BE SCHEME & SYLLABUS

FIRST YEAR

(I and II Semester)

(With effect from 2025-26)

Computer Science and Engineering Stream

ST JOSEPH ENGINEERING COLLEGE

AN AUTONOMOUS INSTITUTION

Vamanjoor, Mangaluru - 575028

MOTTO

Service and Excellence

VISION

To be a global premier Institution of professional education and research

MISSION

- Provide opportunities to deserving students of all communities, the Christian students in particular, for quality professional education
- Design and deliver curricula to meet the national and global changing needs through student-centric learning methodologies
- Attract, nurture and retain the best faculty and technical manpower
- Consolidate the state-of-art infrastructure and equipment for teaching and research activities
- Promote all-round personality development of the students through interaction with alumni, academia and industry
- Strengthen the Educational Social Responsibilities (ESR) of the Institution

ST JOSEPH ENGINEERING COLLEGE

An Autonomous Institution

Vamanjoor, Mangaluru - 575028

Affiliated to VTU – Belagavi & Recognized by AICTE New Delhi

NAAC – Accredited with A+

B.E. SCHEME & SYLLABUS

(With effect from 2025-26)

Computer Science and Engineering Stream

(Applicable to CSE, AIML, CSBS and CS(DS))

FIRST YEAR

(I and II Semester)

AUTONOMY AND ACCREDITATION

St Joseph Engineering College (SJEC) is an Autonomous Institute under Visvesvaraya Technological University (VTU), Belagavi, Karnataka State, and is recognized by the All-India Council for Technical Education (AICTE), New Delhi. SJEC is registered under the trust "Diocese of Mangalore, Social Action Department".

The SJEC has been conferred Fresh Autonomous Status from the Academic Year 2021-22. The college was granted autonomy by the University Grants Commission (UGC) under the UGC Scheme for Autonomous Colleges 2018 and conferred by VTU. The UGC Expert Team had visited the college on 28-29 November 2021 and rigorously assessed the college on multiple parameters. The fact that only a handful of engineering colleges in the state have attained Autonomous Status adds to the college's credibility that has been on a constant upswing. Autonomy will make it convenient for the college to design curricula by recognizing the needs of the industry, offering elective courses of choice and conducting the continuous assessment of its students.

At SJEC, the Outcome-Based Education (OBE) system has been implemented since 2011. Owing to OBE practised at the college, SJEC has already been accredited by the National Board of Accreditation (NBA). Two of the PG programs, namely MBA and MCA programs, have accreditation from the NBA.

Also, SJEC has been awarded the prestigious A+ grade by the National Assessment and Accreditation Council (NAAC) for five years. With a Cumulative Grade Point Average (CGPA) of 3.39 on a 4-point scale, SJEC has joined the elite list of colleges accredited with an A+ grade by NAAC in its first cycle. The fact that only a small percentage of the Higher Education Institutions in India have bagged A+ or higher grades by NAAC adds to the college's credibility that has been on a constant upswing.

The college is committed to offering quality education to all its students, and the accreditation by NAAC and NBA reassures this fact. True to its motto of "Service and Excellence", the college's hard work has resulted in getting this recognition, which has endorsed the academic framework and policies that the college has been practicing since its inception. The college has been leveraging a flexible choice-based academic model that gives students the freedom to undergo learning in respective disciplines and a transparent and continuous evaluation process that helps in their holistic development.

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St Joseph Engineering College Mangaluru

(Autonomous Institution Affiliated to VTU Belagavi)

B.E. - Scheme of Teaching and Examinations-2025 (Effective from the academic year 2025-26)

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

I Semester - Computer Science and Engineering (CSE) Stream **(Physics Group)**

Sl.No	Course and Course Code		Course title	TD/PSB	Teaching Hours/Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	ASC(IC)	1BMATS101	Applied Mathematics - I for Computer Science and Engineering Stream	Maths	2	2	2	03	50	50	100	04
2	ASC(IC)	1BPHYS102	Applied Physics for Computer Science and Engineering Stream	Physics	3	0	2	03	50	50	100	04
3	PSC	1BPOP103	Principles of Programing Using C	Respective Engg Dept	3	0	0	03	50	50	100	03
4	ESC	1BESC104x	Engineering Science Course-I	Respective Engg Dept	3	0	0	03	50	50	100	03
5	ETC	1BETC105	Introduction to AI and Applications	Any Dept	3	0	0	03	50	50	100	03
6	PSCL	1BPOP106L	C Programming Lab	Respective Engg Dept	0	0	2	03	50	50	100	01
7	HSMC	1BKSK107/ 1BKBK107	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	02	50	50	100	01
8	AEC/SDC	1BPFT108L	Prototype Fabrication and Testing (Project Based Learning)	Any Dept	0	0	2	02	50	50	100	01
9	AEC/SDC	1BITS109	Industry Oriented Training – Soft Skills	Any Dept	1	0	0	02	50	-	50	-
				TOTAL	**16**	**2**	**8**		**450**	**400**	**850**	**20**
10	**AICTE Activity Points** (Students have to earn 100 activity points between 01-08 semester)											

ASC-Applied Science Courses, **TD/PSB**- Teaching Department / Paper Setting Board, **PSC**- Program Specific Course, **ESC**- Engineering Science Courses, **ETC**- Emerging Technology Courses, **PSCL** – Program Specific Course Lab, **AEC**- Ability Enhancement Courses, **HSMC**-Humanities, Social Sciences and Management Courses, **SDC**- Skill Development Courses, **NCMC**-Non-credit Mandatory Courses, **CIE**–Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course).

Credit Definition:	
1- hour Lecture **(L)** per week= **1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session
2-hours Tutorial **(T)** per week=**1 Credit**	04-Credits (IC) are to be designed for 40 hours theory and 10-12 hours of Practical Session
2- hours Practical / Drawing (**P**) per week =**1 Credit**	03-Credits courses are to be designed for 40 hours of Teaching-Learning Session
	02- Credits courses are to be designed for 25 hours of Teaching-Learning Session
	01-Credit courses are to be designed for 12-15 hours of Teaching-Learning Session

Engineering Science Courses-I (ESC-I)				
Code	**Title**	**L**	**T**	**P**
1BESC104A	Introduction to Civil Engineering	3	0	0
1BESC104B	Introduction to Mechanical Engineering	3	0	0
1BESC104C	Introduction to Electrical Engineering	3	0	0
1BESC104D	Introduction to Electronics and Communication Engineering	3	0	0
1BESC104E	Essentials of Information Technology	3	0	0

- The student has to select one course from the ESC-I group which is offered from the other engineering streams.
- For example, CSE and allied branches students shall opt for any one of the courses from the ESC-I group **except, 1BESC104E - Essentials of Information Technology.**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester.

St Joseph Engineering College Mangaluru

(Autonomous Institution Affiliated to VTU Belagavi)

B.E. - Scheme of Teaching and Examinations-2025 (Effective from the academic year 2025-26)

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

II Semester - C S E Stream **Chemistry Group (For the students who studied Physics group in the I semester)**

Sl.No	Course and Course Code		Course title	TD/PSB	Teaching Hours/Week			Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P					
1	ASC (IC)	1BMATS201	Applied Mathematics -II for Computer Science and Engineering Stream	Maths	2	2	2	03	50	50	100	04
2	ASC(IC)	1BCHES202	Applied Chemistry for Computer Science and Engineering Stream	Chemistry	3	0	2	03	50	50	100	04
3	ESC	1BCED203	Computer Aided Engineering Drawing	MEC Dept	2	0	2	03	50	50	100	03
4	ESC	1BESC204x	Engineering Science Course-II	Respective Engg Dept	3	0	0	03	50	50	100	03
5	PLC (IC)	1BPLC205B	Python Programming	CSE and Allied Dept	3	0	2	03	50	50	100	04
6	AEC	1BENG206	English Communication Skills	Humanities	1	0	0	02	50	50	100	01
7	NCMC	1BICP207	Indian Constitution and Professional Ethics	Humanities	1	0	0	02	50	-	50	-
8	AEC/SDC	1BETP208L	Emerging Technologies: A Primer (Inter-Disciplinary Project Based Learning)	Respective Dept (Multiple Dept)	0	0	2	02	50	50	100	01
				TOTAL	**15**	**2**	**10**		**400**	**350**	**750**	**20**
9	**AICTE Activity Points** (Students have to earn 100 activity points between 01-08 semester)											

ASC-Applied Science Courses, **TD/PSB**- Teaching Department / Paper Setting Board, **PSC**- Program Specific Course, **ESC**- Engineering Science Courses, **ETC**-Emerging Technology Courses, **PSCL** – Program Specific Course Lab, **AEC**- Ability Enhancement Courses, **HSMC**-Humanities, Social Sciences and Management Courses, **SDC**- Skill Development Courses, **NCMC**-Non-credit Mandatory Courses, **CIE**–Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course).

Credit Definition:	
1- hour Lecture **(L)** per week= **1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session
2-hours Tutorial **(T)** per week=**1 Credit**	04-Credits (IC) are to be designed for 40 hours theory and 10-12 hours of Practical Session
2- hours Practical / Drawing (**P**) per week =**1 Credit**	03-Credits courses are to be designed for 40 hours of Teaching-Learning Session 02- Credits courses are to be designed for 25 hours of Teaching-Learning Session 01-Credit courses are to be designed for 12-15 hours of Teaching-Learning Session

Engineering Science Courses-II (ESC-II)				
Code	**Title**	**L**	**T**	**P**
1BESC204A	Introduction to Civil Engineering	3	0	0
1BESC204B	Introduction to Mechanical Engineering	3	0	0
1BESC204C	Introduction to Electrical Engineering	3	0	0
1BESC204D	Introduction to Electronics and Communication Engineering	3	0	0
1BESC204E	Essentials of Information Technology	3	0	0

- The student has to select one course from the ESC-II group which is offered from the other engineering streams.
- For example, CSE and allied branches students shall opt for any one of the courses from the ESC-II group **except, 1BESC204E - Essentials of Information Technology.**
- The students have to opt for the courses from ESC group without repeating the course in either 1st or 2nd semester.

I Semester

Applied Mathematics-I for Computer Science and Engineering Stream			
Course Code	**1BMATS101**	CIE Marks	50
Course Type (Theory/Integrated/Practical)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	2:2:2	SEE Duration	3 hours
Total Hours	40 Hours Theory + 20 Hours Lab	Credits	4

Course Learning Objectives: The objective of the course is to

- Apply calculus concepts to solve optimization and approximation problems.
- Solve linear systems using matrices, eigenvalues, and eigenvectors.
- Use vector spaces and linear transformations for computational applications.

Module-1: Vector Calculus **(8 hours)**

Scalar and vector fields, Gradient, directional derivatives, divergence and curl, solenoidal vector fields, irrotational vector fields and scalar potential. Curvilinear coordinates: Scale factors, base vectors, Cylindrical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality.

Application topic: Physical Meaning of divergence

Self-Study Components: Spherical polar coordinates

Module-2: Multivariate Calculus and series expansion **(8 Hours)**

Partial differentiation, total derivative - differentiation of composite functions, Statement of Taylor's and Maclaurin's series expansion for two variables.

Application: Maxima and minima for the function of two variables

Self-Study Topic: Jacobian of a matrix

Module-3: Vector Space **(8 Hours)**

Vector spaces and subspace: definition and examples. linear Combinations, linear span, linearly independent and dependent sets, basis and dimension, row space, column space and null space of a matrix, Coordinates.

Module-4: Linear Transformation (8Hours)

Definition and examples, algebra of linear transformations, matrix of a linear transformation. singular, non-singular linear transformations and invertible linear transformations. Rank and nullity of linear transformations

Application topic: Rank Nullity theorem

Self- Study Components: Inner Products and orthogonality

Module-5: Linear Algebra **(8 hours)**

Elementary row transformation of a matrix, Echelon form, rank of a matrix. Consistency and solution of system of linear equations, Gauss elimination, Gauss Jordan method,
Eigenvalues and Eigenvectors, modal matrix..

Application topic: Traffic Flow

Self - Study Components: Diagonalization of the matrix

Practical Module

1. Introduction to MATLAB
2. Basic Operations on Matrices
3. Plotting of Curves
4. Partial Differentiation and Jacobian
5. Linear Algebra – I
6. Taylor Series and L'Hôpital's Rule
7. Vector Spaces

Demo Experiment

Data Visualization using Python-Line, Bar and Pie Charts.

Course Outcomes: At the end of the course the student will be able to:	
1BMATS101.1	Apply partial derivatives, series expansions, and optimization to solve engineering problems.
1BMATS101.2	Analyze scalar/vector fields using gradient, divergence, and curl in physical models.
1BMATS101.3	Solve linear systems and compute eigenvalues/eigenvectors with applications like traffic flow.
1BMATS101.4	Use vector spaces, basis, and orthogonality to tackle computational problems.
1BMATS101.5	Apply linear transformations, rank–nullity, and invertibility in data and computational models.
1BMATS101.6	Experiment with MATLAB for visualization, simulation, and verification of concepts.

Sl.No	**Title of the book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks:				
1.	Higher Engineering Mathematics, Khanna Publishers	B. S. Grewal	Khanna Publishers	44th Ed., 2021
2.	Linear Algebra and its Applications	Gilbert Strang	Cengage Publications	4th Ed., 2022
3.	Linear Algebra	Seymour Lipschutz and Marc Lipson	Schaum's outlines series	4th Ed., 2008
Reference books:				
1.	Higher Engineering Mathematics	V. Ramana	McGraw-Hill Education	11th Ed., 2017
2.	A Textbook of Engineering Mathematics	N.P Bali and Manish Goyal	Laxmi Publications	10th Ed., 2022
3.	Calculus	James Stewart	Cengage Publications	7thEd., 2019
4.	Linear Algebra, a modern introduction	David Poole	Cengage publishers	4th Ed., 2014
5.	Linear Algebra and its Applications	David C Lay	Pearson Publishers	4th Ed., 2018
6.	Linear Algebra with applications	Gareth Williams	Jones Bartlett Publishers Inc.	6th Ed., 2017

Video links (e resources):

Module	**Topic Name**	**Videos**
Module 1: Vector Calculus	Scalar and vector field	https://youtu.be/36kKhxQ7qOo https://nptel.ac.in/courses/111105160
	Curvilinear Coordinate system	https://www.youtube.com/watch?v=KZzAFX54DWs
Module 2: Multivariable Calculus and Series Expansion	Partial differentiation	https://youtu.be/8ZAucbZscNA
	Maxima and minima for the function of two variables	https://youtu.be/jGwA4hknYp4

Module 3: Vector Space	Vector space and subspace	https://nptel.ac.in/courses/111107164 https://youtu.be/aEF5PPbv8Oc?si=8GK-d-motHBqmYHE
	Basis and Dimension	https://youtu.be/mNB7cDaXshQ?si=3i0yTcJwEXqS_1Ux
Module 4: Linear Transformation	Linear Transformation	https://www.youtube.com/watch?v=zvRdbPMEMUI&list=PLbMVogVj5nJQ2vsW_hmyvVfO4GYWaaPp7&index=15
	The Matrix of a Linear Transformation	https://www.youtube.com/watch?v=lm-9hPRXhbE&list=PLbMVogVj5nJQ2vsW_hmyvVfO4GYWaaPp7&index=20
	The Null Space and the Range Space of a Linear Transformation	https://www.youtube.com/watch?v=1uzqGEfOk8E&list=PLbMVogVj5nJQ2vsW_hmyvVfO4GYWaaPp7&index=16
	The Rank-Nullity-Dimension Theorem	https://www.youtube.com/watch?v=FL9ANdNTQus&list=PLbMVogVj5nJQ2vsW_hmyvVfO4GYWaaPp7&index=17
Module 5: Linear Algebra	Row Echelon form of a matrix	https://youtu.be/tqW6sjW4F_k?si=u5yuYu4GFyx_GOgK
	Rank of a matrix	https://youtu.be/1Q5Z1fGeLqk?si=axY0i87xkg-2yrFf
	Consistency	https://youtu.be/gdv_p299-jA?si=pFjNJkJWH5TYOZbJ
	Gauss Elimination Method	https://youtu.be/XLCEpW2A5wo?si=JVwvjGOns-9goItt
	Gauss Jordan method	https://youtu.be/LCaB_nJmXNk?si=nFts6_weNEaPOcy2
	Gauss Seidal Method	https://youtu.be/Spmar6neOOc?si=VJhr0N142XkWAXC5
	Rayleigh's power method	https://youtu.be/rwa_o0FbAhc?si=Ymtox5_HTS0Imzal

Course Articulation Matrix

Course Outcomes (COs)	**Program Outcomes (POs)**										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BMATS101.1	2	2	-	-	-	-	-	-	-	-	-
1BMATS101.2	3		2	-	1	-	-	-	-	-	-
1BMATS101.3	3		2		1	-	-	-	-	-	-
1BMATS101.4	2	2	-	-	-	-	-	-	-	-	-
1BMATS101.5	3	2	-		1	-	-	-	-	-	-
1BMATS101.6	-	-	-	1	2	-	-	-	-	-	-

1: Low 2: Medium 3: High

Applied Physics for Computer Science and Engineering Stream			
Course Code	**1BPHYS102**	Semester	
Course Type	Integrated	CIE Marks	50
Teaching Hours/Week (L:T:P)	3:0:2	SEE Marks	50
Total Hours of Pedagogy (Theory and Lab hours)	40 hours theory and 10-12 hours of practical sessions	Total Marks	100
Credits	04	Exam Hours	03

COURSE OBJECTIVES: The objectives of this course is to

1. Demonstrate competency and understanding of the basic concepts in Physics.
2. Develop problem solving skills and implementation in technology.
3. Develop team spirit and experimentation skills in Physics.

Module-1 – 8 Hours

Quantum Mechanics:
Matter waves, Expression for electron wave, Heisenberg's Uncertainty Principle and its application, Non-existence of electron inside the nucleus, Principle of Complementarity, Wave Function, Time independent Schrödinger wave equation (Derivation), Physical significance of a wave function and Born Interpretation, Eigen functions and Eigen values, Particle inside one dimensional infinite potential well, quantum tunneling(Qualitative), Numerical Problems.
Self-Learning: Black Body Radiation.

Module-2 – 8 Hours

Electrical Properties of Metals and Semiconductors:
Assumptions of Quantum Free Electron Theory, Density of States (Qualitative), Fermi Dirac statistics, Fermi Energy, Fermi factor, Variation of Fermi Factor with Temperature and Energy, Semiconductors: Expression for carrier concentration (Qualitative), Fermi level for intrinsic (with derivation) and extrinsic semiconductor (no derivation) Expression for electrical conductivity, Hall effect, Numerical Problems.
Self-Learning: Classical Free electron Theory, Classification of semiconductors.

Module-3 – 8 Hours

Superconductivity:
Zero resistance state, Persistent current, Meissner effect, Critical temperature, Critical current (Silsbee Effect) – Derivation for a cylindrical wire using ampere's law, Critical field, Formation of Cooper pairs - Mediation of phonons, , BCS Theory, Type-I and Type-II superconductors, High Tc superconductors, Formation of Vortices, Explanation for upper critical field, Josephson junction, Flux quantization, DC Squid, Superconducting Magnet, MAGLEV, Numerical Problems.
Self-Learning: Mattheisen's rule, Lossless power transmission.

Module-4 – 8 Hours

Photonics:
Interaction of radiation with matter – Einstein's A and B coefficients, Prerequisites for lasing actions, Types of LASER – Carbon dioxide laser, Use of attenuators for single photon sources, Optical modulators –Pockel's effect, Kerr effect, Photodetectors – Single Photon Avalanche Diode, Optical fiber- construction and mechanism Derivation of Numerical aperture, V-number, Number of modes, Types of optical fibre, losses in optical fiber, Mach-Zehnder interferometer, Numerical problems.
Self-learning: Semiconductor diode LASER.

Module-5– 8 Hours

Quantum Computing:
Moore's law - limitation of VLSI, Classical vs Quantum Computation, bit, Qubit and its properties, Bloch Sphere, Dirac notation, Brief discussion on types of qubit, Superconducting qubits, Harmonic oscillator (qualitative) – Need for anharmonicity, Charge qubit, Quantum Gates – Pauli

Gates, Phase gate (S, T), Hadamard Gate, Two qubit gates – CNOT gate, Numerical Problems. **Self-learning:** Vector Algebra.
PRACTICAL COMPONENTS
FIXED SET OF EXPERIMENTS
1. Determination of wavelength of LASER using Diffraction Grating. 2. Determination of acceptance angle and numerical aperture of the given Optical Fiber. 3. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Light 4. Determination of Planck's Constant using LEDs. 5. Black-Box Experiment (Identification of basic Electronic Components) 6. Resonance in LCR circuit. 7. Characteristics of a Bipolar Junction Transistor. 8. Characteristics of Zener diode **Simulation Labs** 9. Determination of Energy gap of the given Semiconductor. 10. Predicting the outputs of various combinations of single and two-qubit gates using QUIRK Quantum Simulator.

Course Outcomes (COs): At the end of the course, the student will be able to	
1BPHYS102.1	Apply the fundamental principles of quantum mechanics to solve problems in quantum computing and related technologies.
1BPHYS102.2	Analyze electron transport in solids using classical and quantum models to determine key electrical properties for material and device applications.
1BPHYS102.3	Evaluate the principles and key features of superconductivity and their significance in advanced physical systems.
1BPHYS102.4	Interpret the interaction of radiation with matter and the operating principles of devices used in photonics applications.
1BPHYS102.5	Analyze fundamental concepts of quantum computing and predict outcomes using theoretical models.
1BPHYS102.6	Investigate the impact of physics-based innovations on society and industry by utilizing scientific communication, analytical, and experimental skills.

Text Books:				
Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
1	Engineering Physics	Satyendra Sharma and Jyotsna Sharma	Pearson	2018
2	Engineering Physics	S. L. Kakani, Shubra Kakani	CBS Publishers and Distributers Pvt. Ltd.	3rd Edition, 2020
3	Solid State Physics	S. O. Pillai	New Age International	2005
4	Quantum Computing	Parag K Lala	McGraw Hill	2020
5	A Detailed Text Book of Engineering Physics	SP Basavaraj	Subhas Publications / Subhas Stores	2018
Reference Books:				
1	Concepts of Modern Physics	A. Beiser	McGraw-Hill Education	6th Edition, 2002

2	Introduction to Quantum Mechanics	D. J. Griffiths	Pearson	2nd or 3rd Edition, 2018
3	Introduction to Superconductivity	M. Tinkham	Dover Publications	2nd Edition, 2004
4	Superconductivity – Basics and Applications	P. K. Mishra	Ane Books	2009
5	Lasers and Non-Linear Optics	B. B. Loud	New Age International	2011
6	Fundamentals of Photonics	B. E. A. Saleh, M. C. Teich	Wiley	3rd Edition, 2019
7	Quantum Computation and Quantum Information	M. A. Nielsen, I. L. Chuang	Cambridge University Press	10th Anniversary Edition, 2010
8	Quantum Computing	Vishal Sahani	McGraw Hill Education	2007 Edition

Web links and Video Lectures (e-Resources):

1. NPTEL – Quantum Mechanics I (IIT Madras): https://nptel.ac.in/courses/115106066
2. NPTEL – Physics: Introductory Quantum Mechanics (NOC): https://archive.nptel.ac.in/courses/115/104/115104096
3. Solid State Physics – NPTEL (IIT Madras) https://nptel.ac.in/courses/115106127
4. A Brief Course on Superconductivity – NPTEL IIT Guwahati (Prof. Saurabh Basu)
5. Playlist Introduction Video: https://www.youtube.com/watch?v=SHoGV-sezNI
6. Full playlist available via the YouTube channel description or archive link.
7. Concepts in Magnetism and Superconductivity – NOC (IIT Kharagpur) Series start (Lecture 1): https://digimat.in/nptel/courses/video/115105131/L01.html
8. Introduction to Photonics – NPTEL (IIT Madras, Prof. Balaji Srinivasan) Lecture 03 to Lecture 12 cover: Direct video link (start Lecture 03): https://nptel.ac.in/courses/108106135/03
9. Semiconductor Optoelectronics – NPTEL (IIT Delhi, Prof. M. R. Shenoy)Direct video link (start relevant lecture): https://nptel.ac.in/courses/108108174/05
10. Lecture 04 – Quantum Computing Basics: https://www.youtube.com/watch?v=-fttE1SzpD8
11. Lecture 08 – Quantum Gates and Circuits Part 1: https://www.youtube.com/watch?v=nGPr1QM_XrY

Course Articulation Matrix

Course Outcomes (COs)	**Program Outcomes (POs)**										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
1BPHYS102.1	**3**	**2**									
1BPHYS102.2	**3**	**2**									
1BPHYS102.3	**2**	**2**				**1**					
1BPHYS102.4	**3**	**1**									
1BPHYS102.5	**2**										**1**
1BPHYS102.6				**2**		**1**		**3**	**2**		**1**

1: Low, 2: Medium, 3: High

Principles of Programming using C			
Course Code	**1BPOP103**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives: The objective of the course is to:

- Understand the basic concepts of Programming.
- Explain the basic concepts of C Programming Language Constructs.
- Design and Develop Programming Skills.
- Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems
- Apply programming constructs of C language to solve the real-world problems

Module-1 Fundamentals of C Programming (8 hours)

Introduction to C Language: Basic structure of a C program, Character sets, C Tokens, Keywords, Identifiers, Constants, Variables, Declaration and Initialization of Variables, Data types.

Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional Operators, Arithmetic Expressions and Evaluation, Precedence and Associativity, Type conversions

Reading and writing a character, Formatted Input and Output

Textbook 1: Chapter 1, 2, 3, 4

Module-2 Control Structures in C (8 hours)

Decision making: Decision making statements: if, if-else, nested if-else, cascaded if-else, switch statement.

Looping statements: for, while, do-while, **Branching statements:** break and continue

Textbook 1: Chapter 5, 6

Module-3 Arrays and Strings in C (8 hours)

Arrays: Introduction, One - Dimensional, Two- Dimensional arrays : declaration, initialization, basic sorting/searching algorithms using arrays e.g., Bubble Sort, Linear/Binary Search.

Strings: Introduction to Strings, Declaration and initialization, Reading strings from the terminal, Writing strings to screen, String handling functions.

Textbook 1: Chapter 7, 8

Module-4 User defined functions (8 hours)

User defined Functions: Definition, elements of user defined functions. Category of user defined functions, Nesting of functions, Recursion e.g., Fibonacci number generation, Factorial computation, Passing arrays to functions, Passing strings to functions, Passing by value, Passing by reference.

Textbook 1: Chapter 9

Module-5 Structures, Unions and Pointers (8 hours)

Structures: Introduction, Defining a structure, Declaring Structure variables, Accessing Structure Members, Initialization, Operations on individual members, Array of structures, Arrays within structures, Structures within structures.

Unions: Introduction, Defining a union, Declaring union.

Pointers: Introduction, Accessing the address of a variable, Declaring a Pointer variable, Initialization of pointer variables, Accessing a variable through its pointer.

Textbook 1: Chapter 10, 11.

Self-study (for Learning Activity, Not for SEE):

1. File handling in C - opening, reading, writing, closing, file position indicators, error handling, text vs binary files, structured data storage
2. Dynamic memory allocation - malloc, calloc, realloc, free, common errors like dangling pointers
3. Pointers and advanced usage - Pointer arithmetic, pointer-to-pointer, Function pointers (callbacks, plugin-like behavior), Pointers to arrays and arrays of pointers

Course Outcomes: At the end of the course the student will be able to :	
1BPOP103.1	Apply the fundamentals of C programming, evaluate expressions using operators, and apply input/output concepts to solve basic problems.
1BPOP103.2	Develop C programs using decision-making, branching, and looping techniques.
1BPOP103.3	Apply arrays in C programming to design and implement efficient solutions.
1BPOP103.4	Implement programs using string handling functions and operations in C.
1BPOP103.5	Design modular programs by applying various programming constructs in C.
1BPOP103.6	Implement C programs using structures, unions, and pointers for problem solving.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1.	Programming in ANSI C	E. Balaguruswamy	Tata McGraw-Hill, India,	7th Edition, 2017
Reference Books				
1.	Computer Science, A Structured programming approach using C	Behrouz A. Forouzan	Cengage Learning	3rd Edition 2007
2.	Programming with C Schaum's Outlines.	Byron Gottfried Schaum's	Tata McGraw Hill	3rd Edition 2017
3.	Computer Fundamentals and Programming in C	Reema Thareja	Oxford University	2nd Edition, 2017

Additional Resources: Web links/NPTEL Courses

- C Programming Tutorial https://www.geeksforgeeks.org/c/c-programming-language/
- Learn C - Free Interactive C Tutorial learn-c.org
- Great Learning C for Beginners https://www.mygreatlearning.com/academy/learn-for-free/courses/c-for-beginners1

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
1BPOP103.1	1	2	2	-	2	-	-	-	2	1	-
1BPOP103.2	1	2	3	-	2	-	-	-	2	1	-
1BPOP103.3	2	2	3	-	2	-	-	-	2	1	-
1BPOP103.4	2	3	3	-	2	-	-	-	2	1	-
1BPOP103.5	2	3	3	-	2	-	-	-	2	1	-
1BPOP103.6	2	3	3	-	2	-	-	-	2	1	-

1: Low 2: Medium 3: High

INTRODUCTION TO CIVIL ENGINEERING			
Course Code	1BESC104A	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

1. To make students learn the scope of various specializations of Civil engineering.
2. To make students learn the concepts of sustainable infrastructure
3. To develop students' ability to analyse the problems involving forces and moments with their applications.
4. To make students learn the concepts of Equilibrium, types of beams and supports, and Support Reactions.
5. To develop the student's ability to find out the centroid and its applications.

Module-1 Civil Engineering Disciplines and Building Science (8 hours)

Importance and Scope of various fields of Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Transportation Engineering, Environmental Engineering, Construction Planning, and Project Management.

Materials of Construction: Types and Uses of Bricks and Autoclaved Aerated Concrete (AAC) Blocks, Cement, Structural Steel, and Concrete.

Structural Elements of a Building: Concept of Foundation, Plinth, Lintel, Chejja, Masonry wall, Column, Beam, Slab, and Staircase.

Module-2 Sustainable and Green Infrastructure Development (8 hours)

Societal and Global Impact of Infrastructure:

Introduction to sustainable development goals, Smart city concept, clean city concept, Safe city concept. Environment: Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control.

Module-3 Analysis of Force System (8 hours)

Concept of idealization, system of forces, principles of transmissibility, superposition and physical independence, Resolution and composition of forces, Resultant of concurrent and non-concurrent coplanar force systems, Moment and Couple of forces, Varignon's theorem: Numerical examples.

Module-4 Equilibrium and Support Reactions (8 hours)

Equilibrium of Coplanar Concurrent forces: Free body diagram, equations of equilibrium, Lami's Theorem, and Numerical examples.

Equilibrium of Coplanar Non-Concurrent forces: Types of loadings, beams and supports, Concept of Statically determinate and indeterminate structures, Numerical examples on Statically determinate beams.

Module-5 Centroid of Plane areas (8 hours)

Importance of centroid and center of gravity, Derivation of the centroid of rectangle, triangle, semicircle, and quadrant of a circle using method of integration, Numerical examples of centroid of built-up sections.

Course Outcomes: At the end of the course, the student will be able to:	
1BESC104A.1	Explain the fundamental concepts of various disciplines of Civil engineering
1BESC104A.2	Assess the societal impact of infrastructure development
1BESC104A.3	Evaluate the sustainability aspects of the built environment through the appropriate selection of green materials and the interpretation of rating systems.
1BESC104A.4	Apply the system of force principles to solve coplanar force systems.

1BESC104A.5	Analyze the equilibrium of coplanar force systems.
1BESC104A.6	Locate the centroid of simple and composite plane areas.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Basic Civil Engineering and Engineering Mechanics,	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan,	Laxmi Publications	3rd edition, 2015
2	Building Construction	Rangwala	Charotar Publishing House Pvt. Ltd	33rd Edition, 2016
3	Elements of Civil Engineering and Engineering Mechanics	Kolhapure B K,	EBPB	8th Edition 2014
4	Elements of Civil Engineering and Engineering Mechanics	H.J.Sawant and S.P.Nitsure	Technical publications	2nd Edition, 2012
5	Elements of Civil Engineering and Engineering Mechanics	M N Sheshaprakash and Ganesh Mogaveer B	PHI Learning Private Limited	3rd Edition, 2014
Reference Books				
1	Engineering Mechanics	Bhavikatti S S,	New Age International	7th Edition, 2019
2	Engineering Mechanics	Timoshenko S, Young D. H., Rao J. V.,	Pearson Press	5th Edition, 2017
3	Engineering Mechanics: Principles of Statics and Dynamics	R. C. Hibbler	Pearson	14th Edition, 2016
4	Mechanics for Engineers, Statics and Dynamics	F. P. Beer and E. R. Johnston	McGraw Hill	12th Edition, 2019
5	Engineering Mechanics	Irving H. Shames	Prentice Hall	4th Edition, 2005
6	Engineering Mechanics: Statics	J. L. Meriam. L. and G. Kraige.	Willey India	9th Edition, 2018

Additional Resources: Web links

https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT
https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&i ndex=2
https://www.youtube.com/watch?v=3YBXteL-qY4
https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq 2KBphJz95rao7q8PpwT&index=10
https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2 KBphJz95rao

7q8PpwT&index=7
https://www.youtube.com/watch?v=atoP5_DeTPE
https://www.youtube.com/watch?v=ksmsp9OzAsI
https://www.youtube.com/watch?v=x1ef048b3CE
https://www.youtube.com/watch?v=l_Nck-X49qc
https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resul tant_Force
https://www.youtube.com/watch?v=RIBeeW1DSZg
https://www.youtube.com/watch?v=R8wKV0UQtlo
https://www.youtube.com/watch?v=0RZHHgL8m_A
https://www.youtube.com/watch?v=Bls5KnQOWkY
Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning •
https://www.youtube.com/watch?v=Zrc_gB1YYS0
https://www.youtube.com/watch?v=Hn_iozUo9m4

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1BESC104A.1	**3**												
1BESC104A.2	**3**					**2**		**2**	**2**				
1BESC104A.3	**3**	**3**				**2**							
1BESC104A.4	**3**	**3**											
1BESC104A.5	**3**	**3**											
1BESC104A.6	**3**	**3**											

1: Low 2: Medium 3: High

Introduction to Mechanical Engineering			
Course Code	**1BESC104B**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

1. Acquire a fundamental understanding role of Mechanical Engineering in NTM.
2. Acquire a basic knowledge of renewable energy resources.
3. Acquire knowledge of various engineering materials and metal joining techniques.
4. Acquire knowledge of IC engines, EVs & Hybrid vehicles.
5. Acquire essential experience on machine tools and power transmission system
6. Acquire knowledge of basic concepts on CNC, mechatronics and robotics.

Module-1 (8 hours)

Energy Sources and Power Plants: Introduction and application of energy sources, Construction and working of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant, Wind power plant and concept of bio-fuels.

Non-Traditional Machining Processes: Ultrasonic Machining (USM), Electrochemical Machining (ECM), Electrical Discharge Machining (EDM), Electron Beam Machining (EBM) and Laser Beam Machining (LBM)

Self-Study Component: Study additional renewable energy technologies and their impact on future power generation.

Module-2 (8 hours)

Engineering Materials: Types, properties and applications of ferrous and non-ferrous metals, ceramics, composites, smart materials and shape memory alloys.

Metal Joining Processes: Soldering, Brazing and Welding: Definition & Classification of soldering, brazing, and welding. Brief description of arc welding, Oxy-acetylene gas welding and types of flames.

Self-Study Component: Explore advanced materials and their role in modern manufacturing applications.

Module-3 (8 hours)

Fundamentals of IC Engines: Components and working principle of 4-stroke petrol and diesel engines, Application of IC Engines.

Insight into future mobility technology: Brief description & Components of Electric and Hybrid Vehicles, Advantages and disadvantages of EVs and Hybrid Vehicles.

Self-Study Component: Compare conventional IC engines with electric vehicle powertrains through case studies.

Module-4 (8 hours)

Machine Tools and Operations: Working principle of lathe, lathe operations: turning, facing, knurling, working principle of drilling, drilling operations: drilling, boring, reaming, working principle of milling machine, milling operations: slot milling and plane milling (Sketches of operations of lathe, drilling and milling must be drawn for explanation in the exam)

Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, Gear Trains and their application: simple and compound Gear Trains

Self-Study Component: Study applications of different gear trains in real-life mechanical systems.

Module-5 (8 hours)

Introduction to Modern Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D Printing.

Automation in industry: Fixed, programable & flexible automation and basic elements with block diagrams and concept of open-loop and closed-loop mechatronic system.

Introduction to Robotics: Robot configurations, applications, advantages and disadvantages. **Self-Study Component:** Explore recent advancements in CNC, automation, and robotics used in smart manufacturing industries.

Course Outcomes: At the end of the course the student will be able:	
1BESC104B .1	Classify energy sources, power plants, and non-traditional machining processes with their applications.
1BESC104B .2	Analyze the suitability of non-traditional machining processes (USM, ECM, EDM, EBM, LBM) for engineering applications.
1BESC104B .3	Select engineering materials and compare metal joining processes for specific applications.
1BESC104B .4	Compare IC engines with electric and hybrid vehicles in terms of components, performance, and limitations.
1BESC104B .5	Demonstrate basic machine tools and analyze the applications of gear drives and gear trains.
1BESC104B .6	Evaluate emerging trends in modern manufacturing systems such as CNC, 3D printing, automation, and robotics.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Elements of Engineering Mechanical	K R Gopalakrishna	Subhas Publications	38th Edition 2018
2	Text Book of Elements of Mechanical Engineering	S Trymbaka Murthy	MEDTECH (Scientific International Pvt Ltd)	5th Edition 2019
3	Elements of Engineering Mechanical	Hajra Choudhury	Media Promoters, New Delhi	Vol 1 & 2 2001
Reference Books				
1	Elements of Engineering Mechanical	Dr. A. S. Ravindra	Thomson Press (India) Ltd	8th Edition 2011
2	Introduction to Robotics: Mechanics and Control	Craig J. J	Pearson International Education	3rd Edition 2005
3	Mechatronics-Principles Concepts and Applications	Nitaigour Premchand Mahalik	Tata McGraw Hill	1st Edition 2003
4	Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing	Ian Gibson, David W. Rosen, Brent Stucker	Springer	2nd Edition 2015
5	Modern Electric, Hybrid Electric and FuelCell Vehicles.	MehrdadEhsani, Yimin Gao, Sebastien E. Gay and Li Emadi,	CRC Press LLC	1st Edition 2005

6	Modern Maching Process	P. C. Pandey and H. S. Shah	McGraw Hill Education India Pvt. Ltd.	2000

Weblinks/Video Lectures/MOOCs

1. **MOOC:** https://nptel.ac.in/courses/112/105/112105123/
2. **MOOC:** https://nptel.ac.in/courses/112/107/112107208/
3. **MOOC:** https://nptel.ac.in/courses/112/103/112103262/
4. **NPTEL:** https://www.youtube.com/watch?v=GQHCnWl2U6I

Course Articulation Matrix

Course Outcomes (CO)	Program Outcomes (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BESC104B.1	3	-	-	-	-	-	-	-	-	-	-
1BESC104B.2	-	3	-	-	-	-	-	-	-	-	-
1BESC104B.3	-	-	2	-	-	-	-	-	-	-	-
1BESC104B.4	-	-	-	2	-	-	-	-	-	-	-
1BESC104B.5	-	-	-	-	-	-	-	-	-	-	-
1BESC104B.6	-	-	-	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Introduction to Electrical Engineering			
Course Code	**1BESC104C**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

1. Illustrate the behavior of circuit elements in single-phase circuits.
2. Comprehend the importance of three phase AC circuits and connections.
3. Explain the construction and operation of transformers, DC generators and motors and induction motors.
4. Discuss concepts of circuit protecting devices and earthing.
5. Explain electric power generation, electricity billing, equipment and personal safety measures

Module-1 Power Generation and DC circuits **8 hours**

Introduction: Conventional and non-conventional energy resources; Advantages and limitations, general structure of electrical power systems using single line diagram approach.
Power Generation: Hydel, nuclear, solar & wind power generation (Block Diagram approach).
DC Circuits: Ohm's Law and its limitations, Concepts of KVL and KCL (maximum two branches), Power and Energy. (Numericals covering all the concepts).

Module-2 AC circuits **8 hours**

AC Fundamentals: Definitions of waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. Voltage and current relationship with phasor diagrams in R, L and C circuits (No power equation derivations). Concept of Impedance in R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Numericals covering all the concepts).
Three Phase Circuits: Generation of Three phase AC quantity, star and delta connection, relationship between line and phase quantities (Excluding proof & Numericals).
Self-Study: Advantages & Limitation of three phase system over single phase system

Module-3 DC Machines & Synchronous Machines **8 hours**

DC Generator: Principle of operation, constructional details, types of generators (DC Shunt &Series) [Excluding Numericals]
DC Motor: Principle of operation, types of motors [Excluding Numericals]
Synchronous Generators: Principle of operation, types and construction. [Excluding Numericals]
Self-Study: Advantages and applications of DC Generators/Motors.

Module-4 AC Machines **8 hours**

Transformers: Necessity of transformer, principle of operation, Types and construction of single phase transformers, EMF equation, losses. (Numericals on EMF equations & Transformation ratio)
Three-phase induction Motors: Concept of rotating magnetic field (excluding the derivation), Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance. (Numericals on Slip).

Module-5 Electrical Safety **8 hours**

Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, printers. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff,
Self-Study: Case Study on calculation of electricity bill for domestic consumers.
Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.
Personal safety measures: Electric shock, earthing and its types, safety precautions to avoid shock.

Course Outcomes: At the end of the course the student will be able to:	
1BESC104C.1	Describe the concept of electric power generation using various energy resources.
1BESC104C.2	Apply basic laws of electrical engineering to analyze the DC circuits.
1BESC104C.3	Solve numericals on single phase and three phase AC circuits
1BESC104C.4	Discuss the construction and operation of DC electrical machines
1BESC104C.5	Discuss the construction and operation of AC electrical machines.
1BESC104C.6	Illustrate the use of circuit protective devices and earthing.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Basic Electrical Engineering.	D C Kulshreshtha.	Tata McGraw Hill.	1st Edition 2019.
2	A text book of Electrical Technology.	B.L. Theraja.	S Chand and Company	Reprint edition 2014.
Reference Books				
1	Basic Electrical Engineering,	D.P Kothari and I. J. Nagrath,	Tata McGraw Hill	4th Edition, 2019.
2	Principles of Electrical Engineering & Electronics	V. K. Mehta, Rohit Mehta,	S Chand and Company	2nd Edition, 2015.
Additional Resources: Web links/NPTEL Courses				
• https://nptel.ac.in/courses/108105112 (Fundamentals of Electrical Engineering)				

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BESC104C.1	3	-	-	-	-	-	-	-	-	-	-
1BESC104C.2	3	3	-	-	1	-	-	-	-	-	-
1BESC104C.3	3	2	-	-	1	-	-	-	-	-	-
1BESC104C.4	3	-	-	-	-	-	-	-	-	-	-
1BESC104C.5	3	1	-	-	-	-	-	-	-	-	-
1BESC104C.6	3	-	-	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Introduction to Electronics and Communication Engineering			
Course Code	1BESC104D	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE	3 Hours
Total Hours	40 Hrs	Credits	03

Course Learning Objectives: The objective of the course is to

- Develop a conceptual and analytical foundation in semiconductor devices, particularly rectifier and voltage regulation circuits.
- Gain the ability to interpret oscillator behavior and operational amplifier configurations in analog signal processing.
- Build computational skills in handling various number systems relevant to digital logic.
- Acquire the skills to design and analyze basic logic circuits using fundamental digital components.
- Familiarize with the evolution, architecture, and applications of embedded systems in modern electronics.
- Introduce the basic principles of communication systems with emphasis on analog modulation methods.

Module-1 Semiconductor Diodes and Power Supply Circuits (8 hours)

N-type and P-type Semiconductors, The PN junction, Forward and Reverse Biased Junction, Characteristics and Parameters, Diode approximations, Half-Wave Rectification (HWR), Full-Wave Rectification (FWR), Capacitor Filter Circuits (full wave & half wave), Zener diode Voltage Regulators with and without load.

Activities: Virtual lab experiments on rectifiers

Self-Learning Topics: Full wave capacitor filter circuits, Zener diode voltage regulator without load.

Textbook 1: 1.4, 1.5, 1.6, 2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.6

Module-2 Oscillators and Applications of Operational Amplifiers (8 hours)

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Crystal controlled oscillators (Only concepts, working, and waveforms. No mathematical derivations)

Textbook 2: 7.7, 7.13.

Operational Amplifiers (Op-Amp) – Introduction, Op-Amp symbol, characteristics of ideal and practical Op-Amps, Basic Op-Amp circuits: Inverting and Non-inverting amplifiers, Linear applications of Op-Amp: Voltage follower, Summer, Subtractor, Integrator, Differentiator

Activities: Multisim-based experiments on Op-Amp as Inverting and Non-inverting amplifiers, Voltage follower, Summer, Subtractor, Integrator and Differentiator.

Self-Learning Topics: Non Inverting Amplifier, Voltage follower.

Textbook 2: 6.1 and 6.2.

Module-3 Digital Logic Fundamentals and Combinational Circuits (8 hours)

Boolean Algebra and Logic Circuits: Introduction, Number systems & Conversion: Decimal, Binary, Hexadecimal, Octal, Complement of Binary numbers, Boolean algebra theorems, Logic gates.

Combinational Circuits: Adders: Half adder and Full adder.

Activities: Demonstrate the working of basic gates and De Morgan's law using trainer kits.

Self-Learning Topics: Conversion: Octal to Hexadecimal and vice versa.

Textbook 2: 10.1, 10.2, 10.4, 10.5.1, 10.5.2

Module-4 Fundamentals of Embedded Systems and Architectures (8 hours)

Embedded Systems – Definition, Embedded Systems Versus General Computing Systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Purpose of Embedded System, A typical Embedded System, Core of the Embedded System, Microprocessor versus Microcontroller, RISC versus CISC, Harvard versus Von-Neumann architecture.

Activities: LED, serial monitor, ultrasonic sensor using Arduino. Self-Learning Topics: Major application areas of Embedded Systems Textbook 3: 1.1, 1.2, 1.4, 1.5, 1.6, 2.1, 2.1.1
Module-5 Introduction to Communication Systems (8 hours)
Introduction, Elements of communication systems, Types of modulation (only concepts): AM and FM, Difference between AM and FM, Modulation, Multiplexing, Transmission lines, Concept of Radio wave and antennas, Satellite Communication, Principle of operation of mobile phone, Optical fiber communication. Activities: Demonstrate the working of AM and FM. Self-Learning Topics: Principle of operation of mobile phone. Textbook 2: 18.1, 18.2, 18.11, 18.12, 18.13, 18.14, 18.15, 18.17, 18.18, 18.22

Course Outcomes: At the end of the course the student will be able to:	
1BESC104D.1	Develop a conceptual and analytical foundation in semiconductor devices, particularly rectifier and voltage regulation circuits.
1BESC104D.2	Gain the ability to interpret oscillator behavior and operational amplifier configurations in analog signal processing.
1BESC104D.3	Build computational skills in handling various number systems relevant to digital logic.
1BESC104D.4	Acquire the skills to design and analyze basic logic circuits using fundamental digital components.
1BESC104D.5	Familiarize with the evolution, architecture, and applications of embedded systems in modern electronics.
1BESC104D.6	Introduce the basic principles of communication systems with emphasis on analog modulation methods

Sl.No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Electronic Devices and Circuits	David A Bell	Oxford University Press	4th Edition, 2008.
2	Basic Electronics	D P Kothari and I J Nagrath	McGraw Hill Education (India)	2nd Edition, 2018.
3	Introduction to Embedded Systems	Shibhu KV	McGraw Hill Education (India)	2nd Edition, 2017.
Reference Books				
1	Electronic Devices	Thomas L. Floyd	Pearson Education	9th Edition, 2012.
2	Electronic Devices and Circuit Theory	R Boylestad, Nashelskey	Pearson Education	11th Edition, 2013.

Web links and Video Lectures (e-Resources):

1. Basic Electronics Virtual Lab-IIT Kharagpur: http://vlabs.iitkgp.ac.in/be/
2. Digital Electronics https://www.youtube.com/watch?v=2xXErGeeb_Q 3.
3. https://www.youtube.com/watch?v=Yryi1bbmUjU.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
1BESC104D.1	2	-	-	-	3	-	-	-	1	-	-
1BESC104D.2	1	-	-	-	3	-	-	-	1	-	-
1BESC104D.3	1	2	-	-	-	-	-	-	-	-	-
BESC104D.4	1	2	-	-	-	-	-	-	-	-	-
1BESC104D.5	1	-	-	-	-	-	-	-	-	-	-
1BESC104D.6	1	-	-	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Essentials of Information Technology			
Course Code	**1BESC104E**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

- Identify different information representation and manipulation schemes.
- Apply operating system principles and algorithmic techniques.
- Utilize knowledge of networking and cybersecurity essentials.
- Analyse ethical and legal issues in information technology.
- Explore software engineering principles and database systems.
- Design simple web applications and explore benefits and risks of social media.

Module-1 Data Storage and Manipulation (8 hours)

Data Storage: Bits and Their Storage, Main Memory, Mass Storage, Representing Information as Bit Patterns, The Binary System, Storing Integers, Storing Fractions.
Data Manipulation: Computer Architecture, Machine Language, Program Execution, Arithmetic/Logic Instructions, Communicating with Other Devices, Programming Data Manipulation. **Textbook 1: Chapter 1: 1.1-1.7, Chapter 2: 2.1-2.6**

Module-2 Operating Systems and Algorithms (8 hours)

Operating Systems: The History of Operating Systems, Operating System Architecture, Coordinating the Machine's Activities, Handling Competition Among Processes, Security.
Algorithms: The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery, Iterative Structures, Recursive Structures. **Textbook 1: Chapter 3, Chapter 5: 5.1-5.5**

Module-3 Networking and Cyber Security (8 hours)

Networking and the Internet: Network Fundamentals, The Internet, The World Wide Web, Internet Protocols, Security.
Cybersecurity: Overview—What is Cybersecurity? Brief History of Cybersecurity Events, The Basic Information Security Model, Cyber Hygiene, Teams in Cybersecurity**.**
Ethical Issues in Information Technology: Overview, Ownership Rules, Ethics and Online Content. **Textbook 1: Chapter 4 Textbook 2: Chapter 16 and 17**

Module-4 Software Engineering and Database Systems (8 hours)

Software Engineering: The Software Engineering Discipline, The Software Life Cycle, Software Engineering Methodologies, Modularity, Tools of the Trade.
Database Systems: Database Fundamentals, The Relational Model.
Textbook 1: Chapter 7 :7.1-7.5, Chapter 9: 9.1-9.2

Module-5 Introduction to HTML and Social Media (8 hours)

Introduction to HTML and Website Development: What is HTML?, Cascading Style Sheets (CSS), Website Design and Storyboarding, Structure of a Website.
Social Media: Benefits of Social Media, Risks of Social Media. **Textbook 2: Chapter 12 and 18**

Self-study (for Learning Activity, Not for SEE): i. Word Processors. ii. Introduction to Spreadsheets and iii. Introduction to Presentation Applications.

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

1BESC104E.1	Apply the fundamentals of data storage, representation, and manipulation in computer systems, including binary systems, memory, and program execution.
1BESC104E.2	Identify the architecture of operating systems and develop algorithmic solutions using iterative and recursive structures.

1BESC104E.3	Apply networking concepts and cybersecurity practices in everyday tasks.
1BESC104E.4	Apply software engineering principles and database fundamentals to design efficient software systems.
1BESC104E.5	Develop simple web pages using HTML and CSS.
1BESC104E.6	Analyse the benefits and risks of social media.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Computer Science an overview	J. Glenn Brookshear and Dennis Brylow	Pearson Education Limited	12th Edition 2017
2	Fundamentals of Information Technology	Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manis	Digital Commons at The University of South Florida	1st Edition 2023
Reference Books				
1	Introduction to Information Technology	V. Rajaraman	PHI Learning	3rd Edition 2018
2	Information Technology in Theory	Pelin Aksoy	Cengage	1st Edition 2012

Web links and Video Lectures (e-Resources):

- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01281821790293196830622_shared/overview (Major Attacks on Networks)
- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01436050621856153674/overview(Software Development Life Cycle)
- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01338269041100390473 5_shared/overview (Computer Networks)
- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01338269041100390473 5_shared/overview (Software Engineering)

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
1BESC104E.1	3										
1BESC104E.2		3	2								
1BESC104E.3	3						2				
1BESC104E.4	3	2	2								
1BESC104E.5	2		3			2					
1BESC104E.6		3					2				

1: Low 2: Medium 3: High

Introduction to AI and Applications			
Course Code	**1BETC105**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

1. Understand the basic concepts of Artificial Intelligence.
2. Gain foundational knowledge of Machine Learning techniques.
3. Familiarize students with emerging trends in AI.
4. Equip students with prompt engineering techniques and explore diverse real-world applications of AI.

Module-1: Introduction to AI (8 hours)

Introduction to Artificial Intelligence (AI): Artificial Intelligence, How Does AI Work? Advantages and Disadvantages of Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Weak AI, Strong AI, Reactive Machines, Limited Memory, Theory of Mind, Self-Awareness, Is Artificial Intelligence Same as Augmented Intelligence and Cognitive Computing, Machine Learning and Deep Learning.

Machine Intelligence: Defining Intelligence, Components of Intelligence, Differences Between Human and Machine Intelligence, Agent and Environment, Search.

Textbook 1: Chapter 1 (1.1-1.5), Chapter 3 (3.1-3.5)

Module-2: Introduction to Machine Learning (8 hours)

Machine Learning: Techniques in AI, Machine Learning Model, Regression Analysis in Machine Learning, Classification Techniques, Clustering Techniques.

Textbook 1: Chapter 2 (2.1-2.4.1, 2.5-2.5.6)

Module-3: Trends in AI (8 hours)

Trends in AI: AI and Ethical Concerns, AI as a Service (AIaaS), Recent trends in AI.

Where AI is heading Today: Expert System, Internet of Things, Artificial Intelligence of Things (AIoT).

Textbook 1: Chapter 8 (8.1, 8.2, 8.4), Chapter 9 (9.1- 9.3)

Module-4: Prompt Engineering (8 hours)

Introduction to Prompt Engineering: LLMs Are Magic, Language Models: How Did We Get Here? Prompt Engineering.

Prompt content: Sources of content, Static Content, Dynamic Content.

Textbook 2: Chapter 1, Chapter 5

Module-5: Applications of AI (8 hours)

Applications of AI, Robotics-an Application of AI, Drones Using AI, No Code AI, Low Code AI.

Industrial Applications of AI: Application of AI in Healthcare, Application of AI in Finance, Application of AI in Retail, Application of AI in Agriculture, Application of AI in Education, Application of AI in Transportation.

Textbook 1: Chapter 1 (1.6, 1.7, 1.8, 1.10, 1.11), Textbook 3: Chapter 3 (3.1-3.6)

Self-Learning Topics:

Prompts for Effective Writing, Prompts for Multimedia Content Retrieval (graphs, images, audio, etc.), AI in Experimentation and Multi-disciplinary research.

Course Outcomes: At the end of the course the student will be able:

1BETC105.1	Understand the fundamental concepts, scope, and types of Artificial Intelligence (AI) and Machine Intelligence.
1BETC105.2	Illustrate and compare basic Machine Learning methods for regression,

	classification, and clustering.
1BETC105.3	Identify and analyze recent trends and advancements in AI and Machine Learning.
1BETC105.4	Apply prompt engineering techniques to effectively interact with generative AI tools.
1BETC105.5	Explain diverse industrial applications of AI across multiple domains.
1BETC105.6	Apply AI knowledge and techniques to design solutions for real-time applications.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Artificial Intelligence: Beyond Classical AI	Reema Thareja	Pearson Education	1st Edition, 2023
2	Prompt Engineering for LLMs: The Art and Science of Building Large Language Model–Based Applications.	John Berryman and Albert Ziegler	O'Reilly	1st Edition, 2023
3	AI for Everyone – A Beginner's Handbook for Artificial Intelligence	Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti	Pearson	1st Edition, 2024
Reference Books				
1	Artificial Intelligence: A Modern Approach	Stuart Russell and Peter Norvig	Pearson Education	4th Edition, 2023
2	Artificial Intelligence	Elaine Rich, Kevin Knight, and Shivashankar B. Nair	McGraw Hill Education	3rd Edition, 2017

Additional Resources: Web links/NPTEL Courses

- Elements of AI - https://www.elementsofai.com
- CS50's Introduction to Artificial Intelligence with Python -Harvard https://cs50.harvard.edu/ai/
- Google Machine Learning Crash Course – https://developers.google.com/machine-learning/crash-course
- Learn Prompting (Open-Source Guide)- https://learnprompting.org
- Google AI – Learn with Google AI https://ai.google/education/
- Coursera – Machine Learning by Andrew Ng (Stanford University) https://www.coursera.org/learn/machine-learning
- OpenAI Prompt Engineering Guide (for ChatGPT) https://platform.openai.com/docs/guides/gpt-best-practices
- Prompt Engineering for Developers – DeepLearning.AI + OpenAI https://www.deeplearning.ai/short-courses/chatgpt-prompt-engineering-for-developers/
- Ethics in AI – Google Responsible AI Practices https://ai.google/responsibilities/responsible-ai-practices/
- Google Teachable Machine (Train AI models visually without code) https://teachablemachine.withgoogle.com

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BETC105.1	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
1BETC105.2	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
1BETC105.3	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**
1BETC105.4	**-**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
1BETC105.5	**-**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
1BETC105.6	**-**	**-**	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**2**

1: Low 2: Medium 3: High

C Programming Lab			
Course Code	**1BPOP106L**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Practical	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(0:0:2)	Credits	01

Course Learning Objectives:

- To understand the basic concepts of programming.
- To explain the basic concepts of C programming language constructs.
- To design and develop programming skills.
- To explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems
- To apply programming constructs of C language to solve the real-world problems

Demonstration: Flowcharts play a vital role in helping students understand the experimental procedures and the logical sequence of tasks to be performed in the lab. An introduction to flowcharts and a demonstration of their use should be conducted during the first lab session to build a strong foundation for planning and executing experiments effectively.

Laboratory Programs:

PART - A	
1.	A math app needs to determine the type of roots for a quadratic equation based on user input. Develop a C program to calculate and display the roots based on the given coefficients. Draw the flow chart for the solution.
2.	Develop a C program that takes a student's marks as input and displays their grade based on the following criteria: 90 and above: Grade A 75 to 89: Grade B 60 to 74: Grade C 50 to 59: Grade D Below 50: Grade F Choose a suitable control structure to implement this logic efficiently. Draw the flowchart for the solution.
3.	In an image processing system, a transpose of a matrix is frequently used. Develop a C program that accepts a matrix and prints matrix and its transpose.
4.	Develop a C program that takes a unique identification input like PAN Number, AADHAR_Number, APAAR_Id, Driving License, Passport and checks it against a set of stored KYC records. Based on the input, display whether the individual is verified or not. Use an appropriate control structure to handle multiple possible ID matches. Assume all Unique identification are of integer type.
5	Develop a C program that accepts a course description string and a keyword from the user. Search whether the keyword exists within the course description using appropriate string functions. If found, display: "Keyword '<keyword>' found in the course description." Otherwise, display: "Keyword '<keyword>' not found in the course description."
6.	A sports teacher has recorded the scores of students in a 100-meter race. To prepare the result sheet, the teacher wants the scores arranged in descending order (from highest to lowest). Develop a C program to sort the scores using Bubble sort.
7.	A company wants to store employee details. Each employee has an ID, Name, and Salary. Develop a C program using structures to accept details of employees, display all the employee details, and also display the employee with the highest salary.

8.	a) In a mathematics learning app, Fibonacci numbers are generated recursively. Develop a C program that accepts a number n and prints the first n Fibonacci numbers using recursion. b) In an ATM system, two account balances need to be swapped temporarily for validation. Develop a C program that accepts two balances and uses a function with pointers to swap them. Display the balances before and after swapping.
9.	A college library has a digital bookshelf system where each book is assigned a unique Book ID. Book ID and title details are stored in the system. The bookshelf is organized in ascending order of Book IDs. Develop a C Program to quickly find whether a book with a specific Book ID is available in the shelf using Binary Search.

PART B

OPEN – ENDED EXPERIMENTS

Open-ended experiments are a type of laboratory activity where the outcome is not predetermined, and students are given the freedom to explore, design, and conduct the experiment based on the problem statements as per the concepts defined by the course coordinator. Students are encouraged to apply creativity, critical thinking, and inquiry-based learning, and any one open-ended experiment must be carried out as part of the course.

Each student is required to complete at least one experiment from Experiments 1 to 4. It is suggested that all 4 experiments be distributed among the students, with each student completing at least one experiment.

1. A small warehouse tracks how many units of different products are shipped from multiple branches. Another dataset shows how much revenue each product generates per unit. Develop a C program which combines these datasets to calculate the total revenue generated by each branch.

2. A basic mobile contact manager stores first and last names separately. For displaying full names in the contact list, you need to join them manually. Additionally, the system must check the length of each full name to ensure it fits the screen. Perform these operations by developing a C program without using built-in string functions

3. An online shopping portal allows customers to purchase multiple products. Each product has a Product ID, Name, Price, and Quantity. Develop a C program to design a simple shopping cart system where the customer can add several products, display a detailed bill showing each product with its total cost, and finally calculate the grand total. If the total purchase amount exceeds a fixed threshold, apply a discount and display the final payable amount.

4. A city transport department wants to create a bus reservation system. Each bus has a unique Bus Number, a Source, a Destination, and a fixed number of Seats. Develop a C program that allows passengers to book tickets by entering the bus number and the number of seats required. The system should check seat availability before confirming a booking, update the remaining seats after a successful booking, and display the booking details. If the requested seats are not available, the system should display an appropriate message.

Course Outcomes: At the end of the course the student will be able to:	
1BPOP106L.1	Apply the fundamentals of C programming, evaluate expressions using operators, and apply input/output concepts to solve basic problems.
1BPOP106L.2	Develop C programs using decision-making, branching, and looping techniques.

1BPOP106L.3	Apply arrays in C programming to design and implement efficient solutions.
1BPOP106L.4	Implement programs using string handling functions and operations in C.
1BPOP106L.5	Design modular programs by applying various programming constructs in C.
1BPOP106L.6	Implement C programs using structures, unions, and pointers for problem solving.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1.	Programming in ANSI C	E. Balaguruswamy	Tata McGraw-Hill, India,	7th Edition, 2017
Reference Books				
1.	Computer Science, A Structured programming approach using C	Behrouz A. Forouzan	Cengage Learning	3rd Edition 2007
2.	Programming with C, Schaum's Outlines.	Byron Gottfried Schaum's	Tata McGraw Hill	3rd Edition, 2017
3.	Computer Fundamentals and Programming in C	Reema Thareja	Oxford University	2nd Edition, 2017

Additional Resources: Web links/NPTEL Courses

- C Programming Tutorial https://www.geeksforgeeks.org/c/c-programming-language/
- Learn C - Free Interactive C Tutorial learn-c.org
- Great Learning C for Beginners https://www.mygreatlearning.com/academy/learn-for-free/courses/c-for-beginners1

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BPOP106L.1	1	2	2	-	2	-	-	-	2	1	-
1BPOP106L.2	1	2	3	-	2	-	-	-	2	1	-
1BPOP106L.3	2	2	3	-	2	-	-	-	2	1	-
1BPOP106L.4	2	3	3	-	2	-	-	-	2	1	-
1BPOP106L.5	2	3	3	-	2	-	-	-	2	1	-
1BPOP106L.6	2	3	3	-	2	-	-	-	2	1	-

1: Low 2: Medium 3: High

Balake Kannada			
Course Code	**1BKBK107**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	(1:0:0)	SEE	2 Hours
Total Hours	15 hours	Credits	01

Course Learning Objectives:

1. To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To train the learners for correct and polite conservation.
5. To know about Karnataka state and its language, literature and General information about this state.

Module-1 Introduction to Kannada Language and Pronouns (3 hours)

Introduction to Kannada Language: Necessity of learning Kannada - importance in daily life, Easy learning of Kannada Language: tips for polite conservation, listening and speaking, transcription.

Pronouns: Personal pronouns, Possessive forms, Interrogative words.

Textbook 1: Chapter 1

Module-2 Nouns and Adjectives (3 hours)

Nouns: Possessive forms of nouns and Relative nouns.

Adjectives: Qualitative, Quantitative and Colour Adjectives, Numerals, Predictive Forms, Locative case

Textbook 1: Chapter 2,3,4.

Module-3 Plural Forms, Numerals and Verb Forms (3 hours)

Plural Forms, Numerals: Dative Cases, and Numerals, Ordinal numerals and Plural markers.

Verb Forms: Defective/ Negative verbs& Colour Adjective

Textbook 1: Chapter 5-7.

Module-4 Functional Communication- Verb Usage and Expressions (3 hours)

Functional Communication: Permission, Commands, Encouragement and Warnings (Imperative sentences), Accusative Cases and Potential Forms in General communication.

Verb Usage: Helping Verbs, Corresponding Future and Negation verbs.

Expressions: Comparative, Relationship, Identification and Negation Words.

Textbook 1: Chapter 8-11.

Module-5 Tenses and Conversation Practice (3 hours)

Tenses: Different types of Tense, Time and Verbs. Formation of Past, Future and Present Tense Sentences with Verb Forms.

Conversation Practice: Daily Useful Kannada Vocabulary for Conversations

Textbook:1: Chapter 12, 13, 18

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

1BKBK107.1	Demonstrate the ability to understand and use basic Kannada words, personal pronouns, possessive forms, and interrogative words for effective day-to-day communication.
1BKBK107.2	Apply grammatical structures, including noun forms, adjectives, numerals, and relative nouns to construct meaningful Kannada sentences.
1BKBK107.3	Use dative cases, accusative cases, and locative forms in Kannada for general communication and workplace interactions.

1BKBK107.4	Develop the skill to use imperative sentences, helping verbs, and negation forms in various contexts such as giving commands, seeking permission, and making polite requests.
1BKBK107.5	Construct grammatically correct Kannada sentences in past, present, and future tense while effectively using verb forms.
1BKBK107.6	Engage in basic professional and social conversations using Kannada vocabulary relevant to engineering and daily life situations.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Balake Kannada	Dr. L Thimmesha	Prasaranga VTU Belagavi	1st Edition 2020
Reference Books				
1	Kannada Kali	Lingadevaru Halemane	Kannada University Hampi	4th Edition 2016
2	Spoken Kannada	N.D Krishnamurthy Dr.S.M.Rameshchandra Swamy Abdul Rehman Pasha	Kannada Sahitya Parishat	2018
3	Vyavaharika Kannada	Dr. L Thimmesha Prof V Keshavamoorthy	Prasaranga VTU Belagavi	

Additional Resources: Web links/Video Lectures

1. https://youtu.be/RuRmq7VyCaQ?feature=shared
2. https://youtu.be/daY6TRvHFB4?feature=shared

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
1BKBK107.1	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK107.2	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK107.3	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK107.4	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK107.5	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK107.6	-	-	-	-	-	-	-	-	**2**	-	**2**

1: Low 2: Medium 3: High

Samskrutika Kannada			
Course Code	**1BKSK107**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	**Theory**	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(1:0:0)	SEE	2 hours
Total hours	15 hours	Credits	01

Course objectives

The course (1BKSK107) will enable the students to:

1. ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
3. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು .
4. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು .
5. ಸಾಂಸ್ಕೃತಿಕ, ಪರಿಸರ ಲೇಖನ ಹಾಗೂ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
6. ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು

Teaching-Learning Process

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes andmake Teaching –Learning more effective:

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧರಿಸಿ ಬ್ಲಾಕ್ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು- ಅಂದರೆ ಕವಿ ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು ಸಂಭಾಷಣೆಗಳು ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಡಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

ಘಟಕ –1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು **3 Hours**

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ
2. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ
3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಘಟಕ – 2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ **3 Hours**

1. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
2. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ - ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಘಟಕ – 3 ಆಧುನಿಕ ಕಾವ್ಯ ಭಾಗ **3 Hours**

1. ಡಿ.ವಿ.ಜಿ - ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು
2. ಶ್ರಾವಣ : ದ.ರಾ. ಬೇಂದ್ರೆ
3. ರೊಟ್ಟಿ ಮತ್ತು ಕೋವಿ – ಸು.ರಂ.ಎಕ್ಕುಂಡಿ

ಘಟಕ – 4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ **3 Hours**

1. ಡಾ.ಸರ್.ಎಂ.ವಿಶ್ವೇಶ್ವರಯ್ಯ : ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ. ಎನ್. ಮೂರ್ತಿರಾವ್
2. ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು

ಘಟಕ – 5 ಕಥೆ ಮತ್ತು ಪರಿಸರ ಲೇಖನ **3 Hours**

1. ಬೆಡ್ ನಂಬರ್ – 7 (ಕಥೆ)
2. ಚೀಂಕ್ರ ಮೇಸ್ತ್ರಿ ಮತ್ತು ಅರಿಸ್ಟಾಟಲ್ – ಕೆ.ಪಿ.ಪೂರ್ಣಚಂದ್ರ ತೇಜಸ್ವಿ (ಪರಿಸರ ಲೇಖನ)

Course Outcomes:	
ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (22KSK17/27) ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ : At the end of the course the student will be able to:	
1BKSK107.1	ಕನ್ನಡ ಬಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ
1BKSK107.2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಫೂರ್ತಿ ಮಾಡುತ್ತದೆ
1BKSK107.3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಾಗುತ್ತದೆ
1BKSK107.4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾದಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ
1BKSK107.5	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳು, ವ್ಯಕ್ತಿ ಪರಿಚಯ ಹಾಗೂ ಕಥೆಯ ತಂತ್ರಗಾರಿಕೆಗಳ ಅಧ್ಯಯನದ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಓದು, ಬರಹ ಮತ್ತು ವಿಶ್ಲೇಷಣಾ ಸಾಮರ್ಥ್ಯವನ್ನು ವಿಕಸನಗೊಳಿಸುವುದು.
1BKSK107.6	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು

Textbooks:

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ	ಡಾ.ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ & ಡಾ.ಎಲ್.ತಿಮ್ಮೇಶ	ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ	2022
2	ಕನ್ನಡ ಮನಸು	ಡಾ ಎಚ್ ಜೆ ಲಕ್ಕಪ್ಪ ಗೌಡ, ಡಾ ಕೆ ವಿ ನಾರಾಯಣ, ಡಾ ಮಲ್ಲಿಕಾ ಘಂಟಿ, ಡಾ ವಿವೇಕ ರೈ, ಡಾ ರಹಮತ್ ತರೀಕೆರೆ, ಪ್ರೊ.ಲಿಂಗದೇವರು ಹಳೇಮನೆ	ಪ್ರಸಾರಾಂಗ ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಹಂಪಿ	2018

Reference Books:

1	ಕನ್ನಡ ಸಾಹಿತ್ಯಕೋಶ & ವ್ಯಾಕರಣ ಪುಸ್ತಕ	ರಾಜಪ್ಪ ದಳವಾಯಿ	ದಳವಾಯಿ ಪ್ರಕಾಶನ ಬೆಂಗಳೂರು	2008
2	ಕನ್ನಡ ಕ್ಲಿಷ್ಟಪದ ಕೋಶ (ಶಬ್ದದ ವ್ಯುತ್ಪತ್ತಿ ಸಹಿತ)	ಪ್ರೊ. ಜಿ. ವೆಂಕಟ ಸುಬ್ಬಯ್ಯ ಹಾಗೂ ರಾಜ್ಯಶ್ರೀ ಸತೀಶ್	ಪ್ರಿಸಮ್ ಬುಕ್ಸ್ ಪ್ರೈ.ಲಿ.	2006
3	ಸ್ವಚ್ಛ ಭಾಷೆ ಅಭಿಯಾನ – ಕಸವಿಲ್ಲದ ಕನ್ನಡಕ್ಕೊಂದು ಕೈಪಿಡಿ	ಶ್ರೀವತ್ಸ ಜೋಶಿ	ಸಾಹಿತ್ಯ ಪ್ರಕಾಶನ	2022

Additional Resources:

1) https://youtu.be/Vy6gc5x9Vo4?si=r2OfnHLO2w00sXrr
2) https://youtu.be/Maj-eDsjGvQ?si=ree_8BKve5w9Tl8U
3) https://youtu.be/4PslKzscekQ?si=V7nozqH6Y_SXHoJw
4) https://youtu.be/N5Wn2NlzKng?si=LfBwxyFVMp5p6dNM
5) https://youtu.be/6w_qjI2DdjE?si=ydhXjoHtNmBEoQmj
6) https://youtu.be/FGR3r2t4XOo?si=fk7xFjSH7YHWW8vE
7) https://youtu.be/sG3Ztsk3iHs?si=1TULROnmOj2w0c1K

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BKSK107.1	-	-	-	-	-	-	-	-	**3**	-	**2**
1BKSK107.2	-	-	-	-	-	-	-	-	**3**	-	**2**
1BKSK107.3	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKSK107.4	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKSK107.5	-	-	-	-	-	-	-	-	**3**	-	**2**
1BKSK107.6	-	-	-	-	-	-	-	-	**2**	-	**2**

1: Low 2: Medium 3: High

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.
- To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks.
- Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks.

Continuous Internal Evaluation (CIE):

Two Unit Tests each of 30 Marks (duration 1 hour)

- First test is in the 8th week after the completion of 30-40 % of the syllabus
- Second test is in the 15th week after completion of 80-90% of the syllabus

Two assignments each of 10 Marks

2 assignments of 10 marks each have to be submitted during the semester and the total marks shall be considered for CIE.

Semester End Examination (SEE)

Semester End Examination (SEE) will be conducted for 50 marks and it will be multiple-choice objective type.

Prototype Fabrication and Testing			
Course Code:	**1BPFT108L**	CIE Marks	50
Type of Course	Practical	SEE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	Total	100
Credits	01	Exam Hours	02

Course Learning Objectives:

1. Understand basic Manufacturing Processes used in the industry
2. Apply the advanced Manufacturing Processes in their Project work
3. Articulate embedded electronics and basics of electrical wiring
4. Apply the basic knowledge of design thinking in project work
5. Create a prototype using the skill learnt as a team in the project work

Module 1 Basic manufacturing process

Carpentry - Hand tools & machines, Types of joints, and Pattern making.
Sheet Metal Practice - Bending, punching, and drawing various sheet metal joints, development of joints.
Joining - Temporary and permanent joints between similar and dissimilar material by processes of chemical bonding, mechanical fasteners, and fusion technologies
Safety in Workshop - Fire hazards, electric short circuit –causes and remedies, Machine protection, Human protection, Accident prevention methods, developing ability to observe safe working habits.
Wood Lathe.
Basics of drilling, milling and grinding operations. **08 Hours**

Module 2 Basic electronic fabrication and test practices

Basic electronic components, PCB design and fabrication- etching and milling, Electronic testing equipment, Basic electrical wiring **06 Hours**

Module 3 Advanced manufacturing process

Part modelling and 3D printing, 3D scanners, Laser cutting and engraving, CNC wood router, Vinyl Cutter and Power tool operations **06 Hours**

Module 4 Basics of Design Thinking (For CIE only)

Definition of Design Thinking, need for Design Thinking, Objective of Design Thinking, Stages of Design Thinking Process– Empathize, Define, Ideate, Prototype, Test (explain with examples) **02 Hours**

Course Outcomes: At the end of the course, the student will be able to:	
1BPFT108L.1	perform basic manufacturing operations used in the industry
1BPFT108L.2	use the advanced manufacturing processes for prototype building
1BPFT108L.3	develop simple PCB boards using etching and milling process
1BPFT108L.4	use basic electronic components and test its working
1BPFT108L.5	apply design thinking to product development
1BPFT108L.6	inculcate the teamwork and communication skills

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Reference Books				
1	**Fab Lab: Revolution Field Manual**	Niggli Verlag	Massimo Menichinelli	2017
2	**Skill Development and Entrepreneurship in India**	Rameshwari Pandya	Ingram short title	2016
3	**101 Design Methods: A Structured Approach for Driving Innovation in Your Organization**	Vijay Kumar	Wiley	2012

Web links/Video Lectures

1. https://fabacademy.org/
2. https://www.youtube.com/watch?v=gHGN6hs2gZY&t=33s
3. https://www.youtube.com/watch?v=4nTh3AP6knM

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
1BPFT108L.1			3								-
1BPFT108L.2	2	3		3	3						-
1BPFT108L.3	2	3									-
1BPFT108L.4	2	3									-
1BPFT108L.5		3	3								-
1BPFT108L.6								3	3	3	-

1: Low 2: Medium 3: High

Industry Oriented Training-Soft Skills			
Course Code	**1BITS109**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	--
		Total Marks	50
Teaching Hours/Week (L:T:P)	(1:0:0)	SEE	--
Total Hours	15 hours	Credits	--

Course Learning Objectives:

1. To Apply social skills for clear communication, persuasion, self-awareness, and active listening.
2. Use emotional skills to build confidence, manage stress, and adapt to change.
3. Set ambitious goals, practice empathy, and apply creativity for problem-solving.
4. Demonstrate discipline, time management, and structured problem-solving.
5. Work in teams, negotiate, resolve conflicts, and think critically.

Module-1 Social Skills (3 hours)

Communication: Principles of clear and effective exchange of ideas in professional and social contexts.

Persuasion: Techniques to influence and convince through logical, emotional, and ethical appeals.

Self-Awareness: Identifying personal strengths, weaknesses, opportunities, and challenges (SWOC analysis).

Active Listening: Paraphrasing, questioning techniques, and demonstrating attentiveness.

Module-2 Emotional Skills I (3 hours)

Emotional Intelligence (EI): Recognizing and managing emotions, empathy, relationship management, and conflict resolution.

Stress Management: Identifying stress triggers, relaxation techniques, work-life balance strategies, and mindfulness practices.

Time Management: Prioritization (Eisenhower Matrix), setting SMART goals, avoiding procrastination, and effective scheduling.

Adaptability & Resilience: Handling change, bouncing back from setbacks, and developing a growth mindset.

Module-3 Emotional Skills II (3 hours)

Ambition & Goal Setting: Defining personal and professional aspirations, creating SMART goals, and aligning actions with long-term vision.

Sympathy & Empathy: Understanding emotional perspectives, differentiating between the two and applying them in workplace and social interactions.

Creativity & Innovation: Generating original ideas, problem-solving, and applying creative thinking techniques (mind-mapping, SCAMPER).

Module-4 Professional Skills I (3 hours)

Problem Solving: Identifying root causes, analysing options, and implementing solutions using methods like 5 Whys and Fishbone Diagram.

Discipline: Building consistency, accountability, and professional habits.

Time Management: Prioritizing tasks (Eisenhower Matrix), scheduling, avoiding procrastination.

Module-5 Professional Skills II (3 hours)

Collaboration & Teamwork: Working effectively in diverse teams, fostering trust, and achieving shared goals.

Negotiation & Conflict Resolution: Strategies to resolve differences and reach win– win outcomes.

Critical Thinking: The ability to analyze, evaluate, and synthesize information to make well-reasoned decisions.

Teaching–Learning and Assessment Methods

Instructional Design	Each competency is taught and assessed through guided visualisations, reflections, explainers and hands on activities conducted during lab sessions those build both conceptual understanding and real-world application.
Teaching Methodology	TBTL (Task-Based Teaching Learning) – interactive workshops, simulations, peer feedback. Eclectic Approach
Language Lab	Quicklrn.com
Experiential Learning Methods	To embed skills, participants get hands-on through: Guided reflections and explainers to connect concepts with relatable real-life situations Guided visualization to prompt reflection and self-discovery Role-plays and activities to practice behaviours in context Peer discussions to gain diverse perspectives.
Assessment Methods	**Formative:** Role-plays, group discussions, peer feedback. **Summative:** Presentations, written reflections, problem-solving exercises.

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

CO1	Apply social skills to communicate clearly, persuade effectively, demonstrate self-awareness, and practice active listening.
CO2	Use emotional intelligence to build confidence, manage stress, adapt to change, and practice resilience.
CO3	Set personal and professional goals, demonstrate empathy, and apply creativity for innovative problem-solving.
CO4	Exhibit professional discipline, manage time efficiently, and apply structured approaches to problem-solving.
CO5	Collaborate effectively in teams, negotiate and resolve conflicts, and employ critical thinking for decision-making.
CO6	Demonstrate professional presentation, reflection, and interpersonal skills through role-plays, simulations, and real-life application activities.

Extra Reading

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Principles of Scientific and Technical Writing	Pratap K. J. Mohapatra, Sanjib Moulick	McGraw-Hill Education India	First,2025
2	Soft Skills	Soma Mahesh Kumar	McGraw Hill Education India	First,2024
3	Effective Technical Communication	Ashraf M. Rizvi, Priyadarshi Patnaik,	McGraw-Hill Education India	Third,2024
4	A course in English pronunciation	Yadav, D. P.	Notion Publications.	First,2022

Learning Resources:

- Oxford Advance Learners Dictionary
- Cambridge English Skills Real Listening and Speaking by Miles Craven
- Communicative English for Professionals by Nitin Bhatnagar and Mamta Bhatnagar

Additional Resources: Web links/NPTEL Courses
Digital Resources

- Google Docs + Voice Typing - https://docs.google.com
- LearnEnglish – https://learnenglish.britishcouncil.org/
- TakeIELTS - https://www.britishcouncil.in/exam/ielts
- British Council Apps -
  BBC Learning English Online Grammar
  Learn English Podcasts
  IELTS Word Power
  Learn English Sounds Right (Phonemic Chart).

Course Articulation Matrix

Course Outcomes	Program Outcomes										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1								1	3		2
2									3		2
3									3		2
4								1	3		2
5								1	3		2
6								3	3		

1: Low 2: Medium 3: High

II Semester

Applied Mathematics-II for Computer Science and Engineering Stream			
Course Code	**1BMATS201**	CIE Marks	50
Course Type	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	2:2:2	SEE Duration	3 Hours
Total Hours	40 Hours Theory + 20 Hours Lab	Credits	4

Course Learning Objectives: The objective of the course is to

- Apply numerical methods to solve equations, systems, and interpolation problems.
- Model engineering problems using ODEs, matrices, and eigenvalue techniques.
- Evaluate accuracy and efficiency of numerical integration and ODE solvers.

Module-1: Introduction to Numerical Methods **(08 hours)**

Errors and their computation: Round off error, Truncation error, Absolute error, Relative error and Percentage error. Solution of algebraic and transcendental equations: Bisection, Regula-Falsi, and Newton-Raphson method.

Application: Solution of algebraic and transcendental equations in CSE

Self-study: Secant Method

Module-2: Numerical Solutions for System of Linear Equations **(08 hours)**

Norms: Vector norms and Matrix norms-L1, L2 and L∞, Ill conditioned linear system, condition number. Solution of system of linear equations: Gauss Seidel method and LU-decomposition method. Eigenvalues and Eigen vectors: Jacobi's method.

Application: Eigenvalues and Eigen vectors in CSE

Self-study component: Rayleigh power method

Module-3: Interpolation **(08 hours)**

Finite differences, interpolation using Newton Gregary forward and Newton Gregary backward difference formulae, Newton's divided difference. piecewise interpolation-linear and quadratic.

Self-study component: Lagrange interpolation formulae.

Module-4: Differential Equations of First and Higher Order **(08 hours)**

Bernoulli`s differential equations. Exact and reducible to exact differential equations with integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$. Homogeneous and non-homogeneous Differential equations of higher order with constant coefficients. Inverse differential operators – e^{ax}, $\sin(ax+b)$, $\cos(ax+b)$ and x^n.

Self-study component: Linear differential equations

Module-5: Numerical Integration and Numerical Solution of Differential Equations **(08 hours)**

Numerical integration: Simpson's 1/3rd, Simpson's 3/8th rule and Weddle's rule.

Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method, Modified Euler's method, Runge-Kutta method of fourth order and Milne's predictor-corrector method.

Application: Numerical Integration to find area of a region

Self-study component: Trapezoidal rule of numerical integration

PRACTICAL MODULE

1. Programming in MATLAB
2. Numerical Method of Solving Transcendental Equations
3. Numerical Method of First Order Ordinary Differential Equation
4. Numerical Integration
5. Interpolation Methods
6. Linear Algebra – II
7. Linear Transformation

Demo Experiment
Advanced Data Visualization using Python and Excel.

Course Outcomes: At the end of the course the student will be able to:	
1BMATS201.1	Develop the ability to detect and minimize computational errors while applying numerical techniques to find solutions of algebraic and transcendental equations.
1BMATS201.2	Gain proficiency in solving systems of linear equations and computing eigenvalues/eigenvectors using iterative and matrix-based approaches, and interpret their role in real-world models.
1BMATS201.3	Acquire skills in interpolation methods to construct approximations from discrete data, enabling accurate predictions and problem-solving in computational applications.
1BMATS201.4	Formulate and solve first- and higher-order differential equations using both analytical and numerical approaches, and apply them to represent and analyze engineering phenomena.
1BMATS201.5	Apply and compare various numerical integration and differential equation techniques, implement them with modern computational tools, and critically evaluate the accuracy of results.
1BMATS201.6	Utilize MATLAB to implement numerical algorithms, visualize results, and validate the accuracy of solutions to mathematical and engineering problems.

Sl.No.	**Title of the Book**	**Name of the Autthor/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Numerical Methods for Scientific and Engineering Computation	M.K. Jain, S.R.K. Iyengar and R.K. Jain	New Age International Publishers	8th Edition 2022
2	Linear Algebra and its Applications	David C Lay	Pearson Publishers	5th Edition 2023
3	Higher Engineering Mathematics	B. S. Grewal	Khanna Publishers	44th Edition 2021
Reference Books				
1	Higher Engineering Mathematics	V. Ramana	McGraw-Hill Education	11th Edition 2017
2	A Textbook of Engineering Mathematics	N. P. Bali and Manish Goyal, A	Laxmi Publications	10th Edition 2022
3	Applied Numerical Methods with Matlab for Engineers and Scientists	Steven V. Chapra and Raymond P. Canale	McGraw-Hill	3rd Edition 2011
4	Numerical Analysis	Richard L. Burden, Douglas J. Faires, A. M. Burden	Cengage Publishers.	10th Edition 2010

Additional Resources:

Module	Topic Name	Videos
Module 1: Introduction to Numerical Methods	Bisection method, Numerical solution of algebraic and transcendental equations	https://youtu.be/nX_L8mYNBxI
	Errors and their computation: Round off error, Truncation error, Absolute error, Relative error and Percentage error.	https://www.youtube.com/watch?v=fROf2j2SoYQ
Module 2: Numerical solutions for system of linear equations	Norms: Vector norms and Matrix norms-L1, L2 and L∞, Ill conditioned linear system, condition number.	https://www.youtube.com/watch?v=y0AjJeeWoNM
	gauss seidel method	https://www.youtube.com/watch?v=pQVqaiFBvoU
	lu decomposition method matrix	https://www.youtube.com/watch?v=PORf7vXejbQ&t=211s
	Eigenvalues and Eigen vectors: Jacobi's method.	https://www.youtube.com/watch?v=6R1kVlIrtZE
Module 3: Interpolation	newton forward and backward interpolation	https://www.youtube.com/watch?v=Y-yMQvYpltU
	newton divided interpolation method	https://www.youtube.com/watch?v=ZNiy2C3o3Pg
	lagrange's interpolation	https://www.youtube.com/watch?v=zdyUwzOm1zw
	piecewise interpolation-linear and quadratic.	https://www.youtube.com/watch?v=Jrg9AW2g9RA
Module 4: Differential Equations of First and Higher	solution of first degree first order differential equations.	https://www.youtube.com/results?search_query=nptel+-+solution+of+first+degree+first+order+differential+equations.
	Homogeneous and non-homogeneous Differential equations of higher order with constant coefficients.	https://www.youtube.com/watch?v=tHqx1qxA8q4&list=PLU6SqdYcYsfIgl58LabHfHW3mksEWimFs
Module 5: Numerical Integration and Numerical Solution of Differential Equations	Numerical integration: Simpson's 1/3rd, Simpson's 3/8th rule and Weddle's rule.	https://www.youtube.com/watch?v=EA76ONWBgK4&list=PLhSp9OSVmeyJBkLSO51JFPSEIIoeRiaJy
	Taylor's series method	https://www.youtube.com/watch?v=3e9bO1GBxXM&list=PLM9RnGtTy9_-HqWNh7Z5mP4_pI9t1vXBM&index=2
	Modified Euler's method	https://www.youtube.com/watch?v=ojqdArjGHQg
	Runge-Kutta method of fourth order	https://www.youtube.com/watch?v=iSO9DFcMDog
	Milne's predictor- corrector method	https://www.youtube.com/watch?v=bI46OqXUtd8

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BMATS201.1	3	2	-	-	-	-	-	-	-	-	-
1BMATS201.2	3		2	-	1	-	-	-	-	-	-
1BMATS201.3	-	3	-	2	-	-	-	-	-	-	-
1BMATS201.4	2	2	-	-	-	-	-	-	-	-	-
1BMATS201.5	-	3	-		1	-	-	-	-	-	-
1BMATS201.6	-	-	-	1	2	-	-	-	-	-	-

1: Low 2: Medium 3: High

Applied Chemistry for Computer Science and Engineering Stream			
Course Code	**1BCHES202**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	3:0:2	SEE	3 hours
Total Hours	40 hours Theory + 12 Lab slots	Credits	04

Course Learning Objectives: This course (1BCHES102/202) objectives are to provide the students with basic principles of chemistry for building technical competence in industries, research, and development in the following fields,

- Functional Materials for Memory and Display
- Quantum Materials and Polymers
- Sustainable Energy Systems
- Sensors and Corrosion Science
- Green Materials and E-Waste Management

Module 1: Functional Materials for Memory and Display Systems (08 hours)

Memory Devices: Introduction, organic semiconductors - types of organic semiconductors used in memory devices, p-type semiconductor - pentacene and n-type semiconductor - perfluoropentacene, difference between organic and inorganic memory devices.

Resistive RAM (ReRAM) Materials: Introduction, synthesis of TiO_2 - RAM nanomaterial by sol-gel method, properties, and its applications.

Display Systems: Introduction, liquid crystals (LCs) - classification, properties and its applications. Construction, working principle and applications of Light Emitting Diodes (LEDs).

Self study: Construction, working and advantages of pentacene semiconductor chip. Organic Light Emitting Diodes (OLEDs), Active Matrix Organic Light Emitting Diodes (AMOLEDs) and Quantum Light Emitting Diodes (QLEDs).

Module 2: Quantum Materials and Polymers (08 hours)

Quantum Dots: Introduction, size-dependent properties - quantum confinement effect, surface-to-volume ratio & band gap.

Polymer: Introduction, molecular weight of polymers - number and weight average molecular weight of polymers, numerical problems. Structure-property relationship (crystallinity, strength, elasticity, and chemical resistivity) of polymers. Synthesis and properties of nylon-6,6, and its advantages in 3D printing applications. Synthesis and properties of chlorinated poly vinyl chloride (CPVC) and polymethyl methacrylate (PMMA) and their uses in device applications.

Conducting polymers - Introduction, synthesis of polyaniline, conducting mechanism, and its engineering applications.

Self study: Synthesis of Cd-Se Quantum dots by wet chemical method and its applications. Construction, working principle and applications of quantum dot sensitized solar cells (QDSSCs).

Module 3: Sustainable Energy Systems (08 hours)

Energy Systems: Introduction, basic overview of Nernst equation. Construction and working of concentration cell and concentration cells numerical problems. Classification of batteries, construction, working, and applications of Li-Ion battery.

Next-Generation Energy Devices: Introduction, construction, and working of sodium ion battery for EV applications.

Sustainable Energy Devices: Introduction, fuel cell, difference between fuel cell and battery, construction, working principle, applications, and limitations of solid-oxide fuel cell (SOFCs) and solar photovoltaic cell (PV cell). Production of green hydrogen by photocatalytic water splitting using TiO2 method and its advantages.

Self study: Construction and working of ultra-small asymmetric super capacitor and its applications in IoT/wearable devices.

Module 4: Sensors and Corrosion Science (08 hours)

Sensors: Introduction, terminologies - Transducer, Actuators and Sensors. Conductometric sensor – principle, construction, and its application in the estimation of acid mixture. Colorimetric sensor - principle, instrumentaion, and its application in the estimation of copper in PCB. Electrochemical gas sensors - principle, construction, and their application in the the detection of NOx & SOx in air sample. Biosensor – principle, construction, and working for detection of glucose in biofluids.

Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion - differential metal and differential aeration corrosion – waterline and pitting corrosion. Corrosion control - galvanization and anodization. Corrosion penetration rate (CPR) - definition and numerical problems.

Self study: Vapour corrosion inhibitors for protecting computer circuit boards.

Module 5: Green Materials and E-Waste Management (08 hours)

Green Chemistry: Introduction, properties, and applications of green solvents for server heat management. Synthesis and properties of glycerol trioleate ester and its uses in IT infrastructure applications.

Biomaterials: Introduction, synthesis, and properties of polylactic acid (PLA) and polyethylene glycol (PEG) for touch screen applications, synthesis and properties of alginate hydrogel and its uses in Brain-Computer Interfaces (BCIs) applications.

E-waste: Introduction, sources, composition of e-waste, effects of e-waste on environment and human health, Artificial intelligence in e-waste management, extraction of gold from e-waste by bioleaching method.

Self study: Green synthesis of ZnO nanoparticles and its uses in magnetic Radio Frequency Identification (RFID) & Internet of Nano Things (IONT) system applications.

PRACTICAL MODULE

Part – A

1. Estimation of total hardness of water by the EDTA method.
2. Estimation of percentage of CaO in cement by the EDTA method.
3. Determination of chemical oxygen demand (COD) of industrial effluent sample.
4. Estimation of iron in TMT bar by diphenyl amine indicator method.
5. Determination of total alkalinity of the given water sample.

Part – B

6. Estimation of acid mixture by conductometric sensor (Conductometry).
7. Estimation of iron in rust sample by Potentiometric sensor (Potentiometry).
8. Determination of pKa of vinegar using a pH sensor (Glass electrode).
9. Estimation of copper present in e-waste by optical sensor (Colorimetry).
10. Determination of the viscosity coefficient of an organic solvent using Ostwald's viscometer.

Part – C

Demonstration experiments (any one):

1. Green synthesis of copper nanoparticles for conductive ink applications.
2. Smartphone-Based colorimetric estimation of total phenolic content in coffee products.
3. Data analysis of pKa of a weak acid and its interpretation using origin software.
4. Chemical structure drawing using software: Chem Draw/ Chem Sketch.
5. Determination of dissolved oxygen by Winkler's method.

Part – D
Beyond the syllabus/Offline/virtual lab experiments (any one): 1. Flame Photometric estimation of alkali and alkaline earth metals. 2. Determination of Hardness/COD in water sample.

Course Outcomes: At the end of the course the student will be able to:	
1BCHES202.1	Develop an intuitive understanding of the principles, materials, construction, and applications of functional materials in memory and display systems.
1BCHES202.2	Evaluate quantum materials, conducting polymers, and their roles in energy and electronic systems.
1BCHES202.3	Analyze next-generation energy storage systems and green hydrogen production for sustainable energy applications.
1BCHES202.4	Apply the principles, working mechanisms, and applications of sensors and corrosion processes, and analyze methods for detection, prevention, and control in engineering applications.
1BCHES202.5	Interpret the principles of green chemistry, biomaterials, and sustainable technologies to develop eco-friendly solutions.
1BCHES202.6	Investigate the chemical substances by chemical and instrumental methods to solve multidisciplinary engineering problems.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	**Chemistry for Engineering Students**	B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar.	Subash Publications	6th Editi on, 2018
2	**Engineering Chemistry along with lab experiments**	R.V.Gadag & A. Nityananda Shetty	I K International Publishing House Private Ltd. New Delhi.	1st edition, 2019
3	**Engineering Chemistry**	P. C. Jain & Monica Jain	Dhanpat Rai Publications, New Delhi.	17th Edition 2016
Reference Books				
1	**Engineering Chemistry**	O. G. Palanna,	Tata McGraw Hill Education Pvt. Ltd. New Delhi	2nd Edition 2017
2	**Nanochemistry A Chemical Approach to Nanomaterials**	G.A.Ozin & A.C. Arsenault	RSC publishing	2nd Edition 2008
3	**Wiley Engineering Chemistry**	Wiley India	Wiley India Pvt. Ltd. New Delhi	2nd Edition 2013
4	**Polymer Science**	V R Gowariker, N V Viswanathan, Jayadev, Sreedhar	Newage Int. Publishers	4th edition 2021
5	**Corrosion Engineering**	M. G. Fontana	Tata McGraw Hill Publishing	3rd edition 2017

Web links and Video Lectures (e-Resources):

1. **Organic semiconductors** - https://youtu.be/1TGTVQbMlIc
2. **QLED and OLED** - https://www.youtube.com/watch?v=IzWONUYlQ5E&t=56s
3. **Organic memory devices** - https://youtu.be/3j0jLuOs0v4
4. **Pentacene** - https://youtu.be/CeZxn8CyM6Q
5. **Polymer used in Organic memory device** - https://youtu.be/om0gppRTKoU
6. **OLED, mini-LED, QLED, LCD, LED, QD-OLED & More** - https://youtu.be/_ubwkG7uCFA
7. **Quantum Dots** - https://youtu.be/0EokkhdppgE?si=L6Znx5yXYjI9EVlw
8. **Weight Average Molecular Weight of Polymers** - https://youtu.be/hT2yCPnNEoI
9. **Quantum Dot Sensitized Solar Cells (QDSC)** - https://www.youtube.com/watch?v=EE35ICGthR8
10. **Polymer Molecular Weight** - https://www.youtube.com/live/CMyIb58vd4Q
11. **Calculating Molecular Weight (number and weight average) for polymers** - https://www.youtube.com/watch?v=YsZcSnqV9lg
12. **Quantum Dots Affect Optoelectronic Properties** - -
13. **What are Quantum Dots** - https://youtu.be/OEDapr-9lNE?si=CYdVhq3d5ffzdXUC
14. **Synthesis of Silicon Quantum Dots** - https://youtu.be/QNKPaZkWC9Q?si=PyI4sQUL75340I9i
15. **Conductometric Sensors** - https://youtu.be/0Citdpy92EE
16. **Dissolved oxygen sensors** - https://youtu.be/zaNdJ9I21YA
17. **Electrochemical Gas Sensors for Determination of NOx** - https://youtu.be/YAW7nMf8j0A
18. **Working principle of electrochemical sensors** - https://www.youtube.com/watch?v=FXGNQqdRBzc
19. **Introduction to Sensors** - https://www.youtube.com/watch?v=KvmqgAYO0MI
20. **Green chemistry** - https://www.youtube.com/watch?v=SvlrAFDHOLc
21. **Recycling of E-waste: Pyrometallurgy** - https://youtu.be/kUCVBhSka2Q
22. **Polylactic Acid (PLA)** - https://www.youtube.com/watch?v=Ic5TEuKxj8M
23. **Principles of green chemistry** - https://www.youtube.com/watch?v=ATn92XwdgC4
24. **E-waste GOLD Recovery** - https://www.youtube.com/watch?v=ldlniZfA2X4
25. **12 Principles of Green Chemistry** - https://www.youtube.com/watch?v=C0K1XRT1myg
26. **Quantum Dots and QD-based Devices** - https://www.youtube.com/watch?v=iVcSgej7-K8

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

- https://www.vlab.co.in/broad-area-chemical-sciences
- https://demonstrations.wolfram.com/topics.php
- https://interestingengineering.com/science

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BCHES202.1	3	-	3	-	-	-	-	-	-	-	-
1BCHES202.2	-	-	3	-	-	3	-	-	-	-	-
1BCHES202.3	3	3	2	-	-	-	-	-	-	-	-
1BCHES202.4	3	3	-	-	-	-	-	-	-	-	-
1BCHES202.5	-	-	3	-	-	3	-	-	-	-	-
1BCHES202.6	3	-	-	3	-	-	-	-	-	-	1

1: Low 2: Medium 3: High

Computer Aided Engineering Drawing			
Course Code	1BCED203	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	2:0:2	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

CLO1: To expose the students to standards and conventions followed in preparation of engineering drawings.

CLO2: To make them understand the concepts of orthographic and isometric projections.

CLO3: To develop the ability of conveying the engineering information through drawings.

CLO4: To make them understand the relevance of engineering drawing to different engineering domains.

CLO5: To develop the ability of producing engineering drawings using drawing instruments.

CLO6: To enable them to use computer aided drafting tools for the generation of drawings.

Module-1 (4 Hours)

Introduction to CAED (*for CIE only)*

Significance of Engineering drawing with respect to various branches*, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales. Introduction to Computer Aided Drafting software, Coordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet and curves.

Introduction to Orthographic Projections of Points, Lines

Orthographic projections of Points and Orthographic projections of Lines (Placed in First quadrant only).

Module-2 (8 Hours)

Orthographic Projections of Planes:

Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular lamina (Placed in First quadrant only using change of position method).

Module-3 (12 Hours)

Orthographic Projection of Solids:

Orthographic projection of right regular solids (**Solids Resting on HP only**): Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cones, Cubes & Tetrahedron.

Module-4 (8 Hours)

Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids.

Module-5 (08 Hours)

Development of Lateral Surfaces of Solids:

Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only. Development of lateral surfaces of their frustums and truncations.

Significance of Engineering drawing with respect to various branches*

Multidisciplinary Applications & Practice *(For CIE Only):*

Free hand Sketching; True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture etc.

Electric Wiring and lighting diagrams; Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software

Basic Building Drawing; Like, Architectural floor plan, basic foundation drawing, steel

structures- Frames, bridges, trusses using AutoCAD or suitable software,

Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings, practice on layers concept.

Graphs & Charts: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.

Course Outcomes: At the end of the course the student will be able to:	
1BCED203.1	Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.
1BCED203.2	Produce computer generated drawings using CAD software.
1BCED203.3	Use the knowledge of orthographic projections to represent engineering information/ concepts and present the same in the form of drawings.
1BCED203.4	Develop isometric drawings of simple objects.
1BCED203.5	Develop the lateral surfaces of different objects.
1BCED203.6	Use the knowledge of engineering drawing to represent interdisciplinary engineering components or systems through graphical representation.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Text Books				
1.	Engineering drawing	N. D. Bhatt & V. M. Panchal	Charotar Publishing House Gujarat.	48th edition, 2005
2.	Computer Aided Engineering Drawing	Prof. M. H. Annaiah	New Age International Publisher, New Delhi.	2009
Reference Books				
1.	Computer Aided Engineering Drawing	S. Trymbaka Murthy	I.K. International Publishing House Pvt. Ltd., New Delhi,	3rd revised edition, 2006.
2.	Engineering Graphics	K R Gopalakrishna	Subash Publishers, Bangalore.	32nd edition, 2005
3.	Fundamentals of Engineering Drawing with an Introduction to interactive computer Graphics for design and Production	Luzadder Warren J, Duff John M	Prentice – Hall of India Pvt. Ltd., New Delhi.	Eastern Economy Edition, 2005
4.	A Primer on Computer Aided Engineering Drawing		Published by VTU, Belgaum.	2006

Web links/Video Lectures/MOOCs

1. https://nptel.ac.in/courses/112103019/

Course Articulation Matrix

Course Outcomes (CO)	Program Outcomes (PO)										
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11
1BCED203.1	2	-	-	-	2	-	-	-	-	-	-
1BCED203.2	-	2	-	-	3	-	-	-	-	-	-
1BCED203.3	-	2	-	-	2	-	-	-	-	-	-
1BCED203.4	-	2	-	-	2	-	-	-	-	-	-
1BCED203.5	-	2	-	-	2	-	-	-	-	-	-
1BCED203.6	-	-	2	-	2	-	-	-	-	-	-

1: Low 2: Medium 3: High

INTRODUCTION TO CIVIL ENGINEERING			
Course Code	1BESC204A	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

1. To make students learn the scope of various specializations of Civil engineering.
2. To make students learn the concepts of sustainable infrastructure
3. To develop students' ability to analyse the problems involving forces and moments with their applications.
4. To make students learn the concepts of Equilibrium, types of beams and supports, and Support Reactions.
5. To develop the student's ability to find out the centroid and its applications.

Module-1 Civil Engineering Disciplines and Building Science (8 hours)

Importance and Scope of various fields of Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Water Resources Engineering, Transportation Engineering, Environmental Engineering, Construction Planning, and Project Management.

Materials of Construction: Types and Uses of Bricks and Autoclaved Aerated Concrete (AAC) Blocks, Cement, Structural Steel, and Concrete.

Structural Elements of a Building: Concept of Foundation, Plinth, Lintel, Chejja, Masonry wall, Column, Beam, Slab, and Staircase.

Module-2 Sustainable and Green Infrastructure Development (8 hours)

Societal and Global Impact of Infrastructure:

Introduction to sustainable development goals, Smart city concept, clean city concept, Safe city concept. Environment: Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control.

Module-3 Analysis of Force System (8 hours)

Concept of idealization, system of forces, principles of transmissibility, superposition and physical independence, Resolution and composition of forces, Resultant of concurrent and non-concurrent coplanar force systems, Moment and Couple of forces, Varignon's theorem: Numerical examples.

Module-4 Equilibrium and Support Reactions (8 hours)

Equilibrium of Coplanar Concurrent forces: Free body diagram, equations of equilibrium, Lami's Theorem, and Numerical examples.

Equilibrium of Coplanar Non-Concurrent forces: Types of loadings, beams and supports, Concept of Statically determinate and indeterminate structures, Numerical examples on Statically determinate beams.

Module-5 Centroid of Plane areas (8 hours)

Importance of centroid and center of gravity, Derivation of the centroid of rectangle, triangle, semicircle, and quadrant of a circle using method of integration, Numerical examples of centroid of built-up sections.

Course Outcomes: At the end of the course, the student will be able to:	
1BESC204A.1	Explain the fundamental concepts of various disciplines of Civil engineering
1BESC204A.2	Assess the societal impact of infrastructure development
1BESC204A.3	Evaluate the sustainability aspects of the built environment through the appropriate selection of green materials and the interpretation of rating systems.
1BESC204A.4	Apply the system of force principles to solve coplanar force systems.

1BESC204A.5	Analyze the equilibrium of coplanar force systems.
1BESC204A.6	Locate the centroid of simple and composite plane areas.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Basic Civil Engineering and Engineering Mechanics,	Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan,	Laxmi Publications	3rd edition, 2015
2	Building Construction	Rangwala	Charotar Publishing House Pvt. Ltd	33rd Edition, 2016
3	Elements of Civil Engineering and Engineering Mechanics	Kolhapure B K,	EBPB	8th Edition 2014
4	Elements of Civil Engineering and Engineering Mechanics	H.J.Sawant and S.P.Nitsure	Technical publications	2nd Edition, 2012
5	Elements of Civil Engineering and Engineering Mechanics	M N Sheshaprakash and Ganesh Mogaveer B	PHI Learning Private Limited	3rd Edition, 2014
Reference Books				
1	Engineering Mechanics	Bhavikatti S S,	New Age International	7th Edition, 2019
2	Engineering Mechanics	Timoshenko S, Young D. H., Rao J. V.,	Pearson Press	5th Edition, 2017
3	Engineering Mechanics: Principles of Statics and Dynamics	R. C. Hibbler	Pearson	14th Edition, 2016
4	Mechanics for Engineers, Statics and Dynamics	F. P. Beer and E. R. Johnston	McGraw Hill	12th Edition, 2019
5	Engineering Mechanics	Irving H. Shames	Prentice Hall	4th Edition, 2005
6	Engineering Mechanics: Statics	J. L. Meriam. L. and G. Kraige.	Willey India	9th Edition, 2018

Additional Resources: Web links

https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT
https://www.youtube.com/watch?v=nkg7VNW9UCc&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT&i ndex=2
https://www.youtube.com/watch?v=3YBXteL-qY4
https://www.youtube.com/watch?v=z95UW4wwzSc&list=PLOSWwFV98rfKXq 2KBphJz95rao7q8PpwT&index=10
https://www.youtube.com/watch?v=lheoBL2QaqU&list=PLOSWwFV98rfKXq2 KBphJz95rao

7q8PpwT&index=7
https://www.youtube.com/watch?v=atoP5_DeTPE
https://www.youtube.com/watch?v=ksmsp9OzAsI
https://www.youtube.com/watch?v=x1ef048b3CE
https://www.youtube.com/watch?v=l_Nck-X49qc
https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resul tant_Force
https://www.youtube.com/watch?v=RIBeeW1DSZg
https://www.youtube.com/watch?v=R8wKV0UQtlo
https://www.youtube.com/watch?v=0RZHHgL8m_A
https://www.youtube.com/watch?v=Bls5KnQOWkY
Activity-Based Learning (Suggested Activities in Class)/ Practical Based learning •
https://www.youtube.com/watch?v=Zrc_gB1YYS0
https://www.youtube.com/watch?v=Hn_iozUo9m4

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)												
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
1BESC204A.1	**3**												
1BESC204A.2	**3**					**2**		**2**	**2**				
1BESC204A.3	**3**	**3**				**2**							
1BESC204A.4	**3**	**3**											
1BESC204A.5	**3**	**3**											
1BESC204A.6	**3**	**3**											

1: Low 2: Medium 3: High

Introduction to Mechanical Engineering			
Course Code	**1BESC204B**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

1. Acquire a fundamental understanding role of Mechanical Engineering in NTM.
2. Acquire a basic knowledge of renewable energy resources.
3. Acquire knowledge of various engineering materials and metal joining techniques.
4. Acquire knowledge of IC engines, EVs & Hybrid vehicles.
5. Acquire essential experience on machine tools and power transmission system
6. Acquire knowledge of basic concepts on CNC, mechatronics and robotics.

Module-1 (8 hours)

Energy Sources and Power Plants: Introduction and application of energy sources, Construction and working of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant, Tidal power plant, Wind power plant and concept of bio-fuels.

Non-Traditional Machining Processes: Ultrasonic Machining (USM), Electrochemical Machining (ECM), Electrical Discharge Machining (EDM), Electron Beam Machining (EBM) and Laser Beam Machining (LBM)

Self-Study Component: Study additional renewable energy technologies and their impact on future power generation.

Module-2 (8 hours)

Engineering Materials: Types, properties and applications of ferrous and non-ferrous metals, ceramics, composites, smart materials and shape memory alloys.

Metal Joining Processes: Soldering, Brazing and Welding: Definition & Classification of soldering, brazing, and welding. Brief description of arc welding, Oxy-acetylene gas welding and types of flames.

Self-Study Component: Explore advanced materials and their role in modern manufacturing applications.

Module-3 (8 hours)

Fundamentals of IC Engines: Components and working principle of 4-stroke petrol and diesel engines, Application of IC Engines.

Insight into future mobility technology: Brief description & Components of Electric and Hybrid Vehicles, Advantages and disadvantages of EVs and Hybrid Vehicles.

Self-Study Component: Compare conventional IC engines with electric vehicle powertrains through case studies.

Module-4 (8 hours)

Machine Tools and Operations: Working principle of lathe, lathe operations: turning, facing, knurling, working principle of drilling, drilling operations: drilling, boring, reaming, working principle of milling machine, milling operations: slot milling and plane milling (Sketches of operations of lathe, drilling and milling must be drawn for explanation in the exam)

Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, Gear Trains and their application: simple and compound Gear Trains

Self-Study Component: Study applications of different gear trains in real-life mechanical systems.

Module-5 (8 hours)

Introduction to Modern Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D Printing.

Automation in industry: Fixed, programable & flexible automation and basic elements with block diagrams and concept of open-loop and closed-loop mechatronic system.

Introduction to Robotics: Robot configurations, applications, advantages and disadvantages. **Self-Study Component:** Explore recent advancements in CNC, automation, and robotics used in smart manufacturing industries.

Course Outcomes: At the end of the course the student will be able:	
1BESC204B .1	Classify energy sources, power plants, and non-traditional machining processes with their applications.
1BESC204B .2	Analyze the suitability of non-traditional machining processes (USM, ECM, EDM, EBM, LBM) for engineering applications.
1BESC204B .3	Select engineering materials and compare metal joining processes for specific applications.
1BESC204B .4	Compare IC engines with electric and hybrid vehicles in terms of components, performance, and limitations.
1BESC204B .5	Demonstrate basic machine tools and analyze the applications of gear drives and gear trains.
1BESC204B .6	Evaluate emerging trends in modern manufacturing systems such as CNC, 3D printing, automation, and robotics.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Elements of Engineering Mechanical	K R Gopalakrishna	Subhas Publications	38th Edition 2018
2	Text Book of Elements of Mechanical Engineering	S Trymbaka Murthy	MEDTECH (Scientific International Pvt Ltd)	5th Edition 2019
3	Elements of Engineering Mechanical	Hajra Choudhury	Media Promoters, New Delhi	Vol 1 & 2 2001
Reference Books				
1	Elements of Engineering Mechanical	Dr. A. S. Ravindra	Thomson Press (India) Ltd	8th Edition 2011
2	Introduction to Robotics: Mechanics and Control	Craig J. J	Pearson International Education	3rd Edition 2005
3	Mechatronics-Principles Concepts and Applications	Nitaigour Premchand Mahalik	Tata McGraw Hill	1st Edition 2003
4	Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing	Ian Gibson, David W. Rosen, Brent Stucker	Springer	2nd Edition 2015
5	Modern Electric, Hybrid Electric and FuelCell Vehicles.	MehrdadEhsani, Yimin Gao, Sebastien E. Gay and Li Emadi,	CRC Press LLC	1st Edition 2005

6	Modern Maching Process	P. C. Pandey and H. S. Shah	McGraw Hill Education India Pvt. Ltd.	2000

Weblinks/Video Lectures/MOOCs

1. **MOOC:** https://nptel.ac.in/courses/112/105/112105123/
2. **MOOC:** https://nptel.ac.in/courses/112/107/112107208/
3. **MOOC:** https://nptel.ac.in/courses/112/103/112103262/
4. **NPTEL:** https://www.youtube.com/watch?v=GQHCnWl2U6I

Course Articulation Matrix

Course Outcomes (CO)	Program Outcomes (PO)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BESC204B .1	3	-	-	-	-	-	-	-	-	-	-
1BESC204B .2	-	3	-	-	-	-	-	-	-	-	-
1BESC204B .3	-	-	2	-	-	-	-	-	-	-	-
1BESC204B .4	-	-	-	2	-	-	-	-	-	-	-
1BESC204B .5	-	-	-	-	-	-	-	-	-	-	-
1BESC204B .6	-	-	-	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Introduction to Electrical Engineering			
Course Code	**1BESC204C**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

1. Illustrate the behavior of circuit elements in single-phase circuits.
2. Comprehend the importance of three phase AC circuits and connections.
3. Explain the construction and operation of transformers, DC generators and motors and induction motors.
4. Discuss concepts of circuit protecting devices and earthing.
5. Explain electric power generation, electricity billing, equipment and personal safety measures

Module-1 Power Generation and DC circuits **8 hours**

Introduction: Conventional and non-conventional energy resources; Advantages and limitations, general structure of electrical power systems using single line diagram approach.
Power Generation: Hydel, nuclear, solar & wind power generation (Block Diagram approach).
DC Circuits: Ohm's Law and its limitations, Concepts of KVL and KCL (maximum two branches), Power and Energy. (Numericals covering all the concepts).

Module-2 AC circuits **8 hours**

AC Fundamentals: Definitions of waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. Voltage and current relationship with phasor diagrams in R, L and C circuits (No power equation derivations). Concept of Impedance in R-L, R-C, R-L-C Series circuits. Active power, reactive power and apparent power. Concept of power factor. (Numericals covering all the concepts).
Three Phase Circuits: Generation of Three phase AC quantity, star and delta connection, relationship between line and phase quantities (Excluding proof & Numericals).
Self-Study: Advantages & Limitation of three phase system over single phase system

Module-3 DC Machines & Synchronous Machines **8 hours**

DC Generator: Principle of operation, constructional details, types of generators (DC Shunt &Series) [Excluding Numericals]
DC Motor: Principle of operation, types of motors [Excluding Numericals]
Synchronous Generators: Principle of operation, types and construction. [Excluding Numericals]
Self-Study: Advantages and applications of DC Generators/Motors.

Module-4 AC Machines **8 hours**

Transformers: Necessity of transformer, principle of operation, Types and construction of single phase transformers, EMF equation, losses. (Numericals on EMF equations & Transformation ratio)
Three-phase induction Motors: Concept of rotating magnetic field (excluding the derivation), Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance. (Numericals on Slip).

Module-5 Electrical Safety **8 hours**

Electricity Bill: Power rating of household appliances including air conditioners, PCs, laptops, printers. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff,
Self-Study: Case Study on calculation of electricity bill for domestic consumers.
Equipment Safety measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits.
Personal safety measures: Electric shock, earthing and its types, safety precautions to avoid shock.

Course Outcomes: At the end of the course the student will be able to:	
1BESC204C.1	Describe the concept of electric power generation using various energy resources.
1BESC204C.2	Apply basic laws of electrical engineering to analyze the DC circuits.
1BESC204C.3	Solve numericals on single phase and three phase AC circuits
1BESC204C.4	Discuss the construction and operation of DC electrical machines
1BESC204C.5	Discuss the construction and operation of AC electrical machines.
1BESC204C.6	Illustrate the use of circuit protective devices and earthing.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Basic Electrical Engineering.	D C Kulshreshtha.	Tata McGraw Hill.	1st Edition 2019.
2	A text book of Electrical Technology.	B.L. Theraja.	S Chand and Company	Reprint edition 2014.
Reference Books				
1	Basic Electrical Engineering,	D.P Kothari and I. J. Nagrath,	Tata McGraw Hill	4th Edition, 2019.
2	Principles of Electrical Engineering & Electronics	V. K. Mehta, Rohit Mehta,	S Chand and Company	2nd Edition, 2015.
Additional Resources: Web links/NPTEL Courses				
• https://nptel.ac.in/courses/108105112 (Fundamentals of Electrical Engineering)				

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BESC204C.1	3	-	-	-	-	-	-	-	-	-	-
1BESC204C.2	3	3	-	-	1	-	-	-	-	-	-
1BESC204C.3	3	2	-	-	1	-	-	-	-	-	-
1BESC204C.4	3	-	-	-	-	-	-	-	-	-	-
1BESC204C.5	3	1	-	-	-	-	-	-	-	-	-
1BESC204C.6	3	-	-	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Introduction to Electronics and Communication Engineering			
Course Code	**1BESC204D**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	3:0:0	SEE	3 Hours
Total Hours	40 Hrs	Credits	03

Course Learning Objectives: The objective of the course is to

- Develop a conceptual and analytical foundation in semiconductor devices, particularly rectifier and voltage regulation circuits.
- Gain the ability to interpret oscillator behavior and operational amplifier configurations in analog signal processing.
- Build computational skills in handling various number systems relevant to digital logic.
- Acquire the skills to design and analyze basic logic circuits using fundamental digital components.
- Familiarize with the evolution, architecture, and applications of embedded systems in modern electronics.
- Introduce the basic principles of communication systems with emphasis on analog modulation methods.

Module-1 Semiconductor Diodes and Power Supply Circuits (8 hours)

N-type and P-type Semiconductors, The PN junction, Forward and Reverse Biased Junction, Characteristics and Parameters, Diode approximations, Half-Wave Rectification (HWR), Full-Wave Rectification (FWR), Capacitor Filter Circuits (full wave & half wave), Zener diode Voltage Regulators with and without load.

Activities: Virtual lab experiments on rectifiers

Self-Learning Topics: Full wave capacitor filter circuits, Zener diode voltage regulator without load.

Textbook 1: 1.4, 1.5, 1.6, 2.1, 2.2, 2.3, 3.1, 3.2, 3.3, 3.6

Module-2 Oscillators and Applications of Operational Amplifiers (8 hours)

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Crystal controlled oscillators (Only concepts, working, and waveforms. No mathematical derivations)

Textbook 2: 7.7, 7.13.

Operational Amplifiers (Op-Amp) – Introduction, Op-Amp symbol, characteristics of ideal and practical Op-Amps, Basic Op-Amp circuits: Inverting and Non-inverting amplifiers, Linear applications of Op-Amp: Voltage follower, Summer, Subtractor, Integrator, Differentiator

Activities: Multisim-based experiments on Op-Amp as Inverting and Non-inverting amplifiers, Voltage follower, Summer, Subtractor, Integrator and Differentiator.

Self-Learning Topics: Non Inverting Amplifier, Voltage follower.

Textbook 2: 6.1 and 6.2.

Module-3 Digital Logic Fundamentals and Combinational Circuits (8 hours)

Boolean Algebra and Logic Circuits: Introduction, Number systems & Conversion: Decimal, Binary, Hexadecimal, Octal, Complement of Binary numbers, Boolean algebra theorems, Logic gates.

Combinational Circuits: Adders: Half adder and Full adder.

Activities: Demonstrate the working of basic gates and De Morgan's law using trainer kits.

Self-Learning Topics: Conversion: Octal to Hexadecimal and vice versa.

Textbook 2: 10.1, 10.2, 10.4, 10.5.1, 10.5.2

Module-4 Fundamentals of Embedded Systems and Architectures (8 hours)

Embedded Systems – Definition, Embedded Systems Versus General Computing Systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Purpose of Embedded System, A typical Embedded System, Core of the Embedded System, Microprocessor versus Microcontroller, RISC versus CISC, Harvard versus Von-Neumann architecture.

Activities: LED, serial monitor, ultrasonic sensor using Arduino. Self-Learning Topics: Major application areas of Embedded Systems Textbook 3: 1.1, 1.2, 1.4, 1.5, 1.6, 2.1, 2.1.1
Module-5 Introduction to Communication Systems (8 hours)
Introduction, Elements of communication systems, Types of modulation (only concepts): AM and FM, Difference between AM and FM, Modulation, Multiplexing, Transmission lines, Concept of Radio wave and antennas, Satellite Communication, Principle of operation of mobile phone, Optical fiber communication. Activities: Demonstrate the working of AM and FM. Self-Learning Topics: Principle of operation of mobile phone. Textbook 2: 18.1, 18.2, 18.11, 18.12, 18.13, 18.14, 18.15, 18.17, 18.18, 18.22

Course Outcomes: At the end of the course the student will be able to:	
1BESC204D.1	Develop a conceptual and analytical foundation in semiconductor devices, particularly rectifier and voltage regulation circuits.
1BESC204D.2	Gain the ability to interpret oscillator behavior and operational amplifier configurations in analog signal processing.
1BESC204D.3	Build computational skills in handling various number systems relevant to digital logic.
1BESC204D.4	Acquire the skills to design and analyze basic logic circuits using fundamental digital components.
1BESC204D.5	Familiarize with the evolution, architecture, and applications of embedded systems in modern electronics.
1BESC204D.6	Introduce the basic principles of communication systems with emphasis on analog modulation methods

Sl.No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Electronic Devices and Circuits	David A Bell	Oxford University Press	4th Edition, 2008.
2	Basic Electronics	D P Kothari and I J Nagrath	McGraw Hill Education (India)	2nd Edition, 2018.
3	Introduction to Embedded Systems	Shibhu KV	McGraw Hill Education (India)	2nd Edition, 2017.
Reference Books				
1	Electronic Devices	Thomas L. Floyd	Pearson Education	9th Edition, 2012.
2	Electronic Devices and Circuit Theory	R Boylestad, Nashelskey	Pearson Education	11th Edition, 2013.

Web links and Video Lectures (e-Resources):

1. Basic Electronics Virtual Lab-IIT Kharagpur: http://vlabs.iitkgp.ac.in/be/
2. Digital Electronics https://www.youtube.com/watch?v=2xXErGeeb_Q 3.
3. https://www.youtube.com/watch?v=Yryi1bbmUjU.

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
1BESC204D.1	2	-	-	-	3	-	-	-	1	-	-
1BESC204D.2	1	-	-	-	3	-	-	-	1	-	-
1BESC204D.3	1	2	-	-	-	-	-	-	-	-	-
1BESC204D.4	1	2	-	-	-	-	-	-	-	-	-
1BESC204D.5	1	-	-	-	-	-	-	-	-	-	-
1BESC204D.6	1	-	-	-	-	-	-	-	-	-	-

1: Low 2: Medium 3: High

Essentials of Information Technology			
Course Code	**1BESC204E**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	(3:0:0)	SEE	3 Hours
Total Hours	40 hours	Credits	03

Course Learning Objectives:

- Identify different information representation and manipulation schemes.
- Apply operating system principles and algorithmic techniques.
- Utilize knowledge of networking and cybersecurity essentials.
- Analyse ethical and legal issues in information technology.
- Explore software engineering principles and database systems.
- Design simple web applications and explore benefits and risks of social media.

Module-1 Data Storage and Manipulation (8 hours)

Data Storage: Bits and Their Storage, Main Memory, Mass Storage, Representing Information as Bit Patterns, The Binary System, Storing Integers, Storing Fractions.
Data Manipulation: Computer Architecture, Machine Language, Program Execution, Arithmetic/Logic Instructions, Communicating with Other Devices, Programming Data Manipulation. **Textbook 1: Chapter 1: 1.1-1.7, Chapter 2: 2.1-2.6**

Module-2 Operating Systems and Algorithms (8 hours)

Operating Systems: The History of Operating Systems, Operating System Architecture, Coordinating the Machine's Activities, Handling Competition Among Processes, Security.
Algorithms: The Concept of an Algorithm, Algorithm Representation, Algorithm Discovery, Iterative Structures, Recursive Structures. **Textbook 1: Chapter 3, Chapter 5: 5.1-5.5**

Module-3 Networking and Cyber Security (8 hours)

Networking and the Internet: Network Fundamentals, The Internet, The World Wide Web, Internet Protocols, Security.
Cybersecurity: Overview—What is Cybersecurity? Brief History of Cybersecurity Events, The Basic Information Security Model, Cyber Hygiene, Teams in Cybersecurity**.**
Ethical Issues in Information Technology: Overview, Ownership Rules, Ethics and Online Content. **Textbook 1: Chapter 4 Textbook 2: Chapter 16 and 17**

Module-4 Software Engineering and Database Systems (8 hours)

Software Engineering: The Software Engineering Discipline, The Software Life Cycle, Software Engineering Methodologies, Modularity, Tools of the Trade.
Database Systems: Database Fundamentals, The Relational Model.
Textbook 1: Chapter 7 :7.1-7.5, Chapter 9: 9.1-9.2

Module-5 Introduction to HTML and Social Media (8 hours)

Introduction to HTML and Website Development: What is HTML?, Cascading Style Sheets (CSS), Website Design and Storyboarding, Structure of a Website.
Social Media: Benefits of Social Media, Risks of Social Media. **Textbook 2: Chapter 12 and 18**

Self-study (for Learning Activity, Not for SEE): i. Word Processors. ii. Introduction to Spreadsheets and iii. Introduction to Presentation Applications.

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

1BESC204E.1	Apply the fundamentals of data storage, representation, and manipulation in computer systems, including binary systems, memory, and program execution.
1BESC204E.2	Identify the architecture of operating systems and develop algorithmic solutions using iterative and recursive structures.

1BESC204E.3	Apply networking concepts and cybersecurity practices in everyday tasks.
1BESC204E.4	Apply software engineering principles and database fundamentals to design efficient software systems.
1BESC204E.5	Develop simple web pages using HTML and CSS.
1BESC204E.6	Analyse the benefits and risks of social media.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Computer Science an overview	J. Glenn Brookshear and Dennis Brylow	Pearson Education Limited	12th Edition 2017
2	Fundamentals of Information Technology	Roy, Shambhavi; Daniel, Clinton; and Agrawal, Manis	Digital Commons at The University of South Florida	1st Edition 2023
Reference Books				
1	Introduction to Information Technology	V. Rajaraman	PHI Learning	3rd Edition 2018
2	Information Technology in Theory	Pelin Aksoy	Cengage	1st Edition 2012

Web links and Video Lectures (e-Resources):

- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01281821790293196830622_shared/overview (Major Attacks on Networks)
- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01436050621856153674/overview(Software Development Life Cycle)
- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01338269041100390473 5_shared/overview (Computer Networks)
- https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01338269041100390473 5_shared/overview (Software Engineering)

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**
1BESC204E.1	3										
1BESC204E.2		3	2								
1BESC204E.3	3						2				
1BESC204E.4	3	2	2								
1BESC204E.5	2		3			2					
1BESC204E.6		3					2				

1: Low 2: Medium 3: High

Python Programming			
Course Code	**1BPLC205B**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	3:0:2	SEE	3 Hours
Total Hours	40 hours Theory + 10 Lab slots	Credits	04

Course Learning Objectives: The objective of the course is to

- Develop scripts using primitive language constructs of python.
- Identify the methods to manipulate primitive python data structures.
- Make use of Python standard libraries for programming.
- Build scripts for performing file operations.
- Illustrate the concepts of Object-Oriented Programming as used in Python.
- Make use of NumPy, Pandas and data visualization for efficient numerical computation and data analysis.

Module-1 Introduction to Python Basics (08 hours)

The way of the program: The Python programming language, what is a program? What is debugging? Syntax errors, Runtime errors, Semantic errors, Experimental debugging.
Variables, Expressions and Statements: Values and data types, Variables, Variable names and keywords, Statements, Evaluating expressions, Operators and operands, Type converter functions, Order of operations, Operations on strings, Input, Composition, The modulus operator.
Iteration: Assignment, updating variables, the for loop, the while statement, The Collatz 3n + 1 sequence, tables, two-dimensional tables, break statement, continue statement, paired data, Nested Loops for Nested Data.
Functions: Functions with arguments and return values.
Text Book 1: Chapter: 1.1-1.7, 2.1-2.12, 3.3, 4.4, 4.5

Module-2 Strings, Tuples and Lists (08 hours)

Strings: Working with strings as single things, working with the parts of a string, Length, Traversal and the for loop, Slices, String comparison, Strings are immutable, the in and not in operators, A find function, Looping and counting, Optional parameters, The built-in find method, The split method, Cleaning up your strings, The string format method.
Tuples: Tuples are used for grouping data, Tuple assignment, Tuples as return values, Composability of Data Structures.
Lists: List values, accessing elements, List length, List membership, List operations, List slices, Lists are mutable, List deletion, Objects and references, Aliasing, cloning lists, Lists and for loops, List parameters, List methods, Pure functions and modifiers, Functions that produce lists, Strings and lists, list and range, Nested lists, Matrices.
TextBook 1: Chapter: 5.1, 5.2, 5.3

Module-3 Dictionaries, Numpy and Files (08 hours)

Dictionaries: Dictionary operations, dictionary methods, aliasing and copying.
Numpy: About, Shape, Slicing, masking, Broadcasting, dtype.
Files: About files, writing our first file, reading a file line-at-a-time, turning a file into a list of lines, Reading the whole file at once, working with binary files, Directories.
TextBook 1: Chapter: 5.4, 6.1-6.5, 7.1-7.7

Module-4 Object Oriented Programming (06 hours)

Object oriented programming: Classes and Objects — The Basics, Attributes, Adding methods to our class, Instances as arguments and parameters, Converting an instance to a string, Instances as return values, Objects are mutable, Sameness, Copying.
Inheritance: Pure functions, Modifiers, Generalization, Operator Overloading, Polymorphism. Exceptions: Catching Exceptions, Raising your own exceptions.
TextBook 1: Chapter: 11.1 11.2.2-11.2.4, 11.3.2-11.3.9, 12.1, 12.2

Module-5 Pandas and Visualization with Matplotlib (08 hours)
Pandas: Introducing to pandas data structure, essential functionally, summarizing and computing descriptive statistics, handling missing data. **Visualization with Matplotlib**: General Matplotlib tips, simple line plots, simple scatter plots, visualizing errors, density and contour plots, histograms, binning and density, customizing plot legends and colorbars, customizing matplotlib. **Textbook 2: Chapter 5 ,Textbook 3: Chapter 4**
Self-study (for Learning Activity, Not for SEE): * Regular expressions, * Web Scraping

PRACTICAL MODULE

PART – A

1. a) Develop a python program to read 2 numbers from the keyboard and perform the basic arithmetic operations based on the choice. (1-Add, 2-Subtract, 3-Multiply, 4-Divide).
   b) Develop a program to read the name and year of birth of a person. Display whether the person is eligible to vote or not.

2. a) Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
   b) Write a python program to find the area of square, rectangle and circle using user defined functions. Take input from the user and print the results.

3. a) Write a python program to Read N numbers from the console and create a list and perform the following operations
      a. Inserting
      b. Removing
      c. Popping an element
      d. Appending an element
      e. Displaying the length of the list
      f. Sorting
      g. Searching
   b) Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].
4. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use a dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display the dictionary slice of the first 10 items.
5. Define a function that takes TWO objects representing complex numbers and returns a new complex number with the sum of two complex numbers. Define a suitable class ‘Complex’ to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the addition of N complex numbers.
6. Write a Python program to create a User-Defined Exception by creating a PercentageError to derive it from the Exception base class. Derive three classes InvalidPercentageError, LessPercentageError and checkPercentage from PercentageError class. To decide which student can enroll in a particular course, there is a cut-off and maximum score. If a student's percentage is in the acceptable range, they are enrolled, or else an exception is raised. In this case, no student enrolling should have a percentage less than the cut-off, and their score cannot be higher than the maximum score. Use exception handling to identify

the eligible student by assuming necessary class members.

7. Write a Python program to demonstrate the init, str, and add methods.
8. A manufacturing company records the **monthly production costs** (in ₹) for three sections: **Raw Materials, Labor, and Transportation** across six production units. Some cost values are missing. The sample data is as follows:

Unit	Raw Materials	Labor	Transportation
U1	120000	80000	Nil
U2	115000	85000	76000
U3	125000	Nil	78000
U4	130000	90000	79000
U5	110000	87000	74000
U6	Nil	88000	77000

Write a Python program using Pandas to:

a. Create a DataFrame to store the above data.
b. Display the **Labor** costs only.
c. Compute and display:
The average cost in each section.

The highest cost in the **Transportation** section

d. Identify missing values and replace them with the average cost of the respective section

9. Write a Python program using **NumPy** to demonstrate the basic operations on arrays. Create a 2D array with values [[10, 20, 30], [40, 50, 60]]. Display the **shape** of the array and perform **slicing** operations to print the first row, the second column, and the element at row 1, column 2. Apply **masking** to display only those elements that are greater than 30. Using **broadcasting**, add 5 to every element of the array. Finally, display the **data type (dtype)** of the array and then convert it into a float array, showing the new dtype as well.
10. Implement a python program to demonstrate Data visualization with various types of Graphs using numpy.

(Open Ended Problems)

(Any one open-ended experiment must be carried out as part of the course)

1. Accept multiple students' names and marks in 3 subjects. Store them using appropriate data structures. Display summary reports (average, topper in each subject - student name, subject and marks) as well as appropriate graph representation.
2. Using suitable dataset demonstrate usage of NumPy, pandas and Matplotlib Libraries.

Course Outcomes: At the end of the course the student will be able to:	
1BPLC205B.1	Demonstrate the use of decision-making, looping constructs and functions using python.
1BPLC205B.2	Apply concepts of Lists, Strings and Tuples to solve problems

1BPLC205B.3	Demonstrate usage of Dictionaries, Numpy array functions and Files
1BPLC205B.4	Use Object Oriented Programming concepts in Python
1BPLC205B.5	Experiment Pandas library for data analytics concepts.
1BPLC205B.6	Explore Data Visualization tools matplotlib.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	How to think like a computer scientist: learning with python 3	Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers	Green Tea Press	3rd Edition 2020
2	Python for Data Analysis	Wes McKinney	Shroff/O'Reilly	3rd Edition 2022
3	Python Data Science Handbook: Essential tools for working with data	Jake Vander plas	O'Reilly Media, Inc.	1st Edition 2016
Reference Books				
1	Python for Everybody: Exploring Data Using Python 3	Charles R. Severance,	Charles Severance's	1st Edition 2016
2	Automate the Boring Stuff with Python"	Al Sweigart	William Pollock	1st Edition 2015
3	Think Python: How to Think Like a Computer Scientist	Allen B. Downey	Shroff/O' Reilly	2nd Edition 2016

Web links and Video Lectures (e-Resources):

- https://www.learnbyexample.org/python/
- https://www.learnpython.org/
- https://pythontutor.com/visualize.html#mode=edit
- https://infyspringboard.onwingspan.com/web/en/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**
1BPLC205B.1	2											2	
1BPLC205B.2	2											2	
1BPLC205B.3			2		2							2	
1BPLC205B.4			2		2							2	
1BPLC205B.5			3		2							2	
1BPLC205B.6			3		2							2	

1: Low 2: Medium 3: High

English Communication Skills			
Course Code	**1BENG206**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:)	(1:0:0)	SEE	2 Hours
Total Hours	15 hours	Credits	01

Course Learning Objectives:

- Build essential verbal, non-verbal, and phonetic communication skills for clarity and effectiveness.
- Use interpersonal skills in group discussions, presentations, and professional interactions.
- Apply formal writing, email etiquette, and creative content development for employability.
- Communicate effectively in digital platforms, following netiquette and academic integrity.
- Prepare job applications, resumes, and perform confidently in interviews.

Module-1 COMMUNICATION SKILLS (3 Hours)

Glimpses of Essential English for Engineers (General Overview) Communication Skills: Process, Verbal and Non-Verbal, Proxemics, Chronemics and Barriers. Writing: Sentence structures. Speaking & Listening: Listening to English Pronunciation – English Phonemes – Intelligible Accent – Speech Organs- Syllable Structures.

Teaching Methodology	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	**Quiklrn.com**
Digital Tools	ALL 44 sounds of English in 75 minutes - https://www.youtube.com/watch?v=QxQUapA-2w4&t=51s. AI-based grammar and writing tools (e.g., Grammarly, ChatGPT, Quillbot) AI-based pronunciation tools (Google Speech-to-Text) for real-time feedback
Reading Material	"**The Chimney Sweeper"** **by William Blake** Martin Luther King Jr's "I Have a Dream" Speech
Assessment Techniques and Tools	**Role Play**: Formal/informal scenarios, **Group Discussion (GD), Case Studies Analysis**: Identify barriers and suggest solutions, Observation Rubric (for body language, tone, time cues).

Module-2 INTERPERSONAL SKILLS (3 Hours)

Importance of interpersonal skills in workplace-types, Group Discussions-Debates, giving technical presentations. Reading: Reading the Interview of an Achiever (Skimming and Scanning) (case studies) Grammar: Sentence patterns. Vocabulary Development: Idioms and Phrases, Phrasal verbs.

Teaching Methodology	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	**Quiklrn.com**
Digital Tools	Google Meet / Zoom + AI Transcription- Practice group discussions with live transcription. Grammarly - Highlights grammar issues with explanations. **Oxford Learner's Dictionaries** (https://www.oxfordlearnersdictionaries.com/) - Includes etymology, pronunciation, synonyms/antonyms.
Assessment Techniques and Tools	Group discussion performance (listening, turn-taking, clarity) Technical presentations (confidence, structure, clarity) Role plays (relevance, tone, spontaneity)

		Activity: Read a short **interview of an achiever** (e.g., A. P. J. Abdul Kalam, Sudha Murthy) **LMS (Learning Management Systems)**: Moodle or Google Classroom for submissions and reflections.

Module-3 ENGLISH FOR EMPLOYABILITY (3 Hours)

Writing: Formal Letter writing (Enquiry, Order, and Complaint). Tenses – Reported Speech- Voice - Email Etiquettes, Structure, Writing and Responding to Emails. Paragraph Writing (Descriptive, Argumentative, Expository, Short Story, and Narrative), Blog Writing. **Reading**: Proof Reading (Spelling, Punctuation, Grammar). Error Identification Exercises. **Speaking:** Questions & Requests (Wh questions and Question tags).

Pedagogy	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	**Quiklrn.com**
Digital Tools	Grammarly – Check grammar, tone, spelling Canva – Free templates to create posters, ads, infographics Adobe Express – Visual storytelling and ad design
Assessment Techniques and Tools	**Paragraph Writing -** Descriptive, Argumentative, Expository, Short Story, Narrative - Paragraph rubric (structure, logic, vocabulary, grammar) Writing - **Tool**: Digital submission + rubric for content originality, reader engagement, clarity. **Speaking Skills -** Oral assessment rubric (intonation, clarity, accuracy)

Module-4 ENGLISH IN DIGITAL WORLD (3 Hours)

Writing: Framing of search terms / keywords in search engines/ Commands for search on open AIs - Tools to support synchronous communication such as webinar platforms, and asynchronous communication such as forums and social media - Online communication - Types – pros and cons of online communication. Acceptable online roles and behaviours – Netiquettes - Etiquettes of social media. Problems and opportunities in handling digital resources

Pedagogy	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	**Quiklrn.com**
Digital Tools	Google Meet - Integrated with Gmail, free for students Google Classroom - Forum, assignments, comments
Assessment Techniques and Tools	Write a short essay (150–200 words) on the **problems and opportunities.** Evaluation rubric (structure, coherence, grammar). Grammar assessment rubric (before vs after comparison, understanding of corrections).

Module-5: APPLYING FOR JOBS (3 Hours)

Listening: TED Talks. Speaking: Mock Interview, Telephone Interviews, Job Interview- language used in formal professional tone. Writing: Job Applications and Resumes Grammar: Modal verbs Vocabulary Development: Technical Vocabulary.

Pedagogy Language Lab	TBTL (Task-Based Teaching Learning) & Eclectic Approach
Language Lab	**Quiklrn.com**
Assessment Techniques and Tools	Listening to professional talks, analyzing tone and structure - https://www.ted.com/talks Non-verbal cues in professional reading - https://www.youtube.com/c/Mindsight Grammar AI practice - https://quillbot.com/grammar-check
Assessment Techniques and Tools	Reading comprehension tests, Resume & Application rubric (content, layout, tone, language), Grammar MCQs / Vocabulary worksheet

Course Outcomes: At the end of the course the student will be able:	
1BENG206.1	To use English as a communication tool through the four skills of listening, speaking, reading and writing.
1BENG206.2	To Speak and interact with fellow speakers about familiar topics, express personal views and exchange information
1BENG206.3	.To apply English grammar to improve the quality of learning other subjects in the general education curriculum.
1BENG206.4	To Communicate effectively in digital platforms, following netiquette and academic integrity
1BENG206.5	To Prepare job applications, resumes, and perform confidently in interviews.
1BENG206.6	To use English for further education or immediate employment upon completion

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Reference Books				
1	Technical Communication: Principles and practice	Raman, M., & Sharma, S.	Oxford University Press	2015
2	English for Engineers and Technologists.	Kumar, A. R.	Orient Black Swan	2008
3	A Course in English Pronunciation.	Yadav, D. P.	Notion Publications	2022

Additional Resources: Web links/NPTEL Courses

Language lab: Quiklrn.com

Learn English – https://learnenglish.

britishcouncil.org/ • Take IELTS - https://www.britishcouncil.in/exam/ielts

British Council Apps - bbcLearnEnglishonline Grammar

IELTS Word Power

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BENG206.1	-	-	-	-	-	-	-	**1**	**3**	-	**2**
1BENG206.2	-	-	-	-	-	-	-	-	**3**	-	**2**
1BENG206.3	-	-	-	-	-	-	-	-	**3**	-	**2**
1BENG206.4	-	-	-	-	-	-	-	-	**3**	-	**2**
1BENG206.5	-	-	-	-	-	-	-	**1**	**3**	-	**2**
1BENG206.6	-	-	-	-	-	-	-	**1**	**3**	-	**2**

1: Low 2: Medium 3: High

Assessment Structure:

The assessment in each course is divided equally between Continuous Internal Evaluation (CIE) and the Semester End Examination (SEE), with each carrying 50% weightage.

- To qualify and become eligible to appear for SEE, in the CIE, a student must score at least 40% of 50 marks, i.e., 20 marks.
- To pass the SEE, a student must score at least 35% of 50 marks, i.e., 18 marks.
- Notwithstanding the above, a student is considered to have passed the course, provided the combined total of CIE and SEE is at least 40 out of 100 marks

Continuous Internal Evaluation (CIE):

Two Unit Tests each of 30 Marks (duration 1 hour)

- First test is in the 8th week after the completion of 30-40 % of the syllabus
- Second test is in the 15th week after completion of 80-90% of the syllabus

Average of the two tests shall be taken into consideration.

Two assignments each of 10 Marks

2 assignments of 10 marks each have to be submitted during the semester and the total marks shall be considered for CIE.

Semester End Examination (SEE)

Semester End Examination (SEE) will be conducted for 50 marks and it will be descriptive.

Indian Constitution and Professional Ethics			
Course Code	**1BICP207**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Theory	SEE Marks	--
		Total Marks	50
Teaching Hours/Week (L:T:P)	(1:0:0)	SEE	--
Total Hours	15 hours	Credits	--

Course Learning Objectives:

1. To know about the basic structure of the Indian Constitution.
2. To know the Fundamental Rights (FRs), DPSP's, and Fundamental Duties (FD's) of our constitution.
3. To know about our Union Government, political structure & codes, and procedures.
4. To know the State Executive & Elections system of India.
5. To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

Module-1 Introduction to Indian Constitution

The Necessity of the Constitution, The Societies before and after the Constitution adoption. Introduction to the Indian constitution, The Making of the Constitution, The Role of the Constituent Assembly. The Preamble of Indian Constitution & Key concepts of the Preamble. Salient features of India Constitution.

Module-2 FR's, FD's and DPSP's

Fundamental Rights and its Restriction and limitations in different Complex Situations. Directive Principles of State Policy (DPSP) and its present relevance in our society with examples. Fundamental Duties and its Scope and significance in Nation building.

Module-3 Union Executive

Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet, Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Supreme Court of India, Judicial Reviews and Judicial Activism.

Module-4 State Executive & Elections, Amendments and Emergency Provisions

State Executive, Election Commission, Elections & Electoral Process. Amendment to Constitution (How and Why) and Important Constitutional Amendments till today. Emergency Provisions.

Module-5 Professional Ethics

Ethics & Values. Types of Ethics. Scope & Aims of Professional & Engineering Ethics. Positive and Negative Faces of Engineering Ethics. Clash of Ethics, Conflicts of Interest. The impediments to Responsibility. Trust & Reliability in Engineering, IPRs (Intellectual Property Rights), Risks, Safety and liability in Engineering.

Course Outcomes: At the end of the course the student will be able:

1BICP207.1	To analyse the basic structure of Indian Constitution.
1BICP207.2	To develop awareness and understanding of the Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties provided in the Constitution.
1BICP207.3	To gain knowledge of the Union Government, its political structure, codes, and procedures
1BICP207.4	To learn about the structure and functions of the State Executive and the electoral system of India
1BICP207.5	To study the Amendments, Emergency Provisions, and other significant provisions of the Constitution.
1BICP207.6	To apply principles of intellectual property rights (IPRs), trust, reliability, risk, and safety to make ethical and responsible engineering judgments.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Constitution of India	C R Kothari and Gaurav Garg	Naidhruva Edutech Learning Solutions	2022
2	Engineering Ethics	M.Govindarajan, S.Natarajan, V.S.Senthilkumar	Prentice –Hall	2004
Reference Books				
1	"Samvidhana Odu" - for Students & Youths	Justice HN Nagamohan Dhas, Sahayana, kerekon.	Sage Publications India Pvt Ld New Delhi	2004
2	Constitution of India, Professional Ethics and Human Rights"	Shubham Singles, Charles E. Haries, and et al	Cengage Learning India, Latest Edition	2019
3	Introduction to the Constitution of India	Durga Das Basu (DD Basu)	Prentice –Hall	2008
Additional Resources: Web links/NPTEL Courses				
https://www.constitutionofindia.net/read/				
https://infosecawareness.in/cyber-laws-of-india				

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BICP207.1	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP207.2	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP207.3	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP207.4	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP207.5	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP207.6	-	-	-	-	-	-	**3**	-	-	-	**3**

1: Low 2: Medium 3: High

Assessment Structure:

There is only Continuous Internal Evaluation (CIE) for this course.

- A student must score at least 40% of 50 marks, i.e., 20 marks in CIE.

Continuous Internal Evaluation (CIE):

Two Unit Tests each of 30 Marks (duration 1 hour)

- First test is in the 8th week after the completion of 30-40 % of the syllabus
- Second test is in the 15th week after completion of 80-90% of the syllabus

Two assignments each of 10 Marks

2 assignments of 10 marks each have to be submitted during the semester and the total marks shall be considered for CIE.

Emerging Technologies: A Primer			
Course Code	**1BETP208L**	CIE Marks	50
Type of the Course	Practical	SEE Marks	50
Teaching Hours/Week (L:T:P)	(0:0:2)	Total	100
Credits	1	Exam Hours	02

Course Learning Objectives:

1. To develop a strong awareness of the ethical and societal implications associated with emerging technologies.
2. To instil practical skills related to AI (Artificial Intelligence), Blockchain, Digital Twins, RPA (Robotic Process Automation), and Cybersecurity.
3. To enable experiences of working on a team project, allowing students to apply their knowledge and skills to a real-world problem and present their findings effectively.

Module-1: AI and Web 3.0 (06 Hours)

Introduction to Emerging Technologies: Overview of the course, Importance of staying updated with emerging technologies, Ethical and societal considerations.
Artificial Intelligence (AI): Definition and history of AI, Machine learning and deep learning, Applications of AI in various industries, In-Class Assignment: AI in Everyday Life, Homework Assignment: Building a Simple Chatbot.
Web 3.0: Blockchain and Metaverse - Introduction to Blockchain technology, Metaverse and its potential, In-Class Assignment: Creating a Simple Smart Contract, Homework Assignment: Exploring a Metaverse Platform.

Module-2: Smart Manufacturing and Robotic Process Automation (06 Hours)

Smart Manufacturing and Digital Twins: The concept of Smart Manufacturing, Role of IoT and sensors, Digital Twins and their applications, In-Class Assignment: Explore the designs of Digital Twins, Homework Assignment: Analysing a Smart Manufacturing Case Study.
Robotic Process Automation: Understanding Robotic Process Automation (RPA), Types of robots and their applications, Human-robot collaboration, In-Class Assignment: Automating a Task with RPA, Homework Assignment: Researching Advances in Robotics.

Module-3: Cybersecurity and Quantum Computing (06 Hours)

Cybersecurity: Importance of cybersecurity in the digital age, Threats and vulnerabilities, Security best practices, In-Class Assignment: Ethical Hacking Simulation, Homework Assignment: Creating a Cybersecurity Plan.
Quantum Computing: Introduction to Quantum Mechanics, Quantum bits (qubits) and quantum gates, Quantum supremacy and real-world applications. Homework Assignment: Exploring Quantum Computing Research.

Module-4: Project Work (06 Hours)

Team Formation, Synopsis submission, Mid-Term Progress Review, Final Project Presentation.

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

1BETP208L.1	Assess the ethical and societal impacts of emerging technologies, demonstrating critical thinking skills.
1BETP208L.2	Apply AI and Web 3.0 concepts to develop practical solutions and explore real-world applications.
1BETP208L.3	Apply RPA principles and tools to automate common tasks to boost productivity.
1BETP208L.4	Explain common cybersecurity threats and recommend best practices to safeguard digital assets.

1BETP208L.5	Explain the fundamentals of quantum computing and its real-world applications.
1BETP208L.6	Develop a solution using emerging technologies for a real-world problem in teams.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Artificial Intelligence: A Modern Approach	Stuart Russell, Peter Norvig	Pearson	Fourth Edition, 2020
2	Blockchain Technology	Chandramouli Subramanian, Asha A George, Abhilash K A and Meena Karthikeyan	Universities Press (India) Pvt. Ltd.	First Edition 2020
3	Metaverse and Web 3: A Beginner's Guide: A Beginner's Guide: A Digital Space Powered with Decentralized Technology	Utpal Chakraborty	BPB Publications	First Edition, 2022
4	Learning Robotic Process Automation: Create Software robots and automate business processes with the leading RPA tool - UiPath	Alok Mani Tripathi	Packt Publishing	First Edition 2018
5	Cybersecurity: The Beginner's Guide: A comprehensive guide to getting started in cybersecurity	Dr. Erdal Ozkaya	Packt Publishing Limited	First Edition 2019
6	Quantum Computing: A Gentle Introduction	Eleanor G. Rieffel, Wolfgang H. Polak.	MIT Press	First Edition 2014
Reference Books				
1	Smart Manufacturing Technologies for Industry 4.0: Integration, Benefits, and Operational Activities	Edited By: Jayakrishna Kandasamy, Kamalakanta Muduli, V. P. Kommula, Purushottam L. Meena	CRC Press	First Edition 2022
2	The Robotic Process Automation Handbook: A Guide to Implementing RPA Systems	Tom Taulli	Apress Berkeley, CA	2020
3	The Cyber Security Handbook: Prepare for, respond to and recover from cyber-attacks with the IT Governance Cyber Resilience Framework (CRF)	Alan Calder	IT Governance Publishing	First Edition 2020

Web links/Video Lectures:

Introduction to Emerging Technologies:

1. https://aiethics.princeton.edu/case-studies/case-study-pdfs/
2. https://research.aimultiple.com/ai-ethics/
3. https://news.harvard.edu/gazette/story/2020/10/ethical-concerns-mount-as-ai-takes-bigger-decision-making-role/
4. https://www.sciencedirect.com/science/article/pii/S0268401223000816
5. https://www.youtube.com/watch?v=G2fqAlgmoPo
6. https://www.youtube.com/watch?v=zizonToFXDs

Web 3.0: Blockchain and Metaverse

1. What is Ethereum? | ethereum.org
2. Navigating Remix — Remix - Ethereum IDE 1 documentation (remix-ide.readthedocs.io)
3. Solidity — Solidity 0.6.8 documentation (soliditylang.org)
4. https://www.youtube.com/watch?v=nalMdCI_pv8&t=765s
5. The Decentralized Autonomous Organization and Governance Issues by Usman W. Chohan :: SSRN
6. Ethereum Smart Contract Best Practices (consensys.github.io)
7. https://hackernoon.com/hack-solidity-reentrancy-attack

Smart Manufacturing and Digital Twins:

1. https://www.youtube.com/watch?v=nwFed03fS_s
2. https://www.youtube.com/watch?v=ScmK-bKJ4MI

RPA and Robotics:

1. https://www.youtube.com/watch?v=9URSbTOE4YI
2. https://www.youtube.com/watch?v=UEbw7dIOg0g
3. https://www.uipath.com/resources/automation-case-studies
4. https://www.ibm.com/products/robotic-process-automation/case-studies

Cybersecurity:

1. https://www.getastra.com/blog/security-audit/what-is-vapt/
2. https://owasp.org/www-project-top-ten/
3. https://owasp.org/www-project-mutillidae-ii/
4. https://www.youtube.com/watch?v=JAtwZoW76-I
5. Threat modelling (STRIDE framework): https://learn.microsoft.com/en-us/azure/security/develop/threat-modeling-tool-threats
6. Cyber Kill Chain:https://www.lockheedmartin.com/en-us/capabilities/cyber/cyber-kill-chain.html

Quantum Computing:

1. https://www.youtube.com/watch?v=e3fz3dqhN44
2. https://quantumai.google/

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BETP208L.1	-	-	-	-	-	**3**	-	**2**	-	--	-
1BETP208L.2	-	**2**	-	-	**3**	-	-	-		-	**1**
1BETP208L.3	-	-	-	**3**	**2**	-	-	-	--	-	-
1BETP208L.4	-	-	-	-	**3**	-		-	-	-	**1**
1BETP208L.5	**2**	-	-	-	**3**	-	-	-	-	-	-
1BETP208L.6	-	-	**2**	-	**3**	-	--	-	**2**	-	**1**

1: Low 2: Medium 3: High

***

Core Values of the Institution

SERVICE

A Josephite will keep service as the prime goal in everything that is undertaken. Meeting the needs of the stakeholders will be the prime focus of all our endeavors.

EXCELLENCE

A Josephite will not only endeavor to serve, but serve with excellence. Preparing rigorously to excel in whatever we do will be our hallmark.

ACCOUNTABILITY

Every member of the SJEC Family will be guided to deliver on assurances given within the constraints set. A Josephite will always keep budgets and deadlines in mind when delivering a service.

CONTINUOUS ADAPTATION

Every member of the SJEC Family will strive to provide reliable and continuous service by adapting to the changing environment.

COLLABORATION

A Josephite will always seek to collaborate with others and be a team-player in the service of the stakeholders.

Objectives

- Provide Quality Technical Education facilities to every student admitted to the College and facilitate the development of all round personality of the students.
- Provide most competent staff and excellent support facilities like laboratory, library and internet required for good education on a continuous basis.
- Encourage organizing and participation of staff and students in in-house and outside Training programmes, seminars, conferences and workshops on continuous basis.
- Provide incentives and encouragement to motivate staff and students to actively involve in research-innovative projects in collaboration with industry and R &D centres on continuous basis
- Invite more and more number of persons from industry from India and abroad for collaboration and promote Industry-Institute Partnership.
- Encourage consultancy and testing and respond to the needs of the immediate neighbourhood.

St Joseph Engineering College

AN AUTONOMOUS INSTITUTION

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