



BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(Autonomous Institute affiliated to VTU, Belagavi, Approved by AICTE, New Delhi)

Avalahalli, Yelahanka, Bengaluru 560064



Bachelor of Engineering

Department of Civil Engineering

**III and IV Semester Scheme and Syllabus
2022 Scheme - Autonomous**

Approved in the BoS meeting held on 13.10.2023

Program Educational Objectives (PEOs)

- Lead a successful career by analyzing, designing and solving various problems in the field of Civil Engineering.
- Execute projects through team building, communication and professionalism.
- Excel through higher education and research for endured learning.
- Provide effective solution for sustainable environmental development.

Vision and Mission of the Department

Vision

To be an Exemplary Centre, disseminating quality education and developing technically competent civil engineers with professional integrity for the betterment of society.

Mission

- Impart technical proficiency through quality education.
- Motivate entrepreneurship through enhanced industry - interaction and skill based training.
- Inculcate human values through outreach activities.

Program Specific Outcomes (PSOs)

- Identify & address the challenges in transportation, sanitation, waste management, and urban flooding in metropolitan cities.
- Provide solutions related to civil engineering built environment through a multidisciplinary approach.



Date: 16.10.2023

**CONTINUOUS INTERNAL EVALUATION AND SEMESTER END EXAMINATION
PATTERN: 2022 BATCH ONWARDS**

All students of 2022 scheme onwards are hereby informed to note the following with reference to Continuous internal evaluation and Semester end examination: 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.

IPCC COURSES: 4 CREDITS AND 3 CREDITS						
Evaluation Type		Internal Assessments (IAs)	Test/ Exam Marks Conducted for	Marks to be scale down to	Min. Marks to be Scored	Evaluation Details
Theory Component	CIE – IA Tests	CIE – Test 1 (1.5 hr)	40	15	06	Average of two internal assessment tests each of 40 marks, scale down the marks scored to 15 marks
		CIE – Test 2 (1.5 hr)	40			
	CIE – CCAs (Comprehensive Continuous Assessment)	CCA -1	10	10	04	Any two assessment methods as per clause 22OB4.2 of regulations (if assessment is project based, then one assessment method may be adopted)
		CCA-2	10			
	Total CIE Theory				25	10
Practical Component	CIE - Practical		-	15	06	Conduction of experiments and preparation of laboratory records etc.
	CIE Practical Test		50	10	04	One test after all experiment's to be conducted for 50 marks
	Total CIE Practical			25	10	Scale down marks of experiments, record and test to 25
Total CIE Theory + Practical				50	20	
SEE			100	50	18	SEE exam is a theory exam, conducted for 100 marks, scored marks are scaled to 50 marks
CIE + SEE				100	40	
The minimum marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum marks-25) in the theory component and 10 (40% of maximum marks -25) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.						

Professional Core Course (PCC) courses: 03 and 02 Credit Courses						
Evaluation Type		Internal Assessments (IAs)	Test/ Exam Marks Conduct ed for	Marks to be scale down to	Min. Marks to be Scored	Evaluation Details
Theory Component	CIE – IA Tests	CIE – Test 1 (1.5 hr)	40	25	10	Average of two internal assessment tests each of 40 marks, scale down the marks scored to 25 marks.
		CIE – Test 2 (1.5 hr)	40			
	CIE - CCAs	CCA -1	25	25	10	Any two assessment methods as per clause 220B4.2 of regulations (if it is project based, one CCA shall be given)
		CCA-2	25			
	Total CIE Theory			50	20	
SEE			100	50	18	SEE exam is a theory exam, conducted for 100 marks, scored marks are scaled down to 50 marks
CIE + SEE				100	40	

NON IPCC COURSES: 01 Credit Courses-MCQ						
Evaluation Type		Internal Assessments (IAs)	Test/Exam Marks Conducted for	Marks to be scale down to	Min. Marks to be Scored	Evaluation Details
Continuous Internal Evaluation on Component	CIE – IA Tests (MCQs)	CIE – Test 1 (1 hr)	40	25	10	Average of two internal assessment tests each of 40 marks, scale down the marks scored to 25 marks
		CIE – Test 2 (1 hr)	40			
	CIE - CCAs	CCA -1	25	25	10	Any two assessment methods as per clause 220B4.2 of regulations
		CCA-2	25			
	Total CIE Theory			50	20	
SEE (MCQ Type)				50	18	MCQ-type question papers of 50 questions with each question of 01 mark, examination duration is 01 hour
CIE + SEE				100	40	

Professional Core Course Laboratory (PCCL) course- 01 credit					
Evaluation Type	Internal Assessments (IAs)	Test/ Exam Marks Conducted for	Marks to be scale down to	Min. Marks to be Scored	Evaluation Details
Continuous Internal Evaluation	CIE - Practical	-	30	-	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 shall be approved by the PAC and are made known to students at the beginning of the practical session. Record should contain all the specified experiments in the syllabus. Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
	CIE Practical Test	100	20	-	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 by PAC. The marks scored shall be scaled down to 20 marks (40% of the maximum marks).
	Total CIE	-	50	20	
Semester End Examination		100	50	18	General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result - 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 (Rubrics shall be approved by the PAC)
CIE+SEE		100	50	40	

Computer Aided Engineering Drawing (BCEDK103/BCEDK203): 3 credit								
Evaluation Type		Topics/Modules	Computer Printout	Preparatory Sketch	Max Marks	Total Marks	Marks to be Scaled Down to	Min Marks to Pass
CIE	Sketchbook and CAD Modelling	Projection of Points	10	05	15	200	20	08
		Projection of Lines	10	10	20			
		Projection of Planes	20	15	35			
		Projection of Solids	40	20	60			
		Isometric Projections	20	15	35			
		Development of lateral surfaces	20	15	35			
	Test 1	Module 1 & 2	24	06	30	70	20	08
		Module 3	32	08	40			
	Test 2	Module 3	32	08	40	70		
		Module 4	24	06	30			
	CCA 1	Module 5	08	02	10	10	10	04
	CCA 2	Module 5	08	02	10			
	CIE Total							50
SEE		Module 1 & 2	24	06	30	100	50	20
		Module 3	32	08	40			
		Module 4	24	06	30			
CIE + SEE							100	40

Computer Aided Modelling for Manufacturing (BME305): 1 credit								
Evaluation Type		Module	Computer Printout	Preparatory Calculations / Sketch	Max Marks	Total Marks	Marks to be Scaled Down to	Min Marks to Pass
CIE	Sketchbook and CAD Modeling	Module 1	60	30	90	200	20	08
		Module 2	40	20	60			
		Module 3	40	10	50			
	Test 1	Module 1	20	10	30	60	20	08
		Module 2	20	10	30			
	Test 2	Module 1	20	10	30	60		
		Module 3	20	10	30			
	CCA	Module 1	30	10	40	40	10	04
	Total CIE							50
SEE		Module 1	30	10	40	100	50	20
		Module 2	20	10	30			
		Module 3	20	10	30			
CIE + SEE							100	40


220B 4.2 Continuous Internal Evaluation (CIE)

1) For a theory course, with an L-T-P distribution of L-0-0, the CIE will carry a maximum of 50% weightage of the total marks of a course. Before the start of the Academic session of each Semester, a faculty may choose for his course Internal Assessment Test and a minimum of two of the following assessment methods with suitable weightage for each

- i) Assignments (Individual and /or Group)
- ii) Seminars
- iii) Oral/ Online Quizzes
- iv) Group Discussions
- v) Case studies/ Case lets
- vi) Practical orientation on Design Thinking, Creativity & Innovation
- vii) Participatory & Industry – integrated learning
- viii) Practical activities/ problem-solving exercises
- ix) Class presentations
- x) Analysis of Industry/ Technical/ Business Reports
- xi) Reports on Guest Lectures/ Webinars/ Industrial Visits
- xii) Industrial/ Social/ Rural projects
- xiii) Participation in Seminars/ Academic Events/ Symposia, etc.
- xiv) Any other academic activity


CoE 18/10/2023


Principal 18/10


Dean (AA) 18.10.2023



BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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Scheme of Teaching and Examination: Effective from AY 2023 – 24

Choice Based Credit System (CBCS)

UG PROGRAM: CIVIL ENGINEERING (CV)									Semester: IV				
Sl. No.	Course category	Course Code	Course Title	Teaching Dept.	Teaching Hours/Week				Credits	Examination			
					L	T	P	PW		Duration	CIE Marks	SEE Marks	Total Marks
1	PCC	BCV401	Analysis of Structures	CV	3	0	0		3	3	50	50	100
2	IPCC	BCV402	Fluid Mechanics and Hydraulics	CV	3	0	2		4	3	50	50	100
3	IPCC	BCV403	Transportation Engineering	CV	3	2	2		4	3	50	50	100
4	PCCL	BCV404	Building Materials Testing Lab	CV	0	0	2		1	3	50	50	100
5	ESC	BCV405x	ESC/ETC/PLC		3	0	0		3	3	50	50	100
6	AEC/SEC	BCV456x	Ability Enhancement Course/Skill Enhancement Course- IV	TD and PSB: Concerned department	If the course is Theory				1	1	50	50	100
					1	0	0						
					If the course is a lab					2			
					0	0	2						
7	BSC	BBOK407	Biology For Engineers	TD / PSB: BT, CHE,	3	0	0		3	3	50	50	100
8	UHV	BUHK408	Universal human values course	Any Department	1	0	0		1	1	50	50	100
9	MC	BNSK459	National Service Scheme (NSS)	NSS coordinator	0	0	2		0		100	---	100
		BPEK459	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK459	Yoga	Yoga Teacher									
		BNCK459	NCC	NCC coordinator									
		BMUK459	Music	Music Teacher									
TOTAL					16	2	10		19	-	500	400	900
					28								

PCC: Professional Core Course, **PCCL:** Professional Core Course laboratory, **UHV:** Universal Human Value Course, **MC:** Mandatory Course (Non-credit), **AEC:** Ability Enhancement Course, **SEC:** Skill Enhancement Course, **L:** Lecture, **T:** Tutorial, **P:** Practical **S= SDA:** Skill Development Activity, **CIE:** Continuous Internal Evaluation, **SEE:** Semester End Evaluation. K : This letter in the course code indicates common to all the stream of engineering.

**Ability Enhancement Course / Skill Enhancement
Course - IV**

BCV456A	Finance for Professionals	BCV456C	Electronic Waste Management - Issues and Challenges
BCV456B	GIS with Quantum GIS	BCV456D	Technical Writing Skills

Engineering Science Course (ESC/ETC/PLC)

BCV405A	Building Information Modelling in Civil Engineering	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.

IV Semester Syllabus

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV</p>			
<p align="center">Analysis of Structures (3:0:0) 3 (Effective from the academic year 2023-24)</p>			
Course Code	BCV401	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	3:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	03
<p>Course Learning objectives: This course will enable students to</p> <ol style="list-style-type: none"> 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. 			
Module-1			
<p>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. Numerical.</p>			
L1,L2,L3			
Module-2			
<p>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. Numerical.</p> <p>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 calculatedeflection of beams, trusses and frames (No numerical on unit load method). Numerical.</p>			
Module-3			
<p>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. Numerical.</p>			
L1,L2,L3			
Module-4			
<p>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</p> <p>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.</p>			
L1,L2,L3,L4			
Module-5			
<p>Matrix Method: Flexibility Method: Introduction, Axes and coordinates, Flexibility matrix, Analysis of continuous beams, Stiffness Method: Introduction, Stiffness matrix, Analysis of continuous beams.</p>			
L1,L2,L3,L4			

Course outcome

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

CO1 Identify the different forms of structural systems and analyse the trusses.

CO2 Determine the slope and deflections in beams, frames and trusses by using moment area method and energy principle.

CO3 Analyse and determine the stress resultants in arches and cables.

CO4 Analyse the indeterminate structures and construct BMD AND SFD using slope deflection methods.

CO5 Analyse the indeterminate structures and construct BMD AND SFD using Moment Distribution Method.

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

Web links and Video Lectures (e-Resources):

- <https://nptel.ac.in/courses/105105166>
- <https://nptel.ac.in/courses/105105166>
- <https://nptel.ac.in/courses/105105166>
- <https://nptel.ac.in/courses/105105109>
- <https://nptel.ac.in/courses/105105109>
- <https://nptel.ac.in/courses/105105109>

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.

B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV			
Fluid Mechanics and Hydraulics (3:0:2) 4 (Effective from the academic year 2023-24)			
Course Code	BCV402	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2	SEE Marks	50
Total Number of Contact Hours	40 + 8-10 Lab slots	Exam Hours	3
Course Learning objectives: This course will enable students to <ol style="list-style-type: none"> 1. Understand the Fundamentals of properties of fluids, fluid pressure measurement and hydrostatic law. 2. Learn the Principles of kinematics, hydrodynamics, and its applications. 3. Study the Flow measurements and design of pipes. 4. Understand the design of open channels and energy concepts. 5. Understand the Working principles of hydraulic turbines and pumps 			
MODULE-1			
Fluids and their properties – specific properties, surface tension, capillarity, Pascal’s law, hydrostatic law, fluid pressure measurement using simple and differential manometers & digital meters, Total pressure, and center of pressure on vertical and inclined plane surfaces. Numerical. L1 L2,L3			
MODULE-2			
Kinematics- Types of flow, continuity equation in Cartesian coordinates, velocity potential, stream function, orthogonality, flow nets. Numerical. Dynamics- Euler’s equation of motion, Bernoulli’s equation, Application-Venturimeter & Orifice ---meter. Numerical. L1, L2, L3, L4			
MODULE-3			
Flow measurement: Classification of orifice, hydraulic coefficients of orifice, discharge over rectangular, triangular and Cipoletti notch. Numerical Flow through pipes- major loss (Darcy- Weisbach equation) and minor losses (no derivations), pipes in series and parallel, equivalent pipe, typical pipe connections in buildings. Numerical L1, L2, L3,L4			
MODULE-4			
Open channel hydraulics- classification of flow, Chezy’s equation with empirical equations, Most economical channel sections-rectangular, trapezoidal, circular. Uniform flow: specific energy curve and critical parameters. Non-uniform flow: hydraulic jump-equation & energy loss equation. Numerical L1, L2, L3,L4			
MODULE-5			
Hydropower plants – heads & efficiencies, Impulse-Momentum equation, Velocity triangles. Turbines-types, Pelton wheel-working, work done and hydraulic efficiency & design. Kaplan turbine-working & working proportions. Numerical Centrifugal pumps-working, heads & efficiency, work done (no derivation), specifications of centrifugal pumps. L1, L2,L3, L4			

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Sl.NO	Experiments (L1, L2, L3, L4)
1	Verification of Bernoulli’s equation
2	Calibration of Venturimeter
3	Determination of hydraulic coefficients of small vertical orifice

4	Calibration of triangular notch & Cipolletti notch
5	Determination of major losses in pipes of varying diameter
6	Determination of major losses in pipe network bench
7	Determination of Cd for broad crested weir
8	Determination of efficiency of jet on flat and curved vanes
9	Determination of Cd of Venturiflume
10	Demo of determination of efficiency of centrifugal pump
11	Demo of determination of efficiency of Kaplan turbine
12	Demo of determination of efficiency of Pelton wheel
Course outcomes (Course Skill Set): At the end of the course, the student will be able to: <ul style="list-style-type: none"> • Explain the fundamental properties of fluids and solve problems on fluid pressure and hydrostatics. • Apply the principles of kinematics and dynamics of fluid flow to solve problems on velocity and pressure. • Compute the discharge through pipes, notches, and weirs. • Design the turbines and open channels of different sections and estimate the energy loss in hydraulic jump. • Able to interpret the experimental results of discharge, efficiency based on the test conducted in the laboratory. 	
Suggested Learning Resources: Books: Text Books: <ol style="list-style-type: none"> 1. P.N. Modi and S.M. Seth-Hydraulics and Fluid Mechanics, including Hydraulic machines, standard Book House, New Delhi 2. K Subramanya- Fluid Mechanics and Hydraulic Machines, Tata McGraw-Hill, New Delhi 3. R.K. Bansal- A text book of Fluid Mechanics and Hydraulic Machines- Laxmi Publications, New Delhi 4. Victor L. Streeter, Benjamin Wylie E and Keith W. Bedford- Fluid Mechanics, Tata McGraw Hill publishing Co Ltd, New Delhi 5. J.F. Douglas. M. Gastric, John Warfield, Lynne Jack – Fluid Mechanics, Pearson, Fifth edition. 6. K. Subramanya- Fluid Mechanics and Hydraulic Machines, Problems and Solutions, Tata McGrawhill, New Delhi. 7. S K SOM and G.Bis was – “ introduction to Fluid Mechanics and Fluid Machines, Tata Mcg raw Hill, New Delhi. 	
Web links and Video Lectures (e-Resources): <ul style="list-style-type: none"> • YouTube Videos 	
Activity Based Learning (Suggested Activities in Class)/ Practical Based learning: <ul style="list-style-type: none"> • Visit to hydro- electric power plant • Visit to sites to visualise the flow measuring devices, viz., weirs, spillways, etc. 	

B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV			
Transportation Engineering (3:0:2) 4 (Effective from the academic year 2023-24)			
Course Code	BCV403	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:2	SEE Marks	50
Total Number of Contact Hours	40 hours Theory + 8-10 Lab slots	Total Marks	100
Course Learning objectives: This course will enable students to <ol style="list-style-type: none"> 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. 			
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 and their functions; types of joints used in 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. (L1,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. (L1,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. **(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. **(L1,L2, L3)**

PRACTICAL COMPONENT OF IPCC *(May cover all / major modules)*

Sl.NO	Experiments (8-10 Lab slots)
1	Tests on Aggregates a. Crushing Strength Test b. Los Angeles abrasion test c. Impact test d. Shape tests (combined index and angularity number) (L1, L2)
2	Tests on Bituminous Materials a. Penetration test b. Ductility test c. Softening point test d. Specific gravity test e. Viscosity test by tar viscometer f. Flash and fire point test (L1, L2)
3	Tests on Soil a. Wet sieve analysis b. CBR Test on soil (L1, L2)
4	Design of flexible pavement as per IRC 37-2018 (L2, L4)
5	Design of Rigid pavement as per IRC 58-2015 (L3, L4)
6	Bituminous Mix Design by Marshall Method (Demonstration only) (L1, L2)
7	Traffic Engineering studies (L3, L4)

Course outcomes

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

CO1 Explain the basic principles of geometric design in the context of transportation engineering and planning.

CO2 Select the appropriate pavement materials for construction and design the pavement as per standard practices.

CO3 Conduct traffic studies and analyse traffic data for practical applications.

CO4 Identify the Components parts of Railway Track and design the suitable runway for an Airport.

CO5 Able to interpret the experimental results of highway materials based on laboratory tests and design the pavement as per IRC guidelines.

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, Roorkee.
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.

Web links and Video Lectures (e-Resources):

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>

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

- Visit to a road construction project

B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV			
Building Materials Laboratory (0:0:2) 1 (Effective from the academic year 2023-24)			
Course Code	BCV404	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2	SEE Marks	50
Total Number of Contact Hours	15	Exam Hours	3
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..			
Sl.NO	Experiments		
1	Tests on Bricks and Tiles (Weight & Dimensionality, Water Absorption, Strength) (L1, L2, L3, L4)		
2	Tests Cement Concrete blocks (Weight & Dimensionality, Water Absorption, Strength) (L1, L2, L3, L4)		
3	Test on Cement, Initial and Final Setting Time, Consistency and Specific Gravity (L1, L2, L3, L4)		
4	Tests on Fine aggregates - Sieve Analysis, Moisture content, Specific gravity, Bulk density, Bulking and Silt Content (L1, L2, L3, L4)		
5	Tests on Coarse aggregates- Sieve Analysis, Water absorption, Moisture content, specific gravity and Bulk density. (L1, L2, L3, L4)		
6	Compression test on mild steel and wood. (L1, L2, L3, L4)		
7	Compression Test on mortar/Concrete cubes specimens (L2,L3,L4)		
8	Splitting Tensile strength on mortar/concrete cylinder specimens (L2,L3,L4)		
9	Tensile Test on Steel Bars (L1, L2, L3, L4)		
10	Demonstration of Strain gauges and Strain indicators.	(L1, L2, L3, L4)	
NOTE: All tests to be carried out as per relevant latest BIS Codes			
Course outcomes At the end of the course the student will be able to: CO1 Analyze the physical characteristics, and behavior of common building materials. CO2 Reproduce the basic knowledge of mathematics and engineering in finding the strength in tension, compression, shear and torsion for steel CO3 Evaluate the impact of engineering solutions on the society and also will be aware of Contemporary issues regarding failure of structures due to unsuitable materials. CO4 Recognize the importance of ethical conduct, integrity, and accuracy in materials testing and reporting.			

Suggested Learning Resources:

- Davis, Troxell and Hawk, “Testing of Engineering Materials”, International Student Edition – McGraw Hill Book Co. New Delhi.
- M L Gambhir and Neha Jamwal, “Building and construction materials-Testing and quality control”, McGraw Hill education (India) Pvt. Ltd., 2014.
- Fenner, “Mechanical Testing of Materials”, George Newnes Ltd. London.
- Holes K A, “Experimental Strength of Materials”, English Universities Press Ltd. London.
- Suryanarayana A K, “Testing of Metallic Materials”, Prentice Hall of India Pvt. Ltd. New Delhi.
- Kukreja C B, Kishore K. and Ravi Chawla “Material Testing Laboratory Manual”, Standard Publishers & Distributors 1996.
- Relevant latest IS Codes.

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV</p>			
<p align="center">Building Information Modelling in Civil Engineering (2:2:0) 3 (Effective from the academic year 2023-24)</p>			
Course Code	BCV405A	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	2:2:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3
<p>Course objectives:</p> <ol style="list-style-type: none"> 1. Understand the concept of Building Information Modelling 2. Create the workflow followed in industry during creation of BIM 3D model which includes 3. Building the discipline-based model and create the federated models 4. Design the process of creating the 4D & 5D BIM model 			
<p align="center">Module-1</p>			
<p>Evolution of Engineering, Introduction to BIM Concepts and Design Authoring: Evolution of Engineering from 2D drawings to BIM Model, Isometric View, Limitation of Isometric views and concept of 3D-Modeling, Building Information Modelling – Introduction & Process, Design Authoring – Concepts and workflow, Fundamentals of Discipline Based Modelling, Introduction to stages of BIM Modelling process as per ISO 19650, Federated model- concepts and demonstrations, workflow of design coordination, Engineering Analysis – Concept and types of analysis, Process and workflow of Design Review in BIM.</p> <p align="right">L1, L2, L3.</p>			
<p align="center">Module-2</p>			
<p>Visualization and Interference/Clash check: Views in BIM Model, Visualization Modes, Walkthrough of the Model, Fly through the model, Layers & Properties, Concept of viewpoints, Sectioning and Visualization through Tablet and Mobile, Concept of BIM Kiosk & BIM Rooms, Visualization through Augment Reality (AR), Virtual Reality (VR) & Mixed Reality (MR) Clash Check – Types, Clash avoidance process, Clash Detection Process, Clash Detection Priority Matrix and Report generation, Clash Detection Rules, Report, Grouping, Clash Detection Process – Demo.</p> <p align="right">L1, L2, L3.</p>			
<p align="center">Module-3</p>			
<p>Documentation & CDE & Level of Development: Documentation and CDE (Common Data Environment) -2D drawings generation from BIM Model, Computer Network types, Concept of Cloud Computing, Concept and Application of CDE: Traditional Information Sharing, Definition, Reference, and Concept, Setting up the workflow and process for CDE- Filenaming convention, Roles and Responsibilities, Request for Information and Review Process Concept of LOD (Level of Development), preparation of LOD matrix and Progression matrix Definition of LOD, Level of Detail and Information, LOD- Wall foundation, Precast Structural Inverted T-Beam, Domestic Water Piping, Plumbing Fixture, Packaged Generator Assembly, LOD- Chart, Matrix and Model Progression Matrix</p> <p align="right">L1, L2, L3.</p>			
<p align="center">Module-4</p>			
<p>4D / Field BIM & Its Applications: Introduction to 4D / Field BIM: Concept of 4D, Introduction to construction sequence and project schedule, Project scheduling using Gantt Chart and its limitation, 4D BIM Modeling Project demo and workflow, Synchronization of 4D BIM Model with project schedule, Reviewing project progress w.r.t planned dates and actual dates, Generation of Reports Application of Field BIM/ 4D BIM: Understanding concept and usage of BIM in field for coordination- 3D Coordination and Visual Communication, Site utilization planning and Construction analysis, Application of wearables in coordination. 3D Control and planning Other Applications of Field BIM/ 4D BIM: Concept and usages of BIM in field for safety, disaster and risk analysis, digital fabrication and scan to BIM, Existing Condition Modeling, Phase Planning, As-built/ Record Models</p> <p align="right">L1, L2, L3.</p>			

Module-5

5D BIM, AIM & Beyond BIM - Emerging Trends: 5D BIM: Introduction concepts of 5D BIM, Quantity take off with UoM, Concept of QTO with UoM, 5D BIM with UoM with cost, Quantity take off exercise, Demo of Quantity take off: Understanding QTO for Wall, Plaster & Tile, BIM Maturity LOD and General Practice of QTO, Cost Breakup structures, 5D BIM and cost control AIM: Introduction to Asset Information Model (AIM), COBie structures and Asset Information Deliverables, Space Attributes and Asset Attributes- Examples with data, Asset requirement Discipline wise Infrastructure System, Classification code and Information Exchange, Information Exchange with Facility Management Beyond BIM: Emerging Trends- Concepts of Industrialisation, IoT, Big Data, Data Analytics and their applications in BIM: Industrialisation of Construction through BIM- DfMA, IoT in BIM, BIM and Big data, Data Analytics using AI & ML Future scope of BIM Applications: Smart Infrastructure and the need for connected infrastructure, Digital twins- Concepts and benefits, National Digital Twin or a City level Digital Twin in a Smart City, Fundamental requirements for the success of a Digital Twin and its uses, Digital Twin applications in diverse industries. **L1, L2, L3.**

Course outcome

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

1. Interpret the basic principles of BIM evolution and concept of BIM in lifecycle of project
2. Understand the workflows of Design authoring followed in industry during creation of 3D model
3. Analyze the engineering analysis and the process followed in industry to check and resolve clashes
4. Evaluate the integration of schedule and cost in 3D model using 4D and 5D BIM
5. Illustrate the various emerging trends of BIM & concept of digital twin

Suggested Learning Resources:**Books**

1. ISO 19650 - Building Information Modelling (BIM)
2. BIM Handbook – Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston

Web links and Video Lectures (e-Resources):

E-learning content on L&T EduTech Platform.

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

Create a plan of residential building and practice BIM tools

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV</p>			
<p align="center">Construction Equipment, Plants and Machinery (2:2:0) 3 (Effective from the academic year 2023-24)</p>			
Course Code	BCV405B	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	2:2:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3
<p>Course objectives:</p> <ol style="list-style-type: none"> 1. To provide insight on the different functions and operations of different equipment and techniques during construction 2. To impart knowledge on the various maintenance and safety to be considered during construction 3. To acquire knowledge on the life cycle of a construction equipment 4. To adopt mechanization in the Construction industry 			
Module-1			
<p>Introduction to Construction Equipment- Classification of Construction Equipment, Factors behind the selection of equipment's. Earth Moving Equipment: Classification and Types, Functions, Attachments of Excavators, Operations of Earth Moving Equipment. Hoisting Equipment: Classification and Types, Functions, Operations of Hoisting Equipment. L1, L2, L3.</p>			
Module-2			
<p>Road Making and Quarry/Mining Equipment: Introduction, Classification and Types, Functions, Operations of Equipment. Classification to Hot mix Plant Process of Asphalt Paver-PQC Paver-. Classification & Components- Motor Grader and Horizontal Movement Vehicles. L1, L2, L3.</p>			
Module-3			
<p>Concreting Equipment: Classification and Types, Functions and Operations. Operations of a Batching Plant - Introduction - Components of Concrete Pump & Placer - Concrete Pipeline Laying and Cleaning. Equipment Life Cycle Management: Life Cycle of an Equipment- Equipment Performance Parameters - Introduction to Maintenance- Types of Maintenance- Maintenance Practices. Equipment Acquisition, Depreciation and method of calculation of depreciation. L1, L2, L3.</p>			
Module-4			
<p>Tunnelling Equipment / Piling Equipment: Introduction to Tunnel Boring Machines- Details and Operation of a Hard-Rock TBM Details of Earth Pressure Balance (EPB) TBM- Details and operation of Slurry TBM & Components- Hydraulic Grabs- Piling Rig L1, L2, L3.</p>			
Module-5			
<p>Mechanization and Digitalization in Construction and Safety in Construction Equipment: Importance of Digital Analytics- Digital Solution in Construction Projects- Importance of Mechanization - Railway Track Construction- Rebar Processing Machine- Operation of Mechanized Equipment- Introduction to 3D Concrete Printer- Importance of Safety- Various PPE & Purpose- Safety of Men & Machines at Work- Safety During Construction Activities Safety with Tools & Tackles L1, L2, L3.</p>			

<p>Course outcome</p> <p>At the end of the course, the student will be able to:</p> <ol style="list-style-type: none"> 1. Evaluate equipment and techniques required during construction 2. Understand the operation of a batching plant. 3. Analyse the equipment life cycle management. 4. Comprehend mechanization and digitalisation in construction
<p>Suggested Learning Resources:</p> <p>Books</p> <ol style="list-style-type: none"> 1. Velumani. P, “Construction Techniques and Practices”, SIA Publishers & Distributers PvtLtd, 2020. 2. Dr. Manoranjan Samal, “Advanced Construction Techniques and Equipment” S.K. Kataria& Sons 3. S.C.Sharma, “Construction Equipment and management” E-Book .2019.
<p>References</p> <ol style="list-style-type: none"> 1. Kumar Neeraj Jha, “Construction Project Management” PEARSON publications
<p>Web links and Video Lectures (e-Resources):</p> <ul style="list-style-type: none"> • E-learning content on L&T EduTech Platform.
<p>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</p> <ul style="list-style-type: none"> • Visit to construction site to understand construction equipments

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV</p>			
<p align="center">Concreting Techniques and Practices (2:2:0) 3 (Effective from the academic year 2023-24)</p>			
Course Code	BCV405C	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	2:2:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3
<p>Course objectives:</p> <ol style="list-style-type: none"> 1. To present the basics of concrete and different materials used in it. 2. To impart knowledge on materials used in concrete, relevant Indian standard codes, and practical aspects on concreting activities at projects. 3. To explain the importance of making good quality concrete to build durable structures. 4. To introduce the Design of concrete mixes from the Industrial experiences at Sites and optimization of higher grades of Concrete. 5. To get overview of pre-cast elements and their application in construction industry. 6. To learn the best practices in concrete construction from industry's decades of experiences, thumb rules, mitigation of concreting issues at Sites 			
Module-1			
<p>Introduction to concrete, overview of materials- cement, low carbon cement, coarse aggregate and fine aggregate, and mineral admixture:- fly ash, GGBS, micro silica / silica fume, metakaolin / rice husk ash, composite cement and ultrafine materials, lab test - fineness of fly ash, recycled aggregate- Physical & chemical Properties of admixtures.</p> <p>Water and chemical admixture: source, requirements, limits and testing Blending of fine and coarse aggregate, gradation for optimization and practical aspects. L1, L2, L3.</p>			
Module-2			
<p>Mix design - Volumetric mix design, mix design by absolute volume method, worked out practical examples based on industries experience at project sites over several decades, higher grades of concrete, high performance concrete, test on concrete: workability of concrete, flexural and compressive strength tests, Overview on mix design using IS 10262:2019. L1, L2, L3.</p>			
Module-3			
<p>Production of concrete- batching plant, calibration, mixing and transportation of concrete handling of concrete at construction, ready-mix concrete, pumping, placing of concrete with boom placers, levelling, vibration and compaction, cold joints, finishing and curing and protection of concrete. L1, L2, L3.</p>			
Module-4			
<p>Pre-cast concrete elements- Difference between Precast and Other forms of Concrete construction, Advantages of this form of construction. Need for Prefabrication: Principles of prefabrication, Comparison with cast-in-situ construction, types of prefabrication, automation in manufacturing of precast elements, Erection. Structural Concepts of Precast concrete Systems: Loads, Load path, Limit states, Precast Concrete building systems. L1, L2, L3.</p>			
Module-5			
<p>Special types of concrete: self-compacting concrete, mass concrete, dry lean concrete, geo-polymer concrete, pavement quality concrete, fiber reinforced concrete, composite concrete, lightweight concrete, ferro-cement, shotcreteing, guniting, grouting, challenges faced at sites: plastic shrinkage cracks, plastic settlement, honey comb, bug holes, cover to concrete, do's and don'ts in concrete construction, site shoot, introduction on 3D printing. Mix ratio proportion of special concrete. L1, L2, L3.</p>			

<p>Course outcome</p> <p>At the end of the course, the student will be able to :</p> <ol style="list-style-type: none"> 1. Evaluate the properties of concrete by conducting test on cement, aggregate and concrete(with & without admixtures) for using the data for Mix design procedures 2. Understand to Select and proportionate different materials used in a concrete mix including admixtures 3. Design a concrete mix as per requirement of construction project 4. Gather knowledge on pre-cast elements and their application in construction industry. 5. Apply the best practices in concrete construction from industry's requirement, thumb rules,mitigation of concreting issues at Sites.
<p>Suggested Learning Resources:</p> <p>Books</p> <ol style="list-style-type: none"> 1. Concrete Technology by M. S. Shetty, S Chand, New Delhi-110055. 2. Concrete Technology by M. L. Gambhir, Tata McGraw-Hill. 3. Structural design manual", Precast concrete connection details, Society for the studies in the use of precast concrete, Netherland Betor Verlag, 2009 4. IS 456, IS 269, IS 516, IS 1786, IS 1893, IS 12269, IS 9103, IS 8112, IS 10262
<p>Web links and Video Lectures (e-Resources):</p> <ul style="list-style-type: none"> • E-learning content on L&T EduTech Platform.
<p>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</p> <ul style="list-style-type: none"> • Visit to construction site to understand concreting process

B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV			
Watershed Management (2:2:0) 3 (Effective from the academic year 2023-24)			
Course Code	BCV405D	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3
Course objectives: <ol style="list-style-type: none"> 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 			
Module-1			
Principles of Watershed Management: Basics concepts, hydrology and water availability, surface water, ground water, water budget equation conjunctive use, human influences and effects of climate change in the water resources system- urban and rural area. L1, L2, L3.			
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, L1, L2, L3.			
Module-3			
Conservation of Water: Perspective on recycle and reuse, wastewater reclamation, lake rejuvenation, 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 for rural and urban area, roof catchments system, check dams, aquifer storage, urban flood management. L1, L2, L3.			
Module-4			
Sustainable Watershed Approach: Sustainable integrated watershed management, natural resources management, agricultural practices, integrated farming, soil erosion and conservation. National water policy in India and International water law. L1, L2, L3.			
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. L1, L2, L3.			

Course outcome At the end of the course, the student will be able to : <ol style="list-style-type: none"> 1. Discuss surface and ground water resources system and, human influences. 2. Integrate water resources system in arid and semi-arid regions and explain watershed aquifer for management. 3. Analyze water resources related issues for conservation and synthesize augmentation of water resources. 4. Design integrated watershed management system. 5. Apply modern tools in watershed management.
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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

Web links and Video Lectures (e-Resources):

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

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

- Seminars/Quiz (To assist in GATE Preparations)
- Self-Study on simple topics
- Discussion of case studies
- Field visits to construction sites

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV</p>			
<p align="center">Finance for Professionals (1:0:0) 1 (Effective from the academic year 2023-24)</p>			
Course Code	BCV456A	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Exam Hours	1
<p>Course objectives:</p> <ol style="list-style-type: none"> To give learners an overview of finance and develop their finance sense 			
<p align="center">Module-1</p>			
<p>Economics: Introduction to economics, Economic policies, Role of monetary policy in managing the economy L1, L2, L3.</p>			
<p align="center">Module-2</p>			
<p>Finance Vocabulary and Financial Statements: Unique role of finance, Unique role of finance example, Accounting, finance & auditing, Capital vs. revenue, Capital vs. revenue example, Sources & uses of funds, Sources & uses of funds example, Revenue recognition principles, Double entry bookkeeping, Illustration of double entry book keeping, Understanding profit & loss, Understanding profit & loss example, Profit and profitability, Profit and profitability example 1, Profit and profitability example 2 L1, L2, L3.</p>			
<p align="center">Module-3</p>			
<p>Financial Statement and Risk Analysis: Finance metrics & financial statement analysis, Finance metrics & financial statement analysis example, understanding liquidity, understanding liquidity example, Funds flow analysis, Example of funds flow analysis, Cash flow analysis, Example of cash flow analysis, Introduction to risk management, understanding risk management example, Management of risk, understanding risk management measurement example, Understanding risk management products example, Holistic look at risk management. L1, L2, L3.</p>			
<p align="center">Module-4</p>			
<p>Time Value of Money: Time value of money, understanding time value of money, understanding financial functions, Applications of time value of money, Capital structure, Capital structure example, Cost of capital, Cost of capital example, Capital budgeting, Understanding capital budgeting - example L1, L2, L3.</p>			
<p align="center">Module-5</p>			
<p>Personal Finance: Financial Instrument, Approaches to investing, Ratios for investment, Portfolio management principles, Example of portfolio, forming a portfolio, Forming a portfolio example, Bill book entry as Schedule of rates (example). L1, L2, L3.</p>			
<p>Course outcome</p> <p>At the end of the course the student will be able to:</p> <ol style="list-style-type: none"> Understand how their work and effort contribute to organizational financial performance Comprehend financial acumen and tools to optimize outcomes 			

Suggested Learning Resources:**Books**

1. Financial Management: Theory & Practice | 11th Edition by Prasanna Chandra
2. International Financial Reporting Standards (Bangalore Univ)

Web links and Video Lectures (e-Resources):

- E-learning content on L&T EduTech Platform.

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

- Case study to understand the project finance concept

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV</p>			
<p align="center">GIS with Quantum GIS (0:2:0) 1 (Effective from the academic year 2023-24)</p>			
Course Code	BCV456B	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	0:2:0	SEE Marks	50
Total Number of Contact Hours	15	Exam Hours	1
<p>Course objectives:</p> <ol style="list-style-type: none"> 1. Learning the open source QGIS software for Civil Engineering applications 2. Understand raster and vector data 3. Creation of base map and thematic maps for specific application 			
<p align="center">Module-1</p>			
<p>QGIS Introduction: Definition of GIS and its use. Introduction to a free and open source desktop geographic information system software. Types of data (vector and raster formats), web services, useful commands and utilities for geo-processing, extending its capabilities to digital satellite image processing and analysis L1, L2, L3.</p>			
<p align="center">Module-2</p>			
<p>INTRODUCTION IN QGIS About QGIS Characteristics of QGIS Start using QGIS. QGIS TOOLS QGIS Configuration, General tools, Working with projections QGIS Browser. WORKING WITH RASTER DATA Introduction, Display raster data, Raster calculator, Working with images, Practical exercises: Working with raster data and operations with images. L1, L2, L3.</p>			
<p align="center">Module-3</p>			
<p>QGIS PLUGINS Additional modules of QGIS or “plugins” Description of Plugins incorporated in QGIS Operations through “plugins” Practical exercises: Different QGIS “plugins” and their applications: GDAL library tool, georeferencing, coordinate capture, format converter. L1, L2, L3.</p>			
<p align="center">Module-4</p>			
<p>CREATE MAPS AND RELATED PRODUCTS: Creation tools, Graphic elements, Atlases generation, and Graphic output creations. Practical exercises: Map creation with QGIS. L1, L2, L3.</p>			
<p align="center">Module-5</p>			
<p>RELATIONAL DATABASE MANAGEMENT SYSTEMS AND SPATIAL DATA. Database design, Database connections, Table joins Spatial joins, generate new statistics and new data using table and spatial data information. Practical exercises: Creation of thematic maps like population data of taluk, Watershed map with drainage and water bodies, Highway with other 2 road intersection details L1, L2, L3.</p>			

<p>Course outcome</p> <p>At the end of the course the student will be able to:</p> <ol style="list-style-type: none"> 1. Use open source software for civil engineering applications 2. Various tools in QGIS software 3. Create thematic layers with attribute data 4. Generate maps for decision making
<p>Suggested Learning Resources:</p> <p>Books</p> <ol style="list-style-type: none"> 1. Geographic Information System-An Introduction, Tor Bernharadsen, 2009, 3rd Edition, Wiley India Pvt. Ltd. New Delhi, ISBN - 9788126511389. 2. Principles of Remote sensing and Image Interpretation, Lillesand and Kiefer, 2011, 6th Edition, John Wiley Publishers, New Delhi, ISBN – 8126532238.
<p>Web links and Video Lectures (e-Resources):</p> <ul style="list-style-type: none"> • YouTube videos • https://docs.qgis.org/3.16/pdf/en/QGIS-3.16-DesktopUserGuide-en.pdf for QGIS manual • NPTEL Lectures.
<p>Activity Based Learning (Suggested Activities in Class)/ Practical Based learning</p> <ul style="list-style-type: none"> • Prepare the thematic maps using google earth images for various applications

B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV			
Electronic Waste Management - Issues and Challenges (0:2:0) 1 (Effective from the academic year 2023-24)			
Course Code	BCV456C	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	0:2:0	SEE Marks	50
Total Number of Contact Hours	15	Exam Hours	1
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.			
Module-1 Introduction: Definition - Global Overview of E-waste Generation Rates - National (India's) Overview of E-waste Generation Rates L1, L2, L3.			
Module-2 E-waste Composition: Components, Examples & Sources L1, L2, L3.			
Module-3 E-Waste Hazards & Toxicity: Environmental Risks & Risk to Human Health - Case Studies L1, L2, L3.			
Module-4 Methods of E-waste Collection - Methods of E-waste Recycling, Reuse & Repair - Methods of E-waste Disposal - Business opportunity L1, L2, L3.			
Module-5 E-Waste Management Policies - E-waste Regulations in India L1, L2, L3			
<ul style="list-style-type: none"> • Self-Study: MOOC - UNITAR's e-course "How to Prevent E-Waste?" • Site-visit - To locate e-waste collection and recycling facilities in respective locality and understand how value can be created from household e-wastes. • Awareness Exercise - To enable a change in consumer behavior, by raising the awareness with regard to the role of other stakeholders, including local governments, retailers and manufacturers. 			
Course Outcome At the end of the course the student will be able to.... 1. Identify different types of E-wastes; and their hazards, owing to improper E-waste Management. 2. Identify the appropriate methods for the organized collection, recycling and disposal of E-wastes. 3. Demonstrate knowledge of the existing policies, regulations, and frameworks for E-waste management and generation aspects across the Globe and in India. 4. Highlight individual and community actions to tackle and manage E-waste Management.			

Reference Materials

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.
6. Rajesh Gopinath and N. Balasubramanya, "Environmental science and Engineering", 1st Edition, City of Publisher, Cengage Learning India Private Limited, 2018.
7. Rajesh Gopinath, E-Waste and the uprising technological Era in Environmental Inequality, BEL (Quarterly Bulletin), March 2019.

Web links and Video Lectures (e-Resources):

NPTEL video Lectures.

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

Visit to an E-waste management industry

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV</p>			
<p align="center">Technical Writing Skills (1:0:0) 1 (Effective from the academic year 2023-24)</p>			
Course Code	BCV456D	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Exam Hours	1
<p>Course objectives:</p> <ol style="list-style-type: none"> 1. Achieve better Technical writing and Presentation skills for employment. 2. Develop adequate knowledge of paragraph writing and precise writing techniques 3. Write business proposals and reports. 4. Write conference papers and prepare gist of published papers. 5. Develop efficiency in drafting social media posts and blogs. 			
Module-1			
<p>Technical Report Writing: Introduction to Technical writing process, Understanding of writing process, Introduction to various Technical Report writing. L1, L2, L3</p>			
Module-2			
<p>Art of condensation and Paragraph Writing: Introduction and importance, Types and principles of condensation. Importance of paragraph writing, Features and its construction styles. L1, L2, L3</p>			
Module-3			
<p>Business Report Writing: Introduction, Definition and Salient features of Business reports. Significance and types of report writing. (Formal and Informal). Resume building and Types of resumes. (samples of resumes) L1, L2, L3</p>			
Module-4			
<p>Technical Articles and Proposals: Nature and significance, Types of technical Articles Journal articles and conference papers. Elements of technical articles. Introduction to technical proposal writing, Purpose, importance, structure and types of technical proposals. Plagiarism Checking and Proof reading. L1, L2, L3</p>			
Module-5			
<p>Social media posts and Blog Writing: Ethics and practices of social media posts, Principles and fundamentals, Guiding principles for composition of articles, some common pitfalls. Maintaining common etiquette. Blogs and Blog writings strategies. L1, L2, L3</p>			
<p>Course outcome</p> <p>At the end of the course the student will be able to:</p> <ol style="list-style-type: none"> 1. Effectively communicate in technical matters. 2. Practice preparation of gist, abstract and notes from a technical article. 3. Prepare a business proposals and reports. 4. Write and respond in social media and write blogs. 			

Suggested Learning Resources:**Books**

1. Sanjay Kumar and Pushpalata, 'Communication Skills', Oxford University Press. 2018.
2. M. Ashraf Rizvi, 'Effective Technical Communication', McGraw Hill, 2018.
3. Gajendra Singh Chauhan and et.al. 'Technical Communication', Cengage Publication, 2018.
4. Meenakshi Raman and Sangeeta Sharma, Technical Communication Principles and Practice, Oxford University Press, 2018.

Web links and Video Lectures (e-Resources):

- <https://developers.google.com/tech-writing/announcements>
- <https://www.classcentral.com/course/technical-writing-7117>.

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

- Demonstrations of Videos
- Group Discussion
- Practice sessions
- Presentation on any social issues
- Quizzes

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER - IV</p>			
<p align="center">BIOLOGY FOR ENGINEERS (3:0:0)3 (Effective from the academic year 2023-24)</p>			
Course Code	BBOK407	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3 Hour
Course Objectives:			
<p>This course will enable students to:</p> <ol style="list-style-type: none"> 1. Understand the biological concepts from an engineering perspective and applications. 2. Acquire knowledge on biomolecules and human organ system. 3. Impart knowledge about spectroscopy and clinical imaging system for biological study. 4. Gain knowledge on Nature-Bioinspired mechanisms and materials can be substitute. 5. Learn about recent developments and trends in Bioengineering 			
Module – 1			
<p>Introduction to Biology</p> <p>Importance of Biology for Engineers, need to study Biology, Life Science studies significance. The cell: the basic unit of life, Structure and functions of a cell. Prokaryotic and Eukaryotic cell, carbohydrates nucleic acids: Classification, salient features, functions. Enzymes: Classification, properties and functions. plant based proteins and protein as food, Lipids: functions, biodiesel, cleaning agents/detergents.</p> <p>Spectroscopy and Microscopy techniques for Biology</p> <p>Basic principle and biological applications of infrared spectroscopy, Case studies on Raman spectroscopy and its use in biological studies. (8 Hours)</p> <p align="right">(L1,L2,L3)</p>			
Module – 2			
<p>Biomolecules and Applications</p> <p>Carbohydrates: cellulose-based water filters, PHA and PLA as bioplastics, Nucleic acids Forensics: DNA fingerprinting, Proteins: Proteins as food.</p> <p>Biological Mechanisms</p> <p>Skeletal muscles in the body, the structure of muscles, passive muscles, activating muscles, Gecko - Gecko tape, Whale fins - Turbine blades, Termite/ ant hill-passive cooling, Namib beetle- Water collection. Ventilators, Kidney as a filtration system: mechanism of filtration. Case studies on Biological Neural Network: Principles and importance. (08 Hours)</p> <p align="right">(L1,L2,L3)</p>			
Module – 3			
<p>Human Organ Systems and Bio Designs: Brain as a CPU system: signal transmission and EEG, Robotic arms for prosthetics. Eye as a Camera system (architecture of rod and cone cells, lens materials, bionic eye). Heart as a pump system and electrocardiography (ECG). artificial heart, Lungs as purification system: gas exchange mechanisms, spirometry.</p> <p>Clinical Imaging System Basic principle and biological uses of Computerized Tomography (CT), Magnetic Resonance Imaging (MRI). Case studies on X-ray Imaging techniques and biological applications. (08 Hours)</p> <p align="right">(L1,L2,L3)</p>			

Module – 4	
<p>Nature-Bioinspired Mechanisms: Echolocation: ultrasonography/ultrasound Imaging, sonars Photosynthesis: bionic leaf, Birds and insects: flight aerodynamics. Lotus leaf effect: super hydrophobic and self-cleaning surfaces, Mosquito inspired micro needle, Plant burrs: Velcro, Shark skin: Friction reducing swim suits, Kingfisher beak: Bullet train.</p> <p>Nature-Bioinspired Materials: Bio filter, biochips and their applications in health. Physiological Assist Device: Artificial Skin, artificial limbs. Case studies on Bio-composites. (08 Hours)</p> <p style="text-align: right;">(L1,L2,L3)</p>	
Module – 5	
<p>Trends in Bioengineering</p> <p>Introduction to regenerative medicine: Muscular and Skeletal Systems as scaffolds (architecture, mechanisms,), scaffolds and tissue engineering,3D printing of ear, bone and skin, 3D printed foods. Artificial Self-healing Bioconcrete based on bacillus spores and calcium lactate nutrients, Biosensors for personal diabetes management, Biopolymers, Bio fertilizer, Artificial kidney, immunological biosensors: types and applications. DNA bio sensor. Case study on Bio printing techniques and materials. (08 Hours)</p> <p style="text-align: right;">(L1,L2,L3)</p>	
<p>Course Outcomes:</p> <p>The students will be able to:</p> <p>CO1: Describe the concept of Biology from an engineering perspectives and applications.</p> <p>CO2: Summarize biomolecules and human organ systems.</p> <p>CO3: Discuss microscopy techniques and clinical imaging system for biological study.</p> <p>CO4: Illustrate Nature-Bioinspired materials and mechanisms.</p> <p>CO5: Elaborate principles and applications of bioengineering.</p>	
Textbooks:	
[1]	Biology for Engineers, Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., Tata McGraw-Hill, New Delhi, 2012.
[2]	Biology for Engineers, Rajendra Singh C and Rathnakar Rao N, Rajendra Singh C and Rathnakar Rao, N Publishing, Bengaluru, 2023.
References:	
[1]	Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011
[2]	Wilson and Walker- Principles and Techniques of Biochemistry and Molecular Biology, by Andreas Hofmann, Samuel Clokie. 2018 Edition.
[3]	Biology for Engineers, Sohini Singh and Tanu Allen, Vayu Education of India, New Delhi, 2014.
[4]	3D Bioprinting: Fundamentals, Principles and Applications by Ibrahim Ozbolat, Academic Press, 2016.
	<p>Web links and Video Lectures (e-Resources):</p> <ul style="list-style-type: none"> • 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

	<ul style="list-style-type: none">• https://www.coursera.org/courses?query=biology• https://onlinecourses.nptel.ac.in/noc19_ge31/preview• https://www.classcentral.com/subject/biology• https://www.futurelearn.com/courses/biology-basic-concepts
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<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER – IV</p>			
<p align="center">Universal Human Values (UHV) (1:0:0)1 (Common to all branches) (Effective from the academic year 2023-24)</p>			
Course Code	BUHK408	CIE Marks	50
Teaching Hours/Week (L: T:P:S)	1:0:0	SEE Marks	50
Total Number of Contact Hours	15-hour Theory Session +15 hour Self study	Exam Hours	01
<p>Course Objectives: This course is intended to:</p> <ol style="list-style-type: none"> 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. 4. This course is intended to provide a much-needed orientation input in value education to the young enquiring minds 			
Module – 1			
<p>Introduction to Value Education: 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 (03 Hours) L1,L2,L3</p>			
Module – 2			
<p>Harmony in the Human Being: 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. (03 Hours) L1,L2,L3</p>			
Module – 3			
<p>Harmony in the Family and Society: 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. (03 hours) L1,L2,L3</p>			
Module – 4			
<p>Harmony in the Nature/Existence: 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 (03 hours) L1,L2,L3</p>			
Module – 5			
<p>Implications of the Holistic Understanding – a Look at Professional Ethics: 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 (03 hours) L1,L2,L3</p>			
<p>Course outcome At the end of the course, students are expected to become more aware of themselves, and their surroundings (family, society, nature);</p>			

Co1: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. □ They would have better critical ability.
 Co2: They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
 CO3. 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.

Expected to positively impact common graduate attributes like:

1. Ethical human conduct
2. Socially responsible behaviour
3. Holistic vision of life
4. Environmentally responsible work
5. Having Competence and Capabilities for Maintaining Health and Hygiene
6. Appreciation and aspiration for excellence (merit) and gratitude for all

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. 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

Textbooks and Teachers Manual

1.	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 97893-87034- 47-1
2.	The Teacher's Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G

References

1.	Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantik, 1999
2.	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004
3.	The Story of Stuff (Book).
4.	SThe Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5.	Small is Beautiful - E. F Schumacher
6.	Slow is Beautiful - Cecile Andrews
7.	Economy of Permanence - J C Kumarappa.
8.	Bharat Mein Angreji Raj – Pandit Sunderlal
9.	Rediscovering India - by Dharampal
10.	Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11.	India Wins Freedom - Maulana Abdul Kalam Azad
12.	Vivekananda - Romain Rolland (English)

13	Gandhi - Romain Rolland (English)
14	Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
15	Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome’s report, Universe Books.
16	A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
17	P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers
18	A N Tripathy, 2003, Human Values, New Age International Publishers.
19	Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
20	E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
21	M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
22	B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books
23	B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
Web links and Video Lectures (e-Resources): <ul style="list-style-type: none"> • 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 • Al Gore, An Inconvenient Truth, Paramount Classics, USA • Charlie Chaplin, Modern Times, United Artists, USA • IIT Delhi, Modern Technology – the Untold Story • Gandhi A., Right Here Right Now, Cyclewala Productions • https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw • https://fdp-si.aicte-india.org/8dayUHV_download.php • https://www.youtube.com/watch?v=8ovkLRYXIjE • https://www.youtube.com/watch?v=OgdNx0X923I • https://www.youtube.com/watch?v=nGRcbRpvGoU • https://www.youtube.com/watch?v=sDxGXOGYEKM 	

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER – IV</p>			
<p align="center">NSS (0:0:2) (Common to all branches) (Effective from the academic year 2023-24)</p>			
Course Code	BNSK459	CIE Marks	100
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	-
Total Number of Contact Hours	26	Exam Hours	-
<p align="center">Mandatory Course (Non-Credit) (Completion of the course shall be mandatory for the award of degree)</p>			
<p>Course Objectives: National Service Scheme (NSS) will enable the students to:</p> <ol style="list-style-type: none"> 11. Understand the community in general in which they work. 12. Identify the needs and problems of the community and involve them in problem solving. 13. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems. 14. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes. 15. Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general. 			
Module – 1			
<p>Introduction to NSS History and growth of NSS, Philosophy of NSS, Objectives of NSS, Meaning of NSS Logo, NSS Programs and activities, administrative structure of NSS, Planning of programs / activities, implementation of NSS programs / activities, National & State Awards for NSS College / Program Officer / Volunteers.</p>			
(04 Hours) L1,L2,L3			
Module – 2			
<p>Overview of NSS Programs Objectives, special camping – Environment enrichment and conservation, Health, Family, Welfare and Nutrition program. Awareness for improvement of the status of women, Social Service program, production-oriented programs, Relief & Rehabilitation work during natural calamities, education and recreations, Selection of the problem to be addressed.</p>			
(04 Hours) L1,L2,L3			
Module – 3			
<p>NSS Activities - Group Contributions to Society / community (Activity based Learning) Organic Farming, Indian agriculture (Past, Present, Future) Connectivity for marketing, Waste management– Public, Private and Govt. organization, 5 R's. Water conservation techniques – role of different stakeholders – implementation, preparing an actionable business proposal for enhancing the village income and approach for implementation. Helping local schools to achieve good results and enhance their enrolment in Higher/ technical/ vocational education.</p>			
(06 Hours) L1,L2,L3			
Module – 4			
<p>NSS National Level Activities for Society / Community at large (Activity based Learning) Developing Sustainable Water management system for rural areas and implementation approaches. Contribution to any national level initiative of Government of India. Foreg. Digital India, Skill India, Swachh Bharat, Atmanirbhar Bharath, Make in India, Mudra scheme, Skill development programs etc.</p>			
(06 Hours) L1,L2,L3			
Module – 5			
<p>NSS Individual Activities for Local Voice (Activity based learning) Govt. school Rejuvenation and helping them to achieve good infrastructure, Plantation and adoption of plants. Know your plants. Spreading public awareness under rural outreach programs, National integration and social harmony events.</p>			
(06 Hours) L1,L2,L3			

Course outcomes :

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

CO1: Understand the importance of his / her responsibilities towards society.

CO2: Analyse the environmental and societal problems/issues and will be able to design solutions for the same.

CO3: Evaluate the existing system and to propose practical solutions for the same for sustainable development.

CO4: Implement government or self-driven projects effectively in the field.

CO5: Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

Teaching Practice:

- Classroom teaching (Chalk and Talk)
- ICT – Power Point Presentation
- Audio & Video Visualization Tools

Assessment Details

Weightage	CIE – 100%
Presentation -1 Selection of topic, PHASE-1	20 Marks
Commencement of activity and its progress – PHASE – 2	20 Marks
Case Study based Assessment – Individual performance	20 Marks
Sector wise study and its consolidation	20 Marks
Video based seminar for 10 minutes by each student at the end of the course with Report	20 Marks

Suggested Learning Resources:**Books:**

1. NSS Course Manual, Published by NSS Cell, VTU Belagavi.
2. Government of Karnataka, NSS cell, activities reports and its manual.
3. Government of India, NSS cell, Activities reports and its manual.

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER – IV</p>			
<p align="center">Sports (0:0:2) (Common to all Branches) (Effective from the academic year 2023-24)</p>			
Course Code	BPEK459	CIE Marks	100
Teaching Hours/Week (L: T:P)	0:0:2	SEE Marks	--
Total Number of Contact Hours	26	Exam Hours	--
<p align="center">Mandatory Course (Non-Credit) (Completion of the course shall be mandatory for the award of degree)</p>			
<p>Course Objectives: The course will enable students to</p> <ol style="list-style-type: none"> 1. Develop a healthy life style. 2. Acquire Knowledge about various stages of sports and games. 3. Focus on modern technology in sports. 			
<p align="center">Module – 1</p>			
<p>Introduction of the game: Aim of sports and games, Brief history of the game, Nature of the game, Terminology & Modern trends of the game, Fitness & Skill tests along with Game Performance. (06 Hours) L1,L2,L3</p>			
<p align="center">Module – 2</p>			
<p>Offensive and Defensive Techno Tactical Abilities: Fitness, Fundamentals & Techniques of the game with the implementation of Biomechanics, Tactics- Drills for the Techno Tactical abilities, Individual and Group, Miner games- to implement the Techniques, Tactics and Motor abilities. (05 Hours) L1,L2,L3</p>			
<p align="center">Module – 3</p>			
<p>Team tactics and Rules of the Game: Rules and Regulations of the Game: Game rules as well as sequence of officiating, Team tactics: Offensive and Defensive team strategies and scrimmages, Practice Matches: among the group, Analysis of Techno Tactical abilities: Correction and implementation of skills and Sports Injuries and rehabilitation: First aid, PRICE treatment, (05 Hours) L1,L2,L3</p>			
<p align="center">Module – 4</p>			
<p>Sports Training: Introduction of Sports Training, Principles of Sports performance, how to increase and sustain the sports performance, Training Load & Recovery- How to increase the training load (volume/Intensity) and means and methods for Recovery, Periodization: Shorts, Medium and Long term, Physiological changes: Changes in Lung capacity, heart beats etc... (05 Hours) L1,L2,L3</p>			
<p align="center">Module – 5</p>			
<p>Organization of Sports Event: Tournament system, Planning and preparation for the competition, Ground preparation and Equipment's, Organizing an event among the group. (05 Hours) L1,L2,L3</p>			

The above 5 modules are common to all the sports events / games, we are offering the following games: **1. Baseball, 2. Kabaddi, 3. Table Tennis, and 4. Volleyball.**

Course outcomes:

The students will be able to:

- 6 Understand the importance of sports and games, inculcate healthy habits of daily exercise & fitness, Self-hygiene, good food habits, Create awareness of Self-assessment of fitness.
- 7 Develops individual and group techno tactical abilities of the game.
- 8 Increases the team combination and plan the strategies to play against opponents.
- 9 Outline the concept of sports training and how to adopt technology to attain high level performance.

10 Summarize the basic principles of organising sports events and concept of technology implemented to organise competitions in an unbiased manner.
<p>Teaching Practice:</p> <ul style="list-style-type: none"> Classroom teaching (Chalk and Talk) ICT – Power Point Presentation and video analysing. Practical classes in outdoor and indoor as per requirement.
<p>CIE: 100 Marks</p> <ul style="list-style-type: none"> CIE 1 for 40 marks – A theory paper which is MCQ / Descriptive conducted during the semester. CIE 2 for 60 marks – A practical test conducted at the end of the semester in which the student has to give fitness and skill tests and his performance in game will be assessed.
<p>Textbooks</p> <ol style="list-style-type: none"> Barbara Bushman, “ACSM’s complete guide to Fitness & Health”, 2011, Human Kinetics USA Pankaj Vinayak Pathak, “Sports and Games - Rules and Regulation”, 2019, Khel Sahitya Kendra. Hardayal Singh, “Sports Training, General Theory & Methods”, 1984 “Netaji Subhas, National Institute of Sports”. Keith A. Brown, “International Handbook of Physical Education and Sports Science”, 2018, (5 Volumes) Hardcover. <p>References</p> <ol style="list-style-type: none"> Tudor O Bompa, ” <i>Periodization Training for Sports</i>”, 1999, Human Kinetics, USA Michael Boyle, “New Functional Training for Sports” 2016, Human Kinetics USA Michael Kjaer, Michael Rogsgaard, Peter Magnusson, Lars Engebretsen & 3 more, “Text book of Sports Medicine: Basic Science and Clinical Aspects of Sports Injury and Physical Activity”, 2002, Wiley Blackwell. Scott L. Delp and Thomas K. Uchida, “Biomechanics of Movement: The Science of Sports, Robotics, and Rehabilitation”, 2021, The MIT Press MCARDLE W.D. “Exercise Physiology Nutrition Energy And Human Performance” 2015, LWW IE (50)

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER – IV</p>			
<p align="center">Yoga (0:0:2) (Common to all Branches) (Effective from the academic year 2023-24)</p>			
Course Code	BYOK459	CIE Marks	100
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	-
Total Number of Contact Hours	26	Exam Hours	-
<p>Course Objectives: This course will enable students to:</p> <ol style="list-style-type: none"> 16. Understand the importance of practicing yoga in day-to-day life. 17. Be aware of therapeutic and preventive value of Yoga. 18. Have a focussed, joyful and peaceful life. 19. Maintain physical, mental and spiritual fitness. 20. Develop self-confidence to take up initiatives in their lives. 			
Module – 1			
<p>Introduction to Yoga: Introduction, classical and scientific aspects of yoga, Importance, Types, Healthy Lifestyle, Food Habits, Brief Rules, Sithalikaarana Practical classes. (04 Hours) L1,L2,L3</p>			
Module – 2			
<p>Physical Health: Introduction, Pre-requisites, Asana-Standing, Sitting, Supine and Prone, Practical classes. (06 Hours) L1,L2,L3</p>			
Module – 3			
<p>Psychological Health: Introduction Thought Forms, Kriya (Kapalabhati), Preparation to Meditation, Practical classes. (06 Hours) L1,L2,L3</p>			
Module – 4			
<p>Therapeutic Yoga: Mudra Forms, Acupressure therapy, Relaxation techniques Practical classes. (06 Hours) L1,L2,L3</p>			
Module – 5			
<p>Spirituality & Universal Mantra: Introduction, Being Human, Universal Mantra, Universal LOVE, Benefits of practice of Spirituality in day-to-day life, practical classes. (04 Hours) L1,L2,L3</p>			
<p>Course Outcomes: Students will be able to:</p> <ol style="list-style-type: none"> 6. Understand the requirement of practicing yoga in their day-to-day life. 7. Apply the yogic postures in therapy of psychosomatic diseases 8. Train themselves to have a focussed, joyful and peaceful life. 9. Demonstrate the fitness of Physical, Mental and Spiritual practices. 10. Develops self-confidence to take up initiatives in their lives. 			
<p>Teaching Practice:</p> <ul style="list-style-type: none"> • Classroom teaching (Chalk and Talk) • ICT – Power Point Presentation • Audio & Video Visualization Tools 			
<p>CIE: 100 Marks</p> <ul style="list-style-type: none"> • CIE 1 for 40 marks – A theory paper which is MCQ / Descriptive conducted during the semester. • CIE 2 for 60 marks – A practical test conducted at the end of the semester in which the student have to perform asanas. 			
<p>Textbooks</p> <ol style="list-style-type: none"> 1. George Feuerstein: The yoga Tradition (Its history, literature, philosophy and practice.) 2. Sri Ananda: The complete Book of yoga Harmony of Body and Mind. (Orient paper Backs: vision Books Pvt.Ltd., 1982. 3. B.K.S Iyengar: Light on the Yoga sutras of patanjali (Haper Collins Publications India Pvt.,Ltd., New 			

Delhi.)

4. Science of Divinity and Realization of Self – Vethathiri Publication, (6-11) WCSC, Erode

References

1. Principles and Practice of Yoga in Health Care, Publisher: Handspring Publishing Limited, ISBN: 9781909141209, 9781909141209

2. Basavaraddi I V: Yoga in School Health, MDNIY New Delhi, 2009

3. Dr. HR. Nagendra: Yoga Research and applications (Vivekanda Kendra Yoga Prakashana Bangalore)

4. Dr. Shirley Telles: Glimpses of Human Body (Vivekanda Kendra Yoga Prakashana Bangalore)

Web resources

Web links and Video Lectures (e-Resources): Refer links

1. <https://youtu.be/KB-TYlgd1wE>

2. <https://youtu.be/aa-TGOWg1Ls>

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER – IV</p>			
<p align="center">NCC (0:0:2) (Common to all Branches) (Effective from the academic year 2023-24)</p>			
Course Code	BNCK459	CIE Marks	100
Teaching Hours/Week (L: T:P)	0:0:2	SEE Marks	-
Total Number of Contact Hours	26	Exam Hours	-
<p align="center">Mandatory Course (Non-Credit) (Completion of the course shall be mandatory for the award of degree)</p>			
<p>Course Objectives: This course will enable students to:</p> <ul style="list-style-type: none"> Understand the vision of NCC and its functioning. Understand the security set up and management of Border/Coastal areas. Acquire knowledge about the Armed forces and general awareness. 			
<p align="center">Module– 1</p>			
<p>Introduction to National Cadet Corp: What is NCC, who can join NCC, benefits, Establishment, history, 3 wings, motto, core values, Aims, flag, song, pledge, cardinals, Organization, Director General NCC, Directorates, Uniform and Cadet ranks, Camps, Certificate exams, Basic aspects of drill. National Integration: Importance of national integration, Factors affecting national integration, Unity in diversity, Role of NCC in nation building. Disaster Management: What is a Disaster, Natural and Man-made disasters, Earthquake, Floods. <p align="right">(04 Hours) L1,L2,L3</p> </p>			
<p align="center">Module– 2</p>			
<p>Indian Army: Introduction to Indian Army, Command and control, Fighting & supporting arms, Rank structure, Major Regiments of the Army, Major Wars and Battles, Entry to the Indian Army, Renowned leaders and Gallantry Awardees. <p align="right">(02 Hours) L1,L2,L3</p> </p>			
<p align="center">Module– 3</p>			
<p>Indian Air Force: Introduction to Indian Air Force, Command and control, Rank structure, Major Aircrafts, Entry to the Indian Air Force, Renowned leaders. Indian Navy: Introduction to Indian Navy, Command and control, Rank structure, Major Ships and Submarines, Entry to the Indian Navy, Renowned leaders. <p align="right">(02 Hours) L1,L2,L3</p> </p>			
<p align="center">Module– 4</p>			
<p>Health and Hygiene: First Aid Protocols - CPR, Understanding Types of Bandages, Fire Fighting Field & Battle Crafts: Field Signals using hands, Judging distance -Types of Judging Distance, Section formations-types of Section Formation <p align="right">(10 Hours) L1,L2,L3</p> </p>			
<p align="center">Module– 5</p>			
<p>Drill Practicals: Savdhan, Vishram, Salute, Turning, Marching. <p align="right">(08 Hours) L1,L2,L3</p> </p>			

Course outcomes:

The students will be able to:

- CO1: Develop qualities like character, comradeship, discipline, leadership, secular outlook, spirit of adventure, ethics and ideals of selfless service.
- CO2: Get motivated and trained to exhibit leadership qualities in all walks of life and be always available for the service of the nation.
- CO3: Familiarize on the issues related to social & community development and disaster management and equip themselves to provide solutions.
- CO4: Get an insight of the defense forces and further motivate them to join the defense forces.

Teaching Practice:

- Blackboard/Multimedia Assisted Teaching.
- Class Room Discussions, Brainstorming Sessions, Debates.
- Activity: Organizing/Participation in Social Service Programs.
- On Ground: Drill training.

CIE: 100 Marks

- CIE 1 for 40 marks – A theory paper which is MCQ / Descriptive conducted during the semester.
- CIE 2 for 60 marks – A practical test conducted at the end of the semester.

Textbooks:

3. NCC Cadets Handbook –Common Directorate General of NCC, New Delhi.
4. NCC Cadets Handbook –Special(A), Directorate General of NCC, New Delhi.

References:

- Chandra B. Khanduri, “Field Marshal KM Cariappa: a biographical sketch”, Dev Publications, 2000.
- Gautam Sharma, “Valour and Sacrifice: Famous Regiments of the Indian Army”, Allied Publishers, 1990.

<p align="center">B.E. CIVIL ENGINEERING Choice Based Credit System (CBCS) SEMESTER – IV</p>			
<p align="center">Music (0:0:2) (Common to all Branches) (Effective from the academic year 2023-24)</p>			
Course Code	BMUK459	CIE Marks	100
Teaching Hours/Week (L: T:P)	0:0:2	SEE Marks	-
Total Number of Contact Hours	26	Exam Hours	-
<p align="center">Mandatory Course (Non-Credit) (Completion of the course shall be mandatory for the award of the Degree)</p>			
<p>Course Objectives: The course will enable the students to:</p> <ol style="list-style-type: none"> 1. Identify the major traditions of Indian music, both through notations and aurally. 2. Analyze the compositions with respect to musical and lyrical content. 3. Demonstrate an ability to use music technology appropriately in a variety of settings. 			
<p align="center">Module – 1</p>			
<p>Preamble: Contents of the curriculum intend to promote music as a language to develop an analytical, creative, and intuitive understanding. For this the student must experience music through study and direct participation in improvisation and composition.</p> <p>Origin of the Indian Music: Evolution of the Indian music system, Understanding of Shruthi, Nada, Swara, Laya, Raga, Tala, Mela.</p> <p align="right">(03 Hours) L1,L2,L3</p>			
<p align="center">Module – 2</p>			
<p>Compositions: Introduction to the types of compositions in Carnatic Music - Geethe, Jathi Swara, Swarajathi, Varna, Krithi, and Thillana, Notation system.</p> <p align="right">(03 Hours) L1,L2,L3</p>			
<p align="center">Module – 3</p>			
<p>Composers: Biography and contributions of Purandaradasa, Thyagaraja, Mysore Vasudevacharya.</p> <p align="right">(03 Hours) L1,L2,L3</p>			
<p align="center">Module – 4</p>			
<p>Music Instruments: Classification and construction of string instruments, wind instruments, percussion instruments, Idiophones (Ghana Vaadya), Examples of each class of Instruments</p> <p align="right">(03 Hours) L1,L2,L3</p>			
<p align="center">Module – 5</p>			
<p>Abhyasa Gana: Singing the swara exercises (Sarale Varase Only), Notation writing for Sarale Varase and Suladi Saptha Tala (Only in Mayamalavagowla Raga), Singing 4 Geethe in Malahari, and one Jathi Swara, One Nottu Swara OR One krithi in a Mela raga, a patriotic song</p> <p align="right">(14 Hours) L1,L2,L3</p>			

Course Outcomes (COs):

The students will be able to:

- CO1: Discuss the Indian system of music and relate it to other genres (Cognitive Domain)
- CO2: Experience the emotions of the composer and develop empathy (Affective Domain)
- CO3: Respond to queries on various patterns in a composition (Psycho-Motor Domain)

Teaching Practice:

- Classroom teaching
- ICT – PowerPoint Presentation
- Audio & Video Visualization Tools

CIE: 100 Marks

- **CIE 1** for 40 marks – A theory paper which is MCQ / Descriptive conducted during the semester
- **CIE 2** for 60 marks – A practical test conducted at the end of the semester in which the student has to recite one Sarale Varase mentioned by the examiner in three speeds. Sing / Play the Geethe in Malahari. Singing / Playing Jathi Swara / Krithi.

Textbooks

3. Vidushi Vasantha Madhavi, "Theory of Music", Prism Publication, 2007.
4. T Sachidevi and T Sharadha (Thirumalai Sisters), Karnataka Sangeetha Dharpana - Vol. 1 (English), Shreenivaasa Prakaashana, 2018.

References

5. Lakshminarayana Subramaniam, Viji Subramaniam, "Classical Music of India: A Practical Guide", Tranquebar 2018.
6. R. Rangaramanuja Ayyangar, "History of South Indian (Carnatic) Music", Vipanci Charitable Trust; Third edition, 2019.
7. Ethel Rosenthal, "The Story of Indian Music and Its Instruments: A Study of the Present and a Record of the Past", Pilgrims Publishing, 2007.
8. Carnatic Music, National Institute of Open Schooling, 2019.