BE SCHEME & SYLLABUS

FIRST YEAR

(I and II Semester)

(With effect from 2025-26)

Mechanical 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)

Mechanical Engineering Stream

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 – Mechanical Engineering (ME) S t r e a m **C h e m i s t r y G r o u p**

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)	1BMATM101	Applied Mathematics -I for Mechanical Engineering Stream	Maths	2	2	2	03	50	50	100	04
2	ASC(IC)	1BCHEM102	Applied Chemistry for Mechanical Engineering Stream	Chemistry	3	0	2	03	50	50	100	04
3	ESC	1BCED103	Computer Aided Engineering Drawing	MEC Dept	2	0	2	03	50	50	100	03
4	ESC	1BESC104x	Engineering Science Course-I	Respective Engg Dept	3	0	0	03	50	50	100	03
5	PLC (IC)	1BPLC105A	Introduction to C Programming	Respective Engg Dept	3	0	2	03	50	50	100	04
6	AEC	1BENG106	English Communication Skills	Humanities	1	0	0	02	50	50	100	01
7	NCMC	1BICP107	Indian Constitution and Professional Ethics	Humanities	1	0	0	02	50	-	50	-
8	AEC/SDC	1BETP108L	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-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**, Mechanical Engineering and allied branches students** shall opt for any one of the courses from the ESC-I group except, **1BESC104B - Introduction to Mechanical Engineering**.
- 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 - M E Stream **Physics Group - (For the students who studied Chemistry 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)	1BMATM201	Applied Mathematics -II for Mechanical Engineering Stream	Maths	2	2	2	03	50	50	100	04
2	ASC(IC)	1BPHYM202	Applied Physics for Mechanical Engineering Stream	Physics	3	0	2	03	50	50	100	04
3	PSC	1BEME203	Elements of Mechanical Engineering	Mech Engg	3	0	0	03	50	50	100	03
4	ESC	1BESC204x	Engineering Science Course-II	Respective Engg Dept	3	0	0	03	50	50	100	03
5	ETC	1BETC205	Introduction to AI and Applications	Any Dept	3	0	0	03	50	50	100	03
6	PSCL	1BEME206L	Elements of Mechanical Engineering Lab	Mech Engg	0	0	2	03	50	50	100	01
7	HSMC	1BKSK207/ 1BKBK207	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	02	50	50	100	01
8	AEC/SDC	1BPFT208L	Prototype Fabrication and Testing (Project Based Learning)	Any Dept	0	0	2	02	50	50	100	01
9	AEC/SDC	1BITS209	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** 2-hours Tutorial **(T)** per week=**1 Credit** 2- hours Practical / Drawing (**P**) per week =**1 Credit**	04-Credits courses are to be designed for 50 hours of Teaching-Learning Session 04-Credits (IC) are to be designed for 40 hours theory and 10-12 hours of Practical Session 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, **Mechanical Engineering and allied branches students shall opt** for any one of the courses from the ESC-II group **except, 1BESC204B - Introduction to Mechanical Engineering**.
- 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 Mechanical Engineering Stream			
Course Code	**1BMATM101**	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:

- To apply calculus concepts, analyse and model engineering problems.
- Solve linear systems using matrices, eigen values.
- To enhance problem-solving and analytical skills

Module-1: Polar Curves and Curvature **(8 Hours)**

Polar curves, angle between the radius vector and tangent, angle between the polar curves, pedal equations. Curvature and Radius of curvature - Cartesian, parametric, polar and Pedal forms.
Self study : Radius of curvature (polar and parametric)

Module-2: Power Series Expansions, Indeterminate Forms and Multivariable Calculus **(8 Hours)**

Statement & problems on Taylor's and Maclaurin's series expansion for one variable. Partial differentiation, total derivative - differentiation of composite functions. Jacobian.
Applications: Maxima and minima for a function of two variables
Self study: Indeterminate forms - L'Hospital's rule

Module-3: Ordinary Differential Equations of First Order **(8 Hours)**

Exact and reducible to exact differential equations –Integrating factors of the form $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$, Orthogonal Trajectories (polar form). **Non-linear differential equations:** Introduction to general and singular solutions, Solvable for p only, Clairaut's equations.
Applications: Law of natural growth and decay; **Self study:** Reducible to Clairaut's equations.

Module-4: Ordinary Differential Equations of Higher Order **(8 Hours)**

Higher-order linear ODE's with constant coefficients, Homogeneous and non-homogeneous equations - $e^{ax}, \sin(ax+b), \cos(ax+b), x^n$ only. Method of variation of parameters,

Legendre's homogeneous differential equations
Applications: . Mass spring model; **Self study:** Cauchy's homogeneous differential equations

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

Elementary transformations on a matrix, Echelon form, rank of a matrix, consistency of system of linear equations. Gauss Jordan Method, Gauss –Seidel method to solve system of linear equations. Eigen values and eigen vectors of a matrix, Rayleigh power method to determine the dominant eigen value of a matrix.
Applications: Traffic flow problems; **Self study:** Gauss Elimination Method

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. Ordinary Differential Equations

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:	
1BMATM101.1	Apply concepts of curvature and pedal equations to analyze the geometrical properties of curves and solve related engineering problems.
1BMATM101.2	Apply Taylor's and Maclaurin's series expansions and partial differentiation techniques to solve mathematical and engineering problems.
1BMATM101.3	Apply and analyse first-order and higher-order ordinary differential equations to model and interpret real-world systems and physical processes.
1BMATM101.4	Integrate techniques from multivariable calculus, differential equations to design mathematical models for solving complex engineering problems.
1BMATM101.5	Apply matrix methods (rank, echelon form, iterative methods, eigenvalues & eigenvectors) to evaluate and solve systems of linear equations with engineering applications
1BMATM101.6	Apply modern mathematical tools such as MATLAB to compute, visualize, and solve problems in calculus, differential equations, and linear algebra.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	44th Ed., 2021
2	Advanced Engineering Mathematics	E. Kreyszig	John Wiley & Sons	10th Ed., 2018.
3	Linear Algebra and its Applications	Gilbert Strang	Cengage Publications	4th Ed., 2022.
Reference Books				
1	Higher Engineering Mathematics	B.V. Ramana	McGraw-Hill Education	11th Ed., 2017
2	Engineering Mathematics	Srimanta Pal & Subodh C.Bhunia	Oxford University Press	3rd Ed., 2016
3	A Textbook of Engineering Mathematics	N. P. Bali and Manish Goyal	Laxmi Publications	10th Ed., 2022
4	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma	S. Chand Publication	3rd Ed., 2014
5	Linear Algebra and its Applications	David C Lay	Pearson Publishers	4th Ed., 2018.

Additional Resources: Web links/NPTEL Courses

- http://academicearth.org/ , VTU e-Shikshana Program , VTU EDUSAT Program
- https://nptel.ac.in/courses/111106135 - Linear Algebra
- https://nptel.ac.in/courses/111105160 - Advanced Calculus for Engineers
- https://ocw.mit.edu/courses/18-06-linear-algebra-spring-2010/ - Linear Algebra
- https://ocw.mit.edu/courses/18-02sc-multivariable-calculus-fall-2010/ - Multivariable-calculus

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BMATM101.1	**3**	**-**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
1BMATM101.2	**3**	**-**	**-**	**-**	**1**	**-**		**-**	**-**	**-**	**-**
1BMATM101.3	**-**	**2**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
1BMATM101.4	**-**	**2**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**-**	**-**
1BMATM101.5	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**
1BMATM101.6	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**1**	**-**	**-**

1: Low 2: Medium 3: High

Applied Chemistry for Mechanical Engineering Stream			
Course Code	**1BCHEM102**	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 (1BCHEM102) objectives are to provide students with basic principles of chemistry for building technical competence in industries, research and development in the following fields,

- Corrosion Science and Coating Technologies
- Sustainable Fuels
- Materials for Energy Systems
- Materials for Engineering Applications
- Fluid Technology and Smart Sensors

Module 1: Corrosion Science and Coating Technologies (08 hours)

Corrosion: Introduction, electrochemical theory of corrosion, types of corrosion - differential metal and differential aeration corrosion – waterline and pitting corrosion. Corrosion control: metal coating - galvanization, surface conversion coating - anodization, and cathodic protection - sacrificial anode method; Corrosion penetration rate (CPR) - Introduction and numerical problems.

Coating Technologies: Introduction, technological importance, electroplating - electroplating of chromium; hard and decorative, electro-less plating, difference between electroplating and electroless plating.

Self study: Electroless plating of Nickel.

Module 2: Sustainable Fuels (08 hours)

Fuels: Introduction, calorific value, determination of calorific value using bomb calorimeter, numerical problems on GCV and NCV. Knocking in internal combustion engines - knocking mechanism in IC engine. Anti-knocking agents - methyl tertiary butyl ether (MTBE) and ethyl tert-butyl ether (ETBE). Importance of octane and cetane rating of fuel.

Green Fuels: Introduction, power alcohol – properties, applications, and its limitations, biodiesel - synthesis by trans-esterification method, advantages, and its applications. Production of green hydrogen by photocatalytic water splitting and its advantages.

Self study: Hydrogen storage – Introduction, advantages and limitations of metal hydride and ammonia as chemical hydrogen carriers.

Module 3: Materials for Energy Systems (08 hours)

Nanomaterials: Introduction, synthesis of TiO2 nanoparticles by sol-gel method and its uses in catalytic converter. Size-dependent properties of nanomaterial - surface area, catalytical, electrical and thermal conductivity.

Energy Systems: Batteries - Introduction, classification of batteries, characteristics - capacity, power density, shelf life, and cycle life. Construction, working, and applications of Li-ion battery. Fuel cells - Introduction, construction and working of solid oxide fuel cells (SOFCs) and its uses in auxiliary power units (APUs). Differences between fuel cell and battery. Solar photovoltaic cells (PV cells) - construction, working, advantages and limitations.

Self study: Graphene - Synthesis by chemical vapor deposition method, properties and engineering applications. Role of carbon nanotubes (CNTs) in energy devices.

Module 4: Materials for Engineering Applications (08 hours)

Engineering Polymers: Introduction, molecular weight of polymers – number average and weight average molecular weight, numerical problems. Synthesis, properties, and engineering applications of chlorinated polyvinyl chloride (CPVC), and polymethyl methacrylate (PMMA). Structure and property relationship (crystallinity, strength, elasticity, and chemical resistivity) of polymers. Glass transition temperature (Tg), factors affecting Tg, and its significance.

Polymer Composites: Introduction, fiber-reinforced polymers (FRPs); Kevlar – Synthesis, properties, and industrial applications. Carbon-fiber - Preparation from Polyacrylonitrile (PAN), properties, and industrial applications. **Self study:** 3D Printing materials - Introduction, synthesis, properties, and applications of polylactic acid (PLA) resin.
Module 5: Fluid Technology and Smart Sensors (08 hours)
Lubricants: Introduction, classification, ideal properties, and applications. Lubricant testing, experimental determination of viscosity using Ostwald's viscometer. **Industrial effluents:** Introduction, determination of COD, and numerical problems. **Sensors:** Introduction, potentiometric sensor - principle and its application in the estimation of iron in steel industry effluent. Conductometric sensor - principle and its application in the estimation of acids in electrochemical bath effluent. pH sensor - principle and its application in the estimation of pKa of acid electrolyte. **Self study:** Industrial Coolants - Introduction, types - water and oil-based coolants, properties, and industrial applications.

PRACTICAL MODULE

Part – A

1. Estimation of total hardness of water by the EDTA method.
2. Estimation of the 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:	
1BCHEM102.1	Develop an intuitive understanding of the principles of corrosion and coating technologies.
1BCHEM102.2	Illustrate the synthesis, advantages, storage, and properties of conventional and green fuels for sustainable solutions.
1BCHEM102.3	Analyze the synthesis, properties, and applications of nanomaterials, and evaluate the and sustainable engineering applications of advanced energy systems.
1BCHEM102.4	Evaluate polymer-based materials and composite materials for engineering applications.
1BCHEM102.5	Interpret the knowledge of lubricants, industrial coolants, and effluents, and apply sensor-based analytical techniques in industrial environments.
1BCHEM102.6	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 Edition, 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. **Bomb calorimeter -** https://www.vturesource.com/post/1570/News/Bomb-calorimeter-construction-working- vtu-chemistry.html?utm_source

2. **Hydrogen production using TiO_2 -** https://pubs.acs.org/doi/10.1021/acsomega.3c00963?utm_source
3. **Corrosion Lecture -** https://youtu.be/qTw_p9dkiVU
4. **Electrochemical theory of corrosion -** https://youtu.be/wdCYXj-bI-U
5. **Corrosion controlling methods: electroless nickel plating -** https://youtu.be/Y0EkLYK5i-c
6. **Corrosion control industry: carbon nanotechnology & nanocoatings for corrosion protection -** https://youtu.be/tzTxMF7CDd4
7. **Knocking of petrol and diesel II octane & cetane numbers liquid fuels -** https://youtu.be/YxrpQEX9ORA
8. **Rocket science -** https://youtu.be/Gxv4r9qoRf8
9. **Sol-gel synthesis of TiO_2 nanoparticles -** https://youtu.be/XIjDw5Sw9c4
10. **Fundamentals of how a Lithium-ion battery works -** https://youtu.be/j_rNjiIiBKE
11. **Alloys unveiled: from Brass to steel, exploring metal mixtures -** https://youtu.be/GpbcjWstzEE
12. **Polyaniline: Conducting polymer - Synthesis, properties and applications -** https://youtu.be/ygtbo5KDXeI
13. **Colorimetric estimation of Copper -** https://youtu.be/y-7t-GdRTKA
14. **Graphene oxide nanocomposites synthesis -** https://pmc.ncbi.nlm.nih.gov/articles/PMC11085161/?utm_source
15. **Mix epoxy resin with graphite filler -** https://youtu.be/MeOD34QGu-I

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
1BCHEM102.1	3	3	-	-	-	-	-	-	-	-	-
1BCHEM102.2	3	-	-	-	-	3	-	-	-	-	-
1BCHEM102.3	3	-	3	-	-	-	-	-	-	-	-
1BCHEM102.4	-	-	3	-	-	3	-	-	-	-	-
1BCHEM102.5	3	-	-	-	-	3	-	-	-	-	-
1BCHEM102.6	3	-	-	3	-	-	-	-	-	-	1

1: Low 2: Medium 3: High

Computer Aided Engineering Drawing			
Course Code	1BCED103	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:	
1BCED103.1	Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.
1BCED103.2	Produce computer generated drawings using CAD software.
1BCED103.3	Use the knowledge of orthographic projections to represent engineering information/ concepts and present the same in the form of drawings.
1BCED103.4	Develop isometric drawings of simple objects.
1BCED103.5	Develop the lateral surfaces of different objects.
1BCED103.6	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
1BCED103.1	2	-	-	-	2	-	-	-	-	-	-
1BCED103.2	-	2	-	-	3	-	-	-	-	-	-
1BCED103.3	-	2	-	-	2	-	-	-	-	-	-
1BCED103.4	-	2	-	-	2	-	-	-	-	-	-
1BCED103.5	-	2	-	-	2	-	-	-	-	-	-
1BCED103.6	-	-	2	-	2	-	-	-	-	-	-

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 Machining 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	-	-	-	-	-	-	-	-	-
1BESC104D.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 C Programming			
Course Code	**1BPLC105A**	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

- Understand the basic concepts of Computer System and Computer Programming.
- Gain knowledge of Algorithms and Flowcharts.
- Explain the basic concepts of C Programming Language Constructs.
- Design and Develop Programming Skills.

Module-1 Introduction to C Programming Language, Managing input/output Operation (08 hours)

Introduction to Programming: Flowcharts & Algorithms
Introduction to C Programming Language: Basic structure of a C program, Character sets, Tokens, Constants, Variables, Declaration and Initialization of Variables, Data types, Assignment statements.
Managing input/output Operation: Reading and writing a character, Formatted Input and Output.
TextBook 1: Chapter 1,
TextBook 2: Chapter 1(Pg. No.:1-5), 2(Pg. No.:22-40), 4(Pg. No.:81-101)

Module-2 Operators and Expressions, Decision Making and Branching, Looping (08 hours)

Operators and Expressions: Arithmetic, Relational, Logical, Assignment, Increment and Decrement, Conditional Operators, Arithmetic Expressions and Evaluation, Precedence and Associativity, Type conversions, Operator precedence and associativity.
Decision Making and Branching: Decision making statements: if, if-else, nested if-else, cascaded if-else, switch statement, goto Statements.
Decision Making and Looping : for, while, do-while, branching statements: break and continue.
TextBook 2: Chapter 3(Pg. No.:51-72), 5(Pg. No.:111-135), 6(149-169)

Module-3 Array and Strings (08 hours)

Array: Introduction, One - Dimensional, Two- Dimensional arrays: declaration, initialization, Basic Algorithms: Binary Search and Bubble Sort.
Strings: Introduction to Strings, Declaration and initialization, reading strings from the terminal, writing strings to screen, String handling functions.
TextBook 2: Chapter 7(Pg. No.:189-212), 8Pg. No.:(234-255)

Module-4 User Defined Functions (08 hours)

User defined Functions: Introduction, Need for User-defined functions, A multifunctional Program, Elements of user defined functions, Definition of functions, Return Values and their types, Function Calls, Function declaration, Category of functions.
TextBook 2: Chapter 9(Pg. No.:267-291)

Module-5 Structures and Pointers (08 hours)

Structures: Introduction, defining a structure, Declaring Structure variables, Accessing Structure Members, Initialization.
Pointers: Introduction, Understanding Pointers, Accessing the Address of Variable, Declaring pointer variables, initialization of pointers, accessing variables through its pointer.
TextBook 2: Chapter 10(Pg. No.:320-329, 11(Pg. No.:353-361)

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

- Recursion
- Dynamic Memory Allocation

PRACTICAL MODULE

1. a) Develop a C program to convert temperature from degree to Fahrenheit.
   b) Develop a C program to find GCD and LCM of given numbers.
2. Develop a C program to find the roots of quadratic equations.
3. Develop a C program to simulate a simple calculator that performs arithmetic operations like addition, subtraction, multiplication, and division only on integers. Error messages should be reported, if any attempt is made to divide by zero.
4. a) Develop a C program to find the factorial of a number.
   b) Develop a C program that finds prime numbers within a given range.
5. Develop a C program to generate Floyd's triangle and also the inverted Floyd's triangle for given rows.
6. Develop a C program that implements Linear Search. The program should accept an array of elements and a key element as input from the user, then search for the key in the array and display its position if found, or display an appropriate message if the key is not present.
7. Develop a C program to perform Matrix Multiplication.
8. Develop a C program to find the length of a string, copy one string to another and concatenate two strings using user defined functions.
9. Develop a C program to declare the structure of employees and display the employee records with higher salary among two employees.
10. a) Develop a C program to add two numbers using the pointers to the variables.
    b) Develop a C program to swap two numbers using pointers through a user defined function.

Open Ended Problem

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

1. Write a C program to implement a simple game of your choice. The game should use fundamental C concepts such as variables, loops, conditionals, input/output and if possible, random number generation.
2. Write a C program to manage a simple database system for any domain (No real databases, Use suitable data structures).

Course Outcomes: At the end of the course the student will be able to:	
1BPLC105A.1	Outline the basics of algorithms, flowchart, C programming language, and apply the concepts of input/output statements in C
1BPLC105A.2	Evaluate expressions using C operators and apply the concepts of decision making in C.
1BPLC105A.3	Construct C programs using arrays and strings.
1BPLC105A.4	Construct C programs using user defined functions.
1BPLC105A.5	Develop C programs using structures.
1BPLC105A.6	Develop C programs using pointers.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	The Art of Programming Through Flowcharts & Algorithms	Anil Bikas Chaudhuri	Firewall Media	1st Edition 2005

2	Programming in ANSI C	E. Balagurusamy	Tata McGraw- Hill, India	7th Edition 2022
Reference Books				
1	Programming in C	Reema Thareja	Oxford University	3rd Edition 2023
2	The 'C' Programming Language	Brian W. Kernighan and Dennis M. Ritchie	Prentice Hall of India	2nd Edition 2015
3	Let Us C	Yashavant Kanetkar	BPB Publications	19th Edition 2022

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/courses/106104128
- https://www.coursera.org/specializations/c-programming
- https://www.tutorialspoint.com/what-is-an-algorithm-and-flowchart-in-c-language
- https://www.w3schools.com/c/c_intro.php
- https://www.geeksforgeeks.org/c/c-programming-language/
- https://infyspringboard.onwingspan.com/web/en/login

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BPLC105A.1	1										
1BPLC105A.2	1	2	2								
1BPLC105A.3		1	2								
1BPLC105A.4		1	2								
1BPLC105A.5		1	2			1		1			
1BPLC105A.6		1	2			1		1			

1: Low 2: Medium 3: High

English Communication Skills			
Course Code	**1BENG106**	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:	
1BENG106.1	To use English as a communication tool through the four skills of listening, speaking, reading and writing.
1BENG106.2	To Speak and interact with fellow speakers about familiar topics, express personal views and exchange information
1BENG106.3	.To apply English grammar to improve the quality of learning other subjects in the general education curriculum.
1BENG106.4	To Communicate effectively in digital platforms, following netiquette and academic integrity
1BENG106.5	To Prepare job applications, resumes, and perform confidently in interviews.
1BENG106.6	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
1BENG106.1	-	-	-	-	-	-	-	**1**	**3**	-	**2**
1BENG106.2	-	-	-	-	-	-	-	-	**3**	-	**2**
1BENG106.3	-	-	-	-	-	-	-	-	**3**	-	**2**
1BENG106.4	-	-	-	-	-	-	-	-	**3**	-	**2**
1BENG106.5	-	-	-	-	-	-	-	**1**	**3**	-	**2**
1BENG106.6	-	-	-	-	-	-	-	**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	**1BICP107**	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:

1BICP107.1	To analyse the basic structure of Indian Constitution.
1BICP107.2	To develop awareness and understanding of the Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties provided in the Constitution.
1BICP107.3	To gain knowledge of the Union Government, its political structure, codes, and procedures
1BICP107.4	To learn about the structure and functions of the State Executive and the electoral system of India
1BICP107.5	To study the Amendments, Emergency Provisions, and other significant provisions of the Constitution.
1BICP107.6	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
1BICP107.1	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP107.2	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP107.3	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP107.4	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP107.5	-	-	-	-	-	-	**2**	-	-	-	**2**
1BICP107.6	-	-	-	-	-	-	**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	**1BETP108L**	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:

1BETP108L.1	Assess the ethical and societal impacts of emerging technologies, demonstrating critical thinking skills.
1BETP108L.2	Apply AI and Web 3.0 concepts to develop practical solutions and explore real-world applications.
1BETP108L.3	Apply RPA principles and tools to automate common tasks to boost productivity.
1BETP108L.4	Explain common cybersecurity threats and recommend best practices to safeguard digital assets.

1BETP108L.5	Explain the fundamentals of quantum computing and its real-world applications.
1BETP108L.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
1BETP108L.1	-	-	-	-	-	**3**	-	**2**	-	--	-
1BETP108L.2	-	**2**	-	-	**3**	-	-	-		-	**1**
1BETP108L.3	-	-	-	**3**	**2**	-	-	-	--	-	-
1BETP108L.4	-	-	-	-	**3**	-		-	-	-	**1**
1BETP108L.5	**2**	-	-	-	**3**	-	-	-	-	-	-
1BETP108L.6	-	-	**2**	-	**3**	-	--	-	**2**	-	**1**

1: Low 2: Medium 3: High

II Semester

Applied Mathematics-II for Mechanical Engineering Stream			
Course Code	**1BMATM201**	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:

- To apply calculus concepts analyze and model engineering problems.
- Solve linear systems using matrices, eigen values.
- To enhance problem-solving and analytical skills

Module-1: Integral Calculus **(8 Hours)**

Multiple Integrals: Definition, Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Beta and Gamma functions : Definitions, properties, relation between Beta and Gamma functions

Self-study : Evaluation of double integrals by changing into polar coordinates.

Applications: Application of Integral calculus to mathematical quantities (Area, Surface area, Volume),

Module-2: Vector Calculus **(8 Hours)**

Scalar and vector fields: Gradient, directional derivative, divergence and curl.

Vector Integration: Line integrals, Statement of Green's theorem and problems without verifications

Self-study: Stoke's theorem and problems without verifications

Applications: Work done by a force and flux

Module-3: Numerical Methods – 1 **(8 Hours)**

Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods.

Interpolation: Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula.

Numerical integration: Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

Self-study: Trapezoidal rule, **Application:** Finding area of given region using numerical integration

Module-4: Numerical Methods – 2 **(8 Hours)**

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, Milne's predictor-corrector formula,

Self-study: Adams-Bashforth predictor-corrector method,

AI tools: GeoGebra,Maxima, MATLAB

Module-5: Partial Differential Equations (PDE) **(8 Hours)**

Formation of PDEs by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivatives with respect to one independent variable only. Method of Separation of variables.

Self-study: Derivation of one-dimensional heat equation.

Application: Application of one-dimensional heat and wave equation

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. Differential Equations-II

Demo Experiment
Advanced Data Visualization using Python and Excel

Course Outcomes: At the end of the course the student will be able :	
1BMATM201.1	Apply the concept of change of order of integration and variables to evaluate multiple integral and their usage in computing area and volume.
1BMATM201.2	Apply the knowledge applications of vector calculus using line integral and surface integral.
1BMATM201.3	Solve algebraic and transcendental equations using various numerical techniques.
1BMATM201.4	Apply the knowledge of numerical methods in analysing the discrete data and for solving the physical and engineering problems.
1BMATM201.5	Recognize heat and wave equations and solve them.
1BMATM201.6	Apply modern mathematical tools such as MATLAB to compute, visualize, and solve problems in calculus, differential equations, and linear algebra.

Sl. No.	**Title of the Book**	**Name of the Author/s**	**Name of the Publisher**	**Edition and Year**
Textbooks				
1	Higher Engineering Mathematics	B.S. Grewal	Khanna Publishers	44th Ed., 2021
2	Advanced Engineering Mathematics	E. Kreyszig	John Wiley & Sons	10th Ed., 2018.
3	Linear Algebra and its Applications	Gilbert Strang	Cengage Publications	4th Ed., 2022.
Reference Books				
1	Higher Engineering Mathematics	B.V. Ramana	McGraw-Hill Education	11th Ed., 2017
2	Engineering Mathematics	Srimanta Pal & Subodh C.Bhunia	Oxford University Press	3rd Ed., 2016
3	A Textbook of Engineering Mathematics	N. P. Bali and Manish Goyal	Laxmi Publications	10th Ed., 2022
4	Higher Engineering Mathematics	H. K. Dass and Er. Rajnish Verma	S. Chand Publication	3rd Ed., 2014
5	Linear Algebra and its Applications	David C Lay	Pearson Publishers	4th Ed., 2018.

Additional Resources: Web links/NPTEL Courses

- http://academicearth.org /
- VTU e-Shikshana Program
- VTU EDUSAT Program
- https://nptel.ac.in/courses/111105160 - Advanced calculus for Engineers
- https://nptel.ac.in/courses/127106019 - Numerical methods for Engineers

https://ocw.mit.edu/courses/18-335j-introduction-to-numerical-methods-spring-2019/ ---- Introduction to numerical methods

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BMATM201.1	**3**				**1**					**-**	**-**
1BMATM201.2	**2**				**1**					**-**	**-**
1BMATM201.3		**2**			**1**					**-**	**-**
1BMATM201.4	**1**	**2**								**-**	**-**
1BMATM201.5		**2**							**1**	**-**	**-**
1BMATM201.6				**1**	**2**					**-**	**-**

1: Low 2: Medium 3: High

Applied Physics for Mechanical Engineering Stream			
Course Code	**1BPHYM202**	Semester	I/II
Course Type	Integrated	CIE Marks	50
Teaching Hours/Week (L: T:P)	3:0:2	SEE Marks	50
Total Hours	40 hours of theory and 10-12 hours of practical sessions	Total Marks	100
Credits	4	Exam Hours	3
Examination type (SEE)	**Descriptive**		

COURSE OBJECTIVES: The objectives of this course are to

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

Module-1 (08 Hours)

Oscillations:
Simple harmonic motion (SHM), Differential equation for SHM, Springs: Stiffness factor and its physical significance, Series and Parallel combination of springs (Derivation), Types of springs and their applications. Theory of damped oscillations (Qualitative), Types of damping (Graphical Approach). Theory of forced oscillations (Qualitative), Resonance, Sharpness of resonance. Resonance in LCR Circuits (Qualitative), Numerical Problems.
Self-learning: Engineering applications of forced and damped oscillations.

Module-2 (08 Hours)

Elasticity:
Review Stress-Strain Curve, Strain hardening and softening, Failures of engineering materials- Ductile fracture, Brittle fracture. S-N Curve, Elastic Moduli, Poisson's ratio, Relation between Y, n and σ (with derivation), mention relation between K, Y and σ, limiting values of Poisson's ratio. Beams, Bending moment and derivation of expression, Cantilever, Torsion and Expression for couple per unit twist, Elastic materials (qualitative). Numerical problems.
Self-learning: Factors affecting elasticity, Applications of elastic materials in Engineering.

Module-3 (08 Hours)

Cryogenics:
Introduction to Thermodynamics, Carnot's principle, Efficiency, Production of low temperature - Joule Thomson effect (Derivation with 3 cases), Porous plug experiment with theory, Thermodynamical analysis of Joule Thomson effect, Liquefaction of Oxygen by cascade process, Lindey's air liquefier, Applications of Cryogenics: Aerospace, Dewar Flask, Numerical Problems
Self-learning: Liquefaction of Helium and its properties (superfluidity).

Module-4 (08 Hours)

Thermoelectric materials and devices:
Thermo emf and thermo current, Seebeck effect, Peltier effect, Seebeck and Peltier coefficients, figure of merit (Mention Expression), laws of thermoelectricity. Expression for thermo emf in terms of T_1 and T_2, Thermo couples, Construction and working of thermoelectric generators (TEG) and Thermoelectric coolers (TEC), low, mid and high temperature thermoelectric materials, Applications: Exhaust of automobiles, Refrigerator, Numerical Problems
Self-learning: Space program (Radioisotope Thermoelectric Generator- RTG

Module-5 (08 Hours)

Material Characterization and Instrumentation Techniques:
Nano Materials:
Introduction, properties, classification, synthesis: Bottom-up approach -arc discharge method, top-down approach - ball milling method.
Instrumentation Techniques:
X-Ray Diffractometer (XRD), Schrerrer equation, Atomic Force Microscope (AFM), X-ray

Photoelectron Spectroscopy (XPS), Scanning Electron Microscope (SEM), Numerical Problems. **Self-learning:** Applications of nanomaterials and Transmission Electron Microscopy (TEM)
PRACTICAL COMPONENTS
1. Study of Forced Mechanical Oscillations and Resonance (Helmholtz Resonator) 2. Study of the frequency response of Series & Parallel LCR circuits. 3. Determination of the effective spring constant of the given springs in series and parallel combinations 4. Kundt's Dust Tube – Determination of Velocity of Sound. 5. Determination of Young's modulus of the material of the given bar using Single Cantilever. 6. Determination of Moment of Inertia of the given irregular body and Rigidity modulus of the material of the wire by setting Torsional Oscillations. 7. Verification of Newton's Law of Cooling. 8. Determination of Grating Constant Using LASER Diffraction **Simulation Experiments:** 9. Determination of wavelength of Ultrasonic using Ultrasonic Interferometer 10. STEP Interactive Physical Simulations / Data Analysis using Spread Sheets

CO No.	**Course Outcomes (Cos):** At the end of the course, the student will be able to
1BPHYM202.1	Evaluate oscillatory motion for its application in mechanical and electrical systems.
1BPHYM202.2	Analyze the mechanical behavior of materials under various loading conditions and their relevance in engineering applications.
1BPHYM202.3	Interpret thermodynamic processes and cryogenic techniques for their effectiveness in low-temperature applications and thermal system design.
1BPHYM202.4	Evaluate thermoelectric phenomena and materials for their effectiveness in energy conversion and thermal management applications
1BPHYM202.5	Demonstrate material characterization techniques and instrumentation to analyze macroscopic and microscopic properties of engineering materials.
1BPHYM202.6	Investigate the impact of physics-based innovations on society and industry by utilizing scientific communication, analytical, and experimental skills

Textbooks:

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1.	A Detailed Text Book of Engineering Physics	S P Basavaraju	Subhas Stores, Bangalore	CBCS EDITION 2018
2.	Engineering Physics	Shatyendra Sharma and Jyotsna Sharma	Pearson	2018
3.	A Textbook of Engineering Physics	M.N. Avadhanulu, P G. Kshirsagar and TVS Arun Murthy	S Chand	2014, 11th Edition
4.	Fundamentals of Cryogenic Engineering	Mamata Mukhopadhyay	PHI Learning (India)	2010
5.	Textbook of Nanoscience and Nanotechnology	B S Murty;P Shankar;Baldev Raj;B B Rath;James Murday	Universities Press (India) Private Limited	First Edition 2013
6.	Characterization of Materials	Mitra P.K	Prentice Hall India Learning	December 12, 2013

			Private Limited	
Reference books				
1.	Physics, Oscillations and Waves, Optics and Quantum Mechanics	Alok Agarwal	Pearson	2025
2.	Vibrations and Waves (MIT introductory Physics Series)	A P French	CBS	2003 Edition
3.	Elements of Properties of Matter	D S Mathus	S Chand	Reprint 2016
4.	Engineering Physics	R. K. Gaur and S. L. Gupta	Dhanpat Rai Publications Ltd., New Delhi-110002	2010 edition
5.	Engineering Physics	S L Kakani, Shubra Kakani	CBS Publishers and Distributers Pvt. Ltd.	3rd Edition, 2020
6.	Cryogenics: A Text Book	S.S. Thipse	Alpha Science International Limited	2013
7.	Treatise on Heat	M N Saha and B N Srivastava	Indian Press Original from, the University of California	2nd Edition 1935
8.	Textbook on Fundamentals and Applications of Nanotechnology	K Raja & M Kannan Subramanian, K S	Daya Publishing House	2018
9.	Nanotechnology: Principles and Practices	Sulabha K. Kulkarni	Springer Nature	3rd edition
10.	Materials Characterization Techniques	Sam Zhang, Lin Li, Ashok Kumar	CRC Press	First Edition, 2008

Web links and Video Lectures (e-Resources):

1. Lecture Series on Physics - I: Oscillations and Waves by Prof.S.Bharadwaj, Department of Physics and Meteorology, IIT Kharagpurn: https://www.youtube.com/watch?v=gnD8Se92hfk
2. Waves and Oscillations https://www.youtube.com/watch?v=xoJWoMQwTAw&list=PLyqSpQzTE6M9X7oRXliYM8t0aaR_N0Csd
3. Simple Harmonic motion: https://www.youtube.com/watch?v=k2FvSzWeVxQ
4. Oscillations and waves: https://openstax.org › books › college-physics-2e
5. Stress- strain curves :https://web.mit.edu/course/3/3.11/www/modules/ss.pdf
6. Stress curves: https://www.youtube.com/watch?v=f08Y39UiC-o.
7. Fracture in materials:https://www.youtube.com/watch?v=x47nky4MbK8
8. Cryogenic Engineering by Prof. M.D. Atrey , Department of Mechanical Engineering, IIT Bombay.: https://www.youtube.com/watch?v=4gGMBNEzeuc
9. Liquefaction of gases: https://www.youtube.com/watch?v=aMelwOsGpIs

10.	Materials Characterization : https://youtu.be/SXIYzrFGmkU.
11.	Material characterization:https://onlinecourses.nptel.ac.in/noc20_mm14/preview.

CO-PO Mapping:

Course Outcomes (COs)	Program Outcomes (POs)										
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
1BPHYM202.1	3	2	-	-	-	-	-	-	-	-	-
1BPHYM202.2	3	2	-	-	-	-	-	-	-	-	-
1BPHYM202.3	3	-	-	--	2	-	-	-	-	-	-
1BPHYM202.4	3	-	-	-	-	-	-	-	-	-	1
1BPHYM202.5	3	-	-	-	2	-	-	-	-	-	-
1BPHYM202.6	-	-	-	2	-	1	-	3	2	-	1

1: (Low), 2: (Medium), 3: (High)

Elements of Mechanical Engineering			
Course Code	**1BEME203**	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

- Provide knowledge of engineering materials, including conventional, composite, smart, and nano materials, with emphasis on their properties and applications.
- Develop understanding of thermodynamics, energy systems, steam applications, and emerging vehicle technologies.
- Familiarize students with the working principles and applications of common machine tools and joining processes.
- Impart knowledge of power transmission elements, robotics, and their role in mechanical systems.
- Introduce students to modern manufacturing practices, automation, CNC, CAD/CAM, and the applications of AI in mechanical engineering.

Module-1 (08 hours)

Engineering materials: Introduction, Classification, Ferrous and Non-Ferrous metals: Types, Properties, and their applications.
Composite materials: Introduction, Constituents of a composite, Classification, Types of Matrix and Reinforcement materials, Advantages, Disadvantages, and Applications of composite materials in Aerospace and Automobile industries.
Smart materials: Introduction, Types - Piezoelectric materials, MR fluids, Shape memory alloys, and Advantages, Disadvantages, and Applications.
Nano materials: Introduction, Types of nano materials, Advantages, Disadvantages, and Applications.
Self-Study Component: Learn how different materials are used in engineering and explore simple ways to select materials for specific applications.

Module-2 (08 hours)

Concepts of Thermodynamics: Work, Energy, Heat, Modes of Heat Transfer: Conduction, Convection, and Radiation. Steam: Formation of steam, Properties of Steam, Numericals related to the properties of steam.
Introduction to Heat engines and Heat pumps.
Introduction to Internal Combustion engines: Introduction, Types, Parts of IC Engine, Working principle of Four stroke engines (SI & CI Engines), No Numericals.
Electric vehicles and Hybrid vehicles: Working principles, Electric and Hybrid vehicle components, Brief introduction to energy storage in Electric vehicles.
Self-Study Component: Understand how heat and energy work in engines and vehicles, and explore simple ways to improve engine efficiency.

Module-3 (08 hours)

Machine Tools:
Lathe: Working principle, Specifications, Operations performed – Turning, Facing, Taper turning by swivelling the compound rest, Thread cutting and Knurling.
Drilling Machine: Working principle, Specifications, Operations performed – Drilling, Reaming, Boring, Counterboring, Countersinking, Tapping.
Milling machine: Working principle, Specifications, Operations performed – Plane milling, End milling, Slot milling, Angular milling.
(Sketches of machine tools not required. Sketches to be used only for explaining the operations).

Joining Processes: Introduction, Temporary and Permanent joining methods: Working principle of Soldering, Brazing and Electric Arc welding, Advantages, Limitations and Applications. **Self-Study Component:** Learn how machines shape materials, and explore how different machining operations and joining methods are applied in industries..
Module-4 (08 hours)
Belt drives: Introduction, Open and Cross belt drives. (Only Derivation of Length of Belt), Flat belts and V belts. **Gear Drives:** Types of Gears, Velocity ratio, Gear Trains - Simple and Compound gear trains and Numericals. **Robotics:** Introduction, Generation of Robots, Robot anatomy - Links and Joints, Types of Robots, Configurations of Robots **Self-Study Component:** Understand how belts, gears, and robots move and work, and explore simple ways they are used in automated systems.
Module-5 (08 hours)
Computer Numerical Control (CNC): Introduction, Definition of NC and CNC Components of CNC. Definition of CAD, CAM, CAE and CIM. **Automation:** Definition, Types of Automation, Reasons for Automation. **Applications of AI in Mechanical Engineering:** Automobile industry, manufacturing industry and Mechanical design. **Self-Study Component:** Learn how CNC machines, automation, and AI are used in manufacturing, and explore how they improve efficiency in mechanical engineering.

Course Outcomes: At the end of the course, the student will be able to:	
1BEME103/203.1	Explain the classification, properties, and applications of engineering, composite, smart, and nano materials.
1BEME103/203.2	Apply thermodynamic principles to analyze steam properties, heat transfer modes, and basic heat engine concepts.
1BEME103/203.3	Demonstrate the working principles and operations of common machine tools and joining processes.
1BEME103/203.4	Analyze the performance and applications of power transmission systems, robotics, and automation technologies.
1BEME103/203.5	Identify and describe the components and working of CNC machines, automation systems, and AI applications in mechanical engineering.
1BEME103/203.6	Present technical topics through seminars and discussions using appropriate communication and visual tools.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Elements of Mechanical Engineering	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 Mechanical Engineering	Hajra Choudhury	Media Promoters, New Delhi	Vol 1 & 2 2001

Reference Books				
1	Elements of Mechanical Engineering	Dr. A. S. Ravindra	Thomson Press (India) Ltd	8th Edition 2011
2	Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing	Ian Gibson, David W. Rosen, Brent Stucker	Springer	2nd Edition 2015
3	Modern Electric, Hybrid Electric and Fuel Cell Vehicles.	MehrdadEhsani, Yimin Gao, Sebastien E. Gay and Li Emadi	CRC Press LLC	1st Edition 2005

Web links and Video Lectures (e-Resources):

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 (COs)	Program Outcomes (POs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PSO1**	**PSO2**	**PSO3**
1BEME203.1	-	2	-		-	-	-	-	-	-	-	-	-	-
1BEME203.2	3	-	-	-		-	-	-	-	-	-	-	-	-
1BEME203.3	-	-	-	2	-	-	-	-	-	-	-	-	-	-
1BEME203.4	-	-	2	-	-	-	-	-	-	-	-	-	-	-
1BEME203.5	-	-	-	-	-	-	-	2	-	1	-	-	-	-
1BEME203.6	-	-	-	-	-	-	-	-	3	-	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 Machining 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

Introduction to AI and Applications			
Course Code	**1BETC205**	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:

1BETC205.1	Understand the fundamental concepts, scope, and types of Artificial Intelligence (AI) and Machine Intelligence.
1BETC205.2	Illustrate and compare basic Machine Learning methods for regression,

	classification, and clustering.
1BETC205.3	Identify and analyze recent trends and advancements in AI and Machine Learning.
1BETC205.4	Apply prompt engineering techniques to effectively interact with generative AI tools.
1BETC205.5	Explain diverse industrial applications of AI across multiple domains.
1BETC205.6	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
1BETC205.1	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	
1BETC205.2	**1**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
1BETC205.3	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**
1BETC205.4	**-**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
1BETC205.5	**-**	**1**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
1BETC205.6	**-**	**-**	**3**	**2**	**-**	**2**	**-**	**-**	**-**	**-**	**2**

1: Low 2: Medium 3: High

Elements of Mechanical Engineering Lab			
Course Code	1BEME206L	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Practical	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P)	0:0:2	SEE	3 Hours
Total Hours	24 Hours (12-week session)	Credits	01

Course Learning Objectives: The objective of the course is to

- Learn the functions of different basic tools in fitting, welding and sheet metal
- Perform various models/joints using fitting operations.
- Gain knowledge on measuring devices to achieve accuracy of measurement.
- Determine the properties and characteristics of fuels and oils.
- Determine the hardness of materials using hardness testing machine
- Perform various operation on lathe machine

PART – A
CONVENTIONAL EXPERIMENTS

1. Understand the use of fitting tools and perform basic fitting operations
2. Performing facing, turning, step turning and knurling operation on lathe machine

PART – B
TYPICAL 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. It encourages creativity, critical thinking, and inquiry-based learning.

1. Examine the basic measuring instruments such as Vernier caliper, micrometer, screw gauge, and bevel protractor by taking different measurements and observing their accuracy.
2. Comparative study of flash point and fire point of various fuels / oils using the open cup method
3. Comparative study of flash point and fire point of various fuels / oils using the closed cup method
4. Comparative study on viscosity of different base fuels using Saybolt and Redwood Viscometer
5. Investigation of the effect of additives on the viscosity of base fuels.
6. Prepare welded joints using the arc welding process, exploring different joint types and welding techniques.

Note:

1. The laboratory syllabus consists of PART-A and PART-B. While PART-A has 2 conventional experiments, PART-B has 6 typical open-ended experiments. The maximum marks for the laboratory course are 100.
2. Both PART-A and PART-B are considered for CIE and SEE.
3. Students have answer 1(one) question from PART-A and 1(one) question from PART-B.
   a. The questions set for SEE shall be from among the experiments under PART-A. It is evaluated for 70 marks out of the maximum 100 marks.
   b. The open-ended question set for SEE shall be any other open-ended question and not selected from the experiments under PART-A. It shall be evaluated for 30 marks.

For continuous internal evaluation, during the semester, classwork, the typical open-ended questions shall be from PART-B, and any other similar questions to enhance the skill of the students.

Course Outcomes: At the end of the course the student will be able to:	
1BEME206L.1	Demonstrate the tools used in the fitting workshop and perform basic fitting operations
1BEME206L.2	Use the concept of measurements and science of basic measuring instruments
1BEME206L.3	Perform basic operations on Lathe machine
1BEME206L.4	Operate the welding machine and perform welding operation to join similar metal objects
1BEME206L.5	Practically examine the viscosity of fuels and oils using viscometers, and determine their flash and fire points using open and closed cup tests
1BEME206L.6	Work effectively in teams to explore engineering problems, discuss solutions, and apply practical knowledge from mechanical systems and materials.

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
Textbooks				
1	Elements of Engineering	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
4	Engineering Metrology	R.K. Jain	Khanna Publishers, Delhi,	2009
Reference Books				
1	Elements of Engineering Mechanical	Dr. A. S. Ravindra	Thomson Press (India) Ltd	8th Edition 2011
2	Elements of Workshop Technology	Technology Hajra Choudhury	Media Promoters, New Delhi	15th Edition 2013
3	Internal Combustion Engines	Ganeshan. V,	Tata McGraw Hill,	4th Edition 2012

Web links and Video Lectures (e-Resources):

- https://www.millerwelds.com/resources/article-library/the-fundamentals-of-welding- process-equipment-and-applications
- https://www.youtube.com/watch?v=FlZkOtzNY8Y
- https://www.youtube.com/watch?v=fBlk9Z4dj1o
- https://www.youtube.com/watch?v=bldr5Ipn7dA
- https://www.youtube.com/watch?v=mmKy5PbndQI&list=PLyqSpQzTE6M-KwjFQByBvRx464XpCgOEC

Course Articulation Matrix

Course Outcomes (COs)	Program Outcomes (POs)													
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
1BEME206L.1	-	-	-	-	-	1	-	-	-	-	2	-	-	-
1BEME206L.2	1	-	-	-	1	-	-	-	-	-	3	-	-	-
1BEME206L.3	-	-	-	-	-	1	-	-	-	-	2	-	-	1
1BEME206L.4	-	-	-	-	-	1	-	-	-	-	3	-	-	1
1BEME206L.5	-	-	-	1	1	-	-	1	-	-	2	-	1	-
1BEME206L.6	-	-	-	1	-	-	-	3	-	-	2	-	-	-

1: Low 2: Medium 3: High

Balake Kannada			
Course Code	**1BKBK207**	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:

1BKBK207.1	Demonstrate the ability to understand and use basic Kannada words, personal pronouns, possessive forms, and interrogative words for effective day-to-day communication.
1BKBK207.2	Apply grammatical structures, including noun forms, adjectives, numerals, and relative nouns to construct meaningful Kannada sentences.
1BKBK207.3	Use dative cases, accusative cases, and locative forms in Kannada for general communication and workplace interactions.

1BKBK207.4	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.
1BKBK207.5	Construct grammatically correct Kannada sentences in past, present, and future tense while effectively using verb forms.
1BKBK207.6	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**
1BKBK207.1	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK207.2	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK207.3	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK207.4	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK207.5	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKBK207.6	-	-	-	-	-	-	-	-	**2**	-	**2**

1: Low 2: Medium 3: High

Samskrutika Kannada			
Course Code	**1BKSK207**	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:	
1BKSK207.1	ಕನ್ನಡ ಬಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ
1BKSK207.2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಫೂರ್ತಿ ಮಾಡುತ್ತದೆ
1BKSK207.3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಾಗುತ್ತದೆ
1BKSK207.4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾದಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ
1BKSK207.5	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ವಿವಿಧ ಪ್ರಕಾರಗಳು, ವ್ಯಕ್ತಿ ಪರಿಚಯ ಹಾಗೂ ಕಥೆಯ ತಂತ್ರಗಾರಿಕೆಗಳ ಅಧ್ಯಯನದ ಮೂಲಕ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಓದು, ಬರಹ ಮತ್ತು ವಿಶ್ಲೇಷಣಾ ಸಾಮರ್ಥ್ಯವನ್ನು ವಿಕಸನಗೊಳಿಸುವುದು.
1BKSK207.6	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
1BKSK207.1	-	-	-	-	-	-	-	-	**3**	-	**2**
1BKSK207.2	-	-	-	-	-	-	-	-	**3**	-	**2**
1BKSK207.3	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKSK207.4	-	-	-	-	-	-	-	-	**2**	-	**2**
1BKSK207.5	-	-	-	-	-	-	-	-	**3**	-	**2**
1BKSK207.6	-	-	-	-	-	-	-	-	**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:	**1BPFT208L**	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:	
1BPFT208L.1	perform basic manufacturing operations used in the industry
1BPFT208L.2	use the advanced manufacturing processes for prototype building
1BPFT208L.3	develop simple PCB boards using etching and milling process
1BPFT208L.4	use basic electronic components and test its working
1BPFT208L.5	apply design thinking to product development
1BPFT208L.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**
1BPFT208L.1			3								-
1BPFT208L.2	2	3		3	3						-
1BPFT208L.3	2	3									-
1BPFT208L.4	2	3									-
1BPFT208L.5		3	3								-
1BPFT208L.6								3	3	3	-

1: Low 2: Medium 3: High

Industry Oriented Training-Soft Skills			
Course Code	**1BITS209**	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

***

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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