# 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

## V Semester Scheme and Syllabus
## 2022 Scheme - Autonomous

**Approved in the BoS meeting held on 12/07/2024**

# 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.

ಬಿ.ಎಂ.ಎಸ್. ತಾಂತ್ರಿಕ ಮತ್ತು ವ್ಯವಸ್ಥಾಪನಾ ಮಹಾವಿದ್ಯಾಲಯ
**BMS Institute of Technology and Management**
(An Autonomous Institution, Affiliated to VTU Belagavi)
Avalahalli, Doddaballapur Main Road, Bengaluru, Karnataka – 560064

**Ref.:** BMSIT&M/Exam/2023-24/ 104 **Date:** 21.09.2024

## CONTINUOUS INTERNAL EVALUATION (CIE) AND SEMESTER END EXAMINATION (SEE) PATTERN

(Applicable to UG students admitted from the 2022 batch, effective from the Academic year 2024-25 onwards)

The UG students admitted from the 2022 batch onwards are hereby informed to note the following regarding Continuous Internal Evaluation and Semester End Examination pattern:

- The Weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Examination (SEE) is 50%.
- The Minimum passing mark for the CIE is 40% of the Maximum marks (i.e. 20 marks out of 50) and for the SEE minimum passing mark is 35% of the Maximum marks (i.e. 18 out of 50 marks).
- A student will be declared to have passed the course if they secure a minimum of 40% (i.e. 40 marks out of 100) in the combined total of the CIE and SEE.

The following tables summarize the CIE and SEE Patterns for the courses of various credits:

**INTEGRATED PROFESSIONAL COMPETENCE COURSE (IPCC) COURSES**
**4 OR 3 CREDITS**

| Evaluation Type | | Internal Assessments (IAs) | Test/ Exam Marks Conducted for | Marks to be scaled down to | Min. Marks to be Scored | Evaluation Details |
|---|---|---|---|---|---|---|
| Theory Component | CIE - Internal Assessment (IA) Tests | CIE – Test 1 (1.5 hr) | 40 | 20 | - | The sum of the two internal assessment tests will be **80 Marks** and the same shall be scaled down to **20 Marks**. |
| | | CIE – Test 2 (1.5 hr) | 40 | | | |
| | CIE – CCA (Comprehensive Continuous Assessment) | CCA | 10 | 10 | - | Any one assessment method can be used from the list appended below. |
| | **Total CIE Theory** | | | **30** | **12** | |
| Practical Component | CIE - Practical | | 30 | 10 | - | Each laboratory experiment is to be |

| | | | | | |
|---|---|---|---|---|---|
| | | | | | assessed for **30 Marks** using appropriate rubrics. |
| | CIE Practical Test | 20 | 10 | - | One test after all experiments to be conducted for **20 Marks** |
| | **Total CIE Practical** | | **20** | **08** | |
| **Total CIE Theory + Practical** | | | **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** | |
| **Note:** The assessment of the laboratory component for the IPCC courses shall be restricted to CIE only. | | | | | |

| **PROFESSIONAL CORE COURSES (PCC) / ENGINEERING SCIENCE COURSES (ESC) 03 OR 02 CREDITS** | | | | | | |
|---|---|---|---|---|---|---|
| **Evaluation Type** | | **Internal Assessments (IAs)** | **Test/ Exam Marks Conducted for** | **Marks to be scaled down to** | **Min. Marks to be Scored** | **Evaluation Details** |
| Theory Component | CIE – IA Tests | CIE – Test 1 (1.5 hr) | 40 | 30 | - | The sum of the two internal assessment tests will be **80 Marks** and the same will be scaled down to **30 Marks**. |
| | | CIE – Test 2 (1.5 hr) | 40 | | | |
| | CIE - CCAs | CCA | 20 | 20 | - | Any Two assessment methods can be used from the list. If it is project-based, one CCA shall be given. |
| | **Total CIE Theory** | | | **50** | **20** | |
| **SEE** | | | 100 | 50 | 18 | SEE is a theory exam, conducted for **100 Marks**, scored marks are scaled down to **50 Marks.** |
| **CIE + SEE** | | | | **100** | **40** | |

| NON-IPCC COURSES<br>**01 CREDIT – MULTIPLE CHOICE QUESTION TYPE** | | | | | | |
|---|---|---|---|---|---|---|
| **Evaluation Type** | | **Internal Assessments (IAs)** | **Test/ Exam Marks Conducted for** | **Marks to be scaled down to** | **Min. Marks to be Scored** | **Evaluation Details** |
| Continuous Internal Evaluation Component | CIE – IA Tests (MCQs) | CIE – Test 1 (1 hr) | 40 | 40 | - | The question paper pattern for this course shall be an **MCQ** of **1 or 2 Marks (s).**<br>The questions with 2 Marks can be framed based on a higher Bloom's level.<br>The sum of the two internal assessment tests will be **80 Marks**, and the same will be scaled down to **40 Marks**. |
| | | CIE – Test 2 (1 hr) | 40 | | | |
| | CIE - CCAs | CCA | 10 | 10 | - | Any One Assessment method can be used from the list provided below. |
| | **Total CIE** | | | **50** | **20** | |
| **SEE (MCQ Type)** | | | | 50 | 18 | The question paper pattern for this course shall be an **MCQ** of **1 or 2 Marks (s).**<br>The questions with 2 Marks can be framed based on higher Bloom's level.<br>MCQ-type question papers of 50 questions with each question of a **01 Mark**, the examination duration is 01 hour. |
| **CIE + SEE** | | | | **100** | **40** | |

| PROFESSIONAL CORE COURSE LABORATORY (PCCL) /ABILITY ENHANCEMENT COURSE LABORATORY (AEC)<br>**01 CREDIT** | | | | | |
|---|---|---|---|---|---|
| **Evaluation Type** | **Internal Assessments (IAs)** | **Test/ Exam Marks Conducted for** | **Marks to be scaled down to** | **Min. Marks to be Scored** | **Evaluation Details** |
| Continuous Internal Evaluation | CIE - Practical | 30 | 30 | | Each laboratory experiment is to be evaluated for **30 Marks** using appropriate rubrics. |
| | CIE - Practical Test | 50 | 20 | | One test after all experiments is to be conducted for **50 Marks** and to be scaled down to **20 Marks**. |
| | **Total CIE** | - | **50** | **20** | |
| Semester End Examination | | 100 | 50 | 18 | SEE to be conducted for **100 Marks**. |
| **CIE+SEE** | | **100** | | **40** | |

| NON-IPCC / ABILITY ENHANCEMENT COURSE (AEC)<br>**01 CREDIT – DESCRIPTIVE TYPE** | | | | | | |
|---|---|---|---|---|---|---|
| **Evaluation Type** | | **Internal Assessments (IAs)** | **Test/ Exam Marks Conducted for** | **Marks to be scaled down to** | **Min. Marks to be Scored** | **Evaluation Details** |
| Theory Component | CIE – IA Tests | CIE – Test 1 (1.5 hr) | 40 | 30 | - | The sum of the two internal assessment tests will be **80 Marks** and the same will be scaled down to **30 Marks**. |
| | | CIE – Test 2 (1.5 hr) | 40 | | | |
| | CIE - CCAs | CCA | 20 | 20 | - | Any Two assessment methods can be used from the list. If it is project-based, one CCA shall be given. |
| | **Total CIE Theory** | | | **50** | **20** | |

| | | | | |
|---|---|---|---|---|
| **SEE** | 100 | 50 | 18 | SEE is a theory exam, conducted for **100 Marks for 02 Hours duration**, scored marks are scaled down to **50 Marks.** |
| **CIE + SEE** | | **100** | **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 | **Sketch Book and CAD Modelling** | Projection of Points | 10 | 05 | 15 | 200 | 20 | - |
| | | 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 | - |
| | | 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 | - |
| | **CCA 2** | Module 5 | 08 | 02 | 10 | | | |
| **CIE Total** | | | | | | | **50** | **20** |
| **SEE** | | Module 1 & 2 | 24 | 06 | 30 | 100 | **50** | **18** |
| | | Module 3 | 32 | 08 | 40 | | | |
| | | Module 4 | 24 | 06 | 30 | | | |
| **CIE + SEE** | | | | | | | **100** | **40** |

| COMPUTER AIDED MODELLING FOR MANUFACTURING (BME305)<br>**1 CREDIT** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Evaluation Type** | | **Topics/ Modules** | **Computer Printout** | **Preparatory Calculations / Sketch** | **Max Marks** | **Total Marks** | **Marks to be Scaled Down to** | **Min Marks to Pass** |
| **CIE** | **Sketch Book and CAD Modelling** | Module 1 | 60 | 30 | 90 | 200 | 20 | |
| | | Module 2 | 40 | 20 | 60 | | | |
| | | Module 3 | 40 | 10 | 50 | | | |
| | **Test 1** | Module 1 | 20 | 10 | 30 | 60 | 20 | - |
| | | 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 | - |
| **CIE Total** | | | | | | | **50** | **20** |
| **SEE** | | Module 1 | 30 | 10 | 40 | 100 | **50** | **18** |
| | | Module 2 | 20 | 10 | 30 | | | |
| | | Module 3 | 20 | 10 | 30 | | | |
| **CIE + SEE** | | | | | | | **100** | **40** |

**Learning Activities for CCAs:**

A faculty member may choose the following CCAs based on the needs of the course:

1. Course project
2. Literature review
3. MOOC
4. Case studies
5. Tool exploration
6. GATE-based aptitude test
7. Open book tests
8. Industry integrated learning
9. Analysis of Industry / Technical / Business reports
10. Programming assignments with higher Bloom level
11. Group discussions
12. Industrial / Social / Rural projects

**CoE** 21/09/2024

**Dean - AA** 21/09/24

21/9/2024

**Principal**

**Copy To:**

1. The Vice-Principal, Deans, HoDs, and Associate HoDs
2. All faculty members and students of 2022, 2023, and 2024 batch.
3. Examination Section

# Scheme of V Semester

# BMS INSTITUTE OF TECHNOLOGY & MANAGEMENT

**(Autonomous Institution Affiliated to VTU, Belagavi)**

## B. E. in Civil Engineering

## Scheme of Teaching and Examinations – 2022 Scheme

Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)

(Effective from the academic year 2024-25 onwards)

### V Semester

| Sl. No. | Course Category | Course Code | Course Title | Teaching Department (TD) and Question Paper Setting Board (PSB) | Credits Distribution | | | | Examination | | | | Contact Hours/week |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | L | T | P | Total | CIE Marks | SEE Marks | Total Marks | SEE Duration (H) | |
| 1 | HSMC | BCV501 | Construction Management and Entrepreneurship | TD: CV<br>PSB:CV | 3 | 0 | 0 | 3 | 50 | 50 | 100 | 3 | 3 |
| 2 | IPCC | BCV502 | Geotechnical Engineering | | 3 | 0 | 1 | 4 | 50 | 50 | 100 | 3 | 5 |
| 3 | PCC | BCV503 | Concrete Technology | | 4 | 0 | 0 | 4 | 50 | 50 | 100 | 3 | 4 |
| 4 | PCCL | BCVL504 | Concrete Testing Laboratory | | 0 | 0 | 1 | 1 | 50 | 50 | 100 | 3 | 2 |
| 5 | PEC | BCV505X | Professional Elective Course I | | 3 | 0 | 0 | 3 | 50 | 50 | 100 | 3 | 3 |
| 6 | PW | BCV506 | Mini Project (Extensive Survey Project) | | 0 | 0 | 3 | 3 | 50 | 50 | 100 | 3 | 6 |
| 7 | AEC | BRMK507 | Research Methodology and IPR | Any Department | 2 | 0 | 0 | 2 | 50 | 50 | 100 | 3 | 2 |
| 8 | MC | BESK508 | Environmental Studies | TD: CV<br>PSB: CV | 1 | 0 | 0 | 1 | 50 | 50 | 100 | 1 | 1 |
| 9 | NCMC | BNSK509 | National Service Scheme (NSS) | NSS Coordinator | 0 | 0 | 0 | 0 | 100 | - | 100 | - | 2 |
| | | BPEK509 | Physical Education (Sports and Athletics) | PED | | | | | | | | | |
| | | BYOK509 | Yoga | Yoga Teacher | | | | | | | | | |
| | | BNCK509 | National Cadet Corps (NCC) | NCC officer | | | | | | | | | |
| | | BMUK509 | Music | Music Teacher | | | | | | | | | |
| **TOTAL** | | | | | | | | **21** | **500** | **400** | **900** | **-** | **28** |

**HSMC:** Humanities, Social Sciences and Management Course, **IPCC**: Integrated Professional Core Course, **PCC**: Professional Core Courses, **PCCL**: Professional Core Course laboratory, **PEC:** Professional Elective Course, **PW:** Project Work, **AEC**: Ability Enhancement Course, **MC:** Mandatory Course, **NCMC**: Non Credit Mandatory Course, **L:** Lecture, **T**: Tutorial, **P**: Practical, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation.

| Professional Elective Course I | | | |
|---|---|---|---|
| **Course Code** | **Course Name** | **Course Code** | **Course Name** |
| BCV505A | Water Power Hydraulics | BCV505D | Remote Sensing and GIS |
| BCV505B | Building Services-HVAC, Acoustics and Fire Safety | BCV505E | Traffic Engineering |
| BCV505C | Solid Waste Management | | |

**Integrated Professional Core Course (IPCC):** Refers to Professional Core Course Theory Integrated with practical's 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.

**National Service Scheme /Physical Education/Yoga/NCC/Music:** All students have to register for any one of the courses namely National Service Scheme (NSS), Physical Education (PE) (Sports and Athletics), Yoga (YOG), National Cadet Corps (NCC) and Music with the concerned coordinator of the course during the beginning of each semester starting from III semester to VII semester. In every semester, students should choose any one mandatory course among the available 5 courses without repeating the course again. Activities shall be carried out in each of the semesters from 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. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the course is mandatory for the award of degree.

**Professional Elective Courses (PEC):** A professional elective (PEC) course is intended to enhance the depth and breadth of educational experience in the Engineering and Technology curriculum. Multidisciplinary courses that are added supplement the latest trend and advanced technology in the selected stream of engineering. Each group will provide an option to select one course. The minimum number of students' strengths for offering a professional elective is 10. However, this conditional shall not be applicable to cases where the admission to the program is less than 10.

**Mini Project:** The Mini Project Work is a part of the curriculum in the pre-final year. Mini Project is a course which will provide a platform to students to enhance their practical knowledge and skills by the development of small systems/applications. Based on the ability/abilities of the student/s and recommendations of the mentor, a Mini- project can be assigned to a group having not more than 4 students. A comprehensive report is to be prepared after completion of the project work.

# V Semester Syllabus

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Construction Management and Entrepreneurship** (3:0:0) 3

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BCV501 | 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 |

**Course objectives:**

1. To understand the concept of Scheduling and cost management in construction project.
2. To go through the Statutory and regulatory requirements in construction.
3. To explain the concept of procurement and contract management.
4. To understand Quality and Safety during construction.
5. To identify the risks and its management.

**Module-1**

**Planning and Scheduling**

**Construction project formulation** – construction management, define scope – scope management, types of project planning and its management, Statutory and regulatory requirements- layout and building plan approval, contract, Fire and Safety, Quality, Environmental, commencement certificate, legal and public policies.

**Schedule management** – WBS, Bar Charts, Sequencing and Dependency, Network Diagram, Activity Duration, Critical Path Method, PERT.

**Cost Management** - Creating schedules, Assigning Resources, Cost, Evaluation, Optimization and Tracking.

**Module-2**

**Resource Management -** Basic concepts of resource management, class of labour, Wages & statutory requirement, Labor Production rate or Productivity, Factors affecting labour output or productivity. Construction Equipment - classification of construction equipment, estimation of productivity for: excavator, dozer, compactors, graders, and dumpers.

**Module-3**

**Contract and Procurement Management**

Procurement – procurement types, planning, stages – procurement execution – Sustainable procurement management

Construction contract –formation, types, essential elements, contract law – tendering process contract award – Documentation – contractor and sub-contractor management –claims – disputes compensation – breach of contract – project completion and project closure

**Module-4**

**Quality, Safety and Risk Management**

Quality Management - Occupational Health, Safety and Environment, Barriers, Quality Management System – Chart and tools.

Safety management - safety requirements, Safety and Health codes.

Risk management - Process, Terminology, Identification, Analysis and Response Strategy Completion certificate, occupancy certificate, Facilities management.

**Module-5**

**Introduction to Entrepreneurship –**

Characteristics of a Successful Entrepreneur, Understand the entrepreneurial journey, different entrepreneurial styles, personality traits, strengths, and weaknesses. 5M Model, Communication skills:

**Business Planning Process:** Business planning process, marketing plan, financial plan, project report and feasibility study, guidelines for preparation of model project report for starting a new venture. Introduction to international entrepreneurship opportunities, entry into international business, exporting, direct foreign investment, venture capital.

**Course outcome**

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

CO 1: Understand the fundamental concepts of construction management process.
CO 2: Comprehend the management of various resources in construction project.
CO 3: Illustrate the procurement process and contract management in construction.
CO 4: Analyze the quality, safety aspect and risk in construction management.
CO 5: Comprehend the concept of entrepreneurship and business planning.

**Suggested Learning Resources:**

**Text Books**


1. Kumar Neeraj Jha, "Construction Project Management, Theory and Practices",2nd Edition, Pearson Education India,2015.
2. Chitkara, K.K, "Construction Project Management: Planning Scheduling and Control", Tata McGraw Hill Publishing Company, New Delhi,2019
3. Dr. U.K. Shrivastava "Construction Planning and Management", Galgotia Publications Pvt. Ltd. New Delhi,2000


**Reference Books**


1. Khan M Y, "Cost Accounting", 2nd Edition,Tata McGraw-Hill, 2017
2. Banga T.R and Sharma S.C "Mechanical Estimating & Costing, 17th Edition, 2011, Khanna Publishers, 2001
3. Poornima M. Charantimath, "Entrepreneurship Development and Small Business Enterprise", Pearson Education,2018
4. Panneerselvam, "Engineering Economics"2 nd Edition, Prentice Hall India Learning Private Limited, New Delhi 2013


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

- NPTEL VIDEOS..

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

- Seminars/Quizz (To assist in GATE Preparations
- Self-Study on simple topics
- Case Study Presentation

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Geotechnical Engineering** (3:0:1) 4

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BCV502 | CIE Marks | 50 |
| Teaching Hours/Week (L: T:P: S) | 3:0:2 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 + 10 | Exam Hours | 03 |

**Course objectives:**

1. Appreciate basic concepts of soil mechanics as an integral part in civil engineering.
2. Comprehend basic engineering and mechanical properties of different types of soil.
3. Become broadly familiar with geotechnical engineering requirements, such as, flow of water through soil medium and compaction characteristics.
4. Model and measure strength & settlement characteristics and bearing capacity of soils.

**Module-1**

**Index Properties and Is Classification**

Phase Diagram, definitions, and their interrelationships. Determination of Index properties, Types of soil structures and Clay Minerals, IS soil classification of Soil.

**Module-2**

**Soil Water-Effective Stress Analysis**

Soil Water: Permeability, Darcy's law-assumption and validity, coefficient of permeability and its determination (only laboratory method), permeability of stratified soils. Capillary phenomenon, Effective Stress Analysis: Effective stress concept-total stress, effective stress and Neutral stress.

**Module-3**

**Compaction and Consolidation**

Compaction: Principle of compaction, Standard and Modified proctor's compaction test, factors affecting compaction, effect of compaction on soil properties

Consolidation: Mass-spring analogy, Terzaghi's one dimensional consolidation theory (No derivation). Consolidation characteristics of soil (Cc, av, mv and Cv). Laboratory one dimensional consolidation test, Pre-consolidation pressure and its determination by Casagrande's method.

**Module-4**

**Shear Strength**

Concept of shear strength, Mohr–Coulomb Failure Criterion, Total and effective shear strength parameters, Measurement of shear strength parameters – Direct shear test, unconfined compression test, triaxial compression test and field Vane shear test, Factors affecting shear strength of soils.

**Module-5**

**Bearing Capacity and Settlement**

Bearing Capacity: Types of foundations, Determination of bearing capacity by Terzaghi's and BIS methods (IS: 6403), Modes of shear failure, Factors affecting Bearing capacity of soil. Effect of water table and load eccentricity on bearing capacity of soil, Field methods of determining bearing capacity of soil (SPT and plate load test). Settlement: Types of settlements and importance, Computation of immediate and consolidation settlement, permissible differential and total settlements (IS 8009 Part 1).

**PRACTICAL COMPONENT OF IPCC**

| Sl. No | Experiments |
|---|---|
| 1 | Water content determination by oven drying, Rapid moisture meter method |
| 2 | Grain size analysis (Sieve analysis of soil) |
| 3 | In-situ density tests i) Core-cutter method ii) Sand replacement method |
| 4 | Consistency limits i) Liquid limit test (by Casagrande's and cone penetration method) & ii) Plastic limit test |
| 5 | Co-efficient of permeability test i) Constant head test ii). Variable head test |
| 6 | Standard compaction test (light compaction only) |
| 7 | Direct shear test |
| 8 | Unconfined compression test & Laboratory vane shear test |
| 9 | Triaxial test (unconsolidated undrained test only) |
| 10 | Demonstration of Standard penetration test & Boring equipment |
| 11 | Demonstration of Proctors Needle |
| 12 | Demonstration of Vane shear test |

**Course outcome**

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

CO 1: Characterize and classify the soil as per IS classification system.

CO 2: Implement the knowledge of saturated and partially saturated soil to determine the stresses in the soil.

CO 3: Apply the comprehension of compaction and consolidation characteristics to estimate the settlement under the stresses.

CO 4: Analyse the insights of shear strength parameters of the soil by the virtue of various tests.

CO 5: Evaluate the serviceability in terms of safe bearing capacity and the settlement of the shallow foundations as per IS provisions.

**Suggested Learning Resources:**

**Books**


1. Gopal Ranjan and Rao A.S.R., Basic and Applied Soil Mechanics, 3rd Edition, New Age International (P) Ltd., New Delhi. 2016
2. Murthy V.N.S., Principles of Soil Mechanics and Foundation Engineering, CBS Publishers and Distributors, New Delhi. 2018
3. Punmia B C, Soil Mechanics and Foundation Engineering, Laxmi Publications co., New Delhi. 2017


**Reference Books**


1. Lambe T.W and Whitman R.V, "Soil Mechanics", Wiley India Pvt Ltd, 2012
2. Shashi K. Gulathi & Manoj Datta, Geotechnical Engineering-Tata McGraw Hill Publications. 2010
3. Bowles J E, Foundation analysis and design, McGraw- Hill Publications 5th edition 2001
4. Soil Testing for Engineers by S. Mittal and J.P. Shukla 2020
5. H S Vishwanath and Vinod B R "Basic Geotechnical Engineering", Published by Sapna Book House(P) Ltd, ISBN:978-81-947812-0-2, September 2020.
6. Braja, M. Das, Geotechnical Engineering; Thomson Business Information India (P) Ltd., India. 2015


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

Students may be teamed in to teams of four and given the task of determining the SBC of soil at any site shown. They will be required to conduct all relevant tests and use the knowledge gained to assess SBC of soil. This will address PO6, PO9, PO10 and PO12. If EXCEL is used for calculation of bearing capacity, PO5 also will be addressed.

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Concrete Technology** (4:0:0) 4

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BCV503 | CIE Marks | 50 |
| Teaching Hours/Week (L: T:P: S) | 4:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 50 | Exam Hours | 03 |

**Course objectives:**

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

**Module-1**

**Concrete Ingredients**

**Cement** Cement manufacturing process, chemical composition and their importance, hydration of cement, types of cement. Testing of cement, steps to reduce carbon footprint.

**Fine Aggregate** Functions, requirement, Alternatives to River sand, M-sand introduction, and manufacturing.

**Coarse Aggregate** Importance of size, shape and texture. Grading and blending of aggregate. Testing on aggregate, requirement. Recycled aggregates Water – qualities of water.

**Chemical Admixtures** Plasticizers, accelerators, retarders, and air entraining agents.

**Mineral admixtures** – Pozzolanic and cementitious materials, Fly ash, GGBS, silica fumes, Metakaolin and rice husk ash.

**Module-2**

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

**Module-3**

**Hardened Concrete** Factors influencing strength, W/C ratio, gel/space ratio, Maturity concept, testing of hardened concrete, Creep – factors affecting creep. Shrinkage of concrete – plastic shrinking and drying shrinkage, Factors affecting shrinkage. Definition and significance of durability. Internal and external factors influencing durability,

**Mechanisms** Sulphate attack – chloride attack, carbonation, freezing and thawing. Corrosion, Durability requirements as per IS-456, In situ testing of concrete- Penetration and pull-out test, rebound hammer test, ultrasonic pulse velocity, core extraction – Principal, applications and limitations.

**Module-4**

**Concrete Mix Design** Principles of concrete mix design, Parameters and factors influencing mix design, Concept of Mix Design with and without admixtures, variables in proportioning and Exposure conditions, Selection criteria of ingredients used for mix design, Procedure of mix proportioning. Numerical Examples of Mix Proportioning using IS 10262:2019.

**Module-5**

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

**Course outcome**

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

CO1: Relate material characteristics and their influence on concrete.

CO2: Distinguish concrete behavior based on its fresh properties.

CO3: Discover concrete performance from hardened properties.

CO4: Illustrate proportioning of different types of concrete mixes for required fresh and hardened properties using professional codes.

CO5: Select a suitable type of concrete based on specific application.

**Suggested Learning Resources:**

**Text Books**

1. Neville A.M. “Properties of Concrete”-5th Edition, Pearson Education India,2012
2. M.S. Shetty, “Concrete Technology - Theory and Practice” S Chand Publisher,2011

**Reference Books**

1. Kumar Mehta. P and Paulo J.M. Monteiro “Concrete-Microstructure, Property and Materials”, 4th Edition, McGraw Hill Education, 2017
2.A.R. Santha Kumar, “Concrete Technology”, Oxford University Press ,2006

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

- Cement https://nptel.ac.in/courses/105102012/1
- Aggregates https://nptel.ac.in/courses/105102012/6
- Mineral admixtureshttps://nptel.ac.in/courses/105102012/11
- Chemical admixtures https://nptel.ac.in/courses/105102012/9
- https://nptel.ac.in/courses/105102012/10
- Concrete mix design https://nptel.ac.in/courses/105102012/14
- Concrete production & fresh concrete https://nptel.ac.in/courses/105102012/19
- Engineering properties of concretehttps://nptel.ac.in/courses/105102012/23
- Dimensional stability & durability https://nptel.ac.in/courses/105102012/27
- Durability of concrete https://nptel.ac.in/courses/105102012/31
- Special concretes https://nptel.ac.in/courses/105102012/36

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

- Seminars/Quizz(To assist in GATE Preparations
- Demonstrations in Lab
- Self Study on simple topics
- Simple problems solving using Excel
- Virtual Lab Experiments

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Concrete Testing Laboratory** (0:0:1) 1

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BCVL504 | CIE Marks | 50 |
| Teaching Hours/Week (L: T:P: S) | 0:0:2 | SEE Marks | 50 |
| Total Number of Contact Hours | 26 | Exam Hours | 03 |

**Course objectives:**

1. To prepare the students to effectively link theory with practice and application and to demonstrate background of the theoretical aspects.
2. To prepare the students to solve problems including design elements and related to their course work
3. Gain knowledge on testing of Self compacting concrete as per EFNARC norms
4. To prepare the students to effectively link theory with practice and application and to demonstrate background of the theoretical aspects.

**PART A**

**Fresh Concrete Properties**

| SL NO | EXPERIMENT |
|---|---|
| 1 | Conventional Concrete Mix Design as per IS: 10262-2019 and Marsh Cone test - Admixture Dosage Determination. |
| 2 | Slump cone test. |
| 3 | Compaction Factor test (Vee-Bee). |
| 4 | Flow Table test. |
| 5 | Vee Bee Test |
| 6 | Self- Compacting Concrete Mix Design |
| 7 | Slump Cone test |
| 8 | L-Box test |
| 9 | J-Ring test |
| 10 | V Funnel test |

**Part – B**

**Tests on Harden Concrete**

| | |
|---|---|
| 11 | Compressive strength |
| 12 | Split Tensile Strength test |
| 13 | Flexural Strength test. |
| 14 | Determination of Young's Modulus |
| 15 | Non- Destructive Testing:<br>• Rebound Hammer<br>• Ultra-sonic Pulse Velocity (UPV) |

**Course outcome**

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

CO 1: Design concrete mixes as per standard provisions.

CO 2: Analyze the properties of concrete in fresh and hardened state.

CO 3: Understand non-destructive testing (NDT) for evaluating concrete quality.

**Suggested Learning Resources:**

**Books**

1. Kukreja, Material testing lab manual, Standard Publishers,4th edition, 2015.
2. N Subramanian, Building Materials Testing and sustainability, 1st Edition, Oxford Publications, 2019.

**Reference Books**

1. Gambhir, Concrete lab manual, Dhanpat Rai & Sons, 3rd edition,2017
2. MS Shetty, Concrete technology, S Chand Publications,2nd edition, 2011
3. EFNARC. Guidelines for self-compacting concrete. February 2002.

**B.E CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Water Power Hydraulics** (3:0:0)3

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BCV505A | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 3:0:0 | SEE Marks | 50 |
| Total Number of Lecture Hours | 40 | Exam Hours | 3 |

**Course objectives:**

This course will enable students to:

1. To introduce about hydropower plants and their classification
2. To study various components of hydro-power plants
3. To gain knowledge on reservoir planning and operations
4. To analyse structural components of a dam and spillway.
5. To gain knowledge on impact of hydro-power plants on environment

**Module – 1**

**Introduction to Course:** Hydroelectric power development of the world and sustainability, power systems & load, assessment of available power and problems.

**Hydro-power plants:** Overall efficiency, capacity & installed capacity, Capacity factor, firm power, power factor, utilization factor, diversity factor. General arrangement of hydroelectric power project. Classification of hydropower plants, Run-of-river plants, reservoir storage plants, pumped storage plants, diversion canal plants. Tidal power plants.

**Module – 2**

**Components:** design of turbines- Pelton wheel, bulb turbine and Kaplan, Performance characteristics of turbines, Specific and unit quantities, Electrical load on hydro-turbines, Power house dimension and planning, Water hammer and surge analysis, Surge tanks, pumping systems.

**Water conveyance systems:** Covered conduits and tunnel, Power canals, Penstocks – Alignment, types of penstocks, economic diameter of penstocks, Anchor Blocks.

**Module – 3**

Introduction, classification of Reservoirs, Storage zones of a reservoir, Mass curve, fixing capacity of a reservoir, safe yield, problems, density currents, Trap efficiency, Reservoir sedimentation, life of a reservoir, economic height of a dam, problems. Environmental effects of reservoirs. Essential stream flow data, flow duration curve, power duration curve, use of flow duration and power Duration curve.

**Module – 4**

Introduction, types of dams- gravity and earth dams. **Gravity dam**- forces on a gravity dam, combination of forces for design. Elementary & practical profiles of a gravity dam, stability analysis (without earth quake forces), problems

**Earth dams**- Types of Earth dams, construction methods, Design criteria for Earth dams, causes of failure of earth dams, section of dam, preliminary design criteria, problems, control of seepage through earth dams.

**Spillways:** Essentials of a spillway, spillway components, factors affecting type & design of Ogee spillway.

**Module – 5**

**Hydro power development:** Small and micro hydro power development, Current scenarios in hydropower development, Project feasibility, Impact of hydropower development on water sources systems, river bank environment, socioeconomic conditions and national economy.

**Renewable Energy management-** Environment impact assessment of hydro-power plant, Integrated Energy systems and their cost benefit analysis, comparison with other renewable energy systems.

**Course outcomes:**

The students will be able to:

CO 1: Apply fundamentals of applied hydraulics to plan hydro-power plants

CO 2: Design hydro-power components and hydraulic systems.

CO 3: Plan reservoir potential and analyse dam structure to establish hydro-power plants

CO 4: Assess environmental impact of hydro-power plants and determine project feasibility

CO 5: Evaluate case studies on renewable energy management and effect of hydro-power plants on climate change

**Suggested Learning Resources:**

**Textbooks**

1. Sharma, S. K. ., "Irrigation Engineering and Hydraulic Structures", S. Chand Publishing, 2017).
2. Punmia, B. C., Pande Brij Basi Lal, Ashok Kumar Jain, and Arun Kumar Jain., "Irrigation and water power engineering", Laxmi Publications, Ltd., 2009.

**References**

1. Mead, Daniel Webster, "Water power engineering: the theory, investigation and development of water powers", McGraw-Hill. Reprint 2018
2. Arora, K. R. Irrigation, "Water power and water resources engineering", Standard Publisher Distributors, 2002.

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Building Services-HVAC, Acoustics and Fire Safety** (3:0:0) 3

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BCV505B | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 3:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 | Exam Hours | 03 |

**Course objectives:**

1. Learn the importance of sanitation, domestic water supply, plumbing and fire services
2. Understand the concepts of heat, ventilation and air conditioning
3. Develop technical and practical knowledge in Building Services.

**Module-1**

**Water Supply and its Services:** Water requirements for different types of buildings, simple method of removal of impurities, water saving practices and their potential Service connection from mains, sump and storage tank, types and sizes of pipes, special installation in multistoried buildings. Material, types of fixtures and fitting for a contemporary bathroom– taps –quarter turn, half turn, ceramic, foam flow etc, hot water mixer, hand shower Rainwater harvesting to include roof top harvesting, type of spouts, sizes of rainwater pipes and typical detail of a water harvesting pit.

**Module-2**

**Heat Ventilation and Air Conditioning (HVAC):** Behavior of heat propagation, thermal insulating materials and their co-efficient of thermal conductivity. General methods of thermal insulation: Thermal insulation of roofs, exposed walls. Ventilation: Definition and necessity, system of ventilation. Principles of air conditioning, Air cooling, Different systems of ducting and distribution, Essentials of air-conditioning system.

**Module-3**

**Electrical and Fire Fighting Services:** Electrical systems, Basics of electricity, single/Three phase supply, protective devices in electrical installation, Earthing for safety, Types of earthing, ISI Specifications. Electrical installations in buildings, Types of wires, Wiring systems and their choice , planning electrical wiring for building, Main and distribution boards, Principles of illumination, Classification of buildings based on occupancy, causes of fire and spread of fire, Standard fire, Firefighting, protection and fire resistance, Firefighting equipment and different methods of fighting fire., means of escape, alarms, etc., Combustibility of materials, Structural elements and fire resistance, Fire escape routes and elements, planning and design. Wet risers, dry risers, sprinklers, heat detector, smoke detectors, fire dampers, fire doors, etc. Provisions of NBC.

**Module-4**

**Plumbing and Fire Fighting Layout of Simple Buildings:** Application of above studies in preparing layout and details - Plumbing layout of residential and public buildings, Fire fighting layout, Reflected ceiling plan of smoke detectors / sprinklers, etc.

**Module-5**

Engineering Services: Engineering services in a building as a system, Lifts, escalators, cold and hot water systems, waste water systems and electrical systems. Pumps and Machineries: Reciprocating, Centrifugal, Deep well, Submersible, Automatic pumps, Sewerage pumps, Compressors, Vacuum pump – their selection, installation and maintenance – Hot water boilers

**Course outcome**

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

CO 1. Understand Electrical System along with substation for a building infrastructure

CO 2. Comprehend the basics of acoustics and ELV systems in building.

CO 3. Design and implementation of HVAC System

CO 4. Implement Fire Alarm System (PAS) for building

CO 5. Understand the importance of water supply and sanitary plumbing system for a building

**Suggested Learning Resources:**

**Books**

1.Code of Practice for fire safety of buildings (IS1641–IS1646)

2.M. A. Zaher," Building Services". Createspace Independent Pub,2012.

3.Fred Hall, Roger Greeno," Building Services Handbook",7th Edition, Routledge,2013.

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

- Online study material
- NPTEL video lectures.

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

- Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
- Visit to Actual Repair, Retrofitting and Rehabilitation of Structures sites.
- Imparting knowledge of Techniques and materials for retrofitting.
- Mini Projects to explain the concept of Repair, Retrofit and Rehabilitation of structures.

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Solid Waste Management** (3:0:0) 3

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BCV505C | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 3:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 | Exam Hours | 03 |

**Course objectives:**

1. To facilitate the learners to understand fundamentals of key elements in solid waste management and governance.
2. To impart knowledge to arrive strategies for waste management and selection of technologies for processing, treatment, and disposal.
3. To examine and plan designs for material recovery facility, micro composting units, incinerators, bio digesters, and landfills

**Module-1**

Introduction to Solid waste management Definition, Classification, need and Global perspective of solid waste management. Policies and legislative frameworks, Government initiatives on Solid waste management. Integrated solid waste management and concept of 3R's, Role of stakeholders.

**Module-2**

Waste generation and characterization Factors affecting waste generation and methods to estimate the quantity of waste generated. Physical, chemical, and biological methods of waste characterization.

**Module-3**

Storage, collection, and Transportation of waste Methods of storage, Storage container types and materials, onsite processing. Methods of collection and collection vehicles, Analysis, and design of Hauled and Stationary container systems with case studies. Transfer stations – feasibility and economic analysis.

**Module-4**

Waste processing and Disposal Waste processing facilities- MRFs Landfills – Selection of liners, Design, Closure and Leachate management, Composting, Waste to Energy concepts – Incineration, Biogas recovery and Refuse derived fuels RDFs.

**Module-5**

Special Waste and Smart Solid Waste Management Definition, Classification, Effects, treatment, disposal, Legislation and case studies of Hazardous waste, Construction and demolition waste, Electronic waste, Plastic, Biomedical waste and Radioactive waste. Life cycle assessment of solid waste management, Automation and IOT in storage, collection and treatment of solid waste. Case studies.

**Course outcome**

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

CO 1: Analyze the existing solid waste management system w.r.t different elements and identify their drawbacks.

CO 2: Provide systematic and comprehensive designs for collection and route optimization in solid waste management.

CO 3: Offer engineering solutions to societal problems like solid waste disposal and technologies to meet the growing challenges of the solid waste management problems in the cities.

CO 4: Suggest suitable scientific methods in handling & disposal of Hazardous Waste.

CO 5: Evaluate latest technologies in solid waste processing and energy recovery techniques.

**Suggested Learning Resources:**

**Books**

1. Handbook of Solid Waste Management by Frank Kreith, George Tchobanoglous 1994
2. Management of Municipal Solid waste by T.V. Ramachandra 2009

**Reference Books**

1. Hazardous Waste management by Michael D LaGrega, Philip. L. Buckingham, Jeffery C. Evans 2001
2. Manuals and best practices in solid waste management by Swachh Bharat Mission
3. (https://swachhbharatmission.gov.in/sbmcms/technical-notes.htm)

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

- Introduction to solid waste https://www.youtube.com/watch?v=k0ktJRoRcOA
- Solid waste management https://www.youtube.com/watch?v=sMeUGwpvLtk
- Municipal Solid Waste Management (Civil Engineering)
- https://www.digimat.in/nptel/courses/video/105103205/L01.html
- Primary collection SWM https://www.digimat.in/nptel/courses/video/105103205/L09.html
- Solid waste types, methods, challenges and solutions
- https://www.youtube.com/watch?v=T_pIJiZ8JYI
- Types and sources of SWM https://www.digimat.in/nptel/courses/video/105103205/L03.html

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

- http://nptel.ac.in
- https://swayam.gov.in
- https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Remote Sensing and GIS** (3:0:0) 3

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BCV505D | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 3:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 | Exam Hours | 03 |

**Course objectives:**

1. Understand concept of using photographic data to determine relative positions of points.
2. Study the methods of collection of land data using Terrestrial and Aerial camera.
3. Analyse the data gathered from various sensors and interpret for various applications.
4. Apply the principles of RS, GIS and GPS in various scopes of Civil Engineering

**Module-1**

**Remote Sensing-** Definition, types of remote sensing, components of remote sensing, electromagnetic spectrum, Black body, Atmospheric windows, energy interaction with earth surface features. Spectral reflectance curve. Platforms and sensors. Sensor resolutions. Types of satellites Indian and other remote sensing satellites (IRS, IKONS and Landsat). Principle of visual interpretation - key elements.

**Module-2**

**Photogrammetry:** Introduction types of Photogrammetry, Advantages Photogrammetry, Introduction to digital Photogrammetry. Aerial Photogrammetry: Advantages over ground survey methods- geometry of vertical photographs, scales of vertical photograph. Ground coordination relief displacement, scale ground coordinates – flight planning.

**Module-3**

**Geographic Information System**- Introduction, Functions and advantages, sources of data for GIS. Database – Types, advantages and disadvantages. Data Analysis.-overlay operations, network analysis, spatial analysis. Outputs and map generation. GPS- components and working principles.

**Module-4**

**Applications of GIS, Remote Sensing and GPS**: Water Resources engineering and management-prioritization of river basins, water perspective zones and its mapping, Highway and transportation - highway alignment, Optimization of routes, accident analysis, Environmental Engineering- Geostatistical analysis of water quality, rainfall

**Module-5**

**Applications of GIS, Remote Sensing and GPS:** Urban Planning & Management, urban sprawl, Change detection studies, forests and urban area, agriculture, Disaster Management. Layouts: Dead end, Radial, Grid iron, Circular system.

**Course outcome**

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

CO 1:Understand the principle of Remote Sensing (RS) and Geographical InformationnSystems (GIS) data acquisition and its applications.

CO 2:Comprehend the different types of photogrammetry.

CO 3:Apply RS and GIS technologies in various fields of engineering and social needs.

CO 4:Analyse the information obtained by applying RS and GIS technologies in Engineering.

CO 5:Create a feasible solution for various natural disasters using RS and GIS.

**Suggested Learning Resources:**

**Books**


1. Geographic Information System-An Introduction, Tor Bernharadsen,3rd Edition, Wiley India Pvt. Ltd. New Delhi,2009
2. Principles of Remote sensing and Image Interpretation, Lillesand and Kiefer,, 6th Edition, John Wiley Publishers, New Delhi,2011.


**Reference Books**


1. Higher Surveying, Chandra A.M, 2015, 3rd Edition, New age international (P) Ltd, ISBN: 8122438121
2. Remote Sensing, Robert A. Schowengerdt, 2009, 3rd Edition, Elsevier India Pvt Ltd, New Delhi.
3. Remote Sensing and GIS, Bhatta B, 2011, Oxford University Press, New Delhi, ISBN - 0198072392


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

- NPTEL lecture videos.

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

- Delineating the boundary for a watershed using SOI topomap as reference in GIS software
- Delineating the national highway and study the different components
- Delineating different features on land surface and create land use/land cover map using top map and google earth image of specific region

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**TRAFFIC ENGINEERING** (3:0:0) 3

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BCV505E | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 3:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 | Exam Hours | 03 |

**Course objectives:**

1. Understand fundamental knowledge of traffic engineering, scope and its importance.
2. Describe basic techniques for collecting and analysing traffic data, diagnosing problems, designing appropriate remedial treatment, and assessing its effectiveness.
3. Apply probabilistic and queuing theory techniques for the analysis of traffic flow situations and emphasis the interaction of flow efficiency and traffic safety.
4. Understand and analyse traffic issues including safety, planning, design, operation and control.
5. Apply intelligent transport system and its applications in the present traffic scenario.

**Module-1**

**Traffic Planning and Characteristics:** Road Characteristics-Road user characteristics, PIEV theory, Vehicle Performance characteristics, Fundamentals of Traffic Flow, Urban Traffic problems in India, Integrated planning of town, country, regional and all urban infrastructures, Sustainable approach-land use & transport and modal integration.

**Module-2**

**Traffic Surveys:** Traffic Surveys- Speed, journey time and delay surveys, Vehicles Volume Survey including non-motorized transports, Methods and interpretation, Origin Destination Survey, Methods and presentation, Parking Survey, Accident analyses-Methods, interpretation and presentation, Statistical applications in traffic studies and traffic forecasting, Level of service-Concept, applications and significance.

**Module-3**

**Traffic Design and Visual Aids:** Intersection Design- channelization, Rotary intersection design, Signal design, Coordination of signals, Grade separation, Traffic signs including VMS and road markings, Significant roles of traffic control personnel, Networking pedestrian facilities & cycle tracks.

**Module-4**

**Traffic Safety and Environment:** Road accidents, Causes, effect, prevention, and cost, Street lighting, Traffic and environment hazards, Air and Noise Pollution, causes, abatement measures, Promotion and integration of public transportation, Promotion of non-motorized transport**.**

**Module-5**

**Traffic Management:** Area Traffic Management System, Traffic System Management (TSM) with IRC standards, Traffic Regulatory Measures, Travel Demand Management (TDM), Direct and indirect methods, Congestion and parking pricing, All segregation methods- Coordination among different agencies, Intelligent Transport System for traffic management, enforcement and education.

**Course outcome**

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

CO 1: Interpret traffic characteristics and address urban traffic issues for sustainable development.
CO 2: Conduct different types of traffic surveys and analyse data collected for traffic studies.
CO 3: Design efficient intersections and implement traffic control measures.
CO 4: Analyse road accidents and impact of traffic on environment.
CO 5: Comprehend various traffic management strategies and Intelligent Transport Systems.

**Suggested Learning Resources:**

**Books**


1. Kadiyali. L.R. "Traffic Engineering and Transport Planning", Khanna Publishers, Delhi,2013
2. S K Khanna and CEG Justo and A. Veeraragavan, "Highway Engineering", Nem Chand and Bros.
3. Indian Roads Congress (IRC) Specifications: Guidelines and Special Publications on Traffic Planning and Management.


**Reference Books:**


1. Fred L. Mannering, Scott S. Washburn and Walter P. Kilareski, Principles of Highway Engineering and Traffic Analysis, Wiley India Pvt. Ltd., New Delhi,2011.
2. GarberandHoel, "PrinciplesofTrafficandHighwayEngineering", CENGAGELearning, NewDelhi, 2010.
3. SP: 43-1994, IRCSpecification, "Guidelines on Low-cost Traffic Management Techniques" for Urban Areas,1994.
4. John E Tyworth, "Traffic Management Planning, Operations and control", Addison Wesly Publishing Company, 1996.
5. Hobbs F. D. "Traffic Planning and Engineering", University of Brimingham, Peragamon Press Ltd, 2005.
6. Salter. R.I and Hounsell N.B, "Highway Traffic Analysis and design", Macmillan PressLtd.1996.

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Research methodology and IPR** (2:0:0) 2

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BRMK507 | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 2:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 26 | Exam Hours | 03 |

**Course objectives:**

1. Explain research process and research problem.
2. Gain knowledge on research design, sampling survey and data collection.
3. Familiarized with Interpretation and report writing.
4. Understand the concept of IP, patent and copy right.
5. Enhance their knowledge on trademarks, industrial and IC layout design.

**Module-1**

**Research Methodology:** Meaning of Research, Objectives of research, types of research, research approaches, Significance of research, Research Process: Formulating research problem, Research methods verses methodology, Research and scientific method. Criteria of good research.

**Defining the Research Problem:** What is a Research Problem? Selecting the Research Problem, Necessity of Defining the Problem, Techniques Involved in Defining a problem.

**Module-2**

**Research Design:** Meaning of Research Design, Need for Research design, Feature of a Good Design. Research Design in case of exploratory research studies, descriptive and diagnostic research studies. Basic Principles of Experimental Designs.

**Design of sampling survey:** Sample Design: Objective, size of sample, parameter of interest, selection of proper sample design. Sampling errors, non-sampling errors.

**Data Collection:** Experiments and Surveys, collection of primary data: observation method. Collection of secondary data. Selection of appropriate method for data collection.

**Module-3**

**Interpretation and Report writing:** Meaning of Interpretation, Techniques of Interpretation, Precautions in interpretation, Significance of report writing, Different steps in report writing, layout of the research report, Types of reports, Oral presentation, Mechanics of writing research report, Precautions for writing a research reports.

**Module-4**

**Introduction to IP:** Various forms of IP, Importance of intellectual property, Trade policy reviews, Agreement on trips.

**Patent**: What is patent, condition for grant of patent, Temporal and spatial aspects of patent, right of patentee, Patent office and register of patent.

**Copyright:** Copyright and classes of work, meaning of publication, ownership of copyright, license of copyright, term of copyright, Internet and copyright issues.

**Module-5**

**Trademarks:** Introduction to trademark, term of trademark, collective marks, certification trademarks.

**Industrial Design:** Registration of Design: Non-registrable designs under The Design Act 2000, Condition for registration of Industrial Designs. Term of Industrial Designs.

**IC Layout Design:** Integrated Circuits Layout Design, Grant of registration of IC Layout Design.

**Course outcome**

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

CO 1. Illustrate research process and research problem.
CO 2. Describe research design, sampling survey and data collection.
CO 3. Explain the techniques of Interpretation and report writing.
CO 4. Summarize the concept of IP, patent and copy right.
CO 5. Discuss trademarks, industrial and IC layout design.

**TEXTBOOKS:**


1. CR Kothari and Gaurav Garg, Research Methodology, New Age International Publishers, 2020.
2. Neeraj Pandey, Khushdeep Dharni, "Intellectual Property Rights", PHI Learning, 2014.


**REFERENCES:**


1. Dinakar Deb, rajdeep Dey, Valentina, Engineering Research Methodology, Springer, 2019.
2. David V. Thiel, Research method for engineers, Cambridge University Press, 2014.
3. Prabhuddha Ganguli, "Intellectual Property Rights", Tata Mc-Graw –Hill, 2017.


**ASSESSMENT METHODS**

**CIE Components** (50 Marks)

Two Unit Tests each of 40 Marks. Sum of the two Internal Assessments Tests Marks will be out of 80 Marks and scaled down to 25 Marks.

CCA 1: 25 Marks
CCA 2 : 25 Marks
Sum of the CCA's will be out of 50 Marks and scaled down to 25 Marks.

Internal Assessments Tests: 25 Marks
CCA: 25 Marks
Total CIE Marks: 50 Marks

**SEE Component** (50 Marks)

- SEE examination is conducted for 100 Marks and scaled down to 50 Marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub- questions) from each module.

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

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER - V**

**Environmental Studies** (1:0:0) 1

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | BESK508 | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 1:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 15 | Exam Hours | 03 |

**Course objectives:**

1. Recognize the ecological basis for regional and global Environmental issues, and lead by example as an environmental steward.
2. Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes.
3. Analyze the trans-national character of environmental problems and ways of addressing them, including interactions across local to global scales.
4. Demonstrate proficiency in quantitative methods, qualitative analysis, critical thinking, and written and oral communication needed to conduct high-level work as environmentalists.

**Module-1**

**Biodiversity:** Types, Value, Hot spots and Threats.

***Field work:** Visit to a local area to document environmental assets: River / Forest / Grassland / Hill

**Module-2**

**Environmental Pollution & Abatement & Relevant Acts:** Water, Soil and Air Pollution.

***Field work:** Visit to a local polluted Site-Urban/Rural/Industrial/Agricultural, followed by observation and documentation of environmental pollution and recommendation of remedial measures.

**Module-3**

**Waste Management & Public Health Aspects & Relevant Acts:** E-waste, Bio-medical & Hazardous wastes.

***Field work:** Visit to a Resource Management Facility or Waste Treatment Facility, followed by understanding of process and its brief documentation.

**Module-4**

**Global Environmental Concerns:** Ground water depletion, Climate Change and Carbon Trading

***Field work:** Visit to a Green Building, followed by understanding of process and its brief documentation.

**Module-5**

**Latest Developments in Environmental Pollution Mitigation:** E.I.A., E.M.S., SDG.

***Field work:** Visit to Environmental NGOs, followed by brief documentation**.**

Self-Study/Discussion on Case Studies: Environmental Stewardship

* Any one Field Work is to be successfully accomplished. The same will be assessed for AAT.

**Course outcome**

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

CO 1. Appraise the significance of ecological systems under the ambit of environment.

CO 2. Analyze for the consequences owing from anthropogenic interactions on the environmental processes.

CO 3. Recommend solutions in the Anthropocene Epoch, with an in-depth understanding of the interdisciplinary facets of environmental issues.

CO 4. Elucidate the trans-national character of environmental problems and ways of addressing them.

CO 5. Appraise latest developments, concerns and ethical challenges associated with Environmental Protection.

**Suggested Learning Resources:**

**Text Book:**


1. Rajesh Gopinath and N. Balasubramanya, "Environmental science and Engineering", 1st Edition, Cengage Learning India Private Limited, 2018.
2. Singh, J.S, Singh S.P and S. R. Gupta, "Ecology, Environmental Science and Conservation", India, S.Chand Publishing, 2017.


**References:**


1. Gadgil. M and Guha. R , "This Fissured Land: An Ecological History of India", Univ. of California Press, 1993.
2. Odum E.P and Odum H.T , "Fundamentals of Ecology", Philadelphia: Saunders Publisher, 1971.
3. Mckinney M.L , "Environmental Science systems & Solutions", Web enhanced Edition, City o Publisher, R. M. Publisher, 1996.


**ASSESSMENT METHODS:**

**CIE Components** (50 Marks)

The pattern of the CIE question paper is MCQ.

Two Unit Tests each of 40 Marks, MCQ type (duration 01 hour). Average of the two Internal Assessments Tests Marks will be out of 40 Marks.

**Internal Assessments Tests:** 40 Marks

**Assignment and AAT:** 10 Marks

Total CIE Marks: 50 Marks (Student should score a minimum of 20 marks to be eligible.)

**SEE Components** (50 Marks)

- The pattern of the SEE question paper is MCQ.
- SEE question paper will be set for 50 questions of each of 01 marks. (Student should score a minimum of 20 marks to be eligible.)

**Assessment Details** (both CIE and SEE):

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

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER – V**

**NSS** (0:0:0)

(Common to all branches)

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | **BNSK509** | CIE Marks | 100 |
| Teaching Hours/Week (L:T:P) | 0:0:2 | SEE Marks | - |
| Total Number of Contact Hours | 26 | Exam Hours | - |

Mandatory Course (Non-Credit)

(Completion of the course shall be mandatory for the award of degree)

**Course Objectives: National Service Scheme (NSS) will enable the students to:**

1. Understand the community in general in which they work.
2. Identify the needs and problems of the community and involve them in problem solving.
3. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
4. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
5. Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

**Module – 1**

**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.

**Module – 2**

**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.

**Module – 3**

**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.

**Module – 4**

**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.

**Module – 5**

**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.

**(**06 Hours**)**

**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<br>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.

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER – V**

**Sports** (0:0:0)

(Common to all Branches)

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | **BPEK509** | CIE Marks | 100 |
| Teaching Hours/Week (L: T:P) | 0:0:2 | SEE Marks | -- |
| Total Number of Contact Hours | 26 | Exam Hours | -- |

**Mandatory Course (Non-Credit)**

(Completion of the course shall be mandatory for the award of degree)

**Course Objectives:** The course will enable students to

1. Develop a healthy life style.
2. Acquire Knowledge about various stages of sports and games.
3. Focus on modern technology in sports.

**Module – 1**

**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.

**Module – 2**

**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.

**Module – 3**

**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,

**Module – 4**

**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…

**Module – 5**

**Organization of Sports Event:** Tournament system, Planning and preparation for the competition, Ground preparation and Equipment's, Organizing an event among the group.

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:**

CO 1. 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.

CO 2. Develops individual and group techno tactical abilities of the game.

CO 3. Increases the team combination and plan the strategies to play against opponents.

CO 4. Outline the concept of sports training and how to adopt technology to attain high level performance.

**CO 5.** Summarize the basic principles of organising sports events and concept of technology implemented to organise competitions in an unbiased manner.

**Teaching Practice:**

- Classroom teaching (Chalk and Talk)
- ICT – Power Point Presentation and video analysing.
- Practical classes in outdoor and indoor as per requirement.

**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 give fitness and skill tests and his performance in game will be assessed.

**Textbooks**


1. Barbara Bushman, "ACSM's complete guide to Fitness & Health", 2011, Human Kinetics USA
2. Pankaj Vinayak Pathak, "Sports and Games - Rules and Regulation", 2019, Khel Sahitya Kendra.
3. Hardayal Singh, "Sports Training, General Theory & Methods", 1984 "Netaji Subhas, National Institute of Sports".
4. Keith A. Brown, "International Handbook of Physical Education and Sports Science", 2018, (5 Volumes) Hardcover.


**References**


1. Tudor O Bompa," Periodization Training for Sports", 1999, Human Kinetics, USA
2. Michael Boyle, "New Functional Training for Sports" 2016, Human Kinetics USA 3. 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.
4. Scott L. Delp and Thomas K. Uchida, "Biomechanics of Movement: The Science of Sports, Robotics, and Rehabilitation", 2021, The MIT Press
5. MCARDLE W.D. "Exercise Physiology Nutrition Energy And Human Performance" 2015, LWW IE (50)

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER – V**

**Yoga** (0:0:0)

(Common to all Branches)

(Effective from the academic year 2024-25)

| | | | |
|---|---|---|---|
| Course Code | **BYOK509** | CIE Marks | 100 |
| Teaching Hours/Week (L:T:P) | 0:0:2 | SEE Marks | - |
| Total Number of Contact Hours | 26 | Exam Hours | - |

**Course Objectives:**

This course will enable students to:

2. Understand the importance of practicing yoga in day-to-day life.
3. Be aware of therapeutic and preventive value of Yoga.
4. Have a focussed, joyful and peaceful life.
5. Maintain physical, mental and spiritual fitness.
6. Develop self-confidence to take up initiatives in their lives.

**Module – 1**

**Introduction to Yoga:** Introduction, classical and scientific aspects of yoga, Importance, Types, Healthy Lifestyle, Food Habits, Brief Rules, Sithalikarana Practical classes.

**Module – 2**

**Physical Health:** Introduction, Pre-requisites, Asana-Standing, Sitting, Supine and Prone, Practical classes.

**Module – 3**

**Psychological Health:** Introduction Thought Forms, Kriya (Kapalabhati), Preparation to Meditation, Practical classes.

**Module – 4**

**Therapeutic Yoga:** Mudra Forms, Acupressure therapy, Relaxation techniques Practical classes.

**Module – 5**

**Spirituality & Universal Mantra:** Introduction, Being Human, Universal Mantra, Universal LOVE, Benefits of practice of Spirituality in day-to-day life, practical classes.

**Course Outcomes:**

Students will be able to:

1. Understand the requirement of practicing yoga in their day-to-day life.
2. Apply the yogic postures in therapy of psychosomatic diseases
3. Train themselves to have a focussed, joyful and peaceful life.
4. Demonstrate the fitness of Physical, Mental and Spiritual practices.
5. Develops self-confidence to take up initiatives in their lives.

**Teaching Practice:**

- Classroom teaching (Chalk and Talk)
- ICT – Power Point 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 have to perform asanas.

**Textbooks**

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 Iyenkar: 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-TG0Wg1Ls**

**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:**

1. NCC Cadets Handbook –Common Directorate General of NCC, New Delhi.
2. 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.

**B.E. CIVIL ENGINEERING**
Choice Based Credit System (CBCS)
**SEMESTER – V**

**NCC** (0:0:0)
(Common to all Branches)
(Effective from the academic year 2023-24)

| | | | |
|---|---|---|---|
| Course Code | **BNCK509** | CIE Marks | 100 |
| Teaching Hours/Week (L: T:P) | 0:0:2 | SEE Marks | - |
| Total Number of Contact Hours | 26 | Exam Hours | - |

**Mandatory Course (Non-Credit)**
(Completion of the course shall be mandatory for the award of degree)

**Course Objectives:**
This course will enable students to:
- 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.

**Module– 1**

**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.

**Module– 2**

**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.

**Module– 3**

**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.

**Module– 4**

**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

**Module– 5**

**Drill Practicals:** Savdhan, Vishram, Salute, Turning, Marching.

**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.

**B.E. CIVIL ENGINEERING**

Choice Based Credit System (CBCS)

**SEMESTER – V**

**Music** (0:0:0)

(Common to all Branches)

(Effective from the academic year 2023-24)

| | | | |
|---|---|---|---|
| Course Code | **BMUK509** | CIE Marks | 100 |
| Teaching Hours/Week (L: T:P) | 0:0:2 | SEE Marks | - |
| Total Number of Contact Hours | 26 | Exam Hours | - |

**Mandatory Course (Non-Credit)**

(Completion of the course shall be mandatory for the award of the Degree)

**Course Objectives:**

The course will enable the students to:

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.

**Module – 1**

**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.

**Origin of the Indian Music:** Evolution of the Indian music system, Understanding of Shruthi, Nada, Swara, Laya, Raga, Tala, Mela.

**Module – 2**

**Compositions:** Introduction to the types of compositions in Carnatic Music - Geethe, Jathi Swara, Swarajathi, Varna, Krithi, and Thillana, Notation system.

**Module – 3**

**Composers:** Biography and contributions of Purandaradasa, Thyagaraja, Mysore Vasudevacharya.

**Module – 4**

**Music Instruments:** Classification and construction of string instruments, wind instruments, percussion instruments, Idiophones (Ghana Vaadya), Examples of each class of Instruments

**Module – 5**

**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

**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**


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


**References**


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

Carnatic Music, National Institute of Open Schooling, 2019.