BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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

Avalahalli, Yelahanka, Bengaluru 560119

Bachelor of Engineering

Department of Electronics and Communication Engineering

III Semester Scheme and Syllabus
2022 Scheme – Autonomous

Approved in the BoS meeting held on 09/08/2025

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

- To nurture students with a strong foundation in theoretical and practical concepts through innovative pedagogy and industry interface.
- To foster interdisciplinary research, entrepreneurship skills and instill professional ethics by providing experiential learning opportunities.

Program Educational Objectives (PEOs)

1. Establish successful careers in electronics, communication, and allied engineering domains.
2. Pursue advanced studies and conduct research to devise innovative solutions, propelling technological advancements.
3. Demonstrate leadership, effective communication, and teamwork while upholding ethical practices through sustainable engineering solutions

Program Specific Outcomes (PSOs)

1. Design and analyze digital and analog circuits using industry-standard Electronic Design Automation (EDA) tools, applying electronic fundamental principles for VLSI system implementation.
2. Design and develop communication and signal processing systems using fundamental principles of analog and digital communication, effectively utilizing analytical tools and techniques.
3. Integrate, debug, and deploy embedded hardware and software solutions for various real-time applications, demonstrating proficiency in programming, interfacing, and system-level design.

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 Team work:*** 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)

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, reuse 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.

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

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).** The questions with 2 Marks can be framed based on a higher Bloom's level. 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).** The questions with 2 Marks can be framed based on higher Bloom's level. 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 & MANAGEMENT

(Autonomous Institution Affiliated to VTU, Belagavi)

B. E. in Electronics & Communication Engineering

Scheme of Teaching and Examinations – 2022 Scheme

Outcome-Based Education (OBE) and Choice Based Credit System (CBCS) AY 2025-2026

UG PROGRAM: ECE | **Semester: III**

Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching Hours /Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	PCC	BMATEC301	Mathematics-III for EC Engineering	TD- Maths PSB - Maths	3	0	0		03	50	50	100	3
2	IPCC	BEC302	Digital System Design using Verilog	TD: ECE PSB: ECE	3	0	2		03	50	50	100	4
3	IPCC	BEC303	Electronic Principles and Circuits	TD: ECE PSB: ECE	3	0	2		03	50	50	100	4
4	PCC	BEC304	Network Analysis	TD: ECE PSB: ECE	3	0	0		03	50	50	100	3
5	PCCL	BECL305	Analog and Digital Systems Design Lab	TD: ECE PSB: ECE	0	0	2		03	50	50	100	1
6	ESC	BXX306x	ESC/ETC/PLC	TD: ECE PSB: ECE	3	0	0		03	50	50	100	3
7	UHV	BSCK307	Social Connect and Responsibility	Any Department	0	0	2		01	100	---	100	1
8	AEC / SEC	BXX358x	Ability Enhancement Course/Skill EnhancementCourse– III	ECE ECE ECE ECE	If the course is a Theory: 1 0 0 If a course is a laboratory: 0 0 2				01 02	50	50	100	1
9	NCMC	BNSK359	National Service Scheme (NSS)	NSS coordinator		0	2			100	---	100	0
		BPEK359	Physical Education (PE) (Sports and Athletics)	Physical Education Director									
		BYOK359	Yoga	Yoga Teacher									
		BNCK359	NCC	NCC Teacher									
		BMUK359	Music	Music teacher									
				Total	16	0	12	--	--	**550**	**350**	**900**	**20**
Non-Credit Mandatory Course (NCMC) prescribed to lateral entry Diploma Students													
10	NCMC	BENGDIP1	English Communication Skill I	HSS	0	0	0	0	2	100	---	100	0

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. ESC: Engineering Science Course, ETC: Emerging Technology Course, PLC: Programming Language Course

Engineering Science Course (ESC/ETC/PLC)			
BEC306A	Electronic Devices	BEC306C	Computer Organization and Architecture
BEC306B	Sensors and Instrumentation	BEC306D	Applied Numerical Methods
Ability Enhancement Course – III			
BEC358A	LABVIEW programming	BEC358C	C++ Basics
BEC358B	MATLAB Programming	BEC358D	IOT Applications

Professional Core Course (IPCC): Refers to Professional Core Course Theory Integrated with practical's of the same course. Credit for IPCC can be 04 and its Teaching–Learning hours (L : T : P) can be considered as (3 : 0 : 2) or (2 : 2 : 2). The theory part of the IPCC shall be evaluated both by CIE and SEE. The practical part shall be evaluated by only CIE (no SEE). However, questions from the practical part of IPCC shall be included in the SEE question paper. For more details, the regulation governing the Degree of Bachelor of Engineering /Technology (B.E./B.Tech.) 2022-23 may please be referred.

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

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

Semester – III

Mathematics - III for EC Engineering (3:0:0)

Electronics & Communication Engineering

Academic Year 2025-2026

Course Code	**BMATEC301**	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Exam Hours	3 Hours

Course Objectives:

This course aims to prepare the students to:

- Learn to use the Fourier series to represent periodical physical phenomena in engineering analysis and to enable the student to express non-periodic functions to periodic functions using the Fourier series and Fourier transforms.
- Analyze signals in terms of Fourier transforms.
- Develop the knowledge of solving differential equations and their applications in Electronics & Communication engineering.
- To find the association between attributes and the correlation between two variables.

Module-1: Fourier series and practical harmonic analysis

Periodic functions, Dirichlet's condition. Fourier series expansion of functions with period 2π and with arbitrary period: periodic rectangular wave, Half-wave rectifier, rectangular pulse, Saw tooth wave. Half-range Fourier series. Triangle and half range expansions, Practical harmonic analysis, variation of periodic current. (8 Hours)

Module-2: Fourier transforms and Z -transforms

Infinite Fourier transforms: Definition, Fourier sine, and cosine transform. Inverse Fourier transforms Inverse Fourier cosine and sine transforms. Problems.

Z-transforms: Definition, Standard z-transforms, Damping, and shifting rules, Problems. Inverse z-transform and applications to solve difference equations. (8 Hours)

Module-3: Probability Distributions

Review of basic probability theory. Random variables (discrete and continuous), probability mass and density functions. Mathematical expectation, mean and variance. Binomial, Poisson and normal distributions- problems (derivations for mean and standard deviation for Binomial and Poisson distributions only)-Illustrative examples. Exponential distribution. (8 Hours)

Module-4: Ordinary Differential Equations of Higher Order

Introduction to Higher-order linear ODEs with constant coefficients - (Recap of Cases $\phi(x) = e^{ax}$,$\phi(x) = \sin ax$ or $\cos ax$ and $\phi(x) =$ Polynomial). Solution of non-homogeneous ordinary differential equations $f(D)y = \phi(x)$ using inverse differential operator, where $\phi(x) = e^{ax}v$ and $\phi(x) = xv$, where v is a function of x, problems. Method of undetermined coefficients - problems. Application problems. 8 Hours

Module-5: Curve fitting, Correlation, and Regressions

Principles of least squares, Curve fitting by the method of least squares in the form $y = a + bx$, $y = a + bx + cx^2$, and $y = ax^b$. Correlation, Coefficient of correlation, Lines of regression, Angle between regression lines, standard error of estimate, rank correlation. (8 Hours)

Course Outcomes (Course Skill Set):

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

CO1: Apply Fourier series in communications, digital signal processing and field theory.
CO2: Solve problems involving discrete/continuous-time signals using Z-transforms and Fourier transforms.
CO3: Apply discrete and continuous probability distributions in the engineering field.
CO4: Apply higher order differential equations for circuit problems.
CO5: Analyze statistical data using correlation and regression methods.

Suggested Learning Resources: (Text Book/ Reference Book/ Manuals):

Textbooks:

1. B. S. Grewal "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
2. Ronald E. Walpole, Raymond H Myers, Sharon L Myers & Keying Ye "Probability & Statistics for Engineers & Scientists", Pearson Education, 9th edition, 2017.
3. N.P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.

Reference books / Manuals:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 9th Edition, 2006.
2. Peter Bruce, Andrew Bruce & Peter Gedeck "Practical Statistics for Data Scientists" O'Reilly Media, Inc., 2nd edition 2020.
3. G Haribaskaran "Probability, Queuing Theory & Reliability Engineering", Laxmi Publication, Latest Edition, 2006.

Web links and Video Lectures (e-Resources):

- http://nptel.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicearth.org/
- http://www.bookstreet.in.
- VTU EDUSAT PROGRAMME – 20
- VTU e-Shikshana Program

Continuous Comprehensive Assessments (CCA's):

CCA will be conducted for a total of 20 marks. It is recommended to include a maximum of two learning activities aimed at enhancing the holistic development of students. These activities should align with course objectives and promote higher-order thinking and application-based learning.

Learning Activity -1: Tool/Software Exploration (Marks- 10)

Learning Activity -2: GATE-based Aptitude Test Marks- 10)

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

Semester – III

Digital System Design using Verilog (3:0:2) 4

Academic Year 2025-2026

Course Code	**BEC302**	CIE Marks	50
Teaching Hours/Week (L: T:P)	3:0:2	SEE Marks	50
Total Number of Contact Hours	40 hours Theory + 26 hours lab	Exam Hours	3

Course Objectives:

This course will enable students to:

- Simplify Boolean expressions using K-map techniques and Quine- McCluskey minimization techniques.
- Impart the concepts of designing and analyzing combinational and sequential logic circuits.
- Impart the concepts of Verilog HDL-data flow and behavioral models for the design of digital systems.
- Model combinational and sequential circuits using simulation tools and write a report.

Module – 1

Principles of Combinational Logic: Definition of combinational logic, Canonical forms, Generation of switching equations from truth tables, Karnaugh maps-up to 4 variables, Quine-McCluskey Minimization Technique. Quine-McCluskey using Don't Care Terms. (Section3.1to3.5of Text1).

Module – 2

Logic Design with MSI Components and Programmable Logic Devices: Binary Adders and Subtractors, Comparators, Decoders, Encoders, Multiplexers, Programmable Logic Devices (PLDs) (Section5.1 to 5.7 of Text2)

Module – 3

Flip-Flops and its Applications: The Master-Slave Flip-flops (Pulse-Triggered flip-flops):SR flipflops, JK flip flops, Characteristic equations, Registers, Binary Ripple Counters, Synchronous Binary Counters, Counters based on Shift Registers, Design of Synchronous mod-n Counter using clocked JK flip-flops. (Section 6.4, 6.6 to 6.9 (Excluding 6.9.3) of Text2)

Module – 4

Introduction to Verilog: Structure of Verilog module, Operators, Data Types, Styles of Description. (Section1.1to1.6.2, 1.6.4 (only Verilog), 2 of Text 3)

Verilog Data flow description: Highlights of Data flow description, Structure of Data flow description. (Section2.1to2.2(only Verilog) of Text3)

Module – 5

Verilog Behavioral description: Structure, Variable Assignment Statement, Sequential Statements, Loop Statements, Verilog Behavioral Description of Multiplexers (2:1, 4:1, 8:1). (Section 3.1 to 3.4 (only Verilog) of Text 3)

Verilog Structural description: Highlights of Structural description, Organization of structural description, Structural description of ripple carry adder. (Section4.1 to 4.2 of Text 3)

PRACTICAL COMPONENT OF IPCC *(Experiments can be conducted either using any circuit simulation software or discrete components)*

SL.NO	Experiments
1	To design and verify Demorgan's Theorem for 2 variables using Multisim tool.
2	To design and verify the sum-of product and product-of-sum expressions with universal gates Using Multisim tool.
3	To design and verify 1-bit Comparator using Multisim tool.
4	To realize Adder & Subtractor (half and full) circuits using Multisim tool.
5	To simplify the given Boolean expressions and realize using Multisim tool.
6	To realize Adder/Subtractor (half and Full) circuits using Verilog data flow description.
7	To realize 1-bit Comparator using Verilog program.
8	To realize the following Code converters using Verilog Behavioral description a) Gray to binary and vice versa b) Binary to excess3 and vice versa
9	To realize using Verilog Behavioral description: 8:3encoder, Priority encoder
10	To realize using Verilog Behavioral description: 8:1mux, 1:8 Demux
11	To realize using Verilog Behavioral description: Flip-flops: a) JK type b) SR type c) T type and d) D type
12	To realize Binary Counters-up counter and down counter using Verilog Behavioral description.
Demonstration Experiments (For CIE only–not to be included for SEE) Use FPGA/CPLD kits for down loading Verilog codes and check the output for interfacing experiments.	
9	Verilog Program to interface a Stepper motor to the FPGA/CPLD and rotate the motor in the specified direction (by N steps).
10	Verilog programs to interface Switches and LEDs to the FPGA/CPLD and demonstrate its working.

Course Outcomes (Course Skill Set):

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

CO1: Elucidate the concepts of combinational and sequential logic circuits and also the styles of description using Verilog.

CO2: Apply different simplification methods to construct combinational and sequential circuits.

CO3: Analyze combinational and sequential circuits for various applications using Verilog.

CO4: Design a digital circuit for various applications using Verilog.

Suggested Learning Resources:

Textbooks:

1. Digital Logic Applications and Design by John MYarbrough, Thomson Learning,2001.
2. Digital Principles and Design by Donald DGivone, McGrawHill, 2002.

3. HDL Programming VHDL and Verilog by Nazeih M Botros, 2009 reprint, Dream tech press.

Reference Books:

1. Fundamentals of logic design, by Charles H Roth Jr., Cengage Learning
2. Logic Design, by Sudhakar Samuel, Pearson/Sanguine, 2007
3. Fundamentals of HDL, by Cyril PR, Pearson/Sanguine2010

Continuous Comprehensive Assessments (CCA's):

- Infosys Spring Board MOOC Certification Course.

Web links/e-resources:

- https://nptel.ac.in/courses/117105080

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – III

Electronic Principles and Circuits (3:0:2) 4

Academic Year 2025-2026

Course Code	**BEC303**	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Total Number of Contact Hours	40 hours Theory + 26 hours lab	Exam Hours	3

Course Objectives:

This course will enable students to

- Design and analyse the BJT circuits as an amplifier and voltage regulation.
- Design of MOSFET Amplifiers and analyse the basic amplifier configurations using small signal equivalent circuit models
- Design of operational amplifiers circuits as Comparators, DAC and filters.
- Understand the concept of positive and negative feedback.
- Analyze Power amplifier circuits in different modes of operation.
- Construct Feedback and Oscillator circuits using FET.
- Understand the thyristor operation and the different types of thyristors.

Module – 1

BJT AC models: Base Biased Amplifier, Emitter Biased Amplifier, Small Signal Operation, AC Beta, AC Resistance of the emitter diode, Two transistor models, Analyzing an amplifier.

Review of BJT CE amplifier [Text1]

MOSFET: Device structures and Physical operations, Current-Voltage Characteristics

(Text2: 5.1 and 5.2, 7th edition) (08 Hours)

Module – 2

MOSFET

Biasing in MOS amplifier circuits: Fixing VGS, Fixing VG, Drain to Gate feedback resistor. Small signal operation and modelling: The DC bias point, signal current in drain, voltage gain, small signal equivalent circuit models, transconductance, The T equivalent circuit model.

MOSFET Amplifier configuration: Basic configurations, characterizing amplifiers, CS amplifier with and without source resistance, The Common Gate Amplifier, Source follower. (08 Hours)

Module – 3

Linear Opamp Circuits: Summing Amplifier and D/A Converter, Nonlinear Op-amp Circuits: Comparator with zero reference, Comparator with non-zero references. Comparator with Hysteresis.

Oscillator: Theory of Sinusoidal Oscillation, The Wein-Bridge Oscillator, RC Phase Shift Oscillator, The Colpitts Oscillator, Hartley Oscillator, Crystal Oscillator.

The 555 timer: Monostable Operation, Astable Operation. (Text1) (08 Hours)

Module – 4

Negative Feedback: Four Types of Negative Feedback, VCVS Voltage gain, Other VCVS Equations, ICVS Amplifier, VCIS Amplifier, ICIS Amplifier (No Mathematical Derivation).

Active Filters: Ideal Responses, First Order Stages, VCVS Unity Gain Second Order Low pass

Filters, VCVS Equal Component Low Pass Filters, VCVS High Pass Filters, MFB Bandpass Filters, Bandstop Filters. (Text1) (08 Hours)

Module – 5

Power Amplifiers: Amplifier terms, two load lines, Class A Operation, Class B operation, Class B push pull emitter follower, Class C Operation.

Thyristors: The four-layer Diode, SCR, SCR Phase control, Bidirectional Thyristors, IGBTs, Other Thyristors. (Text1) (08 Hours)

Experiments (Experiment can be conducted either using any circuit simulation software or discrete components)

1. Design and Test a Zener voltage regulator.
2. Design and Test Biased Parallel Clippers – a) Positive, b) Negative, c) Positive-Negative
3. Design and Test Positive and Negative Clampers with and without Reference.
4. Plot the transfer and drain characteristics of n-channel MOSFET and calculate its parameters, namely-drain resistance, mutual conductance and amplification factor.
5. Design and test (i) Emitter Follower, (ii) Darlington Connection
6. Design and plot the frequency response of Common Source MOSFET amplifier
7. Test the Opamp Comparator with zero and non-zero reference and obtain the Hysteresis curve.
8. Design and test Full wave Controlled rectifier using RC triggering circuit.
9. Design and test Precision full wave rectifier using Opamp
10. Design and test RC phase shift oscillator

Course outcomes (Course Skill Set):

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

CO1: Analyze the characteristics of BJT and MOSFET for small signals and amplification.

CO2: Apply the concept of MOSFET characteristics and working principle to design the MOSFET circuits for given functionality.

CO3: Design amplifier circuits for the given parameters using MOSFET and BJT

CO4: Apply the knowledge of basics of circuits to explain the working of different linear opamp circuits, oscillators and timer circuits.

CO5: Apply the knowledge of feedback concepts and basic mathematics to explain the feedback amplifiers and active filters.

CO6: Apply the performance/working of power electronic devices to develop switching/power amplifier circuits.

Suggested Learning Resources:

Textbooks:

1. Albert Malvino, David J Bates, Electronic Principles, 7th Edition, Mc Graw Hill Education, 2017, ISBN:978-0- 07-063424-4.

2. Microelectronic Circuits, Theory an Applications, Adel S Sedra, Kenneth C Smith, 6thEdition, Oxford, 2015. ISBN:978-0-19-808913-1

Continuous Comprehensive Assessments (CCA's):

- Simulation of the given problems using Modern tool and validation of the obtained results with the theoretical values

Web links/e-resources:

- https://onlinecourses.nptel.ac.in/noc25_ee20/preview

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – III

Network Analysis (3:0:0) 3

Academic Year 2025-2026

Course Code	**BEC304**	CIE Marks	50
Teaching Hours/Week (L: T:P)	3:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3

Course Objectives:

This course will enable students to:

- Apply mesh and nodal techniques to solve an electrical network.
- Solve different problems related to Electrical circuits using Network Theorems and Two port network.
- Familiarize with the use of Laplace transforms to solve network problems.
- Study two port network parameters and their applications.

Module – 1

Basic Concepts: Practical sources, Source transformations, Network reduction using Star - Delta transformation, Loop and node analysis with linearly dependent and independent sources for DC and AC networks. (8 Hours)

Module – 2

Network Theorems: Superposition, Millman's theorems, Thevenin's and Norton's theorems, Maximum Power transfer theorem (8 Hours)

Module – 3

Transient behavior and initial conditions: Behavior of circuit elements under switching condition and their Representation, evaluation of initial and final conditions in RL, RC and RLC circuits for AC and DC excitations. (8 Hours)

Module – 4

Laplace Transformation &Applications: Solution of networks, step, ramp and impulse responses, waveform Synthesis. (8 Hours)

Module – 5

Two port network parameters: Definition of Z, Y, h and Transmission parameters, modelling with these parameters, relationship between parameters sets.

Resonance: Definition, Characteristics of Series and Parallel Resonance. Summary/Recap of all the modules: Applications: Circuit Creation and Simulation using Multisim Tool, Verification of Thevenin's, Norton's and Maximum power Transfer Theorem. (8 Hours)

Course Outcomes (Course Skill Set):

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

1.Apply fundamental network analysis techniques, to solve for circuit parameters in circuits containing both dependent and independent sources.

2.Apply the concepts of network theorems to simplify complex circuits and determine circuit responses.

3. Analyse the transient and steady-state behavior of RL, RC, and RLC circuits by determining initial and final conditions.
4.Apply the Laplace transforms to synthesize aperiodic and periodic waveforms.
5.Compute the two port parameters (Z, Y, h, and T), their interrelationships, and the parameters of resonant circuits.

Suggested Learning Resources:

Textbooks:

1. M. E. Van Valkenburg (2000), Network Analysis, Prentice Hall of India, 3rd edition, 2000, ISBN:9780136110958.
2. Roy Choudhury-Networks and Systems, 2nd edition, New Age International Publications, 2006, ISBN: 9788122427677

Reference Books:

1. Hayt, Kemmerly and Durbin-Engineering Circuit Analysis, TMH 7th Edition, 2010.
2. J. David Irwin/ R. Mark Nelms- Basic Engineering Circuit Analysis JohnWiley,8th ed,2006.
3. Charles K Alexander and Mathew NO Sadiku-Fundamentals of Electric Circuits, Tata McGraw-Hill, 3rd Ed ,2009.

Continuous Comprehensive Assessments (CCA's):

- Gate Level Quiz
- Simulation using Modern Tool

Web links/e-resources:

- https://nptel.ac.in/courses/108105159

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B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – III

Analog and Digital Systems Design Laboratory (0:0:2) 1

Academic Year 2025-2026

Course Code	**BECL305**	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	15	Exam Hours	03

Course Objectives:

This laboratory course enables students to

- Understand the electronic circuit schematic and its working
- Realize and test amplifier and oscillator circuits for the given specifications
- Realize the opamp circuits for the applications such as DAC, implement mathematical functions and precision rectifiers.
- Study the static characteristics of SCR and test the RC triggering circuit.
- Design and test the combinational and sequential logic circuits for their functionalities.
- Use the suitable ICs based on the specifications and functions.

Experiments (All the experiments have to be conducted using discrete components**)**

1.Design and set up the BJT common emitter voltage amplifier with and without feedback and determine the gain bandwidth product, input and output impedances.

2.Design and set-up BJT/FET i) Colpitts Oscillator, ii) Crystal Oscillator

3.Design and set up the circuits using opamp: i) Adder, ii) Integrator, iii) Differentiator and iv) Comparator

4.Design 4-bit R – 2R Op-Amp Digital to Analog Converter (i) for a 4-bit binary input using toggle switches (ii) by generating digital inputs using mod-16

5.Design and implement (a) Half Adder & Full Adder using basic gates and NAND gates, (b) Half subtractor & Full subtractor using NAND gates, (c) 4-variable function using IC74151(8:1MUX).

6.Realize (i) Binary to Gray code conversion & vice-versa (IC74139), (ii) BCD to Excess-3 code conversion and vice versa

7.a) Realize using NAND Gates: i) Master-Slave JK Flip-Flop, ii) D Flip-Flop and iii) T Flip-Flop b) Realize the shift registers using IC7474/7495: (i) SISO (ii) SIPO (iii) PISO (iv) PIPO (v) Ring counter and (vi) Johnson counter.

8.Realize a) Design Mod – N Synchronous Up Counter & Down Counter using 7476 JK Flip-flop b) Mod-N Counter using IC7490 / 7476 c) Synchronous counter using IC74192

Demonstration Experiments (For CIE)

9. Design and Test Bandpass Filter and Bandstop Filter

10. Design and test the following using 555 timer
i) Monostable Multivibraator
ii) Astable Multivibrator

11.Design and Test a Regulated Power supply

12. Design and test an audio amplifier by connecting a microphone input and observe the output using a loud speaker.

Course Outcomes (Course Skill Set):

At the end of the course the student will be able to:
CO1: Analyze the BJT/FET amplifier and oscillator circuits.
CO2: Design Opamp circuits to realize the mathematical computations, DAC and precision rectifiers.
CO3: Design the combinational circuits for the given specifications.
CO4: Design the sequential logic circuits for the given functionality

Suggested Learning Resources:

Textbooks:

1. David A Bell, "Fundamentals of Electronic Devices and Circuits Lab Manual", 5th Edition, 2009, Oxford University Press.
2. Albert Malvino, David J Bates, Electronic Principles, 7th Edition, McGraw Hill Education, 2017.
3. Fundamentals of Logic Design, Charles H Roth Jr., Larry L Kinney, Cengage Learning, 7th Edition.

Open Ended Experiment

- Application oriented Circuit Design

Web links/e-resources:

- https://www.vlab.co.in/ba-nptel-labs-electronics-and-communications

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B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – III

Electronic Devices (3:0:0) 3

Academic Year 2025-2026

Course Code	**BEC306A**	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 basics of semiconductor physics and electronic devices.
- Describe the mathematical models BJTs and FETs along with the constructional details.
- Understand the construction and working principles of optoelectronic devices
- Understand the fabrication process of semiconductor devices and CMOS process integration.

Module – 1

Semiconductors

Bonding forces in solids, Energy bands, Metals, Semiconductors and Insulators, Direct and Indirect semiconductors, Electrons and Holes, Intrinsic and Extrinsic materials, Conductivity and Mobility, Drift and Resistance, Effects of temperature and doping on mobility, Hall Effect.

(Text1:3.1.1,3.1.2,3.1.3,3.1.4,3.2.1,3.2.3,3.2.4,3.4.1,3.4.2,3.4.3,3.4.5) (08 Hours)

Module – 2

PN Junctions

Forward and Reverse biased junctions-Qualitative description of Current flow at a junction, reverse bias, Reverse bias breakdown- Zener breakdown, avalanche breakdown, Rectifiers. (Text1:5.3.1,5.3.3,5.4,5.4.1,5.4.2,5.4.3)

Optoelectronic Devices Photodiodes: Current and Voltage in an Illuminated Junction, Solar Cells, Photodetectors. Light Emitting Diode: Light Emitting materials.

(Text1:8.1.1,8.1.2,8.1.3,8.2,8.2.1) (08 Hours)

Module – 3

Bipolar Junction Transistor

Fundamentals of BJT operation, Amplification with BJTS, BJT Fabrication, the coupled Diode model (Ebers-Moll Model), Switching operation of a transistor, Cutoff, saturation, switching cycle, specifications, Drift in the base region, Base narrowing, Avalanche breakdown.

(Text1:7.1,7.2,7.3,7.5.1,7.6,7.7.1,7.7.2, 7.7.3) (08 Hours)

Module – 4

Field Effect Transistors

Basic pn JFET Operation, Equivalent Circuit and Frequency Limitations, MOSFET-Two terminal MOS structure- Energy band diagram, Ideal Capacitance-Voltage Characteristics and Frequency Effects, Basic MOSFET Operation, MOSFET structure, Current-Voltage Characteristics.

(Text2:9.1.1,9.4,9.6.1,9.6.2,9.7.1,9.7.2,9.8.1,9.8.2) (08 Hours)

Module – 5

Fabrication of p-n junctions

Thermal Oxidation, Diffusion, Rapid Thermal Processing, Ion implantation, chemical vapour deposition, photolithography, Etching, metallization. (Text 1: 5.1)

Integrated Circuits

Background, Evolution of ICs, CMOS Process Integration, Integration of Other Circuit Elements. (Text 1:9.1,9.2,9.3.1,9.3.3) (08 Hours)

Course Outcomes (Course Skill Set):

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

CO1: Apply the basics of semiconductor physics, including the effects of temperature and doping on mobility

CO2: Analyze and interpret the electrical behavior and performance of PN junction diodes, Zener diodes, and optoelectronic devices under forward and reverse bias conditions

CO3: Apply PN junction principle in developing simple rectifiers circuits

CO4: Analyze the characteristics of BJTs and apply their working principles in designing amplifiers

CO5: Analyze the characteristics and working principles of JFETs and MOSFETs, including the effects of frequency.

CO6: Design a fabrication process for the evolution of integrated circuits.

Suggested Learning Resources:

Textbooks:

1. Ben. G. Streetman, Sanjay Kumar Banerjee, "Solid State Electronic Devices",7thEdition, Pearson Education,2016, ISBN978-93-325-5508-2.
2. Donald A Neamen, Dhrubes Biswas, "Semiconductor Physics and Devices", 4thEdition, McGraw Hill Education, 2012, ISBN 978-0-07- 107010-2.

Reference Books:

1. S.M. Sze, KwokK. Ng,"PhysicsofSemiconductorDevices",3rdEdition, Wiley,2018.
2. AdirBar-Lev,"SemiconductorandElectronicDevices",3rdEdition, PHI, 1993

Continuous Comprehensive Assessments (CCA's):

- Mini Project with Prototype

Web links/e-resources:

- https://onlinecourses.nptel.ac.in/noc24_mm10/preview
- https://onlinecourses.nptel.ac.in/noc21_ee80/preview

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – III

Sensors and Instrumentation (3:0:0) 3

Academic Year 2025-2026

Course Code	**BEC306B**	CIE Marks	50
Teaching Hours/Week (L: T: P)	3:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3

Course Objectives:

This course will enable students to:

- Understand various technologies associated in manufacturing of sensors
- Acquire knowledge about types of sensors used in modern digital systems
- Get acquainted about material properties required to make sensors
- Understand types of instrument errors and circuits for multirange Ammeters and Voltmeters.
- Describe principle of operation of digital measuring instruments and Bridges.
- Understand the operations of transducers and instrumentation amplifiers

Module – 1

Introduction to sensor-based measurement systems: General concepts and terminology, sensor classification, Primary Sensors, material for sensors, microsensor technology. (Text 1) (08 Hours)

Module – 2

Self-generating Sensors-Thermoelectric sensors, piezoelectric sensors, pyroelectric sensors, photovoltaic sensors, electrochemical sensors. (Text 1) (08 Hours)

Module – 3

Principles of Measurement: Static Characteristics, Error in Measurement, Types of Static Error. (Text 2: 1.2-1.6) Multirange Ammeters, Multirange voltmeter. (Text2:3.2,4.4)

Digital Voltmeter: Ramp Technique, Dual slope integrating Type DVM, Direct Compensation type and Successive Approximations type DVM (Text 2: 5.1-5.3, 5.5,5.6) (08 Hours)

Module – 4

Digital Multimeter: Digital Frequency Meter and Digital Measurement of Time, Function Generator.

Bridges: Measurement of resistance: Wheatstone's Bridge, AC Bridges - Capacitance and Inductance Comparison bridge, Wien's bridge (Text2: refer 6.2,6.3 up to 6.3.2, 6.4 up to 6.4.2, 8.8, 11.2, 11.8 -11.10, 11.14). (08 Hours)

Module – 5

Transducers: Introduction, Electrical Transducer, Resistive Transducer, Resistive position Transducer, Resistance Wire Strain Gauges, Resistance Thermometer, Thermistor, LVDT. (Text2:13.1-13.3,13.5, 13.6 up to 13.6.1,13.7,13.8,13.11).

Instrumentation Amplifier using Transducer Bridge, Temperature indicators using Thermometer, analog Weight Scale (Text2:14.3.3, 14.4.1, 14.4.3). (08 Hours)

Course Outcomes (Course Skill Set):

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

CO1: Realize the principle of transducers, manufacturing process and material properties required to model sensors.
CO2: Analyze the instrument characteristics, errors and sensors applications.
CO3: Design electronic circuit using sensors and instrumentation.
CO4: Develop circuits for multi range Ammeters, Voltmeters and Bridges to measure component values.

Suggested Learning Resources:

Textbooks:

1. "Sensors and Signal Conditioning", Ramon Pallas Areny, John G. Webster,2nd edition, John Wiley and Sons,2000
2. H.S. Kalsi, "Electronic Instrumentation", Mc Graw Hill,3rd Edition,2012, ISBN:9780070702066.

Reference Books:

1. David A. Bell, "Electronic Instrumentation & Measurements", Oxford University Press PHI 2ndEdition, 2006, ISBN 81-203-2360-2.
2. D. Helfrickand W.D. Cooper, "Modern Electronic Instrumentation and Measuring Techniques", Pearson, 1st Edition, 2015, ISBN: 9789332556065.

Continuous Comprehensive Assessments (CCA's):

- Case study

Web links/e-resources:

- https://onlinecourses.nptel.ac.in/noc23_ee105/preview
- https://onlinecourses.nptel.ac.in/noc21_ee32/preview

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – III

Computer Organization and Architecture (3:0:0) 3

Academic Year 2025-2026

Course Code	**BEC306C**	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:

- Explain the basic sub systems of a computer, their organization, structure and operation.
- Illustrate the concept of programs as sequences of machine instructions.
- Demonstrate different ways of communicating with I/O devices
- Describe memory hierarchy and concept of virtual memory.
- Illustrate organization of simple pipelined processor and other computing systems.

Module – 1

Basic Structure of Computers: Computer Types, Functional Units, Basic Operational Concepts, Bus Structures, Software, Performance -Processor Clock, Basic Performance Equation (upto1.6.2of Chap1of Text).

Machine Instructions and Programs: Numbers, Arithmetic Operations and Characters, IEEE standard for Floating point Numbers, Memory Location and Addresses, Memory Operations, Instructions and Instruction Sequencing (up to 2.4.6 of Chap 2 and 6.7.1 of Chap 6 of Text). (08 Hours)

Module – 2

Addressing Modes, Assembly Language, Basic Input and Output Operations, Stacks and Queues, Subroutines, Additional Instructions (from2.4.7ofChap2, except 2.9.3, 2.11 & 2.12 of Text). (08 Hours)

Module – 3

Input/ Output Organization: Accessing I/O Devices, Interrupts -Interrupt Hardware, Enabling and Disabling Interrupts, Handling Multiple Devices, Controlling Device Requests, Direct Memory Access (up to 4.2.4 and 4.4 except 4.4.1 of Chap 4 of Text). (08 Hours)

Module – 4

Memory System: Basic Concepts, Semiconductor RAM Memories-Internal organization of memory chips, Static memories, Asynchronous DRAMS, Read Only Memories, Cash Memories, Virtual Memories, Secondary Storage Magnetic Hard Disks. (5.1,5.2,5.2.1,5.2.2,5.2.3,5.3,5.5 (except 5.5.1 to 5.5.4), 5.7 (except5.7.1), 5.9, 5.9.1 of Chap 5 of Text). (8 Hours)

Module – 5

Basic Processing Unit: Some Fundamental Concepts, Execution of a Complete Instruction, Multiple Bus Organization, Hardwired Control, Microprogrammed Control (up to 7.5 except 7.5.1 to7.5.6 of Chap 7 of Text). Pipelining: Basic Concepts (8.1 of Chap 8 of text) (8 Hours)

Course Outcomes (Course Skill Set):

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

CO1: Identify and summarize the important features of the basic organization of a computer system

CO2: Apply the concepts of addressing modes, instruction formats and program control statements to develop optimal programs.

CO3: Compare various types of IO mapping techniques, Investigate direct memory access.

CO4: Analyze the various methods for accessing input/ output device including interrupts, different types of semiconductor and other secondary storage memories.

CO5: Analyze the impact of bus architecture on the performance and data throughput of a simple processor, considering different configurations.

Suggested Learning Resources:

Textbook:

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5thEdition, Tata McGrawHill,2002.

Reference Books:

1. David A. Patterson, John L. Hennessy: Computer Organization and Design-The Hardware/ Software Interface ARM Edition, 4th Edition, Elsevier,2009.
2. William Stallings: Computer Organization & Architecture,7th Edition, PHI, 2006.
3. Vincent P. Heuring & Harry F. Jordan: Computer Systems Design and Architecture, 2nd Edition, Pearson Education, 2004.

Continuous Comprehensive Assessments (CCA's):

- Role Play

Web links/e-resources:

- https://onlinecourses.nptel.ac.in/noc22_cs88/preview

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B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – III

Applied Numerical Methods (3:0:0) 3

Academic Year 2025-2026

Course Code	**BEC306D**	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:

The course will enable the students to:

- To provide the knowledge and importance of error analysis in engineering problems
- To represent and solve an application problem using a system of linear equations
- Analyze regression data to choose the most appropriate model for a situation.
- Familiarize with the ways of solving complicated mathematical problems numerically
- Prepare to solve mathematical models represented by initial or boundary value problems

Module – 1: Errors in computations and Root of the equations

Approximations and Round Off -Errors in computation: Error definitions, Round-Off errors, Truncation errors and the Taylor series-The Taylor series, Error Propagation, Total numerical error, Absolute, Relative and percentage errors, Blunders, Formulation errors and data uncertainty. Roots of equations: Simple fixed point iteration methods. Secant Method, Muller's method, and Graeffe's Roots Squaring Method. Aitkin's Method.

(8 hours) (RBT Levels: L1, L2 and L3)

Module – 2: Solution of System of Linear Equations

Rank of the matrix, Echelon form, Linearly dependent and independent equations, Solutions for linear equations, Partition method, Croute's Triangularisation method. Relaxation method. Solution of non-linear simultaneous equations by Newton-Raphson method. Eigen Values and properties, Eigen Vectors, Bounds on Eigen Values, Jacobi's method, Given's method for symmetric matrices.

(8 hours) (RBT Levels: L1, L2 L3)

Module – 3: Curve Fitting

Least-Squares Regression: Linear Regressions, Polynomial regressions, Multiple Linear regressions, General Linear Least squares, Nonlinear Regressions, QR Factorization. Curve Fitting with Sinusoidal Functions

Introduction to Splines, Linear Splines, Quadratic Splines, Cubic Splines. Bilinear Interpolation.

(8 hours) (RBT Levels: L1, L2 L3)

Module – 4: Numerical integration, Difference equations and Boundary Value Problems

Romberg's method, Euler-Maclaurin formula, Gaussian integration for n = 2 and n=3. Numerical double integration by trapezoidal and Simpson's 1/3 rd rule. Solution of linear difference equations. Boundary-Value Problems, Introduction. The Shooting Method, Finite-Difference Methods

(8 hours) (RBT Levels: L1, L2 and L3)

Module – 5: Numerical solution of partial differential equations

Classifications of second-order partial differential equations, Finite difference approximations to partial derivatives. Solution of: Laplace equation, Poisson equations, one-dimensional heat equation and wave equations.
(8 hours) (RBT Levels: L1, L2 and L3)

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

CO1: Analyse and measure errors in numerical computations
CO2: Test for consistency and solve a system of linear equations.
CO3: Construct a function which closely fits given n- n-points of an unknown function.
CO4: Apply the basic concepts related to solving problems by numerical differentiation and numerical integration.
CO5: Apply the appropriate numerical methods to study phenomena modelled as partial differential equations.

Suggested Learning Resources:
Textbooks:

1. **Steven C. Chapra & Raymond P. Canale: "**Numerical Methods for Engineers and Scientists", McGraw Hill, 8th Edition, 2020.
2. **Steven C. Chapra**: "Applied Numerical Methods with MATLAB for Engineers and Scientists", McGraw Hill, Fifth Edition, 2023.
3. **B. S. Grewal**: "Numerical Methods in Engineering & Science with programs in C, C++ and MATLAB", Khanna Publishers, 10hEd., 2015.

Reference Books:

1. John H. Mathews & Kurtis D. Frank: "Numerical Methods Using MATLAB", PHI Publications, 4th Edition, 2005.
2. Won Young Yang, Wenwu Cao, Tae Sang Chung, John Morris: **"**Applied Numerical Methods Using MATLAB**",** WILEY Inter science**,** Latest Edition, 2005.

Continuous Comprehensive Assessments (CCA's):

- Simulation of examples

Web links/e-resources:

- https://onlinecourses.nptel.ac.in/noc23_me135/preview

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Choice Based Credit System (CBCS)

SEMESTER – III

(Common to all branches)

Social Connect and Responsibility (0:0:2) 1

Academic Year 2025-2026

Course Code	**BSCK307**	CIE Marks	**100**
Teaching Hours/Week (L: T:P)	0:0:2	SEE Marks	-
Total Number of Contact Hours	26 Hours	Exam Hours	**-**
Credits	01		

Course Objectives:

The course will enable the students to:

- Provide a formal platform for students to communicate and connect to the surrounding.
- create a responsible connection with the society.
- 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.

Social Connect & Responsibility –All Modules Activity Based Learning

Module-1

Plantation and adoption of a tree: Plantation of a tree that will be adopted for four years by a group of BE / B.Tech students. (ONE STUDENT ONE TREE) They will also make an excerpt either as a documentary or a photo blog describing the plant's origin, its usage in daily life, its appearance in folklore and literature - – Objectives, Visit, case study, report, outcomes. (04 Hours)

Module-2

Heritage walk and crafts corner: Heritage tour, knowing the history and culture of the city, connecting to people around through their history, knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms - – Objectives, Visit, case study, report, outcomes. (05 Hours)

Module-3

Organic farming and waste management: Usefulness of organic farming, wet waste management in neighboring villages, and implementation in the campus – Objectives, Visit, case study, report, outcomes.

(06 Hours)

Module-4

Water conservation: Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photoblog presenting the current practices –

Objectives, Visit, case study, report, outcomes. (06 Hours)

Module-5

Food walk: City's culinary practices, food lore, and indigenous materials of the region used in cooking – Objectives, Visit, case study, report, outcomes. (05 Hours)

Course Outcomes (Course Skill Set):

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

CO1: Communicate and connect to the surrounding.

CO2: Create a responsible connection with society.

CO3: Involve in the community in general in which they work.

CO4: Notice the needs and problems of the community and involve them in problem –solving.

CO5: Develop among themselves a sense of social & civic responsibility utilize their knowledge in finding practical solutions to individual and community problems.

CO6: Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

Activities: Jamming session, open mic, and poetry: Platform to connect to others. Share the stories with others. Share the experience of Social Connect. Exhibit the talent like playing instruments, singing, one-act play, art-painting, and fine art.

Pedagogy: The pedagogy will include interactive lectures, inspiring guest talks, field visits, social immersion, and a course project. Applying and synthesizing information from these sources to define the social problem to address and take up the solution as the course project, with your group. Social immersion with NGOs/social sections will be a key part of the course. Will all lead to the course project that will address the needs of the social sector?

Course Topics: The course will introduce social context and various players in the social space, and present approaches to discovering and understanding social needs. Social immersion and inspiring conversional will culminate in developing an actual, idea for problem-based intervention, based on an in-depth understanding of a key social problem

Duration: A total of 26 hours engagement per semester is required for the 3rd semester of the B.E./B.Tech. program. The students will be divided into groups. Each group will be handled by faculty mentor. Faculty mentor will design the activities (particularly Jamming sessions open mic, and poetry) Faculty mentors have to design the evaluation system as per VTU guidelines of scheme & syllabus.

Guideline for Assessment Process: Continuous Internal Evaluation (CIE): After completion of the course, the student shall prepare with daily diary as reference, a comprehensive report in consultation with the mentor/s to indicate what he has observed and learned in the social connect period. The report should be signed by the mentor. The report shall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activity completed. Marks allotted for the diary are out of 50. Planning and scheduling the social connect Information/Data collected during the social connect Analysis of the information/data and report writing Considering all above points allotting the marks as mentioned below

Excellent: 80 to 100
Good: 60 to 79
Satisfactory: 40 to 59
Unsatisfactory and fail: <39

Special Note: NO Semester End Examination (SEE) – Completely Practical and activities-based evaluation

Pedagogy – Guidelines: It may differ depending on local resources available for the study as well as environment and climatic differences, location and time of execution.

Sl. No	Topic	Group size	Location	Activity execution	Reporting	Evaluation of the Topic
1.	**Plantation and adoption of a tree**	May be individual or team	Farmers land/ parks / Villages / roadside/ community area / College campus etc	Site selection /Proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
2.	**Heritage walk and crafts corner**	May be individual or team	Temples / monumental places / Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc	Site selection /Proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty

3.	**Organic farming and waste management**	May be individual or team	Farmers land / parks / Villages visits / roadside/ community area / College campus etc	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
4.	**Water conservation & conservation techniques**	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers / campus etc	site selection / proper consultation/ Continuous monitoring/ Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty
5.	**Food walk: Practices in society**	May be individual or team	Villages/ City Areas / Grama panchayat/ public associations/Government Schemes officers/ campus etc	Group selection / proper consultation / Continuous monitoring / Information board	Report should be submitted by individual to the concerned evaluation authority	Evaluation as per the rubrics of scheme and syllabus by Faculty

Plan of Action (Execution of Activities)

Sl.NO	Practice Session Description
1	Lecture session in field to start activities
2	Students Presentation on Ideas
3	Commencement of activity and its progress
4	Execution of Activity
5	Execution of Activity
6	Execution of Activity
7	Execution of Activity
8	Case study-based Assessment, Individual performance
9	Sector/ Team wise study and its consolidation
10	Video based seminar for 10 minutes by each student at the end of semester with Report.

- Each student should do activities according to the scheme and syllabus.
- At the end of semester student performance has to be evaluated by the faculty for the assigned activity progress and its completion.
- At last consolidated report of all activities from 1st to 5th, compiled report should be submitted as per the instructions and scheme.

Assessment Details for CIE (both CIE and SEE)

Weightage	**CIE – 100%**	• Implementation strategies of the project (NSS work). • The last report should be signed by NSS Officer, the HOD and principal. • At last report should be evaluated by the NSS officer of the institute. • Finally, the consolidated marks sheet should be sent to the university and also to be made available at LIC visit.
Field Visit, Plan, Discussion	10 Marks	
Commencement of activities and its progress	20 Marks	
Case study-based Assessment Individual performance with report	20 Marks	
Sector wise study & its consolidation 5*5 = 25	25 Marks	
Video based seminar for 10 minutes by each student at the end of semester with Report. **Activities 1 to 5, 5*5 = 25**	25 Marks	
Total marks for the course in each semester	**100 Marks**	

For each activity, 20 marks CIE will be evaluated for IA marks at the end of semester, Report and assessment copy should be made available in the department.

Students should present the progress of the activities as per the schedule in the prescribed practical session in the field.

There should be positive progress in the vertical order for the benefit of society in general through activities.

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - III

LABVIEW Programming (0:0:2) 1

Academic Year 2025-2026

Course Code	**BEC358A**	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	15	Exam Hours	02

Course Objectives:

The course will enable the students to:

- Aware of various front panel controls and indicators.
- Connect and manipulate nodes and wires in the block diagram.
- Locate various tool bars and pull-down menus for the purpose of implementing specific functions
- Locate and utilize the context help window.
- Familiar with LabVIEW and different applications using it.

SL .NO	VI Programs (using LabVIEW software) to realize the following:
1	Basic arithmetic operations: addition, subtraction, multiplication and division
2	Boolean operations: AND, OR, XOR, NOT and NAND
3	Sum of 'n' numbers using 'for' loop
4	Factorial of a given number using 'for' loop
5	Determine square of a given number
6	Factorial of a given number using 'while'loop
7	Sorting even numbers using 'while' loop in an array.
8	Finding the array maximum and array minimum
	Demonstration Experiments (For CIE)
9	Build a Virtual Instrument that simulates a heating and cooling system. The system must be able to be controlled manually or automatically.
10	Build a Virtual Instrument that simulates a Basic Calculator (using formula node).
11	Build a Virtual Instrument that simulates a Water Level Detector.
12	Demonstrate how to create a basic VI which calculates the area and perimeter of a circle.

Course Outcomes (Course Skill Set):

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

CO1: Comprehend LabVIEW to create data acquisition, analysis and display operations

CO2: Create user interfaces with charts, graph and buttons

CO3: Apply the programming structures and data types that exist in LabVIEW

CO4: Analyze various editing and debugging techniques.

Continuous Comprehensive Assessments (CCA's):

- Simulation experiment
- Open ended experiments

Web links/e-resources:

- https://elearn.nptel.ac.in/shop/completed-courses/masterclass-series-closed/automating-test-hardware-with-labview/?v=c86ee0d9d7ed

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B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – III

MATLAB Programming (1:0:0) 1

Academic Year 2025-2026

Course Code	**BEC358B**	CIE Marks	50
Teaching Hours/Week(L:T:P)	1:0:0	SEE Marks	50
Total Number of Lecture Hours	14	Exam Hours	01

Course Objectives:

The course will enable the students to:

- Understand the MATLAB commands and functions.
- Create and execute the script and function files
- Work with built in function, saving and loading data and create plots.
- Work with the arrays, matrices, symbolic computations, files and directories.
- Learn MATLAB programming with script, functions and language specific features.

Module – 1

Introduction: Basics of MATLAB, Simple arithmetic calculations, Creating and working with arrays and numbers. Creating and printing simple plots.

Module – 2

Creating, saving and executing a script file, Creating and executing a function file, Working with arrays and matrices, multi-branching statement like If, if else, and for loops

Module – 3

Working with anonymous functions, Symbolic Computations, Importing and exporting data, Working with files and directories.

Module – 4

Interactive computations: Matrices and vectors, Matrix and array operations, Character strings, Command line functions, Built-in functions, Saving and loading data, Plotting simple plots.

Module – 5

Programming in MATLAB: Script Files, Function Files, Language specific Features

Course Outcomes (Course Skill Set):

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

CO1: Gain proficiency in MATLAB syntax for performing arithmetic computations, manipulating arrays and matrices, and effectively utilizing built-in MATLAB functions.

CO2: Demonstrate the ability to employ both built-in and user-defined functions in MATLAB to develop programs for tasks such as data manipulation, plot generation, and file and directory operations.

CO3: Analyse MATLAB programs incorporating symbolic computations, as well as importing and exporting data and files.
CO4: Develop programs in MATLAB utilizing character strings, command line functions, and leveraging built-in functions for various applications.

Suggested Learning Resources:
Textbook:

1. Rudra Pratap, Getting Started with MATLAB – A quick Introduction for scientists and Engineers, Oxford University Press, 2010.

Continuous Comprehensive Assessments (CCA's):

- Open ended Experiments

Web links/e-resources:

- https://onlinecourses.nptel.ac.in/noc20_ge05/preview

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B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER – III

C++ Basics (0:0:2)1

Academic Year 2025-2026

Course Code	**BEC358C**	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	24	Exam Hours	02

Course objectives

- Understand object-oriented programming concepts, and apply them in solving problems.
- To create, debug and run simple C++ programs.
- Introduce the concepts of functions, friend functions, inheritance, polymorphism and function overloading.
- Introduce the concepts of exception handling and multithreading.

Sl. No	Experiments
1	Write a C++ program to find largest, smallest & second largest of three numbers using inline functions MAX & Min.
2	Write a C++ program to calculate the volume of different geometric shapes like cube, cylinder and sphere using function overloading concept.
3	Define a STUDENT class with USN, Name & Marks in 3 tests of a subject. Declare an array of 10 STUDENT objects. Using appropriate functions, find the average of the two better marks for each student. Print the USN, Name & the average marks of all the students.
4	Write a C++ program to create class called MATRIX using two-dimensional array of integers, by overloading the operator == which checks the compatibility of two matrices to be added and subtracted. Perform the addition and subtraction by overloading + and – operators respectively. Display the results by overloading the operator <<. If (m1 == m2) then m3 = m1 + m2 and m4 = m1 – m2 else display error
5	Demonstrate simple inheritance concept by creating a base class FATHER with data members: *First Name, Surname, DOB & bank Balance* and creating a derived class SON, which inherits: Surname & Bank Balance feature from base class but provides its own feature: First Name & DOB. Create & initialize F1 & S1 objects with appropriate constructors & display the FATHER & SON details.
6	Write a C++ program to define class name FATHER & SON that holds the income respectively. Calculate & display total income of a family using Friend function.
7	Write a C++ program to accept the student detail such as name & 3 different marks by get_data() method & display the name & average of marks using display() method. Define a friend function for calculating the average marks using the method mark_avg ().
8	Write a C++ program to explain virtual function (Polymorphism) by creating a base class polygon which has virtual function areas two classes rectangle & triangle derived from polygon & they have area to calculate & return the area of rectangle & triangle respectively.
9	Design, develop and execute a program in C++ based on the following requirements: An EMPLOYEE class containing data members & members functions: i) Data members: employee number (an integer), Employee_ Name (a string of characters), Basic_ Salary (in

	integer), All_ Allowances (an integer), Net_Salary (an integer). (ii) Member functions: To read the data of an employee, to calculate Net_Salary & to print the values of all the data members. (All_Allowances = 123% of Basic, Income Tax (IT) =30% of gross salary (=basic_ Salary_All_Allowances_IT).
10	Write a C++ program with different class related through multiple inheritance & demonstrate the use of different access specified by means of members variables & members functions.
11	Write a C++ program to create three objects for a class named count object with data members such as roll_no & Name. Create a members function set_data ( ) for setting the data values & display ( ) member function to display which object has invoked it using „this" pointer.
12	Write a C++ program to implement exception handling with minimum 5 exceptions classes including two built in exceptions.

Course Outcomes (Course Skill Set):

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

CO1: Comprehend different data types in C++ and Importance of OOPS.

CO2: Write C++Programs using different operators, Control statements and Functions.

CO3: Apply the Object-oriented programming concepts in writing programs.

CO4: Analyze Object oriented programs to generate the expected output.

CO5: Design an object-oriented programming paradigm to develop solutions to real world problems

Suggested Learning Resources:

Textbooks:

1. Object oriented programming in TURBO C++, Robert Lafore, Galgotia Publications, 2002
2. The Complete Reference C++, Herbert Schildt, 4th Edition, Tata McGraw Hill, 2003.
3. Object Oriented Programming with C++, E Balaguruswamy, 4th Edition, Tata McGraw Hill, 2006.

Continuous Comprehensive Assessments (CCA's):

- Open ended experiments

Web links/e-resources:

https://onlinecourses.nptel.ac.in/noc22_cs42/preview

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

Choice Based Credit System (CBCS)

Semester – III

IoT Applications (1:0:0) 1

Academic Year 2025-2026

Course Code	**BEC358D**	CIE Marks	50
Teaching Hours/Week (L: T:P)	1:0:0	SEE Marks	50
Total Number of Lecture Hours	14	Exam Hours	01

Course Objectives:

The course will enable the students to:

- Understanding of the concepts, principles, and applications of IoT.
- Explore the role of IoT technologies in transforming infrastructure into smart, efficient, and sustainable systems.
- Acquaint the real-world case studies and successful implementations of IoT in smart cities, buildings, transportation, and energy management.

Module-1

Introduction to IoT:
Definition of IoT & its characteristics, IoT protocols, IoT Communication models, IoT Communication APIs, IoT Enabling technologies (4 Hours)

Module-2

IoT Applications
Home Automation, Cities, Environment, Energy (4 hours)

Module-3

IoT and M2M
M2M, Difference between IoT and M2M, Software Defined Networking, Network Function Virtualization (2 hours)

Module-4

IoT System Management
Need for IoT system management, Simple Network Management Protocol (SNMP)(2 hours)

Module-5

IoT Platforms Design methodology
Purpose and requirement specification, Process specification, Domain model specification, Information model specification, Service specification, IoT level, Functional view specification, Operational view specification, Device, component integration and Application development, Case study- IoT system for Weather Monitoring. (3 hours)

Course Outcomes (Course Skill Set):

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

CO1: Comprehend the fundamentals of M2M communication and IoT

CO2: Apply the basics of protocols, networking to connect hardware devices of IoT network

CO3: Apply the knowledge of design methodology, system management to establish the Internet of things

CO4: Analyze different case studies and applications of IoT

Suggested Learning Resources:

Textbook:

1. "Internet of Things (A Hands-on-Approach)" by Arshdeep Bahga and Vijay Madisetti, Universities Press India Pvt. Ltd., 2015/16

Reference Books:

1. "Building the Internet of Things: Implement New Business Models, Disrupt Competitors, Transform Your Industry" by Maciej Kranz
2. "Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia" by Anthony M. Townsend

Continuous Comprehensive Assessments (CCA's):

- Case study example

Web links/e-resources:

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

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Choice Based Credit System (CBCS)

SEMESTER – III

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

(Common to all branches)

Academic Year 2025-2026

Course Code	**BNSK359**	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 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:

Textbooks:

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.

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B.E. ELECTRONICS & COMMUNICATION ENGINEERING

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Choice Based Credit System (CBCS)

SEMESTER – III

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

(Common to all Branches)

Academic Year 2025-2026

Course Code	**BPEK359**	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: Increases the 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.

Suggested Learning Resources:

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.

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)

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DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Choice Based Credit System (CBCS)

SEMESTER – III

Yoga (0:0:2)

(Common to all Branches)

Academic Year 2025-2026

Course Code	**BYOK359**	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.

Suggested Learning Resources:

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

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

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B.E. ELECTRONICS & COMMUNICATION ENGINEERING

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Choice Based Credit System (CBCS)

SEMESTER – III

NCC (0:0:2)

(Common to all Branches)

Academic Year 2025-2026

Course Code	**BNCK359**	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.

Suggested Learning Resources:

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 Books:

- 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

B.E. ELECTRONICS & COMMUNICATION ENGINEERING

DEPARTMENT OF HUMANITIES AND SOCIAL SCIENCES

Choice Based Credit System (CBCS)

SEMESTER – III

Music (0:0:2)

(Common to all Branches)

Academic Year 2025-2026

Course Code	**BMUK359**	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 (CognitiveDomain)

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

Suggested Learning Resources:

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 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.