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 Telecommunication Engineering

III and IV Semester Scheme and Syllabus

2022 Scheme - Autonomous

Approved in the BoS meeting held on 12.10.2023

Vision of the Department

To emerge as a premier department developing high quality Electronics and Telecommunication Engineering Professionals with ethics and eco-friendliness for betterment of the society.

Mission of the Department

Impart quality education in Electronics and Telecommunication Engineering by facilitating:

M1: Conducive learning environment and research activities

M2: Good communication skills, leadership qualities and ethics

M3: Strong Industry-Institute interaction

Program Educational Objectives (PEOs)

After three to four years of graduation our graduates will:

PEO 1: Excel as Professionals in Electronics, Telecommunication and IT related fields.

PEO 2: Engage in life-long learning.

PEO 3: Maintain ethical norms, exhibit good communication skills and leadership qualities.

Program Specific Outcomes (PSOs)

PSO 1: Analyze and design communication systems

PSO 2: Analyze and implement signal processing applications

PSO 3: Design and implement embedded systems

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(An Autonomous Institution Affiliated to VTU, Belagavi)
Avalahalli, Doddaballapur Main Road, Bengaluru – 560064

Date: 16.10.2023

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

All students of 2022 scheme onwards are hereby informed to note the following with reference to Continuous internal evaluation and Semester end examination: The Weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The Minimum passing mark for the CIE is 40% of the Maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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

The minimum marks to be secured in CIE to appear for SEE shall be 10 (40% of maximum marks-25) in the theory component and 10 (40% of maximum marks -25) in the practical component. The laboratory component of the IPCC shall be for CIE only. However, in SEE, the questions from the laboratory component shall be included in their respective modules only.

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

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

Professional Core Course Laboratory (PCCL) course- 01 credit					
Evaluation Type	**Internal Assessments (IAs)**	**Test/ Exam Marks Conducted for**	**Marks to be scale down to**	**Min. Marks to be Scored**	**Evaluation Details**
Continuous Internal Evaluation	CIE - Practical	-	30	-	Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments shall be approved by the PAC and are made known to students at the beginning of the practical session. Record should contain all the specified experiments in the syllabus. Total marks scored by the students are scaled down to 30 marks (60% of maximum marks).
	CIE Practical Test	100	20	-	Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus. In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce. The suitable rubrics can be designed to evaluate each student's performance and learning ability by PAC. The marks scored shall be scaled down to 20 marks (40% of the maximum marks).
	Total CIE	-	**50**	**20**	
Semester End Examination		100	**50**	**18**	General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result - 60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (Rubrics shall be approved by the PAC)
CIE+SEE		**100**	**50**	**40**	

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

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

220B 4.2 Continuous Internal Evaluation (CIE)

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

i) Assignments (Individual and /or Group)

ii) Seminars

iii) Oral/ Online Quizzes

iv) Group Discussions

v) Case studies/ Case lets

vi) Practical orientation on Design Thinking, Creativity & Innovation

vii) Participatory & Industry – integrated learning

viii) Practical activities/ problem-solving exercises

ix) Class presentations

x) Analysis of Industry/ Technical/ Business Reports

xi) Reports on Guest Lectures/ Webinars/ Industrial Visits

xii) Industrial/ Social/ Rural projects

xiii) Participation in Seminars/ Academic Events/ Symposia, etc.

xiv) Any other academic activity

CoE 18/10/2023

Dean (AA) 18.10.2023

Principal 18/10

IV Semester
Scheme and Syllabus

BMS INSTITUTE OF TECHNOLOGY ANDMANAGEMENT

(Autonomous Institute affiliated to VTU)

Scheme of Teaching and Examination 2022

Effective from Academic Year 2023-24

Choice Based Credit System (CBCS)

UG PROGRAM: ECE/ETE | **SEMESTER: IV**

Sl. No	Course and Course Code		Course Title	Teaching Department (TD)and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Self -Study	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1.	PCC	BEC401	Engineering Electromagnetics	TD- Maths PSB - Maths	3	0	0		03	50	50	100	3
2.	IPCC	BEC402	Basic signal Processing	TD: ECE/ETE PSB: ECE/ETE	3	0	2		03	50	50	100	4
3.	IPCC	BEC403	Principles of Communication Systems	TD: ECE/ETE PSB: ECE/ETE	3	0	2		03	50	50	100	4
4.	PCCL	BECL404	Communication laboratory	TD: ECE/ETE PSB: ECE/ETE	0	0	2		03	50	50	100	1
5.	ESC	BEC405X	ESC/ETC/PLC	TD: ECE/ETE PSB: ECE/ETE	3	0	0		03	50	50	100	3
6.	AEC/ SEC	BXX456X	Ability Enhancement Course/SkillEnhancement Course- IV	TD: ECE/ETE PSB: ECE/ETE	If the course is Theory 1	0	0		01	50	50	100	1
					If the course is a lab 0	0	2		02				
7.	BSC	BBOK407	Biology For Engineers	TD / PSB: BT, CHE	3	0	0		03	50	50	100	3
8.	UHV	BUHK408	Universal human values course	TD: ECE/ETE PSB: ECE/ETE	1	0	0		01	50	50	100	1
9.	MC	BNSK459	National Service Scheme (NSS)	NSS coordinator	0	0	2			100	---	100	0
		BPEK459	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK459	Yoga	Yoga Teacher									
		BNCK359	NCC	NCC Teacher									
		BMUK359	Music	Music teacher									
									Total	**500**	**400**	**900**	**20**

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **MC**: Mandatory Course (Non-credit), **AEC**: AbilityEnhancement 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.

B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.
Choice Based Credit System (CBCS)
SEMESTER - IV

Engineering Electromagnetics (3:0:0) 3
(Effective from the academic year 2023-24)

Course Code	**BEC401**	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:

1. Study the different coordinate systems, Physical significance of Divergence, Curl and Gradient.
2. 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.
3. Understand the physical significance of Biot-Savart's, Ampere's Law and Stokes' theorem for different current distributions.
4. Infer the effects of magnetic forces, materials and inductance.
5. Know the physical interpretation of Maxwell's equations and applications for Plane waves for their behavior in different media.
6. Acquire knowledge of Poynting theorem and its application of power flow.

Module – 1

Revision of Vector Calculus-(Text1:Chapter1)
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.

(8 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

(8 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)**

(8 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)**

(8 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)**

(8 hours)

Course outcome (Course Skill Set)

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

1. Apply the knowledge of mathematics and physics to solve the problems related to electrostatics, magneto statics and time varying fields.
2. Analyze different field configurations to derive electromagnetic Field Equations and propagation of electromagnetic waves.
3. Interpret the given case study material related to the application of electromagnetics.
4. Perform in a group to make an effective presentation on electromagnetic radiation hazards, EM waves, effect of EM waves on environment and simulation of applications of electromagnetics.

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

B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.
Choice Based Credit System (CBCS)
SEMESTER IV

Basic Signal Processing (3:0:2:0) 4
(Effective from the academic year 2023-24)

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 + 8-10 Lab slots	Exam. Hours	3

Course Objectives:
This course will enable students to:

1. **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.
2. **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

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 Gram-Schmidt Orthogonalization procedure

(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.

(8 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-non-causal, static dynamic, stable-unstable, invertible. **(Text2) [Only for Discrete Signals & Systems]**

(8 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). b. Program to create and modify a matrix.
2	Programs on basic operations on matrix.
3	Program to solve system of linear equations.
4	Program for Gram-Schmidt orthogonalization.
5	Program to find Eigen value and Eigen vector.
6	Program to find Singular value decomposition.
7	Program to generate discrete waveforms.
8	Program to perform asic operation on signals.
9	Program to perform convolution of two given sequences.
10	a. Program to perform verification of commutative property of convolution. b. Program to perform verification of distributive property of convolution. c. Program to perform verification of associative property of convolution.

Course outcomes (Course Skill Set):

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

1. Apply the concepts of Linear Algebra to accomplish numerous computations using matrices
2. Apply the fundamentals of mathematics to classify and perform various operation and transformations on signals and systems.
3. Analyze the properties of signals and LTI systems in time and transform domain.
4. Interpret the given case study material related to different operations and properties of signals and systems in various domains.
5. Perform in a group to execute simple applications of signal processing operations using modern tools.

Suggested Learning Resources:

Books

1. Gilbert Strang, "Linear Algebra and its Applications", Cengage Learning, 4thEdition, 2006, ISBN97809802327
2. Simon Haykin and Barry Van Veen, "Signals and Systems", 2nd Edition, 2008, Wiley India. ISBN9971-51-239-

Reference Books

1. Michael Roberts, "Fundamentals of Signals & Systems", 2nd edition, Tata McGraw-Hill, 2010, ISBN978-0-07-070221-9.
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. H P H su, R Ranjan, "Signals and Systems", Schaum's outlines, TMH, 2006.
4. BP Lathi, "Linear Systems and Signals", Oxford University Press, 2005.
5. Ganesh Rao and Satish Tunga, "Signals and Systems", Pearson/Sanguine.
6. Seymour Lipschutz, Marc Lipson, "Schaums Easy Outline of Linear Algebra", 2020.

B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.
Choice Based Credit System (CBCS)
SEMESTER - IV

Principles of Communication Systems (3:0:2:0) 4
(Effective from the academic year 2023-24)

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 + 8-10 Lab slots	Exam Hours	03

Course Objectives:
This course will enable students to:

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

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 a) Class A line RF amplifier. 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:

1. Understand and explain different analog modulation and detection techniques.
2. Apply the knowledge of electronic circuits for the generation and detection of modulation /demodulation schemes.
3. Analyse the performance of modulation/demodulation schemes.
4. Interpret the given case study material related to the application of modulation/ demodulation schemes.
5. Write a report for the conducted experiment.
6. Perform in a group to demonstrate modulation/demodulation schemes using modern tools.

Suggested Learning Resources:

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”, Oxford University Press., 4th edition, 2010, ISBN: 97801980738002.
4. Simon Haykins & Moher, Communication Systems, 5th Edition, John Wiley, India Pvt. Ltd, 2010, ISBN: 978- 81-265-2151-7.

B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.
Choice Based Credit System (CBCS)
SEMESTER – IV

Communication Laboratory (0:0:2) 1
(Effective from the academic year 2023-24)

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

1. Understand the basic concepts of AM, FM modulation and demodulation.
2. Design the electronic circuits used for AM, FM modulation and demodulation circuits.
3. Understand the sampling theory and design circuits which enable sampling and reconstruction of analog signals.
4. Analyse the electronic circuits to perform pulse amplitude modulation, pulse code modulation and multiplexing.
5. Understand the working principles of RF transmitters and receivers.

SL NO	Experiments
1	Design and plot the frequency response of an active band pass and band stop filters.
2	Design and test a high-level collector Modulator circuit and Demodulation the signal using diode detector.
3	Test the Balanced Modulator / Lattice Modulator (Diode ring)
4	Frequency modulation using VCO and PLL FM demodulator.
5	Design and test i) Pulse sampling, flat top sampling and reconstruction. ii)Pulse amplitude modulation and demodulation.
6	Design and test the Time Division Multiplexing of two bandlimited signals
7	Design and test BJT/FET Mixer
8	Design and test the Pulse width Modulation and Pulse Position Modulation
	Demonstration Experiments (For CIE)
9	PLL Frequency Synthesizer
10	PAM Multiplexer and Demultiplexer
11	Design Pre-Emphasis & De-Emphasis Circuits
12	Low power RF Transmitter and Receiver operations.

Course outcomes (Course Skill Set):

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

1. Understand the basic concepts of analog and digital transmitters and Receivers circuits.
2. Design and conduct the sampling, filtering analog and digital modulation techniques.
3. Analyze the sampling, filtering analog and digital modulation techniques.
4. Write the report for conduction of experiments in the laboratory for assessment.
5. Conduct and interpret the modulators and demodulators circuits as a 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.

B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.
Choice Based Credit System (CBCS)
SEMESTER – IV

8051 Microcontroller (3:0:0:0) 3
(Effective from the academic year 2023-24)

Course Code	**BEC405A**	CIE Marks	50
Teaching Hours/Week (L: T:P:S)	3:0:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	03

Course objectives:
This course will enable students to:

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

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:

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

1. Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.
2. Write 8051 Assembly level programs using 8051 instruction set.
3. Define the Interrupt system, operation of Timers/Counters and Serial port of 8051.
4. Develop applications using Assembly language program/C programming by interfacing 8051 Microcontroller with LCD, Stepper motor, Keypad, Simple switches.
5. Design and demonstrate small Embedded system projects in team.

Suggested Learning Resources:

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.

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Choice Based Credit System (CBCS)
SEMESTER – IV

Industrial Electronics (3:0:0) 3
(Effective from the academic year 2023-24)

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

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 outcome (Course Skill Set)

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

1. Understand the concept of soft-core processor,characteristics and working principles of the power devices,circuits, sensors,
2. Apply the acquired knowledge to construct and protect various power electronic devices and circuits, and to design computer architectures.
3. Analyse the Different power electronic, MEMS, sensors, Transducers devices and circuits,
4. Comprehend the principles of computer architecture and explicate the case study materials for the technological advancement.

Suggested Learning Resources:

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.

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Choice Based Credit System (CBCS)

SEMESTER - IV

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

(Effective from the academic year 2023-24)

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

Course Objectives:

This course will enable students to:

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

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. **(Topics from sections 1.2,1.3,2.2 to 2.8 of text 1).**

(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. (**Topics from sections 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 of Text 1**)

(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. (**Topics from Sections 5.5 to 5.9, 6.1 to 6.3 except optimal policy and 6.3.1, 6.7, 6.8 of Text 1**).

(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. (**Topics from section 7.1 to 7.8 of Text**).

(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. (**Topics from sections 10.1 to 10.3, 11.1 to 11.5 of Text**).

(8 hours)

Course outcome (Course Skill Set):

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

1. Understand the basic concepts and structure of Operating system
2. Apply the implementation of process, threads in operating systems.
3. Analyze the knowledge of process, threads in operating systems.
4. Interpret the given Case study material related to physical and virtual memory, scheduling, file and I/O systems.
5. Conduct workshop on operating systems for various operations of OS and write a report on same .

Suggested Learning Resources:

Books:

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

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Choice Based Credit System (CBCS)

SEMESTER – IV

Control Systems (3:0:0) 3

(Effective from the academic year 2023-24)

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:

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

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 Skillsets):

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

1. Understand the basic features, configurations and application of control systems.
2. Apply different control system's techniques to assess a system's stability and to find the transfer function.
3. Analyze a system's behavior with its time and frequency domain specification.
4. Interpret the given case study material related to control system and its applications.
5. Simulate simple control systems using modern tools and present their models.

Suggested Learning Resources:

Book:

1. J. Nagarath and M. Gopal, "Control Systems Engineering", New Age International(P) Limited, Publishers, Fifth edition- 2005, ISBN:81- 224-2008-7.

Reference Books:

1. "Modern Control Engineering", K.Ogata, Pearson Education Asia/PHI, 4thEdition, 2002. ISBN978-81 -203-4010- 7.
2. "Automatic Control Systems", Benjamin C. Kuo, John Wiley India Pvt. Ltd., 8th Edition, 2008.
3. "Feedback and Control System," Joseph J Distefano III et.al., Schaum's Outlines, TMH, 2nd Edition 2007.

B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.
Choice Based Credit System (CBCS)
SEMESTER – IV

Embedded C Basics (0:0:2:0) 1
(Effective from the academic year 2023-24)

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

Course objectives:
This course will enable students to:

1. Understand the basic programming of Microprocessor and microcontroller.
2. Develop the microcontroller-based programs for various application in simulation environment
3. 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).

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 16bit numbers and store the 32 bit 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 32 numbers
7	Writea8051 C program to arrange a series of 32bit 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 32bit 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:

1. Write C programs in 8051 for solving simple problems that manipulate input data using different instructions.
2. Develop testing and experimental procedures on 8051 Microcontroller, analyze their operation under different cases.
3. Develop microcontroller applications using external hardware interfaces.
4. Extract solutions for real time problems using 8051 microcontrollers and peripherals.

Suggested Learning Resources:
“The8051Microcontroller: Hardware, Software and Applications”, V Udayashankara and MS Mallikarjuna Swamy, McGrawHillEducation,1stedition,2017.

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CHOICE BASED CREDIT SYSTEM (CBCS)

SEMESTER - IV

PCB Design (1:0:0:0)

Effective from the AY-2023-24

Course Code	**BEC456B**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	1:0:0:0	SEE Marks	50
Total Number of Contact Hours	16	Exam Hours	1

Course Objectives:

This course will enable students to:

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

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.

(8 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.

(8 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

(8 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

(8 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.

(8 hours)

Course outcome (Course Skill Set)

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

1. Outline the detailed circuit diagram and prerequisite before the actual PCB layout.
2. Understand the process of PCB production, Material selection and PCB fabrication.
3. Explore about the Plating techniques, Etching process, and multilayer PCB board Construction.
4. Perform in a group to exhibit effective presentation on recent technology trends in PCB design and its applications.

Suggested Learning Resources:

Books

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

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Choice Based Credit System (CBCS)
SEMESTER -IV

DAQ using Lab VIEW (0:0:2:0) 1
(Effective from the academic year 2023-24)

Course Code	**BEC456C**	CIE Marks	50
Teaching Hours/Week (L:T:P:S):	0:0:2:0	SEE Marks	50
Total Number of Lecture Hours	40	Exam Hours	02 (P)

Course objectives:

This course will enable students to:

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

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:

1. Build temperature indicating instruments using LabVIEW (NIDAQ)
2. Interface peripheral devices/instruments to LabVIEW
3. Develop LabVIEW modules to sense and process audio inputs
4. Apply programming structures, data types, and the analysis and signal processing algorithms in LabVIEW

Suggested Learning Resources:

1. Virtual Instrumentation using LABVIEW, Jovitha Jerome, PHI,2011
2. Virtual Instrumentation using LABVIEW, Sanjay Gupta, Joseph John, TMH, McGraw Hill, Second Edition,2011.

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Choice Based Credit System (CBCS)
Semester – IV

Security and Privacy in Internet of Things (1:0:0) 1
(Effective from the academic year 2023-24)

Course Code	**BEC456D**	CIE Marks	50
Teaching Hours/Week (L: T:P: S)	1:0:0:0	SEE Marks	50
Total Number of Lecture Hours	14	Exam Hours	01

Course objectives:

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

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

(3 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 outcome (Course Skill Set)

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

1. Understand the concepts of security issues and challenges in an IoT system
2. Apply the concepts of keys, authentication and malware identification to improve IoT performance.
3. Perform in a group to present a poster related to security challenges and issues in different IoT applications.

Textbook:

"Security and Privacy in Internet of Things, models, algorithms, implementations, by Fei Hu, CRC press.

Reference Book:

1. "The Internet of Risky Things: Trusting the Devices That Surround Us" by Sean Smith and Abel Sanchez

B.E. Electronics & Communication Engg. / Electronics & Telecommunication Engg.
Choice Based Credit System (CBCS)
Semester – IV

Biology For Engineers (3:0:0)3
(Effective from the academic year 2022-23)

Course Code	**BBOK407**	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3 Hour

Course Objectives:

This course will enable students to:

1. Understand Biological concepts from an engineering perspective and applications.
2. Gain technology application for biological and life sciences. Develop interdisciplinary vision of biological engineering.
3. Describe basics of biology, human physiology which is essential for bioengineering field.
4. Enable the students with an understanding of biodesign principles to create novel devices and structures.
5. Provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems.
6. Acquire knowledge about biological problems that requires engineering expertise to solve them

Module – 1

Introduction to Biology:
Importance of Biology for Engineers, need to study Biology, Life Science studies significance. The cell: the basic unit of life, Structure and functions of a cell. Prokaryotic and Eukaryotic cell.

Bio-molecules:
Classification, salient features, biological significance Functions of Carbohydrates, Nucleic acids, proteins, lipids. Enzymes: Classification and functions, Enzyme based biosensor, plant based proteins, lipids (biodiesel, cleaning agents/detergents), lignolytic enzyme in bio-bleaching). Immunological bio sensors, Describe electrical signalling with respect to nerve cells.

Spectroscopy and Microscopy techniques for Biology:
Basic principle and biological applications of infrared spectroscopy, Emission spectroscopy: fluorescence, Phase-contrast Microscope, Electron Microscopy, Transmission Electron microscopy. Case studies on Raman spectroscopy and its use in biological studies.

(9 Hours)

Module – 2

Biomolecules and their Applications:
Carbohydrates (cellulose-based water filters, PHA and PLA as bioplastics), Nucleic acids (Forensics – DNA fingerprinting), DNA bio sensor, Proteins (Proteins as food)

Biological Mechanisms:
Skeletal muscles in the body, the structure of muscles, passive muscles, activating muscles, Gecko - Gecko tape, Whale fins - Turbine blades, Termite/ ant hill-passive cooling, Namib beetle- Water collection. Ventilators, Kidney as a filtration system: mechanism of filtration. mechanism of passive dynamic walkers. series- and parallel- elastic actuators, bone fractures, Mechanical properties of bone. Case studies on Biological Neural Network, Principles and importance.

(07 Hours)

Module – 3

Human Organ Systems and Bio Designs:
Brain as a CPU system: signal transmission and EEG, Robotic arms for prosthetics. Eye as a Camera system (architecture of rod and cone cells, lens materials, bionic eye). Heart as a pump system and electrocardiography (ECG). artificial heart, Lungs as purification system: gas exchange mechanisms, spirometry.

Clinical Imaging System:
Basic principle and biological uses of Computerized Tomography (CT), Magnetic Resonance Imaging (MRI). Case studies on X-ray imaging Techniques and biological applications.

(09 Hours)

Module – 4

Nature-Bioinspired Materials and Mechanisms
Nature-Bioinspired Mechanisms: Echolocation (ultrasonography/ultrasound Imaging (US). sonars), Photosynthesis (photovoltaic cells, bionic leaf). Birds, insects, flight aerodynamics, Lotus leaf effect (Super hydrophobic and self-cleaning surfaces), Mosquito inspired micro needle, Plant burrs (Velcro), Shark skin (Friction reducing swim suits), Kingfisher beak (Bullet train). Artificial kidney, artificial liver and pancreas.

Nature-Bioinspired Materials:
Bio filter, biochips and their applications in health. Biopolymers; Bio-steel, multi-functional biological materials. Physiological Assist Device: Artificial Skin, artificial limbs. Principles of artificial joints, Bio fertilizer. Case studies on Bio-composites.

(07 Hours)

Module – 5

Trends in Bioengineering
Introduction to regenerative medicine: Muscular and Skeletal Systems as scaffolds (architecture, mechanisms,), scaffolds and tissue engineering,3D printing of ear, bone and skin. 3D printed foods. Electrical tongue and electrical nose in food science, Artificial Intelligence for disease diagnosis. Self-healing Bioconcrete based on bacillus spores, calcium lactate nutrients), Biosensors for personal diabetes management, Non-invasive Biosensors in Clinical Analysis, concept of biomedical instrumentation Bioinformatics: Database, definition of database, types. Biological database: Databases (primary, secondary and specialized). Case study on Bio printing techniques and materials.

(8 hours)

Course Outcomes:
The students will be able to:
1. Describe the concept of Biology, biomolecules and its structure.
2. Summarize Human Organ Systems and Bio designs.
3. Discuss Microscopy techniques and Clinical imaging system for biological system.
4. Illustrate Nature-Bioinspired materials and mechanisms.
5. Elaborate principles and applications of bioengineering aspects.

Textbooks:

[1]	Biology for Engineers, Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., Tata McGraw-Hill, New Delhi, 2012.
[2]	Biology for Engineers, Rajendra Singh C and Rathnakar Rao N, Rajendra Singh C and Rathnakar Rao, N Publishing, Bengaluru, 2023.

References:

[1]	Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011
[2]	Wilson and Walker- Principles and Techniques of Biochemistry and Molecular Biology, by Andreas Hofmann, Samuel Clokie. 2018 Edition.
[3]	Biology for Engineers, Sohini Singh and Tanu Allen, Vayu Education of India, New Delhi, 2014.
[4]	3D Bioprinting: Fundamentals, Principles and Applications by Ibrahim Ozbolat, Academic Press, 2016.

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

Choice Based Credit System (CBCS)

Semester – IV

Department of Humanities and Social Sciences

Choice Based Credit System (CBCS)

Universal Human Values (UHV)

(Effective for the 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:

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

Teaching-Learning Process (General Instructions)

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

1. The methodology of this course is explorational and thus universally adaptable. It involves a systematic and rational study of the human being vis-à-vis the rest of existence.
2. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the activities will develop students' theoretical and applied skills.
3. State the need for UHV activities and its present relevance in the society and provide real-life examples.
4. Support and guide the students for self-study activities.
5. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
6. This process of self-exploration takes the form of a dialogue between the teacher and the students to begin with, and then to continue within the student in every activity, leading to continuous self-evolution.
7. Encourage the students for group work to improve their creative and analytical skills.

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 are expected to become more aware of themselves, and their surroundings (family, society, nature);
1.They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind. They would have better critical ability.
2. They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
3. It is hoped that they would be able to apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.
Expected to positively impact common graduate attributes like:
1. Ethical human conduct
2. Socially responsible behaviour
3. Holistic vision of life
4. Environmentally responsible work
5. Having Competence and Capabilities for Maintaining Health and Hygiene
6. Appreciation and aspiration for excellence (merit) and gratitude for all

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

Continuous internal Examination (CIE)

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

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

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

Semester End Examinations (SEE)

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

Textbooks and Teachers Manual	
1.	The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 97893-87034- 47-1
2.	The Teacher‟s Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G
References	
1.	Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar 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) KrishiTantraShodh, Amravati.

20	E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
21	M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
22	B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books
23	B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Web links and Video Lectures (e-Resources):

- 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 – III to VI

NSS

(Common to all branches)

(Effective for the 2022 scheme)

Course Code	**BNSK359/459/559/659**	CIE Marks	100
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	-
Total Number of Contact Hours	26	Exam Hours	-

Mandatory Course (Non-Credit)

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

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

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

Module – 1

Introduction to NSS

History and growth of NSS, Philosophy of NSS, Objectives of NSS, Meaning of NSS Logo, NSS Programs and activities, administrative structure of NSS, Planning of programs / activities, implementation of NSS programs / activities, National & State Awards for NSS College / Program Officer / Volunteers. **(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 Selection of topic, PHASE-1	20 Marks
Commencement of activity and its progress – PHASE – 2	20 Marks
Case Study based Assessment – Individual performance	20 Marks
Sector wise study and its consolidation	20 Marks
Video based seminar for 10 minutes by each student at the end of the course with Report	20 Marks

Suggested Learning Resources:

Books:

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

BMS Institute of Technology and Management

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Choice Based Credit System (CBCS)

SEMESTER – III to VI

Sports

(Common to all Branches)

(Effective for the 2022 scheme)

Course Code	BPEK359/459/559/659	CIE Marks	100
Teaching Hours/Week (L: T:P)	0:0:2	SEE Marks	--
Total Number of Contact Hours	26	Exam Hours	--

Mandatory Course (Non-Credit)

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

Course Objectives: The course will enable students to

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

Module – 1

Introduction of the game: Aim of sports and games, Brief history of the game, Nature of the game, Terminology & Modern trends of the game, Fitness & Skill tests along with Game Performance.

(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:

The students will be able to:

1. Understand the importance of sports and games, inculcate healthy habits of daily exercise & fitness, Self-hygiene, good food habits, Create awareness of Self-assessment of fitness.
2. Develops individual and group techno tactical abilities of the game.
3. Increases the team combination and plan the strategies to play against opponents.
4. Outline the concept of sports training and how to adopt technology to attain high level performance.
5. Summarize the basic principles of organising sports events and concept of technology implemented to organise competitions in an unbiased manner.

Teaching Practice:

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

CIE: 100 Marks

- CIE 1 for 40 marks – A theory paper which is MCQ / Descriptive conducted during the semester.
- CIE 2 for 60 marks – A practical test conducted at the end of the semester in which the student has to give fitness and skill tests and his performance in game will be assessed.

Textbooks

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

References

1. Tudor O Bompa,*" Periodization Training for Sports*", 1999, Human Kinetics, USA
2. Michael Boyle, "New Functional Training for Sports" 2016, Human Kinetics USA
3. Michael Kjaer, Michael Rogsgaard, Peter Magnusson, Lars Engebretsen & 3 more, "Text book of Sports Medicine: Basic Science and Clinical Aspects of Sports Injury and Physical Activity", 2002, Wiley Blackwell.
4. Scott L. Delp and Thomas K. Uchida, "Biomechanics of Movement: The Science of Sports, Robotics, and Rehabilitation", 2021, The MIT Press
5. MCARDLE W.D. "Exercise Physiology Nutrition Energy And Human Performance" 2015, LWW IE (50)

Director, Physical Education

BMS Institute of Technology and Management

Department of Humanities and Social Sciences

Choice Based Credit System (CBCS)

SEMESTER – III to VI

Yoga

(Common to all Branches)

(Effective for the 2022 scheme)

Course Code	**BYOK359/459/559/659**	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:

1. Understand the importance of practicing yoga in day-to-day life.
2. Be aware of therapeutic and preventive value of Yoga.
3. Have a focussed, joyful and peaceful life.
4. Maintain physical, mental and spiritual fitness.
5. 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:

Students will be able to:

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

Teaching Practice:

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

CIE: 100 Marks

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

Textbooks

1. George Feuerstein: The yoga Tradition (Its history, literature, philosophy and practice.)

2. Sri Ananda: The complete Book of yoga Harmony of Body and Mind. (Orient paper Backs: vision Books Pvt.Ltd., 1982.

3. B.K.S Iyenkar: Light on the Yoga sutras of patanjali (Haper Collins Publications India Pvt.,Ltd., New Delhi.)

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

References

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

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

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

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

Web resources

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

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

2. https://youtu.be/aa-TG0Wg1Ls

NSS Program Officer
BMSIT&M
17-10-2023

BMS Institute of Technology and Management

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES
Choice Based Credit System (CBCS)
SEMESTER – III to VI

NCC
(Common to all Branches)
(Effective for the 2022 scheme)

Course Code	BNCK359/459/559/659	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

(10 Hours)

Module– 5

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

(08 Hours)

Course outcomes:

The students will be able to:

CO1: Develop qualities like character, comradeship, discipline, leadership, secular outlook, spirit of adventure, ethics and ideals of selfless service.

CO2: Get motivated and trained to exhibit leadership qualities in all walks of life and be always available for the service of the nation.

CO3: Familiarize on the issues related to social & community development and disaster management and equip themselves to provide solutions.

CO4: Get an insight of the defense forces and further motivate them to join the defense forces.

Teaching Practice:

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

CIE: 100 Marks

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

Textbooks:

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

References:

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

BMS Institute of Technology and Management

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Choice Based Credit System (CBCS)

SEMESTER – III to VI

Music

(Common to all Branches)

(Effective for the 2022 scheme)

Course Code	BMUK359/459/559/659	CIE Marks	100
Teaching Hours/Week (L: T:P)	0:0:2	SEE Marks	-
Total Number of Contact Hours	26	Exam Hours	-

Mandatory Course (Non-Credit)

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

Course Objectives:

The course will enable the students to:

1. Identify the major traditions of Indian music, both through notations and aurally.
2. Analyze the compositions with respect to musical and lyrical content.
3. Demonstrate an ability to use music technology appropriately in a variety of settings.

Module – 1

Preamble: Contents of the curriculum intend to promote music as a language to develop an analytical, creative, and intuitive understanding. For this the student must experience music through study and direct participation in improvisation and composition.

Origin of the Indian Music: Evolution of the Indian music system, Understanding of Shruthi, Nada, Swara, Laya, Raga, Tala, Mela. **(03 Hours)**

Module – 2

Compositions: Introduction to the types of compositions in Carnatic Music - Geethe, Jathi Swara, 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 Geethe in Malahari, and one Jathi Swara, One Nottu Swara OR One krithi in a Mela raga, a patriotic song

(14 Hours)

Course Outcomes (COs):

The students will be able to:

CO1: Discuss the Indian system of music and relate it to other genres (Cognitive Domain)

CO2: Experience the emotions of the composer and develop empathy (AffectiveDomain)

CO3: Respond to queries on various patterns in a composition (Psycho-Motor Domain)

Teaching Practice:

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

CIE: 100 Marks

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

Textbooks

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

References

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