BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

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

Avalahalli, Yelahanka, Bengaluru 560064

Bachelor of Engineering

Department of Electronics and Communication Engineering

III Semester Scheme and Syllabus
2022 Scheme – Autonomous
AY 2024-25, 2023 Batch

Approved in the BoS meeting held on 20.07.2024

Vision and Mission of the Department

Vision

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

Mission

1. Impart sound theoretical concepts and practical skills through innovative pedagogy

2. Promote Interdisciplinary Research

3. Inculcate Professional Ethics

Program Educational Objectives (PEOs)

1. Work as Professionals in the area of Electronics, Communication and Allied Engineering Fields.
2. Pursue Higher Studies and involve in Interdisciplinary Research Work.
3. Exhibit Ethics, Professional Skills and Leadership Qualities in their Profession.

Program Specific Outcomes (PSOs)

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

Program Outcomes (POs)

1. **Engineering Knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem Analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/Development of Solutions:** Design solutions for complex engineering problems and design system components or processes that

meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

4. **Conduct Investigations of Complex Problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern Tool Usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations
6. **The Engineer and Society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and Sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and Team Work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project Management and Finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long Learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

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(An Autonomous Institution, Affiliated to VTU Belagavi)
Avalahalli, Doddaballapur Main Road, Bengaluru, Karnataka – 560064

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

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

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

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

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

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

INTEGRATED PROFESSIONAL COMPETENCE COURSE (IPCC) COURSES **4 OR 3 CREDITS**						
Evaluation Type		**Internal Assessments (IAs)**	**Test/ Exam Marks Conducted for**	**Marks to be scaled down to**	**Min. Marks to be Scored**	**Evaluation Details**
Theory Component	CIE - Internal Assessment (IA) Tests	CIE – Test 1 (1.5 hr)	40	20	-	The sum of the two internal assessment tests will be **80 Marks** and the same shall be scaled down to **20 Marks**.
		CIE – Test 2 (1.5 hr)	40			
	CIE – CCA (Comprehensive Continuous Assessment)	CCA	10	10	-	Any one assessment method can be used from the list appended below.
	Total CIE Theory			**30**	**12**	
Practical Component	CIE - Practical		30	10	-	Each laboratory experiment is to be

					assessed for **30 Marks** using appropriate rubrics.
	CIE Practical Test	20	10	-	One test after all experiments to be conducted for **20 Marks**
	Total CIE Practical		**20**	**08**	
Total CIE Theory + Practical			**50**	**20**	
SEE		100	50	18	SEE exam is a theory exam, conducted for **100 Marks**, scored marks are scaled down to **50 Marks.**
CIE + SEE			**100**	**40**	
Note: The assessment of the laboratory component for the IPCC courses shall be restricted to CIE only.					

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

NON-IPCC COURSES **01 CREDIT – MULTIPLE CHOICE QUESTION TYPE**						
Evaluation Type		**Internal Assessments (IAs)**	**Test/ Exam Marks Conducted for**	**Marks to be scaled down to**	**Min. Marks to be Scored**	**Evaluation Details**
Continuous Internal Evaluation Component	CIE – IA Tests (MCQs)	CIE – Test 1 (1 hr)	40	40	-	The question paper pattern for this course shall be an **MCQ** of **1 or 2 Marks (s).** 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**, the 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**	

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

SEE	100	50	18	SEE is a theory exam, conducted for **100 Marks for 02 Hours duration**, scored marks are scaled down to **50 Marks.**
CIE + SEE		**100**	**40**	

COMPUTER AIDED ENGINEERING DRAWING (BCEDK103/BCEDK203)
3 CREDIT

Evaluation Type		Topics/ Modules	Computer Printout	Preparatory Sketch	Max Marks	Total Marks	Marks to be Scaled Down to	Min Marks to Pass
CIE	**Sketch Book and CAD Modelling**	Projection of Points	10	05	15	200	20	-
		Projection of Lines	10	10	20			
		Projection of Planes	20	15	35			
		Projection of Solids	40	20	60			
		Isometric Projections	20	15	35			
		Development of lateral surfaces	20	15	35			
	Test 1	Module 1 & 2	24	06	30	70	20	-
		Module 3	32	08	40			
	Test 2	Module 3	32	08	40	70		
		Module 4	24	06	30			
	CCA 1	Module 5	08	02	10	10	10	-
	CCA 2	Module 5	08	02	10			
CIE Total							**50**	**20**
SEE		Module 1 & 2	24	06	30	100	**50**	**18**
		Module 3	32	08	40			
		Module 4	24	06	30			
CIE + SEE							**100**	**40**

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

Learning Activities for CCAs:

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

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

CoE 21/09/2024

Dean - AA 21/09/24

21/9/2024

Principal

Copy To:

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

BMS INSTITUTE OF TECHNOLOGY & MANAGEMENT

(Autonomous Institution Affiliated to VTU, Belagavi)

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

Scheme of Teaching and Examinations – 2022 Scheme

Outcome-Based Education (OBE) and Choice Based Credit System (CBCS) AY 2024-2025, 2023 Batch

UG PROGRAM: ECE/ETE | **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 Engg. / Electronics & Telecommunication Engg.

Choice Based Credit System (CBCS)

Semester – III

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

(Common to ECE/ETE)

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

Course Code	**BMATEC301**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	3:0:0:0	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.

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

(RBT Levels: L1, L2 and L3)

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.

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

Module-4: Ordinary Differential Equations of Higher Order

Higher-order linear ODEs with constant coefficients - Inverse differential operator, problems. Linear differential equations with variable Coefficients-Cauchy's and Legendre's differential equations–Problems. Application of linear differential equations to L-C circuit and L-C-R circuit.

(RBT Levels: L1, L2 and L3) (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.

(RBT Levels: L1, L2 and L3) (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.

Text books:

1. **Ronald E. Walpole, Raymond H Myers, Sharon L Myers & Keying Ye** "Probability & Statistics for Engineers & Scientists", Pearson Education, 9th edition, 2017.
2. **Peter Bruce, Andrew Bruce & Peter Gedeck** "Practical Statistics for Data Scientists" O'Reilly Media, Inc., 2nd edition 2020.

Reference Books:

1. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons, 9 th Edition, 2006.
2. B. S. Grewal "Higher Engineering Mathematics", Khanna publishers, 44 th Ed., 2021.
3. G Haribaskaran "Probability, Queuing Theory & Reliability Engineering", Laxmi Publication, Latest Edition, 2006.
4. Irwin Miller & Marylees Miller, John E. Freund's "Mathematical Statistics with Applications" Pearson. Dorling Kindersley Pvt. Ltd. India, 8 th edition, 2014.
5. S C Gupta and V K Kapoor, "Fundamentals of Mathematical Statistics", S Chand and Company, Latest edition.
6. Robert V. Hogg, Joseph W. McKean & Allen T. Craig. "Introduction to Mathematical Statistics", Pearson Education 7 th edition, 2013.
7. Jim Pitman. Probability, Springer-Verlag, 1993.
8. Sheldon M. Ross, "Introduction to Probability Models" 11 th edition. Elsevier, 2014.
9. A.M. Yaglom and I. M. Yaglom, "Probability and Information". D. Reidel Publishing Company. Distributed by Hindustan Publishing Corporation (India) Delhi, 1983.
10. P. G. Hoel, S. C. Port and C. J. Stone, "Introduction to Probability Theory", Universal Book Stall, (Reprint), 2003.
11. S. Ross, "A First Course in Probability", Pearson Education India, 6 th Ed., 2002.
12. W. Feller, "An Introduction to Probability Theory and its Applications", Vol. 1, Wiley, 3rd Ed., 1968.
13. N.P. Bali and Manish Goyal, A Textbook of Engineering Mathematics, Laxmi Publications, Reprint, 2010.
14. Veerarajan T, Engineering Mathematics (for semester III), Tata McGraw-Hill, New Delhi, 2010.

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
Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning ● Programming Assignment ● Seminars

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Choice Based Credit System (CBCS)

Semester – III

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

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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 + 8-10 Lab slots	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 digitalsystems.
- 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	Understand the principles of combinational logic in digital circuits simplification
CO2	Apply the knowledge of combinational logic to design combinational circuits
CO3	Apply the knowledge of sequential logic to design sequential circuits
CO4	Understand the constructs and syntax of hardware description langiages to develop combinational and sequential circuits

Suggested Learning Resources:

Books

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

Suggested AAT's:

1. Simulate digital circuits for real time applications using any modern tool.

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Choice Based Credit System (CBCS)

SEMESTER – III

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

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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 + (8-10) Lab slots	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]

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.

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]

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]
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]

SL. NO	**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	Analyse the characteristics of BJTs and MOSFETs for small signals and amplification
CO2	Design of the MOSFET circuits for given functionality using the concept of device characteristics and working principles.
CO3	Analyse the linear opamp circuits, oscillators and timer circuits with different configurations using linear ICs
CO4	Apply the negative feedback concepts to realize the parameters of feedback amplifiers and active filters
CO5	Analyse the power electronic devices for switching amplification and power circuit operations.

Suggested Learning Resources:
Books 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
AAT:
Mini project on circuit implementation using the modern tools

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Choice Based Credit System (CBCS)

SEMESTER – III

Network Analysis (3:0:0) 3

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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:

CO1	Apply the knowledge of transformations and kirchhoffs circuit laws to solve the problems related to electric circuits.

CO2	Use the concept of network theorems to find the fundamental parameters of electric circuit.
CO3	Analyse the given electrical circuit to arrive at a suitable conclusion under transient conditions.
CO4	Analyse linear circuits and systems using the Laplace transforms.
CO5	Understand the concepts of two–port network parameters & resonance.

Suggested Learning Resources:

Books

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.

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Choice Based Credit System (CBCS)

SEMESTER – III

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

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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.

Sl.NO	**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	Design and analyze the BJT/FET amplifier and oscillator circuits.
CO2	Design and test Opamp circuits to realize the mathematical computations, DAC and precision rectifiers.
CO3	Design and test the combinational circuits for the given specifications.
CO4	Design and test the sequential logic circuits for the given functionality

Suggested Learning Resources:

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.

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SEMESTER – III

Electronic Devices (3:0:0) 3

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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)

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),

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)

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).

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).**

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

CO1	Understand 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	Understand fabrication techniques involved in the evolution of integrated circuits.

Suggested Learning Resources:

Books

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

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SEMESTER – III

Sensors and Instrumentation (3:0:0) 3

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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

Teaching-Learning Process (General Instructions)

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

- Lecture method(L) does not mean only traditional lecture method, but different type of teaching methods may be adopted to develop the outcomes.
- Encourage collaborative (Group)Learning in the class.
- Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking.
- Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
- Topics will be introduced in a multiple representation.
- Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
- Discuss how every concept can be applied to the real world-and when that's possible, it helps improve the students' understanding.
- Adopt Flipped class technique by sharing the materials/Sample Videos prior to the class and have discussions on the topic in the succeeding classes.

Module – 1

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

Module – 2

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

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)

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).

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).

Course Outcomes (Course Skill Set):

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

1. Understand the principle of transducers, manufacturing process and material properties required to model sensors.
2. Apply the principle of operation of electronic instrumentation and develop circuits for multi range Ammeters, Voltmeters and Bridges to measure passive component values and frequency.
3. Analyze the instrument characteristics and errors.
4. Design an electronic circuit using sensors and instrumentation.
5. Interpret the applications of sensors and instrumentation using case study material.

Suggested Learning Resources:

Books

1. "Sensors and Signal Conditioning", Ramon Pallas Areny, JohnG. 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.

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SEMESTER – III

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

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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).**

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).**

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).

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)

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:

Book

1. Carl Hamacher, Zvonko Vranesic, Safwat Zaky: Computer Organization, 5th Edition, 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.

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SEMESTER – III

Applied Numerical Methods (3:0:0:0) 3

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

Course Code	**BEC306D**	CIE Marks	50
Teaching Hours/Week (L:T:P:S)	3:0:0:0	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	03

Course Objectives:

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: Explain 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: Understand and apply the basic concepts related to solving problems by numerical differentiation and numerical integration.
CO5: Use appropriate numerical methods to study phenomena modelled as partial differential equations

Suggested Learning Resources: Books

Text Books:

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.

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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

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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 - Credit		

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%**
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

- 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

		Total marks for the course in each semester	**100 Marks**	marks sheet should be sent to the university and also to be made available at LIC visit.
		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 Engg. / Electronics & Telecommunication Engg.

Choice Based Credit System (CBCS)

SEMESTER - III

Lab VIEW Programming (0:0:2) 1

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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:

1. Understand LabVIEW to create data acquisition, analysis and display operations
2. Create user interfaces with charts, graph and buttons

3. Apply the programming structures and data types that exist in LabVIEW
4. Analyze various editing and debugging techniques.

BMS Institute of Technology and Management

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

Choice Based Credit System (CBCS)

SEMESTER – III

MATLAB Programming (1:0:0) 1

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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:

1. Gain proficiency in MATLAB syntax for performing arithmetic computations, manipulating arrays and matrices, and effectively utilizing built-in MATLAB functions.
2. 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.

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

Suggested Learning Resources:

Book

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

BMS Institute of Technology and Management

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

Choice Based Credit System (CBCS)

SEMESTER – III

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

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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:

1. Understand different data types in C++ and Importance of OOPS.
2. Write C++Programs using different operators, Control statements and Functions.
3. Apply the Object-oriented programming concepts in writing programs.
4. Analyze Object oriented programs to generate the expected output.
5. Design an object-oriented programming paradigm to develop solutions to real world problems

Suggested Learning Resources:

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.

BMS Institute of Technology and Management

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

Choice Based Credit System (CBCS)

Semester – III

IoT Applications (1:0:0) 1

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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

Course Objectives:

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	Understand the fundamentals of M2M communication and IoT
CO2	Apply the basics of protocols, networking to connect hardware devices of IoT network
CO3	Use the knowledge of platforms, design methodology, system management to establish the Internet of things
CO4	Analyze different case studies and applications of IoT

Textbook:

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

Reference Book:

Suggested Learning Resources:

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

BMS Institute of Technology and Management

Department of Humanities and Social Sciences

Choice Based Credit System (CBCS)

SEMESTER – III

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

(Common to all branches)

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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:

Books:

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

BMS Institute of Technology and Management

Department of Humanities and Social Sciences

Choice Based Credit System (CBCS)

SEMESTER – III

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

(Common to all Branches)

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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.

Textbooks

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

References

1. Tudor O Bompa,*" Periodization Training for Sports*", 1999, Human Kinetics, USA

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

BMS Institute of Technology and Management

Department of Humanities and Social Sciences

Choice Based Credit System (CBCS)

SEMESTER – III

Yoga (0:0:2)

(Common to all Branches)

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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.

Text books:

1. George Feuerstein: The yoga Tradition (Its history, literature, philosophy and practice.)
2. Sri Ananda: The complete Book of yoga Harmony of Body and Mind. (Orient paper Backs: vision Books Pvt. Ltd., 1982.
3. B.K.S Iyenkar: Light on the Yoga sutras of patanjali (Haper Collins Publications India Pvt.,Ltd., New Delhi.)
4. Science of Divinity and Realization of Self – Vethathiri Publication, (6-11) WCSC, Erode

Reference Book:

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

BMS Institute of Technology and Management

Department of Humanities and Social Sciences

Choice Based Credit System (CBCS)

SEMESTER – III

NCC (0:0:2)

(Common to all Branches)

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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.

Textbooks:

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

References:

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

BMS Institute of Technology and Management

Department of Humanities and Social Sciences

Choice Based Credit System (CBCS)

SEMESTER – III

Music (0:0:2)

(Common to all Branches)

(Effective from the academic year 2024-25) (2022 Scheme-2023 USN Batch)

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

CIE: 100 Marks

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

Textbooks

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

References

1. Lakshminarayana Subramaniam, Viji Subramaniam, "Classical Music of India: 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.

Department of Humanities and Social Sciences
Choice Based Credit System (CBCS)
SEMESTER – III

English Communications Skill I
(Common to all Branches, for Lateral Entry Diploma students)
(Effective from the academic year 2024-2025)

Course Code	BENGDIP1	CIE Marks	100
Teaching Hours/Week (L: T:P)	0:0:2 - NCMC	SEE Marks	-
Total Number of Lecture Hours	26	Total Marks	100

Course objectives:

This course will enable students to

1. Familiarise with basic English Grammar and Communication Skills in general.
2. Identify the nuances of phonetics, intonation and enhance pronunciation skills
3. Enhance English vocabulary and language proficiency for better communication skills.
4. Learn about Techniques of Information Transfer through presentation

Module – 1: Fundamentals of Communication

Introduction, Communication-an overview, Definition of communication, Features of successful professional communication, Importance of communication, Purpose of professional communication, Rule of critical and creative thinking in effective communication, Role of emotions in communication, Role of Inter-Cultural Communication, Different forms of communication, Communication network in an organization, Barriers to communication, Some remedies.

Non-verbal communication: Introduction, Body language, Paralinguistic features, Proxemics/ Space distance, Haptics. **4 Hours**

Module – 2: Grammar Essentials and Phonetics

Grammar: Essentials and Applications

Introduction, Parts of Speech, Articles and Prepositions, Modals, Sentences and their types, Subject-verb, Concord, using tenses, Moods of Verbs, Active passive voice, Direct indirect speech, Clause and its types, Using non-Finites.

Basic of Phonetics: Introduction, Reasons for incorrect pronunciations, received pronunciation, Misconceptions about sounds, Transcriptions, Problems of Indian English, Syllables, Word stress, How to transcribe, Weak forms, Intonation and rhythm, Difference between British American and Indian spoken English**.** **6 Hours**

Module – 3: Reading and Listening Skills

Reading skills: Introduction, need for developing efficient reading skills, Benefits of effective reading, Speed of reading, four basic steps to effective reading, overcoming common obstacles, Types, Approaches to efficient reading, Tips for effective reading, employing different reading skills, Understanding the authors point of view, Identifying the central idea, inferring lexical and contextual meaning, employing discourse analysis, Worked out passages.

Listening skills: Introduction, Listening is an art, Listening vs hearing, Poor vs effective listening, Advantages of good listening, Process of listening, Types of listening. Intensive listening vs extensive listening, Barriers to effective listening, five steps of active listening techniques for effective listening, Listening and not taking. **8 Hours**

Module – 4: Paragraphs and Precis Writing
Introduction, precise, Summary, Abstract, Synopsis, Paraphrasing, Art of condensation, Some working principles, Seven step ladder to writing an effective precis, Writing precise for given passages, Structure of a paragraph, Construction of a paragraph, Features of a paragraph, Descriptive writing techniques, Augmentative paragraph, Analytical paragraph. **4 hours**
Module – 5: Professional Presentations and Writing
Professional Presentations: Introduction, combating stage fright, preparing PPT slides, Describing objects, Situations and people, Individual and group presentations, Delivering JAMs **Essays, Letters, Resumes:** Introduction, Types of essays, Characteristic features of an essay, Stages in essay writing, Components comprising an essay, Essay writing-guiding principles, Business letters and resumes- Importance, Elements of structure, Layout. Business letters- Elements of style, Types of business letters, Resume preparation. **4 Hours**
Course Outcomes: The students will be able to: 1. Understand and apply basic English grammar for effective communication. 2. Identify the nuances of phonetics, intonation, and enhance pronunciation skills. 3. Understand and use all types of English vocabulary and language proficiency. 4. Enhance their knowledge about techniques of information transfer through presentations.
Textbooks 1. Meenakshi Raman and Sangeeta Sharma, Technical Communication Principles and Practice, Oxford Publications, 3rd Edition, 2015 2. Sanjay Kumar and Pushpa Lata, Communication Skills, Oxford University Press, 3. A Textbook of English Language Communication Skills, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022. References 1. Gajendra Singh Chauhan, Technical Communication Cengage Learning India Pvt Limited, Latest Revised Edition, 2019 2. Michael Swan, Practical English Usage, Oxford University Press, 2016 **3.** N.P.Sudharshana and C.Savitha, English for Engineers, Cambridge University Press, 2018