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 Electrical & Electronics Engineering

III and IV Semester Scheme and Syllabus
2022 Scheme - Autonomous

Approved in the BoS meeting held on 12.10.2023

Vision and Mission of the Department

Vision of the Department:
To emerge as one of the finest Electrical & Electronics Engineering Departments facilitating the development of competent professionals, contributing to the betterment of society.

Mission of the Department:
Create a motivating environment for learning Electrical Sciences through teaching, research, effective use of state of the art facilities and outreach activities.

Program Educational Objectives (PEOs)

Graduates of the program will,

PEO1	Have successful professional careers in Electrical Sciences, and Information Technology enabled areas and be able to pursue higher education.
PEO2	Demonstrate ability to work in multidisciplinary teams and engage in lifelong learning.
PEO3	Exhibit concern for environment and sustainable development.

After the successful completion of the course, the graduate will be able to,

PO1: Engineering knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2: 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.
PO3: 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.
PO4: 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.
PO5: 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.
PO6: 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.
PO7: 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.
PO8: Ethics	Apply ethical principles and commit to professional ethics and

	responsibilities and norms of the engineering practice.
PO9: Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10: 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.
PO11: 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.
PO12: 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.

Program Specific Outcomes (PSOs)

The Graduates of the Program will be able to

PSO1:	**Analyze and design electrical power systems.**
PSO2:	**Analyze and design electrical machines.**
PSO3:	**Analyze and design power electronic controllers for industrial drives.**
PSO4:	**Analyze and design analog and digital electronic systems.**

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Avalahalli, Doddaballapur Main Road, Bengaluru – 560064

Date: 16.10.2023

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

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

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

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

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

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

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

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

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

220B 4.2 Continuous Internal Evaluation (CIE)

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

i) Assignments (Individual and /or Group)

ii) Seminars

iii) Oral/ Online Quizzes

iv) Group Discussions

v) Case studies/ Case lets

vi) Practical orientation on Design Thinking, Creativity & Innovation

vii) Participatory & Industry – integrated learning

viii) Practical activities/ problem-solving exercises

ix) Class presentations

x) Analysis of Industry/ Technical/ Business Reports

xi) Reports on Guest Lectures/ Webinars/ Industrial Visits

xii) Industrial/ Social/ Rural projects

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

xiv) Any other academic activity

CoE 18/10/2023

Dean (AA) 18.10.2023

Principal 18/10

Scheme of IV Semester

BMS INSTITUTE OF TECHNOLOGY AND MANAGEMENT

(Autonomous Institute affiliated to VTU)

Scheme of Teaching and Examination: Effective from AY 2022–23Choice Based Credit System (CBCS)

UG PROGRAM: Department of Electrical and Electronics Engineering (EEE) — **Semester: IV**

Sl. No	Course Category	CourseCode	Course Title	Teaching Dept.	Teaching Hours /Week				Credits	Examination			
					L	T	P	PW		Duration in Hours	CIE Marks	SEE Marks	Total Marks
1	PCC	BEE401	Electric Motors	EE	3	0	0	0	3	3	50	50	100
2	PCC	BEE402	Transmission and Distribution	EE	4	0	0	0	4	3	50	50	100
3	IPCC	BEE403	Microcontrollers	EE	3	0	2	0	4	3	50	50	100
4	PCCL	BEEL404	Electric Motors lab	EE	0	0	2	0	1	3	50	50	100
5	ESC	BEE405x	ESC/ETC/PLC	EE	3	0	0	0	3	3	50	50	100
6	AEC/SEC	BEE456x	Ability Enhancement Course/Skill Enhancement Course- IV	EE	0	0	2	0	1	2	50	50	100
7	BSC	BBOK407	Biology For Engineers	CHE	3	0	0	0	3	3	50	50	100
8	UHV	BUHK408	Universal human values course	EEE	1	0	0	0	1	1	50	50	100
9	MC	BNSK459	National Service Scheme (NSS)	NSS Coordinator	0	0	2	0	0	2	100	--	100
		BPEK459	Physical Education (PE) (Sports andAthletics)	PE Director									
		BYOK459	Yoga	Yoga Teacher									
		BNCK459	NCC	NCC Coordinator									
		BMUK459	Music	Music Teacher									
TOTAL									**20**		**500**	**400**	**900**

Engineering Science Course (ESC/ETC/PLC)	
Course Code	**Course Title**
BEE405A	Electrical Power Generation and Economics
BEE405B	Op-Amp and LIC
BEE405C	Engineering Materials
BEE405D	Object Oriented Programming
BEE405E	Operation Research

Ability Enhancement Course -III	
Course Code	**Course Title**
BEEL456A	Basics of VHDL Lab
BEEL456B	Sci Lab / MATLAB for Electrical and Electronic Measurements
BEEL456C	PCB Design Laboratory
BEEL456D	Arduino & Raspberry PI Based Projects

IV SEMESTER SYLLABUS

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Electric Motors (3:0:0) 3

(Effective from the academic year 2022-23)

Course Code	BEE401	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:

- To study the constructional features of Motors and select a suitable drive for specificApplication.
- To study the constructional features of Three Phase and Single-phase induction Motors.
- To study different test to be conducted for the assessment of the performance characteristics of motors.
- To study the speed control of motor by different methods.
- Explain the construction and operation of Synchronous motor and special motors.

Module – 1

DC Motors:

Construction and working principle. Back E.M.F and its significance, Torque equation, Classification, Characteristics of shunt and series motors, Speed control of shunt motor (Armature and Flux Control Methods), Application of DC motors.

Losses and Efficiency- Losses in DC motors, power flow diagram, efficiency, condition for maximum efficiency.

(8 Hours)

Module – 2

Testing of DC Motors:

Direct & indirect methods of testing of DC motors- Load Test on DC Shunt Motor, Swinburne's test, Hopkinson's Test, Field test, merits and demerits of tests. (numerical as applicable)

Other Motors: Permanent magnet DC motors, Servo Motors, BLDC Motors**.**

(8 Hours)

Module – 3

Three Phase Induction Motors: Concept and generation of rotating magnetic field, Principle of operation, construction; squirrel-cage, slip-ring. Slip and its significance,Torque equation, torque-slip characteristic, Maximum torque, (numerical as applicable)

(8 Hours)

Moule-4

Performance of Three-Phase Induction Motor: Phasor diagram of induction motor on no-load and on load, equivalent circuit, losses, efficiency, No-load and blocked rotor tests. Cogging and crawling. High torque rotors-double cage and deep rotor bars. Induction motor working as induction generator. (numerical as applicable)

Starting and Speed Control of Three-Phase Induction Motors: Necessity of starter. Direct on line, Star-Delta, and autotransformer starting. Rotor resistance starting. Speed control by frequency. **(8 Hours)**

Moule-5

Single-Phase Induction Motor:

Double revolving field theory and principle of operation. Construction and operation of split-phase, capacitor start and capacitor run and shaded pole motors.

Principle of operation, methods of starting, V and inverted V curves, applications of synchronous machines.

(8 Hours)

Course outcome (Course Skill Set)

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

CO1: Illustrate the construction and operation of AC and DC motors.

CO2: . Apply different starting mechanisms and control the AC and DC motors using different methods

CO3: Select AC and DC Motors observing the operational characteristics of AC and DC motors.

CO4: Examine the performance of AC and DC Motors through various testing methods.

Text Books:

1. Electric Machines, D. P. Kothari, I. J. Nagrath, McGraw Hill, 4th edition, 2011.
2. Theory of Alternating Current Machines, Alexander Langsdorf, McGraw Hill, 2ndEdition, 2001.
3. Electric Machines, AshfaqHussain, DhanpatRai& Co, 2nd Edition, 2013.

Reference Books:

1. Electrical Machines, Drives and Power systems, Theodore Wildi, Pearson, 6th Edition,2014
2. Electrical Machines, M.V. Deshpande, PHI Learning, 2013
3. Electric Machinery and Transformers, Bhag S. Guru at el, Oxford University Press, 3rdEdition, 2012
4. Electric Machinery and Transformers, Irving Kosow, Pearson, 2nd Edition, 2012
5. Principles of Electric Machines and power Electronic, P.C.Sen, Wiley, 2nd Edition, 2013
6. Electrical Machines, R.K. Srivastava, Cengage Learning, 2nd Edition, 2013

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Transmission and Distribution (4:0:0) 4

(Effective from the academic year 2022-23)

Course Code	BEE402	CIE Marks	50
Teaching Hours/Week (L:T:P)	4:0:0	SEE Marks	50
Total Number of Contact Hours	50	Exam Hours	3

Course objectives:

- To understand the structure of electrical power system, its components, advantages of high voltage AC and DC transmission, various conductors used for transmission, sag and its calculation.
- To understand various types of insulators, methods to improve string efficiency.
- To understand the various transmission line parameters, their effects on transmission of electricity.
- To understand the various parameters that influences the performance of transmission line and to calculate performance parameters of various transmission lines.
- To understand corona and its effects, underground cables, its construction, classification, limitations and specifications.
- To understand and evaluate different types of distribution systems and Busbar schemes.

Module – 1

Introduction to Power System:

Structure of electric power system: generation, transmission and distribution. Comparison between AC & DC Transmission, Advantages of higher voltage transmission: HVAC, EHVAC, UHVAC and HVDC.

Overhead Transmission Lines:

A brief introduction to types of supporting structures and line conductors- Conventional conductors; Aluminum Conductor steel reinforced (ACSR), All – aluminum alloy conductor (AAAC) and All –aluminum conductor (AAC). High temperature conductors; Thermal resistant aluminum alloy (ATI),Super thermal resistant aluminum alloy (ZTAI), Gap type thermal resistant aluminum alloy conductor steel reinforced (GTACSR), Gap type super thermal resistant aluminum alloy conductor steel reinforced (GZTACSR). Bundle conductor and its advantages. Importance of sag, Sag calculation – supports at same and different levels, effect of wind and ice. Line vibration and vibration dampers. Overhead line protection against lightening; ground wires

Overhead Line Insulators:

A brief introduction to types of insulators, material used- porcelain, toughened glass and polymer (composite). Potential distribution over a string of suspension insulators. String efficiency, Methods of increasing string efficiency. Arcing horns

(8 Hours)

Module – 2

Line Parameters: Introduction to line parameters- resistance, inductance and capacitance. Calculation of inductance of single phase and three phase lines with equilateral spacing, unsymmetrical spacing, double circuit and transposed lines. Inductance of composite – conductors, geometric mean radius (GMR) and geometric mean distance (GMD). Calculation of capacitance of single phase and three phase lines with equilateral spacing, unsymmetrical spacing, double circuit and transposed lines. Capacitance of composite – conductor, geometric mean radius (GMR) and geometric mean distance (GMD). Advantages of single circuit and double circuit lines.

(8 Hours)

Module – 3

Performance of Transmission Lines:
Classification of lines – short, medium and long. Current and voltage relations, line regulation and Ferranti effect in short length lines, medium length lines considering Nominal T and nominal circuits, and long lines considering hyperbolic form equations. Equivalent circuit of a long line. ABCD constants in all cases.

(8 Hours)

Moule-4

Corona: Phenomena, disruptive and visual critical voltages, corona loss. Advantages and disadvantages of corona. Methods of reducing corona.

Underground Cable: Types of cables, constructional features, insulation resistance, thermal rating, charging current, grading of cables – capacitance and inter-sheath. Dielectric loss. Measurement of Capacitance of Single Core and Three Core Cable.

(8 Hours)

Moule-5

Distribution: Primary AC distribution systems – Interconnection-Feeders, distributors and service mains. Radial feeders, parallel feeders, loop feeders and interconnected network system. Secondary AC distribution systems – Three phase 4 wire system and single phase 2 wire distribution. Effect of disconnection of neutral in a 3 phase four wire system.

Sub Station:
Classification of Substations: Indoor and Outdoor, Selection of Site for Substation, Busbar Arrangement Schemes and Single Line Diagrams of Substations.

(8 Hours)

Course outcome (Course Skill Set)

At the end of the course, the student will be able to:
Co1: Explain the structure of electrical power system, its components, advantages of high voltage AC and DC transmission, various conductors used for transmission, sag and its calculation.
Co2: Explain various types of insulators and methods to improve string efficiency.
CO3: Explain the various transmission line parameters, their effects on transmission of electricity.
CO4: Evaluate the parameters that influence the performance of transmission line and to calculate performance parameters of various transmission lines.
CO5: Explain corona and its effects, underground cable, its construction and types and substations
CO6: Evaluate different types of distribution systems.

Text Books:

1. A Course in Electrical Power, Sony Gupta and Bhatnagar, Dhanpat Rai
2. Principles of Power System, V.K. Mehta, Rohit Mehta, S. Chand, 1st Edition 2013

Reference Books:

1. Power System Analysis and Design, J. Duncan Gloverat el, Cengage Learning, 4th Edition 2008
2. Electrical power Generation, Transmission and Distribution, S.N. Singh, PHI, 2nd Edition,2009
3. Electrical Power, S.L.Uppal, Khanna Publication
4. Electrical Power Systems, C. L. Wadhwa, New Age, 5th Edition, 2009
5. Electrical Power Systems, Ashfaq Hussain, CBS Publication
6. Electric Power Distribution, A.S. Pabla, McGraw-Hill, 6th Edition,2012

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Microcontrollers (3:0:2) 4

(Effective from the academic year 2022-23)

Course Code	BEE403	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:

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

1. To explain the internal organization and working of Computers, microcontrollers and embeddedprocessors.
2. Compare and contrast the various members of the 8051family.
3. To explain the registers of the 8051 microcontroller, manipulation of data using registers and MOV instructions.
4. To explain in detail, the execution of 8051 Assembly language instructions and data types
5. To explain loop, conditional and unconditional jump and call, handling and manipulation of I/Oinstructions.
6. To explain different addressing modes of 8051, arithmetic, logic instructions, and programs.
7. To explain develop 8051C programs for time delay, I/O operations, I/O bit manipulation, logic.
8. To explain writing assembly language programs for data transfer, arithmetic, Boolean and logical instructions.
9. To explain writing assembly language programs for code conversions.
10. To explain writing assembly language programs using subroutines for generation of delays, counters,configuration of SFRs for serial communication and timers.
11. To perform interfacing of stepper motor and DC motor for controlling the speed.
12. To explain generation of different waveforms using DAC interface.

Module – 1

8051 Microcontroller Basics:

Inside the Computer, Microcontrollers and Embedded Processors, Block Diagram of 8051, PSW and Flag Bits, 8051 Register Banks and Stack, Internal Memory Organization of 8051, IO Port Usage in 8051, Types of Special Function Registers and their uses in 8051, Pins of 8051. Memory Address Decoding, 8051 Interfacing with External ROM And RAM. 8051 Addressing Modes.

(8 Hours)

Module – 2

Assembly Programming and Instruction of 8051:

Introduction to 8051 assembly programming,Assembling and running an 8051 program, Data types and Assembler directives Arithmetic, logic instructions and programs, Jump, loop and call instructions, IO port programming. **(8 Hours)**

Module – 3

8051 Programming in C:

Data types and time delay in 8051C, IO programming in 8051C, Logic operations in 8051 C, Data conversion program in 8051 C, accessing code ROM space in 8051C, Data serialization using 8051C.

8051 Timer Programming in Assembly and C:

Programming 8051 timers, Counter programming, Programming timers 0 and 1 in 8051 C.

(8 Hours)

Moule-4

8051 Serial Port Programming in Assembly and C: Basics of serial communication, 8051 connectionsto RS232, 8051 serial port programming in assembly, serial port programming in 8051 C.

8051 Interrupt Programming in Assembly and C: 8051 interrupts, Programming timer, external hardware, serial communication interrupt, Interrupt priority in 8051/52, Interrupt programming in C.

(8 Hours)

Moule-5

Interfacing:
LCD interfacing, Keyboard interfacing.

ADC, DAC and Sensor Interfacing:

ADC 0808 interfacing to 8051, DAC interfacing.

Motor Control: Relay, PWM, DC and Stepper Motor:

Relays and opto isolators, stepper motorinterfacing, DC motor interfacing and PWM.

8051 Interfacing with 8255:
Programming the 8255, 8255 interfacing, C programming for 8255.

(8 Hours)

PRACTICAL COMPONENT OF IPCC

Sl. No	Experiments (to be carried out using discrete components)
Note: For the experiments 1 to 7, 8051 assembly programming is to be used.	
1	Arithmetic instructions: Addition, subtraction, multiplication and division. Square using MATLAB/simulink.
2	Data transfer – Program for block data movement, sorting, exchanging, finding largest element in an array.
3	Up/Down BCD/ Binary Counters
4	Boolean and logical instructions (bit manipulation).
5	Code conversion programs – BCD to ASCII, ASCII to BCD, ASCII to decimal, Decimal to ASCII, Hexa.
6	Programs to generate delay, Programs using serial port and on-chip timer/counters.
Note: Single chip solution for interfacing 8051 is to be with C Programs for the following experiments.	
7	Simulate and test a PWM controlled DC motor using Simscape.
8	Stepper motor interface for direction and speed control.

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

CO1: Understand the 8051 architecture, registers, internal memory organization, addressing modes, instruction sets of 8051, accessing data and I/O port programming, serial data and interrupt programing.

CO2: Develop 8051C programs for time delay, I/O operations, I/O bit manipulation, logic and arithmetic operations, data conversion and timer/counter programming.

CO3: Develop 8051 programs for serial datacommunication and interrupt programming.

CO4: Program 8051 to work with external devices for DAC, Stepper motor control, DC motor control

Text Books

1. The 8051 Microcontroller and Embedded Systems Using Assembly and C, Muhammad Ali Mazadi, Pearson, 2nd Edition, 2008.
2. The 8051 Microcontroller, Kenneth Ayala, Cengage, 3rd Edition, 2005.
   Microcontrollers: Architecture, Programming, Interfacing and System Design, Raj Kamal, Pearson, 1st Edition, 2012.

Web links and Video Lectures (e-Resources):

- NPTEL course on 8051 microcontrollers:**https://nptel.ac.in/courses/108105102**
- You tube videos on 8051 microccontrollers
  8051 programming online course: Complete 8051 Microcontroller Programming Course | Udemy

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Electric Motors lab (0:0:2) 1

(Effective from the academic year 2022-23)

Course Code	BEEL404	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	3

Course objectives:

1. To perform tests on DC Machines to determine their characteristics.
2. To study the different control methods for DC Motors.
3. To conduct test for pre-determination of the performance characteristics of DC Machines.
4. To conduct load test on single-phase and three-phase Induction Motor.
5. To conduct test on Induction Motor to determine performance characteristics.
6. To conduct test on synchronous motor to draw performance curves.

List of Experiments

Sl.NO	Experiments
1	Load test on DC shunt motor to draw speed–torque and horse power–efficiency characteristics.
2	Speed control of DC shunt motor by armature and field control methods.
3	Swinburne's Test on DC shunt motor.
4	Regenerative (Hopkinson's) test on DC shunt machines.
5	Load test on three phase induction motor.
6	No-load and Blocked rotor test on three phase induction motor to draw (i) equivalent circuit and (ii) circle diagram. Determination of performance parameters at different load conditions.
7	Speed control of three phase induction motor.
8	Load test on single phase induction motor to draw output versus torque, current, power and efficiencycharacteristics.
9	Analyze current and load torque of DC Shunt Motor using Simscape
10	Model 3-phase induction motor using MATLAB and Simulink

Course outcomes (Course Skill Set):

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

CO1: Perform tests on DC and AC Machines to determine their characteristics.

CO2: Control the speed of AC and DC Motors using different methods.

CO3: Pre-determine the performance of AC and DC Machines.

CO4: Model AC and DC Motors using Simulation Tool and analyze the performance

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Electrical Power Generation and Economics (3:0:0) 3

(Effective from the academic year 2022-23)

Course Code	BEE405A	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:

- To understand the basics of hydroelectric power plant, merits and demerits of hydroelectric power plants, site selection, arrangement and elements of hydroelectric plant.
- To understand the working, site selection and arrangement of Steam, Diesel and Gas Power Plants.
- To understand the working, site selection and arrangement of Nuclear Power Plants.
- To understand importance of different equipment's in substation, Interconnection of power stations and different types of grounding.
- To understand the economics of power generation.

Module – 1

Hydroelectric Power Plants:

Hydrology, run off and stream flow, hydrograph, flow duration curve, Mass curve, reservoir capacity, dam storage. Hydrological cycle, merits and demerits of hydroelectric power plants, Selection of site. General arrangement of hydel plant, elements of the plant, Classification of the plants based on water flow regulation, water head and type of load the plant has to supply. Water turbines – Pelton wheel, Francis, Kaplan and propeller turbines. Characteristic of water turbines Governing of turbines, selection of water turbines

(8 Hours)

Module – 2

Steam Power Plants:

Introduction, Efficiency of steam plants, Merits and demerits of plants, selection of site. Working of steam plant, Power plant equipment and layout, Steam turbines, Fuels and fuel handling, Fuel combustion and combustion equipment, Coal burners, Fluidized bed combustion.

Diesel Power Plant:

Introduction, Merits and demerits, selection of site, elements of diesel power plant, applications.

Gas Turbine Power Plant:

Introduction Merits and demerits, selection of site, Fuels for gas turbines, Elements of simple gas turbine power plant, Methods of improving thermal efficiency of a simple gas power plant, Closed cycle gas turbine power plants. Comparison of gas power plant with steam and diesel power plants.

(8 Hours)

Module – 3

Nuclear Power Plants:

Introduction, Economics of nuclear plants, Merits and demerits, selection of site, Nuclear reaction, Nuclear fission process, Nuclear chain reaction, Nuclear energy, Nuclear fuels, Nuclear plant and layout, Nuclear reactor and its control, Classification of reactors, power reactors in use, Effects of nuclear plants, Disposal of nuclear waste and effluent, shielding.

(8 Hours)

Moule-4

Substations:

Introduction to Substation equipment; Transformers, High Voltage Fuses, High Voltage Circuit

Breakers and Protective Relaying, High Voltage Disconnect Switches, Lightning Arresters, High Voltage Insulators and Conductors, Voltage Regulators, Storage Batteries, Reactors, Capacitors, Measuring Instruments, and power line carrier communication equipment. Classification of substations – indoor and outdoor, Selection of site for substation, Bus-bar arrangement schemes and single line diagrams of substations. Interconnection of power stations. Introduction to gas insulated substation, Advantages and economics of Gas insulated substation.

Grounding:

Introduction, Difference between grounded and ungrounded system. System grounding – ungrounded, solid grounding, resistance grounding, reactance grounding, resonant grounding. Earthing transformer. Neutral grounding and neutral grounding transformer.

(8 Hours)

Moule-5

Economics:

Introduction, Effect of variable load on power system, classification of costs, Cost analysis. Interest and Depreciation, Methods of determination of depreciation, Economics of Power generation, different terms considered for power plants and their significance, load sharing. Choice of size and number of generating plants.

Tariffs, objective, factors affecting the tariff, types. Types of consumers and their tariff.

Power factor, disadvantages, causes, methods of improving power factor, Advantages of improved power factor, economics of power factor improvement and comparison of methods of improving the power factor. Choice of equipment**.**

(8 Hours)

Course outcome (Course Skill Set)

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

1. Explain the basics of hydroelectric power plant, merits and demerits of hydroelectric power plants, site selection, arrangement and elements of hydroelectric plant.
2. Explain the working, site selection and arrangement of Steam, Diesel and Gas Power Plants.
3. Explain the working, site selection and arrangement of Nuclear Power Plants.
4. Explain the importance of different equipment's in substation, Interconnection of power stations and different types of grounding. Explain the economics of power generation.

Text Books

1. Power Plant Engineering, P.K. Nag, Mc Graw Hill, 4th Edition, 2014
2. Generation of Electrical Energy, B.R.Gupta, S. Chand, 2015
3. Electrical power Generation, Transmission and Distribution, S.N. Singh, PHI, 2nd Edition, 2009

Reference Books

1. A Course in Power Systems, J.B. Gupta, Katson, 2008
2. Electrical Power Distribution Systems, V. Kamaraju, McGrawHill, 1st Edition, 2009
3. A Text Book on Power SystemEngineering, A. Chakrabarti, et al, Dhanpath Rai, 2nd Edition, 2010
4. Electrical Distribution Engineering, Anthony J. Pansini, CRC Press, 3rd Edition, 2006
5. Electrical Distribution Systems, Dale R PatrickEt al, CRC Press, 2nd Edition, 2009

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

OpAmp and LIC (3:0:0) 3

(Effective from the academic year 2022-23)

Course Code	BEE405B	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:

- To understand the basics of Linear ICs such as Op-amp, Regulator, Timer & PLL.
- To learn the designing of various circuits using linear ICs.
- To use these linear ICs for specific applications.
- To understand the concept and various types of converters.
- To use these ICs in Hardware projects.

Module – 1

Operational Amplifiers:

Introduction, Block diagram representation of a typical Op-amp, schematic symbol, characteristics of an Op-amp, ideal op-amp, equivalent circuit, ideal voltage transfer curve, open loop configuration, differential amplifier, inverting & non –inverting amplifier, Op-amp with negative feedback; voltage series feedback amplifier - gain, input resistance, output resistance, voltage shunt feedback amplifier - gain, input resistance, output resistance.

General Linear Applications:

D.C. & A.C. amplifiers, peaking amplifier, summing, scaling & averaging amplifier, inverting and non-inverting configuration, differential configuration, instrumentation amplifier

(8 Hours)

Module – 2

Active Filters:

First & Second order high pass & low pass Butterworth filters, higher order filters, Band pass filters, Band reject filters & all pass filters.

DC Voltage Regulators:

Voltage regulator basics, voltage follower regulator, adjustable output regulator, LM317 & LM337 Integrated circuits regulators.

(8 Hours)

Module – 3

Signal Generators:

Working and derivation of frequency of oscillation for Phase shift oscillator, Wien bridge oscillator, square wave generator, saw tooth wave generator, triangular wave generator, and rectangular wave generator.

Comparators & Converters:

Basic comparator, zero crossing detector, inverting & non-

Inverting Schmitt trigger circuit, voltage to current converter with grounded load, current to voltage converter.

(8 Hours)

Moule-4

Signal Processing Circuits:

Precision half wave & full wave rectifiers, limiting circuits, clamping circuits, peak detectors, sample & hold circuits.

A/D & D/A Converters: Basics, R–2R D/A Converter, Integrated circuit 8 bit D/A, successive approximation ADC, linear ramp ADC, dual slope ADC, digital ramp ADC.

(8 Hours)

Moule-5

Phase Locked Loop (PLL):
Basics PLL, components, performance factors, applications of PLL IC565. **Timer:** Internal architecture of IC 555 timer, Monostable & Astable-multivibrator and applications

(8 Hours)

Course outcome (Course Skill Set)

At the end of the course, the student will be able to:
CO1: Explain the basics of linear ICs.
CO2: Analyse circuits using Linear ICs.
CO3: Design circuits using linear ICs.
CO4: Demonstrate the application of Linear ICs.

Text Books

1. Op-Amps and Linear Integrated Circuits, Ramakant A Gayakwad, Pearson, 4th Edition, 2015
2. Operational Amplifiers and Linear ICs, David A. Bell, Oxford, 3rd Edition, 2011
3. Linear Integrated Circuits, S. Salivahanan, et.al., Wiley India, 2013
4. Op-Amps and Linear Integrated Circuits, Concept and Application, James M Fiore, Cengage, 2009
5. NPTEL course on opamps: https://nptel.ac.in/courses/108108114

You tube videos on opamps and Linear Integrated Circuits.

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Engineering Materials (3:0:0) 3

(Effective from the academic year 2022-23)

Course Code	BEE405C	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:

- To understand the free electron theory of conduction in metals.
- To understand the polarization under static fields, behavior of dielectrics in alternatingfields, Inorganic materials, organic materials), resins and varnishes, liquid insulators.
- To understand the mechanism of conduction in semiconductors.
- To understand the magnetic materials, their classification and magneto materials.

Module – 1

THEORY OF METALS:

Free electron theory of metals: Thermionic Emission, Schottky Effect. Contact Potential. CRYSTALLINE STRUCTURE: Simple cubic structure, Body centered cubic, Face centered cubic. Band Theory of Solids. Effective mass of Electron. Thermal Velocity of Electron at equilibrium. Electron mobility, conductivity and resistivity.

(8 Hours)

Module – 2

DIELECTRICS:

Dielectric, polarization under static fields- electronic ionic and dipolar polarizations, behavior of dielectrics in alternating fields, Factors influencing dielectric strength and capacitor materials. Insulating materials, complex dielectric constant, dipolar relaxation and dielectric loss.

(8 Hours)

Module – 3

INSULATING MATERIALS: Inorganic materials (mica, glass, porcelain, asbestos), organic materials (paper, rubber, cotton silk fiber, wood, plastics and bakelite), resins and varnishes, liquid insulators(transformer oil) gaseous insulators (air, SF6 and nitrogen) and ageing of insulators.

(8 Hours)

Moule-4

SEMICONDUCTORS:

Mechanism of conduction in semiconductors, density of carriers in intrinsic semiconductors, the energy gap, types of semiconductors. Hall effect, compound semiconductors, basic ideas ofamorphous and organic semiconductors.

(8 Hours)

Moule-5

Magnetic materials:

Magnetic materials: Classification of magnetic materials- origin of permanent magnetic dipoles, ferromagnetism, Magnetic Domains: Domain structure, Domain Wall motion, Hysteresis loop, Eddy current losses, Demagnetization, hard and soft magnetic materials, magneto materials used in electrical machines, instruments and relays. **(8 Hours)**

Course outcomes (Course Skill Set):

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

1. Explain the free electron theory of conduction in metals.
2. Explain the polarization under static fields, behavior of dielectrics in alternating fields, Inorganic materials, organic materials,), resins and varnishes, liquid insulators.
3. Explain the mechanism of conduction in semiconductors.
4. Explain the magnetic materials, their classification and magneto materials.

Text Books

1. Bhadra Prasad Pokharel and Nava Raj Karki,"Electrical Engineering Materials", Sigma offset Press,Kamaladi, Kathmandu, Nepal,2004.
2. R.C. Jaeger, "Introduction to Microelectronic Fabrication- Volume IV", Addison Wesley publishing Company,Inc., 1988.
3. Introduction to Electrical Engineering Materials 4th Edn. 2004 Edition by Indulkar C, S. Chand &Company Ltd-New Delhi.
4. Electrical and Electronic Engineering Materials by SK Bhattacharya, Khanna Publishers, New Delhi.

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Object Oriented Programming (3:0:0) 3

(Effective from the academic year 2022-23)

Course Code	BEE405D	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

- To get a clear understanding of object-oriented concepts.
- To understand object-oriented programming through C++

Module – 1

Overview:

Why Object-Oriented Programming in C++ - Native Types and Statements –Functions andPointers Implementing ADTs in the Base Language.

(8 Hours)

Module – 2

BASIC CHARACTERISTICS OF OOP:

Data Hiding and Member Functions- Object Creation and Destruction- Polymorphism data abstraction: Iterators and Containers.

(8 Hours)

Module – 3

ADVANCED PROGRAMMING:

Templates, Generic Programming, and STL-Inheritance-Exceptions-OOP Using C++.

(8 Hours)

Moule-4

OVERVIEW OF JAVA:

Data types, variables and arrays, operators, control statements, classes, objects, methods – Inheritance

(8 Hours)

Moule-5

EXCEPTION HANDLING:

Packages and Interfaces, Exception handling, Multithreaded programming, Strings, Input/Output

(8 Hours)

Course outcome (Course Skill Set)

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

1. Discuss the basic Object Oriented concepts.
2. Develop applications using Object Oriented Programming Concepts.
3. Implement features of object oriented programming to solve real world problems.

Text Books:

1. Ira Pohl, “Object-Oriented Programming Using C++”, Pearson Education Asia, 2003.
2. H.M.Deitel, P.J.Deitel, "Java : how to program", Fifth edition, Prentice Hall of India private limited, 2003.

Reference Books

1. Herbert Schildt, "The Java 2: Complete Reference", Fourth edition, TMH, 2002
2. Bjarne Stroustrup, “The C++ Programming Language”, Pearson Education, 2004.
3. Stanley B. Lippman and Josee Lajoie , “C++ Primer”, Pearson Education, 2003.

K.R.Venugopal, Rajkumar Buyya, T.Ravishankar, "Mastering C++", TMH, 2003.

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

BASICS OF VHDL LAB (0:0:2) 1

(Effective from the academic year 2022-23)

Course Code	**BEE456A**	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	2

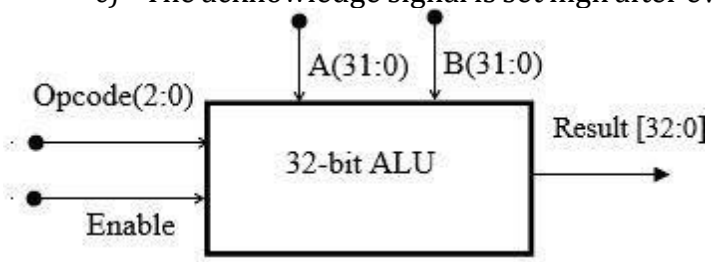
Course objectives:

This course enables students to:

- Along with prescribed hours of teaching –learning process, provide opportunity to perform the experiments/programmes at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.
- Provide unhindered access to perform whenever the students wish.
- Vary different parameters to study the behaviour of the circuit without the risk of damaging equipment/device or injuring themselves.

List of Experiments

Note: Programming can be done using any compiler. Download the programs on a FPGA/CPLD board and performance testing may be done using 32 channel pattern generator and logic analyser, apart fromverification by simulation with tools such as Altera/ModelSim or equivalent

Sl. NO	Experiments
1	Write Verilog program for the following combinational design along with test bench to verifythe design: a) 2 to 4 decoder realization using NAND gates only (structural model) b) 8 to 3 encoder with priority encoder and without priority encoder (behavioral model) c) 8 to 1 Multiplexer using case statement and if statement **d)** 4 bit binary to gray code converter using 1 bit gray to binary converter 1 bit adder andsubtractor.
2	Model in Verilog for a full adder and add functionality to perform logical operations of XOR,XNOR, AND and OR gates. Write test bench with appropriate input patterns to verify the modelled behavior.
3	Verilog 32 bit ALU shown in figure below and verify the functionality of ALU by selectingappropriate test patterns. The functionality of the ALU is shown in Table-1. a) Write test bench to verify the functionality of the ALU considering all possible inputpatterns b) The enable signal will set the output to required functions if enabled, if disabled all theoutputs are set to tri-state. c) The acknowledge signal is set high after every operation is complete. 

<table>
<tr><td></td><td>
<table>
<tr><th>Opcode (2:0)</th><th>ALU Operation</th><th colspan="2">Remarks</th></tr>
<tr><td>000</td><td>A + B</td><td>Addition of two numbers</td><td rowspan="2">Both A and B are in two's complement format</td></tr>
<tr><td>001</td><td>A – B</td><td>Subtraction of two numbers</td></tr>
<tr><td>010</td><td>A + 1</td><td>Increment Accumulator by 1</td><td rowspan="2">A is in two's complement format</td></tr>
<tr><td>011</td><td>A - 1</td><td>Decrement accumulator by 1</td></tr>
<tr><td>100</td><td>A</td><td>True</td><td rowspan="4">Inputs can be in any format</td></tr>
<tr><td>101</td><td>A Complement</td><td>Complement</td></tr>
<tr><td>110</td><td>A OR B</td><td>Logical OR</td></tr>
<tr><td>111</td><td>A AND B</td><td>Logical AND</td></tr>
</table>
</td></tr>
<tr><td>4</td><td>Write Verilog code for SR, D and JK and verify the flip flop</td></tr>
<tr><td>5</td><td>Write Verilog code for 4 bit BCD synchronous counter</td></tr>
<tr><td>6</td><td>Write Verilog code for counter with given input clock and check whether it works as clockdivider performing division of clock by 2, 4, 8 and 16 . Verify the functionality of the code.</td></tr>
<tr><td colspan="2">PART B
Note: Interfacing and Debugging: (ED) WinXp, PSpice, MultiSim, Proteus, CircuitLab, or any other equivalent tool canbe used.</td></tr>
<tr><td>7</td><td>Write a Verilog code to design a clock divider circuit that generates ½, 1/3rd, 1/4th ,clock fromgiven input clock . Port the design to FPGA and validate the functionality through CRO.</td></tr>
<tr><td>8</td><td>Interface a DC motor to FPGA and write Verilog code to change its speed and direction</td></tr>
<tr><td>9</td><td>Interface a stepper motor to FPGA and write Verilog code to control the stepper motor rotationwhich in turn may control a Robatic arm. External switches to be used for different controls like rotate the stepper motor:
a) + N steps if the switch number 1 of a DIP switch is closed.
+N/2 steps if switch number 2 of a DIP switch is closed.c)-N steps if switch number 3 of a DIP switch is closed etc.</td></tr>
<tr><td>10</td><td>Interface a DAC to FPGA and write Verilog code to generate a sine wave of frequency f KHz, ex f
= 100 KHz, or 200 KHz etc, . Modify the code to down sample the frequency to f/2 KHz.Display the original and down sampled signals by connecting them to CRO.</td></tr>
<tr><td>11</td><td>Write Verilog code using FSM to simulate elevator operation.</td></tr>
<tr><td>12</td><td>Write Verilog code to convert an analog input signal of a sensor to digital form and to displaythe same on a suitable display like simple set of LEDs , 7 segment display digits or LCD display</td></tr>
<tr><td colspan="2">Course outcomes (Course Skill Set):
At the end of the course the student will be able to:

1. Write the VHDL/Verilog programs to simulate combinational circuits in data flow, behavioral, gatelevel abstractions.
2. Describe sequential circuits like flip-flops, counters, in behavioral descriptions and obtain simulatedwaveforms.
3. Use FPGA/CPLD kits for downloading Verilog codes and check output.
4. Synthesize combinational and sequential circuits on programmable ICs and test the hardware
5. Interface the hardware programmable chips and obtain the required output.</td></tr>
</table>

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Scilab / MATLAB for Electrical and Electronic Measurements (0:0:2) 1

(Effective from the academic year 2022-23)

Course Code	**BEEL456B**	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	2

Course objectives:

- Along with prescribed hours of teaching –learning process, provide opportunity to perform the experiments/programmes at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.
- Provide unhindered access to perform whenever the students wish.
- Vary different parameters to study the behaviour of the circuit without the risk of damaging equipment/ device or injuring themselves.

List of Experiments

Sl. NO	Experiments
1	Design and Analysis of measurement of Resistance using Wheatstone OR Kelvins double bridge.
2	Design and Analysis of measurement of Inductance using Schering OR De-Sauty's Bridges.
3	Design and Analysis of measurement of Inductance using Maxwells OR Anderson Bridges.
4	Design and Analysis of measurement of Frequency in Single and Three Phase Circuits.
5	Design and Analysis of measurement of Real Power, Reactive and Power Factor in Three Phase Circuits.
6	Design and Analysis of measurement of Energy in Three Phase Circuits.
7	Design and Analysis of measurement of Flux and Flux density.
8	Testing and Analysis of Current Transformer using Silsbees Deflection Method.
9	Testing and Analysis of Voltage Transformer using Silsbees Deflection Method.
10	Design and Analysis of True RMS Reading Volt Meters.
11	Design and Analysis of Integrating OR Successive approximation type Digital Volt Meters.
12	Design and Analysis of Q Meter.

Course outcomes (Course Skill Set):

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

CO1: Simulate and Conduct measurement tests on Bridges, CT and PT to evaluate their performance.

CO2: Measure and Analyze Power, power factor, Q factor and electrical energy consumption in various types of loads and circuits.

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

PCB Design Laboratory (0:0:2) 1

(Effective from the academic year 2022-23)

Course Code	**BEEL456C**	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	2

Course objectives:

(1) Along with prescribed hours of teaching –learning process, provide opportunity to perform the experiments/programmes at their own time, at their own pace, at any place as per their convenience and repeat any number of times to understand the concept.

(2) Provide unhindered access to perform whenever the students wish.

(3) Vary different parameters to study the behaviour of the circuit without the risk of damaging equipment/device or injuring themselves.

List of Experiments

Sl. NO	Experiments
1	**Introduction** Need for PCB, Types of PCBs : Single and Multilayer, Technology: Plated Through Hole, Surface Mount, PCB Material, Electronic Component packaging, PCB Designing, Fabrication, Electronic Design Automation Tools: proteus, Orcad or any other tool.
2	Introduction to proteus, Orcad or any other tool., Schematic entry / drawing, netlisting, layering, component foot print library selection & designing, design rules, component placing: Manual & automatic, track routing: automatic & manual, rules: track length,angle, joint & size, Autorouter setup. Design Rules.
3	PCB Designing Practice : PCB Designing of Basic and Analog Electronic Circuits, PCB Designing of Power Supplies.
4	Post Designing & PCB Fabrication Process: Printing the Design, Etching, Drilling, Interconnecting and Packaging electronic Circuits, Gerber Generation, Soldering and De-soldering, Component Mounting, PCB and Hardware Testing.

Course outcomes (Course Skill Set):

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

Analyse in an intelligent manner, think better, and perform better.

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

ARDUINO AND RASPBERRY PI (0:0:2) 1

(Effective from the academic year 2022-23)

Course Code	**BEEL456D**	CIE Marks	50
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	50
Total Number of Contact Hours	40	Exam Hours	2

Course objectives:

- To impart necessary and practical knowledge of components of Internet ofThings
- To develop skills required to build real-life IoT based projects

List of Experiments

Sl. NO	Experiments
1	i) To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to 'turn ON' LED for 1 sec after every 2 seconds. **ii)** To interface Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to 'turn ON' LED when push button is pressed or at sensor detection.
2	i) To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to printtemperature and humidity readings. **ii)** To interface OLED with Arduino/Raspberry Pi and write a program to print temperature and humidity readings on it.
3	To interface motor using relay with Arduino/Raspberry Pi and write a program to 'turn ON' motor when push button is pressed
4	To interface Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to Smartphone using Bluetooth
5	To interface Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from Smartphone using Bluetooth
6	Write a program on Arduino/Raspberry Pi to upload temperature and humidity data to thing speak cloud
7	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud
8	Write a program on Arduino/Raspberry Pi to retrieve temperature and humidity data from thing speak cloud
9	Write a program on Arduino/Raspberry Pi to publish temperature data to MQTT broker
10	Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data to UDP client when requested.
11	Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.
12	Write a program on Arduino/Raspberry Pi to subscribe to MQTT broker for temperature data and print it.

Course outcomes:

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

CO1: Design and Develop C/C+ programs for Arduino/Raspberry based systems.

CO2: Design and Develop key board/display systems.

CO3: Design and Develop analog/digital sensor data acquisition systems.

CO4: Design and Develop Motor control systems

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Biology for Engineers (3:0:0) 3

(Effective from the academic year 2022-23)

Course Code	BBOK407	CIE Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE Marks	--
Total Number of Contact Hours	40	Exam Hours	3

Course objectives:

1. Understand the biological concepts from an engineering perspective and applications.
2. Acquire knowledge on biomolecules and human organ system.
3. Impart knowledge about spectroscopy and clinical imaging system for biological study.
4. Gain knowledge on Nature-Bioinspired mechanisms and materials can be substitute.
5. Learn about recent developments and trends in Bioengineering

Module – 1

Introduction to Biology:

Importance of Biology for Engineers, need to study Biology, Life Science studies significance. The cell: the basic unit of life, Structure and functions of a cell. Prokaryotic and Eukaryotic cell, carbohydrates nucleic acids: Classification, salient features, functions. Enzymes: Classification, properties and functions. plant based proteins and protein as food, Lipids: functions, biodiesel, cleaning agents/detergents.

Spectroscopy and Microscopy techniques for Biology

Basic principle and biological applications of infrared spectroscopy, Case studies on Raman spectroscopy and its use in biological studies. **(8 Hours)**

Module – 2

Biomolecules and Applications

Carbohydrates: cellulose-based water filters, PHA and PLA as bioplastics, Nucleic acids Forensics: DNA fingerprinting, Proteins: Proteins as food.

Biological Mechanisms

Skeletal muscles in the body, the structure of muscles, passive muscles, activating muscles, Gecko - Gecko tape, Whale fins - Turbine blades, Termite/ ant hill-passive cooling, Namib beetle- Water collection. Ventilators, Kidney as a filtration system: mechanism of filtration. Case studies on Biological Neural Network: Principles and importance. **(08 Hours)**

Module – 3

Human Organ Systems and Bio Designs:

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

Clinical Imaging System Basic principle and biological uses of Computerized Tomography (CT), Magnetic Resonance Imaging (MRI). Case studies on X-ray Imaging techniques and biological applications. **(08 Hours)**

Moule-4

Nature-Bioinspired Mechanisms:

Echolocation: ultrasonography/ultrasound Imaging, sonars Photosynthesis: bionic leaf, Birds and insects: flight aerodynamics. Lotus leaf effect: super hydrophobic and self-cleaning

surfaces, Mosquito inspired micro needle, Plant burrs: Velcro, Shark skin: Friction reducing swim suits, Kingfisher beak: Bullet train.

Nature-Bioinspired Materials: Bio filter, biochips and their applications in health. Physiological Assist Device: Artificial Skin, artificial limbs. Case studies on Bio-composites.

(08 Hours)

Moule-5

Trends in Bioengineering

Introduction to regenerative medicine: Muscular and Skeletal Systems as scaffolds (architecture, mechanisms,), scaffolds and tissue engineering,3D printing of ear, bone and skin, 3D printed foods. Artificial Self-healing Bio concrete based on bacillus spores and calcium lactate nutrients, Biosensors for personal diabetes management, Biopolymers, Bio fertilizer, Artificial kidney, immunological biosensors: types and applications. DNA bio sensor. Case study on Bio printing techniques and materials.

(08 Hours)

Course Outcomes:

The students will be able to:

1. Describe the concept of Biology from an engineering perspectives and applications.
2. Summarize biomolecules and human organ systems.
3. Discuss microscopy techniques and clinical imaging system for biological study.
4. Illustrate Nature-Bioinspired materials and mechanisms.
5. Elaborate principles and applications of bioengineering.

Text Books:

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

References:

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

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/121106008
- https://freevideolectures.com/course/4877/nptel-biology-engineers-other-non-biologists
- https://ocw.mit.edu/courses/20-020-introduction-to-biological-engineering-design-spring-2009
- https://ocw.mit.edu/courses/20-010j-introduction-to-bioengineering-be-010j-spring-2006
- https://www.coursera.org/courses?query=biology
- https://onlinecourses.nptel.ac.in/noc19_ge31/preview
- https://www.classcentral.com/subject/biology
- https://www.futurelearn.com/courses/biology-basic-concepts

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Universal Human Values (UHV)

(Effective for the 2022 scheme)

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

Course Objectives:

This course is intended to:

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

Teaching-Learning Process (General Instructions)

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

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

Module – 1

Introduction to Value Education:
Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) Understanding Value Education, Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity – the Basic Human Aspirations, Happiness and Prosperity – Current Scenario, Method to Fulfil the Basic Human Aspirations

(03 Hours)

Module – 2

Harmony in the Human Being:
Understanding Human being as the Co-existence of the Self and the Body, distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.

(03 Hours)

Module – 3

Harmony in the Family and Society:
Harmony in the Family – the Basic Unit of Human Interaction, 'Trust' – the Foundational Value in Relationship, 'Respect' – as the Right Evaluation, Other Feelings, Justice in Human-to Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.

(03 hours)

Module – 4

Harmony in the Nature/Existence:
Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence

(03 hours)

Module – 5

Implications of the Holistic Understanding – a Look at Professional Ethics:
Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value-based Life and Profession

(03 hours)

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

Assessment Details (both CIE and SEE) :

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

Continuous internal Examination (CIE)

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

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

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

Semester End Examinations (SEE) :

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

Textbooks and Teachers Manual	
1.	The Textbook A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 97893-87034- 47-1
2.	The Teacher‟s Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G
References	
1.	Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999
2.	Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004
3.	The Story of Stuff (Book).
4.	SThe Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5	Small is Beautiful - E. F Schumacher
6	Slow is Beautiful - Cecile Andrews
7	Economy of Permanence - J C Kumarappa.
8	Bharat Mein Angreji Raj – Pandit Sunderlal
9	Rediscovering India - by Dharampal
10	Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11	India Wins Freedom - Maulana Abdul Kalam Azad
12	Vivekananda - Romain Rolland (English)

13	Gandhi - Romain Rolland (English)
14	Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
15	Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
16	A Nagraj, 1998, Jeevan Vidya Ek Parichay, Divya Path Sansthan, Amarkantak.
17	P L Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers
18	A N Tripathy, 2003, Human Values, New Age International Publishers.
19	Subhas Palekar, 2000, How to practice Natural Farming, Pracheen (Vaidik) KrishiTantraShodh, Amravati.
20	E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press
21	M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethics (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.
22	B P Banerjee, 2005, Foundations of Ethics and Management, Excel Books
23	B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

Web links and Video Lectures (e-Resources):

- Value Education websites
- https://www.uhv.org.in/uhv-ii
- http://uhv.ac.in
- http://www.uptu.ac.in
- Story of Stuff
- http://www.storyofstuff.com
- Al Gore, An Inconvenient Truth, Paramount Classics, USA
- Charlie Chaplin, Modern Times, United Artists, USA
- IIT Delhi, Modern Technology – the Untold Story
- Gandhi A., Right Here Right Now, Cyclewala Productions
- https://www.youtube.com/channel/UCQxWr5QB_eZUnwxSwxXEkQw
- https://fdp-si.aicte-india.org/8dayUHV_download.php
- https://www.youtube.com/watch?v=8ovkLRYXIjE
- https://www.youtube.com/watch?v=OgdNx0X923I
- https://www.youtube.com/watch?v=nGRcbRpvGoU
- https://www.youtube.com/watch?v=sDxGXOgYEKM

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

NSS

(Common to all branches)

(Effective for the 2022 scheme)

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

Mandatory Course (Non-Credit)

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

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

11. Understand the community in general in which they work.
12. Identify the needs and problems of the community and involve them in problem solving.
13. Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
14. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
15. 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.

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Yoga

(Common to all Branches)

(Effective for the 2022 scheme)

Course Code	**BYOK359/459/559/659**	CIE Marks	100
Teaching Hours/Week (L:T:P)	0:0:2	SEE Marks	-
Total Number of Contact Hours	26	Exam Hours	-

Course Objectives:

This course will enable students to:

16. Understand the importance of practicing yoga in day-to-day life.
17. Be aware of therapeutic and preventive value of Yoga.
18. Have a focussed, joyful and peaceful life.
19. Maintain physical, mental and spiritual fitness.
20. Develop self-confidence to take up initiatives in their lives.

Module – 1

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

(04 Hours)

Module – 2

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

(06 Hours)

Module – 3

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

(06 Hours)

Module – 4

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

(06 Hours)

Module – 5

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

(04 Hours)

Course Outcomes:

Students will be able to:

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

Teaching Practice:

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

CIE: 100 Marks

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

Textbooks

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

References

1. Principles and Practice of Yoga in Health Care, Publisher: Handspring Publishing Limited, ISBN: 9781909141209, 9781909141209
2. Basavaraddi I V: Yoga in School Health, MDNIY New Delhi, 2009
3. Dr. HR. Nagendra: Yoga Research and applications (Vivekanda Kendra Yoga Prakashana Bangalore)
4. Dr. Shirley Telles: Glimpses of Human Body (Vivekanda Kendra Yoga Prakashana Bangalore)

Web resources

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

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

B.E. ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)
SEMESTER - IV

NCC

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

Course Code	BNCK359/459/559/659	CIE Marks	100
Teaching Hours/Week (L: T:P)	0:0:2	SEE Marks	-
Total Number of Contact Hours	26	Exam Hours	-

Mandatory Course (Non-Credit)

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

Course Objectives:

This course will enable students to:

- Understand the vision of NCC and its functioning.
- Understand the security set up and management of Border/Coastal areas.
- Acquire knowledge about the Armed forces and general awareness.

Module– 1

Introduction to National Cadet Corp: What is NCC, who can join NCC, benefits, Establishment, history, 3 wings, motto, core values, Aims, flag, song, pledge, cardinals, Organization, Director General NCC, Directorates, Uniform and Cadet ranks, Camps, Certificate exams, Basic aspects of drill.

National Integration: Importance of national integration**,** Factors affecting national integration, Unity in diversity**,** Role of NCC in nation building.

Disaster Management: What is a Disaster**,** Natural and Man-made disasters**,** Earthquake, Floods.

(04 Hours)

Module– 2

Indian Army:

Introduction to Indian Army, Command and control, Fighting & supporting arms**,** Rank structure, Major Regiments of the Army**,** Major Wars and Battles**,** Entry to the Indian Army, Renowned leaders and Gallantry Awardees.

(02 Hours)

Module– 3

Indian Air Force: Introduction to Indian Air Force, Command and control**,** Rank structure**,** Major Aircrafts, Entry to the Indian Air Force, Renowned leaders.

Indian Navy: Introduction to Indian Navy, Command and control, Rank structure, Major Ships and Submarines**,** Entry to the Indian Navy, Renowned leaders.

(02 Hours)

Module– 4

Health and Hygiene: First Aid Protocols - CPR, Understanding Types of Bandages, Fire Fighting

Field & Battle Crafts: Field Signals using hands, Judging distance -Types of Judging Distance, Section formations-types of Section Formation

(10 Hours)

Module– 5

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

(08 Hours)

Course outcomes:

The students will be able to:

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

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

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

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

Teaching Practice:

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

CIE: 100 Marks

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

Textbooks:

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

References:

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

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Sports

(Common to all Branches)

(Effective for the 2022 scheme)

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

Mandatory Course (Non-Credit)

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

Course Objectives: The course will enable students to

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

Module – 1

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

(06 Hours)

Module – 2

Offensive and Defensive Techno Tactical Abilities: Fitness, Fundamentals & Techniques of the game with the implementation of Biomechanics, Tactics- Drills for the Techno Tactical abilities, Individual and Group, Miner games- to implement the Techniques, Tactics and Motor abilities.

(05 Hours)

Module – 3

Team tactics and Rules of the Game: Rules and Regulations of the Game: Game rules as well as sequence of officiating, Team tactics: Offensive and Defensive team strategies and scrimmages, Practice Matches: among the group, Analysis of Techno Tactical abilities: Correction and implementation of skills and Sports Injuries and rehabilitation: First aid, PRICE treatment,

(05 Hours)

Module – 4

Sports Training: Introduction of Sports Training, Principles of Sports performance, how to increase and sustain the sports performance, Training Load & Recovery- How to increase the training load (volume/Intensity) and means and methods for Recovery, Periodization: Shorts, Medium and Long term, Physiological changes: Changes in Lung capacity, heart beats etc.

(05 Hours)

Module – 5

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

(05 Hours)

The above 5 modules are common to all the sports events / games, we are offering the following games**: 1. Baseball, 2. Kabaddi, 3. Table Tennis, and 4. Volleyball.**

Course outcomes:

The students will be able to:

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

Teaching Practice:

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

CIE: 100 Marks

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

Textbooks:

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

References:

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

B.E ELECTRICAL AND ELECTRONICS ENGINEERING

Choice Based Credit System (CBCS)

SEMESTER - IV

Music

(Common to all Branches)

(Effective for the 2022 scheme)

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

Mandatory Course (Non-Credit)

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

Course Objectives:

The course will enable the students to:

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

Module – 1

Preamble: Contents of the curriculum intend to promote music as a language to developan analytical, creative, and intuitive understanding. For this the student must experiencemusic 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 (COs):

The students will be able to:

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

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

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

Teaching Practice:

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

CIE: 100 Marks

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

Textbooks

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

References

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