# 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 Electronics and Communication Engineering

## IV Semester Scheme and Syllabus
## 2022 Scheme – Autonomous
## AY 2024-2025

Approved in the BoS meeting held on 01.03.2025

# Vision and Mission of the Department

**Vision**

Be a pioneer in providing quality education in electronics, communication, and allied engineering fields to serve as a valuable resource for industry and society.

**Mission**

1. Impart Sound Theoretical and Practical Concepts.
2. Promote Interdisciplinary Research.
3. Inculcate Professional Ethics.

# Program Educational Objectives (PEOs)

1. Establish successful careers in electronics, communication, and allied engineering domains by leveraging their technical expertise, problem-solving skills, and adaptability to emerging technologies.
2. Conduct cutting-edge research and pursue higher education to develop innovative solutions that contribute to the advancement of technology that address societal and global challenges.
3. Demonstrate leadership, effective communication, and teamwork while upholding ethical practices to positively impact industry, entrepreneurship, and society through sustainable engineering solutions.

# Program Specific Outcomes (PSOs)

1. Demonstrate the knowledge of electronic devices, circuits, micro-nano electronics and other fundamental courses to exhibit competency in the domain of VLSI design.
2. Apply advanced techniques, technological innovations in communication and signal processing domain.
3. Exhibit the skills gathered to analyze, design, develop software applications and hardware products in the field of embedded systems and allied areas.

# Program Outcomes (POs)

**PO1:** ***Engineering Knowledge:*** Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.

**PO2:** ***Problem Analysis:*** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)

**PO3:** ***Design/Development of Solutions:*** Design creative solutions for complex

engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

**PO4*: Conduct Investigations of Complex Problems:*** Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8)

**PO5: *Engineering Tool Usage:*** Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)

**PO6: *The Engineer and The World:*** Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7)

**PO7: *Ethics:*** Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

**PO8: *Individual and Collaborative Teamwork:*** Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.

**PO9: *Communication:*** Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences.

**PO10: *Project Management and Finance:*** Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

**PO11: *Life-Long Learning:*** Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

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## Knowledge and Attitude Profile (WK)

**WK1:** A systematic, theory-based understanding of the natural sciences applicable to the discipline and awareness of relevant social sciences.

**WK2:** Conceptually-based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.

**WK3:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.

**WK4:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.

**WK5**: Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.

**WK6:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.

**WK7:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.

**WK8:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.

**WK9:** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

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**BMS Institute of Technology and Management**
(An Autonomous Institution, Affiliated to VTU Belagavi)
Avalahalli, Doddaballapur Main Road, Bengaluru, Karnataka – 560064

# REVISED

**Date:** 18-12-2024

## 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:

| **IPCC COURSES: 4 CREDITS 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 – 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 will be scaled down to **20 Marks**. |
| | | CIE – Test 2 (1.5 hr) | 40 | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | CIE – CCA (Comprehensive Continuous Assessment) | CCA | 10 | 05 | - | Any one assessment method can be used from the list appended below. |
| | **Total CIE Theory** | | | **25** | **10** | |
| Practical Component | CIE - Practical | | 30 | 15 | - | Each laboratory experiment is to be evaluated 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** | | | **25** | **10** | |
| **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** | |
| The laboratory component of the IPCC shall be for CIE only. | | | | | | |

| **Professional Core Courses (PCC) / Engineering Science Courses (ESC): 03 and 02 Credit** | | | | | | |
|---|---|---|---|---|---|---|
| **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: 01 Credit Course - MCQ | | | | | | |
|---|---|---|---|---|---|---|
| **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**, examination duration is 01 hour. |
| **CIE + SEE** | | | | **100** | **40** | |

| Professional Core Course Laboratory (PCCL) /Ability Enhancement Course Laboratory (AEC) - 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** | |

**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 18/12/2024

Dean AA 18.12.24

Principal 18/12/24

**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

# BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

**(Autonomous Institute affiliated to VTU)**

**B.E. in Electronics & Communication Engineering/B.E in Electronics & Telecommunication Engineering**

**Scheme of Teaching and Examination 2025**

**Outcome Based Education (OBE) and Choice Based Credit System (CBCS)- 2022 Scheme**

**Effective from AY 2024-2025**

**UG PROGRAM: ELECTRONICS & COMMUNICATION ENGINEERING (ECE) / ELECTRONICS & TELECOMMUNICATION ENGINEERING (ETE)**

**SEMESTER IV**

| 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 | PCC | BEC401 | Engineering Electromagnetics | ECE | 4 | 0 | 0 | 4 | 50 | 50 | 100 | 03 | 4 |
| 2 | IPCC | BEC402 | Basic signal Processing | ECE | 3 | 0 | 1 | 4 | 50 | 50 | 100 | 03 | 5 |
| 3 | IPCC | BEC403 | Principles of Communication Systems | ECE | 3 | 0 | 1 | 4 | 50 | 50 | 100 | 03 | 5 |
| 4 | PCCL | BECL404 | Communication laboratory | ECE | 0 | 0 | 1 | 1 | 50 | 50 | 100 | 03 | 3 |
| 5 | ESC | BEC405x | ESC/ETC/PLC | | 3 | 0 | 0 | 3 | 50 | 50 | 100 | 03 | 3 |
| 6 | AEC/SEC | BXX456x | Ability Enhancement Course/SkillEnhancement Course- IV | TD and PSB: Concerned department | If the course is Theory | | | | 50 | 50 | 100 | 01 | 1 |
| | | | | | 1 | 0 | 0 | 1 | | | | | |
| | | | | | If the course is a lab | | | | | | | 02 | 2 |
| | | | | | 0 | 0 | 1 | 1 | | | | | |
| 7 | BSC | BBOK407 | Biology For Engineers | TD / PSB: BT, CHE, | 2 | 0 | 0 | 2 | 50 | 50 | 100 | 02 | 2 |
| 8 | UHV | BUHK408 | Universal human values | Any Department | 1 | 0 | 0 | 1 | 50 | 50 | 100 | 01 | 1 |
| 9 | NCMC | BNSK459 | National Service Scheme (NSS) | NSS coordinator | 0 | 0 | 2 | 0 | 100 | --- | 100 | 02 | 0 |
| | | BPEK459 | Physical Education (PE) (Sports and Athletics) | Physical Education Director | | | | | | | | | |
| | | BYOK459 | Yoga | Yoga Teacher | | | | | | | | | |
| | | BNCK459 | NCC | NCC Teacher | | | | | | | | | |
| | | BMUK459 | Music | Music teacher | | | | | | | | | |
| 10 | NCMC for DIP | BENGDIP2 | English Communication Skill II | HSS | 0 | 0 | 2 | 0 | 100 | --- | -- | 02 | 0 |
| **Total** | | | | | **17** | **0** | **8** | **20** | **500/600** | **400** | **900** | | |

**Note:** The lateral entry Diploma students admitted to third semester are required to complete the English Communication Skill I in the third semester and English Communication Skill II in the fourth semester. These courses shall not be considered for vertical progression as well as for the calculation of SGPA and CGPA, but completion of the courses shall be mandatory for the award of degree.

**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.

| **Engineering Science Course (ESC/ETC/PLC)** | | | |
|---|---|---|---|
| BEC405A | 8051 Microcontroller | BEC405C | Operating Systems |
| BEC405B | Industrial Electronics | BEC405D | Control Systems |
| **Ability Enhancement Course / Skill Enhancement Course - IV** | | | |
| BEC456A | Embedded C basics | BEC456C | DAQ using LabVIEW |
| BEC456B | PCB Design | BEC456D | Security and Privacy in Internet of Things |

**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 IIIsemester 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.

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER - IV**

**Engineering Electromagnetics** (4:0:0) 4

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC401** | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 4:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 50 | Exam Hours | 03 |

**Course Objectives:**

This course will enable students to:

- Study the different coordinate systems, Physical significance of Divergence, Curl and Gradient.
- Understand the applications of Coulomb's law and Gauss law to different charge distributions and the applications of Laplace's and Poisson's Equations to solve real time problems on capacitance of different charge distributions.
- Understand the physical significance of Biot-Savart's, Ampere's Law and Stokes' theorem for different current distributions.
- Infer the effects of magnetic forces, materials and inductance.
- Know the physical interpretation of Maxwell's equations and applications for Plane waves for their behavior in different media.
- Acquire knowledge of Poynting theorem and its application of power flow.

**Preamble:** Significance and Scope of the course, Importance of the Course/Subject in Economic growth of Nation, Impact of the course on Societal Problems/ Sustainable Solutions/ National Economy, Career Perspective, Innovations (Current), Research status/trends

## Module – 1

**Revision of Vector Analysis:** Scalars and Vectors, Vector Algebra, Cartesian coordinate system, component vectors and unit vectors, vector field, dot product, cross product, cylindrical coordinate system, spherical coordinate system. (Text: Chapter 1.1 to 1.9)

**Coulomb's Law, Electric Field Intensity and Flux density:** Experimental law of Coulomb, Electric field intensity, Field due to continuous volume charge distribution, Field of a line charge, Field due to Sheet of charge, Electric flux density, Numerical Problems. (Text: Chapter 2.1 to 2.5, 3.1)

**(10 Hours)**

## Module – 2

**Gauss's law and Divergence:** Gauss law, Application of Gauss law to point charge, line charge, Surface charge and volume charge, Point (differential) form of Gauss law, Divergence. Maxwell's First equation (Electrostatics), Vector Operator V and divergence theorem, Numerical Problems (Text: Chapter 3.2 to 3.7).

Current and Current density, Continuity of current. (Text: Chapter 5.1, 5.2)

Computational problems in electrostatics using MATLAB

**(10 Hours)**

## Module – 3

**Poisson's and Laplace's Equations:** Derivation of Poisson's and Laplace's Equations, Uniqueness theorem, Examples of the solution of Laplace's equation, Numerical problems on Laplace equation (Text: Chapter 7.1 to 7.3)

**Steady Magnetic Field:** Biot-Savart Law, Ampere's circuital law, Curl, Stokes' theorem, Magnetic flux and magnetic flux density, Basic concepts Scalar and Vector Magnetic Potentials, Numerical problems. (Text: Chapter 8.1 to 8.6)

**(10 Hours)**

## Module – 4

**Magnetic Forces:** Force on a moving charge, differential current elements, Force between differential current elements, Numerical problems (Text: Chapter 9.1 to9.3).

**Magnetic Materials:** Magnetization and permeability, Magnetic boundary conditions, The magnetic circuit, Potential energy and forces on magnetic materials, Inductance and mutual reactance, Numerical problems (Text: Chapter 9.6 to 9.7).

Faraday' law of Electromagnetic Induction -Integral form and Point form, Numerical problems (Text: Chapter 10.1)

**(10 Hours)**

**Module – 5**

**Maxwell's equations** Continuity equation, Inconsistency of Ampere's law with continuity equation, displacement current, Conduction current, Derivation of Maxwell's equations in point form, and integral form, Maxwell's equations for different media, Numerical problems (Text: Chapter 10.2 to 10.4)

**Uniform Plane Wave:** Plane wave, Uniform plane wave, Derivation of plane wave equations from Maxwell's equations, Solution of wave equation for perfect dielectric, Relation between E and **H,** Wave propagation in frees pace, Solution of wave equation for sinusoidal excitation, wave propagation in any conducting media (y,a,,ri) and good conductors, Skin effect or Depth of penetration, Poynting's theorem and wave power, Numerical problems.(Text: Chapter 12.1 to12.4)

**(10 Hours)**

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Apply the principles of electrostatics, vector algebra to solve the problems related to electric force, electric field electric potential, boundary conditions and electric energy density. |
| **CO2** | Use the principles of magneto statics, vector algebra to the solutions of problems relating to magnetic field, force magnetic potential, boundary conditions, magnetic circuits and magnetic energy density. |
| **CO3** | Apply Faraday's law, induced emf and Maxwell Equations for the solution of time varying fields and plane waves |
| **CO4** | Analyze the divergence and curl of electromagnetic fields and time varying fields, plane waves for various field distribution. |

**Text Books:**


1. W.H. Hayt and J.A. Buck, -Engineering Electromagnetics, 8thEdition, Tata McGraw-Hill,2014, ISBN-978-93-392-0327-6.


**Reference Books:**


1. Matthew N.O., Sadiku, Elements of Electromagnetics, Oxford university press, 4th Edn.
2. E.C. Jordan and K.G. Balmain, Electromagnetic Waves and Radiating systems, PHI, 2nd Edn.
3. Joseph Edminister, Electromagnetics, Schaum Outline Series, McGraw Hill.
4. N. Narayana Rao Fundamentals of Electromagnetics for Engineering, Pearson


**Comprehensive Continuous Assessments (CCAs):**

Course Projects-Simulation of applications related to electromagnetic fields using modern tools such as MATLAB/Python/ANSYS etc.,

**Web links / e – resources:**

- https://ocw.mit.edu/courses/6-013-electromagnetics-and-applications-fall-2005/
- https://nptel.ac.in/courses/108104087

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER IV**

**Basic Signal Processing** (3:0:1:0) 4

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC402** | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P:S) | 3:0:2:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 hours Theory + 20 Lab hours | Exam. Hours | 3 |

**Course Objectives:**

This course will enable students to:

- Preparation: To prepare students with fundamental knowledge /overview in the field of Signal Processing with Familiarization with the concept of Vector spaces and orthogonality with a qualitative insight into applications in communications.
- Core Competence: To equip students with a basic foundation of Signal Processing by delivering the basics of quantitative parameters for Matrices & Linear Transformations, the mathematical description of discrete time signals and systems, analyzing the signals in time domain using convolution sum, classifying signals into different categories based on their properties, analyzing Linear Time Invariant (LTI) systems in time and transform domains

**Preamble:**

Signals play important role in our life. Generally, a signal can be a function of time, distance, position, temperature, pressure etc., and represents some variable of interest associated with system. The objective of signal processing is to extract information from signal. Signal processing is concerned with representing the signal in mathematical terms and extracting the information by carrying out the algorithmic operations on the signal.

**Module – 1**

Vector Spaces: Vector spaces and Null subspaces, Rank and Row reduced form, Independence, Basis And dimension, Dimensions of the four subspaces, Rank Nullity Theorem, Linear Transformations Orthogonality: Orthogonal Vectors and Subspaces, Projections and Least squares, Orthogonal Bases and GramSchmidt Orthogonalization procedure (Refer Chapters 2 and 3 of Text 1) **(8 Hours)**

**Module – 2**

Eigen values and Eigen vectors: Review of Eigen values and Diagonalization of a Matrix,Special Matrices (Positive Definite, Symmetric) and their properties, Singular Value Decomposition. (Refer Chapter 5, Text 1) **(7 Hours)**

**Module – 3**

Introduction and Classification of signals: Definition of signal and systems with examples, Elementary signals/Functions: Exponential, sinusoidal, step, impulse and ramp functions Basic Operations on signals: Amplitude scaling, addition, multiplication, time scaling, time shift and time reversal. Expression of triangular, rectangular and other wave forms in terms of elementary signals System Classification and properties: Linear-nonlinear, Time variant-invariant, causal-noncausal, static dynamic, stable-unstable, invertible. (Text2) [Only for Discrete Signals & Systems] **(9 Hours)**

**Module – 4**

Time domain representation of LTI System: Impulse response, convolution sum. Computation of convolution sum using graphical method for unit step and unit step, unit step and exponential, exponential and exponential, unit step and rectangular, and rectangular and rectangular. LTI system Properties in terms of impulse response: System interconnection, Memory less, Causal, Stable, Invertible and Deconvolution and step response (Text2) [Only for Discrete Signals & Systems]

**(8 Hours)**

**Module – 5**

The Z-Transforms: Z-transform, properties of the region of convergence, properties of the Z-transform, Inverse Z-transform by partial fraction, Causality and stability, Transform analysis of LTI systems. (Text2) **(8 Hours)**

**PRACTICAL COMPONENT OF IPCC**

| **Sl.NO** | **Experiments executed using programming languages Scilab / MATLAB (but not limited to)** |
|---|---|
| 1 | a. Program to create and modify a vector (array).<br>b. Program to create and modify a matrix. |
| 2 | Programs on basic operations on matrices. |
| 3 | Program to solve systems of linear equations |
| 4 | Program for Gram-Schmidt orthogonalization. |
| 5 | Program to find Eigen value and Eigen vector. |
| 6 | Program to generate discrete waveforms. |
| 7 | Program to perform basic operation on signals. |
| 8 | Program to perform convolution of two given sequences. |
| 9 | a. Program to perform verification of commutative property of convolution.<br>b. Program to perform verification of distributive property of convolution<br>c. Program to perform verification of associative property of convolution. |
| 10 | Program to find Z-Transform & Inverse Z-Transform for the basic signals. |

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Comprehend the basics of signal processing and linear algebra concepts on signals. |
| **CO2** | Apply the concepts of Linear Algebra to accomplish numerous computations using matrices |
| **CO3** | Apply the fundamentals of mathematics to classify and perform various operations on signals and systems |
| **CO4** | Analyse the properties of LTI systems in time and transform domain. |
| **CO5** | Apply different transformation techniques to analyze signals and systems. |

**Text Books:**

1. Gilbert Strang, "Linear Algebra and its Applications", Cengage Learning, 6th Edition, 2006, ISBN97809802327
2. Simon Haykin and Barry Van Veen, "Signals and Systems", 2nd Edition, 2008, Wiley India. ISBN9971-51-239-

**Reference Books:**

1. D.C. Lay, Linear Algebra and its Applications (2/e), Pearson, 200.
2. Alan V Oppenheim, Alan S WiIIsky and S Hamid Nawab, "Signals and Systems" Pearson Education Asia/ PHI, 2nd edition, 1997. Indian Reprint 2002.
3. BP Lathi, "Linear Systems and Signals", Oxford University Press, 2005.
4. Ganesh Rao and Satish Tunga, "Signals and Systems", Pearson/Sanguine.
5. Seymour Lipschutz, Marc Lipson, "Schaums Easy Outline of Linear Algebra", 2020.
6. Udaya Kumar S, "Signals and Systems", 7th Edition, Pristine Publishing House

**Comprehensive Continuous Assessments (CCAs):**

**MOOC courses:** Students have to take up and complete tool exploration using on-Ramp MATLAB courses and submit the report with course completion certificate

**Web links / e – resources:**

- https://onlinecourses.nptel.ac.in/noc23_ee14/preview
- https://matlabacademy.mathworks.com/details/signal-processing-onramp/signalprocessing
- https://ocw.mit.edu/courses/res-6-007-signals-and-systems-spring-2011/

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER - IV**

**Principles of Communication Systems** (3:0:1:0) 4

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC403** | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P:S) | 3:0:2:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 hours Theory + 20 hours lab | Exam Hours | 03 |

**Course Objectives:**

This course will enable students to:

- Understand and analyse concepts of Analog Modulation schemes viz; AM, FM
- Design and analyse the electronic circuits for AM and FM modulation and demodulation.
- Design and analyse the electronic circuits used at various stages of RF transmitter and receiver.
- Understand and analyse concepts of digitization of signals.
- Evolve the concept of SNR in the presence of channel induced noise

**Preamble:**

Communication is nothing but transmission of information either point-to-point, or broadcast and is basically involves modulation and demodulation of information. There are broadly two types of communication systems, i.e. analog and digital communication systems. In the present days verities of communication systems are evolved, depending on the application, such as, computer communication networks, cypher systems, satellite communication systems, etc,. However, the analog communication is the fundamental and oldest method and still used either independently or in other communication systems as well. These subject addresses analog modulation schemes: Amplitude and frequency modulation and demodulation schemes, Analog transmission and reception, few digital communication techniques and the basic noise involved in the communication systems.

## Module – 1

**Amplitude Modulation Fundamentals:** AM Concepts, Modulation index and Percentage of modulation, Sidebands and the frequency domain, AM Power, Single Sideband Modulation.

**AM Circuits:** Amplitude Modulators, Amplitude Demodulators, Balanced Modulators (Lattice type).

**(8 Hours)**

## Module – 2

**Fundamentals of Frequency Modulation:** Basic Principles of Frequency Modulation, Principles of Phase Modulation, Modulation index and sidebands, Noise Suppression effects of FM, Frequency Modulation versus Amplitude Modulation.

**FM Circuits:** Frequency Modulators: Frequency Demodulators

**(8 Hours)**

## Module – 3

**Radio Transmitters:** Transmitter Fundamentals: Transmitter Configurations, Carrier Generators: Crystal Oscillators, Frequency Synthesisizers, Phase Locked Loop Synthesisizers.

**Communication Receivers:** Basic Principles of Signal reproduction, Superheterodyne Receivers, Frequency Conversion: Mixing principles, Mixer and Converter Circuits, Local Oscillators and Frequency Synthesizers, Intermediate Frequency and Images.

**(8 Hours)**

## Module – 4

**Digital communication Techniques:** Digital transmission of data, parallel and serial Transmission, Data Conversion: Basic Principles of Data Conversion, D/A Converters, A/D Converters, ADC Specifications, Pulse Modulation: Comparing Pulse Modulation Methods, Pulse-Code Modulation

**(8 Hours)**

**Module – 5**

**Noise:** Signal to Noise Ratio, External Noise, Internal Noise, Expressing Noise Levels, Noise in Cascade Stages. **Multiplexing and Demultiplexing:** Multiplexing Principles, Frequency Division Multiplexing, Time Division Multiplexing, Pulse code Modulation: PCM Multiplexers, Demultiplexers, Benefits, Digital Carrier Systems (T carrier System), Duplexing.

**(8 Hours)**

**PRACTICAL COMPONENT OF IPCC** *(Experiments can be conducted using a suitable circuit simulation software or hardware components)*

| Sl.NO | Experiments |
|---|---|
| 1 | Design and Test the Amplitude Modulation and demodulation using diode and transistors. |
| 2 | Design and Test the Frequency modulation using VCO and demodulation using slope detector circuit. |
| 3 | Design and test a high power<br>a) Class A line RF amplifier.<br>b) Class E RF amplifier |
| 4 | Design and test a mixer used for frequency translation. |
| 5 | Design and test a VCO used for local oscillator service |
| 6 | Verification of Sampling Theorem using sampling a sinusoidal signal using a sample and hold circuit. |
| 7 | TDM PAM Multiplexer and Demultiplexer |
| 8 | A String DAC and Flash Converter (Demo Experiment) |
| 9 | Design and Test a RF Transmitter circuit (Demo Experiment) |
| 10 | Design and Test a RF Receiver circuit (Demo Experiment) |

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Apply the knowledge of electronic circuits for the generation of Amplitude Modulated wave and recovery of message from modulated wave. |
| **CO2** | Apply the knowledge of electronic circuits for the generation of Frequency Modulated wave and detection of baseband signal from modulated wave. |
| **CO3** | Apply the fundamental concepts of communication in radio transmitters and receivers. |
| **CO4** | Apply the core principles of digital communication, including signal representation and transmission. |
| **CO5** | Comprehend the effects of noise and use of different multiplexing techniques in communication. |

**Suggested Learning Resources**:

**Text Books:**


1. Louis E Frenzel, "Principles of Electronic Communication Systems", 3rd Edition, Mc Graw Hill Education (India) Private Limited, 2016. ISBN: 978-0-07-066755-6.


**Reference Books:**


2. Herbert Taub, Donald L Schilling, Goutam Saha, "Principles of Communication systems", 4th Edition, Mc Graw Hill Education (India) Private Limited, 2016. ISBN: 978-1-25-902985-1
3. B P Lathi, Zhi Ding, "Modern Digital and Analog Communication Systems", 4th edition, Oxford University Press., , 2010, ISBN: 97801980738002.

4. Simon Haykins & Moher, Communication Systems, 5th Edition, John Wiley, India Pvt. Ltd, 2010, ISBN: 978- 81-265-2151-7.

**Comprehensive Continuous Assessments (CCAs):**

Simulate the given communication problem using any of the tools:

- MATLAB/SIMULINK/NI-Multisim/C-Programming etc, present the result and submit report

**Web links / e – resources:**

- Principles of Communication Systems https://nptel.ac.in/courses/108104091
- Communication Engineering https://nptel.ac.in/courses/117102059

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER – IV**

**Communication Laboratory** (0:0:1) 1

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BECL404** | CIE Marks | 50 |
| Teaching Hours/Week (L: T:P) | 0:0:2 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 | Exam Hours | 03 |

**Course Objectives:**

This laboratory course enables students to

- Understand the basic concepts of modulation and demodulation.
- Design the electronic circuits used for modulation and demodulation circuits.
- Analyse the electronic circuits to perform pulse amplitude modulation, pulse code modulation and multiplexing.
- Understand the working principles of synthesizer and pre-emphasis and de-emphasis circuits

**Preamble:** This course gives enhances the knowledge of communication system concepts filter, modulator and demodulator circuit. PAM, PPM and PWM digital modulation method design was incorporated.

| SL NO | Experiments |
|---|---|
| 1 | Design and plot the frequency response of an active band pass filters. |
| 2 | Design and plot the frequency response of an active band stop filters. |
| 3 | Design and test an Amplitude Modulation circuit and Demodulation of the signal using diode detector. |
| 4 | Test the Balanced Modulator/ring modulator using diodes. |
| 5 | Design and test the Frequency modulation to generate the FM signal, calculate modulation index & bandwidth. |
| 6 | Design Pulse amplitude modulation and demodulation. |
| 7 | Design and test the Time Division Multiplexing of two bandlimited signals. |
| 8 | Design and test BJT Mixer using Transistor SL100. |
| 9 | Design and test the Pulse width Modulation and Pulse Position Modulation. |
| | **Demonstration Experiments** |
| 10 | Design and test Frequency synthesizer. |
| 11 | Design Pre-Emphasis & De-Emphasis Circuits. |

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Apply the concepts communication system in analog-digital transmitters and Receivers circuits. |
| **CO2** | Design active band-pass and band-stop filter. |
| **CO3** | Analyze analog and digital modulation techniques. |
| **CO4** | Write the report for conduction of experiments in the laboratory for assessment. |
| **CO5** | Conduct and interpret the modulators and demodulators circuits as an open-ended experiment. |

**Suggested Learning Resources:**

1. Louis E Frenzel, Principles of Electronic Communication Systems, 3rd Edition, McGraw Hill Education (India) Private Limited, 2016. ISBN: 978-0-07-066755-6.

**Comprehensive Continuous Assessments (CCAs):**

- Open ended experiments

**Web links / e – resources:**

- https://onlinecourses.nptel.ac.in/noc22_ee05/preview
- https://aec-iitkgp.vlabs.ac.i n/exp/active-filter/

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER – IV**

**8051 Microcontroller** (3:0:0) 3

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC405A** | 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:**

This course will enable students to:

- Understand the difference between a Microprocessor and a Microcontroller and
- Embedded microcontrollers.
- Familiarize the basic architecture of 8051 microcontroller.
- Program 8051microprocessor using Assembly Level Language and C.
- Understand the interrupt system of 8051 and the use of interrupts.
- Understand the operation and use of inbuilt Timers/Counters and Serial port of 8051.
- Interface 8051 to external memory and I/O devices using its I/O ports

**Preamble:**

This course highlights the difference between a microprocessor and microcontroller. The assembly level language code of interfacing 8051 microcontroller to external memory and I/O devices are.

**Module – 1**

**8051 Microcontroller:**

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

**(8 Hours)**

**Module – 2**

**8051 Instruction Set:** Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples (without loops) to use these instructions

**(8 Hours)**

**Module – 3**

**8051 Stack, I/O Port Interfacing and Programming:** 8051 Stack, Stack and Subroutine instructions. Assembly language program examples on subroutine and involving loops - Delay subroutine, Factorial of an 8 bit number (result maximum 8 bit), Block move without overlap, Addition of N 8 bit numbers, Picking smallest/largest of N 8 bit numbers.

Interfacing simple switch and LED to I/O ports to switch on/off LED with respect to switch status.

**(8 Hours)**

**Module – 4**

**8051 Timers and Serial Port:** 8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode-2 on a port pin. 8051 Serial Communication- Basics of Serial Data Communication, RS-232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially

**(8 Hours)**

**Module – 5**

**8051 Interrupts and Interfacing Applications:** 8051 Interrupts. Interrupt priority and enable registers, 8255 programmable peripheral interfaces, Architecture of 8255a.

Interfacing 8051 to LCD, keypad and Stepper motor and their 8051 Assembly/C language interfacing programming

**(8 Hours)**

**Course Outcomes (Course Skill set):**

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

| | |
|---|---|
| **CO1** | Elucidate the difference between Microprocessors & Microcontrollers, Architecture of Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051. |
| **CO2** | Write 8051 Assembly level programs using 8051 instructions set. |
| **CO3** | State the Interrupt system, operation of Timers/Counters and Serial port of 8051. |
| **CO4** | Develop applications using Assembly language program/C programming by interfacir Microcontroller with LCD, Stepper motor, Keypad, Simple switches. |
| **CO5** | Design and demonstrate small Embedded system projects |

**Suggested Learning Resources:**

**Text Books:**

1. The 8051 Microcontroller and Embedded Systems – using assembly and C", Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; PHI, 2006 / Pearson, 2006.
2. "The 8051 Microcontroller", Kenneth J. Ayala, 3rd Edition, Thomson/ Cengage Learning

**Reference Books:**

1. "The 8051 Microcontroller Based Embedded Systems", Manish K Patel, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. "Microcontrollers: Architecture, Programming, Interfacing and System Design", Raj Kamal, Pearson Education, 2005.

**Comprehensive Continuous Assessments (CCAs):**

- Mini Project
- Case study
- Technical presentations

**Web links / e – resources:**

- https://onlinecourses.nptel.ac.in/noc22_ee12/preview
- https://www.coursera.org/learn/microcontroller-and-industrial-applications

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER – IV**

**Industrial Electronics** (3:0:0) 3

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC405B** | 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:**

This course will enable students to:

- Explain broad types of industrial power devices, there structure, and its characteristics.
- Design and analyse the broad categories of power electronic circuits.
- Explain various types of MEMs devices, principle of operation and construction.
- Familiarize with soft core processors and computer architecture.
- Apply protective methods for devices and circuits.

**Preamble:** The industrial sector needs automation engineers to design automation systems and use automation techniques to use resources efficiently and improve process plant performance. This course is about advanced industrial circuits and their applications and their implementation strategies to equip the students to develop optimal solutions to real world problems.

## Module – 1

**Industrial Power Devices:** General purpose power diodes, fast recovery power diodes, schottky power diodes, silicon carbide power diodes (Text book 1: 2.5, 2.6), Power MOSFETs, Steady state characteristics, switching characteristics, silicon carbide MOSFETs, COOLMOS, Junction field effect transistors, operation and characteristics of JFETs, Silicon Carbide JFET structures, Bipolar Junction Transistors, Steady state characteristics, switching characteristics, silicon carbide BJTs, IGBT, silicon carbide IGBTs (Text book 1: 4.3, 4.4, 4.6, 4.7), Thyristor, Thyristor characteristics, two transistor model (Text book 1: 9.2, 9.3, 9.4).

**(8 Hours)**

## Module – 2

**Power Electronics Circuits:** Controlled Rectifiers – Single phase full converter with R and RL load, Single phase dual converters, and Three phase full converter with RL load **(**Text book 1: 10.2, 10.3, 10.4). Switching mode regulators – Buck Regulator, Boost regulator, Buck – Boost regulator, comparison of regulators (Text book 1: 5.9.1, 5.9.2, 5.9.3, 5.10)

Inverters – Principle of operation, Single phase bridge inverter, Three phase inverter with 180 and 120 degree conduction, Current source inverter (Text book 1: 6.3, 6.4, 6.5, 6.9).

AC voltage controllers – Single phase full wave controller with resistive load, single phase full wave controller with inductive load (Text book 1: 11.3, 11.4).

**(8 Hours)**

## Module – 3

**MEMS Devices:** Sensing and Measuring Principles, Capacitive Sensing, Resistive Sensing, Piezoelectric Sensing, Thermal Transducers, Optical Sensors, Magnetic Sensors, MEMS Actuation Principles, Electrostatic Actuation, Thermal Actuation, Piezoelectric Actuation, Magnetic Actuation, MEMS Devices Inertial Sensors, Pressure Sensors, Radio Frequency MEMS: Capacitive Switches and Phase Shifters, Microfluidic Components, Optical Devices. (Text book 2: 13.1, 13.3, 13.4)

**(8 Hours)**

## Module – 4

**Soft Core Processors -** Processor Core Options, Processor Definition Process, Software Development Aspects, Utilization of Soft-Core Processors, Custom Instructions, Soft-Core

Processor on an ASIC vs. FPGA, Design Issues, Applications for Soft-Core Processors (Text book 2: 22.2, 22.3, 22.4, 22.5, 22.6, 22.7, 22.8, 22.9).

**Computer Architecture -** Hardware Organization, Computer Software, Programming Languages, Operating Systems, Information Representation in Digital Computers, Computer Programming Model, CPU Registers, Immediate Operands, Memory, Organization, Memory Addressing, Computer Instruction, Types, Interrupts and Exceptions, Evaluating Instruction Set Architectures, Computer System Design, Hierarchical Memory Systems, Memory Characteristics, Semiconductor Memory Technologies, Memory System Organization, Cache Memory, Virtual Memory Management, Interfaces to Input/Output Devices, Microcontroller Architectures Multiple Processor Architectures (Text book 2: 23.2, 23.3, 23.4, 23.5, 23.6, 23.7, 23.8, 23.9, 23.10)

**(8 Hours)**

**Module – 5**

**Protections of Devices and Circuits:** Cooling and Heat sinks, Thermal Modeling of Power Switching Devices, Electrical Equivalent Thermal model, Mathematical Thermal Equivalent Circuit, Coupling of Electrical and Thermal Components, Snubber circuits, Reverse Recovery Transients, Supply and Load side transients, Voltage protection by Selenium Diodes and Metal oxide Varistors, Current protection, Fusing, Fault current with AC source, Fault current with DC source, Electromagnetic Interference, sources of EMI, Minimizing EMI Generation, EMI shielding, EMI standards (Text book 1: 17.2, 17.3, 17.4, 17.5, 17.6, 17.7, 17.8, 17.9).

**(8 Hours)**

**Course Outcomes (Course Skill Set)**

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

| | |
|---|---|
| **CO1** | Apply the concept of soft-core processor, characteristics and working principles of the po devices, circuits, sensors, |
| **CO2** | Apply the acquired knowledge to construct and protect various power electronic devices circuits, and to design computer architectures. |
| **CO3** | Analyse the Different power electronic, MEMS, sensors, Transducers devices and circuits |
| **CO4** | Comprehend the principles of computer architecture for the technological advancement. |

**Suggested Learning Resources:**

**Text Books:**


1. Power Electronics: Devices, Circuits, and Applications, Muhammad H. Rashid, Pearson, 4th International edition.
2. Fundamentals of Industrial Electronics, Bogdan M. Wilamowski, J. David Irwin, CRC Press, 2011,
3. Thomas E. Kissell, Industrial Electronics: Applications for Programmable Controllers, Instrumentation and Process Control, and Electrical Machines and Motor Controls, 3rd edition, 2003, Prentice Hall.
4. Ned Mohan, T.M. Undeland and W.P. Robbins, "Power Electronics: Converters, Applications and Design", Wiley India Ltd, 2008.


**Comprehensive Continuous Assessments (CCAs):**

- Presentation on the state-of art designs in automation.
- Case study on design flaws and its implications.

**Web links / e – resources:**

- https://www.udemy.com/course/embedded-c-programming-for-embedded-systems/?srsltid=AfmBOoqld8xB7J0kPGHX1FrgOx8yD2rGuo2T1M8cN_k-_UNEiU5hFQQn
- https://in.pearson.com/content/dam/region-growth/india/pearson-india/Support/pdf/ECE_2017.pdf

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER - IV**

**Operating system** (3:0:0) 3

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC405C** | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P:S) | 3:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 40 | Exam Hours | 3 |

**Course Objectives:**

This course will enable students to:

- Understand the services provided by an operating system.
- Explain how processes are synchronized and scheduled.
- Understand the different approaches of memory management and virtual memory management,
- Describe the structure and organisation of the file system.
- Understand inter process communication and dead lock situations.

**Preamble:** Operating System (OS) course provides a comprehensive introduction to OS fundamentals, including process and memory management, file systems, I/O handling, and security. Students will explore key concepts like multitasking, synchronization, and scheduling while analyzing real-world OS implementations such as Windows and Linux. Through hands-on exercises and projects, they will gain practical experience in system programming and troubleshooting.

**Module – 1**

**Introduction to Operating System:** OS, goals of an OS, Computational structures, resource allocation techniques, efficiency, system performance and user convenience, classes operating system, batch processing, multiprogramming, time sharing system, real time and distributed operating systems. (Text 1: 1.2,1.3,2.2 to 2.8).

**(8 Hours)**

**Module – 2**

**Process Management:** OS view of processes, PCB, Fundamental state, Transitions of a process**,** Threads, Kernel and User level Threads, Non-Preemptive Scheduling-FCFS and SRN, Preemptive Scheduling- RR and LCN, Scheduling in Unix and Scheduling Linux. (Text 1: 3.3,3.3.1,3.4,3.4.1,3.4.2, Selected scheduling topics from 4.2 and 4.3,4.6,4.7)

**(8 Hours)**

**Module – 3**

Memory Management: Contiguous Memory Allocation, Non-contiguous Memory Allocation, Paging, Segmentation with Paging, Virtual Memory Management, Demand Paging, VM Handler, FIFO, LRU Page replacement policies, Virtual memory in Unix and Linux. (Text 1: 5.5 to 5.9, 6.1 to 6.3 except optimal policy and 6.3.1, 6.7, 6.8).

**(8 Hours)**

**Module – 4**

**File systems:** File systems and IOCS, File Operation, File Organization, Directory Structure, File Protection, Interface between File system and IOCS, Allocation of disk space, Implementing file access. (Text 1: 7.1 to 7.8).

**(8 Hours)**

**Module – 5**

**Message passing and deadlocks:** Overview of Message Passing, implementing message passing, Mailboxes, Deadlocks, Deadlocks in resource allocation, Handling deadlocks, Deadlocks detection algorithm, Deadlocks Prevention. (Text 1: 10.1 to 10.3, 11.1 to 11.5).

**(8 Hours)**

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Elucidate the basics of operating systems, its goals, structure, operation and classes. |
| **CO2** | Apply scheduling techniques to find performance factors. |
| **CO3** | Interpret organization of memory and its file systems. |
| **CO4** | Analyze the various deadlock that occur in an operating system and its effects. |

**Suggested Learning Resources:**

**Text Book:**

1. Operating system – A concept-based Approach, by Dhamdhere, TMH, 2nd edition.

**Reference Books:**


1. Operating Systems Concepts, Silberschatz and Galvin, John Wiley India Pvt. Ltd, 5th edition,2001.
2. Operating System—Internals and Design System, William Stalling, Pearson Education, 4th ed,2006.
3. Operating Systems - Design and Implementation, Tanenbaum, TMH, 2001.
4. Godbole, "Operating Systems", Tata McGraw Hill, 3rd edition, 2014


**Comprehensive Continuous Assessments (CCAs):**

- Implement operating system scripts for any mechanism using any OS.

**Web links / e – resources:**

- Lectures on Operating Systems - CSE IITB

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER – IV**

**Control Systems** (3:0:0) 3

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC405D** | 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:**

This course will enable students to:

- Understand the basic features, configurations and application of control systems.
- Understand various terminologies and definitions for the control systems.
- Learn how to find a mathematical model of electrical, mechanical and electro- mechanical
- systems.
- Know how to find time response from the transfer function.
- Find the transfer function via Masons' rule.
- Analyze the stability of a system from the transfer function.
- To get practical exposure using MATLAB programs to understand the concepts of control system

**Preamble:**

Control Systems course provides a comprehensive introduction to the fundamental principles of control systems, equipping students with the tools and techniques necessary to analyze, design, and implement effective control strategies. This course explores both classical and modern control theory, covering topics such as system modeling, time and frequency domain analysis, stability analysis, feedback control design, and the use of software tools for simulation and analysis. Through a combination of lectures and hands-on labs students will develop a deep understanding of control system behavior and gain the ability to design and optimize systems for desired performance characteristics, preparing them for real-world engineering challenges.

**Module – 1**

**Introduction to Control Systems:** Types of Control Systems, Effect of Feedback Systems, Differential equation of Physical Systems -Mechanical Systems, Electrical Systems, Electro mechanical systems, Analogous Systems.

**(8 Hours)**

**Module – 2**

**Block diagrams and signal flow graphs:** Transfer functions, Block diagram algebra and Signal Flow graphs.

**(8 Hours)**

**Module – 3**

**Time Response of feedback control systems:** Standard test signals, Unit step response of First and Second order Systems. Time response specifications, Time response specifications of second order systems, steady state errors and error constants. Introduction to PI, PD and PID Controllers (excluding design).

**(8 Hours)**

**Module – 4**

**Stability analysis:** Concepts of stability, Necessary conditions for Stability, Routh stability criterion, Relative stability analysis: more on the Routh stability criterion. Introduction to Root-Locus Techniques, the root locus concepts, Construction of root loci.

**Frequency domain analysis and stability:** Correlation between time and frequency response, Bode Plots, Experimental determination of transfer function.

**(8 Hours)**

**Module – 5**

**Introduction to State variable analysis:** Concepts of state, state variable and state models for electrical systems, Solution of state equations.

Hands on using MATLAB programs to: Determine the overall transfer function of a control system, determine rise time, peak time, peak overshoot and settling time for the given transfer function. To obtain and plot the Unit step, Unit ramp response of a closed loop control system. Determination of frequency response of a second order System, Determine the root locus of the given characteristic equation for the given control system and Determine gain margin, phase margin, gain crossover frequency and phase crossover frequency for Bode plot of the given transfer function.

**(8 Hours)**

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Develop mathematical models to represent systems and arrive at their transfer function |
| **CO2** | Analyze the transient and steady state response of Control Systems. |
| **CO3** | Determine the stability of the system using frequency domain analysis |
| **CO4** | Represent state space model of LTI system |

**Suggested Learning Resources:**

**Text Book:**


1. J. Nagarath and M. Gopal, "Control Systems Engineering", New Age International Private Limited, Publishers, 7th edition- 2021, ISBN-13: 978-8195175581.


**Reference Books:**


1. K. Ogata ,"Modern Control Engineering", Pearson Education Asia/PHI, 5th Edition, 2021. ISBN-13: 9780137551064
2. Benjamin C. Kuo and Farid Golnaraghi "Automatic Control Systems", McGraw-Hill Education., 10th Edition, 2017. ISBN: 978-1-25-964384-2
3. Joseph J Distefano III et.al., "Feedback and Control System," Schaum's Outlines, TMH, 2nd Edition 2007.


**Comprehensive Continuous Assessments (CCAs):**

- Buildathon: To design and implement a system that monitors and displays key environmental parameters within a vehicle's cabin, triggering alerts or automated adjustments for passenger comfort and safety in a team.

**Web links / e – resources:**

- https://archive.nptel.ac.in/courses/107/106/107106081/
- https://ctms.engin.umich.edu/CTMS/index.php?aux=Home
- https://www.youtube.com/user/ControlLectures
- https://in.mathworks.com/academia/courseware/teaching-controls-with-matlab-and-simulink.html
- https://qnextech.com/blog/what-are-examples-of-control-systems/

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER – IV**

**Embedded C Basics** (0:0:1) 1

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC456A** | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P:S) | 0:0:2 | SEE Marks | 50 |
| Total Number of Contact Hours | 16 | Exam Hours | 02 |

**Course Objectives:**

This course will enable students to:

- Understand the basic programming of Microprocessor and microcontroller.
- Develop the microcontroller-based programs for various application in simulation environment
- Program a microcontroller to control an external hardware using suitable I/O ports.

Note: Conduct the following experiments by writing C Program using Keil micro vision simulator (any 8051 microcontroller can be chosen as the target).

**Preamble:** This course covers the fundamental concepts of C-Programming language tailored to embedded systems (8051 programming), including data types, operators, control flow, functions, memory management concepts. Motor rotation and waveform generation experiment are covered

**Prerequisite:** Students must be familiar with the internal architecture of 8051 microcontroller, its register organization, addressing modes, instruction sets and I/O ports details which enables to understand and write the programs.

| SL. NO | Experiments |
|---|---|
| 1 | Write a 8051C program to multiply two 16 bit binary numbers. |
| 2 | Write a 8051 C program to find the sum of first 10 integer numbers. |
| 3 | Write a 8051 C program to find factorial of a given number. |
| 4 | Write a 8051 C program to add an array of 8-bit numbers and store the result in internal RAM |
| 5 | Write a 8051C program to find the square of a number (1to10) using look-up table. |
| 6 | Write a 8051 C program to find the largest/smallest number in an array of 10 numbers |
| 7 | Writea8051 C program to arrange a series of 8-bit numbers in ascending/descending order |
| 8 | Write a 8051 C program to count the number of ones and zeros in two consecutive memory locations. |
| 9 | Write a 8051C program to scan a series of 8-bit numbers to find how many are negative. |
| 10 | Writea8051 C program to display “HelloWorld” message (either in simulation mode or interface an LCD display). |
| 11 | Write a 8051C program to generate the waveforms: square, triangle and ramp, using DAQ. |
| 12 | Write a 8051 C program to run a stepper motor in clock wise and counter clockwise direction with a given step angle. |

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Write C programs in 8051 for solving simple problems that manipulate input data using different instructions. |
| **CO2** | Develop testing and experimental procedures on 8051 Microcontroller, analyze their operation under different cases |
| **CO3** | Develop microcontroller applications using external hardware interfaces. |
| **CO4** | Extract solutions for real time problems using 8051 microcontrollers and peripherals. |

**Suggested Learning Resources:**

**Text Book:**

1. V Udayashankara and MS Mallikarjuna Swamy "The8051Microcontroller: Hardware, Software and Applications", 1st edition, McGraw Hill Education ,2017.

**Comprehensive Continuous Assessments (CCAs):**

- Case study
- Open ended experiments

**Web links / e – resources:**

- https://www.udemy.com/course/embedded-c-programming-for-embedded-systems/?srsltid=AfmBOoqld8xB7J0kPGHX1FrgOx8yD2rGuo2T1M8cN_k-_UNEiU5hFQQn

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

CHOICE BASED CREDIT SYSTEM (CBCS)

**SEMESTER - IV**

**PCB Design** (1:0:0) 1

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC456B** | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P:S) | 1:0:0 | SEE Marks | 50 |
| Total Number of Contact Hours | 15 | Exam Hours | 1 |

**Course Objectives:**

This course will enable students to:

- Study about layout planning, art work and design of PCB
- To understand the PCB production process
- Discuss the role of Modern trends and automatic design of PCB

**Preamble:**

Printed Circuit Board (PCB) design is a crucial aspect of modern electronics, enabling the development of compact, reliable, and high-performance electronic devices. This course provides a comprehensive introduction to PCB design principles, covering schematic creation, component selection, layout techniques, signal integrity, and manufacturing considerations.

**Module – 1**

**Design of Printed Circuit Boards: Layout Planning**: Introduction, General Consideration, PCB Sizes, Layout Approaches, Documentation, **Layout, General Rules and Parameters**:

Introduction, Resistance, Capacitance, Inductance of PCB conductors, Conductor Spacing, Component Placing and Mounting, Cooling Requirements and Package Density, Layout Check, Art work.

**(3 Hours)**

**Module – 2**

**Technology of PCB: Film Master Production:** Introduction, Emulsion Parameters, Film Emulsions, Dimensional Stability of Film Masters, Reprographic Cameras, Darkroom, Film Processing, Film Registration, **Properties of Copper Clad Laminates:** Introduction, Manufacture of Copper Clad Laminates, Properties and Types of Laminates, Specifications and Test Methods, **Board cleaning before Pattern Transfer:** Manual and Machine Cleaning Processes.

**(3 Hours)**

**Module – 3**

**Photoprinting:** Basic Processes for Double Sided PCBs, Photoresists, Wet Film Resists, Coating Processes, Exposure and further Processing of Wet Film Resists, Dry Film Resists.

**Screen Printing:** Screen Fabrics, Screen and Frame Preparation, Pattern Transfer onto the screen, Reclamation of the Screen Fabrics, Printing, Trouble shooting

**(3 Hours)**

**Module – 4**

**Plating:** Introduction, Immersion Plating, Electroless Plating, Electroplating, Plating Quality Control, Etching, Etching Machines, Etchant Systems, Minimising Pollution, Mechanical Machining operations. **Multilayer Boards:** Introduction, Design and Test Considerations, Multilayer Construction, Equipment, Laminating Process and further processing

**(3 Hours)**

**Module – 5**

**PCB Technology Trends:** Fine line conductors with Ultra-Thin Copper Foil, Multilayer and Multiwire Boards, Flexible Printed Circuit Boards.

**Automation and Computers in PCB Design:** Automated Artwork Draughting, Computer Aided Design, Design Automation.

**(3 Hours)**

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Outline the detailed circuit diagram and prerequisite before the actual PCB layout. |
| **CO2** | Comprehend the process of PCB production, Material selection and PCB fabrication. |
| **CO3** | Explore about the Plating techniques, Etching process, and multilayer PCB board Construction. |
| **CO4** | Analyse the recent technology trends in PCB design and its applications. |

**Suggested Learning Resources:**

**Text Books:**


1. Walter C Bosshart, "Printed Circuit Boards-Design & Technology" Tata Mc Graw-Hill Pvt. Ltd, 2010
2. Dr. R.S. Khandapur "Printed Circuit Boards-Design, Fabrication, Assembly and Testing", Mc Graw-Hill Education, 2017


**Comprehensive Continuous Assessments (CCAs):**

- Simulation of PCB design using any simulation tool.

**Web links / e – resources:**

- ESim - EDA tool for circuit design, simulation, analysis and PCB design https://onlinecourses.swayam2.ac.in/aic20_sp59
- Electronics systems design:Hands-on circuits and PCB design with CAD software https://www.youtube.com/watch?v=NhC4MYKmCek&list=PLp6ek2hDcoNAUpqc3DUj4U5hcipc2idZ5

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**SEMESTER -IV**

**DAQ using LabVIEW** (0:0:1) 1

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC456C** | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P:S): | 0:0:2 | SEE Marks | 50 |
| Total Number of Lecture Hours | 30 | Exam Hours | 02 (P) |

**Course Objectives:**

This course will enable students to:

- Process the knowledge of loop constructs.
- Fundamentals of graphical programming and use Lab VIEW modules
- Implement 'Timing' functions.
- Input algebraic formulas via 'Formula Nodes' and 'Expression Nodes'.

**Preamble:** This course highlights the LABVIEW models for loop constructs, timing functions and expression nodes. Testing and configuration and generation of LABVIEW code to interact with the DAQ.

| SL. NO | Experiments |
|---|---|
| 1 | Data acquisition using LabVIEW for temperature measurement with thermocouple. |
| 2 | Data acquisition using LabVIEW for temperature measurement with AD590 |
| 3 | Data acquisition using LabVIEW for temperature measurement with RTD. |
| 4 | Data acquisition using LabVIEW for temperature measurement with Thermistor. |
| 5 | Creation of a CRO using LabVIEW and measurement of frequency and amplitude from external source |
| 6 | Create function generator using LabVIEW and display the amplitude and frequency on CRO (externally connected) |
| 7 | Demonstrate amplitude modulation considering modulating and carrier wave from external source. |
| 8 | Interface LEDs to DAQ output and implement counter |
| 9 | Data acquisition using LabVIEW for load/strain measurement using suitable transducers. |
| 10 | Demonstrate binary to grey code converter (&vice-versa) using DAQ card. |
| 11 | Data acquisition using LabVIEW for distance/humidity measurement using suitable transducers. |
| 12 | Reading audio input with Microphones and output using DAQ card. |

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Build temperature indicating instruments using LabVIEW (NIDAQ) |
| **CO2** | Interface peripheral devices/instruments to LabVIEW |
| **CO3** | Develop LabVIEW modules to sense and process audio inputs |
| **CO4** | Apply programming structures, data types, and the analysis and signal processing algorithms in LabVIEW |

**Suggested Learning Resources:**

**Text Books:**

1. Jovitha Jerome, "Virtual Instrumentation using LABVIEW", PHI,2011

2. Sanjay Gupta, Joseph John, “Virtual Instrumentation using LABVIEW”, TMH, McGraw Hill, Second Edition, 2011.

**Comprehensive Continuous Assessments (CCAs):**

- Case Study
- Open ended experiment

**Web links / e – resources:**

- https://www.ni.com
- NI-DAQmx Express VI Tutorial
- Using the DAQ Assistant to Automatically Generate LabVIEW Code
- Using the DAQ Assistant in LabWindows/™ CVI
- Using the DAQ Assistant in Measurement Studio for Visual Studio

# BMS Institute of Technology and Management

**B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.**

Choice Based Credit System (CBCS)

**Semester – IV**

**Security and Privacy in Internet of Things** (1:0:0) 1

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BEC456D** | CIE Marks | 50 |
| Teaching Hours/Week (L: T:P: S) | 1:0:0 | SEE Marks | 50 |
| Total Number of Lecture Hours | 15 | Exam Hours | 01 |

**Course Objectives:**

The course will enable the students to:

- Understanding of the security issues in the applications of IoT.
- Explore the different models of threats in IoT.
- Acquaint the knowledge of authentication, privacy in the network of IoT.

**Preamble:** This course highlights the threats, malwares in IoT, also on the security and privacy issues.

**Module-1**

**Internet of Things as Interconnections of Threats (IoT vs. IoT):**
Phase attacks, Attacks as per architecture, Attacks based on components.

**(3 Hours)**

**Module-2**

**Malware in IoT**
Introduction**,** Malware Schemes in IoT

**Privacy Preservation for IoT Used in Smart Buildings:**
Overview of Smart Building Concept, Privacy Threats in Smart Buildings, Privacy-Preserving Approaches in Smart Buildings

**(4 hours)**

**Module-3**

**Trust and Trust Models for the IoT:**
Introduction**,** Secure key storage, Trust and security from a network perspective, Trust Model Concepts

**(3 hours)**

**Module-4**

**An Emerging Architecture Model for IoT Security and Privacy:**
Introduction, Naming and name resolution, Identifier/locator splitting, Resources, services, and content orchestration, Security, privacy, and trust

**(3 hours)**

**Module-5**

**Authentication in IoT**:
Fundament of Authentication, Entity Authentication.

**(2 hours)**

**Course Outcomes (Course Skill Set):**
At the end of the course the student will be able to:

| | |
|---|---|
| **CO1** | Apply the concepts of security issues and challenges in an IoT system. |
| **CO2** | Analyze the concepts of keys and malware identification to improve IoT performance. |
| **CO3** | Evaluate various authentication methods in IoT |

**Text Book:**

1. Fei Hu "Security and Privacy in Internet of Things: models, algorithms, implementations, by, Taylor and Francis Group, CRC press. 1st Issue, Pb 2020. ISBN: 978-1-0327-0715-0(pbk)

**Reference Book:**

1. Sean Smith and Abel Sanchez "The Internet of Risky Things: Trusting the Devices That Surround Us". 1st Edition, 2017, 5th Indian reprint-Aug 2024, ISBN: 978-93-5213-505-9.

**Comprehensive Continuous Assessments (CCAs):**

Case study on threats and privacy and security concepts in IoT.

**Web links / e – resources:**

- https://onlinecourses.nptel.ac.in/noc23_cs127/preview
- https://onlinecourses.nptel.ac.in/noc23_cs13/preview
- https://onlinecourses.nptel.ac.in/noc22_cs53/preview

# BMS Institute of Technology and Management

Choice Based Credit System (CBCS)

**Semester –IV**

**Biology for Engineers** (2:0:0)2

(Effective from the academic year 2024-25) (2022 scheme)

Common to ECE, ETE, EEE, ME and CV programs

| | | | |
|---|---|---|---|
| Course Code | **BBOK407** | CIE Marks | 50 |
| Teaching Hours/Week (L:T:P) | 2:0:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 25 | Total Marks | 100 |
| Credits | 02 | Exam Hours | 03 |
| Examination type (SEE) | Theory | | |

**Course Objectives:**

**This course will enable students to:**

- To familiarize the students with the basic biological concepts and their engineering applications.
- To enable the students with an understanding of bio-sensor principles.

**Preamble:** This course provides an insight into understanding of concepts of biology and adaptation of anatomical principles, Biomimetics for engineering applications.

**Module – 1**

**Introduction to Biology: The cell:** The basic unit of life, Structure and functions of a cell. Plant Cell and animal cell, Prokaryotic and Eukaryotic cell, Stem cells and their application. (Text 1 and 2)

**(5 Hours)**

**Module – 2**

**Biomolecules and Biosensors: Biomolecules:** Properties and functions of carbohydrates, proteins, lipids. Short Biosensor History, Biosensor Classification. (Text 3: 1.1 and 1.2)

**(5 Hours)**

**Module – 3**

**Biochemical Components used in Biosensor Assemblies:** Enzymes, Antibodies, Protein/Peptide Receptors, Nucleic Acids, Whole Cells as Biosensing Elements, Immobilization of Biochemical Elements of Biosensors. (Text 3: 2.1, 2.2, 2.3, 2.4, 2.5, 2.6)

**(5 Hours)**

**Module – 4**

**Adaptation of Anatomical Principles:** Brain as a CPU system. Eye as a Camera system. Heart as a pump system. Lungs as purification system. Kidney as a filtration system. (Text 4)

**(5 Hours)**

**Module – 5**

**Biomimetics:** Introduction, Echolocation (ultrasonography / ultrasound Imaging), Photosynthesis (photovoltaic cells, bionic leaf). Birds and insects (flight aerodynamics), Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Shark skin (Friction reducing swimsuits), Kingfisher beak (Bullet train). (Text 5 and 6)

**(5 Hours)**

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Interpret the components of a basic biological cell and their functions |
| **CO2** | Understand the principles of bioengineering sensors |
| **CO3** | Compare the adaptation of anatomical principles in day-to-day engineering applications. |
| **CO4** | Relate the solution offered by nature to analogous engineering problems |

**Text Books:**


1. Rajendra Singh C and Rathnakar Rao N, "Biology for Engineers", Rajendra Singh C and Rathnakar Rao N Publishing, Bengaluru, 2023.
2. Stuart Fox, Krista Rompolski, "Human Physiology", McGraw-Hill eBook. 16th Edition, 2022
3. Evtugyn, Gennady "Biosensors: essentials." Springer Berlin Heidelberg, Vol. 84 2014.
4. Leslie Cromwell, "Biomedical Instrumentation", Prentice Hall 2011
5. Yoseph Bar-Cohen "Biomimetics: Nature-Based Innovation", CRC Press, 1st edition, 2012.
6. D. Floreano and C. Mattiussi, "Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies", MIT Press, 2008.


**Reference Books:**


1. Arthur T. Johnson "Biology for Engineers", CRC Press, Taylor and Francis, 2011
2. Andreas Hofmann, Samuel Clokie "Wilson and Walker- Principles and Techniques of Biochemistry and Molecular Biology", 8th Edition Pb.2018.
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.


**Comprehensive Continuous Assessments (CCAs):**

- Poster Presentation

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

- https://nptel.ac.in/courses/121106008
- https://freevideolectures.com/course/4877/nptel-biology-engineers-other-nonbiologists
- https://ocw.mit.edu/courses/20-020-introduction-to-biological-engineering-designspring-2009
- https://ocw.mit.edu/courses/20-010j-introduction-to-bioengineering-be-010j-spring2006
- 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

# BMS Institute of Technology and Management

## Department of Humanities and Social Sciences

Choice Based Credit System (CBCS)

**SEMESTER – IV**

**Universal Human Values (UHV)** (1:0:0:1) 1

(Common to all branches)

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| Course Code | **BUHK408** | CIE Marks | 50 |
| Teaching Hours/Week (L: T:P:S) | 1:0:0:1 | SEE Marks | 50 |
| Total Number of Contact Hours | 15-hour Theory Session +15 hour Self study | Exam Hours | 01 |
| Credits | 1 | | |

**Course Objectives:**

This course is intended to:

- 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.
- 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.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.
- This course is intended to provide a much-needed orientation input in value education to the young enquiring minds

**Preamble:** This course highlights the human values that should be addressed among all the people worldwide. Harmony in the human being, family and society will be addressed.

**Module – 1**

**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)**

**Module – 2**

**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)**

**Module – 3**

**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)**

**Module – 4**

**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)**

**Module – 5**

**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)**

**Course outcome (Course Skill Set)**
At the end of the course, students will be able to

| | |
|---|---|
| **CO1** | Awareness of self and surroundings, responsible decision-making, sustainable solutions |
| **CO2** | Sensitivity towards human values, relationships, and societal commitments |
| **CO3** | Application of human values in real-life settings and personal development |

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

**Text Books and Teachers Manual**


1. R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics" , 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 97893-87034- 47-1
2. R R Gaur, R Asthana, G P Bagaria " The Teacher's Manual for A Foundation Course in Human Values and Professional Ethics", 2022


**Reference Books:**


1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 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) Krishi Tantra Shodh, 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.

**Comprehensive Continuous Assessments (CCAs):**

- Case study/Poster presentation

**Web links /e-Resources:**

- Value Education websites
- https://www.uhv.org.in/uhv-ii
- http://uhv.ac.in
- http://www.uptu.ac.in
- Story of Stuff
- http://www.storyofstuff.com
- 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

# BMS Institute of Technology and Management

**Department of Humanities and Social Sciences**

Choice Based Credit System (CBCS)

**SEMESTER – IV**

**National Service Scheme (NSS)** (0:0:2)

(Common to all branches)

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| 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 | - |

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:

- Understand the community in general in which they work.
- Identify the needs and problems of the community and involve them in problem solving.
- Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
- Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
- 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. **(04 Hours)**

## 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. (**04 Hours)**

## 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.

**(06 Hours)**

## 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. **(06 Hours)**

**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 (Course Skill Set):**

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:**

**Text 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.

# BMS Institute of Technology and Management

**Department of Humanities and Social Sciences**

Choice Based Credit System (CBCS)

**SEMESTER –IV**

**Physical Education (PE) (Sports and Athletics)** (0:0:2)

(Common to all Branches)

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| 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 | -- |

**Mandatory Course (Non-Credit)**

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

**Course Objectives:**

The course will enable students to

- Develop a healthy life style.
- Acquire Knowledge about various stages of sports and games.
- 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.

**(06 Hours)**

**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.

**(05 Hours)**

**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,

**(05 Hours)**

**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…

**(05 Hours)**

**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.

**(05 Hours)**

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 (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | 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. |
| **CO2** | Develops individual and group techno tactical abilities of the game. |
| **CO3** | Increase team combination and plan the strategies to play against opponents. |
| **CO4** | Outline the concept of sports training and how to adopt technology to attain high level performance. |
| **CO5** | Summarize the basic principles of organizing sports events and concept of technology implemented to organize 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.

**Text Books:**


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.


**Reference Books:**


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)

# BMS Institute of Technology and Management

**Department of Humanities and Social Sciences**

Choice Based Credit System (CBCS)

**SEMESTER –IV**

**Yoga** (0:0:2)

(Common to all Branches)

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| 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 | - |

**Course Objectives:**

This course will enable students to:

- Understand the importance of practicing yoga in day-to-day life.
- Be aware of therapeutic and preventive value of Yoga.
- Have a focused, joyful and peaceful life.
- Maintain physical, mental and spiritual fitness.
- 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. **(04 Hours)**

**Module – 2**

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

**(06 Hours)**

**Module – 3**

**Psychological Health:** Introduction Thought Forms, Kriya (Kapalabhati), Preparation to Meditation, Practical classes. **(06 Hours)**

**Module – 4**

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

**(06 Hours)**

**Module – 5**

**Spirituality & Universal Mantra:** Introduction, Being Human, Universal Mantra, Universal LOVE, Benefits of practice of Spirituality in day-to-day life, practical classes. **(04 Hours)**

**Course Outcomes (Course Skill Set):**

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

| | |
|---|---|
| **CO1** | Understand the requirement of practicing yoga in their day-to-day life. |
| **CO2** | Apply the yogic postures in therapy of psychosomatic diseases |
| **CO3** | Train themselves to have a focused, joyful and peaceful life. |
| **CO4** | Demonstrate the fitness of Physical, Mental and Spiritual practices. |
| **CO5** | 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.

**Text Books:**

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

**Reference Books:**

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

- https://youtu.be/KB-TYlgd1wE
- https://youtu.be/aa-TG0Wg1Ls

# BMS Institute of Technology and Management

**Department of Humanities and Social Sciences**

Choice Based Credit System (CBCS)

**SEMESTER – IV**

**NCC** (0:0:2)

(Common to all Branches)

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| 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 | - |

**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.

**(04 Hours)**

**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.

**(02 Hours)**

**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. **(02 Hours)**

**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. **(04 Hours)**

**Module– 5**

**Drill Practical's:** Savdhan, Vishram, Salute, Turning, Marching. . **(14 Hours)**

**Course Outcomes (Course Skill Set):**

At the end of the course 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.

**Text Books:**

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

**Reference Books:**


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

# BMS Institute of Technology and Management

**Department of Humanities and Social Sciences**

Choice Based Credit System (CBCS)

**SEMESTER – IV**

**Music** (0:0:2)

(Common to all Branches)

(Effective from the academic year 2024-25) (2022 scheme)

| | | | |
|---|---|---|---|
| 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 | - |

**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:

- Identify the major traditions of Indian music, both through notations andaurally.
- Analyze the compositions with respect to musical and lyrical content.
- Demonstrate an ability to use music technology appropriately in a variety ofsettings.

**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. **(03 Hours)**

**Module – 2**

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

**(03 Hours)**

**Module – 3**

**Composers:** Biography and contributions of Purandaradasa, Thyagaraja, Mysore Vasudevacharya. **(03 Hours)**

**Module – 4**

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

**(03 Hours)**

**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 Geethein Malahari, and one Jathi Swara, One Nottu Swara OR One krithi in a Mela raga, a patriotic song

**(14 Hours)**

**Course Outcomes (Course Skill Set):**

At the end of the course 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 |

**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 conductedduring 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 inthree speeds. Sing / Play the Geethe in Malahari. Singing / Playing Jathi Swara /Krithi.

**Text Books**


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.


**Reference Books**


1. Lakshminarayana Subramaniam, Viji Subramaniam, "Classical Music of India: APractical 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 thePresent and a Record of the Past", Pilgrims Publishing, 2007.
4. Carnatic Music, National Institute of Open Schooling, 2019.