7	Demonstration of Testing of concrete beam for pure bending

IV. COURSE OUTCOMES

CO1	Relate material characteristics and their influence on microstructure of concrete.
CO2	Distinguish concrete behaviour based on its fresh and hardened properties.
CO3	Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.
CO4	Select a suitable type of concrete based on specific application.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2						2	1				1		1		
CO2	3	2										1		1		
CO3	3	2										1		1		
CO4	3	2										1		1		

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure 2 section 2

Semester End Examination (SEE): Refer Annexure 2 section 2

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	**Title of the Book**	**Name of the author**	**Edition and Year**	**Name of the publisher**

1	Concrete Technology - Theory and Practice	M.S. Shetty	2015	S. Chand and Company, New Delhi
2	Properties of Concrete	Neville A.M	4th ,2018	Longman
VII(b): Reference Books:				
1	Concrete-Microstructure, Property and Materials	Kumar Mehta. P and Paulo J.M. Monteiro	4th, 2014	McGraw Hill Education
2	Concrete Technology	A.R. Santha Kumar	2019	Oxford University Press, New Delhi

VII(c): Web links and Video Lectures (e-Resources):

Cement https://nptel.ac.in/courses/105102012/1
Aggregates https://nptel.ac.in/courses/105102012/6
Mineraladmixtureshttps://nptel.ac.in/courses/105102012/11
Chemical admixtures https://nptel.ac.in/courses/105102012/9
https://nptel.ac.in/courses/105102012/10
Concrete mix design https://nptel.ac.in/courses/105102012/1422.07.2023 22.07.2023
Concrete production & fresh concrete https://nptel.ac.in/courses/105102012/19
Engineering properties of concretehttps://nptel.ac.in/courses/105102012/23
Dimensional stability & durability https://nptel.ac.in/courses/105102012/27
Durability of concrete https://nptel.ac.in/courses/105102012/31
Special concretes https://nptel.ac.in/courses/105102012/36

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

- Seminars/Quizz to assist in GATE Preparations
- Demonstrations in Lab
- Self-Study on simple topics
- Concrete mix design practice
- Virtual Lab Experiments

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Civil Engineering

Semester:	IV	**Course Type:**	**PCCL**		
Course Title: Fluid Mechanics and Hydraulics Lab					
Course Code:	**23CVL405**			**Credits:**	01
Teaching Hours/Week (L:T:P:O)			**0:0:2:0**	**Total Hours:**	26
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	Practical			**Exam Hours:**	03

I. Course Objectives:

1. Determine experimentally flow rate in venturi meter, orifice, notches and weir.
2. Determine experimentally losses in pipe flow.

II. Teaching-Learning Process (General Instructions):

1. Blackboard teaching/PowerPoint presentations
2. Regular review of students by asking questions based on topics covered in the class.
3. Laboratory Experiments.

III Practical Part

Sl. No.	**Experiments / Programs / Problems** (insert rows as many required)
1	Verification of Bernoulli's equation
2	Calibration of Venturi meter/Orifice meter
3	Determination of hydraulic coefficients of small vertical orifice
4	Calibration of triangular / Cipoletti notch
5	Determination of major losses in pipes
6	Determination of Cd for ogee/broad crested weir
7	Determination of efficiency of jet on flat and curved vanes
8	Determination of Cd of Venturi flume
9	Determination of efficiency of centrifugal pump
10	Demo of determination of efficiency of Francis/Kaplan turbine
12	Demo of determination of efficiency of Pelton wheel

Instructions for conduction of practical part: Refer Annexure

IV COURSE OUTCOMES

CO1	Compute the discharge through pipes, notches and weirs.
CO2	Determine the efficiencies of various turbines and pumps.

V CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2	1	1	1	1				1		2		1		
CO2	2	2	1	1	1	1				1		2		1		

VI Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer annexure 2 section 4

Semester End Examination (SEE): Refer annexure 2 section 4

VII Learning Resources

VII(a)Reference Books:

1	Fluid Mechanics and Hydraulic Machines	Dr. R.K. Bansal	2017	Lakshmi Publications,
2	Fluid Mechanics and Hydraulic Machines	Dr.R. K. Rajput	2011	S. Chand and Company Ltd.

VII(b): Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/105103096/2
https://youtu.be/plz3jorOhsk
https://youtu.be/K8C3BSB5XPE

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Seminar, assignments, quiz, case studies, industry visit, self-study activities, group discussions, etc

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Civil Engineering

Semester:	IV	**Course Type:**	ETC		
Course Title: Data Analytics using MS Excel					
Course Code:	**23CVE421**			**Credits:**	3
Teaching Hours/Week (L:T:P:O)			2-0-2-@	**Total Hours:**	30+lab slots
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	Practical			**Exam Hours:**	03

I. Course Objectives:

1) To develop Proficiency in Data Analysis Techniques: Master data cleaning, transformation, and analysis using Microsoft Excel for informed decision-making.
2) To create Effective Visualizations and Dashboards: Design compelling data visualizations and interactive dashboards to communicate insights clearly.
3) To Apply Data Analytics to Real-world Scenarios: Apply Excel-based data analytics to real datasets, identifying issues, conducting analyses, and presenting results for practical decision-making.

II. Teaching-Learning Process (General Instructions):

Chalk & Talk, PPT & Videos

III. COURSE CONTENT

III(a). Theory PART

Module-1: Introduction to Data Analytics and Excel Basics	6Hrs

Understanding the role of data analytics in decision-making, Overview of Microsoft Excel's capabilities for data analysis, Excel interface and basic navigation, Data entry and formatting techniques, Introduction to formulas and functions for basic calculations, Managing worksheets and workbooks, Hands-on exercises: Creating and formatting a sample dataset.
Linda Foulkes, Learn Microsoft Office 2019: 1
Curtis Frye, Microsoft Excel 2016: 1
Self-study problems
RBT Levels: L3

Module-2: Data Cleaning and Transformation	6Hrs

Importance of data quality in analysis, Identifying and handling common data issues (missing values, duplicates, outliers), Text-to-columns and data splitting techniques, using functions for data cleaning (TRIM, PROPER, etc.), Introduction to data validation and drop-down lists, Combining data from multiple sources using CONCATENATE and & operator, Hands-on exercises: Cleaning and transforming messy data
Linda Foulkes, Learn Microsoft Office 2019: 9
Self-study problems
RBT Levels: L3

Module-3: Exploratory Data Analysis (EDA)	6Hrs
Understanding the concept of EDA in data analytics, creating summary statistics using functions (SUM, AVERAGE, COUNT, etc.), Building frequency distributions and histograms, Generating descriptive statistics using the Analysis ToolPak, Creating basic charts for visualization (bar charts, pie charts, line charts), Using PivotTables for interactive data summarization, Hands-on exercises: Analyzing and visualizing sample data using EDA techniques Linda Foulkes, Learn Microsoft Office 2019: 10 Self-study problems **RBT Levels: L3**	
Module-4: Advanced Data Analysis with Excel	6Hrs
Introduction to advanced Excel functions (VLOOKUP, HLOOKUP, INDEX-MATCH), Performing conditional calculations with IF and nested IF statements, Data sorting and filtering techniques, Introduction to data tables and Goal Seek for sensitivity analysis, Building scenarios using Scenario Manager, Using Solver for optimization problems, Hands-on exercises: Solving complex analytical problems using advanced Excel functions Linda Foulkes, Learn Microsoft Office 2019: 12 Self-study problems **RBT Levels: L3**	
Module-5: Data Visualization and Dashboard Creation	6Hrs
Understand the principles of effective data visualization. Create dynamic charts and visualizations using Excel's tools. Design interactive dashboards with slicers, timelines, and Power View. Demonstrate the ability to communicate insights through well-designed dashboards. Self-study problems **RBT Levels: L3**	

III(b). PRACTICAL PART

Sl. No.	**Experiments / Programs / Problems**
1	Given a dataset with missing values and inconsistencies, clean the data by removing duplicates, filling missing values, and ensuring uniform formatting for dates and text.
2	Take a dataset with multiple columns and transform it into a structured format for analysis using Excel functions like PivotTable, VLOOKUP, and CONCATENATE.
3	Create an Excel sheet for data entry with data validation rules to ensure accurate and consistent data input.
4	Visualize the trend in a dataset by creating a line chart to illustrate how a variable change over time
5	Develop a line chart to display the trend in construction costs over the past decade for various infrastructure projects.
6	Construction Project Progress Analysis chart using PIVOTE CHART option
7	Analyze a dataset containing variables like construction time, budget, and quality ratings. Calculate correlations to identify relationships between these variables.
8	Resource Allocation in Construction Project to optimize the allocation of resources to minimize the project's duration while staying within budget constraints
9	Identify outliers in a dataset using advanced statistical functions and create a box plot to visualize them.
10	Construction Project Dashboard that provides an overview of the project's performance and helps you make informed decisions

Instructions for conduction of practical part: Refer Annexure

IV. COURSE OUTCOMES

CO1	Apply Microsoft Excel's data entry, formatting, and basic calculation functions to create and format datasets,
CO2	Make use of quality principles to recognize and address common data issues/*-08 utilizing advanced Excel functions.
CO3	Utilize exploratory data analysis (EDA) techniques to create summary statistics, generate descriptive statistics, and crafting visualizations.
CO4	Make data-driven decisions effectively using Excel as a powerful analytical tool
CO5	Comprehend the principles of effective data visualization, craft dynamic and interactive charts, visualizations, and dashboards

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1		3			3											
CO2					3											
CO3	3			3	3							3				
CO4					3											
CO5			3		3											

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure 2 section 1

Semester End Examination (SEE): Refer Annexure 2 section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
01	Microsoft Excel 2016	Curtis Frye	1, 2015	Microsoft Press
02	Learn Microsoft Office 2019	Linda Foulkes	1, 2020	Packt Publishing

VII(b): Reference Books: (Insert or delete rows as per requirement)

3	Excel 2019 Bible	Bill Jelen and Michael Alexander	1, 2018	Wiley
4	Stephen L. Nelson	Microsoft Excel 2019 Formulas and Functions	1, 2019	Wiley

VII(c): Web links and Video Lectures (e-Resources):

https://www.microsoft.com/en-us/microsoft-365/previous-versions/microsoft-office-2019
https://support.microsoft.com/en-us/excel
https://www.excel-easy.com/
https://chandoo.org/

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Activities as mentioned in lab experiments

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B.E. Civil Engineering

Semester:	IV	**Course Type:**	**ETC**		
Course Title: Sustainable design concept for Building services					
Course Code:	**23CVE422**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- To facilitate learners to understand sustainable building designs and its parameters such as energy and water efficiency, Comfort in buildings, and waste management.
- To expose the learners to shading systems, thermal and visual comfort.
- To impart fundamental knowledge on Life cycle assessment and Green ratings and certifications.

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations.

III. COURSE CONTENT

Module-1: Introduction to Sustainability and Climatology	8 Hrs

Overview of Sustainability – Global energy scenario, carbon footprint and climate action, Net zero in carbon offsetting, Water neutral, Sustainable construction and resource management. Green buildings - Selection of site preservation and planning, Influence of climate on buildings, Basics of climatology, Earth –Sun relationship, Solar angles and sun path diagram, Design of shading systems.

Textbook: Harihara Iyer G**: Chapter-1: sections-1**

Self-Learning: Sustainability concepts.

RBT Levels: L1 L2

Module-2: Comfort in Buildings	8 Hrs

Thermal comfort – Basics of Thermodynamics, Convection/radiation heat transfer, Heat gain through various elements of a building, Thermal comfort models and case studies Acoustics – Building acoustics, measures, defects and prevention of sound transmission Indoor Air Quality – Effects, design consideration and integrated approach for IAQ management Visual comfort – Enhancement strategies for Daylighting and Artificial lighting.

Textbook: Harihara Iyer G**: Chapter 3 &4: Sections 3 & 4**

Self-Learning: Thermal comfort practical approach

RBT Levels: L1 L2 L3

Module-3: Energy, water efficiency and waste management in buildings	8 Hrs

Energy efficiency – Energy efficiency in building envelope and energy efficient HVAC and Lighting as per Energy conservation building code (ECBC) 2017, Energy simulation, Energy management system –Renewable energy and Energy Audit. Water Efficiency – Planning and design of water management system, Rain water harvesting, Water efficient design and fixtures, Treatment and reuse and Water efficient landscape system.

Waste management – Types of waste and its treatment methods, Construction and demolition waste management, Waste management in residential, commercial buildings, healthcare facilities.
Textbook: Harshul Savla**: Chapter 6&8: Sections 6 & 8**
Self-Learning: Energy Efficiency: Buildings and Industry
RBT Levels: L1 L2

Module-4: Life Cycle Assessment of Buildings and Green project management	8 Hrs

Materials-Green product certifications, features of sustainable building materials and sustainable alternatives for structural, envelope and finishing materials. Low carbon cement, Zero emission bricks and lean construction practices. Life cycle assessment and its types – Modelling and Analysis, Greenhouse gas emission. Different phases of green building project management.
Textbook: HarshulSavla**: Chapter 7&12: Sections 7 & 12**
Self-Learning: Life Cycle Assessment and Buildings
RBT Levels: L1 L2

Module-5: Sustainable rating systems	8 Hrs

Green building rating systems- LEED, BREEAM and others, Indian Green building rating systems – IGBC & GRIHA. IGBC criteria for certification -site selection credits, pre-design credits, detailed design credits, pre-construction credits, construction credits, post construction credits.
Textbook: HarshulSavla**: Chapter 10 & 11: Sections 10 & 11**
Self-Learning: sustainable rating systems around the world
RBT Levels: L1 L2

IV. COURSE OUTCOMES

CO1	Comprehend sustainable design, climatology, shading system and analyze heat transfer mechanism in buildings.
CO2	Assess the design considerations and parameters for thermal comfort, visual comfort, indoor air quality and acoustics.
CO3	Develop solutions for energy efficiency, water efficiency and waste management in buildings.
CO4	Adopt green project management methodology and evaluate building life cycle assessment.
CO5	Implement green practices during construction and operation phase of the buildings for achieving green rating.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2	2					2					1		1		
CO2	3	2					2					1		1		
CO3	3	2					2	2				1		1		
CO4	3	2					2	2				1		1		
CO5	3	2					2	2				1		1		

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure 2 section 1

Semester End Examination (SEE): Refer Annexure 2 section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	**Title of the Book**	**Name of the author**	**Edition and Year**	**Name of the publisher**
1	Green Building Fundamentals	Harihara Iyer G	2022	Notion Press

2	Green Building: Principles & Practices	Dr. Adv. Harshul Savla	2021	Notion Press
3	IGBC Green new building rating system - version 3.0	Abridged reference guide	2016	IGBC
VII(b): Reference Books:				
1	The Sustainable Habitat Handbook (6 Volume Set),	-	2019	GRIHA
2	National Building Code,Volume 1&2	-	2016	Bureau of Indian Standards
3	Energy Conservation	-	2017	Building Code Bureau of Energy Efficiency

VII(c): Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=MEwIuV_Zh78
https://www.youtube.com/watch?v=8no-LRozixM
https://www.youtube.com/watch?v=VE2tpwGCN0U
https://www.youtube.com/watch?v=Q4Vlj2zoxGM
https://www.youtube.com/watch?v=nFBvLIfFFqI
http://acl.digimat.in/nptel/courses/video/105102195/L44.html

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

ECO – NIWAS by Ministry of Power, Free Web tool to practice energy conservation.
Roof top solar energy calculator, Free Web tool to calculate solar power available.

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Civil Engineering

Semester:	IV	**Course Type:**	**ETC**		
Course Title: Sustainable Building Materials					
Course Code:	**23CVE423**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Understand the Definition, Concept & Objectives of the terms cost effective construction and green building
- Apply cost effective techniques in construction
- Understand the Problems due to Global Warming
- State the Concept of Green Building

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations.

III. COURSE CONTENT

Module-1: Introduction to Sustainability and Construction — 8 Hrs

Introduction to Sustainability and Construction:

Defining Sustainability: The three pillars (environmental, social, economic) and their relevance to construction.

Environmental impact of buildings: Embodied and operational energy, resource depletion, and pollution.

Sustainable construction practices: Reducing environmental footprint, life cycle thinking, and waste management.

Textbook: Harhara Iyer G

RBT Levels: L1 L2

Module-2: Sustainable Building Materials — 8 Hrs

Sustainable Building Materials

Uses of different types of materials and their availability -Stone and Laterite blocks- Burned Bricks- Concrete Blocks- Stabilized Mud Blocks- Lime Poszolana Cement- Gypsum Board- Light Weight Beams- Fiber Reinforced Cement Components- Fiber Reinforced Polymer Composite- Bamboo- Availability of different materials-Recycling of building materials – Brick- Concrete- Steel- Plastics - Environmental issues related to quarrying of building

textbook: Harhara Iyer G

RBT Levels: L1 L2

Module-3: Environmentally Friendly Materials	8 Hrs

Environmentally Friendly and cost-effective Building Technologies –
Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams –columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof - Pre-engineered and ready to use building elements - wood products - steel
and plastic - Contributions of agencies - Costford - Nirmithi Kendra - Habitat
Textbook: Harhara Iyer G
RBT Levels: L1 L2

Module-4: Material Performance and Indoor Environment Quality (IEQ)	8 Hrs

Material Performance and Indoor Environment Quality (IEQ)
Material properties for sustainable construction: Strength, durability, thermal performance, and moisture management.
Impact of materials on indoor air quality: Low-emitting materials and strategies for healthy buildings. Global Efforts to reduce carbon Emissions Green Buildings – Definition - Features- Necessity
Sustainable finishes and coatings: Low VOC paints and sustainable flooring options.
Textbook: Harhara Iyer G
RBT Levels: L1 L2

Module-5: Green Building Rating Systems	8 Hrs

Green Building Rating Systems
BREEAM – LEED - GREEN STAR -GRIHA (Green Rating for Integrated Habitat Assessment) for new buildings – Purpose - Key highlights - Point System with Differential weight
age. Green Design – Definition - Principles of sustainable development in Building Design - Characteristics of Sustainable Buildings – Sustainably managed Materials - Integrated Lifecycle design of Materials and Structures (Concepts only)
Textbook: Harhara Iyer G
RBT Levels: L1 L2

IV. COURSE OUTCOMES

CO1	Apply the principles of sustainability to building material selection.
CO2	Analyze the environmental impact of different materials throughout their life cycle.
CO3	Identify and utilize sustainable building materials in construction projects.
CO4	Understand the role of green building rating systems in promoting sustainability.
CO5	Stay informed about emerging trends and innovations in sustainable construction materials.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	3				2	2	2	1				1		1		
CO2	3				2	2	2	1				1		1		
CO3	3				2	2	2	1				1		1		
CO4	3				2	2	2	1				1		1		

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure 2 section 1
Rubrics:

Semester End Examination (SEE): Refer Annexure 2 section 1

VII. Learning Resource

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Green Building Fundamentals,	Harhara Iyer G,	2015	Notion Press
2	Green Building: Principles & Practices	Dr. Adv. Harshul Savla,	2014	EBPB
3	Green Building Materials and Design	F. Pacheco-Torgal, S. Labrincha, L. M. Vieira, V. M. Ferreira	2011	BS publication
VII(b): Reference Books:				
1	Sustainable Construction and Building Materials	Bibhuti Bhusan Das and Narayanan Neithalath	1987	McGraw Hill
2	Sustainable Materials in Building Construction	J.M.P.Q. Delgado	2019	New Age International
3	Building Materials for Sustainability	Cynthia F. Roland	2011	BS publication

VII(c): Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=THgQF8zHBW8
https://www.youtube.com/watch?v=DRO_rIkywxQ
http://www.youtube.com/watch?v=KAiWdme6EEM
http://www.youtube.com/watch?v=RocreN7_sqs
http://www.youtube.com/watch?v=aKqNbTo2PFM

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

http://www.youtube.com/watch?v=SKE7CXNdLsc
http://www.youtube.com/watch?v=_GZVxig0Yp0
http://www.youtube.com/watch?v=NxSlnMY3y80
http://www.youtube.com/watch?v=w4rB3pk16VM
http://www.youtube.com/watch?v=im1tv4drLbo

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
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Recognized by UGC, New Delhi with 2(f) & 12 (B)

Civil Engineering

Semester:	IV	**Course Type:**	**ETC**		
Course Title: Watershed Management					
Course Code:	**23CVE424**			**Credits:**	03
Teaching Hours/Week (L:T:P:O)			**3:0:0:0**	**Total Hours:**	40
CIE Marks:	**50**	**SEE Marks:**	**50**	**Total Marks:**	100
SEE Type:	**Theory**			**Exam Hours:**	03

I. Course Objectives:

- Describe the concepts of watershed development
- Explain the reasons for the erosion from the watershed and the methods to control it
- Explain the methods of water harvesting
- Discuss about land use management
- Describe the best water use practices and apply the knowledge to watershed development

II. Teaching-Learning Process (General Instructions):

Chalk and talk, videos, Power Point presentation, animations.

III. COURSE CONTENT

Module-1: Characteristics of Watershed — 8 Hrs

Concept of watershed development, objectives of watershed development, need for watershed development in India, Integrated and multi-disciplinary approach for watershed management.
Size, shape, physiography, slope, climate, drainage, land use, vegetation, geology and soils, hydrology and hydrogeology, socioeconomic characteristics, basic data on watersheds.

Textbook: J. V. S. Murty, "Watershed Management"
Self-Learning: Concept of watershed development
RBT Levels: L1 L2

Module-2: Erosion and its Control — 8 Hrs

Types of erosion, factors affecting erosion, effects of erosion on land fertility and land capability, estimation of soil loss due to erosion, Universal soil loss equation; Measures to control erosion: Contour techniques, ploughing, furrowing, trenching, bunding, terracing, gully control, rock fill dams, brushwood dam, Gabion.

Textbook: J. V. S. Murty, "Watershed Management"
Self-Learning: Universal soil loss equation
RBT Levels: L1 L2 L3

Module-3: Water Harvesting — 8 Hrs

Rainwater Harvesting, catchment harvesting, harvesting structures, soil moisture conservation, check dams, artificial recharge, farm ponds, percolation tanks.

Textbook: J. V. S. Murty, "Watershed Management"
Self-Learning: Rainwater Harvesting

RBT Levels: L1 L2 L3

Module-4: Land Management	8 Hrs

Land use and Land capability classification, management of forest, agricultural, grassland and wild land. Reclamation of saline and alkaline soils.

Textbook: R.A. Wurbs and WP James, "Water Resource Engineering"

Self-Learning: Land use and Land capability classification

RBT Levels: L1 L2 L3

Module-5: Watershed Management	8 Hrs

Ecosystem Management: Role of Ecosystem, crop husbandry, soil enrichment, inter, mixed and strip cropping, cropping pattern, sustainable agriculture, bio-mass management, dry land agriculture, Silvi pasture, horticulture, social forestry and afforestation.
Watershed Management: Planning of activities, people's participation, preparation of action plan, administrative requirements.

Textbook: R.A. Wurbs and WP James, "Water Resource Engineering"

Self-Learning: Role of Ecosystem, crop husbandry

RBT Levels: L1 L2 L3

IV. COURSE OUTCOMES

CO1	Adopt the concepts of watershed development to resolve water problems.
CO2	Correlate the reasons for the erosion from the watershed and the methods to control it.
CO3	Discuss the methods of water harvesting techniques.
CO4	Apply the concept of watershed for land use management
CO5	Follow the best water use practices and apply the knowledge to watershed development

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1	2					2	2	1				1		1		
CO2	3	2				2	2					1		1		
CO3	3	2				2	2	1				1		1		
CO4	3	2				2	2					1		1		

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure 2 section 1

Semester End Examination (SEE): Refer Annexure 2 section 1

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	**Title of the Book**	**Name of the author**	**Edition and Year**	**Name of the publisher**
1	"Water Resource Engineering"	R.A. Wurbs and WP James	2015	Laxmi Publications
2	"Watershed Management"	J. V. S. Murty	2014	EBPB

VII(b): Reference Books:

1	Watershed Management:	Pheba Anandan Pillai and Sudha Menon	1987	New Age International

	Concepts & Experiences			

VII(c): Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=EgTO8phG44w
https://www.youtube.com/watch?v=kGYJsBR4wE8
https://www.youtube.com/watch?v=8hwEllQjigY
https://www.youtube.com/watch?v=9isAx64IiSc
https://www.youtube.com/watch?v=1cEPz5qNLyg

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:
Group Discussions, Quiz

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
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Department of Civil Engineering

Semester:	IV	**Course Type:**	AEC		
Course Title: Revit Architecture					
Course Code:	**23CVAE41**			**Credits:**	1
Teaching Hours/Week (L: T: P: O)			1:0:0:3	**Total Hours:**	40
CIE Marks:	50	**SEE Marks:**	50	**Total Marks:**	100
SEE Type:	Theory			**Exam Hours:**	02

I. Course Objectives:

1. Familiarize students with Revit's interface, navigation, and basic tools for efficient project management.
2. Teach students how to create and manipulate 3D building models using Revit's parametric modelling capabilities.
3. Enable students to add architectural elements such as walls, doors, windows, and roofs to their Revit models accurately.
4. Guide students in producing construction documents and detailed drawings, including floor plans, elevations, and sections.
5. Introduce collaboration tools in Revit, allowing students to coordinate designs, share models, and work in a team environment effectively.

II. Teaching-Learning Process (General Instructions):

1. Provide an overview of Revit's interface, navigation tools, and basic functionalities.
2. Engage students in practical exercises to create building models, focusing on fundamental concepts and parametric modelling techniques.
3. Assign real-world architectural projects where students apply Revit skills to design and develop building models from concept to construction documentation.
4. Facilitate collaborative workshops to simulate industry workflows, emphasizing teamwork, communication, and project coordination using Revit.
5. Provide constructive feedback on student projects, encourage peer review, and guide students in refining their Revit models and documentation skills.

III. COURSE CONTENT

III(a). Theory PART

Module-1: Creating And Modifying Components — Hrs:08

Create and modify grids, Create and modify levels, Create and modify walls, Load and modify doors, Load and modify windows, Tag components by category, Load and modify components, Creating Curtain Wall Adding, Curtain Grids Mullions Reshaping Curtain Wall Panels Adding Curtain Door to panel Embedded Walls

Pre-requisites:Revit software required

RBT Levels: L1,L2	
Module-2: Managing	Hrs:08
Change the view scale ,Change the detail level of a view, Manage visibility/graphics overrides for model categories, Temporarily hide/isolate elements and components , Manage view range, Duplicate views Create section views, Create elevation views, Create 3D views and renderings	
Pre-requisites : Revit Creating And Modifying Components	
RBT Levels: L1,L2	
Module-3: Modelling And Modifying Elements	Hrs:08
Create and modify stairs, Create and modify ramps, Create and modify railings, Create and modify floors, Modify elements using Align, Offset, Mirror, and Split tools, Roof, Creating Roof, Modifying Roof, Shape editing for Roofs and Floors, Roof Soffit, Roof Fascia, Roof Gutter, Openings, Opening on face and Vertical Opening, Wall opening, Shaft opening, Dormer Opening	
Pre-requisites: Revit Managing	
RBT Levels: L1,L2	
Module-4: Modelling And Modifying elements	Hrs:08
Modelling: Creating, editing, and manipulating building elements such as walls, floors, roofs, ceilings, doors, windows, stairs, and other architectural components.	
Geometry Editing: Adjusting the size, shape, location, and orientation of elements using various modification tools like move, rotate, scale, align, and stretch. Modify elements using Move, Copy, Rotate, Trim, and Extend tools, Create and modify top surfaces, Create and modify columns **Modify elements:** using Move, Copy, Rotate, Trim, and Extend tools, Create and modify top surfaces, Create and modify columns	
Pre-requisites : Revit Modelling And Modifying elements	
RBT Levels: L1,L2	
Module-5: Managing Documentation	Hrs:08
Create and modify text, Create and modify dimensions, Create and modify a sheet, Place plan views on a sheet, Create and modify schedules, Text, Adding text notes, Modify text notes, Model text, Tag, Tag tools, Applying tag by category,	
Pre-requisites : Revit Modelling And Modifying elements	
RBT Levels: L1,L2	

IV. COURSE OUTCOMES

CO1	Develop proficiency in using Revit's interface, tools, and workflows for architectural design and documentation.
CO2	Demonstrate the ability to create accurate and detailed 3D building models using Revit's parametric modelling capabilities.
CO3	Produce comprehensive construction documents, including floor plans, elevations, sections, and schedules, adhering to industry standards.
CO4	Apply collaboration tools in Revit to coordinate designs, manage changes, and work effectively in team environments.
CO5	Apply critical thinking and problem-solving skills to address design challenges and optimize Revit models for efficiency and functionality..

CO6	Compile a professional portfolio showcasing proficiency in Revit architecture, including completed projects and construction documentation, to demonstrate readiness for employment or further studies.

V. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1			2													
CO2					2											
CO3			3													
CO4					3											
CO5										3						
CO6											3					

VI. Assessment Details (CIE & SEE)

General Rules:

Continuous Internal Evaluation (CIE): Refer Annexure-2 section 5

Semester End Examination (SEE): Refer Annexure 2 section 5

VII. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Autodesk Revit 2021 Architectural Command Reference	Jeff Hanson, Daniel John Stine	June 26, 2020	SDC Publications
2	Interior Design Using Autodesk Revit 2025	Daniel John Stine	July 30, 2024	SDC Publications
3	Commercial Design Using Autodesk Revit 2025	Daniel John Stine	July 15, 2024	SDC Publications

VII(c): Web links and Video Lectures (e-Resources):

1. **https://youtu.be/vjXjeZc3LeE?si=lzCD53X2ZnT5BCHI**
2. **https://youtu.be/3egDC0dBS24?si=wA41Vu5R8sdFrBPE**
3. **https://youtu.be/DkWokG_j6Q4?si=xMpZiRvqyRIFqIKE**

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

1. Engage students in hands-on modelling tasks to recreate real architectural projects, fostering creativity and problem-solving skills.
2. Task students with creating comprehensive construction documentation sets for architectural projects using Revit, emphasizing accuracy and adherence to industry standards.
3. Facilitate teamwork in collaborative design workshops where students develop Revit models for real-world projects, promoting communication and project coordination.
4. Implement project-based learning modules where students tackle complex architectural design challenges using Revit, encouraging critical thinking and creativity in developing design solutions.

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Semester:	IV	**Course Type:**	NCMC		
Course Title: Mindful Mastery: Aptitude and Soft skill Integration					
Course Code:	**23PDSN04**			**Credits:**	PP/NP
Teaching Hours/Week (L: T: P: O)			0:0:0:2	**Total Hours:**	24
CIE Marks:	50	**SEE Marks:**	NA	**Total Marks:**	50
SEE Type:	-			**Exam Hours:**	-

I. Course Objectives:

- To gain a deep understanding of numerical concepts including place value, fractions, decimals, percentages, ratios, and proportions.
- To acquire skills to prioritize tasks and activities effectively based on their importance and urgency.
- To develop the ability to interpret and utilize various data representations, including tables, charts, graphs, and diagrams.
- To learn to interpret different body language signals and understand their underlying meanings in interpersonal communication.
- To acquire strategies for breaking down complex problems into manageable steps, enhancing problem-solving abilities.

II. Teaching-Learning Process (General Instructions):

The following are some of the strategies that teachers can employ to facilitate the achievement of various course outcomes:

1. **Diverse Teaching Methods**: Instead of relying solely on traditional lecture methods, can explore alternative and effective teaching approaches. These might include interactive discussions, hands-on activities, or multimedia presentations.
2. **Visual Aids**: Utilize videos and animations to elucidate complex concepts. Visual representations enhance understanding and engagement among students.
3. **Collaborative Learning**: Encourage group learning within the classroom. Collaborative activities foster teamwork, communication, and a deeper grasp of subject matter.
4. **Higher Order Thinking (HOT) Questions**: Pose at least three thought-provoking questions during class. These questions stimulate critical thinking and encourage students to analyze and evaluate information.
5. **Problem-Based Learning (PBL):** Implement PBL, which nurtures analytical skills. PBL goes beyond rote memorization by challenging students to design solutions, evaluate evidence, and think critically.
6. **Multiple Representations**: Introduce topics using various representations. Visuals, diagrams, and real-world examples cater to diverse learning styles.
7. **Creative Problem Solving**: Present different approaches to solving the same problem. Encourage students to think outside the box and devise their own innovative solutions.
8. **Real-World Application**: Discuss how each concept relates to practical scenarios. Connecting theoretical knowledge to real-world contexts enhances students' comprehension and retention.

 Chalk & Talk Stud. Assignment Web Resources LCD/Smart Boards Stud. Seminars

III. COURSE CONTENT

Module-1: Arithmetical Ability	5Hrs
Problems on Pipes Cisterns , Time , Work and Averages **Textbook: Textbook 1; Section-1;Page no-510to525**	
Prerequisites: Have the basic knowledge of Mathematics and logics	
Module-2: Time management and Presentation skills	5Hrs
Misconceptions of Time, Symptoms of Poor Time Management, the 'Five Time Zone' Concept, Elements of Effective Time Management. ABC of presentation / Accent and pronunciation / Practice to Perform / Impact of voice modulation, eye contact and body language during presentation. Evaluation, Feed back **Textbook : Textbook 2; Chapter-2**	
Prerequisites: (Self learning): Basic Presentation ideas and Time management.	
Module-3: Quantitative section and Data Interpretation	5Hrs
Simple interest and compound interest problems, Bar graphs, Pie charts and Line graphs concepts and problem. **Textbook: Textbook 1;Section-I; Page no 641-687**	
Prerequisites: Basic Calculation knowledge.	
Module-4: Body language and Postures	5Hrs
Facial expressions, Gestures, Handshakes, tone of voice, Attitude, Universal vs. Culture specific. **Textbook: Textbook 3**	
Module-5: Mental ability	4Hrs
Puzzle based question and Psychometric based interview Question Reference-link:**https://www.hitbullseye.com/puzzle/logical-puzzle-questions-with-answers.php**	

COURSE OUTCOMES: At the end of this course, students will be able to

CO1	Apply problem-solving techniques in Pipes, Cisterns, Time, Work, and Averages, showcasing arithmetical ability.
CO2	Develop efficient time management skills, recognizing misconceptions, symptoms, and implementing effective strategies.
CO3	Apply quantitative analysis and data interpretation, handling problems in simple interest, compound interest, and graphical data interpretation.
CO4	Apply effective body language and postures in communication, distinguishing universal cues from culture-specific ones.
CO5	Apply mental agility through puzzle-solving and psychometric interview preparation, refining problem-solving and cognitive abilities.

IV. CO-PO-PSO MAPPING (mark H=3; M=2; L=1)

PO/PSO	1	2	3	4	5	6	7	8	9	10	11	12	S1	S2	S3	S4
CO1		3		3				2				1	2		1	2
CO2								2	2			2		2		
CO3	3	2						2	2		2	2	2			
CO4						2		2		2		2		2	2	1
CO5	2	2	3									3	1		2	2

V. Assessment Details (CIE & SEE)

General Rules: Refer Annexure-1 section 8

Continuous Internal Evaluation (CIE): Refer Annexure-2 section 8

Semester End Examination (SEE): Refer Annexure 2 section 8

VI. Learning Resources

VII(a): Textbooks:

Sl. No.	Title of the Book	Name of the author	Edition and Year	Name of the publisher
1	Quantitative Aptitude for Competitive examination	R S Agarwal	2017	S Chand
2	Time Management	Marc Mincini	2003	Mcgraw Hill
3	Gestures and Body Language	Aparna majumdar	2017	V& S Publisher

VII(b): Reference Books:

1	Gestures and Body Language	Aparna majumdar	2017	V& S Publisher
2	A modern approach to logical reasoning	R S Agarwal	2019	S Chand

VII(c): Web links and Video Lectures (e-Resources):

- https://youtu.be/-iQEzSd9QUQ?si=qwWVOnDiky3vyuju
- https://youtu.be/MV00SQU_f7E?si=Rq0EAIZKzCU-EVOp
- https://youtu.be/MV00SQU_f7E?list=PLOoogDtEDyvvDNHO_Ba58OrE567nCzzl2

VIII: Activity Based Learning / Practical Based Learning/Experiential learning:

Assignments, Quizzes and Seminar, group discussions etc.

ANNEXURE

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)

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Recognized by UGC, New Delhi with 2(f) & 12 (B)

CIE & SEE Evaluation strategy for Autonomous Scheme 2023 (Tentative)

Revised/updated on 29/06/2024; the update modifies the practical component evaluation of integrated courses & laboratory courses involving the mini projects or course projects.

Sl. No.	Course Type /Credits	Continuous Internal Evaluation (CIE)																		Semester End Examination (SEE)									Total Marks (CIE+SEE)
				I. Theory Component							II. Practical Component											Theory				Practical				
		Total CIE marks	Min. Eligty.	Marks	Min. Eligty.	A. Unit test		B. Formative Assessments		Tot. Theory marks (I)	Marks	Min. Eligty.	C. Weekly Evaluation		D. Internal Test			E. Prj	Tot. marks (II)	Total CIE marks	Dur. In hrs.	Max. cond. marks	Max. considered marks	min. pass %	Max. cond. marks	Max. considered marks	min. pass %	Total SEE marks	
						Nos.	Marks / Each	Nos.	Marks / Each				Each week	Tot. marks	Nos.	Marks / Each	Total marks	Marks												
1	BSC/ESC/PCC/ETC/ PEC/OEC (3 or 4 Credit courses)	50	50%	50	50%	3	50	2	50	50 (avg. of 5)	--	--	--	--	--	--	--	--	--	50 (I)	03	100	50	40%	--	--	--	50	100
2	IBSC/IESC/IPCC (4 Credit courses)	50	50%	50	50%	3	50	--	--	50 (avg. of 3)	50	50%	50	50 (Avg. of all)	1	50	50	50	50 (Avg. of C & [D or E])	50 (Avg. of I & II)	03	100	50	40%	--	--	--	50	100
3	IESC - CAED (4 credit course)	50	50%	--	--	--	--	--	--	--	50	50%	50	50 (Avg. of all)	1	50	50	--	50 (Avg. of C & D)	50	03	--	--	--	100	50	40%	50	100
4	PCCL (1 Credit courses)	50	50%	--	--	--	--	--	--	--	50	50%	50	50 (Avg. of all)	1	50	50	50	50 (Avg. of C & [D or E])	50 (II)	03	--	--	--	100	50	40%	50	100
5	AEC- IDT, Skill Development courses (1 credit course)	50	50%	50	50%	2	50	1	50	50 (Avg. of 3)	--	--	--	--	--	--	--	--	--	50 (I)	02	50	50	40%	--	--	--	50	100
6	HSMC- CIP, Env studies, SFH, UHV (1 credit course)	50	50%	50	50%	2	50	1	50	50 (Avg. of 3)	--	--	--	--	--	--	--	--	--	50 (I)	02	50	50	40%	--	--	--	50	100
7	HSMC - English, Kannada (No credits)	50	50%	50	50%	2	50	1	50	50 (Avg. of 3)	--	--	--	--	--	--	--	--	--	50 (I)	--	--	--	--	--	--	--	--	50
8	NCMC - Personality Development courses, PE, Yoga, NCC, NSS, IKS (No credits)	50	50%	50	50%	--	--	1	50	50	--	--	--	--	--	--	--	--	--	50 (I)	--	--	--	--	--	--	--	--	50

 # Formative (Successive) Assessments: Assignments/quiz/ seminars/field survey and report presentation/course project/etc. based on the faculty & dept. planning. **# Practical Conduction:** The conduction of each experiment/program per week should evaluate for 50 Marks and average of all shall be taken. **# In case of Integrated course,** minimum eligibility shall be attained as prescribed in both the theory and practical components. **# Self Learning Courses (SLC) Courses, Internship, Mini project & Major Project: Rubrics & Methodology shall be defined seperately**

Academic Dean 22/6/24

Dr. BABU. N.V
Prof. & Academic Dean
SJB Institute of Technology
BGS Health & Education City
Kengeri, Bengaluru-560060

25.6.2024
Principal

Principal
SJB Institute of Technology
67, BGS Health & Education City,
Dr. Vishnuvardhan Road,
Kengeri, Bengaluru - 560 060.

ANNEXURE

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)

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CIE and SEE guidelines based on course Type for Autonomous Scheme 2023

Revised/updated on 29/06/2024; the update modifies the practical component evaluation of integrated courses & laboratory courses involving the mini projects or course projects.

Note:

- **The CIE conduction coordination will be done by the office of Controller of Examination (COE).**
- **The SEE will be conducted by the office of Controller of Examination (COE).**

Continuous Internal Evaluation (CIE)	Semester End Examination (SEE)	Final Passing requirement
1. BSC/ESC/PCC/ ETC/PEC/OEC – Theory Course (03 & 04 Credit courses)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.		
The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). **Continuous Internal Evaluation:** CIE will be conducted by the department and it will have only 01 component: **I. Theory component.** Theory Component will consist of A. Internal Assessment Test B. Formative assessments	The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks). **Semester-End Examination:** Duration of 03 hours and total marks of 100. • The question paper will have ten questions. Each question is set for 20 marks. • There will be 2 questions from each module. Each of the two questions under a	The student is declared as a pass in the course if he/she secures a minimum of 45% (45 marks out of 100) in the sum total of the CIE and SEE taken together.

week & 15th week, respectively. • The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks. • The student must answer 2 full questions (one from 1st& 2nd questions and another from 3rd& 4th question). • Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course. **B. Formative assessments:** • 02 formative assessments each of 50 marks shall be conducted by the course coordinator based on the dept. planning during random times. • One formative assessment shall be completed before 5th week and second shall be completed before 12th week. • The syllabus content for the formative assessment shall be defined by the course coordinator. • The formative assessments include Assignments/ Quiz/ seminars/case study/field survey/ report presentation/ course project/etc. • The assignment QP or Quiz QP shall indicate marks of each question and the relevant COs & RBT levels. • The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs & POs and get it approved from academic dean. **The final CIE marks will be 50:** Average of all 05 events of Internal Assessment test and formative assessments. **The documents of all the assessments shall be maintained meticulously.**	module (with a maximum of 3 sub-questions), should have a mix of topics under that module. • The students have to answer 5 full questions, selecting one full question from each module. • Marks scored shall be proportionally reduced to 50 marks.	

2. IBSC/IESC/IPCC – Integrated with Theory & Practical (04 credit courses)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). Minimum eligibility of 50% marks shall be attained separately in both the theory component and practical component. **Continuous Internal Evaluation:** CIE will be conducted by the department and it will have 02 component: I. Theory Component. II. Practical Component. I. Theory Component will consist of A. Internal Assessment Test B. Formative assessments (Not required for Integrated courses) **A. Internal Assessment Test:** • There are 03 tests each of 50 marks conducted during 6th week, 10th week & 15th week, respectively. • The question paper will have four questions (max of 3 sub questions) from the notified syllabus. Each question is set for 25 marks. • It is suggested to include questions on laboratory content in the Internal Assessment test Question papers. • The student must answer 2 full questions (one from 1st& 2nd questions andanother from 3rd& 4th question). • Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course. **B. Formative assessments:** • Not required for Integrated courses.	The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks). **Semester-End Examination:** Only theory SEE for duration of 03 hours and total marks of 100. • The question paper will have ten questions. Each question is set for 20 marks. • There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module. • The laboratory content must be included in framing the theory question papers. • The students have to answer 5 full questions, selecting one full question from each module. • Marks scored shall be proportionally reduced to 50 marks. **No Practical SEE for Integrated Course.** Note: CAED Course shall not be considered here, it shall be considered as in sl. No. 3 in the next row	The student is declared as a pass in the course if he/she secures a minimum of 45% (45 marks out of 100) in the sum total of the CIE and SEE taken together.

II. Practical Component: **C.** Conduction of each experiment/program should be evaluated for 50 marks and average of all the experiments/programs shall be taken.(rubrics will be published by the lab conduction committee) **D.** One laboratoryInternal Assessment test will be conducted during the 14th week for 50 marks.(rubrics will be published by the lab conduction committee) **E.** If the course project / mini project is involved in the laboratory component.**The evaluation shall be completed by 14th week of the semester.** The rubrics required for the evaluation of the project shall be defined by the departments along with mapping of relevant COs & POsand get it approved from academic dean. **Note:** • If component 'E' is involved in the course either component 'D' or 'E' along with component 'C' shall be considered for average of item II. • Otherwise, components 'C' & 'D' shall be considered for average of item II. **The final CIE marks will be 50 =** Avg. {**I** [Avg. of 03 Internal assessment tests] + **II** [Avg. of (C&(Dor E))]} **The documents of all the assessments shall be maintained meticulously.** Note: CAED Course shall not be considered here, it shall be considered as in sl. No. 3 in the next row		
3. IESC: CAED Course (4 credits)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.		
The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). • CIE shall be conducted for max. marks of 100 and shall be scaled down to 50 marks • CIE component should comprise of both Manual and computer drafting i.e. 50% manual and 50% computer drafting out of total 100 marks	The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks). **Semester-End Examination:** SEE for duration of 03 hours and total marks of 100.	The student is declared as a pass in the course if he/she secures a minimum of 45% (45 marks out of 100) in the sum total of the CIE and SEE taken together.

- CIE component should comprise of Continuous evaluation of drawing work of students as and when the modules are covered based on below detailed weightage.

Module	Module Max. Marks	Evaluation Weightage in marks	
		Computer display and print out	Manual Sketching
Module 1	20	10	10
Module 2	20	10	10
Module 3	20	10	10
Module 4	20	10	10
Module 5	20	10	10
TOTAL	**100**	**50**	**50**

- At least one Test covering all the modules is to be conducted for 100 marks during 14th week and the same is to be scaled down to **25 Marks.**
- Assignments = **10 Marks from each module. (50 marks scaled down to 25 Marks)**
- The final CIE 50 marks = Test (25 marks) + Assignment (25 marks).

- SEE shall be conducted and evaluated for maximum marks of 100 and shall be scaled down to 50 marks.
- Question paper shall be made available for each batch asper schedule.
- Evaluation shall be carried jointly by both theinternal & external examiners.
- Scheme of Evaluation: To be defined by both the examiners jointly.
- Maximum 3 questions shall be set as per the following pattern.

From Module			Marks Allotted
Module 01 (Choice between Lines or Planes)			30
Module 02 (Compulsory question)			40
Module 03 or Module 04 or Module 05			30
TOTAL			**100**
Q. No.	**Manual Sketching**	**Computer display and print out**	**TOTAL MARKS**
1	15	15	30
2	20	20	40
3	15	15	30
TOT.	**50**	**50**	**100**

4. PCCL: Laboratory course (01 credit course)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.

The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50).

The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks).

The student is declared as a pass in the course if he/she secures a

Continuous Internal Evaluation: CIE will be conducted by the department and it will have only 01 component: I. Theory Component. (Not required for Laboratory course) II. Practical Component. **II. Practical Component:** **C.** Conduction of each experiment/program should be evaluated for 50 marks and average of all the experiments/program shall be taken (rubrics will be published by the lab conduction committee). **D.** One laboratory Internal Assessment test will be conducted for 50 marks (rubrics will be published by the lab conduction committee). **E.** If the course project / mini project is involved in the laboratory component.**The evaluation shall be completed by 14th week of the semester.** The rubrics required for the evaluation of the project shall be defined by the departments along with mapping of relevant COs & POsand get it approved from academic dean. **Note:** • If component 'E' is involved in the course either component 'D' or 'E' along with component 'C'shall be consideredfor average of item II. • Otherwise, components 'C' & 'D' shall be considered for average of item II. **The final CIE marks will be 50** = Avg. of (C &[D or E]) **The documents of all the assessments shall be maintained meticulously.**	**Semester-End Examination:** Only laboratory SEE will be conducted jointly by the internal examiner and external examiner appointed by COE as per the scheduled timetable for duration of 03 hours. • The examination shall be conducted for 100 marks and shall be reduced to 50 marks proportionately. • All laboratory experiments/programs are to be included for practical examination. • Breakup of marks (Rubrics) and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners (OR) based on the course requirement evaluation rubrics shall be decided jointly by examiners. • Students can pick one question (experiment/program) from the questions lot prepared by the internal /external examiners jointly. • Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners. • General rubrics suggested for SEE: writeup-20%, Conduction procedure and results -60%, Viva-voce 20% of maximum marks. • Change of experiment is allowed only once and shall be assessed only for 85% of the maximum marks.	minimum of 45% (45marks out of 100) in the sum total of the CIE and SEE taken together.
5. AEC: Ability Enhancement Courses (01 credit courses)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.		
The minimum passing mark for the CIE is 50% of the maximum marks	The minimum passing mark for SEE is 40%	The student is declared

(25 marks out of 50). **Continuous Internal Evaluation:** CIE will be conducted by the department and will have only 01 component: **I. Theory component.** Theory Component will consist of A. Internal Assessment Test B. Formative assessments **A. Internal Assessment Test:** • There are 02 tests each of 50 marks conducted during 6th week & 15th week, respectively. • The question paper will be of Multiple-Choice Questions (MCQ). • The student must answer all questions. • Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course **B. Formative assessments:** • 01 formative assessments of 50 marks shall be conducted by the Course coordinator based on the dept. planning before 14th week. • The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc. • The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. • The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs &POs. **The final CIE marks will be 50:** Average of all 03 events (02 Internal Assessment test and 01 formative assessment). **The documents of all the assessments shall be maintained meticulously.**	of the maximum marks (20 out of 50 marks). **Semester-End Examination:** Theory SEE will be conducted by COE as per the scheduled timetable for duration of 02 hours and total marks of 50. • Multiple choice Question paper. • The students have to answer all questions.	as a pass in the course if he/she secures a minimum of 45% (45marks out of 100) in the sum total of the CIE and SEE taken together.
6. HSMC: (01 credit course)		
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.		

The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). **Continuous Internal Evaluation:** CIE will be conducted by the department and will have only 01 component: **I. Theory component.** Theory Component will consist of A. Internal Assessment Test B. Formative assessments **A. Internal Assessment Test:** • There are 02 tests each of 50 marks conducted during 6th week & 15th week, respectively. • The question paper will be of Multiple-Choice Questions (MCQ). • The student must answer all questions. • Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course **B. Formative assessments:** • 01 formative assessments of 50 marks shall be conducted by the faculty based on the dept. planning before 14th week. • The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc. • The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. • The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs &POs. **The final CIE marks will be 50:** Average of all 03 events (02 IA test and 01 formative assessment). **The documents of all the assessments shall be maintained meticulously.**	The minimum passing mark for SEE is 40% of the maximum marks (20 out of 50 marks). **Semester-End Examination:** Theory SEE will be conducted by COE as per the scheduled timetable for duration of 02 hours and total marks of 50. • Multiple choice Question paper. • The students have to answer all questions. • Marks scored shall be proportionally reduced to 50 marks.	The student is declared as a pass in the course if he/she secures a minimum of 45% (45 marks out of 100) in the sum total of the CIE and SEE taken together.
7. HSMC: (0 credit courses)		

The weightage is only for Continuous Internal Evaluation (CIE).		
The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). **Continuous Internal Evaluation:** CIE will be conducted by the department and it will have only 01 component: **I. Theory component.** Theory Component will consist of C. Internal Assessment Test D. Formative assessments **A. Internal Assessment Test:** • There are 02 tests each of 50 marks conducted during 6th week & 15th week, respectively. • The question paper will be of Multiple-Choice Questions (MCQ). • The student must answer all questions. • Internal Assessment Test question paper shall be designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course **B. Formative assessments:** • 01 formative assessments of 50 marks shall be conducted by the faculty based on the dept. planning during random times. • The formative assessments include Assignments/seminars/case study/field survey/ report presentation/course project/etc. • The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. • The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs &POs. **The final CIE marks will be 50** = Average of all 03 events (02 IA test and 01 formative assessment). **The documents of all the assessments shall be maintained meticulously.**	• No Semester End Examination.	The student is declared as a pass in the course if he/she secures a minimum of 50% (25 marks out of 50) in the CIE.
8. NCMC: (0 credit course)		
The weightage is only for Continuous Internal Evaluation (CIE).		

The minimum passing mark for the CIE is 50% of the maximum marks (25 marks out of 50). **Continuous Internal Evaluation:** CIE will be conducted by the department and it will have only 01 component: **I. Theory component.** Theory Component will consist of only 01 assessment A. Internal Assessment Test (not required for NCMC course). B. Formative assessments. **B. Formative assessments:** • 01 formative assessments of 50 marks shall be conducted by the faculty based on the dept. planning during random times. • The formative assessments include Quiz/Assignments/seminars/case study/field survey/ report presentation/course project/etc. • The assignment QP shall indicate marks of each question and the relevant COs & RBT levels. • The rubrics required for the other formal assessments shall be defined by the departments along with mapping of relevant COs &POs. **The final CIE marks will be 50** **The documents of all the assessments shall be maintained meticulously.**	• No Semester End Examination.	The student is declared as a pass in the course if he/she secures a minimum of 50% (25 marks out of 50) in the CIE.

Academic Dean
Dr. Babu N.V

DR. BABU N.V
Prof. & Academic Dean
SJB Institute of Technology
BGS Health & Education City
Kengeri, Bengaluru-560060

25.6.2019

Principal
Dr. K V Mahendra Prashanth

Principal
SJB Institute of Technology
67, BGS Health & Education City,
Dr. Vishnuvardhan Road,
Kengeri, Bengaluru - 560 060.

|| Jai Sri Gurudev ||
Sri Adichunchanagiri Shikshana Trust (R)
SJB Institute of Technology
BGS Health and Education City, Dr. Vishnuvardhana Road, Kengeri, Bengaluru-560060
Approved by AICTE, New Delhi.
Autonomous Institute affiliated to Visvesvaraya Technological University, Belagavi
Accredited by NAAC with 'A+'grade, Certified by ISO 9001 - 2015
Recognized by UGC, New Delhi with 2(f) & 12 (B)

Program Outcomes (POs)- Graduate Attributes

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **Problem analysis**: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. **Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct investigations of complex problems**: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

9. **Individual and teamwork**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **Communication**: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

|| Jai Shree Gurudev ||
Sri Adichunchanagiri Shikshana Trust ®

SJB Institute of Technology

BGS Health and Education City,
Dr. Vishnuvardhan Road, kengeri,
Bengaluru – 560060

+91-80-28612445 / 46

https://sjbit.edu.in/

Approved by AICTE, New Delhi

Affiliated to
Visvesvaraya Technological University, Belagavi

Accredited by NBA

Accredited by NAAC with A+

Recognized by UGC, New Delhi with 2(f) and 12(B)

Certified by ISO 9001 – 2015

ATAL Ranking:
Band Performer

Band of 151 to 300 in
Innovation Category