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INSTITUTE VISION

“To be a preferred institution in Engineering Education by achieving excellence in teaching and research and to remain as a source of pride for its commitment to holistic development of individual and society”

INSTITUTE MISSION

“To continuously strive for the overall development of students by educating them in a state-of-the-art- infrastructure, by retaining the best practices, faculties and inspire them to imbibe real-time problem-solving skills, leadership qualities, human values and societal commitments, so that they emerge as competent professionals”.

DEPARTMENT VISION

"To be the centre of excellence in providing education in the field of Civil Engineering to produce technically competent and socially responsible engineering graduates."

DEPARTMENT MISSION

"Educating students to prepare them for professional competencies in the broader areas of the Civil Engineering field by inculcating analytical skills, research abilities and encouraging culture of continuous learning for solving real time problems using modern tools."

PROGRAM EDUCATIONAL OBJECTIVES (PEO's):

- 1. Pursue a successful career in various domains of Civil Engineering Profession by acquiring knowledge in mathematical, scientific and engineering fundamentals.*
- 2. Analyze and design Civil Engineering systems with social awareness and responsibility.*
- 3. Exhibit professionalism, ethical approach, communication skills & teamwork in their profession and adapt to modern trends by engaging in lifelong learning.*



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PROGRAM OUTCOMES (PO's):

- 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 analyse 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 modelling to complex engineering activities with an understanding of the limitations.
- 6. The engineer and society:** Apply reasoning informed by the 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 the 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 the engineering practice.
- 9. Individual and team work:** 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.

PROGRAM SPECIFIC OUTCOMES (PSO's):

PSO1: Inculcating in students practical knowledge and experimental skills to tackle Civil Engineering problems using technical and management skills, exhibiting professional ethics to meet the societal needs.

PSO2: Provide solutions related to Civil Engineering built environment through a multidisciplinary approach.

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Sl. No.	Purpose	Contact Person	
		Faculty	Instructor
01	HOD, Academics, Attestations, Exam forms signature	Prof. S.M.Chandrakanth	NA
02	Research Center Co-Ordinator,	Prof. S.M.Chandrakanth	NA
03	Industry-Institute-Interaction, Technical Magazine Coordinator (MoU, Ind. Visit etc.)	Prof. Shreedevi S B	NA
04	EMS / ED Cell coordinator, TP Cell officer	Prof. Preethi. R.Patil	NA
05	Project Coordinator, KSCST, IEEE coordinator, Smart India Hackathon, Scholarship, LIC	Prof. Preethi. R.Patil	NA
06	FACE / Website Coordinator	Prof. Sudarshan V Jore	NA
07	Civil/ IT Maintenance, Feedback / Publicity, Department News Letter, NSS, Student Welfare	Prof. Vishwanath I Patil	NA
08	GATE Coaching Coordinator	Prof. Sudarshan V Jore	NA
09	ISTE / E-Shikshana / E-learning / Internship	Prof. Vishwanath I Patil	NA
10	Women Empower cell, Conference, FDP, Workshop	Prof. Shreedevi S B	NA
11	IA Coordinator / Alumni coordinator	Prof. Shreedevi S B	NA
Institute Level			
		Faculty	Contact
12	Student Welfare Convener	Sri. M. G. Huddar	8217056798
13	TP Cell Coordinator	Sri. Pramod. Patil	9731104059
14	Anti-Ragging Committee Member	Sri. K.M.Akkoli	9739114856
15	Anti Raging Squad Convener	Sri. K.M.Akkoli	9739114856
16	Internal Complaint Committee Convener	Smt. S. S. Kamte	9008696825
17	Grievance redressal Convener	Sri. S. S. Tabhaj	9901398134
18	Sports and Cultural / Extra-Curricular Activities Convener	Sri. S.B. Sarawadi	9739109383

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2.0 Departmental Resources

Department of Civil Engineering was established in the year 2020 and is housed in a total area of 858 Sq. Mtrs.

2.1 Faculty Position

Sl.No.	Category	No. in Position	Average experience (in years)
01.	Teaching faculty	05	13
02.	Technical Supporting Staff	00	00
03.	Helper staff	02	21

2.2 Major Laboratories

Sl.No.	Name of the laboratory	Area in Sq. Mtrs	Amount Invested (Rs. in Lakhs)
01.	Computer Aided Building Planning & Drawing	66	14.37
02.	Building Materials Testing Laboratory	149	11.02
03.	Geology Laboratory	76	0.75
04.	Fluid Mechanics & Hydraulic Machines Laboratory	72	7.76
05	Surveying Practice	76	0.70
06	Concrete and Highway Materials Laboratory	72	1.30
07	Geotechnical Engineering Laboratory	73	0.70
08	Environmental Engineering Laboratory	200	New Setup Under Process

Total Investment in the Department

Rs. 36.60 Lakhs

3.0 Teaching Faculty Details

Sl. No.	Name	Designation	Qualification	Specialization	Professional Membership	Teaching Exp (In yrs.)	Phone No.
01	Prof. S.M.Chandrakanth	Asst. Prof./HOD	M. Tech. (PhD)	Highway Engineering	IAENG 220815	12	8867814854
02	Prof. Preethi R. Patil	Asst. Prof.	M. Tech.	Structures	--	04	9606557280
03	Prof. Vishwanath I Patil	Asst. Prof.	M. Tech	Structures	--	05	9975499979
04	Prof. Sudarshan V Jore	Asst. Prof.	M. Tech.	CT & M	--	02	9535459918
05	Prof. Shreedevi S B	Asst. Prof.	M. Tech.	CT & M	--	02	7760429556



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4.0 Institute Academic Calendar

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ACADEMIC CALENDAR OF EVENTS-02 (CoE-02) OF IV& VI SEMs FOR THE AY: 2023-24

Ref: 1) VTU CoE Revised Notification No.: VTU/BGM/AC-MBA/2023-24/6901, Dated 27th March 2024
2) VTU Tentative Academic Calendar Notification No.: VTU/BOS/AC-PG-6th sem BE/2023-24 /239, Dated 15th April 2024

Calendar	Date	Events & Holidays						
April -2024								
Sun	Mon	Tue	Wed	Thu	Fri	Sat	2 nd April 2024	Technovision-24
	1	2	3	4	5	6	9 th April 2024	GH: Yugadi Festival
7	8	9	10	11	12	13	11 th April 2024	GH: Kutub-A-Ramjan
14	15	16	17	18	19	20	22 nd April, 2024	Commencement of IV Semester Classes
21	22	23	24	25	26	27	29 th April, 2024	Commencement of VI Semester Classes
28	29	30					30 th April 2024	Institute Sports Events
May-2024			1 st May 2024	GH: Labours Day				
Sun	Mon	Tue	Wed	Thu	Fri	Sat	3 rd May 2024	Fun Week-HSIT Shambhrama-24
			1	2	3	4	7 th May 2024	GH: Lok Sabha Election
5	6	7	8	9	10	11	8 th May 2024	Graduation Day-24 & World Red Cross Day
12	13	14	15	16	17	18	9 th May 2024	Final Year Project Exhibition
19	20	21	22	23	24	25	10 th May 2024	GH: Basav Jayanti/Akhsay Trutiya
26	27	28	29	30	31		29 th -31 st May 2024	1 st IA Test for IV & VI Sems.
June-2024			31 st May 2024	1 st Feedback on Teaching-Learning (IV & VI Sems.)				
Sun	Mon	Tue	Wed	Thu	Fri	Sat	5 th June 2024	Display of 1 st IA Test Marks of IV & VI Sems.
			1	2	3	4	21 st -22 nd June 2024	Lab IA Test-I (IV & VI Sem. 2021 & 2022 Schemes)
5	6	7	8	9	10	11	21 st June 2024	International Yoga Day
12	13	14	15	16	17	18	27 th -29 th June 2024	2 nd IA Test for IV & VI Sems.
19	20	21	22	23	24	25	29 th June 2024	2 nd Feedback on Teaching-Learning (IV & VI Sems.)
26	27	28	29	30	31		3 rd July 2024	Display of 1 st IA Test Marks of IV & VI Sems.
July-2024			17 th June 2024	GH: Bakreed				
Sun	Mon	Tue	Wed	Thu	Fri	Sat	3 rd July 2024	International Plastic Bag Free Day
						1	11 th July 2024	World Population Day
2	3	4	5	6	7	8	15 th July 2024	World Youth Skills Day
9	10	11	12	13	14	15	17 th July 2024	GH: Last Day of Moharam
16	17	18	19	20	21	22	25 th -27 th July 2024	3 rd IA Test for IV & VI Sems.
23	24	25	26	27	28	29	28 th July 2024	World Nature Conservation Day
August-2024			30 th July 2024	Display of 3 rd IA Test Marks of IV & VI Sems.				
Sun	Mon	Tue	Wed	Thu	Fri	Sat	29 th -30 th July 2024	Lab IA Test-II (IV & VI Sem. 2021 & 2022 Schemes)
							31 st July 2024	Last Working Day of the VI Semester Classes
1	2	3	4	5	6	7	7 th August 2024	Last Working Day of the IV Semester Classes
7	8	9	10	11	12	13	12 th August 2024	International Youth Day
14	15	16	17	18	19	20	15 th August 2024	GH: Independence Day Celebration
21	22	23	24	25	26	27	8 th -17 th August 2024	VTU IV Sem Practical Examinations
28	29	30	31				19 th Aug. -12 th Sept. 2024	VTU IV Sem Theory Examinations
August-2024			1 st -10 th August 2024	VTU VI Sem Practical Examinations				
Sun	Mon	Tue	Wed	Thu	Fri	Sat	12 th Aug. -14 th Sept. 2024	VTU VI Sem Theory Examinations
							20 th August 2024	Sadbhavana Diwas
4	5	6	7	8	9	10	26 th August 2024	Women's Equality Day
11	12	13	14	15	16	17	16 th Sept. 2024	Commencement of V Sem of AY: 2024-25
18	19	20	21	22	23	24		
25	26	27	28	29	30	31		

GH: General Holiday, LH: Local Holiday

Dr.S.N.Topannavar
IQAC Coordinator & Dean (Academics)

Dr.S.C.Kamate
Principal

Nidasoshi, Taq: Hukkeri, Dist: Belgaum, Karnataka - 591 236
Phone:+91-8333-278887, Fax:278886, Web:www.hsit.ac.in, Mail:principal@hsit.ac.in



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5.0 Scheme of Teaching & Examination

VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI
Scheme of Teaching and Examination 2018 – 19
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)
(Effective from the academic year 2018 – 19)

IV Semester

B.E: Civil Engineering


Sl. No	Course and Course Code		Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PCC	BCV401	Analysis of Structures	TD: CV PSB: CV	3	0	0		03	50	50	100	3
2	IPCC	BCV402	Fluid Mechanics and Hydraulics	TD: CV PSB: CV	3	0	2		03	50	50	100	4
3	IPCC	BCV403	Transportation Engineering	TD: CV PSB: CV	3	0	2		03	50	50	100	4
4	PCCL	BCVL404	Building Materials Testing Lab	TD: CV PSB: CV	0	0	2		03	50	50	100	1
5	ESC	BCV405x	ESC/ETC/PLC		3	0	0		03	50	50	100	3
6	AEC/ SEC	BCV456x	Ability Enhancement Course/Skill Enhancement Course- IV	TD and PSB: Concerned department	If the course is Theory				01	50	50	100	1
					1	0	0						
					If the course is a lab				02				
					0	0	2						
7	BSC	BBOK407	Biology For Engineers	TD / PSB: BT, CHE,	3	0	0		03	50	50	100	3
8	UHV	BUHK408	Universal human values course	Any Department	1	0	0		01	50	50	100	1
9	MC	BNSK459	National Service Scheme (NSS)	NSS coordinator									
		BPEK459	Physical Education (PE) (Sports and Athletics)	Physical Education Director	0	0	2			100	---	100	0
		BYOK459	Yoga	Yoga Teacher									
Total									500	400	900	20	

Ability Enhancement Course / Skill Enhancement Course - IV

BCVL456A	Building Information Modelling in Civil Engineering – Basics (0:0:2)	BCV456C	Electronic Waste Management - Issues and Challenges
BCV456B	GIS with Quantum GIS	BCV456D	Technical Writing Skills
Engineering Science Course (ESC/ETC/PLC)			
BCV405A	Finance for Professionals	BCV405C	Concreting Techniques & Practices
BCV405B	Construction Equipment, Plants and Machinery	BCV405D	Watershed Management

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical of the same course. Credit for IPCC can be 04 and its Teaching-Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B.Tech.) 2022-23

National Service Scheme /Physical Education/Yoga: All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE)(Sports and Athletics), and Yoga(YOG) with the concerned coordinator of the course during the first Week of III semesters. Activities shall be carried out between III semester to the VI semester (for 4 semesters). Successful completion of the registered course and requisite CIE score is mandatory for the award of the Degree. The events shall be appropriately scheduled by the colleges and the same shall be reflected in the calendar prepared for the NSS, PE, and Yoga activities. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses is mandatory for the award of Degree.

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Subject Title	ANALYSIS OF STRUCTURES		
Subject Code	BCV401	CIE Marks	50
Number of Lecture Hrs / Week	(3:0:0:0)	SEE Marks	50
Total Number of Lecture Hrs	40	Exam Hours	03
Credits:03			

FACULTY DETAILS:		
Name: Prof. Sudarshan V Jore	Designation: Asst. Professor	Experience: 02 years
No. of times course taught: 2	Specialization: Construction Technology and Management	

1.0 Prerequisite Subjects:

Sl.No	Branch	Semester	Subject
01	Civil Engineering	I	Introduction to Civil Engineering
02	Civil Engineering	II	Engineering & mechanics
03	Civil Engineering	III	Strength of Materials

2.0 Course Objectives

This course will enable students:

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

3.0 Course Outcomes

Having successfully completed this course, the student will be able to:

Sl.No	Course Outcome	RBT Level	POs
01	Identify the different forms of structural systems and analyze the trusses.	L1,L2,L3	1,2,3,5,6,8,12
02	Evaluate the slope and deflections in beams, frames and trusses by using moment area method and energy principle.	L1,L2,L3	1,2,3,5,6,8,12
03	Analyze and determine the stress resultants in arches and cables	L1,L2,L3	1,2,3,5,6,8,12
04	Analyze the indeterminate structures and construct BMD AND SFD using slope deflection methods.	L1,L2,L3	1,2,3,5,6,8,12
05	Analyze the indeterminate structures and construct BMD AND SFD using Moment Distribution Method.	L1,L2,L3	1,2,3,5,6,8,12
Total Hours of Instruction		40	

**4.0 Course Content****Module-1**

Introduction and Analysis of Plane Trusses: 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.

Module-2

Deflection of beams: Moment area method: Derivation, 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.

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, trusses and frames (No numerical on unit load method).

Module-3

Arches and Cable Structures: 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.

Module-4

Slope Deflection Method: 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

Module-5

Moment Distribution Method: 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

5.0 Relevance to future subjects

SI No	Semester	Subject	Topics
1.	VI	Design of Bridges	Deflections, Slopes

6.0 Relevance to Real World

SI No	Real World Mapping
01	Vital role in the design and construction of buildings, bridges, and other structures

7.0 Gap Analysis and Mitigation

SI No	Delivery Type	Details
01	Tutorial	Solving problems of GATE, Other University and previous year QP's
02	NPTEL	Structural Analysis I & II

8.0 Books Used and Recommended to Students

Text Books
1. Reddy, C.S., Basic Structural Analysis, 3 rd. ed., Tata McGraw-Hill Education Pvt. Ltd., New Delhi, 2011.
2. Hibbeler, R.C., Structural Analysis, 9 th edition., Pearson publications., New Delhi, 2012.

3. Thandavamoorthy, T.S., Structural Analysis, 6 th edition., Oxford University press., New Delhi,2015.
4. L S Negi and R S Jangid, “Structural Analysis”, Tata McGraw-Hill Publishing Company Ltd.
5. D S Prakash Rao, “Structural Analysis: A Unified Approach”, Universities Press 4

Reference Books

1. K.U. Muthu and H. Narendra, “Indeterminate Structural Analysis”, IK International Publishing Pvt. Ltd.
2. Gupta S P, G S Pundit and R Gupta, “Theory of Structures”, Vol II, Tata McGraw Hill Publications company Ltd.
3. V N Vazirani and M M Ratwani, “Analysis of Structures”, Vol. 2, Khanna Publishers
4. Wang C K, “Intermediate Structural Analysis”, McGraw Hill, International Students Edition. S. Rajashekhara and G. Sankarasubramanian, “Computational Structural Mechanics”, PHI Learning Pvt. Ltd.,
5. S S Bhavikatti, structural analysis, vikas publishing house pvt.ltd., new Delhi
6. S Ramamrutham and R Narayanan, Theory of structures , Dhanpat Rai Publishing Company.

Additional Study material & e-Books

- <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>
- <https://nptel.ac.in/courses/105105109>
- Class notes and vtu notes

9.0 Relevant Websites (Reputed Universities & Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

<https://en.m.wikipedia.org>

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

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

10.0 Magazines/Journals used and Recommended to Students

Sl.No	Magazines/Journals	Website
1	International Journal	www.constuctionmanagement.com

11.0 Examination Note

Assessment Details (both CIE and SEE)

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 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks



- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments shall be planned properly by the course teacher. The teacher should not conduct two assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests and assignment/s marks. Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.


Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (duration 03 hours).

- 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 students have to answer 5 full questions, selecting one full question from each module.
- Marks scored shall be proportionally reduced to 50 marks

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
Module 1	1	Introduction and Analysis of Plane Trusses	20
	2	Structural forms, Conditions of equilibrium	
	3	Compatibility conditions, Degree of freedom	
	4	Static and kinematic indeterminacies of structural systems	
	5	Types of trusses, Assumptions in analysis	
	6	Analysis of determinate trusses by method of joints	
	7.	Analysis of determinate trusses by method of sections	
	8.	Numerical problems	
Module 2	9	Deflection of beams: Moment area method: Derivation, Mohr's theorems	20
	10.	Sign convention; Application of moment area method to determinate prismatic beams	
	11.	Beams of varying cross section; Use of moment diagram by parts.	
	12	Strain Energy: Principle of virtual displacements	
	13.	Principle of virtual forces, Strain energy and complimentary energy	
	14.	Strain energy due to axial force, bending, shear and torsion	
	15.	Castigliano's theorems, application of Castigliano's theorems.	
	16	Calculate deflection of beams, trusses and frames	
Module 3	17	Arches and Cable Structures	20
	18	Three hinged parabolic arches with supports at the same	
	19	Three hinged parabolic arches with supports at the different levels.	
	20	Determination of normal thrust, radial shear and bending moment	
	21	Numerical problems	
	22	Analysis of cables under point loads and UDL	
	23	Length of cables for supports at same and at different levels	
	24	Numerical Problems	
Module 4	25	Slope Deflection Method: Introduction, sign convention	20

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	26	Development of slope deflection equation	
	27	Analysis of continuous beams with different supports	
	28	Analysis of continuous beams including settlement of supports	
	29	Numerical Problems	
	30	Analysis of orthogonal rigid plane frames	
	31	Analysis of orthogonal rigid plane frames including sway	
	32	Numerical Problems	
Module 5	33	Moment Distribution Method	20
	34	Introduction, Definition of terms	
	35	Development of method	
	36	Analysis of continuous beams with support yielding	
	37	Analysis of orthogonal rigid plane frames	
	38	Analysis of orthogonal rigid plane frames including sway	
	39	Numerical problems	
48	Numerical problems		

13.0 Assignments, Pop Quiz, Mini Project, Seminars

Sl.No	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: Questions on module 1 to 5	Identify the different forms of structural systems and analyze the trusses. Evaluate the slope and deflections in beams, frames and trusses by using moment area method and energy principle. Analyze and determine the stress resultants in arches and cables. Analyze the indeterminate structures and construct BMD AND SFD using slope deflection methods. Analyze the indeterminate structures and construct BMD AND SFD using Moment Distribution Method.	Module 1 to 5 of the syllabus	14	Individual Activity.	Text 1 Ref Book 2
2	Quiz 1; Questions on module 1 to 5	Analyze and answer the pop quiz questions on basic knowledge on analysis of structures	Module 1 to 5 of the syllabus	14	Individual Activity.	Text 1 Ref Book 2

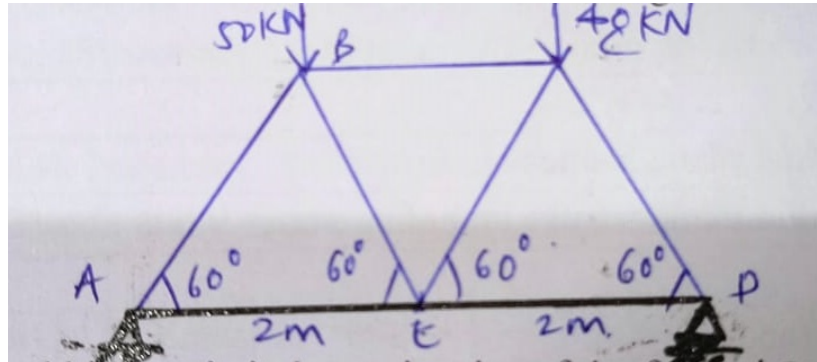
14.0 QUESTION BANK

MODULE 1

1. Explain with examples statically determinate and indeterminate
2. Mention the assumptions made in analysis of trusses.

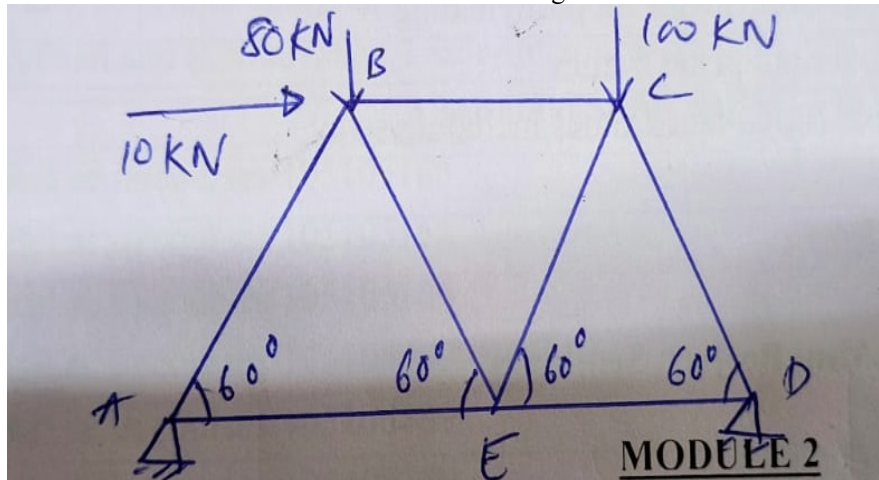


3. Determine the forces in the members of the the truss given in Fig



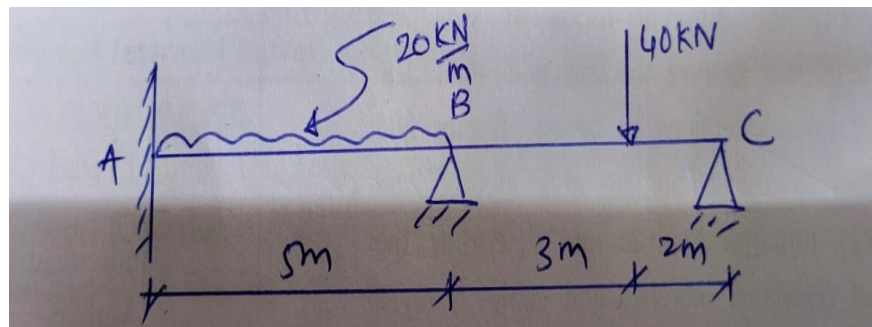
4. Find the static and kinematic indeterminacies of the following structures

5. Determine the forces in all members of the truss a shown in Fig . Indicate the magnitude and nature of forces of the truss. All incline members are at 60° to the horizontal and length of each member is 2m.



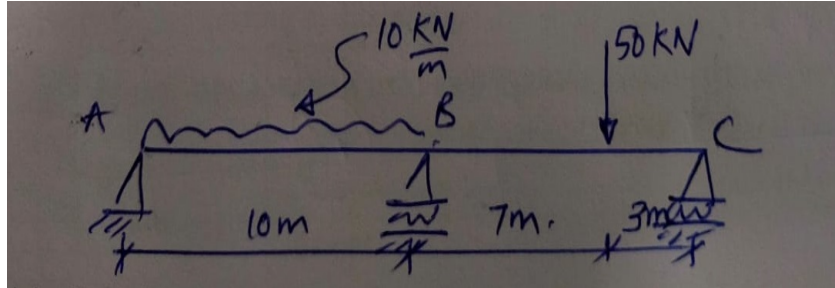
MODULE 2

1. Derive the expression for slope and deflection of beam using Moment Area Method.
2. Determine slope and deflection of a simply supported beam using Mohr's Theorem





3. Determine slope and deflection of a simply supported beam using Mohr's Theorem



4. Explain Castiglano's theorem I & II

5. Derive an expression for strain energy due to axial load

6. Derive an expression for strain energy due to torsional moment

MODULE 3

1. A three hinged parabolic arch of span 16m has a central rise of 3m carries a UDL of 25 KN/m on the left half of span. Determine the following

- Reaction of supports
- Bending moment at 4m from left support
- Normal Thrust at 4m from left support
- Radial Shear at 4m from left support

2. A three hinged parabolic arch of span 16m has a central rise of 3m carries a Point load of 30KN at 2m from left support. Determine the following

- Reaction of supports
- Bending moment at 4m from left support
- Normal Thrust at 4m from left support
- Radial Shear at 4m from left support

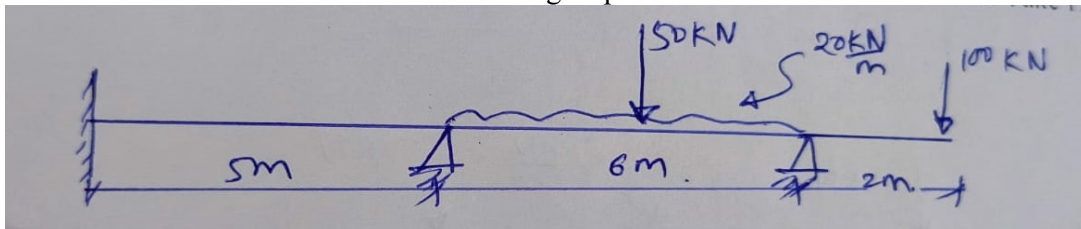
3. Prove that the profile of the cable subjected to UDL is a parabola

4. Prove that the moment at any point of the three hinged parabolic arch subjected to UDL is zero

5. A Three hinged parabolic arch of 20m span with 4m central rise carries a point load of 4KN at 4m horizontally from the left hinge. Calculate the normal thrust and radial shear at a section just after the load. Also calculate the maximum positive and negative BM. Sketch BMD.

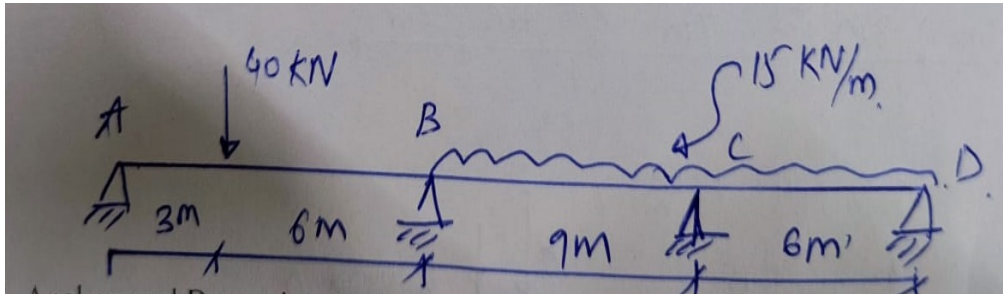
MODULE 4

1. Analyze and Determine the final end moments using slope deflection method. Take EI Constant

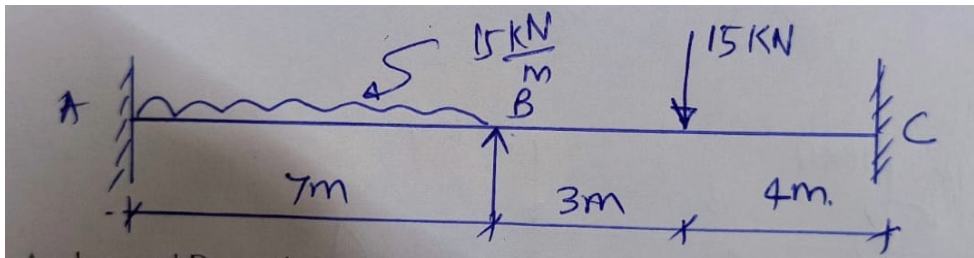




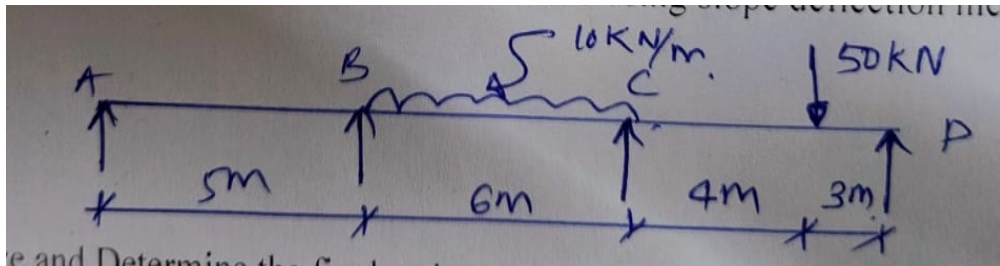
2. Analyze and Determine the final end moments using slope deflection method. Take EI Constant



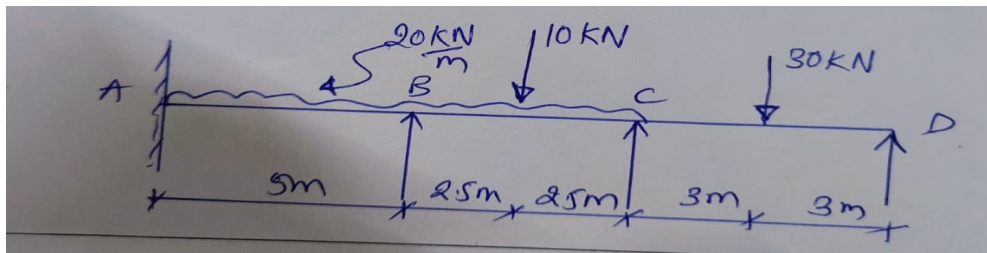
3. Analyze and Determine the final end moments using slope deflection method. Take EI Constant



4. Analyze and Determine the final end moments using slope deflection method. Take EI Constant

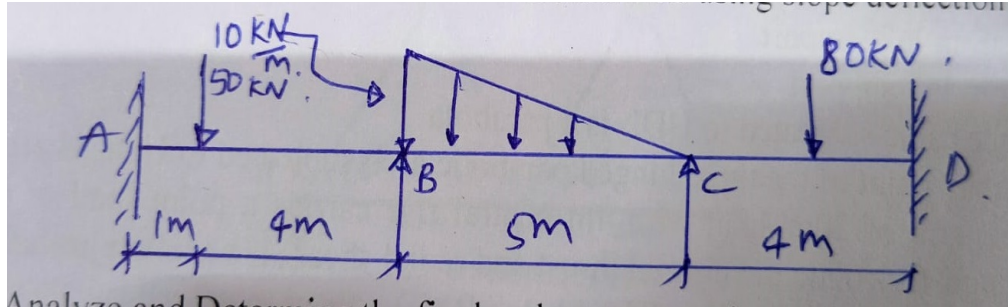


5. Analyze and Determine the final end moments using slope deflection method. Take EI Constant

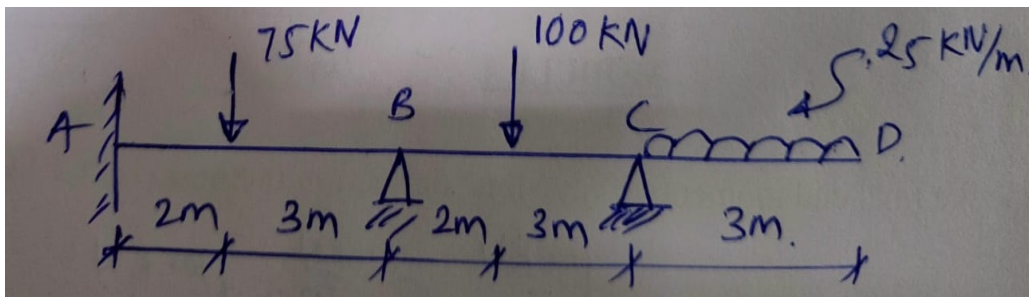


**MODULE -5**

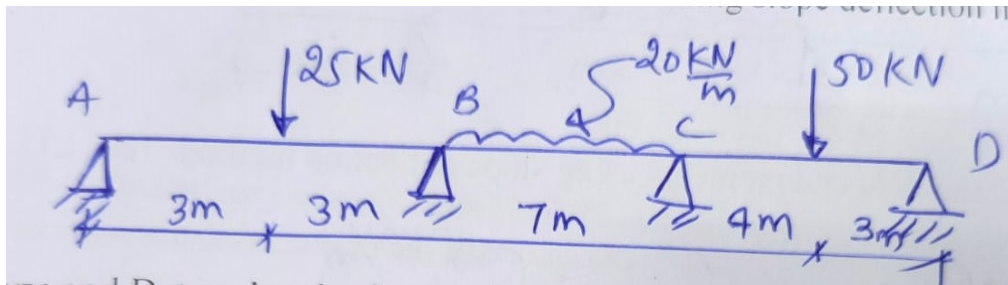
1. Analyze and Determine the final end moments using slope deflection method. Take EI Constant



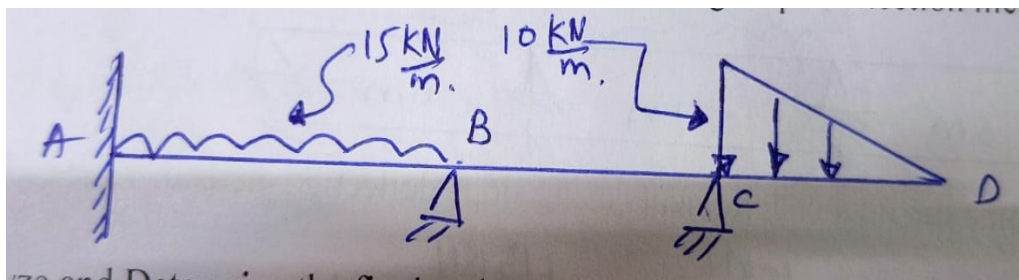
2. Analyze and Determine the final end moments using slope deflection method. Take EI Constant



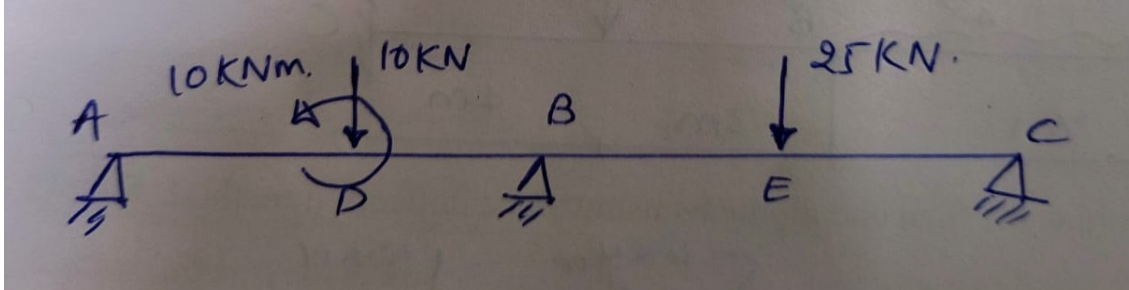
3. Analyze and Determine the final end moments using slope deflection method. Take EI Constant








4. Analyze and Determine the final end moments using slope deflection method. Take EI Constant



5. Analyze and Determine the final end moments using slope deflection method. Take EI Constant



Prepared by	Checked by		
			
Prof. Sudarshan V Jore	Prof. S.M.Chandrakanth	H O D	Principal

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Subject Title	FLUID MECHANICS AND HYDRAULICS		
Subject Code	BCV402	CIE Marks	50
Number of Lecture Hrs / Week	(3:0:2:0)	SEE Marks	50
Total Number of Lecture Hrs	40 + 8-10 Lab slots	Exam Hours	03
CREDITS – 04			

FACULTY DETAILS:		
Name: Prof. V.I.Patil	Designation: Asst. Professor	Experience: 5 Years
No. of times course taught: 01		Specialization: Structural Engineering

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Civil Engineering	I/II	Elements of Civil Engineering

2.0 Course Objectives


This course will enable students to:

- 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

3.0 Course Outcomes

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

	Course Outcome	RBT Level	POs
C219.1	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.	L1, L2, L3, L4	1,2,3,5, 6,8,12
C219.2	Arrange field visits to give brief information about the water and wastewater treatment plant.	L1, L2, L3, L4	1,2,3,5, 6,8,12
C219.3	Encourage collaborative (Group Learning) Learning in the class.	L1, L2,	1,2,3,5,
C219.4	Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking and enhance the knowledge of treatment processes.	L1, L2, L3, L4	1,2,3,5, 6,8,12
C219.5	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.	L1, L2, L3, L4	1,2,3,5, 6,8,12
C219.6	Seminars, surprise tests and Quizzes may be arranged for students in respective subjects to develop skills.	L1, L2, L3, L4	1,2,3,5, 6,8,12
Total Hours of Instruction			50

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4.0 Course Content

Module-1

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

Module-2

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 Venturimeter, Orifice meter, Pitot tube.

Module-3

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.

Module-4

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.

Module-5

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.

5.0 Relevance to future subjects


Sl No	Semester	Subject	Topics
01	VI	Design of Hydraulic Structures	Hydraulic Structures
02	V	Hydrology and Irrigation engineering	Hydro statics on surfaces

6.0 Relevance to Real World

Sl No	Real World Mapping
01	Design of components like Dams, Canals, Gates, Weirs, Notches, discharge & pressure calculation in industries
02	Analysis of hydrostatics & Dynamic forces
03	Design Pipes & Pipe networks using Hardy-Cross method

7.0 Gap Analysis and Mitigation

Sl No	Delivery Type	Details
01	Tutorial	Practicals should clubbed with theory for better understanding
02	NPTEL	https://twitter.com/JFluidMech/status/1442511607775571970 https://youtu.be/A0BuHEqDm88

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8.0 Books Used and Recommended to Students

Text Books

1. P N Modi and S M Seth, "Hydraulics and Fluid Mechanics, including Hydraulic Machines", 20th edition, 2015, Standard Book House, New Delhi.
2. R.K. Bansal, "A Text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi
3. S K SOM and G Biswas, "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill, New Delhi.

Reference Books

1. Victor L Streeter, Benjamin Wylie E and Keith W Bedford, "Fluid Mechanics", Tata McGraw Hill Publishing Co Ltd., New Delhi, 2008(Ed).
2. K Subramanya, "Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Publishing Co. Ltd.
3. K Subramanya, "Fluid Mechanics and Hydraulic Machines-problems and solutions", Tata McGraw Hill Publishing Co. Ltd.
4. J. F. Douglas, J. M. Gasoriek, John Swaffield, Lynne Jack, "Fluid Mechanics", Pearson, Fifth Edition
Mohd. Kaleem Khan, "Fluid Mechanics and Machinery", Oxford University Press.

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

<https://en.wikipedia.org/wiki/fluid>

10.0 Magazines/Journals used and Recommended to Students

Sl.No	Magazines/Journals	Website
1	AEÜ - International Journal of fluid mechanics	www.journals.elsevier.com/aeu


11.0 Examination Note:

Assessment Details (both CIE and SEE)

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 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

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CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC


Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks


The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	% of Portion
MODULE 1	01	Fluids & Their Properties: Concept of fluid, Systems of units. Properties of fluid; Mass density, Specific weight, Specific gravity, Specific volume, Viscosity, Newton's law of viscosity (theory & problems),	20
	02	Specific gravity, Specific volume, Viscosity, Newton's law of viscosity (theory)	
	03	Specific gravity, Specific volume, Viscosity, Newton's law of viscosity (problems),	
	04	Cohesion, Adhesion, Surface tension, Pressure inside a water droplet, soap bubble and liquid jet. (Theory)	
	05	Cohesion, Adhesion, Surface tension, Pressure inside a water droplet, soap bubble and liquid jet. (Problems)	
	06	Capillarity. Capillary rise in a vertical tube and between two plane surfaces (Theory problems) Vapor pressure of liquid, compressibility and bulk modulus, Fluid as a continuum.	
	07	Fluid Pressure and Its Measurements: Definition of pressure, Pressure at a point, Pascal's law	

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	08	Measurement of pressure using manometer Total pressure and centre of pressure on vertical and inclined plane	
MODULE 2	09	Fundamentals of fluid flow (Kinematics): Introduction. Methods of describing fluid motion. Velocity and Total acceleration of a fluid particle.	20
	10	Types of fluid flow, Description of flow pattern. Basic principles of fluid flow.	
	11	Three- dimensional continuity equation in Cartesian coordinate system.	
	12	Derivation for Rotational and irrotational motion.	
	13	Potential function, stream function, orthogonality of streamlines and equipotential lines.	
	14	Dynamics- Euler's equation of motion.	
	15	Bernoulli's equation. Assumptions and limitations of Bernoulli's equation. Modified Bernoulli's equation.	
	16	Application-Venturimeter. Orificemeter, Pitot tube.	
MODULE 3	17	Orifice and Mouth piece: Introduction, classification, flow through orifice.	20
	18	Hydraulic coefficients and Numerical problems.	
	19	Mouthpiece, classification, Borda's Mouthpiece (No problems).	
	20	Notches and Weirs: Introduction. Classification, discharge over rectangular.	
	21	Triangular, trapezoidal notches, Cippoletti notch.	
	22	Broad crested weirs. Numerical problems. Ventilation of weirs, submerged weirs.	
	23	Flow through Pipes: Introduction. Major and minor losses in pipe flow	
	24	Darcy- Weis bach equation for head loss due to friction in a pipe. Pipes in series, pipes in parallel, equivalent pipe-problems. concepts of water hammer and surge tanks.	
MODULE 4	25	Open Channel Hydraulics.	20
	26	Classification of Flow through channels.	
	27	Most economical channel sections: Rectangular;	
	28	Most economical channel sections: Triangular.	
	29	Most economical channel sections:, Circular.	
	30	Uniform flow, Specific energy.	
	31	Non-Uniform flow- Hydraulic jump.	
	32	GVF equation.	
MODULE 5	33	Impact of jet on curved vanes.	20
	34	Momentum equation.	
	35	Impact of jet on stationary curved vanes.	
	36	Impact of jet on stationary and moving curved vanes.	
	37	Turbines- Pelton wheel and components	
	38	Turbines- Pelton wheel and components, Velocity triangle.	
	39	Reaction turbine-Francis turbine ,Working proportions.	
	40	Centrifugal Pumps-Work done and efficiency. Multi stage pumps.	

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13.0 Assignments, Pop Quiz, Mini Project, Seminars


Sl. No	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: Questions on module 1	Students study the basics of fluid properties, fluid pressure & its measurements.	Module 1 of the syllabus	3	Individual Activity.	Text 1 & 2 Ref Book 2
2	Assignment 2: Questions on module 2	Students study the total pressure, centre of pressure for different surfaces & fluid kinematics.	Module 2 of the syllabus	5	Individual Activity.	Text 1 & 2 Ref Book 2
3	Assignment 3: Questions on module 3	Students study orifice, mouth – piece, notches & weirs	Module 3 of the syllabus	8	Individual Activity.	Text 1 & 2 Ref Book 2
4	Assignment 4: Questions on module 4	Students Study flow through pipes & Surge analysis in pipes	Module 4 of the syllabus	10	Individual Activity.	Text 1 & 2 Ref Book 2
5	Assignment 5: Questions on module 5	Students Study on Turbines and Centrifugal Pumps	Module 5 of the syllabus	12	Individual Activity.	Text 1 & 2 Ref Book 2

14.0 QUESTION BANK

MODULE 1

- Define the following with symbols. Dynamic Viscosity, kinetic viscosity, surface tension
- Define the following terms a). Ideal fluids and real fluids
b). surface tension and capillary
- State Newton's law of viscosity. Derive an expression for the same.
- Derive the expression for pressure intensity inside a soap bubble.
- If 10000 liters of certain liquid weigh 1329KN. Calculate
a) Specific weight b) Mass density C) Specific volume d) Specific gravity
- Define gauge pressure, absolute pressure, and atmospheric pressure.
- The space between two square flat parallel plates is filled with oil each inside if the plate is 60cm.the thickness of the oil film is 12.5mm. the upper plate which moves at 2.5m/sec requires a force of 98.1N to maintain the speed. Determine the dynamic viscosity of the oil is poise. Also find the kinematic viscosity of the oil in stokes. If the specific gravity of the oil is 0.95
- Petrol of specific gravity 0.8 flows upwards through a vertical pipe, A and B are two points in the pipe. B being 0.3m higher than A.A connections are led from A and B to a U tube containing mercury. If the difference of pressure between A and B is 0.18 kgf/cm². Find the difference in the mercury level in the differential manometer.

MODULE 2

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1. Derive the expression for total pressure and centre of pressure on an inclined plane surface submerged in the liquid.
2. Explain the procedure of finding the resultant pressure on a curved surface immersed in a liquid.
3. A circular plate of diameter 0.75m is immersed in a liquid of relative density of 0.80 with its plane making an angle of 30° with the horizontal. The centre of the plate is at a depth of 1.50m below the free surface calculate the total pressure pores on one side of the plate and the location of the centre of pressure.
4. Define a) uniform flow and Nonuniform flow
b) Steady and unsteady flow
c) Velocity potential and stream function
d) compressible and incompressible flow
5. A vertical gate closes a horizontal tunnel 3m high and 3m wide running full with water. The pressure at the bottom of the gate is 196.2 KN/m , determine the total pressure on the gate and position of the center of pressure
- 6 In a two-dimensional incompressible flow, the fluid velocity components are given by $u = x - 4y$ and $v = -y - 4x$ Show that velocity potential exists and determine its form. Find also the stream function.
- 7 Define velocity potential function & stream function & give their properties.
- 8 Show that streamlines & equipotential lines form a set of perpendicular lines.
- 9 Write a note on flow net.

MODULE 3

1. Obtain an expression for Euler's equation of motion along a stream line & deduce it to Bernoulli's equation.
2. Define impulse-momentum equation & give its applications
3. A reducer bend having an outlet diameter of 15 cms discharges freely bend connected to a pipe of 20cms diameter has a deflection of 60° (that is change from initial to final direction is 60°) & lies in horizontal plane. Determine the magnitude & direction of force on the bend, when a discharge of $0.3 \text{ m}^3/\text{sec}$ passes through the pipe
4. Derive the equation for discharge through venturi meter
5. A venturi meter is to be fitted in a pipe of 0.25 m diameter where the pressure head is 7.6 m of flowing liquid & the maximum flow is $8.1 \text{ m}^3 / \text{minute}$. Find the diameter of the throat of the venturi meter. Take $C_d=0.96$
6. List the forces present in fluid motion & give equations of motion
7. What is pitot tube? Explain how it is used to find the velocity of flow in pipes or channel
8. Find the discharge of water flowing through a pipe 30 cm diameter placed in an inclined position where venturi meter is inserted, having a throat diameter of 15 cm. The difference of pressure between the main & the throat is measured by a liquid of specific gravity 0.6 in an inverted U-tube which gives a reading of 30 cm. The loss of head between the main & the throat is 0.2 times the kinetic head of the pipe

MODULE 4





1. Give the classification of orifices
2. Derive the expression for discharge through a rectangular notch
3. Define the hydraulic co-efficient (C_c , C_d , C_v) of an orifice & obtain the relation between them
4. Explain the classification of orifice & mouthpiece based on their shape, size sharpness & discharge
5. Water flows through a triangular right-angled weir first & then over a rectangular weir of 1m width. The C_d values of triangular & rectangular weir are 0.6 & 0.7 respectively. If the depth of water over the triangular weir is 360 mm, find the the depth of water over the rectangular weir


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6. Explain cipolletti notch. What is the advantage of cipolletti notch over trapezoidal notch?
7. Derive an expression for discharge through a V- notch.
8. Explain different types of nappes with sketches.
9. Derive the expression for maximum discharge over broad crested weir.
10. Water flows over a rectangular weir 1.0 m wide at a depth of 150 mm & afterward passes through a triangular right-angled weir, taking co-efficient of discharge for the rectangular & triangular weir as 0.62 & 0.59 respectively. Find the depth of water over the triangular weir.

MODULE 5

1. Explain major & minor losses in a pipe .
2. Give an expression for head loss due to sudden expansion in pipeline.
3. Three pipes of length 800 m 500 m & 400 m & of diameters 500 mm, 400 mm & 300 mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1700 m. Find the diameter of single pipe
4. Derive Darcy-Weisbach equation for head loss due to a friction in pipe
5. List the different types of losses in a pipe flow
6. When a sudden contraction from 60cm diameter to 30 cm is introduced in a horizontal pipeline, the pressure drops from 100 kPa at the upstream of the contraction to 80 KPa on the downstream. Assuming a co-efficient of Contraction of 0.65 i) Estimate the flow rate in the pipe & ii) the loss of head due to sudden contraction
7. What is water hammer? List the factors upon which it depends
8. Obtain Dupitt's equation for equivalent pipe
9. Define the term compound pipe & equivalent pipe. Derive the expression for diameter of equivalent pipes
10. Explain Hardy-Cross method used in pipe networks
11. The population of a city is 8,00,000 & it is to be supplied with water from a reservoir 6.4 km away. Water is to be supplied at the rate of 140 liters per head per day & half the supply is to be delivered in 8 hours. The full supply level of the reservoir is RL 180.00 M & its lowest water level is RL 105.00. The delivery end of the main is at RL 22.50 & the head required there IS 12 M. Find the diameter of the pipe. Take $f=0.04$

Prepared by	Checked by		
			
Prof:V.I.Patil	Prof:Preethi R.Patil	HOD	Principal

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Subject Title	TRANSPORTATION ENGINEERING		
Subject Code	BCV403	IA Marks	25
Number of Lecture Hrs / Week	2:2:2:0	Exam Marks	50
Total Number of Lecture Hrs	40 TH + 10 PR	Exam Hours	03
			Credits: 4

FACULTY DETAILS:

Name: Prof. S. M. Chandrakanth	Designation: Asst. Prof. / HOD	Experience: 14 Years
No. of times course taught: 06	Specialization: Highway Engineering	

1.0 Prerequisite Subjects:

Sl.No	Branch	Semester	Subject
01	General Science/Mathematics	I/II	Knowledge of Geometry, Engineering Mathematics and trigonometry.
02	Civil Engineering	I/II	Elements of Civil Engineering and Mechanics
03	Civil Engineering	III	Geodetic Engineering

2.0 Course Objectives

This course will enable students to;

1. Gain knowledge of different modes of transportation systems and to learn the introductory concepts on Highway Engineering.
2. Get insight to different highway materials and pavement design elements of a highway network.
3. Realize the significance of road safety by incorporating the concepts of Traffic Engineering.
4. Understand to different aspects of geometric elements of railway system and evaluate the material quantity required for track laying
5. Gain knowledge about various components of an Airport and its runway design.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to.

CO	Course Outcome	Cognitive Level	POs
C220.1	Explain the basic principles of geometric design in the context of transportation engineering and planning.	L1, L2	1,2,3,4,6,8,12
C220.2	Select the appropriate pavement materials for construction and design the pavement as per standard practices.	L1, L2, L3	1,2,3,4,5,6,8,12
C220.3	Conduct traffic studies and analyse traffic data for practical applications.	L1, L2, L3	1,2,3,4,5,6,8,12
C220.4	Identify the Components parts of Railway Track and design the suitable runway for an Airport.	L1, L2	1,2,3,4,5,6,8,12
C220.5	Able to interpret the experimental results of highway materials based on laboratory tests and design the pavement as per IRC guidelines.	L1, L2, L3	1,2,3,4,5,6,8,12
Total Hours of Instruction		50	

**4.0 Course Content****Module-1**

Transportation Engineering: Introduction, Different Modes of Transportation, M R Jayakar Committee recommendations, Road Classifications and Road Patterns.

Highway Alignment: Factors affecting highway alignment, Engineering surveys for alignment conventional and modern methods.

Highway Geometric Design: Factors affecting geometric design of roads, Cross Sectional Elements, Sight distances, Horizontal alignment- Transition curve, superelevation, Extra widening, Vertical alignment- gradients, summit and valley curves. **(No derivations)**

Problems on Sight distance, Super elevation, extra widening of curves, Length of transition curve, Length of summit and valley curve. (L1, L2)

Module-2

Highway Materials and Pavements: Desirable properties of aggregates, soil subgrade & Bitumen, Application of bituminous emulsion, Desirable properties of Bituminous Mixes

Pavement Design: Factors Controlling design of highway pavements, Pavement types, component parts of pavements & their functions; types of joints used in rigid pavement. Critical stresses in flexible and rigid pavement.

Highway Drainage: Significance and requirements, Surface drainage system and design-Examples, sub surface drainage system, Types of cross drainage structures their choice and location.

Problems on design of Longitudinal drain (L2, L3)

Module-3

Traffic Engineering: Objectives and scope of Traffic Engineering. Traffic Characteristics: Road user characteristics, vehicular characteristics – static and dynamic characteristics, Reaction time of driver and PIEV theory, Types of traffic engineering studies-volume, spot speed, speed and delay, parking, accident, origin & destination, objectives of studies and data collection, method of study, analysis. PCU concept, factors affecting and PCU at different locations and applications. Traffic signs, Signal design by IRC method; Types of intersections.

Problems on Spot speed studies, Speed & delay studies, accident studies, Signal design by IRC method. (L2, L3)

Module-4

Railway Engineering: Permanent way and its requirements, Gauges and types, Typical cross sections single and double-line BG track, Coning of wheels and tilting of rails, Rails-Functions requirements, types and defects of rails. Sleepers and Ballast: Functions, requirements, Track fitting and fasteners, Calculation of quantity of materials required for laying a track, Points & crossings, Railway Station and Yards. Metro train & high-speed train- Design factors considered.


Problem on Quantity calculation for laying railway track. Super-elevation (L1, L2)

Module-5

Airport Engineering: Layout of an airport with component parts and functions, Site selection for airport, Aircraft characteristics affecting the design and planning of airport, Airport classification, Runway orientation using wind rose with examples.

Runway-Basic runway length-Corrections and examples, Runway geometrics, Taxiway-Factors affecting the layout - geometrics of taxiway-Comparison between Runway and Highway, Design of exit taxiway with examples.

Problems on Runway orientation, Basic Runway length, Exit taxiway design. (L2, L3)

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5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	V	Geotechnical Engineering	MDD and OMC and compute consolidation properties and shear parameters of soil and compute the settlement and bearing capacity of soil, Shear parameters of soil and compute the settlement and bearing capacity of soil
02	V	Concrete Technology	Pavement Quality concrete - Materials, Requirements.
03	V	Remote Sensing & GIS	Basic concept of Remote sensing, Remote Sensing Platforms and Sensors, Geographic Information System, Data Models, Integrated Applications of Remote sensing and GIS.
04	VI	Design of Bridges	Design pipe culverts, Design deck slabs for critical loads, Analyse the stability of bridge piers and abutments, Recommend suitable bearings for the given type of bridge and support condition
05	VI	Applied Geotechnical Engineering	Plan and execute geotechnical site investigation program for different civil engineering projects, to estimate factor of safety against failure of slopes and to compute lateral pressure distribution behind earth retaining structures
06	VI	Design and Construction of Highway Pavements	Understanding of the fundamentals of pavement layer behaviour. Comprehend the material specifications by interpreting the relationship between material properties and pavement behaviour. Different tests on road construction materials to evaluate their characteristics. Carry out the design of flexible and rigid pavements
07	VII	Estimation and Contract Management	Estimations of road projects, specifications and tenders.
08	VII	Intelligent Transport Systems	Understand the sensor and communication technologies. Apply the various ITS methodologies, Significance of ITS under Indian conditions.
09	VIII	Metro and Seaports Engineering	Earth retaining systems for the excavations of underground stations

6.0 Relevance to Real World

Sl. No	Real World Mapping
01	To Involve in the design, construction and maintenance of highway systems.
02	To understand the principles & techniques of Highway Engineering.
03	To learn & implement the Standards of highway engineering
04	To analyse and design the highway cross section and alignment elements.
05	To prepare the highway geometric design
06	Students are able to understand future traffic flows, design of highway intersections/interchanges
07	In highway construction, highway pavement materials and design.
08	Understand the structural design of pavement thickness and pavement maintenance.
09	To learn the development of nations which have extensive highway networks
10	To investigate the highway drainage and Highway economics
11	To realize the significance of road safety by incorporating the concepts of Traffic Engineering.
12	To understand the different aspects of geometric elements of railway system
13	To evaluate the material quantity required for track laying
14	To Gain knowledge about various components of an Airport and its runway design.



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Sl. No	Delivery Type	Details
01	Tutorial	Topic: Demonstration to various Equipment's of Highway & Transportation laboratory
02	NPTEL	Introduction to Transportation Engg., Highway Engg., Railway Engg., and Airport Engineering.

8.0 Books Used and Recommended to Students**Suggested Learning Resources: Books**

1. S K Khanna and C E G Justo, "Highway Engineering", Nem Chand Bros, Roorkee.
2. L R Kadiyali, "Highway Engineering, Khanna Publishers, New Delhi.
3. A Text Book of Railway Engineering by S C Saxena and S P Arora
4. Airport Engineering by S C Rangwala
5. Airport Planning and Design by Khanna Arora and Jain, Nem Chand Bros, Roorke.
6. Roads, Railways, Bridges, Tunnels and Harbour Dock Engineering by B L Gupta, Amit Gupta.
7. S K Khanna, C E G Justo and A Veeraragavan, "Highway Materials Testing Laboratory Manual", Nem Chand Bros, Roorkee.

Other Reference Books


1. Relevant IRC Codes.
2. Specifications for Roads and Bridges – MoRTH, IRC, New Delhi.
3. C. Jotin Khisty, B. Kentlal, "Transportation Engineering", PHI Learning Pvt. Ltd. New Delhi.

Additional Study Material & e-Books

1. NPTEL notes, videos and courses
2. VTU online notes,
3. Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended**Website and Internet Contents References**

1. <https://nptel.ac.in/courses/105101087>
2. https://onlinemanuals.txdot.gov/txdotmanuals/rdw/horizontal_alignment.htm#BGBHGEGC
3. www.civil.iitb.ac.in/tvm/1111_nptel/567_Grade/plain/plain.html
4. <https://www.pavementinteractive.org/>
5. <https://www.eng.auburn.edu/research/centers/ncat/research/other-publications.html>
6. <https://nptel.ac.in/courses/105/106/105106203/>
7. <https://nptel.ac.in/courses/105/101/105101008>
8. <https://nptel.ac.in/courses/105/104/105104098>
9. <https://www.classcentral.com/course/edx-intro-to-traffic-flow-modeling-and-intelligenttransport-systems-12728>
10. <https://www.aai.aero/>
11. <https://www.faa.gov/>
12. <https://www.icao.int>

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10.0 Magazines/Journals Used and Recommended to Students

Sl. No	Magazines/Journals	Website
01	Transportation Geotechnics	https://www.sciencedirect.com/journal/transportation-geotechnics
02	Transportation Planning & Technology	https://www.tandfonline.com/journals/gtpt20
03	Transport	https://www.tandfonline.com/journals/tran20
04	Journal of Transportation Engineering,	https://ascelibrary.org/journal/jpeodx

11.0 Examination Note

Assessment Details (both CIE and SEE)

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 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests

(Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.

- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks**).
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test (**duration 02/03 hours**) after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks**.
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. 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.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.



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12.1 Course Delivery Plan (Theory)

Module	Lecture No.	Content of Lecture	% of portion
1	1	Introduction to Transportation Engineering: Different modes of transportation,	20%
	2	Mr. Jayakar Committee recommendations, Road Classifications and Road Patterns.	
	3	Highway Alignment: Engineering surveys for alignment conventional and modern methods, Factors affecting highway alignment.	
	4	Highway Geometric Design: Cross Sectional Elements, Factors affecting geometric design of roads.	
	5	Sight distances, Problems on Sight Distances	
	6	Horizontal alignment- Transition curve, superelevation, Extra widening,	
	7	Problems on Super elevation, Extra widening of curves, Problems on Length of transition curve,	
	8	Vertical alignment–gradients, summit and valley curves. (No derivations), Problems on Length of summit and valley curve	
2	9	Highway materials and pavements: Desirable properties of aggregates,	20%
	10	Soil subgrade & Bitumen, Application of bituminous emulsion,	
	11	Desirable properties of Bituminous Mixes	
	12	Pavement Design: Factors Controlling design of highway pavements,	
	13	Pavement types, component parts of pavements and their functions;	
	14	Types of joints used in rigid pavement. Critical stresses in flexible and rigid pavement	
	15	Highway Drainage: Significance and requirements, Surface drainage system and design-Examples, sub surface drainage system,	
	16	Types of cross drainage structures their choice and location. Problems on design of Longitudinal drain	
3	17	Traffic Engineering: Objectives and scope of Traffic Engineering.	20%
	18	Traffic Characteristics: Road user characteristics,	
	19	Vehicular characteristics – static & dynamic characteristics, Reaction time of driver & PIEV theory.	
	20	Types of traffic engineering studies-volume, spot speed. Speed & delay, parking, accident.	
	21	Origin & destination, objectives of studies and data collection, method of study, analysis.	
	22	PCU concept, factors affecting and PCU at different locations and applications.	
	23	Traffic signs, Signal design by IRC method; Types of intersections.	
	24	Problems on Spot speed studies, Speed & delay studies, accident studies, Signal design by IRC method.	
4	25	Railway Engineering: Permanent way and its requirements, Gauges and types,	20%
	26	Typical cross sections single and double-line BG track,	
	27	Coning of wheels & tilting of rails, Rails-Functions requirements, Types & defects of rails.	
	28	Sleepers and Ballast: Functions, requirements, Track fitting and fasteners,	
	29	Calculation of quantity of materials required for laying a track,	
	30	Points & crossings, Railway Station and Yards.	
	31	Metro train & high-speed train- Design factors considered.	
	32	Problem on Quantity calculation for laying railway track. Problem on Super-elevation	
5	33	Airport Engineering: Layout of an airport with component parts and functions,	20%
	34	Site selection for airport, Aircraft characteristics affecting the design & planning of airport,	
	35	Airport classification, Runway orientation using wind rose with examples.	
	36	Runway-Basic runway length-Corrections and examples,	
	37	Runway geometrics, Taxiway-Factors affecting the layout - Geometrics of taxiway-	
	38	Comparison between Runway and Highway,	
	39	Design of exit taxiway with examples. Problems on Runway orientation,	
	40	Problems on Basic Runway length, Problems on Exit taxiway design	

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12.2 Course Delivery Plan (Laboratory Experiments)

Exp. No	Content of Lecture	% of portion
1	1. Tests on Aggregates: a. Aggregate Crushing value	6.25 %
2	b. Los Angeles abrasion test	6.25 %
3	c. Aggregate impact test	6.25 %
4	d. Aggregate shape tests (combined index & angularity number)	6.25 %
5	2. Tests on Bituminous Materials: a. Penetration test	6.25 %
6	b. Ductility test	6.25 %
7	c. Softening point test	6.25 %
8	d. Specific gravity test	6.25 %
9	e. Viscosity test by tar viscometer	6.25 %
10	f. Flash and fire point test	6.25 %
11	3. Tests on Soil: a. Wet sieve analysis	6.25 %
12	b. CBR test	6.25 %
13	4. Design of flexible pavement : Design of flexible pavement as per IRC 37-2018	6.25 %
14	5. Design of Rigid pavement : Design of Rigid pavement as per IRC 58-2015	6.25 %
15	6. Tests on Bituminous Mixes : a. Marshall Method (Demo Experiment)	6.25 %
16	7. Traffic Engineering : Traffic Engineering studies	6.25 %

13.0 Internal Assessments, Assignments, Group Discussion, Seminars, Quiz, Mini Project.

Sl. No.	Title	Outcome expected	Allied study	Week No.	Max Marks	Individual / Group activity	Reference: book/website /Paper
	Internal Assessment - I	Students study the topics & write / reproduce the answers in blue books	Module 1 & 2 of syllabus	5	25	Individual Assessment, Blue Books as record	Book 1, 2, 3 & notes, also 1-2 of reference list.
1	Internal Assessment - II	Students study the topics & write / reproduce the answers in blue books	Module 2 & 3 of syllabus	10	25	Individual Assessment, Blue Books as record	Book 1, 2, 3 & notes, also 1,2 & 3 of reference list.
	Assignment: Questions	Students study the topics and write the Answers. Get practice to solve numerical of university question papers.	Module 1 to 5 of syllabus	12	05	Individual Activity, Written solution expected.	Book 1, 2, 3 & notes, also 1,2 & 3 of reference list.
2	Internal Assessment - III	Students study the topics & write / reproduce the answers in blue books	Module 5 of syllabus	13	25	Individual Assessment, Blue Books as record	Book 1, 2, 3 & notes, also 1,2 & 3 of reference list.
3	Quiz	Students study the topics and write the answers for MCQ. Get practice to solve numerical	All Modules of syllabus	14	05	Individual Activity, Written Choice solution expected.	Book 1, 2, 3 & notes, also 1,2 & 3 of reference list.
4	Laboratory Internal Assessment	Students study the topics & write / reproduce the answers in laboratory exam sheets	All Experiments of syllabus	13	10	Laboratory exam sheets as record	Laboratory Manual
5	Laboratory Journal Submission	Students study the topics & write / reproduce the Experiments in laboratory Journals	All Experiments of syllabus	12	15	Laboratory Journals as record	Laboratory Manual



MODULE – 1

1. Discuss the role of transportation in national development?
2. Explain various characteristics of road transport?
3. What are the different modes of transportation? Mention their advantages?
4. List & explain briefly the recommendations of Jayakar committee.
5. Discuss briefly the role of transportation in economic, social, political development of country?
6. Explain a) IRC b) CRF c) C R R I.
7. Explain the classification of roads as per Third 20-year road development plan.
8. What are the important policies mentioned in vision: 2021 document.
9. Define i) Master Plan ii) Saturation System
10. With a neat sketch explain: i) Rectangular or Block Pattern ii) Star & Grid Patter
11. List the salient features of i) PMGSY ii) KSHIP Projects.
12. With a neat sketch explain different road patterns.
13. What is saturation of road planning? How is it used to decide best proposal among several alternative proposals?
14. The area of certain backward district in India is 18400km² & there are 15 towns as per 1981 census. Determine the length of different categories of road by third road development plan.
15. Explain the various types of survey to be carried out before planning a highway system for a given area.
16. What is the ideal requirement of highway alignment list & explain briefly?
17. Explain briefly the various factors governing the highway alignment?
18. Three new road links A, B & C are to be constructed during a five-year plan period. Suggest the order of priority for phasing road construction programme Used on maximum utility approach. Assume utility units of 0.5, 1.0 & 2.0 for three-year population ranges & 1 per 1000 tons of Agricultural & industrial Products respectively.

Road link	Length, km	No. of villages served with population Range			Productivity served, in 1000 tons	
		<500	501-1000	1001-2000	Agricultural	Industrial
A	500	100	150	40	250	20
B	600	200	250	68	320	25
C	700	270	350	82	500	35

19. Four new roads A, B, C & D are to be constructed in a district during a five-year plan period. Suggest the order of priority for phasing the development programme based on maximum utility approach. Assume utility units 0.5, 1.0, 2.0 & 4.0 for population ranges & 10.0 for 1000 T of agricultural & industrial products.

Road link	Length, km	No. of villages served with population Range				Productivity in tons	
		<500	500-1000	1000-2000	>2000	Agricultural	Industrial
A	65	40	12	14	14	5000	1000
B	55	22	9	6	6	8000	1200
C	45	32	8	9	9	6000	800
D	72	36	6	3	3	9000	2000



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20. What are objects of highway geometric design? List various geometric elements to be considered in highway?
21. Enumerate the factors governing the width of carriageway. State the IRC Specification for width of carriageway for various classes of roads?
23. In a region with light rainfall a two-lane bituminous road is to be designed. Determine the height of the crown of parabolic camber. Draw the neat sketch?
24. Define right of way. Explain the factors affecting right of way?
25. Draw typical cross section of NH/SH in rural section in embankment & in cutting with dimensions?
26. Discuss importance of camber, skid resistance, unevenness of pavement surface?
27. In Mangalore district of Karnataka state, a VR of thin bituminous pavement 3.75m wide & a NH of bituminous concrete pavement 7m wide are to construct. What should be the height of crown with respect to edge in these two cases?
28. What is Camber? What are the objectives of providing camber to the pavement surface? Specify the values of camber recommended by the IRC for different types of road surfaces?
29. What are the steps to be followed while re-aligning an existing highway with poor alignment?
30. Explain briefly the various surveys to be conducted for the alignment of highway?
31. Define super elevation. Explain maximum & minimum super elevation. Enumerate the steps for practical design of super-elevation.
32. On a highway there is a horizontal curve of radius 400m & length 200m. Compute the setback distance required so as to provide stopping sight distance, for the design speed of 65kmph. The distance between the center line of the road & the center line of inner lane is 1.9m.
33. List the objects of providing extra widening of pavement at horizontal curves & super elevation.
34. Why vertical curves are required? Explain different types of vertical curve.
35. Two cars are approaching from opposite directions of a road with a gradient of two percent, with velocities of 90kmph & 75kmph respectively. Calculate the minimum sight distance required to avoid a head on collision of both the cars. Reaction time of the driver is 2.5sec & the coefficient of friction is 0.35.
36. Define SSD. Explain any one factor that restricts the SSD.
37. The speeds of overtaking & overtaken vehicles are 96kmph & 80kmph. Assuming an acceleration of 2.5 kmph/sec & Driver's reaction time of 2sec, find the OSD & draw a neat sketch of overtaking zone.
38. Explain with the help of a sketch the effect of centrifugal force on a vehicle negotiating a horizontal curve.
39. Explain briefly the attainment of designed super elevation in practice.
40. A summit curve is formed when an ascending gradient of 1 in 25 meets another ascending gradient of 1 in 100. Find the length or summit curve to provide the required SSD for a design speed of 80kmph.
41. List the factors Affecting SSD & OSD.
42. The design speed of overtaking vehicle is 60kmph. The rate of acceleration of the above vehicle is 3.6kmph/sec. The difference in speed between overtaking & overtaken vehicle is 20kmph. Calculate OSD as per IRC guidelines for a lane with two-way traffic.
43. Calculate the length of transition curve for a plain & rolling terrain for the following data: Design speed=80kmph, radius of curve=250m, road width=7.0m, maximum allowable rate of super elevation 1 in 150, super elevation maximum restricted to 0.07. Assume pavement is rotated with respect to center line.
44. Explain with neat sketch the 'PIEV' theory.
45. What is super elevation? Explain the steps for practical design of super elevation.
46. A valley curve is formed by a descending gradient of 1 in 25 meeting an ascending gradient of 1 in 30. Design the total length of valley curve, if the design speed is 100kmph so as to fulfil comfort conditions & head light sight distance for night driving assuming suitable details.

MODULE – 2

1. What are the desirable properties of soil as a highway material?
2. What are the desirable properties of aggregates? List the various tests on rod aggregates.
3. Differentiate between Bitumen and Tar. List the various tests on Bitumen.
4. Explain the following i) Bitumen emulsion ii) Cutback bitumen.
5. Explain HRB soil classification system.
6. Differentiate between Flexible and Rigid Pavement.
7. Explain CBR test procedure with neat sketch.
8. Compare Tar and Bitumen.
9. Define modulus of subgrade reaction. With the sketch explain the principal test for determining the K- value.
How correction for K- value is made for different plate sizes.
10. Explain ESWL. How it is determined for dual wheel load assembly and what are its applications?
11. The properties of subgrade soil are given below:
 Passing 0.074mm sieve=55% Liquid Limit= 50% Plastic Limit= 41%
 a) classify the soil by revised PRA/HRB system.
 b) discuss the suitability of the soil as a subgrade material.
12. The properties of subgrade soil are given below:
 Passing 0.074mm sieve=32% Liquid Limit= 42.5 % Plastic Limit= 26.7 %
 classify the soil by revised PRA/HRB system.
13. Calculate the GI of a sample of soil with the following data:
 Passing 0.074mm sieve= 60% Liquid Limit= 30 % Plasticity index = 12
14. Explain procedure to find K –value (modulus of subgrade reaction)
15. A plate load test was conducted on a soaked subgrade during monsoon season using a plate diameter of 30cm. the load values corresponding to the mean settlement dial reading are given below. Determine the modulus of subgrade reaction for the standard plate.

Mean settlement value, mm	Load values, kg
0	0
0.24	460
0.52	900
0.76	1180
1.02	1360
1.23	1480
1.53	1590
1.76	1640

16. A plate load test was conducted in the field & the following are te readings obtained after the test. Determine the modulus of subgrade reaction if the radius of contact plate is 150mm.

Mean settlement value, mm	Load values, KN
0	0
0.05	1
0.2	5
0.6	10
0.8	15
1.05	20
1.15	25
1.30	30
1.40	35
1.50	40



17. The load penetration values of CBR tests conducted on two specimens of the soil samples are given below. Determine the CBR value of soil if 100 division of the load dial represents 190 kg of load in the Calibration chart of the proving ring.

Penetration of plunger, mm	Load dial readings, divisions	
	Specimen No. 1	Specimen No. 2
0	0	0
0.5	8	0.5
1.0	15	.5
1.5	23	2.5
2.0	29	6.0
2.5	34	13
3.0	37	20
4.0	43	30
5.0	48	38
7.5	57	50
10.0	63	58
12.5	67	63

18. Write down the construction steps for WMM base course.
19. Explain the construction steps for Dry lean concrete sub base.
20. Explain the construction steps for CC Roads.
21. What do you understand by Wet Mix Macadam? What are the materials used and its requirements?
22. Explain the construction procedure for bituminous road.
23. Write the construction steps for: a) Water bound macadam. b) CC pavement.
24. Explain the significance of highway drainage.
25. Indicate the different methods of subsurface drainage, with neat sketches.
26. With the help of a neat sketch, explain how the surface drainage system is provided to lower the
27. ground water table.
28. What are the quantifiable and non- quantifiable road user benefits due to construction of new highway or improvement of existing highway?
29. Briefly explain the three methods of economic evaluation of highway projects.
30. Briefly explain the various factors affecting the VOC.
31. Explain the concept of BOT and BOOT, in financing highway projects.
32. Explain the various benefits that a road user gets by the improvement of road.
33. Compare the annual cost of two types of pavement structures:
- i) WBM with thin bituminous surface at total cost of Rs. 2.2 lakhs per km, life of 5 years, interest at 10%, salvage value of Rs. 0.9 lakhs after 5 years, annual average maintenance cost of Rs. 0.35 lakhs per km and ii) BM base and BC surface, total cost of Rs. 4.2 lakhs per km, life of 15 years, interest at 8%, salvage value of Rs. 2.0 lakhs at the end of 15 years, annual average maintenance cost of Rs. 0.25 lakhs per km.
34. Write a short note on: a) Annual cost method. b) Benefit cost ratio method. c) Alligator Cracking. d) Mud pumping.

MODULE - 3

1. Explain with neat sketch the 'PIEV' theory.
2. What are the traffic characteristics?
3. Explain Objectives and scope of Traffic Engineering.
4. Explain vehicular characteristics
5. What are the different traffic engineering studies
6. Explain factors affecting PCU.
7. Write any two advantages of vehicle actuated signals.
8. What is an at-grade intersection?
9. Explain in Detail About Traffic Control Devices.
10. Write short notes on Traffic signals



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Civil Engg. Dept**Academic
Course Plan****2023-24 (Even)****Rev: 00****MODULE - 4**

1. What are the objectives of coning of wheels and tilting of rails? Explain with sketches.
2. What are gauges of track? Write the different values of gauge adopted on Indian Railways?
3. Draw a typical cross-section of a double track B.G. Railway on trunk route and briefly
4. Indicate the functions of each of the components – electrical railway.
5. Discuss the different type's causes of rail failures with relevant sketches.
6. Explain (a) Rail wear (b) Rail creep giving their causes & remedies.
7. What are different types of rail wear? How the wear of rail can be minimized.
8. What do you understand by the "creep of rail"? Explain any one of the theories to explain the occurrence of creep. How do you prevent the occurrence of creep?
9. Compare the different ballast materials with respect to merits, demerits and suitability of each material as ballast.
10. What are the requirements of good sleeper to be used in railway track? Mention the advantages and limitations of a wooden sleeper.
11. An 8° curve on BG track branches off from a 4V main curve in opposite direction of a BG yard. If the speed on main line is 60 kmph, determine the speed restriction on the branch line for a cant deficiency of 7.2 cm.
12. Explain briefly the different types of yards. With a neat sketch explain the functioning of marshalling yard.
13. What is healing divergence? What are its values adopted in Indian Railway.
14. What are the design details in a diamond crossing? Explain with sketches.
15. Explain different types of switches with the help of neat sketches?
16. With the help of a single line sketch label all the important parts of a right-hand turn
17. List the types of track junctions. Explain the working principle of a diamond crossing by suitable sketch.
18. What are the factors to be kept in view for selecting the site for a railway station? Enumerate the classification and requirement of a station.
19. Compute the quantity of various materials required to construct one-kilometre length of BG track. Take the sleeper density of $n=7$.

MODULE - 5

1. Explain briefly the different aircraft characteristics that influence the design of airport.
2. Write a brief note on development of air transportation in India?
3. Draw a neat sketch of airport layout and mention the function of each component.
4. What are the factors to be considered in the selection of an airport site and explain them briefly?
5. What is basic length of runway and explain how it is determined?
6. What is wind rose? With a given set of wind data, explain how the wind rose diagram can be drawn on the principle of cross wind component.
7. Explain the construction of type II wind rose diagram for orientation of runway.
8. Draw a neat sketch of cross section of runway and indicate various geometrics.
9. Enumerate the assumptions made for designing the basic runway length.
10. Write short note on: (i) Calm period (ii) Wind Head (iii) Cross wind component (iv) Estimation of time of utilization of runway (v) wind coverage.
11. Explain briefly the various factors, which affect the layout of taxiway.
12. Draw the schematic diagram of Instrumentation Landing System (ILS) showing various components.
13. How visual aids are classified for airports? (Airport marking and airport lighting)
14. What are different control aids available for proper air trafficking at airports?
15. Determine the orientation of the runway from the observed wind data in % given below, starting from North direction in clock wise direction: 4.2, 1.3, 2.0, 4.9, 6.8, 11.2, 14.2, 7.5, 4.3, 1.2, 1.8, 3.4, 8.1, 9.9, 7.2, 2.6.

Prepared by	Checked by		
Prof. S.M.Chandrakanth	Prof. Preethi R Patil	HOD Civil Engineering	PRINCIPAL HIT, Nidasoshi
S.J.P.N.T's.HIT, Nidasoshi			



Subject Title	BUILDING MATERIALS LABORATORY		
Subject Code	BCV404	CIE Marks	50
Number of Lecture Hrs / Week	0:0:2:0	SEE Marks	50
Total Number of Lecture Hrs	02	Exam Hours	02
CREDITS – 01			

FACULTY DETAILS:		
Name: Prof. S.S Beesanakoppa	Designation: Asst. Professor	Experience: 2.8Years
No. of times course taught: 00	Specialization: waste water management	

1.0 Prerequisite Subjects:

Sl.No	Branch	Semester	Subject
01	Civil Engineering	IV	Materials testing lab
02	Civil Engineering	V	Construction and structural materials

2.0 Course Objectives

- 1 Ability to apply knowledge of mathematics and engineering in calculating the Mechanical properties of structural materials
2. Ability to function on multi-disciplinary teams in the area of materials testing.
3. Ability to use the techniques, skills and modern engineering tools necessary for engineering.
4. Understanding of professional and ethical responsibility in the areas of material testing.
5. Ability to communicate effectively the mechanical properties of materials..

3.0 Course Outcomes

Having successfully completed this course, the student will be able to:

Sl.No	Course Outcome	RBT Level	POs
CO1	Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion. <i>fn</i>	L1,L2,L3,L4	1,2,3,5,6,8,12
C02	Identify, formulate and solve engineering problems of structural elements subjected to flexure.	L1,L2,L3,L4	1,2,3,5,6,8,12
C03	Evaluate the impact of engineering solutions on the society and also will be aware of contemporary issues regarding failure of structures due to undesirable materials.	L1,L2,L3,L4	1,2,3,5,6,8,12
C04	Ability to communicate effectively the mechanical properties of materials	L1,L2,L3,L4	1,2,3,5,6,8,12

4.0 Course Content



1. Tests on Bricks, Tiles, Cement Concrete blocks (Weight & Dimensionality, Water Absorption, Strength)
2. Tests on Fine aggregates - Sieve Analysis, Moisture content, Specific gravity, Bulk density, Bulking and Silt Content
3. Tests on Coarse aggregates- Sieve Analysis, Water absorption, Moisture content, specific gravity and Bulk density
4. Compression test on mild steel, cast iron and wood.
5. Tension test on mild steel and HYSD bars
6. Torsion test on mild steel circular sections.
7. Bending Test on Wood Under two-point loading
8. Shear Test on Mild steel- single and double shear.
9. Impact test on Mild Steel (Charpy & Izod).
10. Determination of optimum coagulant dosage using Jar test apparatus.
10. Hardness tests on ferrous and non-ferrous metals- Brinell's, Rockwell and Vicker's
11. Demonstration of Strain gauges and Strain indicators

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
1.	V	Material of construction	Modern tools used in site

6.0 Relevance to Real World

Sl No	Real World Mapping
01	Comprehend the concepts of construction technology and structural design.

7.0 Books Used and Recommended to Students

Reference Books
1. Davis, Troxell and Hawk, "Testing of Engineering Materials", International Student Edition – McGraw Hill Book Co. New Delhi.
2. M L Gambhir and Neha Jamwal, "Building and construction materials-Testing and quality control", McGraw Hill education (India) Pvt. Ltd., 2014.
3. Fenner, "Mechanical Testing of Materials", George Newnes Ltd. London.
4. Holes K A, "Experimental Strength of Materials", English Universities Press Ltd. London.
5. Suryanarayana A K, "Testing of Metallic Materials", Prentice Hall of India Pvt. Ltd. New Delhi.
6. Kukreja C B, Kishore K. and Ravi Chawla "Material Testing Laboratory Manual", Standard Publishers & Distributors 1996.
7. Relevant latest IS Codes.
Additional Study material & e-Books
Class notes and vtU notes
1. NPTEL videos, YouTube



8.0 Relevant Websites (Reputed Universities & Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

<https://en.m.wikipedia.org>

9.0 Magazines/Journals used and Recommended to Students

Sl.No	Magazines/Journals	Website
1	International Journal of MAT	www.matjournals.com

10.0 Examination Note

Assessment Details (both CIE and SEE)

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 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are 50 Marks.

The split-up of CIE marks for record/ journal and test are in the ratio 60:40.

□ Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.

□ Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.

□ Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).

□ Weightage to be given for neatness and submission of record/write-up on time.

□ Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.

□ In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.

□ The suitable rubrics can be designed to evaluate each student's performance and learning ability.

□ The marks scored shall be scaled down to 20 marks (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

□ SEE marks for the practical course are 50 Marks.

□ SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.

□ The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.

□ All laboratory experiments are to be included for practical examination.

□ (Rubrics) Breakup of marks 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) from the questions lot prepared by the examiners jointly.



Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

11.0 Course Delivery Plan

Expt No	Name of the Experiment	% of Portion
1	Tests on Bricks, Tiles, Cement Concrete blocks (Weight & Dimensionality, Water Absorption, Strength)	8
2	Tests on Fine aggregates - Sieve Analysis, Moisture content, Specific gravity, Bulk density, Bulking and Silt Content	8
3	Tests on Coarse aggregates- Sieve Analysis, Water absorption, Moisture content, specific gravity and Bulk density	8
4	Compression test on mild steel, cast iron and wood.	8
5	Tension test on mild steel and HYSD bars	8
6	Torsion test on mild steel circular sections.	8
7	Bending Test on Wood Under two-point loading.	8
8	Shear Test on Mild steel- single and double shear.	8
9	Impact test on Mild Steel (Charpy & Izod).	9
10	Hardness tests on ferrous and non-ferrous metals- Brinell's, Rockwell and Vicker's	9
11	Demonstration of Strain gauges and Strain indicators.	9

12.0 QUESTION BANK

Viva Questions

TENSION TEST ON MILD STEEL

1. What is the nature of failure for brittle and ductile materials in tensile test?
2. Distinguish between Yield point and yield strength b) Elastic limit and Proportionality limit
3. Why percentage elongation increases as the gauge length decreases.

COMPRESSION TEST

1. Explain the behavior of ductile material and brittle material under compression?
 2. Why a short specimen should be used in compression test?
 3. The plane of failure in brittle material subjected to compression is at about 45°, state the reason.
 4. Name the devices used to measure deformation in tension and compression tests.
 5. State the reason a) Tension test is preferred to compression test for determining the modulus of elasticity.
- Alkalinity

TORSION TEST ON MILD STEEL CIRCULAR SECTIONS

1. What is a shaft? Give practical Examples.
2. How angle of twist is measured in a torsion test.
3. What mechanical property of material is determined from torsion test and how?
4. Define torsion rigidity, polar moment of inertia and rigidity modulus.



SHEAR TEST ON MILD STEEL

1. Distinguish between Single shear and Double shear.
2. Why modulus of rigidity is not determined by shear test.

IMPACT TEST ON MILD STEEL

1. Give three examples of machine parts or structural members subjected to impact loading.
2. Distinguish between Charpy and Izod tests.
3. Why is a notch provided in the specimen for impact test?

BRINELL HARDNESS TEST

1. Very hard material cannot be tested in Brinell hardness testing machine-state the reasons.
2. How do you select the load for Brinell hardness test in case of following materials?
3. Aluminium, Brass, Mild steel, Cast iron, Copper.
4. What are the values of P are for steel and aluminium for conducting the Brinell hardness test using a 10mm diameter ball indenter?

ROCKWELL HARDNESS TEST

1. What is the purpose of applying minor load in case of Rockwell Hardness test?
2. What are the types of indenters used in hardness tests?

VICKERS HARDNESS TEST





1. What is static loading and dynamic loading applied to hardness test?
2. What are the types of indenters used in hardness tests?


BENDING TEST ON WOOD UNDER TWO POINT LOADING

1. Define a) Elastic limit, b) Flexural Rigidity
c) Proportionality limits d) Modulus of rupture as applied to bending test. BOD
2. Define a) Section modulus b) Moment of resistance c) Tensile failure as applied to bending test.
3. Why two-point symmetrical loading is preferred in bending tests.

TESTS ON AGGREGATE

1. Define bulk density and specific gravity. Which one is most oftenly used in concrete calculations in the field?
2. What is the range of values of specific gravity of ordinary aggregates like gravel and crushed granite?
3. What are light weight aggregates and where do you use them?
4. Why is the knowledge of water absorption of fine aggregate essential?
5. Define bulking of aggregates and discuss its significance.
6. Discuss the Why the bulking takes place only in sand and why not in coarse aggregate? Is this test actually needed in field? If so explain why?
7. If no allowance is made for bulking of sand, how is it going to affect the mix proportions?
8. How does specific gravity vary with hardness of stone?
9. Give the average figures for specific gravity of the aggregate: a) Gravel, b) limestone, c) granite.
10. Define moisture content? Where do we need the knowledge of moisture content
Relative bulking tendencies of coarse sand

Prepared by	Checked by		
			
Prof. S.S. Bessanakoppa	Prof. Preeti. R. Patil	HOD	Principal

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Subject Title	Watershed Management		
Subject Code	BCV405D	IA Marks	50
Number of Lecture Hrs / Week	2:2:0:0	Exam Marks	50
Total Number of Lecture Hrs	40	Exam Hours	03
Credits: 3			

FACULTY DETAILS:		
Name: Prof. S.S.Beesanakoppa	Designation: Asst. Professor	Experience: 2 Years
No. of times course taught: 03		Specialization: Wastewater Management

1.0 Prerequisite Subjects:

Sl.No	Branch	Semester	Subject
02	Civil Engineering	III/V	Municipal wastewater Engineering

2.0 Course Objectives

This Course will enable the students to

1. To understand Watershed Hydrology
2. To estimate water demand and learn, water conservation methods
3. To understand application of Remote Sensing and GIS in watershed management
4. Sustainable measures for watershed management

3.0 Course Outcomes

Having successfully completed this course, the student will be able to.

CO	Course Outcome	Cognitive Level	POs
C204.1	Discuss surface and ground water resources system and, human influences.	L1, L2, L3,	1,2,3,4, 6,8,12
C204.2	Integrate water resources system in arid and semi-arid regions and explain watershed aquifer for management.	L1, L2, L3,	1,2,3,4, 6,8,12
C204.3	Analyse water resources related issues for conservation and synthesize augmentation of water resources.	L1, L2, L3,	1,2,3,4, 6,8,12
C204.4	Design integrated watershed management system.	L1, L2, L3,	1,2,3,4,5, 6,8,12
C204.5	Apply modern tools in watershed management.	L1, L2, L3,	1,2,3,4,5, 6,8,12
Total Hours of Instruction		50	


4.0 Course Content

Module-1

Principles of Watershed Management: Basics concepts, hydrology and water availability, surface water, ground water, conjunctive use, human influences in the water resources system.

Module-2

Water resources systems: Integrated water resources system, river basins morphometric analysis of watersheds for watershed management, watershed management practices in arid and semi-arid regions, watershed management through wells, management of water supply, short term and long-term strategic planning..

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Module-3

Conservation of Water: Perspective on recycle and reuse, wastewater reclamation, social aspects of watershed management and community participation, private sector participation, institutional issues, socio-economy, integrated development, water legislation and implementations, case studies. **Water Harvesting:** Rainwater management, conservation, storage and effective utilization of rainwater, structures for rainwater harvesting, roof catchments system, check dams, aquifer storage.

Module-4

Sustainable Watershed Approach: Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, soil erosion and conservation.

Module-5

Applications of RS and GIS in Watershed management: Role of decision support system in watershed management, watershed characteristics of coastal regions, coastal aquifer management, uniqueness of coastal water resources.

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	IV	Public Health Engineering	All topics
02	VI	Hydrology, Water Resources engineering	All topics

6.0 Relevance to Real World

Sl. No	Real World Mapping
01	Geospatial modeling of water supply distribution system

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Study of map


8.0 Books Used and Recommended to Students

Suggested Learning Resources: Books

1. Singh Vir, Raj., "Watershed Planning and Management", Yash Publishing House, Bikaner. 3rd Revised Edition, 2016.
2. Murthy, J. V. S., "Watershed Management in India", New Age Publishers, New Delhi. 2nd Edition, 2017.
3. "Decision Support System for Integrated Watershed Management", Colorado State University. 2012.
4. Tideman, E. M., "Watershed Management", Omega Scientific Publishers, New Delhi, 2002

Other Reference Books

8. David Clerk, Plane and Geodetic Surveying Vol1 and Vol2, CBS publishers
9. B Bhatia, Remote Sensing and GIS, Oxford University Press, New Delhi.
10. T.M Lillesand, R.W Kiefer, and J.W Chipman, Remote sensing and Image interpretation, 5th edition, John Wiley and Sons India
11. James M Anderson and Adward M Mikhail, Surveying theory and practice, 7th Edition, Tata McGraw Hill Publication.

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12. Kang-stung Chang, Introduction to geographic information systems, McGraw Hill Higher Education.
13. Sateesh Gopi, Global Positioning System, Tata McGraw Hill Publishing Co. Ltd. New Delhi.

Additional Study Material & e-Books

1. NPTEL notes, videos and courses
2. VTU online notes,
3. Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

- <https://www.youtube.com/watch?v=wkPu4LwRKro>
- <https://youtu.be/wkPu4LwRKro>
- <https://youtu.be/wkPu4LwRKro>
- <https://youtu.be/wkPu4LwRKro>

10.0 Magazines/Journals Used and Recommended to Students

Sl. No	Magazines/Journals	Website
01	wikipedia	www. https://cse.umn.edu

11.0 Examination Note

Assessment Details (both CIE and SEE)

Details (both CIE and SEE)

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 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- There are 25 marks for the CIE's Assignment component and 25 for the Internal Assessment Test component.
- Each test shall be conducted for 25 marks. The first test will be administered after 40-50% of the coverage of the syllabus, and the second test will be administered after 85-90% of the Coverage of the syllabus. The average of the two tests shall be scaled down to 25 marks
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The schedule for assignments Shall be planned properly by the course teacher. The teacher should not conduct two Assignments at the end of the semester if two assignments are planned. Each assignment shall be conducted for 25 marks. (If two assignments are conducted then the sum of the two Assignments shall be scaled down to 25 marks)
- The final CIE marks of the course out of 50 will be the sum of the scale-down marks of tests And assignment/s marks.

Internal Assessment Test question paper is designed to attain the different levels of



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Civil Engg. Dept

**Academic
Course Plan**

**2023-24 (Even
Sem)**

Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common Question papers for the course (**duration 03 hours**). 1. The question paper will have ten questions. Each question is set for 20 marks.


2. 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.

3. The students have to answer 5 full questions, selecting one full question from each module.

Marks scored shall be proportionally reduced to 50 marks.

12.1 Course Delivery Plan (Theory)

Module	Lecture No.	Content of Lecture	% of portion
1	1	Principles of Watershed Management	20%
	2	Basics concepts	
	3	hydrology	
	4	water availability surface water,	
	5	surface water	
	6	ground water conjunctive use,	
	7	Human influences in the water resources system	
	8	water resources system	
2	9	Water resources systems	20%
	10	Integrated water resources system	
	11	river basins morphometric analysis of	
	12	watersheds for watershed management	
	13	Watershed management practices in arid and semi-arid regions	
	14	watershed management through wells,	
	15	management of water supply,	
	16	short term and long-term strategic planning.	
3	17	Conservation of Water	20%
	18	Perspective on recycle and reuse, wastewater reclamation	
	19	Social aspects of watershed management	
	20	and community participation	
	21	private sector participation, institutional issues	
	22	socio-economy	
	23	integrated development	
	24	Water legislation and implementations, case studies.	
4	25	Sustainable Watershed Approach	20%
	26	Sustainable integrated watershed management	
	27	integrated watershed management	
	28	natural resources management	
	29	agricultural practices	
	30	integrated farming	
	31	soil erosion and	
	32	Conservation of soil	
5	33	Applications of RS	20%
	34	and GIS in Watershed	
	35	management Role of decision,	
	36	support system in watershed management	
	37	watershed characteristics of coastal regions	
	38	coastal aquifer	
	39	uniqueness of coastal water resources	
	40	thickeners and drying beds	

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13.0 Internal Assessments, Assignments, Group Discussion, Seminars, Quiz, Mini Project.

Sl. No.	Title	Outcome expected	Allied study	Week No.	Max Marks	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: Questions on module 1	study the Integrate water resources system in arid and semi-arid regions and explain watershed aquifer for management	Module 1&2 of syllabus	4	10	Individual Activity, Written solution expected.	Book 1, 2, 3 & notes, also 4-13 of reference list.
2	Internal Assessment - I	Students study the Analyse water resources related issues for conservation and synthesize augmentation of water resources	Module 3&4 of syllabus	5	20	Individual Assessment, Blue Books as record	Book 1, 2, 3 & notes, also 4-13 of reference list.

14.0 QUESTION BANK

MODULE - 1

1. What is watershed based land use planning
2. What are the watershed characteristics physical and geomorphologic?
3. What are the, factors affecting to watershed management?.
4. What is watershed management?.
5. What is Watershed Delineation?.
6. Define hydrologic and hydraulic design of earthen embankments and diversion structures?

MODULE – 2

1. Explain Sediment yield estimation and measurement from a watershed and sediment yield models?
2. Define and briefly explain integrated water resources management.
3. How to planning the reservoir system and explain it
4. What are the important activities of planning of reservoir basins?
4. How do you optimally operate a single resource system?
5. Explain how to allocation of water resources.
6. Discuss the various advantages of conjunctive use of surface and sub-surface water resources.

MODULE – 3





1. Write a short note on Rain-water harvesting system in brief
2. What are different phases of planning of watershed management activities ?
3. Preparation of action plan for watershed management


MODULE – 4

1. What is the watershed approach to sustainable development?
2. What are the helping factors of watershed management?
3. What is the concept of sustainable water?

MODULE – 5

1. What are the applications of remote sensing and GIS in watershed management?
2. What is the application of GIS and RS in water resources?
3. What are the applications of GIS and remote sensing?
4. What is the application of GIS and statistics in water quality studies?
5. What are the applications of GIS and remote sensing in climate change?

Prepared by	Checked by		
			
Prof. S.S. Bessanakoppa	Prof. Preeti. R. Patil	HOD	Principal

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			Course Plan
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Subject Title	Electronic Waste Management-Issues & Challenges		
Subject Code	BCV456C	IA Marks	50
Number of Lecture Hrs / Week	0:2:0:0	Exam Marks	50
Total Number of Lecture Hrs	15	Exam Hours	01
CREDITS – 01			

FACULTY DETAILS:

Name: Preethi. R.Patil	Designation: Asst. Professor.	Experience: 6 yrs
No. of times course taught : 01		Specialization: Structural Engineering

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	Civil Engineering	II	Elements of Civil Engineering & Mechanics

2.0 Course Objectives

1. To provide students with a comprehensive understanding of e-waste and its impact on the environment.
2. To familiarize students with the generation, composition, and hazardous components of e-waste.
3. To highlight the health and environmental risks associated with improper e-waste management.
4. To introduce students to various methods of e-waste collection, recycling, and disposal.
5. To develop an understanding of the relevant policies and regulations governing e-waste management in India.

3.0 Course Outcomes

Having successfully completed this course, the student will be able to draw and use modeling software's to generate

CO'S	Course Outcome	Cognitive Level	POs
C229.1	Explain the concept of e-waste and its significance in the context of environmental sustainability.	L1,L2	1,2,3
C229.2	Identify and classify different types of e-waste and describe their components	L1,L2	1,2,3
C229.3	Recognize the potential health and environmental hazards associated with improper e-waste	L1,L2	1,2,3
C229.4	Evaluate and apply appropriate methods for the collection, recycling, and disposal of	L1,L2	1,2,3
C229.5	Demonstrate knowledge of the existing policies, regulations, and frameworks for e-waste management in India	L1,L2	1,2,3
Total Hours of instruction		15	

4.0 Course Content

Course Syllabus

Module-1

Introduction to E-Waste Management, Overview of e-waste and its impact on the environment,

Module-2

E-Waste Generation and Composition, Types of e-waste and their components


Module-3

E-Waste Hazards and Environmental Impacts, Health and environmental risks associated with ewaste

Module-4

E-Waste Collection and Recycling, Methods of e-waste collection, recycling, and disposal

Module-5

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E-Waste Management Policies and Regulations, Relevant laws, policies, and regulations in India

5.0 Relevance to future subjects

Sl No	Semester	Subject	Topics
01	Higher branches	Theory subjects	Basic fundamentals

6.0 Relevance to Real World

Sl.No	Real World Mapping
01	Basic Elements of Construction And Engineering Fields

7.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Topic: Module I-Module V
02	NPTEL	Fundamental of civil and mechanics Videos

8.0 Books Used and Recommended to Students

Text Books

1. "E-Waste Management: From Waste to Resource" by R. K. Rathore and H. N. Chanakya, TERI Press, 2019
2. "E-Waste in India: An Emerging Crisis" by Sangeeta Sharma, Cambridge Scholars Publishing, 2019
3. "E-Waste Management: Research, Technology, and Applications", Majeti Narasimha Vara Prasad, CRC Press, 2016
4. "Electronic Waste Management and Treatment Technology" by Rezaul Begg, R. M. Sarcar, and R. V. R. Singh, Springer, 2018
5. "E-Waste Management: From Waste to Resource" by Florin-Constantin Mihai, Academic Press, 2018

Reference Books

1. "E-Waste Management: From Waste to Resource" by R. K. Rathore and H. N. Chanakya, TERI Press, 2019
2. "E-Waste in India: An Emerging Crisis" by Sangeeta Sharma, Cambridge Scholars Publishing, 2019
3. "E-Waste Management: Research, Technology, and Applications", Majeti Narasimha Vara Prasad, CRC Press, 2016
4. "Electronic Waste Management and Treatment Technology" by Rezaul Begg, R. M. Sarcar, and R. V. R. Singh, Springer, 2018
5. "E-Waste Management: From Waste to Resource" by Florin-Constantin Mihai, Academic Press, 2018

Additional Study material & e-Books

1. E-Waste Management: From Waste to Resource" by Florin-Constantin Mihai, Academic Press, 2018


9.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

- [https://bookspare.com/\(https://www.tlv.com/global/II/steam-theory/principal-applications-for-steam.html](https://bookspare.com/(https://www.tlv.com/global/II/steam-theory/principal-applications-for-steam.html)
- <https://www.youtube.com/watch?v=br-ezdmEq7A>

10.0 Magazines/Journals Used and Recommended to Students

Sl.No	Magazines/Journals	website
1	Journal of engineering and technology	https://www.journals.elsevier.com/engineering-science-and-technology
2	International Journal of Solids and Structures	http://www.sciencedirect.com/science/journal/00207683

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11.0 Examination Note

Assessment Details (both CIE and SEE)

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 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour**. The student has to secure a minimum of **35% of the maximum marks meant for SEE**.


SCHEME OF EXAMINATION:

Question paper pattern:

- The question paper will have **ten** full questions carrying equal marks.
- 2. Each full question consisting of **20** marks.
- 3. There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- 4. Each full question will have sub question covering all the topics under a module.
- 5. The students will have to answer **five** full questions, selecting **one** full question from each module.

12.0 Course Delivery Plan

Module	Lecture No.	Content of Lecturer	Teaching Method	Laboratory Component	% of Portion
		PART - A			
1	1	Introduction to E-Waste Management	Chalk and Talk, Power-point Presentation		20%
	2	Overview of e-waste			
	3	e-waste and its impact on the environment			
2	4	E-Waste Generation and Composition	Chalk and Talk, Power-point Presentation		40%
	5	Types of e-waste			
	6	e-waste and their components			
3	7	E-Waste Hazards and Environmental Impacts	Power- point Presentation		60%
	8	E-Waste Health			
	9	environmental risks associated with e waste			
4	10	E-Waste Collection and Recycling,	Chalk and Talk, Power-point Presentation		80%
	11	Methods of e-waste collection			
	12	recycling, and disposal			

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5	13	E-Waste Management Policies and Regulations,	Power- point Presentation		100%
	14	Relevant laws, policies			
	15	regulations in India			

13.0 Assignments, Pop Quiz, Mini Project, Seminars





Sl. No.	Title	Outcome expected	Allied study	Week No.	Individual / Group activity	Reference: book/website /Paper
1	Assignment 1: University Questions on Section of Introduction to E waste	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 1 of the syllabus	2	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
2	Assignment 2: University Questions on E waste Generation	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 2 of the syllabus	4	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
3	Assignment 3: University Questions on E-Waste Hazards and Environmental Impacts	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 3 of the syllabus	6	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
4	Assignment 4: E-Waste Collection and Recycling	Students study the Topics and write the Answers. Get practice to solve university questions.	Module 4 of the syllabus	8	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list
5	Assignment 5: E-Waste Management Policies and Regulations	Students study the Topics and write the Answers	Module 5 of the syllabus	10	Individual Activity. Printed solution expected.	Book 1, 2 of the reference list. Website of the Reference list


14.0 QUESTION BANK


What is the iron and steel constitute of e-waste? a) 20 b) 30 c) 40 d) 50
Which of the following element make e-waste hazardous in nature? a) Lead b) Glass c) Plastic d) Iron
In 2006, the IAER projected that _____ electronic and electrical appliances would become e-waste by 2010. a) 1 billion b) 2 billion c) 3 billion d) 4 billion
According to the Comptroller and Auditor- General's (CAG) report what is the amount of e-waste generated annually? a) 4LT b) 5LT c) 6LT d) 7LT
What is the hazardous pollutant released from LED's? a) Arsenic b) Barium c) Cobalt d) Cadmium
What is the hazardous pollutant released from electron tubes? a) Arsenic b) Barium c) Cobalt d) Cadmium

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What is the hazardous pollutant released from batteries? a) Arsenic b) Barium c) Cobalt d) Cadmium
What is the hazardous pollutant released from inductive coils? a) Arsenic b) Barium c) Cobalt d) Copper
What is the hazardous pollutant released from circuit boards? a) Arsenic b) Barium c) Lead d) Copper
What is the hazardous pollutant released from telephones? a) Lithium b) Barium c) Lead d) Copper
What is the hazardous pollutant released from calculators? a) Lithium b) Mercury c) Lead d) Copper
Nickel is released from _____ a) Display b) Calculator c) Alloy d) Transformers
Which of the hazardous pollutant occurs in plastic? a) Lithium b) PCBs c) Lead d) Copper
Which of the following element/s is/are cause of e-waste? A. Lead B. Cadmium C. Beryllium, or Brominates flame retardants D. All of the above
How are electronic items dangerous? A. They degrade over time, releasing cancer-causing chemicals into the air. B. Lead and mercury in components can cause metabolic changes in users. C. They leach toxic metals in landfills and into ground water D.They create electromagnetic fields that interfere with animal reproduction.
Which toxic compound is not found in e-waste? A. Mercury B. Cadmium C. Neon D. Lead
What does e- waste stand for? A. Environment waste B. Electronic waste C. Equipment waste D. None of the above
What are the health hazards which can be caused by E-Waste? A. Lung cancer B. DNA damage C. Brain D. All of the above
Which country produces the most e-waste per year? A. India B. China C. USA D. France
How much lead is in a cathode ray tube (CRT), commonly called a picture tube? A. 1.75 pounds B. Between 2 and 3 pounds C. 19 pounds D. Between 4 and 7 pounds
The most valuable part of a PC or TV is the A. Lead in the CRT B. Circuit boards that contain silver and gold C. Copper in the cathode yoke D. None of the above
Which of the following is the correct related to E-waste? A. E-waste is a popular, informal name for electronic products nearing the end of their "useful life. B. Computers, televisions, VCRs, stereos, copiers, and fax machines are common electronic products. C. Both A and B D. None of the above
Which country produces the most e-waste per year? A. India B. China C. USA D. France
What is the hazardous pollutant released from telephones? a) Lithium b) Barium c) Lead d) Copper
In 2006, the IAER projected that _____ electronic and electrical appliances would become e-waste by 2010. a) 1 billion b) 2 billion c) 3 billion d) 4 billion

Prepared by	Checked by		
			
Prof. Preethi.R.Patil	Prof. V.I.Patil	HOD	Principal

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Subject Title	Biology for Engineers		
Subject Code	BBOK407	CIE Marks	50
		SEE Marks	50
Number of Lecture	03	TotalMarks	100
Total Number of Lecture Hrs	40	Exam Hours	02
CREDITS – 03			

FACULTY DETAILS:			
Name: 1) Dr. Tanuja SB	Designation: Assistant Prof.	Experience: 7.0	
No. of times course taught: 01		Specialization: Physical Chemistry	

1.0 Prerequisite Subjects:

Students should have the basic knowledge chemistry and Basic Science.

Sl. No	Branch	Semester	Subject
01	CV	IV	Biology for Engineers

2.0 Course Objectives

To provide students with knowledge of engineering chemistry for building technical competence in industries, research and development in the following fields


- 1 To familiarize the students with the basic biological concepts and their engineering applications.
- 2 To enable the students with an understanding of biodesign principles to create novel devices and structures.
- 3 To provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems.
- 4 To motivate the students develop the interdisciplinary vision of biological engineering.

3.0 Course Outcomes

On completion of this course, students will have knowledge in:

	Course Outcome	POs	RBT Level s
CO1	Elucidate the basic biological concepts via relevant industrial applications and case studies.	1,2,3,& 7	L3
CO2	Evaluate the principles of design and development, for exploring novel bioengineering projects.	1,2,3, & 7	L1 & L2
CO3	Corroborate the concepts of biomimetics for specific requirements.	1,2,3, & 7	L3
CO4	Think critically towards exploring innovative biobased solutions for socially relevant problems.	1,2,3, & 7	L3
Total Hours of instruction		100	

4.0 Course Content

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MODULE 1: INTRODUCTION TO BIOLOGY:

The cell: the basic unit of life, Structure and functions of a cell. The Plant Cell and animal cell, Prokaryotic and Eukaryotic cell, Stem cells and their application. Biomolecules: Properties and functions of Carbohydrates, Nucleic acids, proteins, lipids. Importance of special biomolecules; Enzymes (Classification (with one example each), Properties and functions), vitamins and hormones.

MODULE 2: BIOMOLECULES AND THEIR APPLICATIONS (QUALITATIVE):

Carbohydrates (cellulose-based water filters, PHA and PLA as bioplastics), Nucleic acids (DNA Vaccine for Rabies and RNA vaccines for Covid19, Forensics – DNA fingerprinting), Proteins (Proteins as food – whey protein and meat analogs, Plant based proteins), lipids (biodiesel, cleaning agents/detergents), Enzymes (glucose-oxidase in biosensors, lignolytic enzyme in bio-bleaching).

MODULE 3: HUMAN ORGAN SYSTEMS AND BIO DESIGNS (QUALITATIVE):

Brain as a CPU system (architecture, CNS and Peripheral Nervous System, signal transmission, EEG, Robotic arms for prosthetics. Engineering solutions for Parkinson's disease). Eye as a Camera system (architecture of rod and cone cells, optical corrections, cataract, lens materials, bionic eye). Heart as a pump system (architecture, electrical signalling - ECG monitoring and heart related issues, reasons for blockages of blood vessels, design of stents, pace makers, defibrillators). Lungs as purification system (architecture, gas exchange mechanisms, spirometry, abnormal lung physiology - COPD, Ventilators, Heart-lung machine). Kidney as a filtration system (architecture, mechanism of filtration, CKD, dialysis systems).

MODULE 4: NATURE-BIOINSPIRED MATERIALS AND MECHANISMS (QUALITATIVE):

Echolocation (ultrasonography, sonars), Photosynthesis (photovoltaic cells, bionic leaf). Bird flying (GPS and aircrafts), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Human Blood substitutes - hemoglobin-based oxygen carriers (HBOCs) and perfluorocarbons (PFCs).

MODULE 5: TRENDS IN BIOENGINEERING (QUALITATIVE):

Muscular and Skeletal Systems as scaffolds (architecture, mechanisms, bioengineering solutions for muscular dystrophy and osteoporosis), scaffolds and tissue engineering, Bioprinting techniques and materials, 3D printing of ear, bone and skin. 3D printed foods. Electrical tongue and electrical nose in food science, DNA origami and Biocomputing, Bioimaging and Artificial Intelligence for disease diagnosis. Self-healing Bioconcrete (based on bacillus spores, calcium lactate nutrients and biomineralization processes) and Bioremediation and Biomining via microbial surface adsorption (removal of heavy metals like Lead, Cadmium, Mercury, Arsenic).

5.0 Relevance to Real World


SL.No	Real World Mapping
01	Evaluate the principles of design and development, for exploring novel bioengineering projects.
02	understanding of biodesign principles to create novel devices and structures
03	how biological systems can be re-designed as substitute products for natural systems

6.0 Gap Analysis and Mitigation

Sl. No	Delivery Type	Details
01	Tutorial	Topic: Numerical problems discussion
02	NPTEL	Each module/ Chapter presentation

7.0 Books Used and Recommended to Students

Text Books
1. Human Physiology, Stuart Fox, Krista Rompolski, McGraw-Hill eBook. 16th Edition, 2022 □ Biology for Engineers, Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S.,

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	Accredited at 'A' Grade by NAAC Programmes Accredited by NBA: CSE& ECE.	

- and Jaganthan M.K., Tata McGraw-Hill, New Delhi, 2012.
- Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011 □ Biomedical Instrumentation, Leslie Cromwell, Prentice Hall 2011.
 - Biology for Engineers, Sohini Singh and Tanu Allen, Vayu Education of India, New Delhi, 2014.
 - Biomimetics: Nature-Based Innovation, Yoseph Bar-Cohen, 1st edition, 2012, CRC Press.
 - Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies, D. Floreano and C. Mattiussi, MIT Press, 2008.

Additional Study material & e-Books

- Bioremediation of heavy metals: bacterial participation, by C R Sunilkumar, N Geetha A C Udayashankar Lambert Academic Publishing, 2019. □ 3D Bioprinting: Fundamentals, Principles and Applications by Ibrahim Ozbolat, Academic Press, 2016.
- Electronic Noses and Tongues in Food Science,

9.0

Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended

Website and Internet Contents References

- VTU EDUSAT / SWAYAM / NPTEL / MOOCS / Coursera / MIT-open learning resource
- <https://nptel.ac.in/courses/121106008>
- <https://freevideolectures.com/course/4877/nptel-biology-engineers-other-non-biologists>
- <https://ocw.mit.edu/courses/20-020-introduction-to-biological-engineering-design-spring-2009>
- <https://ocw.mit.edu/courses/20-010j-introduction-to-bioengineering-be-010j-spring-2006>
- <https://www.coursera.org/courses?query=biology>
- https://onlinecourses.nptel.ac.in/noc19_ge31/preview

10.0

Examination Note

Assessment Details (both CIE and SEE)

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 40% of the maximum marks (20 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation:

Three Unit Tests each of 20 Marks (duration 01 hour)

First test at the end of 5th week of the semester

- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of 10 Marks

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester


Group discussion/Seminar/quiz any one of three suitably planned to attain the COs and POs for 20 Marks (duration 01 hours)

- At the end of the 13th week of the semester

The sum of three tests, two assignments, and quiz/seminar/group discussion will be out of 100 marks and will

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	Accredited at 'A' Grade by NAAC Programmes Accredited by NBA: CSE& ECE.	

be scaled down to 50 marks

(to have less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course).

CIE methods /question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

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 2 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.

The SEE question paper will be set for 100 marks and marks scored will be proportionately reduced to 50 marks

11.0 University Result

Examination	S	A	B	C	D	E	% Passing

Prepared by	Checked by		
Prepared by 1) Dr. Tanuja SB	Dr. Tanuja SB	HOD	Principal



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Mech. Engg. Dept.

Academic

Course Plan

2023-24

Subject Title	Universal Human Values (UHV)		
Subject Code	BUHK408	CIE Marks	50
Teaching Hrs / Week (L: T:P: S)	1:0:0:1	SEE Marks	50
Total Hrs of Pedagogy	15 hour Theory Session +15 hour Self study	Exam Hours	01
CREDITS – 01			

FACULTY DETAILS:

Name: Prof. S. A. Goudadi	Designation: Asst. Professor	Experience: 16 Years
No. of times course taught: 01	Specialization: Design Engineering	

1.0 Prerequisite Subjects:

Sl. No	Branch	Semester	Subject
01	None	--	--

2.0 Course Objectives

This introductory course input is intended:

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

This course is intended to provide a much-needed orientational input in value education to the young enquiring minds.

3.0 Course Outcomes

By the end of the course, students are expected to positively impact common graduate attributes like:

CO	Course Outcome	Cognitive Level	POs
C228.1	They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.	L ₂	PO6, PO7 PO8, PO10, PO12
C228.2	They would have better critical ability.	L ₂	PO6, PO7 PO8, PO10, PO12
C228.3	They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).	L ₂	PO6, PO7, PO8, PO10, PO12
C228.4	It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction	L ₂	PO6, PO7, PO8, PO10, PO12
Total Hours of instruction			15

**4.0 Course Content****Module-1**

Introduction to Value Education (4 hours) Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations.

Module-2

Harmony in the Human Being (4 hours) Understanding Human being as the Co-existence of the Self and the Body, Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.

Module-3

Harmony in the Family and Society (4 hours) Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

Module-4

Harmony in the Nature/Existence (4 hours) Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence.

Module-5

Implications of the Holistic Understanding – a Look at Professional Ethics (4 hours) Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession.

5.0 Relevance to future subjects:

SL. No	Semester	Subject	Topics / Relevance
01	VII	Project work	Team work
02	VII	Internship	Team work

6.0 Relevance to Real World

SL. No	Real World Mapping
01	Self enhancement, Openness to change, Self transcendence & Conservation.

**7.0 Books Used and Recommended to Students****Text Books**

- The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034- 47-1
- The Teacher's Manual " Manual for A Foundation Course in Human Values and Professional Ethics", R R Gaur, R Asthana, G

Reference Books

- Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amarkantak, 1999.
- Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
- The Story of Stuff (Book).
- The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
- Small is Beautiful - E. F Schumacher.
- Slow is Beautiful - Cecile Andrews
- Economy of Permanence - J C Kumarappa
- Bharat Mein Angreji Raj – Pandit Sunderlal
- Rediscovering India - by Dharampal
- Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
- India Wins Freedom - Maulana Abdul Kalam Azad
- Vivekananda - Romain Rolland (English)
- Gandhi - Romain Rolland (English)
- Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
- Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
- A Nagaraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
- P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
- A N Tripathy, 2003, Human Values, New Age International Publishers
- Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
- E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
- M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
- B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books.
- B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

8.0 Relevant Websites (Reputed Universities and Others) for Notes/Animation/Videos Recommended**Web links and Video Lectures (e-Resources):**

- Value Education websites,
- <https://www.uhv.org.in/uhv-ii>,
- <http://uhv.ac.in>,
- <http://www.uptu.ac.in>
- Story of Stuff,
- <http://www.storyofstuff.com>
- https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEKQw
- https://fdp-si.aicte-india.org/8dayUHV_download.php
- <https://www.youtube.com/watch?v=8ovkLRYXlJE>
- <https://www.youtube.com/watch?v=OgdNx0X923I>
- <https://www.youtube.com/watch?v=nGRcbRpvGoU>
- <https://www.youtube.com/watch?v=sDxGXOgYEKM>

9.0 Magazines/Journals Used and Recommended to Students

Sl. No	Magazines/Journals
1	Al Gore, An Inconvenient Truth, Paramount Classics, USA
2	Charlie Chaplin, Modern Times, United Artists, USA
3	IIT Delhi, Modern Technology – the Untold Story
4	Gandhi A., Right Here Right Now, Cyclewala Productions.

10.0 Examination Note

Assessment Details (both CIE and SEE)

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 40% of the maximum marks (**20 marks out of 50**) and for the SEE minimum passing mark is 35% of the maximum marks (**18 out of 50 marks**).

The student is declared as a pass in the course if he/she secures a minimum of 40% (**40 marks out of 100**) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.

The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered

Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned.

The teacher should not conduct two assignments at the end of the semester if two assignments are planned.

For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is 01 hour. The student has to secure a minimum of 35% of the maximum marks meant for SEE.

**11.0 Course Delivery Plan**

Module	Lecture No.	Content of Lecture	% of Portion
I	1	Right Understanding, Relationship and Physical Facility.	20%
	2	Understanding Value Education, Self-exploration as the Process for Value Education.	
	3	Continuous Happiness and Prosperity – the Basic Human Aspirations.	
	4	Happiness and Prosperity – Current Scenario, Method to Fulfill the Basic Human Aspirations.	
II	5	Harmony in the Human Being Understanding Human being as the Co-existence of the Self and the Body.	20%
	6	Distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self.	
	7	Understanding Harmony in the Self, Harmony of the Self with the Body.	
	8	Programme to ensure self-regulation and Health.	
III	9	Harmony in the Family and Society, the Basic Unit of Human Interaction.	20%
	10	'Trust' – the Foundational Value in Relationship.	
	11	'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to-Human Relationship.	
	12	Understanding Harmony in the Society, Vision for the Universal Human Order.	
IV	13	Harmony in the Nature/Existence Understanding Harmony in the Nature.	20%
	14	Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature.	
	15	Realizing Existence as Co-existence at All Levels.	
	16	The Holistic Perception of Harmony in Existence.	
V	17	Implications of the Holistic Understanding – a Look at Professional Ethics Natural Acceptance of Human Values.	20%
	18	Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order.	
	19	Competence in Professional Ethics Holistic Technologies.	
	20	Strategies for Transition towards Value-based Life and Profession.	

12.0 QUESTION BANK

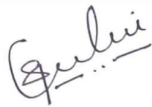


- What is the state of liking and a holistic and all encompassing state of the mind that creates inner harmony?
 - Prosperity
 - Happiness**
 - Innateness
 - Self-organized
- What is called living with assumption for oneself as body and Living of human being only on the basis of physical facilities, and not with right understanding and relationship?
 - Human Consciousness
 - Happiness
 - Right Understanding
 - Animal Consciousness**
- Five basic guidelines for value education are Universal, Natural and verifiable, all encompassing, leading to harmony and
 - Self exploration



2. Education
 3. Right utilization
 4. **Rational**
4. What are the basic desires of every human being for which they are working.
1. Physical facilities
 2. Realization and understanding
 3. Happiness and prosperity
 4. **Continuous happiness and prosperity**
5. When we participate in the larger order, this participation at different levels is known as our value. Values are outcome of
1. Prosperity
 2. Happiness
 3. **Realization and understanding**
 4. Self exploration
6. Identify the solution which helps human being to transform from animal consciousness to human consciousness.
1. **Right understanding**
 2. Realization
 3. Value education
 4. Physical facilities.
7. To maintain harmony we have to work at four levels of living. Identify second level of living.
1. Self
 2. **Family**
 3. Nature
 4. Society
8. Self exploration is a process which helps us to find out "What I am and What I really want to be". Two mechanisms involved in self-exploration are
1. Realization and understanding
 2. Natural and verifiable
 3. **Natural acceptance and experimental validation**
 4. Correctable and identifiable
9. Self exploration uses two mechanisms
1. **Natural acceptance and experiential validation**
 2. Right Understanding and self exploration
 3. Self investigation and self exploration
 4. Natural acceptance and self investigation
10. Samridhi means
1. Happiness
 2. Wealth
 3. **Prosperity**
 4. Health
11. What is the third level of living?
1. **Society**
 2. Individual
 3. Family
 4. Nature
12. Developed nations are the live example of
1. **Prosperity**
 2. Wealth
 3. Happiness
 4. Health
13. The participation of human beings is seen in two forms
1. Prosperity and Work
 2. Values and Understanding



3. Behavior and Wealth
 4. **Behavior and Work**
14. What are the outcomes of realization and understanding?
1. Work
 2. **Values**
 3. Happiness
 4. Health
15. We become by exploring our svatva and living accordingly
- a. **Svatantra**
 - b. Partantra
 - c. Wealthy.
 - d. Happy
16. Developed nations are the live example of health, wealth and wisdom. These three term scan be
- 16.combined to form a single term as
- a. Developed
 - b. **Prosperous**
 - c. Harmony
 - d. Happy
17. Contents of self-exploration area
- a. Desire and needs
 - b. Program and needs
 - c. Program and practical
 - d. **Desire and Program**
18. Value education is becoming important for students now a days because value education helps students to correctly identify our
- a. Values
 - b. Key to success
 - c. **Aspirations**
 - d. Needs
19. Three results are obtained from realization and understanding. Two of them are assurance and satisfaction find third one
- a. **Universality**
 - b. Acceptance
 - c. All-encompassing
 - d. Self-verification
20. The person who are lack of physical facility stands for
- a. Samadhan viheen dukhi daridra
 - b. Sadhan viihin dukhi daridra
 - c. **Sadhan Viheen Dukhi Daridra**
 - d. Sadhan vimukh dukhi daridra

Prepared & Checked by		
		
Prof. S. A. Goudadi	H.O.D	Principal