RNS TRUST ®

RNS INSTITUTE OF TECHNOLOGY

ESTD.: 2001
An Institute with a Difference

Autonomous Institution affiliated to Visvesvaraya Technological University, Belagavi
Approved By AICTE, New Delhi. Accredited by NAAC 'A+' Grade
Channasandra, Dr. Vishnuvardhan Road, Bengaluru - 560 098
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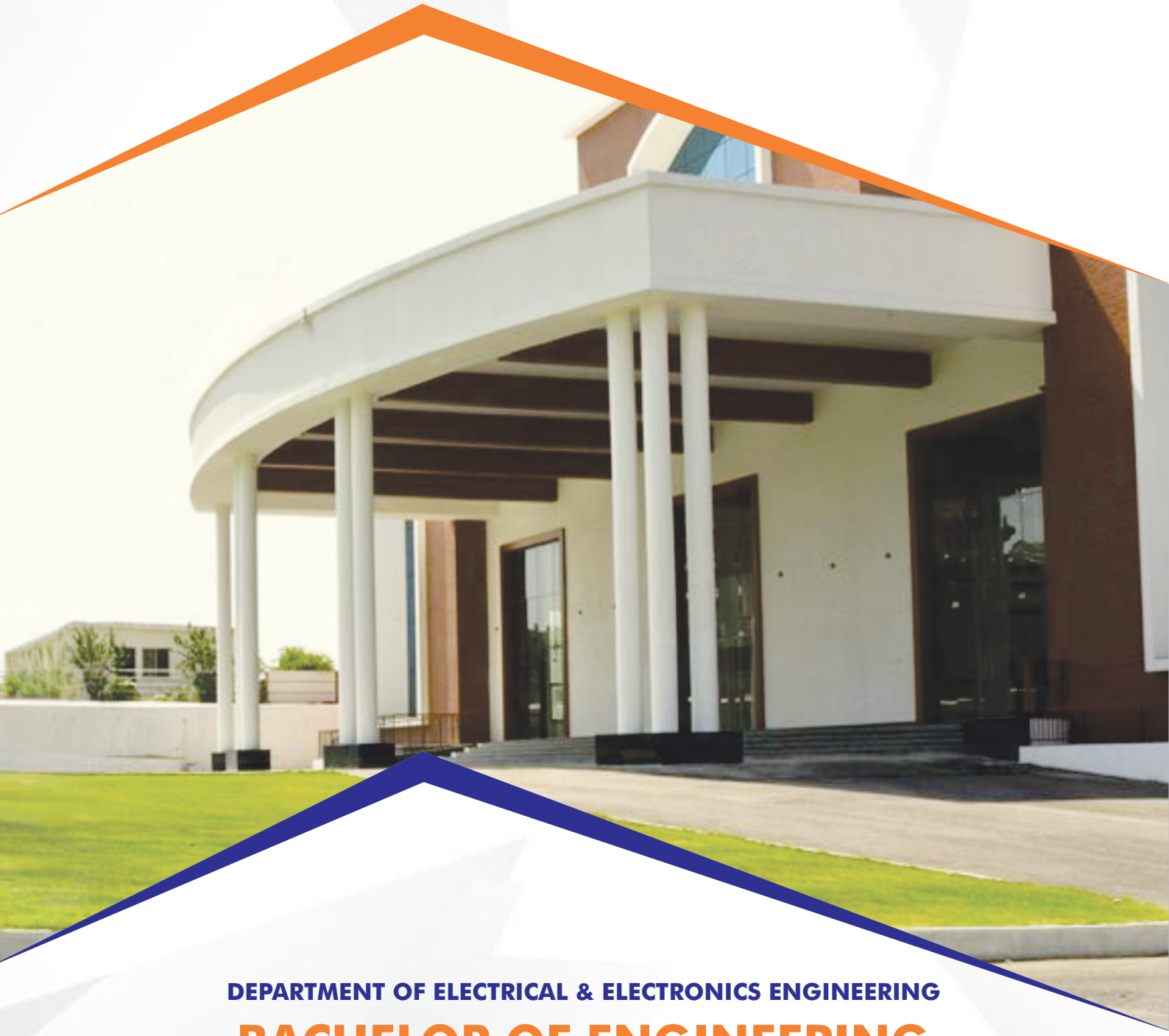
Dr. R N Shetty
Founder



DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

BACHELOR OF ENGINEERING

Scheme and Syllabus of III & IV Semesters

2024 SCHEME

www.rnsit.ac.in

Scheme and Syllabus
Batch 2024 – 2028

(As per NEP – 2020)
(Effective from the Academic year 2024 – 25)

About RNSIT

RNS Institute of Technology, familiar as RNSIT was established in the year 2001. It is the brainchild of Dr. R. N. Shetty, well known industrialist, and a great philanthropist. The institution was established with a sole purpose of imparting quality education in Engineering, Technology and Management. Being one of the premier engineering colleges in the country RNSIT is marching towards placing itself in the global map by excelling in academics and placements.

Lush green campus, state of the art infrastructure, well equipped laboratories, hundreds of activities, numerous new initiatives, consistent VTU ranks, path breaking placements, cultural extravaganza, Sports events, 4000 + students and 300 + faculty – with all these RNSIT has become dream destination for engineering aspirants across the country.

Founded by a great visionary Dr. R N Shetty, a renowned name in the industries viz construction, manufacturing, hotel, automobile, power & IT services, and education, RNSIT has been scripting history in the field of technical education. Right from its inception in the year 2001, the institution is showing exemplary growth with respect to academics, placements, sports and cultural activities. With 9 UG engineering branches, 4 PG courses and 9 R&D centres. RNSIT is aiming towards becoming the premier engineering institutes in the world.

Vision

Building RNSIT into a World Class Institution

Mission

To impart high quality education in Engineering, Technology and Management with a difference, enabling students to excel in their career by

- Attracting quality Students and preparing them with a strong foundation in fundamentals so as to achieve distinctions in various walks of life leading to outstanding contributions.
- Imparting value based, need based, choice based and skill based professional education to the aspiring youth and carving them into disciplined, World class Professionals with social responsibility.
- Promoting excellence in Teaching, Research and Consultancy that galvanizes academic consciousness among Faculty and Students.
- Exposing Students to emerging frontiers of knowledge in various domains and make them suitable for Industry, Entrepreneurship, Higher studies, and Research & Development.
- Providing freedom of action and choice for all the Stakeholders with better visibility.

About EEE Department

The Department of Electrical & Electronics Engineering at RNSIT was started in the year 2004 with a sanctioned intake of 60. The program is NBA accredited and the college is accredited by NAAC with an 'A+' grade. The department is headed by Dr. Roopa Nayak who has specialized in the area of Industrial Drives, VLSI & Embedded System. The department has a total staff strength of 18, including teaching and non-teaching staff.

The well qualified and committed staff, along with the students of the department are working with the vision of making the department one of the best in India in both formal and non-formal education, and offering various research opportunities and services in Electrical Engineering over the next decade. The department provides an excellent learning environment supported by quality teaching with skilled faculty.

The students are well-trained with the support of the placement cell, subsequently paving the way for them in getting placed in top companies. The graduates have performed exceptionally well and achieved significant heights in their career prospects. The department has bagged a total of 13 VTU ranks (11 UG & 2 PG ranks) in VTU examinations till date.

The faculties of Electrical Engineering are involved in active research in the areas of Power Quality, Power System, Voltage Stability, Electric Drives, Power Electronics, Electric Vehicles and High Voltage Engineering. The focus of the department currently is to set up an R&D centre to enable teachers to work for their research purpose, along with undertaking industrial consultancy.

VISION

Pursuit of excellence in the field of Electrical & Electronics Engineering

MISSION

- To prepare students to achieve core competence and academic excellence.
- To provide necessary skills to design, develop and solve complex problem in the field of Electrical & Electronics Engineering and contribute to technological growth.
- To make them ethical professionals/entrepreneur capable of adapting to changes in technologies, and contribute to society.
- To support students to develop leadership qualities, self-learning abilities, communication skills and teamwork skills.

PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

The Graduates of the Department shall

- **PEO 1** : have strong knowledge of core Electrical Engineering and Basic sciences to excel in their career
- **PEO 2:** be able to pursue career in multi-disciplinary areas involving core engineering subjects.
- **PEO 3** : have ability for lifelong learning, use modern tools, and contribute to Research and development in niche areas.
- **PEO 4 :** have positive attitude, good communication skills and professional ethics

PROGRAM SPECIFIC OUTCOMES (PSOs)

The Graduates of the Department shall have the

- **PSO 1:** Ability to design, analyse, and model Electrical systems by applying the knowledge of Circuit Theory, Control Systems, Power Systems and Power Electronics.
- **PSO 2:** Ability to understand and apply latest technologies of Electrical Engineering to develop products useful for society and industry.
- **PSO 3:**Ability to provide eco friendly project solutions for Electrical Systems.

PROGRAM OUTCOMES REVISED (POs)

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

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

3. **PO3: Design/Development of Solutions**: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)

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

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

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

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

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

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

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

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

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(Effective from the Academic Year 2024-25)

III SEMESTER

SL NO	COURSE	COURSE CODE	COURSE TITLE	TD/PSB	TEACHING HOURS PER WEEK			Term work (TW) + Self Learning (SL) Hours Per Semester	EXAMINATION				CREDITS
					THEORY LECTURE (L)	TUTORIAL (T)	PRACTICAL (P)		DURATION IN HOURS	CIE MARKS	SEE MARKS	TOTAL MARKS	
1	PCC	BMATE301	MATHEMATICS – III FOR EE ENGINEERING	Maths	3	0	0	45	3	50	50	100	3
2	IPCC	BEE302	ELECTRIC CIRCUIT ANALYSIS	EEE	3	0	2	45	3	50	50	100	4
3	IPCC	BEE303	ANALOG ELECTRONIC CIRCUITS	EEE	3	0	2	45	3	50	50	100	4
4	PCC	BEE304	TRANSFORMERS AND GENERATORS	EEE	3	0	0	45	3	50	50	100	3
5	PCCL	BEEL305	TRANSFORMERS AND GENERATORS LAB	EEE	0	0	2	0	3	50	50	100	1
6	ESC	BEE306X	ESC/ETC/PLC	EEE	3	0	0	45	3	50	50	100	3
7	UHV	BSCK307	SOCIAL CONNECT AND RESPONSIBILITY	ANY DEPARTMENT	0	0	2	0	2	100	0	100	1
8	AEC/SDC	BEET/L358X	ABILITY ENHANCEMENT / SKILL DEVELOPMENT COURSE	EEE	**IF COURSE IS THEORY**				2	50	50	100	1
					1	0	0	15					
					IF COURSE IS PRACTICAL				3				
					0	0	2	0					
9	MC	BNSK359	NATIONAL SERVICE SCHEME(NSS)	ANY DEPARTMENT	0	0	2	0		100	0	100	0
		BPEK359	PHYSICAL EDUCATION(PE) (SPORTS AND ATHLETICS)	PED									
		BYOK359	YOGA	PED									
TOTAL										**550**	**350**	**900**	**20**

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **MC**: Mandatory Course (Non-credit), **AEC**: Ability Enhancement Course, **SDC**: Skill Development Course, **L:** Lecture, **T**: Tutorial, **P**: Practical **SL**: Self Learning, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation. **Professional Core Course (IPCC):** Refers to Professional Core Course Theory Integrated with practical of the same course.

ENGINEERING SCIENCE COURSE / EMERGING TECHNOLOGY COURSE / PROGRAMMING LANGUAGE LAB COURSE (ESC/ETC/PLC)	
BEE306A	**DIGITAL LOGIC CIRCUITS**
BEE306B	**ELECTRICAL MEASUREMENTS AND INSTRUMENTATION**
BEE306C	**ELECTRICAL POWER GENERATION AND ECONOMICS**
BEE306D	**COMPUTER ORGANIZATION & ARCHITECTURE**
ABILITY ENHANCEMENT / SKILL DEVELOPMENT COURSE (AEC / SDC)	
BFLC358A	**FOREIGN LANGUAGE COURSE I – GERMAN**
BFLC358B	**FOREIGN LANGUAGE COURSE I – SPANISH**
BEEL358C	**DIGITAL LOGIC CIRCUITS LABORATORY**
BEEL358D	**ELECTRICAL HARDWARE LABORATORY**

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IV SEMESTER

SL NO	COURSE	COURSE CODE	COURSE TITLE	TD/PSB	TEACHING HOURS PER WEEK			Term work (TW) + Self Learning (SL)	EXAMINATION				CREDITS
					THEORY LECTURE (L)	TUTORIAL (T)	PRACTICAL (P)	Hours Per Semester	DURATION IN HOURS	CIE MARKS	SEE MARKS	TOTAL MARKS	
1	PCC	BEE401	ELECTRIC MOTORS	EEE	3	2	0	45	3	50	50	100	4
2	PCC	BEE402	TRANSMISSION AND DISTRIBUTION	EEE	3	2	0	45	3	50	50	100	4
3	IPCC	BEE403	MICROCONTROLLER AND EMBEDDED SYSTEMS	EEE	3	0	2	45	3	50	50	100	4
4	PCCL	BEEL404	ELECTRIC MOTORS LAB	EEE	0	0	2	0	3	50	50	100	1
5	ESC	BEE405X	ESC/ETC/PLC	EEE	3	0	0	45	3	50	50	100	3
6	AEC/SDC	BEET/L456X	ABILITY ENHANCEMENT / SKILL DEVELOPMENT COURSE	EEE	**IF COURSE IS THEORY**				2	50	50	100	1
					1	0	0	15					
					IF COURSE IS PRACTICAL				3				
					0	0	2	0					
7	BSC	BENS407/BBOE407	ENVIRONMENTAL STUDIES / BIOLOGY FOR ENGINEERS	CV/Biotech /Chemistry	2	0	0	30	2	50	50	100	2
8	UHV	BUHV408	UNIVERSAL HUMAN VALUES	ANY DEPARTMENT	1	0	0	15	2	50	50	100	1
9	MC	BNSK459	NATIONAL SERVICE SCHEME(NSS)	ANY DEPARTMENT	0	0	2	0		100	0	100	0
		BPEK459	PHYSICAL EDUCATION(PE) (SPORTS AND ATHLETICS)	PED									
		BYOK459	YOGA	PED									
TOTAL										**500**	**400**	**900**	**20**

PCC: Professional Core Course, **PCCL**: Professional Core Course laboratory, **UHV**: Universal Human Value Course, **MC**: Mandatory Course (Non-credit), **AEC**: Ability Enhancement Course, **SDC**: Skill Development Course, **L:** Lecture, **T**: Tutorial, **P**: Practical **SL**: Self Learning, **CIE**: Continuous Internal Evaluation, **SEE**: Semester End Evaluation. **Professional Core Course (IPCC):** Refers to Professional Core Course Theory Integrated with practical of the same course.

ENGINEERING SCIENCE COURSE / EMERGING TECHNOLOGY COURSE / PROGRAMMING LANGUAGE LAB COURSE (ESC/ETC/PLC)	
BEE405A	**OP-AMP AND LIC**
BEE405B	**ELECTRICAL ENGINEERING MATERIALS**
BEE405C	**ELECTROMAGNETIC FIELD THEORY**
BEE405D	**OBJECT ORIENTED PROGRAMMING USING C++**
ABILITY ENHANCEMENT / SKILL DEVELOPMENT COURSE (AEC / SDC)	
BFAT456A	**FINANCE & ACCOUNTING**
BEEL456B	**OP-AMP AND LIC LAB**
BEEL456C	**ARDUINO AND RASPBERRY-PI BASED PROJECTS**
BEEL456D	**MATLAB FOR MACHINES**

NOTE:

(i) 1st semester Chemistry cycle sections will study "ENVIRONMENTAL STUDIES" in 4th semester and "BIOLOGY FOR ENGINEERS" in 5th semester

(ii) 1st semester Physics cycle sections will study "BIOLOGY FOR ENGINEERS" in 4th semester and "ENVIRONMENTAL STUDIES" in 5th semester

III SEMESTER SUBJECTS

B.E. (EC / EE Engineering)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – III

Course Title:	**Mathematics – III for EC / EE Engineering**		
Course Code:	**BMATEC301 / BMATEE301**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3 Hours**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. 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.
2. Analyze signals in terms of Fourier transforms.
3. Develop the knowledge of solving differential equations and their applications in EC & EE engineering.
4. To find the association between attributes and the correlation between two variables

Module1: Ordinary Differential Equations of higher order **9 Hours**

Higher-order linear ODEs with constant coefficients - Inverse differential operator. Linear differential equations with variable Coefficients-Cauchy and Legendre differential equations. Representation of L-C and L-C-R circuits as linear differential equations.

Module2:Fourier series and Practical harmonic analysis **9 Hours**

Periodic functions, Dirichlet's condition. Fourier series expansion of functions with period $2\pi$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.

Module3: Fourier Transforms **9 Hours**

Fourier transforms, Fourier cosine and sine transforms, Inverse Fourier transforms, Inverse Fourier cosine and sine transforms, discrete Fourier transform (DFT), Fast Fourier transform (FFT).

Module4: Probability Distribution **9 Hours**

Random variables (discrete and continuous), probability mass/density function, Binomial distribution, Poisson distribution and exponential distribution.

Stochastic Process: Stochastic processes, probability vector, stochastic matrices, fixed points, regular stochastic matrices, Markov Chains, higher transition probability- simple problems.

Module5: Curve fitting, Correlation and Regression **9 Hours**

Principles of least squares (without proof), Curve fitting by the method of least squares in the form $y=a+bx$,$=a+bx+cx^2$, and $y=ax^b$. Correlation, coefficient of correlation, lines of regression, angle between regression lines, standard error of estimate, Rank correlation, Auto correlation, Cross correlation.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand that physical systems can be described by differential equations and solve such equations.
CO2	Demonstrate the Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing, and field theory.
CO3	To use Fourier transforms to analyze problems involving continuous-time signals.
CO4	Apply discrete and continuous probability distributions in analyzing the probability models arising in the engineering field and illustrate examples of Markov chains related to discrete parameter stochastic process.
CO5	Make use of correlation and regression analysis to fit a suitable mathematical model for Statistical data.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**

SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE **(A+B+C)**	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

Text Books:

1.**B.S. Grewal**: "Higher Engineering Mathematics", Khanna Publishers, 44th Ed.,2021.
2.**E.Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018

Reference Books:

1. **V.Ramana:** "Higher Engineering Mathematics" McGraw-HillEducation,11th Ed.,2017
2. **N.P Bali and Manish Goyal**: "A Text book of Engineering Mathematics"Laxmi Publications, 10th Ed., 2022.
3. **C.Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw–Hill Book Co., New York, 6th Ed., 2017.
4. **H.K.Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S.Chand Publication, 3rd Ed.,2014.

Web links and Video Lectures (e-Resources):

1. http://nptel.ac.in/courses.php?disciplineID=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://academicearth.org/
4. VTU e-Shikshana Program
5. VTUEDUSAT Program

B.E. (Electrical and Electronics Engineering) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – III			
Course Title	**Electric Circuit Analysis**		
Course Code	**BEE302**	**CIE Marks**	**50**
(L:T:P) + (SL)	**(3:0:2) + (45 Hours / Semester)**	**SEE Marks**	**50**
Credits	**04**	**Exam Hours**	**03**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner

- To familiarize the basic laws, source transformations, and the various methods of analyzing electrical circuits.
- To explain the use of network theorems to solve electric circuits.
- To understand the concept of resonance in series and parallel electric circuits.
- To explain the importance of initial conditions, their evaluation and transient analysis of R-L and R-C circuits.
- To impart basic knowledge on network analysis using Laplace transforms.
- To familiarize the analysis of three-phase circuits.
- To evaluate the parameters of two port networks.

MODULE – 1 **9 Hours**

Basic Concepts: Active and passive elements, Concept of ideal and practical sources. Source transformation and source shifting. (Only Concepts), Star – Delta transformation. Analysis of networks by loop analysis and Nodal analysis methods for AC and DC circuits with independent sources. Super-Mesh and Super node analysis.

MODULE – 2 **9 Hours**

Network Theorems: Super Position theorem, Millman's theorem, Thevenin's theorem, Norton's theorem, and Maximum power transfer theorem. (Problems with independent AC and DC sources only).

MODULE – 3 **9 Hours**

Resonant Circuits: Analysis of simple series RLC and parallel RLC circuits under resonances. Problems on Resonant frequency, Bandwidth and Quality factor at resonance.

Transient Analysis: Behaviour of circuit elements under switching action, Evaluation of initial conditions. Transient analysis of RL and RC circuits under DC excitations.

MODULE – 4 **9 Hours**

Laplace Transformation: Laplace transformation of step, ramp, impulse and sinusoidal functions, Initial and Final value theorems. Solution of RL and RC using LT for DC excitation, LT of periodic functions.

MODULE – 5 **9 Hours**

Unbalanced Three Phase Systems: Analysis of three phase unbalanced systems of balanced three phase supply. Evaluation of active and reactive powers.

Two Port networks:, Open circuit impedance, Short circuit admittance and Transmission parameters and their evaluation for simple circuits. (excluding relationship between two port parameters)

Experiments :

1. Study of the effect of Open and Short circuits in simple circuits.
2. Determination of resonant frequency, bandwidth, and Q of a series circuit.
3. Determination of resonant frequency, bandwidth, and Q of a parallel circuit.
4. Verification of Thevenin's theorem.
5. Verification of Reciprocity theorem.
6. Verification of Superposition theorem.
7. Verification of maximum Power transfer theorem.
8. Improvement of Power factor.
9. Measurement of time constant of an RC circuit for different values of R.
10. Measurement of power in three phase Circuits using two watt meter method.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Apply basic laws and network reduction techniques to solve complex electric circuits.
CO2	Apply network theorems to solve complex electric circuits..
CO3	Analyze series and parallel electric circuits under resonant condition and to analyze behavior of the electric circuit with given initial conditions.
CO4	Apply Laplace Transformation to study the performance of electric circuits.
CO5	Solve unbalanced three phase systems and also to evaluate the parameters of two port networks.

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). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student 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 Evaluation (CIE) :

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 20 marks.
Continuous and Comprehensive Evaluation (B)	10	-	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	-	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	-	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**

CIE+SEE **(A+B+C+D)**	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE. 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.			

SEE for IPCC:

Theory SEE will be conducted as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1) The question paper will have ten questions. Each question is set for 20 marks.
2) There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3) The students have to answer 5 full questions, selecting one full question from each module.
4) Marks scored by the student shall be proportionally scaled down to 50 Marks

Suggested Learning Resources:

Text Books :

1. Engineering Circuit Analysis, William H Hayt et al, McGraw Hill,8th Edition,2014.
2. Network Analysis, M.E. Vanvalkenburg, Pearson, 3rd Edition,2014.
3. Fundamentals of Electric Circuits, Charles K Alexander Matthew N O Sadiku, McGraw Hill, 5th Edition, 2013.

Reference Books :

1. Engineering Circuit Analysis, J David Erwin et al, Wiley India, ,10th Edition,2014.
2. Electric Circuits, Mahmood Nahvi, McGraw Hill, 5th Edition,2009.

Web links and Video Lectures (e-Resources):

www.nptel.ac.in

B.E (Electrical & Electronics Engineering) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – III			
Course Title:	**Analog Electronic Circuits**		
Course Code:	**BEE303**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:2) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**4**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Provide the knowledge for the analysis of transistor biasing and thermal stability circuits
2. Develop skills to design the electronic circuits like amplifiers, power amplifiers and oscillators
3. Understand the importance of FET and MOSFET and FET/MOSFET amplifiers

Module-1 **9 Hours**

Transistor Biasing and Stabilization: The operating point, load line analysis, DC analysis and design of voltage divider bias circuit and modified DC bias with voltage feedback. Bias stabilization and stability factors for voltage divider and collector to base bias circuit. Transistor switching circuits.

Small Signal Modeling of Transistor: Hybrid model, h-parameters for CE, CC and CB modes, analysis for voltage divider bias and collector to base bias circuit (bypassed and unbypassed R_E) using hybrid parameter model**.**

Module-2 **9 Hours**

Transistor frequency response: General frequency considerations, Low frequency response of BJT amplifier, Miller effect capacitance, high frequency response of BJT amplifier, multistage frequency effects.

Power Amplifiers: Classification of power amplifiers, Analysis of class A, Class B, class C and Class AB amplifiers, Distortion in power amplifiers, second harmonic distortion, harmonic distortion in Class B amplifiers.

Module-3 **9 Hours**

Feedback Amplifiers: Concept of feedback, Classification of feedback amplifiers, general characteristics of negative feedback amplifiers, Input and output resistance with feedback of various feedback amplifiers

Oscillators: Concept of positive feedback, RC phase shift oscillator, Wien Bridge oscillator, Hartley oscillator, Colpitt's oscillator and crystal oscillator

Module-4 **9 Hours**

Multistage Amplifiers: Cascaded systems, cascode connection, Darlington Connections **FETs:** Differences between BJT & FET, Construction and characteristics JFET, Depletion MOSFET and Enhancement MOSFET. Voltage divider biasing of JFET and Depletion MOSFET, Feedback biasing and voltage divider biasing of Enhancement MOSFET.

Module-5	**9 Hours**
Small Signal Model of FETs: Small signal model of JFET, gain, input impedance and output impedance of common source JFET amplifier using voltage divider bias. Small signal model of depletion type MOSFET and Enhancement type MOSFET, gain, input impedance and output impedance of E-MOSFET drain feedback configuration and voltage divider configuration, Designing FET amplifier Networks.	
Practical Component of IPCC	
Sl No.	**Experiment**
1.	a) Design, and Testing of Full wave – centre tapped transformer type and Bridge type rectifier circuits with and without Capacitor filter. Determination of ripple factor, regulation and efficiency. (b) Design and simulation of Full wave – centre tapped transformer type and Bridge type rectifier circuits with and without Capacitor filter using PSPICE. Determination of ripple factor, regulation and efficiency.
2.	(a)Frequency response of single stage BJT RC coupled amplifier and determination of half power points, bandwidth, input and output impedances. (b) Frequency response of a single stage FET RC coupled amplifier and determination of half power points, bandwidth, input and output impedances.
3.	Design and testing series, shunt and double ended clipper circuits
4.	Design and testing of positive and negative clamper
5.	(a) Design and testing of BJT -RC phase shift oscillator for given frequency of oscillation. (b)Design and simulation of BJT RC Phase shift oscillator for given frequency of oscillations using PSPICE.
6.	Design and testing of Hartley oscillator for given frequency of oscillation
7.	Design and testing of Colpitt's oscillator for given frequency of oscillation
8.	Design and testing of crystal oscillator for given frequency of oscillations
9.	Determination of gain, input and output impedance of BJT Darlington emitter follower with and without bootstrapping.
10.	Design and testing of Class B power amplifier and to determine conversion efficiency.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Design and analyse biasing circuits of BJT and FET
CO2	Design and analyse amplifiers using BJT and FET
CO3	Understand the concept of negative feedback, positive feedback and working of oscillators
CO4	Design and analyse rectifiers, clippers and clamper circuits using diode

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 20 marks.
Continuous and Comprehensive Evaluation (B)	10	-	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	-	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	-	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**

SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE+SEE **(A+B+C+D)**	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE. 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.			

Question Paper for SEE for IPCC

Theory SEE will be conducted by the college as per the scheduled time table, with common question papers for the course (duration **03**hours)

1. The question paper will have 10 questions with a choice between every pair of questions set for each module. Each question is set for 20 Marks.
2. There will be 2 questions from each module. Each of the 2 questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionately scaled down to 50 Marks
5. The number of question papers set shall be four, out of which two shall be from Internal and remaining two shall be from external examiners.

The theory portion of IPCC shall be for both CIE and SEE

Suggested Learning Resources:

Text Books

1. Electronic Devices and Circuit Theory, Robert L Boylestad Louis Nashelsky, Pearson, 11th Edition, 2015
2. Electronic Devices and Circuits, Millman and Halkias, McGraw Hill, 4th Edition, 2015
3. Electronic Devices and Circuits, David A Bell, Oxford University Press, 5th Edition, 2008

Reference Books

1. Microelectronics Circuits Analysis and Design, Muhammad Rashid, Cengage Learning, 2nd Edition, 2014
2. A Text Book of Electrical Technology, Electronic Devices and Circuits, B.L. Theraja, A.K. Theraja, S. Chand, Reprint, 2013

3. Electronic Devices and Circuits, Anil K. Maini, ,VashaAgarval, Wiley, 1st Edition, 2009
4. Electronic Devices and Circuits, S. Salivahanan, Suresh, McGraw Hill, 3rd Edition, 2013

B.E. (Electrical & Electronics Engineering) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – III			
Course Title:	**Transformers and Generators**		
Course Code:	**BEE304**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. To understand the construction, working and various tests of Single phase Transformer.
2. To illustrate the construction, working and parallel operation of Three phase Transformer.
3. To demonstrate the construction, working and analysis of Synchronous Generator.
4. To summarize the construction and working of DC generators.

Module-1 **9 Hours**

Single-phase Transformers: Introduction , Transformer Construction and practical considerations , Ideal Transformer, Transformer on No-Load, Practical Transformer and Equivalent Circuit, Phasor diagrams under No-Load and ON-Load, Transformer Losses, Efficiency, Condition for maximum efficiency, voltage regulation, Introduction to distribution transformer, all-day efficiency. Numerical.

Transformer Testing: Polarity test, Open circuit and short circuit tests, Sumpner's test, Separtion of core losses in a transformer - Numerical.

Module-2 **9 Hours**

Parallel Operation of Single-phase Transformers: Necessity of Parallel operation, conditions for parallel operation of transformers. Load sharing in case of similar and dissimilar transformers. Numerical.

Three-phase Transformers: Introduction, Constructional features of three-phase transformers. Numerical

Three-phase transformer connections – star/star, delta/delta, delta/star and star/delta, comparative features. Choice between star and delta connections, Three-phase transformer groups. Parallel operation of three phase transformers. Numerical.

Auto transformers and Tap changing transformers: Introduction to autotransformer, comparison with two winding transformer, copper economy. No load and on load tap changing transformers. Numerical

Module-3 **9 Hours**

DC generators :, Construction of a DC machine, Working principle EMF equation, types and applications, Numerical

Synchronous Generators: Construction, working, Armature windings, winding factor, Rating of alternators, EMF equation,, Armature reaction, Synchronous reactance, Equivalent circuit, Harmonics–causes, reduction and elimination. Numerical

Module-4 **9 Hours**

Synchronous Generators Analysis: Open circuit and short circuit characteristics, Assessment of reactance-short circuit ratio, Alternator on load. Voltage regulation by EMF and MMF methods. Load characteristics Numerical.

Module-5	**9 Hours**
Salient Pole Generators : Effects of saliency, two-reaction theory, Parallel operation of generators and load sharing. Determination of Xd and Xq by slip test, Methods of Synchronization, Synchronizing power. **Performance of Synchronous Generators: :**Power angle characteristics, capability curves of synchronous generators, Hunting and damper windings. Numerical	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Explain the construction, working and various tests of single phase Transformer.
CO2	Demonstrate the construction, working and parallel operation of three phase transformer.
CO3	Illustrate the construction, working and analysis of Synchronous Generator.
CO4	Analyse the performance of alternator.
CO5	Understand the construction and working of DC generator

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.

Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE **(A+B+C)**	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

Suggested Learning Resources:

Text Books :

1. Electric Machines, D. P. Kothari, I J Nagrath et al, 4th Edition, 2011.
2. Electric Machines, Ashfaq Hussain, Dhanpat Rai & Co, 2nd Edition, 2013.
3. Electrical Machinery by Dr. P. S .Bimbhra, 7th Edition, 2004

Reference Books:

1. Electric Machines, Mulukuntla S. Sarma, at el, Cengage, 1st Edition, 2009.
2. Electrical Machines, Drives and Power systems, Theodore Wildi, Pearson, 6th Edition, 2014.
3. Principals of Electrical Machines, V.K Mehta, Rohit Mehta, S Chand, 2nd edition, 2009
4. Theory and performance of Electrical Machines by J B Gupta, 14th Edition 2013

B.E. (Electrical and Electronics Engineering) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – III			
Course Title	**Transformers and Generators Lab**		
Course Code	**BEEL305**	**CIE Marks**	**50**
(L:T:P) + (SL)	**(0:0:2) + (0 Hours / Semester)**	**SEE Marks**	**50**
Credits	**01**	**Exam Hours**	**03**

COURSELEARNINGOBJECTIVES: The purpose of the course is to facilitate the learner

- To conduct various tests on transformers and synchronous machines and evaluate their performance.
- To perform the parallel operation on two single phase transformers.
- To study and verify the performance of synchronous generator.
- To calculate the voltage regulation of an alternator using different methods for comparison.

SLNO	Experiments
1	Open Circuit and Short circuit tests on single phase step up or step down transformer and pre- determination of (i) Efficiency and regulation (ii) Calculation of parameters for equivalent circuit.
2	Sumpner's test on similar transformers and determination of individual transformer efficiency.
3	Parallel operation of two dissimilar single-phase transformers of different kVA and determination of load.
4	Polarity test and connection of 3 single-phase transformers in star – delta and determination of efficiency and regulation under balanced resistive load.
5	Separation of hysteresis and eddy current losses in single phase transformer.
6	Load test on single phase multi-tapped Transformer (a) To investigate the voltage and current ratios (b) To determine the efficiency.
7	Voltage regulation of an alternator by EMF and MMF methods.
8	Load test on DC Shunt Generator
9	Performance of synchronous generator connected to infinite bus, under constant power and variable excitation& vice - versa.
10	Voltage regulation of an alternator by ZPF method.
11	Model transformer in Simscape for Automatic Voltage Regulation.
12	Simulate power angle curve of generator in MATLAB.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

COURSE OUTCOMES : At the end of the course the student will be able to	
CO1	Make use of the test data obtained from various tests on transformers to analyze the performance of transformers.
CO2	Examine the sharing of load when two single phase transformers of different kVA rating connected in parallel.
CO3	Compare the efficiency by connecting three single phase transformers for three phase conversion and operation for different cases.
CO4	Analyze the voltage regulation of synchronous generator by different methods.
CO5	Assess the performance of synchronous generator connected to infinite bus.

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 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student 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 Evaluation (CIE) :

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE Practical (A)	30	-	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 30 marks.
CIE Practical Test (B)	20	-	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 20.

Total CIE Practical (A+B)	**50**	**20**	**Sum of Marks of Experiments, Record and Test shall be CIE marks awarded for a maximum of 50.**
SEE (C)	**50**	**20**	**SEE is a lab exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

Continuous Internal Evaluation (CIE):

- CIE marks for the practical course is 50 Marks.
- The split-up of CIE marks for record/ journal and test are in the ratio 60:40.
- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up, conduction of experiments by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Marks awarded for weekly conduction of experiments and submission of laboratory records evaluated for 30 marks.
- 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).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests, each for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, write-up, procedural knowledge, conduction of experiments and acceptable result will carry a weightage of 80% and the rest 20% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The average of 02 tests is scaled down to 20 marks (40% of maximum marks).
- The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is thetotal CIE marks scored by the student.
- The minimum marks to be scored in CIE are 20 out of allotted 50 marks to appear for SEE, with minimum of 40% scored in every component of CIE.

Semester End Evaluation (SEE):

- SEE marks for the practical course is 50 Marks.
- All laboratory experiments are to be included for practical examination.
- Break up (Rubrics) of marks strictly adhered to by the examiners.
- Students can pick up one question (experiment) from the questions lot prepared by the internal/external examiners jointly.
- Evaluation of test write-up, conduction procedure, result and viva-voce will be conducted jointly by examiners. General rubrics suggested for SEE are, for write-up-20%, procedure, conduction 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. (However, based upon course type, rubrics shall be decided by the examiners).
- Change of experiment is allowed only once and 20% marks allotted to the procedure part to be made zero.
- The duration of SEE is 03 hours.

Web links and Video Lectures (e-Resources):

www.nptel.ac.in

B.E.(Electrical and Electronics Engineering)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – III

Course Title	**Digital Logic Circuits**		
Course Code	**BEE306A**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits	**03**	**EXAM HOURS**	**03**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. To illustrate simplification of algebraic equations using Karnaugh Maps.
2. To design decoders, encoders, digital multiplexer, adders, subtractors and binary comparators.
3. To explain latches and flip-flops, registers and counters.
4. To analyze Mealy and Moore Models.
5. To develop state diagrams synchronous sequential circuits.
6. To understand the applications of sequential circuits.

Module – 1 **9 Hours**

Principles of Combinational Logic: Introduction to Basic Logic gates, Definition of combinational logic, canonical forms, Generation of switching equations from truth tables, Karnaugh maps-3,4,5variables,Incompletely specified functions (Don‘t care terms) Simplifying Maxterm equations.

Module – 2 **9 Hours**

Analysis and Design of Combinational logic: General approach to combinational logic design, Decoders, BCD decoders, Encoders, digital multiplexers, Using multiplexers as Boolean function generators, Adders and subtractors, Cascading full adders, Look ahead carry, Binary comparators.

Module – 3 **9 Hours**

Flip-Flops: Basic Bistable elements, Latches, Timing considerations, The master-slave flip-flops (pulse triggered flip-flops):SR flip-flops, JK flip-flops, Edge triggered flip- flops, Characteristic equations.

Module – 4 **9 Hours**

Flip-Flops Applications: Registers, binary ripple counters, synchronous binary counters, Counters based on shift registers, Design of asynchronous counter, Design of asynchronous mod-n counter using clocked T, JK, D and SR flip-flops.

Module – 5	**9 Hours**
Sequential Circuit Design: Mealy and Moore models, State machine notation, Synchronous Sequential circuit analysis, Construction of state diagrams, counter design. Memories: Read only and Read/Write Memories, Programmable ROM, EPROM, Flash memory.	

Course outcomes :

After successfully completing the course, the student will be able to:

CO1	Understand the basics of combinational logic and simplify Boolean expressions using Karnaugh maps.
CO2	Design and analyze combinational circuits like decoders, encoders, multiplexers, adders, and comparators
CO3	Explain the operation of flip-flops and latches, and derive their characteristic equations.
CO4	Design and implement counters and registers using flip-flops
CO5	Analyze and design synchronous sequential circuits and understand memory types like ROM, PROM, and Flash memory.

ASSESSMENT DETAILS (Both CIE and SEE)

Continuous Internal Evaluation (CIE):

Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**

SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE **(A+B+C)**	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

Suggested Learning Resources:

Text Books

1) Donald D Givone, Digital Principles and design, MC Graw Hill 2002
2) Charles H Roth Jr, Larry L Kinney, Fundamentals of logic design, Cengage Learning, 7th Edition
3) John M Yarbrough, Digital logic applications and design, Thomson Learning, 2001.

Reference books:

1) D.P.Kothari and J S Dhillon, -Digital circuits and design, Pearson, 2016
2) Morris Mano, Digital Design, PHI, 3rd edition
3] K.A. Navas, Electronics Lab Manual, Vol.1, PHI 5th edition, 2015.

Web links and Video Lectures (e-Resources):

- https://onlinecourses.nptel.ac.in/noc20_ee32/preview
- National Instruments: https://education.ni.com/teach/resources/1104/digital-electronics

B.E. (Electrical and Electronics Engineering) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – 3			
Course Title:	**Electrical Measurements and Instrumentation**		
Course Code:	**BEE306B**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Understand the significance and methods of Measurements, elements of generalised measurement system and errors in measurements.
2. Analyse measurement of resistance, inductance, capacitance by using of different bridges.
3. Understand construction, working and characteristics of various instrument transformers.
4. Understand the working of electronic instruments and display devices.

Module-1:Measurements and Measurement Systems **9 Hours**

Measurements and Measurement Systems: Introduction, significance and methods of Measurements, Instruments and measurement systems, Mechanical, electrical and electronic instruments. Classification of instruments. Functions and applications of Measurement systems. Types of Instrumentation systems, information and signal processing. Elements of generalized measurement system. Input-output configurations of measuring instruments and measurement systems. Methods of correction for interfering and modifying inputs, errors in measurements, Accuracy and precision.

Module-2: Measurement of Resistance, Capacitance and Inductance **9 Hours**

Measurement of Resistance: Wheatstone's bridge, sensitivity, limitations. Kelvin's double bridge. Earth resistance measurement by fall of potential method and by using Megger.

Measurement of Inductance and Capacitance: Sources and detectors, Maxwell's inductance and capacitance bridge, Hay's bridge, Anderson's bridge, Desauty's bridge, Schering bridge. Shielding of bridges. (Derivations and Numerical as applicable). Measurement of frequency using Wien's Bridge.

Module-3: Instrument Transformers **9 Hours**

Instrument Transformers: Introduction, Use of Instrument transformers. Burden on Instrument transformer.

Current Transformer (CT): Relationships in CT, Errors in CT, characteristics of CT, causes and reduction of errors in CT, Construction and theory of CT.

Potential Transformer (PT): Difference between CT and PT, Relationships in PT, Errors in PT, characteristics of PT, reduction of errors in PT.

Module-4: Electronic and Digital Instruments **9 Hours**

Electronic and Digital Instruments: Introduction. Essentials of electronic instruments, Advantages of electronic instruments. True RMS reading voltmeter. Electronic multimeters. Digital voltmeters (DVM) - Ramp type DVM, Integrating type DVM and Successive -

approximation DVM. Q meter. Principle of working of electronic energy meter (with block diagram), extra features offered by present day meters and their significance in billing.
Module-5: Display and Recording Devices **9 Hours**
Display Devices: Introduction, character formats, segment displays, Dot matrix displays, Bar graph displays. Cathode ray tubes, Light emitting diodes, Liquid crystal displays, Nixes, Incandescent, Fluorescent, Liquid vapour and Visual displays. **Recording Devices:** Introduction, Strip chart recorders, Galvanometer recorders, Null balance recorders, Potentiometer type recorders, Bridge type recorders, LVDT type recorders, Circular chart and X-Y recorders. Digital tape recording, Ultraviolet recorders. Electro Cardio Graph (ECG).

After successfully completing the course, the student will be able to:

CO1	Explain the significance and methods of Measurements, elements of generalised measurement system and errors in measurements.
CO2	Measure resistance, inductance and capacitance by different methods.
CO3	Explain the construction, working and characteristics of various instrument transformers
CO4	Explain the working of different electronic instruments and display devices.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE	**100**	**40**	Final marks shall be the sum of marks

(A+B+C)			scored in Components **A, B and C.**

- The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.
- **If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.**

Suggested Learning Resources:

Text Books

1. Electrical and Electronic Measurements and Instrumentation, A.K. Sawhney, Dhanpat Rai & Co, 10th Edition
2. A Course in Electronics and Electrical Measurements and Instrumentation, J. B. Gupta, Katson Books, 2013.

Reference Books:-

1. Electrical and Electronic Measurements and Instrumentation, R.K. Rajput, S Chand, 5th Edition, 2012.
2. Electrical Measuring Instruments and Measurements, S.C. Bhargava, BS Publications, 2013
3. Modern Electronic Instrumentation and Measuring Techniques, Cooper D and A.D. Heifrick, Pearson, First Edition, 2015.
4. Electronic Instrumentation and Measurements, David A Bell, Oxford University, 3rd Edition, 2013.
5. Electronic Instrumentation, H.S.Kalsi, Mc Graw Hill, 3rd Edition,2010.

B.E. (Electrical and Electronics Engineering) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – 03			
Course Title:	**ELECTRICAL POWER GENERATION AND ECONOMICS**		
Course Code:	**BEE306C**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**03**

COURSE LEARNING OBJECTIVES: The purpose of the course is to facilitate the learner to:

1. Understand the arrangement and operation of hydroelectric, steam, diesel, gas turbine and nuclear power plants and working of major equipment in the plants.
2. Classification of substation and explain the operation of different substation equipment.
3. Understand the importance of grounding and different grounding methods used in practice.
4. Understand the economics of power generation and importance of power factor.

Module-1 **9 Hours**

HYDROELECTRIC POWER PLANTS: Hydrology, run off and stream flow, hydrograph, flow duration curve, Mass curve, Selection of site, advantages and disadvantages of hydroelectric power plants, Classification of hydroelectric power plants, storage and pondage, general arrangement of hydroelectric power plants, elements of the plant.

WATER TURBINES– Pelton wheel, Francis, Kaplan and propeller turbines, Governor and speed regulation of Pelton turbines, reaction turbines.

Module-2 **9 Hours**

THERMAL POWER PLANT: Introduction, selection of site. Working of steam plant, Power plant equipment and layout, Efficiency of thermal plants, Steam turbines, Fuels and fuel handling, Fuel combustion and combustion equipment, Coal burners, Fluidized bed combustion, Ash handling, Dust collection, Draught systems, Feed water heater, econimiser air pre-heaters.

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.

Module-3 **9 Hours**

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.

Module-4 **9 Hours**

SUBSTATIONS: Introduction, types of substations, substation bus schemes, substation

equipments – circuit breakers, isolators, fuses, lightning arrester, reactors and capacitors. **GROUNDING:** Introduction, Difference between grounded and ungrounded system. System grounding ungrounded, solid grounding, resistance grounding, reactance grounding, resonant grounding. Voltage transformer earthing.
Module-5 **9 Hours**
ECONOMICS: Introduction, diversity factor, load factor, plant capacity factor, load curves, numericals. **TARIFF:** Objectives of tariff, Factors influencing rate of tariff, types of tariff Numericals. **POWER FACTOR:** Disadvantages of low power factor, 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 Numericals.

COURSE OUTCOMES

After successfully completing the course, the student will be able to:

CO1	Understand the working principles of hydro electric power plant
CO2	Understand working of thermal power plants, and diesel, gas turbine power plants and state functions of major equipments of the power plants nuclear power plant.
CO3	Understand the design of various substations and explain the functions of major equipments in substations. And grounding
CO4	Analyse the economic aspects of power system operation and its effects
CO5	Understand the importance of power factor improvement

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.

Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

- The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.
- **If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.**

Suggested Learning Resources:

Text Books

1. A Text Book on Power System Engineering A.Chakrabarti, ML. Soni, PV Gupta, U.S Bhatnagar Dhanpath Rai 2nd Edition, 2010
2. Power Plant Engineering P.K. Nag McGrawHill 4th Edition,2014
3. Electrical power Generation, Transmission and Distribution S.N. Singh PHI 2nd Edition, 2009

B.E. (Electrical & Electronics Engineering) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – III			
Course Title:	**Computer Organization & Architecture**		
Course Code:	**BEE306D**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Know basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
2. Gain knowledge on computer arithmetic, instruction set, micro programmed control unit, pipelining and vector processing, memory organization and I/O systems

Module-1	**9 Hours**
Computer Data Representation: Basic computer data types, Complements, Fixed point representation, Floating Point Representation. **Register Transfer and Micro operations:** Register Transfer Language, Register transfer, Bus and Memory transfer, Arithmetic Micro operations, Logic Micro-operations, Shift Micro operations, Arithmetic Logic Shift Unit.	
Module-2	**9 Hours**
Basic Computer Organization and Design: Instruction codes, Computer registers, computer instructions, Timing and Control, Instruction cycle, Memory-Reference Instructions, Input output and interrupt, Complete computer description, Design of Basic computer, design of Accumulator Unit **Programming Basic Computer:** Introduction, Machine Language, Assembly Language, assembler, Program loops.	
Module-3	**9 Hours**
Programming Basic Computer: Programming Arithmetic and logic operations and subroutines **Computer Arithmetic:** Introduction, Addition and subtraction, Multiplication Algorithms (Booth Multiplication Algorithm), Division Algorithms.	
Module-4	**9 Hours**
Micro programmed Control and Central Processing Unit: Control Memory, Address sequencing, Micro program Example, design of control Unit, General Register Organization, Stack Organization, Instruction format, Addressing Mode. **Memory Organization:** Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory	
Module-5:	**9 Hours**
Input-Output Organization: Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, DMA	

Pipeline and Vector Processing: Flynn's taxonomy, Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction, Pipeline.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand computer data representation and register transfer and micro operations
CO2	Understand computer organization, design and basic computer programming
CO3	Understand the application of multiplication and division algorithms in computer arithmetic
CO4	Develop a detailed understanding of architecture and functionality of central processing unit
CO5	Understand of I/O devices communicating with Processing Unit and also knowing the characteristics of vector processing.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**

CIE + SEE **(A+B+C)**	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

Question Paper for SEE

Theory SEE will be conducted by the college as per the scheduled time table, with common question papers for the course (duration **03**hours)

1. The question paper will have 10 questions with a choice between every pair of questions set for each module. Each question is set for 20 Marks.
2. There will be 2 questions from each module. Each of the 2 questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionately scaled down to 50 Marks

Suggested Learning Resources:

Text Books

1. M. Morris Mano, Computer System Architecture, Pearson
2. Andrew S. Tanenbaum and Todd Austin, Structured Computer Organization, Sixth Edition, PHI
3. John Hayes, Computer Architecture and Organization, McGrawHill

Reference Books:

1. Hall D, Microprocessors and Interfacing 2E. McGraw-Hill Education (India) Pvt Limited
2. R. S. Gaonkar, "Microprocessor Architecture, Programming and Applications with 8085A", Penram International

B.E. (Common to All Branches)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – III

Course Title:	**Social Connect and Responsibility**		
Course Code:	**BSCK307**	**CIE MARKS**	**100**
L :T : P	**0:0:2**	**SEE MARKS**	**-**
Credits:	**1**	**EXAM HOURS**	**-**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Provide a formal platform for students to communicate and connect to the surrounding.
2. Create a responsible connection with the society.
3. Understand the community in general in which they work.
4. Identify the needs and problems of the community and involve them in problem–solving.
5. Develop among them a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
6. Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

General Instructions - Pedagogy:

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

1. 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 social and cultural skills.
2. State the need for activities and its present relevance in the society and provide real-life examples.
3. Support and guide the students for self-planned activities.
4. You will also be responsible for assigning homework, grading assignments and quizzes, and documenting students' progress in real activities in the field.
5. Encourage the students for group work to improve their creative and analytical skills.

Module-1 **3 Hours**

Plantation and adoption of a tree: Plantation of a tree that will be adopted for four years by a group of BE students. (ONESTUDENT-ONE TREE).

Students can prepare either a Report or a Poster describing the plant's origin, its usage in daily life, its appearance in folklore and literature.

Module-2 **3 Hours**

Heritage walk and crafts corner

Heritage walk- Heritage tour, knowing the history and culture of the city, connecting to people around through their history.

crafts corner- Knowing the city and its craftsman, photo blog and documentary on evolution and practice of various craft forms.

Module-3 **3 Hours**

Organic farming and waste management **Organic Farming:** History of organic farming, objective of organic farming, types of organic farming, Usefulness of organic farming. **Waste Management:** Study of wet waste management in college, Hostel and neighboring villages, and implementation in the campus.
Module-4 **3 Hours**
Water conservation Knowing the present practices in the surrounding villages and implementation in the campus, documentary or photo blog presenting the current practices.
Module-5 **3 Hours**
Food walk City's culinary practices, food lore, and indigenous materials of the region used in cooking.

Course outcomes

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 the 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.

Assessment Details for CIE(both CIE and SEE)

Weightage	**CIE – 100%**	
Field Visit, Plan, Discussion	10 Marks	• Implementation strategies of the project. • The last report should be signed by SCR coordinator, the HOD and Principal. • At last report should be evaluated by the SCR Coordinator. • Finally, the consolidated 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 for10 minutes by each student at the end of semester with Report. **Activities1to5,5*5=25**	25 Marks	sheet should be sent to the CoE/ university and to be made available at LIC visit.
Total marks for the course in each semester	**100 Marks**	
For each activity, 20 marks CIE will be evaluated for IA marks at the end of semester, Report and assessment copy should be made available in the department.		
Students should present the progress of the activities as per the schedule in the prescribed practical session in the field. There should be positive progress in the vertical order for the benefit of society in general through activities.		

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 learnedinthesocialconnectperiod.Thereportshouldbesignedbythementor.Thereportshall be evaluated on the basis of the following criteria and/or other relevant criteria pertaining to the activitycompleted.Marksallottedforthediaryareoutof50.Planningandschedulingthesocial 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 to100
Good :60 to79
Satisfactory :40to59
Unsatisfactory and fail : <39

SPECIALNOTE:NO SEMESTER END EXAM (SEE)–COMPLETELY PRACTICAL AND ACTIVITIES-BASEDEVALUATION

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?

COURSETOPICS

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 conversion 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 30 - 35 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 mentors. Faculty mentors 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.

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 of 5	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 of 5	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 of 5	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 of 5	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 of 5	Villages/CityAreas/ 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 f ield to start activities
2	Students Presentation on Ideas
3	Execution of Activity - Plantation and adoption of a tree
4	Execution of Activity - Heritage walk and crafts corner
5	Execution of Activity - Organic farming and waste management
6	Execution of Activity - Water conservation
7	Execution of Activity – Food walk
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 from1st to 5th, compiled report should be submitted as per the instructions and scheme.

B.E. (Common to all Branches) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – III			
Course Title:	**FOREIGN LANGUAGE COURSE 1- GERMAN**		
Course Code:	**BFLC358A**	**CIE MARKS**	**50**
(L :T : P) + SL	**(1:0:0) + (15 Hours/ Sem)**	**SEE MARKS**	**50**
Credits:	**1**	**EXAM HOURS**	**02**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. To develop basic communication skills in German.
2. To introduce German grammar and sentence structure.
3. To enhance vocabulary in everyday and academic contexts.
4. To enable students to comprehend and respond in spoken and written German.
5. To build intercultural awareness through authentic material like short films and dialogues.

Module 1	**3 Hours**
Vocabulary for day to day activities, Time – official/in official, Possessive articles, Speaking about family, Time prepositions, Worksheets, Short Film Textbook 1: Chapter 5, 6	
Module 2	**3 Hours**
Talk about hobbies, Talking about plans, Trennbareverben/seperable verbs, Going to a restaurant, Worksheets, Short Film Textbook: Chapter 5, 6	
Module 3	**3 Hours**
Talking about jobs, Talking about the workplace, Helping verbs in Past tense , Attending events in your town, Worksheets, Short Film Textbook: Chapter 7,8	
Module 4	**3 Hours**
Daily routine, Body parts, Common illnesses, Visiting the doctor, Healthy living, Worksheets, Short Film Textbook: Chapter 7,8	
Module 5	**3 Hours**
Dativ Imperative, Small Talk…Worksheets, Short Film Textbook: Chapter 7,8	

Course outcomes

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

CO1: Understand and apply basic German grammar and sentence structure.
CO2: Communicate using appropriate vocabulary and expressions in daily situations.
CO3: Fill out simple forms and conduct structured conversations.

CO4: Comprehend basic written and audio-visual content in German.
CO5: Recognize basic cultural and linguistic distinctions in German-speaking countries.

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Average of Two Internal Assessment Tests (MCQs) each conducted for 25 marks.
Alternate Assessment (B)	20	-	Any two Assessment methods as per 24RNBE4.2, scaled to 25 marks.
Total CIE (A+B)	50	20	The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks.
SEE (C)	50	18	Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 2 hours.
CIE + SEE (A+B+C)	100	40	Final marks shall be the sum of marks scored in Components A, B and C.
The minimum marks to be secured in CIE are 20 out of allotted 50 marks to appear for SEE.			

Textbooks

1.Netzwerk A1 Neu Kursbuch
2.Netzwerk A1 Neu Ubungsbuch

Web links and Video Lectures(e-Resources)

- https://www.youtube.com/playlist?list=PLquImyRfMt6esqE6C4RdOeg0h0IBeYWri
- https://www.youtube.com/playlist?list=PLWO81tQUNYnX7laegkYvzQiMrSghMXYCZ
- https://www.youtube.com/watch?v=4-eDoThe6qo
- https://learngerman.dw.com/en/wer-spricht/l-56577891/e-57119877

Activity Based Learning (Suggested Activities in Class)/Practical Based learning

- Role Play
- Flipped classroom
- Debate
- Films
- Quiz
- Games
- Handouts

B.E. (Common to all Branches) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – III			
Course Title:	**FOREIGN LANGUAGE COURSE 1- SPANISH**		
Course Code:	**BFLC358B**	**CIE MARKS**	**50**
(L :T : P) + SL	**(1:0:0) + (15 Hours/ Sem)**	**SEE MARKS**	**50**
Credits:	**1**	**EXAM HOURS**	**02**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. To introduce learners to the basics of Spanish phonetics and vocabulary.
2. To familiarize learners with basic sentence elements such as articles, pronouns, and regular verbs.
3. To promote simple self-expression and comprehension in everyday scenarios.
4. To prepare the learners to introduce and describe a person.

Module 1	**3 Hours**
Introduction and Phonetics: • Spanish alphabet and sounds. • Numbers (0–50), days and months. • Greetings and introducing yourself. Textbook: Chapter 0 and Chapter 1 – Lesson 2	
Module 2	**3 Hours**
Nouns and Articles • Gender and number of nouns. • Definite and indefinite articles. • Simple sentence structure with nouns. Textbook: Chapter 2 – Lesson 3	
Module 3	**3 Hours**
Subject Pronouns and Regular Verbs • Subject pronouns (yo, tú, él, etc.). • Present tense of regular AR/ER/IR verbs. • Making positive and negative sentences. Textbook: Chapter 2 – Lesson 4	
Module 4	**3 Hours**
Ser vs Estar and Adjectives • Usage of 'ser' and 'estar'. • Descriptive adjectives and agreement. • Describing people and places. Textbook: Chapter 6 – Lesson 11	
Module 5	**3 Hours**
Demonstratives, Possessives, and Family • Demonstrative adjectives (este, esa, etc.).	

- Possessive adjectives (mí, tu, su, etc.).
- Talking about family and relationships.

Textbook: Chapter 4 – Lesson 7 & Lesson 8; Chapter 6 – Lesson 12

Course outcomes

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

CO1: Recognize and pronounce basic Spanish phonemes and vocabulary.

CO2: Use articles, nouns, subject pronouns and regular verbs in simple sentences.

CO3: Construct and understand basic descriptive sentences using 'ser' and 'estar'.

CO4: Identify and describe relationships using demonstratives and possessives.

Assessment Details (both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Average of Two Internal Assessment Tests (MCQs) each conducted for 25 marks.
Alternate Assessment (B)	20	-	Any two Assessment methods as per 24RNBE4.2, scaled to 25 marks.
Total CIE (A+B)	50	20	The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks.
SEE (C)	50	18	Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 2 hours.
CIE + SEE (A+B+C)	100	40	Final marks shall be the sum of marks scored in Components A, B and C.

- The minimum marks to be secured in CIE are 20 out of allotted 50 marks to appear for SEE.

Textbook:

1. Chicos Chicas 1
2. Resources and Exercises from Aventura Hispana

Web links:

- **YouTube channels:** Butterfly Spanish, Dreaming Spanish

Activity Based Learning (Suggested Activities in Class)/Practical Based learning

- Role Play
- Debate
- Short videos
- Games
- Handouts

B.E: Electrical and Electronics Engineering Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – III			
Course Title	**Digital Logic Circuits Laboratory**		
Course Code	**BEEL358C**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(0:0:2) + (0 Hours / Semester)**	**SEE MARKS**	**50**
Credits	**01**	**EXAM HOURS**	**03**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. To simplify and realize Boolean expressions using logic and universal gates.
2. To design and implement combinational circuits such as adders, subtractors, comparators, and code converters.
3. To understand and verify the operation of flip-flops and sequential circuits including counters and shift registers.
4. To use standard digital ICs (multiplexers, decoders, encoders, display drivers) in the design of arithmetic and logic circuits.

Sl. No.	Experiments
1	Simplification, realization of Boolean expressions using logic gates/Universal gates.
2	Realization of Half/Full adder and Half/Full Subtractors using logic gates.
3	(i) Realization of parallel adder/Subtractors using 7483 chip. **(ii)** BCD to Excess-3 code conversion and vice versa.
4	Realization of Binary to Gray code conversion and vice versa
5	MUX/DEMUX – use of 74153, 74139 for arithmetic circuits and code converter.
6	Realization of One/Two-bit comparator and study of 7485 magnitude comparator.
7	Use of a) Decoder chip to drive LED display and b) Priority encoder.
8	Design and implement the JK Master-Slave Flip-Flop and verify its truth table by simulating its operation for all possible input combinations.
9	Realization of 3-bit counters as a sequential circuit and MOD – N counter design (7476, 7490, 74192, 74193).
10	To perform Shift left, shift right, SIPO, SISO, PISO, PIPO operations using 74S95.
11	Wiring and testing Ring counter/Johnson counter.
12	Wiring and testing of Sequence generator.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Simplify and implement Boolean functions using basic and universal logic gates.
CO2	Design and realize arithmetic and code conversion circuits using standard ICs.
CO3	Implement combinational circuits using MUX/DEMUX, decoders, and encoders.
CO4	Analyze and verify the behavior of flip-flops and design basic sequential circuits.
CO5	Design and test counters, shift registers, and sequence generators using digital ICs.

ASSESSMENT DETAILS (Both CIE and SEE)

Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE Practical (A)	30	-	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 30 marks.
CIE Practical Test (B)	20	-	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 20.
Total CIE Practical (A+B)	**50**	**20**	**Sum of Marks of Experiments, Record and Test shall be CIE marks awarded for a maximum of 50.**
SEE (C)	**50**	**20**	**SEE is a lab exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**

CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

B.E. (Electrical & Electronics Engineering) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – III			
Course Title:	**Electrical Hardware Laboratory**		
Course Code:	**BEEL358D**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(0:0:2) + (0 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**1**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

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.

Sl No.	Experiments
1.	Verification of KCL and KVL for DC Circuits.
2.	Verification of KCL and KVL for AC Circuits.
3.	Measurement of Current, Power and Power Factor of Incandescent Lamp, Fluorescent Lamp and LED Lamp.
4.	Measurement of Resistance using V-I method.
5.	Measurement of Resistance and Inductance of a Choke coil using three voltmeter method.
6.	Determination of Phase and Line quantities in three-phase star and delta connected loads.
7.	Two-Way and Three-Way Control of Lamp and Formation of Truth Table.
8.	Measurement of Earth Resistance using fall of potential method.
9	Determination of fuse characteristics.
10	Evaluate the loading effect of Voltmeter of electric circuits.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Apply Kirchhoff's Current and Voltage Laws (KCL & KVL) to verify circuit behaviour in DC and AC circuits.
CO2	Measure current, power, and power factor in different lighting systems and analyze efficiency.
CO3	Evaluate the loading effect of voltmeters and determine resistance using V-I and three-voltmeter methods.

CO4	Analyze three-phase star and delta connections, interpreting phase and line quantities.
CO5	Implement two-way & three-way lamp control circuits and measure earth resistance & fuse characteristics.

ASSESSMENT DETAILS (Both CIE and SEE)

1-Credit Lab Course			
Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE Practical (A)	30	-	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 30 marks.
CIE Practical Test (B)	20	-	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 20.
Total CIE Practical (A+B)	**50**	**20**	**Sum of Marks of Experiments, Record and Test shall be CIE marks awarded for a maximum of 50.**
SEE (C)	**50**	**20**	**SEE is a lab exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

B.E. (Common to All Branches) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – III			
Course Title:	**NSS-National Service Scheme**		
Course Code:	**BNSK359**	**CIE MARKS**	**100**
L : T : P: SL	**0:0:0:30**	**SEE MARKS**	**0**
Credits:	**0**	**EXAM HOURS**	**-**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Identify the needs and problems of the community and involve the problem–solving.
2. Develop among them a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
3. Develop competence required for group-living and sharing of responsibilities & gains kills in mobilizing community participation to acquire leadership qualities and democratic attitudes.

Module-1
Introduction and Basic Concepts of NSS Aims and Objective of NSS. Emblem, Moto, Flag Role and Responsibility of youth in various activities of NSS
Module-2
Youth Leadership Definition of Leadership and Important components (Social, Mental, Moral and Cultural) Qualities and Characteristics of good leaders Role of Youth leadership
Module-3
Community Work through NSS Community Work: Meaning and Nature Concept of regular activities undertaking of NSS
Module-4
NSS Activity-1
Module-5
NSS Activity-2

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the motto and concepts of NSS

CO2	Develop overall personality of volunteers and make them as leaders and responsible citizens of our nation
CO3	Analyze the environmental and societal problems/issues and will be able to design solutions for the same.
CO4	Communicate effectively with the community and with the officials.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
Evaluation based on Reports (A)	100	-	5 modules Reports, 5 modules X 10 M each = 50 M
Total CIE Theory (A)	**100**	**40**	
SEE (B)	-	-	-
CIE+SEE (A+B)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B**
• The minimum marks to be secured in CIE is 40 out of allotted 50 marks with minimum 40 % scored in every component of CIE. • No SEE for this subject			

Reference 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.

Web links

1. https://nss.gov.in/
2. https://pledge.mygov.in/

B.E. (Common to All Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – III

Course Title:	**Physical Education**		
Course Code:	**BPEK359**	**CIE MARKS**	**100**
L: T: P: S	**0:0:1:0**	**SEE MARKS**	**---**
Credits:	**---**	**EXAM HOURS**	**---**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Understand the fundamental concepts of Physical Education, games and sports skills, Health, Nutrition and Fitness
2. Familiarization of health-related Exercises, Sports for overall growth and development
3. Participate in the competition at regional/state / national / international levels.
4. Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.

Module-1 **5 Hours**

Orientation

A. Meaning and Importance of Physical Education
B. Lifestyle
C. Health & Wellness

Module-2 **5 Hours**

General Fitness & Components of Fitness

A. Meaning and Importance of Fitness
B. Warming up (Free Hand exercises)
C. Strength – Push-up / Pull-ups

Module-3 **5 Hours**

Specific games (Anyone to be selected by the student)

A. Kabaddi

a) Fundamental skills

Hand touch, Toe Touch, Thigh Hold, Ankle hold and Bonus.

b) Offensive Skills:

Raiding, Hand Touch, Toe Touch, Dubki, Squat Thrust

c) Defensive Skills:

Tackling, Ankle Hold, Thigh Hold, Waist Hold, Blocking, Chain Tackle

d) Other Important Skills:

Agility, Speed, Breath Control, Breath Holding

e) Rules and their interpretation and duties of the officials

B. Kho-Kho

a) Fundamental skills

Giving Kho, Single Chain, Pole dive, Pole turning, 3-6 Up.

b) Skills in Chasing:

Sit on the box (Parallel & Bullet toe method), Get up from the box (Proximal & Distal foot method), Give Kho (Simple, Early, Late & Judgment), Pole Turn, Pole Dive, Tapping, Rectification of foul.

c) Skills in running:

Chain Play, Ring play and Chain & Ring mixed play.

d) Game practice with application of Rules and Regulations.

e) Rules and their interpretations and duties of the officials.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the fundamental concepts of Physical Education, games and sports skills, Health, Nutrition and Fitness
CO2	Familiarization of health-related Exercises, Sports for overall growth and development
CO3	Participate in the competition at regional/state/national/international levels.
CO4	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	60	-----	Sum of Two Internal Assessment Tests (MCQs) each conducted for 30 marks.
Quiz(B)	40	-----	Quiz for a maximum of 40 marks
Total CIE (A+B)	100	40	CIE Evaluation is done for a maximum of 100 marks
• The minimum marks to be secured in CIE is 40 (40%) out of 100 marks allotted to Pass.			

ASSESSMENT DETAILS (Both CIE and SEE)

Textbooks

1. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata.

Reference Books

1. Saraswati Health and Physical Education Textbook
2. V.K. Sharma's Health and Physical Education

B.E. (Common to All Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – III

Course Title:	**Yoga**		
Course Code:	**BYOK359**	**CIE MARKS**	**100**
L: T: P: S	**0:0:1:0**	**SEE MARKS**	**---**
Credits:	**---**	**EXAM HOURS**	**---**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Physical, Mental & spiritual Objectives of Yoga
2. Explain the meaning of Yoga.
3. Discuss the importance of the Yoga and its scope.
4. Describe the aims and objectives of Yoga.
5. Clarify the misconceptions on Yoga

Module-1 **5 Hours**

Orientation

a) Introduction of Yoga
b) Aim, and Objectives of Yoga,
c) Yoga, its origin, history and development.

Module-2 **5 Hours**

Yoga

a) Yoga, its meaning, definitions.
b) Brief introduction of yogic practices for the common man
c) Rules and regulations
d) Misconceptions of Yoga
e) Surya namaskara

Module-3 **5 Hours**

Asanas

Types of Asanas:

a) **Sitting-**	1. Padmasana,	2. Vajrasana
b) **Standing-**	1. Vrikshana,	2. Trikonasana
c) **Prone line-**	1. Bhujangasana	2. Shalabh asana
d) **Supine line-**	1. Utthita dvipadasana	2. Ardha halasana

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the fundamental concepts of Yoga
CO2	Improves of health and related aspects, overall growth and development
CO3	Participate in the competition at regional/state/national/international levels.
CO4	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	60	----	Sum of Two Internal Assessment Tests (MCQs) each conducted for 30 marks.
Quiz(B)	40	----	Quiz for a maximum of 40 marks
Total CIE (A+B)	100	40	CIE Evaluation is done for a maximum of 100 marks
• The minimum marks to be secured in CIE is 40 (40%) out of 100 marks allotted to Pass.			

Textbooks

1. The Yoga Sutras of Patanjali – Sri Swami Satchidananda.
2. Light on Yoga — B.K.S Iyengar.

Reference Books

1. The Heart of Yoga — T.K.V Desikachar.
2. "Asana Pranayama Mudra Bandha" bySwamiSatyanandaSaraswati.

IV SEMESTER SUBJECTS

B.E. (Electrical & Electronics Engineering)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – IV

Course Title:	**Electric Motors**		
Course Code:	**BEE401**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:2:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**04**	**EXAM HOURS**	**03**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. To understand the constructional features of motors and their applications.
2. To demonstrate the constructional features of Three Phase Induction motor and single phase induction motors.
3. To illustrate different tests to be conducted for the assessment of the performance characteristics of motors.
4. Explain the construction and operation of Synchronous motor and special motors.

Module-1 **9 Hours**

DC Motors: Principle of operation, significance of back EMF, Torque equation and power developed by armature, characteristics of DC motors, speed control of DC shunt motor, starters for DC motors, losses and efficiency in DC machine, condition for maximum efficiency.

Testing of DC Machines: Brake test, Swinburne's test, regenerative test, applications of DC motors. Numerical.

Module-2 **9 Hours**

Three Phase Induction Motor : Construction, Types – squirrel cage and slip-ring motor, Working principle, Concept of Rotating magnetic field, Slip and its significance-Torque equation, starting torque and maximum torque and their relations, Torque –slip characteristics showing motoring, generating and braking regions of operation- Applications-Numerical

Module-3 **9 Hours**

Performance of Three-Phase Induction Motor: Equivalent circuit, phasor diagrams (No – load and ON load) losses, efficiency, power flow diagram, No-load and blocked rotor tests, cogging and crawling, High torque cage rotors- deep-bar and double cage rotors. Numerical

Module-4 **9 Hours**

Starting of Three-Phase Induction Motors: Necessity of starter, Starting of cage motors- direct on-line starter, star-delta starter, autotransformer starter. Slip ring induction motor starter.

Speed Control of three phase induction motor : Methods employed for speed control- Autotransformer method and rotor resistance control method- Numerical

Single Phase Induction Motors : Pulsating field as two rotating fields and principle of operation, construction and operation of resistance split-phase motor, capacitor-split phase motor, shaded pole motor, Performance and cost comparison and choice of single phase induction motors, Applications –Numerical

Module-5	**9 Hours**
Synchronous Motors: Principle of operation, equivalent circuit and phasor diagrams, Torque equation, Power flow equations, V and Inverted V curves , Starting methods, applications of synchronous motors. Numerical **Special Machines:** Construction and operation of Universal motor , PMSM, SRM and BLDC motor.	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Explain the construction, working and various tests of DC motors.
CO2	Demonstrate the construction, working and performance characteristics of three phase Induction motor.
CO3	Illustrate various starting methods of three phase Induction motor.
CO4	Understand the construction, working of different single phase induction motors.
CO5	Describe the construction, working and performance of synchronous motors and special motors.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks.**

			Exam duration shall be for 3 hours.
CIE + SEE **(A+B+C)**	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

Suggested Learning Resources:

Text Books :

1. Electric Machines, D. P. Kothari, I J Nagrath et al, 4th Edition, 2011.

2. Electric Machines, Ashfaq Hussain, Dhanpat Rai & Co, 2nd Edition, 2013.

3. Electrical Machinery by Dr. P. S .Bimbhra, 7th Edition, 2004

Reference Books:

1. Electric Machines, Mulukuntla S. Sarma, at el, Cengage, 1st Edition, 2009.

2. Electrical Machines, Drives and Power systems, Theodore Wildi, Pearson, 6th Edition, 2014.

3. Principals of Electrical Machines, V.K Mehta, Rohit Mehta, S Chand, 2nd edition, 2009

4. Theory and performance of Electrical Machines by J B Gupta, 14th Edition 2013

B.E : Electrical and Electronics Engineering Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – IV			
Course Title:	**Transmission and Distribution**		
Course Code:	**BEE402**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:2:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**4**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. To understand the structure of transmission and distribution systems, mechanical design and the types of insulators.
2. To compute the line parameters in the transmission system
3. To analyse the performance of the transmission and distribution systems
4. To understand the construction of cables and insulations.
5. To classify the distribution systems and the distributor schemes

Module-1 **9 Hours**

Introduction: Structure of power systems, General Introduction to power transmission by DC and AC overhead lines, single line diagram- EHVAC and HVDC transmission advantages and disadvantages ACSR conductors and its properties.

Mechanical Overhead design: Sag and Tension- Sag calculation for equal and unequal level supports – effect of wind and ice – Consideration in mechanical design of lines.

Insulators: Types - advantages voltage distribution in suspension insulators – string efficiency – method of improving string efficiency.

Module-2 **9 Hours**

Line Parameters: Resistance, inductance and capacitance calculations in single and three phase transmissions lines - symmetrical and unsymmetrical spacing, transposition- self and mutual GMD.

Module-3 **9 Hours**

Transmission Line Performance: Voltage regulation, Transmission efficiency - Representation of transmission lines: Short, medium and long lines - ABCD constants - Ferranti effect.

Module-4 **9 Hours**

Insulated Cables: Underground cables – types, construction – capacitance of the cables – insulation resistance – dielectric stresses and grading – dielectric losses –thermal characteristics – capacitance of three core cable.

Corona: Critical Disruptive Voltage (CDV), practical importance – Advantages and disadvantages of corona, factors affecting corona, visual critical voltage, power loss due to corona.

Module-5 **9 Hours**

Distribution System: Classification, section and size of feeders, schemes of distributor connections AC distributors; DC Distributors, Reliability and Power quality.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the structure of power systems and compute the transmission line parameters of single and three phase transmission line
CO2	Analyse the performance of transmission of systems using ABCD Constants and Ferranti effect
CO3	Evaluate the cable performance and apply distribution system principles to AC and DC distributors.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be lucted. Average of Two Internal Assessment s shall be scaled down to 30 marks.
Continuous and prehensive uation (B)	20	-	Any two Assessment methods as per NBE4.2 (*if it is project based, one gnment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of arks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 ks and scaled down to 50 marks. Exam ation shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	**Final marks shall be the sum of marks ed in Components A, B and C.**

- **The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.**
- **If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.**

Suggested Learning Resources:

Text Books

1 I.J.Nagrath, D.P.Kothari, Power System Engineering, Tata McGraw Hill Ltd, New Delhi, 2017.
2 CL Wadhwa, Electrical Power Systems, 2017,7th Edition, New Age publication
3 B.R. Gupta Generation of Electrical Energy-7th edition, S.Chand Publishers, New Delhi,2017.

Reference Books:-

1 S.N. Singh, 'Electric Power Generation, Transmission and Distribution', Prentice Hall of India Pvt. Ltd, New Delhi, Second Edition, 2011

2 Ailson P. de Moura, Adriano Aron F. de Moura, Ednardo P. da Rocha, Transmission of ElectricalEnergy-Overhead Lines, CRC Press, 2020.

3 Leonard L. Grigsby , Electric Power Generation, Transmission, and Distribution, CRC Press, 2018

B.E. (Electrical & Electronics Engineering)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – IV

Course Title:	**Microcontroller and Embedded systems**		
Course Code:	**BEE403**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:2) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**4**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Understand the fundamentals of ARM based systems, basic hardware components, selection methods and attributes of an embedded system.
2. Program ARM controller using the various instructions.
3. Identify various components, their purpose, and their application to the embedded system's Applicability.
4. Understand the embedded system's real-time operating system and its application

Module-1 **9 Hours**

Prerequisites: Understanding of Micro Processor and Microcontrollers, Difference between Microprocessors and Microcontrollers, RISC and CISC

ARM Embedded Systems: The RISC design philosophy, The ARM Design Philosophy, Embedded System Hardware Embedded System Software.

ARM-32 bit Microcontroller: ARM Processor Fundamentals: Registers, Current Program Status Register, Pipeline, Exceptions, Interrupts, and the Vector Table, Core Extensions

[Textbook 1: Chapter 1 - 1.1 to 1.4, Chapter 2 - 2.1 to 2.5]

Module-2 **9 Hours**

Prerequisites: Basics of Assembler, Memory, types

Introduction to the ARM Instruction Set: Data Processing Instructions, Branch Instructions, Load store Instructions Software Interrupt Instructions, Program Status Register Instructions, Coprocessor Instructions, Loading Constants

ARM programming using Assembly language: Writing Assembly code, Profiling and cycle counting, instruction scheduling, Register Allocation, Conditional Execution, Looping Constructs

[Textbook 1: Chapter 3 - 3.1 to 3.6, Chapter 6 - 6.1 to 6.6]

Module-3 **9 Hours**

Prerequisites: Basics of C Programming

C Compilers and Optimization : Basic C Data Types, C Looping Structures, Register Allocation, Function Calls, Pointer Aliasing,: Structure Arrangement, Bit-fields, Unaligned Data and Endianness, Division, Floating Point, Inline Functions and Inline Assembly, Portability Issues.

Exception and Interrupt Handling : Exception Handling, Interrupts, Interrupt Handling Schemes

[Textbook 1: Chapter 5 - 5.2 to 5.13, Chapter 9 - 9.1 to 9.3]

Module-4 **9 Hours**

Embedded System Components: Embedded systems vs General computing systems, History of

embedded systems, Classification of Embedded systems, Major applications areas of embedded systems, purpose of embedded systems.
Core of an Embedded System , Memory, Sensors, Actuators, LED, 7 segment LED display, opto coupler, stepper motor, Keyboard, Push button switch, Communication Interface (onboard and external types), Embedded firmware, Other system components.(excluding C language).
[Textbook 2: Chapter 1 (Sections 1.2 to 1.6), Chapter 2 (Sections 2.1 to 2.6)]

Module-5 **9 Hours**

RTOS and IDE for Embedded System Design: Operating System basics, Types of operating systems, Task, process and threads (Only POSIX Threads with an example program), Thread preemption, Multiprocessing and Multitasking, Task Communication (without any program). Embedded system Development Environment – Block diagram (excluding Keil), Disassembler/decompiler, simulator, emulator and debugging techniques, target hardware debugging, boundary scan.
[Textbook 2: Chapter-10 (Sections 10.1-10.4,10.7) , Chapter -13(13.3-13.6)]

Practical Component of IPCC

Sl No.	Experiments
1.	Using Keil software, observe the various registers, dump, CPSR, with a simple ALP program.
2.	Write an ALP to i) multiply two 16-bit binary numbers. ii) Add two 64-bit numbers.
3.	Write an ALP to find the i)sum of the first 10 integer numbers ii) add an array of 16-bit numbers and store the 32-bit result in internal RAM
4.	Write an ALP to find i)the factorial of a number, ii)square of a number (1 to 10) using a look-up table
5.	Write an ALP to find i)the largest or smallest number in an array of 32 numbers ii) arrange a series of 32-bit numbers in ascending/descending order.
6.	Write an ALP to i)count the number of ones and zeros in two consecutive memory Locations ii) Scan a series of 32 bit numbers to find how many are negative
PART B: Conduct the following experiments on an ARM CORTEX M3 evaluation board using evaluation version of Embedded 'C' &Keil µvision-4 tool/compiler	
7.	Interface a Stepper motor and rotate it in clockwise and anti-clockwise direction.
8.	Interface a DAC and generate Triangular and Square waveforms.
9	Interface a simple Switch and display its status through Relay, Buzzer and LED.
10	Determine Digital output for a given Analog input using Internal ADC of ARM controller
11	Interface and Control a DC Motor
12	Display the Hex digits 0 to F on a 7-segment LED interface, with a suitable delay in between.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Describe the architectural features and instructions of ARM microcontroller.
CO2	Apply the knowledge gained for Programming ARM for different applications.

CO3	Interface external devices with ARM microcontroller and interpret the basic hardware components and their selection method based on the characteristics and attributes of an
CO4	Develop the hardware /software co-design, firmware design approaches and demonstrate the need of real time operating system for embedded system applications.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE- IA Tests (A)	20	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 20 marks.
Continuous and Comprehensive Evaluation (B)	10	-	Any one Assessment methods as per 24RNBE4.2 scaled to 10 marks.
Total CIE Theory (A+B)	**30**	**12**	**Marks of Tests and Assignments awarded for a maximum of 30.**
CIE Practical	12	-	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 12 marks.
CIE Practical Test	8	-	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 8.
Total CIE Practical (C)	**20**	**8**	**Marks of Experiments, Record and Test awarded for a maximum of 20 marks.**
CIE: Theory + Practical (A + B + C)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks.**
SEE (D)	**50**	**18**	**SEE is a theory exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall before 3 hours.**

CIE+SEE **(A+B+C+D)**	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B, C and D**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE. 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.			

Question Paper for SEE for IPCC

Theory SEE will be conducted by the college as per the scheduled time table, with common question papers for the course (duration 03hours)

1. The question paper will have 10 questions with a choice between every pair of questions set for each module. Each question is set for 20 Marks.
2. There will be 2 questions from each module. Each of the 2 questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored by the student shall be proportionately scaled down to 50 Marks
5. The number of question papers set shall be four, out of which two shall be from Internal and remaining two shall be from external examiners.

The theory portion of IPCC shall be for both CIE and SEE

Suggested Learning Resources:

Text Books

1. ARM System Developer's Guide, Sloss, Symes, Wright Morgan Kaufmann Publishers, Elsevier,2005
2. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education, Private Limited,2nd Edition

Reference Books:-

1. Computer Organisation& Architecture , William Stallings, PHI , 2010
2. Raghunandan. G.H, Microcontroller (ARM) and Embedded System, Cengage learning Publication,2019
3. The Insider's Guide to the ARM7 Based Microcontrollers, Hitex Ltd., 1st edition, 2005.
4. Steve Furber, ARM System-on-Chip Architecture, Second Edition, Pearson, 2015.
3. Raj Kamal, Embedded System, Tata McGraw-Hill Publishers, 2nd Edition, 2008.

B.E. (Electrical & Electronics Engineering)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER – IV

Course Title	**Electric Motors Lab**		
Course Code:	**BEEL404**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(0:0:2) + (0 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**01**	**EXAM HOURS**	**03**

Course objectives:

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

Sl.NO	Experiments
1	Load test on DC shunt motor to draw speed–torque and efficiency characteristics.
2	Speed control of DC shunt motor by armature and field control.
3	Swinburne's Test on DC motor.
4	Regenerative test on DC shunt machines.
5	Load test on three phase inductionn motor.
6	No-load and Blocked rotor test on three phase induction motor to draw (i) equivalent circuit and (ii) Pre-determination of performance parameters at different load conditions.
7	Load test on induction generator.
8	Load test on single phase induction motor to draw output versus torque, current, power and efficiency characteristics.
9	Conduct suitable tests to draw the equivalent circuit of single phase induction motor and determine performance parameters.
10	Conduct an experiment to draw V and Inverted V curves of synchronous motor at no load and load conditions.

11	Study of performance characteristics of DC Shunt Motor using PSCAD software
12	Study of performance characteristics of induction motor using MATLAB and Simulink

Course outcomes :

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

1. Perform tests on DC Machines to determine their characteristics.
2. Control the DC Motors using different methods.
3. Pre-determination the performance characteristics of DC Machines.
4. Conduct load test on single-phase and three-phase Induction Motor and draw performance characteristics..
5. Conduct test on synchronous motor to draw performance curves.

ASSESSMENT DETAILS (BOTH CIE AND SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE Practical (A)	30	-	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 30 marks.
CIE Practical Test (B)	20	-	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 20.
Total CIE Practical (A+B)	**50**	**20**	**Sum of Marks of Experiments, Record and Test shall be CIE marks awarded for a maximum of 50.**
SEE (C)	**50**	**20**	**SEE is a lab exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

B.E. (Electrical and Electronics Engineering)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – IV

Course Title:	**Op-Amp and LIC**		
Course Code:	**BEE405A**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**3**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Explain the basics of Linear ICs such as Op-amp, Regulator, Timer & PLL
2. Explain various circuits such as adder, subtractor, integrator, differentiator using linear ICs.
3. Use these linear ICs for specific applications such as comparators, converters, signal processing circuits.
4. Learn active filters using Opamps.
5. Learn pulse generator circuits using timers.

Module-1: Operational Amplifier Basics **9 Hours**

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

Parameters of opamp- CMRR, PSRR, slew rate etc., biasing methods.

Operational amplifiers with feedback: 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 ICs applications: Peaking amplifier, Summing, Scaling & averaging amplifier Inverting and non-inverting configuration, Differential configuration, Instrumentation amplifier, Integrator and Differentiator circuits.

Module-2:Filters and Regulators **9 Hours**

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 circuit regulators.

Module-3: Waveform Generators, Non-Linear circuits **9 Hours**

Signal generators: Triangular / rectangular wave generator, Phase shift oscillator, Wien bridge oscillator, Oscillator amplitude stabilization, Signal generator output controls.

Comparators & Converters: Basic comparator, Zero crossing detector, Inverting & noninverting Schmitt trigger circuit, Voltage to current converter with grounded load, Current to voltage converter and basics of voltage to frequency and frequency to voltage converters.

Module-4: Signal Processing and Converter circuits	**9 Hours**
Signal processing circuits: Precision half wave & full wave rectifiers, Precision clipping &clamping circuits, Peak detectors, Sample & hold circuits. **A/D & D/A Converters:** Basics, R–2R ladder D/A Converter, Integrated circuit 8-bit D/A, successive approximation ADC, Linear ramp ADC, Dual slope ADC, Digital ramp ADC.	
Module-5: Pulse Generators and Phase Locked Loop	**9 Hours**
Phase Locked Loop (PLL): Basic PLL, Components, Performance factors, Applications of PLL IC 565. **Timer:** Internal architecture of 555 timer, Mono stable, Astable multivibrators and applications	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the basics of Linear ICs such as Op-amp, Regulator, Timer & PLL
CO2	Analyze various Op-Amp based circuits such as adder, subtractor, integrator, differentiator using linear ICs.
CO3	Analyze working of comparators, converters, signal processing circuits using Opamps.
CO4	Analyze& design active filters using Opamps.
CO5	Analyze the working of pulse generator circuits using timers.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**

SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE **(A+B+C)**	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE. • **If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.**			

Suggested Learning Resources:

Text Books

1. "Op-Amps and Linear Integrated Circuits" by Ramakant A Gayakwad Pearson 4th edition 2015.

2. "Operational Amplifiers and Linear ICs" by David A. Bell Oxford University Press 3rd edition 2011.

Reference Books

1. "Electronic Devices & Circuits", by J. Nagarath, PHI, 2007.

2. "Linear Integrated Circuits", by RoyChoudhary, New Age International, 2003.

B.E. (Electrical and Electronics Engineering) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – 04			
Course Title:	**ELECTRICAL ENGINEERING MATERIALS**		
Course Code:	**BEE405B**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**03**	**EXAM HOURS**	**03**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Understand the knowledge of conducting, dielectric, insulating and magnetic materials and their
2. applications.
3. of major equipment in the plants.
4. Understand the knowledge of superconducting materials and their applications.
5. Understand the knowledge of plastic materials and their applications.
6. Understand the different materials used for opto electronic devices.

Module-1 **9 Hours**

INTRODUCTION TO ELECTRICAL AND ELECTRONIC MATERIALS: Importance of electrical and electronic materials, Classification of electrical and electronic materials, Scope of electrical and electronic materials, Requirement of Engineering materials, Operational requirements of electrical and electronic materials, Classification of solids on the basis of energy gap. Different types of engineering materials, Different levels of material structure. Spintronics and Spintronic materials, Ferromagnetic semiconductors, Left-handed materials.

CONDUCTORS: Conductor materials, Factors affecting conductivity, Thermal conductivity, Heating effect of current, Thermoelectric effect, Seebeck effect, Thomson effect, Wiedemann – Franz law and Lorentz relation.

Module-2 **9 Hours**

CONDUCTIVE MATERIALS TYPES AND APPLICATIONS: Mechanically processed forms of electrical materials, Types of conducting materials, Low resistivity materials, High resistivity materials, Contact materials, Fusible materials, Filament materials, Carbon as filamentary and brush material, Material for conductors, cables, wires, solder, sheathing and sealing.

DIELECTRICS: Introduction to dielectric materials, classification of dielectric materials, Dielectric constant, Dielectric strength and Dielectric loss. Polarization, Mechanisms of polarization, Comparison of different polarization process, Factors affecting polarization, Spontaneous polarization, Behaviour of polarization under impulse and frequency switching, Decay and build-up of polarization under ac field, Complex dielectric constant.

Module-3 **9 Hours**

INSULATING MATERIALS: Solid insulating materials and applications – Ceramic, Mica, Porcelain, Glass, Micanite and Glass bonded mica. Polymeric materials – Bakelite, Polyethylene. Natural and synthetic rubber. Paper. Choice of solid insulating material for different applications, Liquid insulating materials – Requirements, Transformer oil, Bubble theory, Aging of mineral insulating oils. Gaseous insulating Materials – Air, Nitrogen, Vacuum.

MAGNETIC MATERIALS: Origin of permanent magnetic dipole, Magnetic terminology, Relation between relative permeability and magnetic susceptibility. Classification of magnetic materials, Diamagnetic, Paramagnetism, Ferromagnetism, Antiferromagnetic and the corresponding materials. Ferrimagnetism and ferrites – properties and applications, Soft and hard ferrites. Curie temperature, Laws of magnetic materials. Magnetization curve, Initial, and maximum permeability. Hysteresis loop and loss, Eddy current loss.

Module-4 **9 Hours**

MAGNETIC MATERIALS (CONTINUED): Types of magnetic materials, Soft and hard magnetic materials, High energy magnetic materials, Commercial grade soft and hard magnetic materials.

SUPERCONDUCTIVE MATERIALS: Concept of superconductors, Meaning of phenomenon of superconductivity, Properties of superconductors, Types of superconductors, Critical magnetic field and critical temperature, Effects of Isotopic mass on critical temperature, Silsbee rule, Depth of penetration and coherence length. Ideal and Hard superconductors, Mechanism of super conduction, London's theory for Type I superconductors, GLAG theory for Type I superconductors, BCS theory, Applications and limitations. Applications of high temperature superconductors, MRI for medical diagnostics.

Module-5 **9 Hours**

MATERIALS FOR OPTO – ELECTRONIC DEVICES: Introduction, Optical phenomena, Reflection, Refraction, Transitivity, Scattering, Optical absorption, Optical properties of non-metals, Optical properties of metals, Optical properties of semiconductors, Optical properties of insulators. Luminescence, Opto – Electronic devices, Photoconductivity, Photoconductive cell.

PLASTICS IN ELECTRICAL AND ELECTRONIC APPLICATIONS: Expanding plastics, conducting conducting plastics, polymers in electronics, liquid crystal polymers, photo curable polymers, photorefractive polymers.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand and classify electrical electronics materials, understand and discuss conducting materials their properties and classification.
CO2	Understand and differentiate the properties and classification of insulating and dielectric materials and magnetic materials.

CO3	Understand the concept of superconducting materials and their properties and applications.
CO4	Classify the properties and applications of plastics.
CO5	understand the knowledge of materials used for Opto electronics devices.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

- The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.
- **If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.**

Suggested Learning Resources:

Text Books

1. Advanced Electrical and Electronics Materials; Processes and Applications K.M. Gupta, Nishu Gupta Wiley 1st Edition, 2015.
2. Electronic Engineering Materials R.K. Shukla, Archana Singh McGraw Hill 2012.
3. Electrical Engineering Materials A.J. Dekker Pearson 2016

B.E: Electrical and Electronics Engineering Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – IV			
Course Title	**Electromagnetic Field Theory**		
Course Code	**BEE405C**	**CIE Marks**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE Marks**	**50**
Credits	**03**	**Exam Hours**	**03**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. To understand Scalars, Vectors, Cartesian co-ordinate system, relation between different coordinate systems, Coulomb's law, Electric field intensity and its evaluation for different charge conditions.
2. To understand potential field of a point charge, Potential gradient, Energy density in the electrostatic field and conductor's properties and boundary conditions.
3. To understand Poisson's and Laplace Equations, Biot - Savart'sl aw, Ampere's circuital law and Stokes theorem.
4. To understand Magnetic force, Force between differential current elements. Force and torque on a closed circuit, Nature of magnetic materials and Magnetic boundary conditions.
5. To understand Faraday's law, Displacement current. Maxwell's equations, Wave propagation in free space and in dielectrics.

Module – 1 **9 Hours**

Vector Analysis: Scalars and Vectors, Vector algebra, Cartesian co-ordinate system, Vector Components and unit vectors. Scalar field and Vector field. Dot product and Cross product, Gradient of a scalar field. Divergence and Curl of a vector field. Co – ordinate systems: cylindrical and spherical, relation between different coordinate systems. Expression for gradient, divergence and curl in rectangular, cylindrical and spherical co-ordinate systems. Numerical.

Electrostatics: Coulomb'slaw,Electricfieldintensityanditsevaluationfor(i)pointcharge(ii)linecharge(iii)surfacecharge(iv)volumechargedistributions.Electricfluxdensity,Gausslawanditsapplications.Maxwell'sfirstequation(Electrostatics).Divergencetheorem.Numerical.

Module – 2 **9 Hours**

Energy and Potential: Energy expended in moving a point charge in an electric field. The line integral. Definition of potential difference and potential. The potential field of a point charge and of a system of charges. Potential gradient. The dipole. Energy density in the electrostatic field. Numerical.

Conductor and Dielectrics: Current and current density. Continuity of current. Metallic conductors, conductor's properties and boundary conditions. Perfect dielectric materials, capacitance calculations. Parallel plate capacitor with two dielectrics with dielectric interface parallel to the conducting plates. Numerical.

MODULE – 3	**9 Hours**
Poisson's and Laplace Equations: Derivations and problems, Uniqueness theorem. **Steady magnetic fields:** Biot - Savart's law, Ampere's circuital law. The Curl. Stokes theorem. Magnetic flux and flux density. Scalar and vector magnetic potentials. Numerical.	
Module – 4	**9 Hours**
Magnetic forces: Force on a moving charge and differential current element. Force between differential current elements. Force and torque on a closed circuit. Numerical. **Magnetic Materials and Magnetism:** Nature of magnetic materials, magnetisation and permeability. Magnetic boundary conditions. Magnetic circuit, inductance and mutual inductance. Numerical.	
Module – 5	**9 Hours**
Time Varying Fields and Maxwell's Equations: Faraday's law, Displacement current. Maxwell's equations in point form and integral form. Numerical. **Uniform plane wave:** Electromagnetic radiation: near field—non radiative and radiative, far field. Wave propagation in free space and in dielectrics. Pointing vector and power considerations. Propagation in good conductors, skin effect. Numerical.	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Evaluate electric fields from charge configurations using coordinate systems, Coulomb's Law, and Gauss's Law.
CO2	Analyze energy, potential, and field behavior at boundaries in charge systems.
CO3	Analyze steady magnetic fields.
CO4	Analyze the behavior of magnetic fields and magnetic materials under various conditions.
CO5	Evaluate time-varying fields and analyze wave propagation in different media.

ASSESSMENT DETAILS (Both CIE and SEE)
Continuous Internal Evaluation (CIE):

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

Suggested Learning Resources:
Text Books

1. Engineering Electromagnetics William H Hayt et al McGraw Hill 8thEdition, 2014.
2. Principles of Electromagnetics Matthew N. O. Sadiku Oxford 6th Edition, 2015.

Reference books:

1. Fundamentals of Engineering Electromagnetics David K. Cheng Pearson 2014.
2. Electromagnetism -Theory (Volume -1) -Applications (Volume-2) AshutoshPramanik PHI Learning 2014.
3. Electromagnetic Field Theory Fundamentals Bhag Guru et al Cambridge 2005.
4. Electromagnetic Field Theory RohitKhuranaVikas Publishing 1st Edition,2014.

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/108104087

B.E: Electrical and Electronics Engineering Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – IV			
Course Title	**Object Oriented Programming Using C++**		
Course Code	**BEE405D**	**CIE Marks**	**50**
(L:T:P) + (SL)	**(3:0:0) + (45 Hours / Semester)**	**SEE Marks**	**50**
Credits	**03**	**Exam Hours**	**03**

Course objectives:

- Define Encapsulation, Inheritance and Polymorphism.
- Solve the problem with object oriented approach.
- Analyze the problem statement and build object-oriented system model.
- Describe the characters and behavior of the objects that comprise a system.
- Explain function overloading, operator overloading and virtual functions.
- Discuss the advantages of object oriented programming over procedure oriented programming.

Module-1	**9 Hours**
Beginning with C++ and its Features: What is C++? Applications and structure of C++ program, Different Data types, Variables, Different Operators, expressions, operator overloading and control structures in C++. (Topics from Chapter 2 and 3 of textbook]	
Module-2	**9 Hours**
Functions, Classes and Objects: Functions, Inline function, function overloading, friend and virtual functions, specifying a class, C++ program with a class, arrays within a class, memory allocation to objects, array of objects, members, pointers to members and member functions. (Selected Topics from Chapter 4 and 5 of textbook).	
Module-3	**9 Hours**
Constructors, Destructors and Operator Overloading: Constructors, Multiple constructors in a class, copy constructor, Dynamic constructor, Destructors, Defining operator overloading, Overloading Unary and binary operators, Manipulation of strings using operators. (Selected topics from Chapter 6 and 7 of textbook).	
Module-4	**9 Hours**
Inheritance, Pointers, Virtual Functions, Polymorphism: Derived Classes, Single, multilevel, multiple inheritance, Pointers to objects and derived classes, this pointer, Virtual and pure virtual functions (Selected topics from Chapter 8 and 9 of textbook).	
Module-5	**9 Hours**

Streams and Working with Files: C++ streams and stream classes, formatted and unformatted I/O operations, Output with manipulators, Classes for file stream operations, opening and closing a file, EOF (Selected topics from Chapters 10 and 11 of textbook).

Course outcome :

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

1. Understand the basics of Object Oriented Programming concepts
2. Apply the object initialization and understand concepts of constructors and destructors
3. Apply the concept of polymorphism with friend functions to implement compile time polymorphism in programs by using overloading methods on operators
4. Apply the concept of inheritance to reduce the length of code and evaluate its usefulness
5. Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs
6. Apply I/O operations and file streams in programs

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Two tests each of 50 marks shall be conducted. Average of Two Internal Assessment Tests shall be scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20	-	Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

- The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.
- **If any courses of 3 credits are of Integrated Course type, for such courses the method suggested for 4 credits IPCC shall be followed.**

Suggested Learning Resources:

Text Books

1. Object Oriented Programming with C++ E.Balaguruswamy TMH 6th Edition, 2013

Reference Books

1. BjarneStroustrup,"TheC++ProgrammingLanguage",PearsonEducation,2004.

B.E. (Common to All branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – IV

Course Title:	**Finance and Accounting**		
Course Code:	**BFAT456A**	**CIE MARKS**	**50**
(L: T: P) + S	**(1:0:0) + (15 HOURS / SEM)**	**SEE MARKS**	**50**
Credits:	**01**	**EXAM HOURS**	**02**

COURSE LEARNING OBJECTIVES:

1. To enable the students to understand the conceptual framework of accounting, reporting and financial statements.
2. To enable the students in understanding of books of accounts and accounting records leading to final accounts and interpretation there-off.
3. To acquaint the students with the concepts of Time value of Money for decision making.

Module-1 **3 Hours**

Introduction to Accounting: Meaning and objectives, Branches of Accounting, GAAP, IAS, IFRS, Concepts and Conventions, Users of accounting, accounting terminologies. (Only Theory)

Self-Learning Activity: Self-exploration exercise where students write about their understanding of Golden rules of Accounting, Classification of Assets and Liabilities.
Students can Compare GAAP, IAS, and IFRS side by side on Origin, purpose, scope, key differences.
Textbook 1: Section 1; Chapter 1, 2 and 3

Module-2 **3 Hours**

Journal, Ledgers, Trial balance, accounting equation, subsidiary books and final accounts (Only theory)

Self-Learning Activity: Students will write the liquidity and Profitability status by reading the financial statements of a Company.
Textbook 1: Section 1; Chapter 4, 5, 6 and 8

Module-3 **3 Hours**

Emerging accounting Practices: Window dressing, forensic accounting, Green Accounting, Human resource accounting and sustainability reporting.

Self-Learning Activity: Students will understand the significance of human resources accounting in the corporate environment.

Textbook 2: Chapter 6
Module-4 **3 Hours**
Overview of Financial Management: Meaning and scope- objectives of Financial Management- Functions of Finance-Role and functions of finance managers. Indian Financial System: Structure-types-Financial markets- Financial Instruments -Financial institutions and financial services- Non-Banking Financial Companies (NBFCs). (Theory only) **Self-Learning Activity**: Students will have to understand the classification of Banking industry and write the functions of Banking and Non -banking Organisations. **Textbook 3**: Part 1; Chapter 1 and 2
Module-5 **4 Hours**
Emerging areas in Financial Management: Risk Management- Behavioural Finance- Financial Engineering- Derivatives (Theory). **Time Value of Money:** Time value of money –Future value of single cash flow & annuity – Present value and discounting-present value of single cash flow, annuity & perpetuity. Simple interest & Compound interest & loan amortization schedule (Simple problems on FV, FV for Annuity, PV and PV for annuity & Amortization Schedule) **Self-Learning Activity**: Students will Write their own simple problems based on the concepts and solve them. Example: "Calculate the FV of $1,000 invested for 5 years at 6% compound interest." Students are engaged in preparing the Loan amortisation table with detailed interpretation. Students can Create mind maps showing the relationships and key components of risk management, financial engineering, derivatives, and behavioural finance. **Textbook 3**: Part III; Chapter 6

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Recall the basic accounting concepts and terminologies
CO2	Understanding of journal, ledger, trial balance subsidiary books and accounting Equation and final accounts.
CO3	Analyse emerging trends in accounting
CO4	Familiar with the Emerging areas of financial management and create a Loan Amortisation table.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Average of Two Internal Assessment Tests (MCQs) each conducted for 25 marks.
Alternate Assessment (B)	20	-	Any two Assessment methods as per 24RNBE4.2, scaled to 25 marks.
Total CIE (A+B)	50	20	The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks.
SEE (C)	50	18	Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 2 hours.
CIE + SEE (A+B+C)	100	40	Final marks shall be the sum of marks scored in Components A, B and C.
The minimum marks to be secured in CIE are 20 out of allotted 50 marks to appear for SEE.			

Textbooks

1. Accounting for Management, Maheswari S. N,Maheswari Sharad K, Vikas PublishingHouse (P) Ltd., Ed 2024.
2. Accounting for Managers, H.H. Ramesha, Pralhad Rathod, Praveen Kumar B. H., R.G. Saha, Himalaya Publishing House Pvt Ltd.,
3. Financial Management, Prasanna Chandra, TMH, Ed 2024

References

1. Financial Management, Ravi M Kishor, Taxmann's. (Recent Edition)
2. Financial Management, I M Paney, Vikas Publishing House Pvt. Ltd. (Recent Edition)

Accounting for Management, Dr Jawahar Lal, Himalaya Publishing House Pvt Ltd., (Recent Edition)

B.E. (Electrical and Electronics Engineering) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – IV			
Course Title:	**Op-Amp and LIC Lab**		
Course Code:	**BEEL456B**	**CIE MARKS**	**50**
(L:T:P) + (SL)	**(0:0:2) + (0 Hours / Semester)**	**SEE MARKS**	**50**
Credits:	**1**	**EXAM HOURS**	**3**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Understand design aspects of opamp based inverting and non inverting amplifier circuits and its applications.
2. Understand design aspects of opamp based oscillator & filter circuits.
3. Understand design aspects of opamp based switching circuits.
4. Understand design aspects of pulse generator circuits using IC555 timer.
5. Understand design aspects of voltage regulator using IC78XX &79XX series.

Pre Requisites to be covered in 2 Lab sessions

1. Study of pin details, specifications, application features of IC741 (LM741) and IC555 (Timer) through corresponding datasheets.
2. Plot of input and output transfer characteristics to analyze and conclude that op-amps are rarely used in open-loop.
3. Comparison of output performance quantity of an Operational Amplifier obtained by rigging up the circuit with the ideal value of

   (i) A Non – Inverting Amplifier (ii) An Inverting Amplifier (iii) A Difference Amplifier (iv) A Non -Inverting Amplifier with negative feedback (v) An Inverting Amplifier with negative feedback (vi) A Differential Amplifier with negative feedback.

Sl. No	Experiments
1	Design and realize to analyze the frequency response of an op – amp amplifier under inverting and non - inverting configuration for a given gain.
2	Design and verify the output waveform of an op – amp RC phase shift oscillator for a desired frequency.
3	Design and verify the operation of op – amp as an (a) adder (b) subtractor (c) integrator and (d) differentiator.
4	Verify the operation of an op – amp as (a) voltage comparator circuit and (b) zero crossing detector (both inverting and non-inverting configurations, positive and negative reference voltages)
5	Design and realize Inverting Schmitt trigger circuit using an op – amp for (i) Equal values of upper triggering point (UTP) and lower triggering point (LTP)

	(ii) Unequal values of UTP,LTP (iii) UTP=0V & LTP = 0V
6	Design and realize an op – amp based first order Butterworth (a) low pass (b) high pass filters for a given cut off frequency.
7	Design and realize an Opamp based function generator to generate sine, square and triangular waves of desired frequency.
8	Design and realization of opampbased R-2R ladder DAC.
9	Design and verify an IC 555 timer based (i) Monostable multivibrator (ii) Astable multivibrator.
10	Designing of Fixed voltage power supply (voltage regulator) using IC regulators 78 series and 79 series.
11	Design of opamp based instrumentation amplifier.
12	Realization of Two bit Flash ADC using LM324 & basic gates.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the characteristic parameters of an opamp in open loop.
CO2	Design Opamp based adder, subtractor, differentiator and integrator circuits.
CO3	Design and verify the oscillator and filter circuits using an opamp.
CO4	Design multivibrators and power supplies using Linear ICs.
CO5	Design comparator and converter circuits using an opamp.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE Practical (A)	30	-	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 30 marks.
CIE Practical Test (B)	20	-	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 20.
Total CIE Practical (A+B)	**50**	**20**	**Sum of Marks of Experiments, Record and Test shall be CIE marks awarded for a maximum of 50.**

SEE (C)	**50**	**20**	**SEE is a lab exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

B.E. (Electrical and Electronics Engineering)
Outcome Based Education(OBE) and Choice Based Credit System(CBCS)
SEMESTER –IV

Course Title	**ARDUINO AND RASPBERRY- PI BASED PROJECTS**		
Course Code	**BEEL456C**	**CIE Marks**	**50**
(L:T:P) + (SL)	**(0:0:2) + (0 Hours / Semester)**	**SEE Marks**	**50**
Credits	**01**	**Exam Hours**	**03**

Course objectives:

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

Sl.No	Experiments
1	i) To interface LED/Buzzer with Arduino/Raspberry Pi and write a program to 'turn ON' LED for1secafterevery2seconds. ii) To interface Pushbutton and LED with Arduino/Raspberry Pi and writea Program to 'turn ON' LED when push button is pressed
2	i) To interface DHT11 sensor with Arduino/Raspberry Pi and write a program to print temperature 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 Smart phone 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 Smart phone 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 publish temperature data to MQTT broker
9	Write a program to create UDP server on Arduino/Raspberry Pi and respond with humidity data To UDP client when requested.
10	Write a program to create TCP server on Arduino/Raspberry Pi and respond with humidity data to TCP client when requested.

11	Write a program to interface smoke sensor with Arduino/Raspberry Pi and alert on fire detection.
12	Write a program to interface moisture sensor with Arduino/Raspberry Pi and switch on the water motor during low moisture detection for watering plants.

Course outcomes (Course Skill Set):

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

1. Understand the concepts of Internet of Things and its hardware and software components
2. Understand Interface I/O devices, sensors & communication modules
3. Understand the Remotely monitor data and control devices
4. Develop real life IoT based projects.

Assessment Details (both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE Practical (A)	30	-	Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 30 marks.
CIE Practical Test (B)	20	-	Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 20.
Total CIE Practical (A+B)	**50**	**20**	**Sum of Marks of Experiments, Record and Test shall be CIE marks awarded for a maximum of 50.**
SEE (C)	**50**	**20**	**SEE is a lab exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**

CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
• The minimum marks to be secured in CIE is 20 (40%) out of allotted 50 marks to appear for SEE.			

Suggested Learning Resources:

1. https://www.arduino.cc
2. https://www.raspberrypi.org/
3. Course in Internet of Things (IOT) UsingArduino –NIEIT Delhi Centre
4. Vijay Madisetti, Arshdeep Bahga, Internet of Things. "A Hands on Approach", University Press
5. Dr. SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A practical Approach", ETI Labs

B.E. (Electrical and Electronics Engineering) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – IV			
Course Title	**MATLAB for Machines**		
Course Code	**BEEL456D**	**CIE Marks**	**50**
(L:T:P) + (SL)	**(0:0:2) + (0 Hours / Semester)**	**SEE Marks**	**50**
Credits	**01**	**Exam Hours**	**03**

COURSELEARNINGOBJECTIVES: The purpose of the course is to facilitate the learner

- To provide opportunity to perform the experiments 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.
- To Provide unhindered access to perform whenever the students wish.

SL. NO.	Experiments
1	Open Circuit and Short circuit tests on single phase, step up or step down transformer and predetermination of (i) Efficiency and regulation (ii) Calculation of parameters of equivalent circuit.
2	Sumpner's test on similar transformers and determination of efficiency.
3	Parallel operation of two dissimilar single-phase transformers of different kVA and Determination of load sharing and analytical verification given the Short circuit test data.
4	Separation of hysteresis and eddy current losses in single phase transformer.
5	Voltage regulation of an alternator by EMF and MMF methods.
6	Voltage regulation of an alternator by ZPF method
7	Power angle curve of synchronous generator.
8	Sliptest–Measurement of direct and quadrature axis reactance and predetermination of regulation of salient pole synchronous machines.
9	Load test on single phase transformer to determine efficiency and voltage regulation

COURSEOUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Develop a program that intelligently uses the SCIlab software package to carry out various tests on transformers and generators in order to assess their performance characteristics.

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 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course if the student 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 Evaluation (CIE) :

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE Practical (A)	30		Marks awarded for Weekly Conduction of Experiments and Submission of Laboratory records, scaled to 30 marks.
CIE Practical Test (B)	20		Average of marks of Two tests, each conducted for 100 marks covering all experiments, scaled to 20.
Total CIE Practical (A+B)	**50**	**20**	**Sum of Marks of Experiments, Record and Test shall be CIE marks awarded for a maximum of 50.**
SEE (C)	**50**	**20**	**SEE is a lab exam, conducted for 100 marks and scaled down to 50 marks. Exam duration shall be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**

- The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.

Continuous Internal Evaluation (CIE):

- CIE marks for the practical course is 50 Marks.
- The split-up of CIE marks for record/ journal and test are in the ratio 60:40.
- Each experiment to be evaluated for conduction with observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up, conduction of experiments by the faculty who is handling the laboratory session and is made known to students at the beginning of the practical session.
- Marks awarded for weekly conduction of experiments and submission of laboratory records evaluated for 30 marks.
- 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).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct 02 tests, each for 100 marks, the first test shall be conducted after the 8th week of the semester and the second test shall be conducted after the 14th week of the semester.
- In each test, write-up, procedural knowledge, conduction of experiments and acceptable result will carry a weightage of 80% and the rest 20% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The average of 02 tests is scaled down to 20 marks (40% of maximum marks).

- The Sum of scaled-down marks scored in the report write-up/journal and average marks of two tests is the total CIE marks scored by the student.
- The minimum marks to be scored in CIE are 20 out of allotted 50 marks to appear for SEE, with minimum of 40% scored in every component of CIE.

Semester End Evaluation (SEE):

- SEE marks for the practical course is 50 Marks.
- All laboratory experiments are to be included for practical examination.
- Break up (Rubrics) of marks strictly adhered to by the examiners.
- Students can pick up one question (experiment) from the questions lot prepared by the

internal/external examiners jointly.

- Evaluation of test write-up, conduction procedure, result and viva-voce will be conducted jointly by examiners. General rubrics suggested for SEE are, for write-up-20%, procedure, conduction 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. (However, based upon course type, rubrics shall be decided by the examiners).
- Change of experiment is allowed only once and 20% marks allotted to the procedure part to be made zero.
- The duration of SEE is 03 hours.

Web links and Video Lectures (e-Resources):

www.nptel.ac.in

B.E. (Common to All Branches) Outcome Based Education(OBE) and Choice Based Credit System(CBCS) SEMESTER – IV			
Course Title:	**Environmental Studies**		
Course Code:	**BENS407 / 507**	**CIE MARKS**	**50**
(L : T : P)+ SL	**(2:0:0) + (30 Hours/Sem)**	**SEE MARKS**	**50**
Credits:	**2**	**EXAM HOURS**	**2**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Introduce the basic concepts of ecology and ecosystem functioning, including biodiversity and biogeochemical cycles.
2. Understand various types of environmental pollution, their sources, impacts, and preventive measures.
3. Explore causes of environmental degradation and methods of conservation with special emphasis on Indian biodiversity.
4. Create awareness about climate change, global warming, environmental legislation, and significant environmental movements in India.

Module-1	**6 Hours**

Ecology: Basic concepts of ecosystem. Ecosystems (structure and function)- forest, desert, wetlands, river, oceanic and lake. Biotic and Abiotic components; Food chain; Ecological pyramid.

Biogeochemical Cycles: carbon cycle, nitrogen cycle, phosphorus cycle, water cycle

Sustainability: 17 Sustainable Development Goals (SDG)- history, targets, implementation, capacity development.

Module-2	**6 Hours**

Environmental Pollution: Surface and ground water pollution, noise pollution, soil pollution, air pollution and marine pollution - sources, impacts on living beings, impacts on environment, preventive measures. case-study on marine pollution.

Water Chemistry: Significance and effect of pH, total dissolved solids and hardness. Case study on impact of fluoride on human health.

Module-3	**6 Hours**

Environmental Degradation: Causes and effects of deforestation, desertification, soil erosion and glacier melting.

Environmental Conservation: Significance and key features of national parks, wildlife sanctuaries, reserved forest and mangrove forest. Importance of western ghats as biodiversity hotspot (flora and fauna)

Module-4	**6 Hours**

Indian Monsoon and Global Warming

Climate- Impact on monsoons, significance of El Nino and La Nina on India climate.

Global warming: causes, greenhouse gases, effects on environment and human health.

Causes and effects of acid rain and ozone depletion. Air sampler and its importance in assessing pollutants.
Module-5 **6 Hours**
Environmental Legislation: Environmental Protection Act 1984: Definition, Significance and key features. **Indian Environmental Movements:** Bishnoi Movement, Chipko &Appiko movement.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Describe the components and functions of ecosystems and explain major biogeochemical cycles and sustainability goals.
CO2	Understand various forms of pollution and environmental degradation, along with their impacts on ecosystems and human health.
CO3	Demonstrate awareness of climate issues, Indian environmental legislation, and the role of community-based movements in environmental protection.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30		Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20		Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration should be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

Text books

1. Benny Joseph, "Environmental studies", 3rd ed.,TataMcGraw-Hill, 2017.
2. S M Prakash, "Environmental studies", 3rd ed., Pristine publishing house, 2018.

Reference Books:-

1. M.AnjiReddy, "Text book of environmental science and Technology", revised ed., BS publications, 2014.
2. Dr.B.SChauhan,"Environmentalstudies",1st ed., University of science press, 2008.

B.E. (Common to all branches) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – IV / V			
Course Title:	**BIOLOGY FOR ENGINEERS**		
Course Code:	**BBOE407/507**	**CIE MARKS**	**50**
(L: T: P) + SL	**(2:0:0) + (30 Hours/Sem)**	**SEE MARKS**	**50**
Credits:	**2**	**EXAM HOURS**	**2**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Familiarize the students with the basic biological concepts and their engineering applications.
2. Enable the students with an understanding of bio design principles to create novel devices and structures.
3. Provide the students an appreciation of how biological systems can be re-designed as substitute products for natural systems.
4. Motivate the students to develop interdisciplinary vision of biological engineering.

Module-1	**6 Hours**
Introduction to fundamentals of life. Structure and functions of a cell. Biomolecules: Properties and functions of Carbohydrates, Nucleic acids, Proteins, Enzymes and Lipids.	
Module-2	**6 Hours**
Introduction to applications of biomolecules, Carbohydrates in cellulose-based water filters production, PHA and PLA in bioplastics production, Nucleic acids in vaccines and diagnosis, Proteins in food production, Enzymes in biosensors fabrication, food processing, enzymes in biobleaching, Lipids in biodiesel and detergents production.	
Module-3	**6 Hours**
Introduction to adaptations of anatomical principles for bioengineering design, Brain as a CPU system. Eye as a Camera system. Heart as a pump system. Lungs as purification system. Kidney as a filtration system.	
Module-4	**6 Hours**
Introduction to nature inspired biomaterials and mechanisms, Echolocation, Photosynthesis. Bird flying, Lotus leaf effect, Plant burrs, Shark skin, Kingfisher beak. Artificial blood - haemoglobin-based oxygen carriers (HBOCs) and perflourocarbons (PFCs).	
Module-5	**6 Hours**
Introduction to trends in bioengineering, Tissue engineering, stem cells and their applications, Bioprinting techniques and materials. Electrical tongue and electrical nose in food science, DNA origami and Biocomputing, Bioimaging and Artificial Intelligence for disease diagnosis. Bioconcrete.	

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Corroborate the concepts of biomimetics for specific requirements.
CO2	Understand the basic biological concepts for relevant industrial applications. adaptation.
CO3	Evaluate the principles of design and development, for exploring engineering knowledge in biological
CO4	Think critically towards exploring innovative biobased solutions for socially relevant problems.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30		Average of Three Internal Assessment Tests each of 50 marks, scaled down to 30 marks.
Continuous and Comprehensive Evaluation (B)	20		Any two Assessment methods as per 24RNBE4.2 (*if it is project based, one assignment shall be given), scaled to 20 marks.
Total CIE (A+B)	**50**	**20**	**CIE Evaluation is done for a maximum of 50 marks**
SEE (C)	**50**	**18**	**SEE is a theory exam conducted for 100 marks and scaled down to 50 marks. Exam duration should be for 3 hours.**
CIE + SEE (A+B+C)	**100**	**40**	Final marks shall be the sum of marks scored in Components **A, B and C.**
The minimum marks to be secured in CIE is 20 out of allotted 50 marks to appear for SEE, with minimum 40 % scored in every component of CIE.			

Textbooks

1. Basuchandra's Biology for Engineers, Chandra shekara. B.M, Basavaraju B.C, 2025.
2. Biology for Engineers, Rajendra Singh C and Rathnakar Rao N, Rajendra Singh C and Rathnakar Rao N Publishing, Bengaluru, 2023.

Reference Books

1. Human Physiology, Stuart Fox, Krista Rompolski, McGraw-Hill eBook. 16th Edition, 2022

2. Biology for Engineers, Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W.
3. Barathi S., and Jaganthan M.K., Tata McGraw-Hill, New Delhi, 2012.
4. Biology for Engineers, Arthur T. Johnson, CRC Press, Taylor and Francis, 2011
5. Biomedical Instrumentation, Leslie Cromwell, Prentice Hall 2011.
6. Biology for Engineers, Sohini Singh and Tanu Allen, Vayu Education of India, New Delhi, 2014.
7. Biomimetics: Nature-Based Innovation, Yoseph Bar-Cohen, 1st edition, 2012, CRC Press.
8. Bio-Inspired Artificial Intelligence: Theories, Methods and Technologies, D. Floreano and C. Mattiussi, MIT Press, 2008.
9. Bioremediation of heavy metals: bacterial participation, by C R Sunilkumar, N Geetha, A C Udayashankar, Lambert Academic Publishing, 2019.

B.E. (Common to All branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – IV

Course Title:	**Universal Human Values(UHV)**		
Course Code:	**BUHV408**	**CIE MARKS**	**50**
(L: T: P) + S	**(1:0:0) + (15 HOURS / SEM)**	**SEE MARKS**	**50**
Credits:	**01**	**EXAM HOURS**	**02**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

4. 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.
5. 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.
6. 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.
7. This course is intended to provide a much-needed orientation input in value education tothe young enquiring minds.

Module-1 **3 Hours**

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.

Self-Learning Activity: Self-exploration exercise where students write about their understanding of happiness and prosperity.

Module-2 **3 Hours**

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.

Self-Learning Activity: Students will categorize their daily needs into 'self' and 'body' to understand their coexistence.

Module-3 **3 Hours**

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. **Self-Learning Activity**: Students will write and share a personal story where trust or respect played a key role in a relationship.
Module-4 **3 Hours**
Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature, Realizing Existence as Co-existence at All Levels, The Holistic Perception of Harmony in Existence. **Self-Learning Activity**: Students will have a nature walk to observe and reflect on coexistence and mutual fulfillment in nature.
Module-5 **3 Hours**
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. **Self-Learning Activity**: Students are engaged in drafting their personal code of professional ethics aligned with human values.

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Identify and describe the role of self, family, society, and nature in achieving holistic human well-being.
CO2	Analyze real-life personal and societal problems through the lens of human values and ethical reasoning.
CO3	Apply human values to interpersonal and professional situations to ensure harmony in relationships and society.
CO4	Integrate sustainability, ethics, and lifelong learning into personal and professional practices.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	30	-	Average of Two Internal Assessment Tests (MCQs) each conducted for 25 marks.
Alternate Assessment (B)	20	-	Any two Assessment methods as per 24RNBE4.2, scaled to 25 marks.
Total CIE (A+B)	50	20	The sum of two tests, two assignments, will be out of 100 marks and will be scaled down to 50 marks.
SEE (C)	50	18	Question papers having 50 MCQs with each question carrying 01 mark, and Examination duration is 2 hours.
CIE + SEE (A+B+C)	100	40	Final marks shall be the sum of marks scored in Components A, B and C.
The minimum marks to be secured in CIE are 20 out of allotted 50 marks to appear for SEE.			

Textbooks

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 978- 93-87034- 47-1
2. The Teacher's Manual for A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G

Reference Books

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The 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. SubhasPalekar, 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 Govindrajan, 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.

B.E. (Common to All Branches) Outcome Based Education (OBE) and Choice Based Credit System (CBCS) SEMESTER – IV			
Course Title:	**NSS-National Service Scheme**		
Course Code:	**BNSK459**	**CIE MARKS**	**100**
L : T : P	**0:0:0:30**	**SEE MARKS**	**0**
Credits:	**0**	**EXAM HOURS**	**-**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

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

Module-1
Water conservation techniques – Role of different stakeholders– Implementation.
Module-2
Preparing an actionable business proposal for enhancing the village income and approach for implementation.
Module-3
Helping local schools to achieve good results and enhance their enrolment in Higher/technical/ vocational education.
Module-4
NSS Activity-1
Module-5
NSS Activity-2

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the significance of individual responsibilities towards society and contribute meaningfully to community welfare.
CO2	Analyze environmental and societal issues, and design feasible solutions to address them effectively
CO3	Critically evaluate existing systems and propose practical, sustainable solutions for long-term development.
CO4	Plan and implement government initiatives or self-driven projects effectively in real-life community settings.

CO5	Develop the capacity to respond to emergencies and natural disasters, while practicing national integration, social harmony, and unity in diversity.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
Evaluation based on Reports (A)	100	-	5 modules Reports, 5 modules X 10 M each = 50 M
Total CIE Theory (A)	**100**	**40**	
SEE (B)	**-**	**-**	**-**
CIE+SEE (A+B)	**100**	**40**	**Final marks shall be the sum of marks scored in Components A, B**
• The minimum marks to be secured in CIE is 40 out of allotted 50 marks with minimum 40 % scored in every component of CIE. • No SEE for this subject			

Reference 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.

Weblinks:

1. https://nss.gov.in/
2. https://pledge.mygov.in/

B.E. (Common to All Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – IV

Course Title:	**Physical Education**		
Course Code:	**BPEK459**	**CIE MARKS**	**100**
L: T: P: S	**0:0:1: 0**	**SEE MARKS**	**---**
Credits:	**---**	**EXAM HOURS**	**---**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Understand the fundamental concepts of Physical Education, games and sports skills, Health, Nutrition and Fitness
2. Familiarization of health-related Exercises, Sports for overall growth and development
3. Participate in the competition at regional/state / national / international levels.
4. Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.

Module-1 **5 Hours**

Athletics

A. Track - Sprints
B. Throws - Shotput
C. Jumps - Long jump

A.Track Events

i. Starting Techniques: Standing start and Crouch start (its variations) use of Starting Block.
ii. Acceleration with proper running techniques.
iii. Finishing technique: Run Through, Forward Lunging and Shoulder Shrug, Torso Finish.

B. Long Jump

Approach Run, Take-off, Flight in the air (Hang Style/Hitch Kick) and Landing

C. Shot put

Holding the Shot, Placement, Initial Stance, Glide, Delivery Stance and Recovery (Perry O'Brien Technique)

Module-2 **5 Hours**

Volleyball

A. Fundamental skills

1. Service: Underarm Service, Side arm Service, Tennis Service, Floating Service
2. Pass: Under arm Pass, Overhead Pass
3. Spiking & Blocking

4. Game Practice with application of Rules & Regulations **B. Rules and their interpretation and duties of the officials**
Module-3 **5 Hours**
Throwball **A. Fundamental skills** Overhand service, Side arm service, two hand catching, one hand overhead return, side arm return. **B. Rules and their interpretation and duties of the officials**

COURSE OUTCOMES:

After successfully completing the course, the student will be able to:

CO1	Understand the fundamental concepts of Physical Education, games and sports skills, Health, Nutrition and Fitness
CO2	Familiarization of health-related Exercises, Sports for overall growth and development
CO3	Participate in the competition at regional/state/national/international levels.
CO4	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.

ASSESSMENT DETAILS (Both CIE and SEE)

Zero-credit NCMC courses (MCQs for assessment)			
Assessment Type	**Maximum Marks**	**Minimum Passing Marks**	**Evaluation Details**
CIE – IA Tests (A)	60	---	Sum of Two Internal Assessment Tests (MCQs) each conducted for 30 marks.
Quiz(B)	40	---	Quiz for a maximum of 40 marks
Total CIE (A+B)	100	40	CIE Evaluation is done for a maximum of 100 marks
• The minimum marks to be secured in CIE is 40 (40%) out of 100 marks allotted to Pass.			

Textbooks

1. Saha, A. K. Sarir Siksher Ritiniti, Rana Publishing House, Kalyani.
2. Bandopadhyay, K. Sarir Siksha Parichay, Classic Publishers, Kolkata

Reference Books: -

1. Saraswati Health and Physical Education
2. V.K. Sharma's Health and Physical Education
3. Oswaal Books: Educart Chapterwise Question Bank: Offers detailed coverage of concepts and questions by chapter.

B.E. (Common to All Branches)
Outcome Based Education (OBE) and Choice Based Credit System (CBCS)
SEMESTER – IV

Course Title:	**Yoga**		
Course Code:	**BYOK459**	**CIE MARKS**	**100**
L: T: P: S	**0:0:1:0**	**SEE MARKS**	**---**
Credits:	**---**	**EXAM HOURS**	**---**

COURSE LEARNING OBJECTIVES:

The purpose of the course is to facilitate the learner to:

1. Physical, Mental & spiritual Objectives of Yoga
2. Explain the meaning of Yoga.
3. Discuss the importance of the Yoga and its scope.
4. Describe the aims and objectives of Yoga.
5. Clarify the misconceptions on Yoga

Module-1 **5 Hours**

Patanjali Ashtanga Yoga

A. Yama: Ahimsa, satya, asteya, brahmacarya, aparigraha

B. Niyama: shoucha, santosh, tapa, svaadhyaya, Eshvarapranidhan

C. Surya namaskara: 12 Counts, 4 Rounds

Module-2 **5 Hours**

Asana

a) Meaning, Need & Importance of Asana

b) **DifferentTypesofAsanas:**

i. **Sitting -** 1. Sukhasana, 2. Paschimottanasana

ii. **Standing -** 1. ArdhakatiChakrasana 2. Parshva Chakrasana

iii. **Prone line -** Dhanurasana

iv. **Supine line-** Halasana

c) Asana Technique

d) Precautionary measures and benefits of each Asana

Module-3 **5 Hours**

Pranayama

A. Meaning, Need & importance of Pranayama.
Different types of pranayama, technique, precautionary measures and benefits of each Pranayama.

1. **Suryanuloma -Viloma**
2. **Chandranu loma-Viloma**

B. Kapalabhati
Meaning, importance and benefits of Kapalabhati.

COURSE OUTCOMES

After successfully completing the course, the student will be able to:

CO1	Understand the fundamental concepts of Yoga
CO2	Improves of health and related aspects, overall growth and development
CO3	Participate in the competition at regional/state/national/international levels.
CO4	Create consciousness among the students on Health, Fitness and Wellness in developing and maintaining a healthy lifestyle.

ASSESSMENT DETAILS (Both CIE and SEE)

Assessment Type	Maximum Marks	Minimum Passing Marks	Evaluation Details
CIE – IA Tests (A)	60	----	Sum of Two Internal Assessment Tests (MCQs) each conducted for 30 marks.
Quiz(B)	40	----	Quiz for a maximum of 40 marks
Total CIE (A+B)	100	40	CIE Evaluation is done for a maximum of 100 marks
• The minimum marks to be secured in CIE is 40 (40%) out of 100 marks allotted to Pass.			

Textbooks

1. The Yoga Sutras of Patanjali – Sri Swami Satchidananda.
2. Light on Yoga — B.K.S Iyengar.

Reference Books: -

1. The Heart of Yoga — T.K.V Desikachar.
2. “Asana Pranayama Mudra Bandha” bySwamiSatyanandaSaraswati.

VISION

Building RNSIT into a World Class Institution.

MISSION

To impart high quality education in Engineering, Technology and Management with a difference, enabling students to excel in their career by

- Attracting quality students and preparing them with a strong foundation in fundamentals so as to achieve distinctions in various walks of life leading to outstanding contributions.
- Imparting value based, need based, choice based and skill based professional education to the aspiring youth and carving them into disciplined, World class professionals with social responsibility.
- Promoting excellence in Teaching, Research and Consultancy that galvanizes academic consciousness among Faculty and Students.
- Exposing Students to emerging frontiers of knowledge in various domains and make them suitable for Industry, Entrepreneurship, Higher studies, and Research & Development.
- Providing freedom of action and choice for all the Stakeholders with better visibility.

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