ESTD: 1946

THE NATIONAL INSTITUTE OF ENGINEERING

An Autonomous Institution under Visvesvaraya Technological University, Belagavi), Recognised by AICTE, New Delhi, Grant-in-Aid by Government of Karnataka, Accredited by NAAC, New Delhi

2022 Outcome Based EDUCATION

Curriculum Structure and Syllabus 2023-24

I Year B.E.
Information Science & Engineering

Manandavadi Road, Mysuru-570 008
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E-mail : info@nie.ac.in; Website : https://nie.ac.in/

VISION

"The Department will provide quality and value based education to produce innovative world-class computing engineers and will enhance quality research for the betterment of society"

MISSION

- To impart high quality training, education and competence in information science domain through best-in class faculty and facilities

- To produce globally acceptable information science graduates who can contribute professionally to the industry and research activities by offering courses on emerging technologies.

- To provide platforms to work effectively and innovatively in multi-disciplinary domain.

Programme Educational Objectives

PEO 1: Professionally successful in the field of Information and emerging technologies.
PEO 2: Successful in pursuing higher studies at globally recognized institutions.

Programme Specific Objectives

PSO 1: Apply the knowledge of information Systems in the field of Engineering to provide Solution through programming skills
PSO 2: Collaborate and communicate effectively with professionals in the field of computing, involve in continuous learning and address societal issues

Programme Outcomes

1. **Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
2. **Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
3. **Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
4. **Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
5. **Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
6. **The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
7. **Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
8. **Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
9. **Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
10. **Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
11. **Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one’s own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
12. **Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

TABLE OF SCHEME AND EXAMINATION FOR I SEMESTER (2022 BATCH)

I Semester - Chemistry Cycle										
Sl. No.	Course Code	Course Title	Teaching Department	Theory Lecture	Tutorial	Practical/ Drawing	Examination			Credits
				L	T	P	CIE Marks	SEE Marks	Final Marks	
1	BMATS101	Mathematics-I for CSE Stream	Maths	2	2	2	100	100	100	4
2	BCHES102	Applied Chemistry for CSE Stream	Chemistry	2	2	2	100	100	100	4
3	BCEDK103	Computer-Aided Engineering Drawing	Mechanical.	2	0	2	100	100	100	3
4	BESCK104x	Engineering Science Course-I	Respective Engg. Dept	3	0	0	100	100	100	3
5	BPLCK105x	Programming Language Course-I	Dept. of IS&E.	2	0	2	100	100	100	3
6	BENGK106	Communicative English	Humanities	1	0	0	50	-	50	1
7	BICOK107	Indian Constitution	Humanities	1	0	0	50	-	50	1
8	BSFHK158	Scientific Foundations of Health	Any Dept.	1	0	0	50	-	50	1

II Semester - Physics Cycle										
Sl. No.	Course Code	Course Title	Teaching Department	Theory Lecture	Tutorial	Practical/ Drawing	Examination			Credits
				L	T	P	CIE Marks	SEE Marks	Final Marks	
1	BMATS201	Mathematics-II for CSE Stream	Maths	2	2	2	100	100	100	4
2	BPHYS202	Applied Physics for CSE stream	Physics	2	2	2	100	100	100	4
3	BPOPS203	Principles of Programming Using C	Dept. of IS&E	2	0	2	100	100	100	3
4	BESCK204x	Engineering Science Course-II	Respective Engg. Dept	3	0	0	100	100	100	3
5	BETCK205x	Emerging Technology Course-II	Any Dept.	3	0	0	100	100	100	3
6	BPWSK206	Professional Writing Skills in English	Humanities	1	0	0	50	-	50	1
7	BKSKK207/ BKBKK207	Samskrutika Kannada / Balake Kannada	Humanities	1	0	0	50	-	50	1
8	BIDTK258	Innovation and Design Thinking	Dept. of IS&E.	1	0	0	50	-	50	1
						TOTAL				20

Engineering Science Courses-I / II (ESC)				
Code	**Course Title**	**Teaching Hrs/Week**		
		L	**T**	**P**
BESCK104A/204A	Introduction to Civil Engineering	3	0	0
BESCK104B/204B	Introduction to Electrical Engineering	3	0	0
BESCK104C/204C	Introduction to Electronics Communication	3	0	0
BESCK104D/204D	Introduction to Mechanical Engineering	2	0	2

Programming Language Courses-I (PLC)				
Code	**Course Title**	**Teaching Hrs/Week**		
		L	**T**	**P**
BPLCK105A	Introduction to Web Programming	2	0	2
BPLCK105B	Introduction to Python Programming	2	0	2
BPLCK105C	Basics of JAVA programming	2	0	2
BPLCK105D	Introduction to C++ Programming	2	0	2

Emerging Technology Courses (ETC)				
Code	**Course Title**	**Teaching Hrs/Week**		
		L	**T**	**P**
BETCK105S/205S	Introduction to robotics, electric vehicle system and 3D printing	3	0	0
BETCK105T/205T	Renewable Energy Technology	3	0	0
BETCK105U/205U	Introduction to Smart City	3	0	0
BETCK105J/205J	Introduction to Embedded Systems	3	0	0
BETCK105H/205H	Introduction to Internet of Things	3	0	0
BETCK105I/205I	Introduction to Cyber Security	3	0	0

Course Code: BMATS101 **Course Title: Mathematics-I for CSE Stream**
Credits: 4 **CIE: 50%**
L:T:P: 2:2:2 **SEE: 50%**
SEE Hours: 3 **Total Marks: 100**

Prerequisites if any	
Learning objectives	1. **Familiarize** the importance of calculus associated with one variable and multi variable for computer science and engineering. 2. **Analyze** computer science and engineering problems 3. Applying Ordinary Differential Equations. 4. **Apply** the knowledge of modular arithmetic to computer algorithms. 5. **Develop the** knowledge of Linear Algebra to solve the system of equations.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	**Course Outcomes**	**Bloom's level**
CO1	Apply the knowledge of calculus to compute problems on cartesian and polar curves for multivariate functions	Understand, Apply, Analyze
CO2	Learn the notion of partial differentiation to compute rate of change of multivariate functions.	
CO3	Analyze the solution of linear and non-linear ordinary differential equations.	
CO4	Get acquainted with solving equations by matrix methods	
CO5	Get familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB	

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	3	2										1		To be identified for each branch by Course Instructor	
CO2	3	2										1			
CO3	3	2										1			
CO4	3	2										1			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	Introduction to polar coordinates and curvature relating to Computer Science Engineering. Polar coordinates, Polar curves, angle between the radius vector and tangent, angle between two curves. Pedal equations.	2	1	-
1.2	Curvature and Radius of curvature-Cartesian and pedal form-Problems.	2	1	-
1.3	**Applications:** Translation, Shearing, rotation. Basic computer graphics.	1	1	-
	Module – 2			
2.1	**Introduction to series expansion and partial differentiation in the field of** Computer Science Engineering Applications. Taylor's and Maclaurin's series expansion for one variable (Statement only) –problems. Indeterminate forms-L' Hospital's rule- problems.	2	1	-
2.2	Partial differentiation, total derivative-differentiation of composite functions. Jacobian and Problems. Maxima and minima for a function of two variables. Problems.	2	1	-
2.3	**Applications:** Series expansion in computer programming, Lagrange's method for extreme values.	1	1	-
	Module – 3			
3.1	**Introduction to first order ordinary differential equations pertaining to the applications for the** Computer Science Engineering. Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations. Applications of ODE's - Orthogonal trajectories.	2	1	-
3.2	**Nonlinear differential equations:** Introduction to general and singular solutions, Solvable for ponly, Clairaut's equations.-**Problems.**	2	1	-
3.3	**Applications: Newton's law of cooling.**	1	1	-
	Module – 4			
4.1	**Introduction of modular arithmetic and its applications in Computer Science and Engineering.** Introduction to Congruences, Linear Congruences, The Chinese Remainder theorem.	2	1	-
4.2	Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences,	1		-
4.3	Euler's Theorem, Wilson Theorem and Fermat's little theorem.	1	1	-
4.4	Applications of Congruences-RSA algorithm.	1	1	-
	Module – 5			
5.1	**Introduction of liner algebra related to computer science & engineering.** Elementary row transformation of a matrix, Rank of a matrix. Consistency	1	1	-
5.2	Solution of system of linear equations - Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method.	1		-
5.3	**Vector spaces:** Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension. Problems.	1	1	-
5.4	**Applications:** Boolean matrix, Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.	1	1	-

List of Experiments:				
1	2 Dimensional plots for Cartesian and polar curves	-	-	1
2	Finding angle between polar curves, curvature and radius of curvature of a given curve	-	-	1
3	Finding partial derivatives, Jacobian and plotting the graph	-	-	1
4	Applications to Maxima and Minima of two variables	-	-	1
5	Solution of first order differential equation and plotting the graphs	-	-	1
6	Finding GCD using Euclid's Algorithm	-	-	1
7	Applications of Wilson theorem	-	-	1
8	Numerical solution of system of linear equations, test for consistency and graphical representation	-	-	1
9	Solution of system of linear equations using Gauss-Seidel iteration	-	-	1
10	Computation of basis, dimension for a vector space.	-	-	1
Total No. of Lecture Hours		24	-	-
	Total No. of Tutorial Hours		**15**	**-**
	Total No. of Practical Hours			**10**

Self-learning topics identified:
1. Centre and circle of curvature
2. Euler's theorem and problems
3. Solvable for x and y.
4. Divisibility, GCD, Properties of Prime Numbers, Fundamental theorem of Arithmetic.
5. Solution of a system of equations by Gauss-Jacobi iterative method.

Textbooks:

1. **B.S.Grewal**:"HigherEngineeringMathematics",Khannapublishers,44thEd.,2021.
2. **E.Kreyszig**:"AdvancedEngineeringMathematics",JohnWiley&Sons,10th Ed.,2018.

Reference Books:

1. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **Tom Apostol**"Calculus: One variable calculus with an introduction to Linear Algebra", Vol. 1, Wiley publications, 2nd edition.
4. **Tom Apostol**"Calculus: Multi-Variable Calculus and Linear Algebra with applications to differential equations and Probability, Vol.2, , Wiley publications, 2nd edition.
5. **William Stallings:** "Cryptography and Network Security" Pearson Prentice Hall, 6th Ed., 2013.

Online Resources:
1. https://www.youtube.com/watch?v=ixDGaEqWuA0
2. https://www.youtube.com/results?search_query=nptel+linear+algebra

Code: BCHES102 **Course: Applied Chemistry for CSE Stream**
Credits: 4 **L:T:P 2:2:2**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	
Learning objectives	1. To enable students to acquire knowledge on principles of chemistry for engineering applications. 2. To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand the principles and applications of energy storage devices, sensors, memory devices and display systems.	Understand
CO2	Comprehend the mechanism of corrosion, its control and concepts of electrode and its application.	Apply
CO3	Know the importance and applications of bio polymers, green fuels, and e- waste management.	Analyze
CO4	Perform accurate quantitative measurements and equipment handling to analyse the data and interpret the results to arrive at a conclusion.	Analyze

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	-	-	-	2	-	-	-	-	2		To be identified for each branch by Course Instructor			
CO2	3	2	-	-	-	-	2	-	-	-	-	2					
CO3	3	2	-	-	-	-	2	-	-	-	-	2					
CO4	3	2	-	-	-	-	2	-	-	-	-	2					

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

	Chemistry for Computer Science & Engineering stream	No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1 Energy Systems and Sensors (8hr)				
1.1	**Energy Systems:**Introduction to batteries, classifications, Construction, working and applications of Zn – Air, Lithium ion, and Sodium ion batteries.	2	-	-
1.2	Principle, Properties and Applications of Quantum dots sensitized solar cells (QDSSC's).	-	2	-
1.3	**Sensors**: Introduction, principle, characteristics and applications of Electrochemical sensors and its types, Thermometric sensors,	2	-	-
1.4	Conductometric sensors, Optical sensors. Electrochemical gas sensors for SOx, NOx, heavy metal detection, Pesticide, Optical sensors for the measurement of DO	-	2	-
1.5	**Disposable sensors (DS)**: Introduction, principle, characteristics of disposable sensors, advantages of DS over Classical sensors, biosensors for glucose detection.	2	-	-
Module – 2 Materials for Memory and Display Systems (8hr)				
2.1	**Memory Devices:** Introduction, Basic concepts of electronic memory, History of Organic / polymer electronic memory devices, Classification of electronic memory devices,	2	1	-
2.2	types of organic memory devices (Organic molecules (p and n-type), polymeric materials, organic inorganic hybrid materials).	1	-	-
2.3	**Display Systems**: Photoactive and electroactive materials, Nanomaterials And organic materials [Light absorbing and emitting materials] used in optoelectronic devices. Liquid crystals (LC's) –Introduction, classification, properties and application in Liquid Crystal Displays (LCD's).	-	2	-
2.4	Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's), Light emitting electrochemical cells.	1	-	-
Module – 3 Corrosion and Electrode System (8hr)				
3.1	**Corrosion Chemistry:** Introduction, electrochemical theory of corrosion, types of Corrosion - differential metal and differential aeration (Pitting Corrosion)	1	-	-
3.2	Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR)– Introduction and numerical problem.	1	-	-
3.3	**Electrode System**: Introduction, types of electrodes. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode.	1	2	-
3.4	Reference electrode – Calomel electrode – construction, working and applications of calomel electrode.	1	-	-
3.5	**Analytical Techniques**: Introduction, principle and instrumentation of Conductometry; its application in the estimation of weak acid. Potentiometry; its application in the estimation of iron.	1	1	-
Module – 4 Biopolymers and Green Fuels (8hr)				

4.1	**Biopolymers:** Introduction, general characteristics, classification of biodegradable polymers, Biobased plastics, advantages of biopolymers. properties, industrial and biomedical applications of PLA,	2	-	-
4.2	Molecular weight - Number average, weight average and numerical problems.	1	-	-
4.3	**Green Fuels:** Introduction, construction and working of solar photovoltaic cell, advantages, and disadvantages. Green hydrogen: Introduction to properties of hydrogen pertaining to fuel.	1	2	-
4.4	Introduction to electrolysis of water. Generation of hydrogen by electrolysis of water: Alkaline water electrolysis and Proton Exchange Membrane Electrolysis	2	-	-
Module – 5 E-Waste Management (8hr)				
5.1	**E-Waste:** Introduction, sources of e-waste, Composition, Characteristics, and need of e waste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste.	2	-	-
5.2	Recycling and Recovery: Different approaches of recycling (separation, thermal treatments, hydrometallurgical extraction, pyrometallurgical methods, direct recycling).	2	1	-
5.3	Extraction of gold from E-waste. Role of stake holders in environmental management of e-waste (producers, consumers, recyclers, and statutory bodies). Impact of heavy metals on environment and human health.	1	1	-
List of Experiments:				
1	D1. Chemical Structure drawing using software: ChemDraw or ACD/ ChemSketch.	-	-	2
2	D2. Determination of strength of an acid in Pb-acid battery	-	-	2
3	D3: Synthesis of Iron-oxide Nanoparticles	-	-	2
4	D4.Electrolysis of water	-	-	2
5	E1. Conductometric estimation of acid mixture	-	-	2
6	E2. Potentiometric estimation of FAS using $K_2Cr_2O_7$	-	-	2
7	E3. Determination of pKa of vinegar using pH sensor (Glass electrode)	-	-	2
8	E4. Estimation of total hardness of water by EDTA method	-	-	2
9	S1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)	-	-	2
10	S2. Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)	-	-	2
11	S3. Estimation of iron in TMT bar by diphenyl amine/external indicator method	-	-	2
12	S4. Determination of Chemical Oxygen Demand (COD) of industrial waste water sample	-	-	2
13	O1: Evaluation of acid content in beverages by using pH sensors and simulation.	-	-	2
14	O2. Construction of photovoltaic cell.	-	-	2
15	O3. Design an experiment to Identify the presence of proteins in given sample.	-	-	2
16	O4. Searching suitable PDB file and target for molecular docking	-	-	2
	Total No. of Lecture Hours	**26**		
	Total No. of Tutorial Hours		**14**	**-**
	Total No. of Practical Hours			**10 / 16**

Self-learning topics identified: (Maximum of 5 topics)

1. Biosensors for glucose detection
2. Classification of electronic memory devices,
3. Determination of pH using glass electrode
4. Electrolysis of water by Alkaline water electrolysis
5. Impact of heavy metals on environment and human health

Textbooks:

1. A Text book of Engineering Chemistry, SS Dara &Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011
2. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International Publishing house. 2nd Edition, 2016.

Reference Books:

1. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley & Sons, 2010
2. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
3. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
4. OLED Display Fundamentals and Applications, TakatoshiTsujimura, Wiley–Blackwell, 2012

Online Resources:

1. https://nptel.ac.in/downloads/122101001/
2. https://nptel.ac.in/courses/104/103/104103019/
3. https://ndl.iitkgp.ac.in/
4. https://www.youtube.com/watch?v=faESCxAWR9k

Code: BCEDK103 **Course: Computer-Aided Engineering Drawing**
Credits: 3 **L:T:P 2:0:2**
SEE: 50% **CIE: 50%**
SEE Hours: 3 **Max. Marks:100**

Prerequisites if any	
Learning objectives	1. Provide a fundamental understanding of Engineering Drawings and their creation using instruments. 2. Familiarization of a typical drafting software and its applications.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Use drawing instrument and software to construct basic geometric sketches, illustrate the concepts of Orthographic Projections of Points & Lines.	Apply
CO2	Develop the projections of regular plane surfaces and solids	Apply
CO3	Understand the development of surfaces and isometric projections	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	3	3	1	-	3	1	-	-	-	1	-	1		3	-
CO2	3	3	1	-	3	1	-	-	-	1	-	1		3	-
CO3	3	3	1	-	3	1	-	-	-	1	-	1		3	-

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	Introduction to Computer Aided Sketching: Drawing Instruments and their uses, BIS conventions, Dimensioning, Drawing Scales and free hand practicing. (All sketching to be done on A4 Grid Sheets, Mini Drafter not required)	2		
1.2	Introduction to Computer Aided Drafting Software i.e. Solid Edge standard tool bar/menus. Co-ordinate system, selection of drawing sheet size and scale. Commands and creation of Points, Lines, axis, poly-lines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, off-set, mirror, rotate, trim, extend, break, chamfer, fillet, curves, constraints viz. tangency, parallelism, inclination and perpendicularity. Dimensioning conventions.	2		1
1.3	Orthographic Projections of Points and Lines: Introduction to Orthographic Projections, Projections of points in all four quadrants, Orthographic projection of lines (Placed in first quadrant only). *Application on projection of Lines (For CIE only).*	5		3
	Module – 2			
2.1	Orthographic Projections of Plane Surfaces: Orthographic projection of planes viz. regular polygons like triangle, square, rectangle, pentagon, hexagon, & circular laminae.	3		3
	Module – 3			
3.1	Orthographic Projections of Solids: Orthographic Projections of right regular solids like prisms, pyramids, cylinders, cones, Cubes and tetrahedron *(Solids resting on HP only).*	6		4
	Module – 4			
4.1	Development of Lateral Surfaces of solids: Development of lateral surfaces of right, regular prisms, cylinders, cones & pyramids resting with base on HP only. Representation of section planes & section points, Development of lateral surface of their frustum, truncations. *Application problems related to development of lateral surfaces like funnels and trays (For CIE only).*	3		2
	Module – 5			
5.1	Isometric Projection: Isometric scale, Isometric projection of plane figures, solids: tetrahedron, hexahedron (cube), right regular prisms, pyramids, cylinders, cones, spheres, Isometric projection of combination of two simple solids.	3		2
5.2	Demonstration of drawing views in 3D environment.	1		
5.3	Demonstration of a typical Civil Building, Mechanical Production, Electrical and Electronic Wiring and Electronic engineering Drawings.	1		
Total No. of Lecture Hours		**25**		
	Total No. of Tutorial Hours			
	Total No. of Practical Hours			**15**

Self-learning topics identified: (Maximum of 5 topics)

1. First angle and third angle projection.
2. Different software used for drawing.
3. Use of drawings in different fields.
4. Study of a blueprint for house construction.
5. Solids resting on VP.

Textbooks:

1. Engineering Drawing by N.D. Bhatt & V.M. Panchal, 53rd edition, 2019-Charotar Publishing House, Gujarat.
2. Engineering Graphics by K.R. Gopalakrishna, 32nd edition, 2010- Subash Publishers Bangalore.

Reference Books:

1. Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production- by Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice Hall of India Pvt. Ltd., New Delhi.

Online Resources:

1. Mechanical Engineering Department's YouTube channel: https://youtube.com/channel/UCXOY3X4xcbTFIczaNVhESQw
2. Projections of Points: https://youtube.com/playlist?list=PLSYYrV4OuACSlPD3LHQBT5huxrb3o8HM1
3. Projections of Lines: https://youtube.com/playlist?list=PLSYYrV4OuACSmvN5qnKdvM3yzldjp5238
4. Projections of Planes: https://youtube.com/playlist?list=PLSYYrV4OuACTL9RO6NjXdrw3EktYjpfZX
5. Projections of Solids: https://youtube.com/playlist?list=PLSYYrV4OuACSAbmbyoKV33NxB9gCDPsao
6. Development of Surfaces: https://youtube.com/playlist?list=PLSYYrV4OuACTb68S2CT0ncIQl353poXo8
7. Isometric projections: https://youtube.com/playlist?list=PLSYYrV4OuACTGMtF0X3QGT-av0V02jnTr

Engineering Science Courses (ESC)

Code: BESCK104B/204B **Course: Introduction to Electrical Engineering**
Credits: 3 **L:T:P:- 3:0:0**
SEE: 50 Marks **CIE: 50 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	None
Learning objectives	1. Discuss the fundamentals of different components of power system along with safety aspects. 2. Use fundamental laws to solve electrical circuit parameters in DC and AC circuit and demonstrate the construction, operation and characteristics of DC and AC machines.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand the fundamentals of different components of power system along with safety aspects.	Understand
CO2	Analyse AC and DC circuits.	Analyse
CO3	Describe the construction, operation and characteristics of DC and AC machines.	Understand

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	-	-	2		To be identified for each branch by Course Instructor		
CO2	3	3	-	-	-	-	-	-	-	-	-	-				
CO3	3		-	-	-	-	-	-	-	-	-	-				

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1: Introduction to Electrical Engineering				
1.1	Concept of AC and DC	1	0	0
1.2	Generation of power from conventional energy sources	1	0	0
1.3	Generation of power from non-conventional	1	0	0
1.4	Single Line Diagram of Power System	1	0	0
1.5	Concept of power and energy	1	0	0
1.6	Tariff structure for electrical energy consumption	1	0	0
Module – 2: Electric Circuits				
2.1	Faraday's laws. Static and dynamically induced EMF	2	0	0
2.2	Fundamentals of AC and DC waveforms, representation of AC and DC quantities	1	0	0
2.3	Average and RMS values of Sinusoidal wave, Definition of form factor, and peak factor	1	0	0
2.4	Electric circuit analysis using Ohms law and Kirchhoff's laws	2	0	0
2.5	Current and Voltage division rule	1	0	0
2.6	Analysis of single-phase AC circuits with R, L, C, RL, RC and RLC series and parallel configuration, Power factor.	3	0	0
2.7	Numerical on AC circuit	2	0	0
Module – 3: DC Machines and Transformers				
3.1	Construction and working principle of DC Machine	1	0	0
3.2	DC Generator EMF equation. Back emf in DC motor	2	0	0
3.3	Classification of DC motor, DC Motor Characteristics and applications	1	0	0
3.4	Numerical	1	0	0
3.5	Construction and working principle of single-phase transformer.	1	0	0
3.6	EMF equation and losses in transformer	1	0	0
3.7	Numerical	1	0	0
Module – 4: Three-phase Induction Machines and Synchronous Machines				
4.1	Advantages of three phase circuits	1	0	0
4.2	Relation between line and phase quantities in STAR and DELTA connected systems (No derivation), Numerical	1	0	0
4.3	Construction and working principle of Synchronous Generator, EMF equation.	1	0	0
4.4	Numerical	1	0	0
4.5	Construction and working principle of three phase Induction Motor	1	0	0
4.6	Slip, slip speed and frequency of rotor EMF	1	0	0
4.7	Numerical	1	0	0
Module – 5: Special Machines, Electrical wiring and safety				
5.1	Construction and working principle of BLDC Motor and Stepper Motor and their applications.	2	0	0
5.2	Introduction to domestic wiring, Fuse, MCB, and Relay.	2	0	0
5.3	Necessity of earthing, difference between earthing and grounding and types of grounding	1	0	0
5.4	Electric shocks, hazards and safety precautions,	1	0	0
5.5	Standards of wiring as per BIS	1	0	0
	Total No. of Lecture Hours	**40**		
	Total No. of Tutorial Hours		**00**	
	Total No. of Practical Hours			**00**

Self-learning topics identified:

1. Need for conservation of energy
2. Methods for improving power factor
3. Necessity of starter in motors
4. Application of three phase induction motor
5. Earth leakage circuit breakers

Textbooks:

1. D. C. Kulshreshtha, ***"Basic Electrical Engineering",***McGraw Hill, Revised 1st Edition, 2013.
2. D. P. Kothari and I. J. Nagrath, ***"Electrical Engineering",***Tata McGraw Hill, 4th Edition, 2019.

Reference Books:

1. Vincent Del Toro, ***"Electrical Engineering Fundamentals",*** Prentice Hall Publications, 2nd Edition, 2015.
2. H Cotton, ***"Electrical Technology",*** CBS Publishers & Distributors, 2004.

Online Resources:

1. Structure of Electric Power Systems: https://electrical-engineering-portal.com/electric-power-systems
2. Kirchoff's Laws: https://nptel.ac.in/courses/108/108/108108076/
3. Analysis of single-phase AC circuits: http://elearning.vtu.ac.in/econtent/courses/video/BS/ELE1525.html
4. Working of DC machine: http://elearning.vtu.ac.in/econtent/courses/video/BS/15ELE25.html
5. Construction and working principle of transformer: https://nptel.ac.in/courses/108/108/108108076/
6. Three phase star and delta connected systems: http://elearning.vtu.ac.in/econtent/courses/video/BS/ELE1525.html

Code: BESCK104C/204C **Course: Introduction to Electronics Communication**
Credits: 3 **L:T:P 3:0:0**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	NIL
Learning objectives	Learn how to develop and employ electronic circuit models for elementary electronic components.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Acquire knowledge on fundamental blocks of analog electronic systems	Understand
CO2	Develop logic circuits of digital electronic systems using the basics of Boolean Algebra	Apply
CO3	Understand the basic concepts of embedded systems & electronic communication systems.	Understand

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	3	3	2	1								1		To be identified by course instructor	
CO2	3	3	2	1								1			
CO3	3	3	2	1								1			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	**Diodes:** PN junction diodes, Zener Diodes	2	-	-
1.2	**PowerSupplies**–Blockdiagram,Half-waverectifier,Full-waverectifiersandfilters,Voltage regulators.	3	-	-
1.3	**Bipolar Junction Transistors**– BJT as an amplifier,BJTasaswitch	3	-	-
	Module – 2			
2.1	**Operational amplifiers** - Ideal op-amp; characteristics of ideal and practical op-amp; Practical op-ampcircuits:Invertingandnon-invertingamplifiers,	3	-	-
2.2	voltagefollower,summer,subtractor, integrator,differentiator.	2	-	-
2.3	**Oscillators**– Introduction to Oscillators, Crystal controlledoscillators	3	-	-
	Module – 3			
3.1	**BooleanAlgebraandLogicCircuits:**Introduction to number systems, Basicdefinitions,AxiomaticDefinitionofBooleanAlgebra,BasicTheoremsand	2	-	-
3.2	PropertiesofBooleanAlgebra,BooleanFunctions,CanonicalandStandardForms,Other Logic Operations	4	-	-
3.3	Digital Logic Gates, Adders-Halfadder,Fulladder, Multiplexer, demultiplexer, encoder, decoder, Flip-flop's, counters.	2	-	-
	Module – 4			
4.1	**EmbeddedSystems** –Definition,Embeddedsystemsvsgeneral computingsystems,Classificationof Embedded Systems, Major application areas of Embedded Systems, Elements of an EmbeddedSystem,	4	-	-
4.2	CoreoftheEmbeddedSystem,MicroprocessorvsMicrocontroller,RISCvsCISC.	4	-	-
	Module – 5			
5.1	**Introduction to communication systems:** Communication systems and types of modulation s Introduction satellite, mobile and wireless communication,	4	-	-
5.2	Introduction to standards of mobile and wireless communication systems. Working principle of Bluetooth and WI-FI.	4	-	-
	Total No. of Lecture Hours	40	-	-
	Total No. of Tutorial Hours		**0**	**-**
	Total No. of Practical Hours			**-**

Textbooks:

1. ElectronicDevicesandCircuits,DavidABell,5th Edition,Oxford,2016
2. DigitalLogicandComputerDesign,M.MorrisMano,PHILearning,2008ISBN-978-81-203-0417-8

Code: BESCK104D/204D **Course: Introduction to Mechanical Engineering**
Credits: 3 **L:T:P 2:0:2**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks:100**

Prerequisites if any	
Learning objectives	1.To develop basic knowledge on mechanical engineering fundamentals 2.To acquire the knowledge of machine tools, manufacturing processes, hybrid vehicles, mechatronics, and automation

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Explain the role of mechanical engineering in society, energy sources, and machine tool operations.	Understand
CO2	Describe the basic concepts of IC engines, future mobility, engineering materials, and joining processes.	Understand
CO3	Explain the Concepts of Mechatronics, Robotics, and Automation in IoT	Understand

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	3	-	-	-	-	1	2	-	-	1	-	1		To be identified for each branch by Course Instructor	
CO2	3	-	-	-	-	1	1	-	-	1	-	1			
CO3	3	-	-	-	-	1	1	-	-	1	-	1			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	**Introduction**: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.	04	-	-
1.2	**Energy**: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion	04	-	-
	Module – 2			
2.1	**Machine Tool Operations**: Working Principle of lathe, Lathe operations: Turning, facing, knurling.	02	-	-
2.2	Working principles of Drilling Machine, drilling operations: drilling, boring, reaming.	02	-	-
2.3	Working of Milling Machine, Milling operations: plane milling and slot milling.	02	-	-
2.4	**Introduction to Advanced Manufacturing Systems**: Introduction, components of CNC, advantages and applications of CNC.	02	-	-
	Module – 3			
3.1	**Introduction to IC Engines**: Components and Working Principles, 4-Strokes Petrol and Diesel Engines, Application of IC Engines.	04	-	-
3.2	**Insight into Future Mobility:** Hybrid Vehicles, Components of Hybrid Vehicles. Advantages and disadvantages of Hybrid vehicles.	04	-	-
	Module – 4			
4.1	**Engineering Materials**: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer, Shape Memory Alloys.	04	-	-
4.2	**Joining Processes:** Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.	04	-	-
	Module – 5			
5.1	**Introduction to Mechatronics and Robotics**: open-loop and closed-loop mechatronic systems.	02	-	-
5.2	Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages.	03	-	-
5.3	Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages.	01	-	-
5.4	**Introduction to IOT**: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.	02	-	-
	Total No. of Lecture Hours	**40**		
	Total No. of Tutorial Hours		**0**	**-**
	Total No. of Practical Hours			**0**

Self-learning topics identified:

1. Origin of IC engines
2. Identification of materials of objects for engineering domain
3. Use of Robots in advanced countries
4. IOT and mechanical engineering

Textbooks:

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012

Reference Books:

1. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.

2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.

3. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017

4. Robotics, AppuKuttan KK K. International Pvt Ltd, volume 1

5. Dr SRN Reddy, RachitThukral and Manasi Mishra, " Introduction to Internet of Things: A Practical Approach", ETI Labs

6. Raj kamal, " Internet of Things: Architecture and Design", McGraw hill.

Programming Language Courses (PLC)

Code: BPLCK105A **Course: Introduction to Web Programming**
Credits: 3 **L:T:P - 2:0:2**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	NIL
Learning objectives	• To gain the knowledge of creating web pages in HTML and XHTML using different tags and style sheets. • To get familiarity with JavaScript language and understand the Document Object Model.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Discuss the differences between HTML and XHTML	Understand
CO2	Use semantic markup tags to develop HTML5 documents	Apply
CO3	Analyze attributes, values, and types of CSS to create web pages	Analyze
CO4	Use core constructs and event handling mechanisms of JavaScript to develop web pages.	Apply

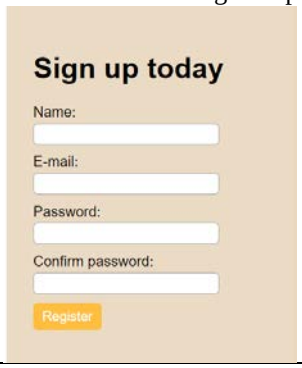
Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	1	-	-	-	3	-	-	-	-	-	-	-		To be identified for each branch by Course Instructor	
CO2	2	-	-	-	3	-	-	-	-	2	-	2			
CO3	1	1	1	-	3	-	1	-	-	-	-	-			
CO4	3	-	1	-	3	-	-	-	-	-	-	2			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	Traditional HTML and XHTML: First Look at HTML and XHTML, Hello HTML and XHTML World, HTML and XHTML: Version History	1	-	-
1.2	HTML and XHTML DTDs: The Specifications Up Close, (X)HTML Document Structure, Browsers and (X)HTML	2	-	-
1.3	The Rules of (X)HTML, Major Themes of (X)HTML, The Future of Markup—Two Paths	2	-	-
	Module – 2			
2.1	HTML5: Hello HTML5, Loose Syntax Returns, XHTML5, HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined	2	-	-
2.2	HTML5 Document Structure Changes, Adding Semantics, HTML5's Open Media Effort, Client-Side Graphics with <canvas>	2	-	-
2.3	HTML5 Form Changes, Emerging Elements and Attributes to Support Web Applications	1	-	-
	Module – 3			
3.1	Cascading Style Sheets (CSS)Introduction, CSS Overview, CSS Rules, Example with Type Selectors and the Universal Selector	1	-	1
3.2	CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Opacity Values for Color, HSL and HSLA Values for Color	2	-	1
3.3	Font Properties, line-height Property, Text Properties, Border Properties, Element Box, padding Property, margin Property, Case Study: Description of a Small City's Core Area	2	-	1
	Module – 4			
4.1	Tables and CSS, Links and Images Table Elements, Formatting a Data Table: Borders, Alignment, and Padding	1	-	1
4.2	CSS Structural Pseudo-Class Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values	2	-	-
4.3	a Element, Relative URLs, Navigation Within a Web Page	1	-	-
4.4	Bitmap Image Formats: GIF, JPEG, PNG, img Element, Responsive Images, Positioning Images, Shortcut Icon, iframe Element	1	-	-
	Module – 5			
5.1	Introduction to JavaScript: Functions, DOM, Forms, and Event Handlers, History of JavaScript, Hello World Web	1	-	-
5.2	Page, Buttons, Functions, Variables, Identifiers, Assignment Statements and Objects	2	-	-
5.3	Document Object Model, Forms and How They're Processed: Client-Side Versus Server-Side	1	-	-
5.4	Form Element, Controls, Text Control, Accessing a Form's Control Values	1	-	1
	List of Experiments:			
1	Create an XHTML page using tags to accomplish the following: a. A paragraph containing the text "All that glitters is not gold". Bold face and italicize this text b. Create equation: $x = 1/3(y_1^2 + z_1^2)$ c. Put a background image to a page and demonstrate all attributes of background image d. Create unordered list of 5 fruits and ordered list of 3 flowers	-	-	1
2	Create the following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary.	-	-	1

	<table><tr><td rowspan="9">Department</td><td rowspan="3">Sem1</td><td>SubjectA</td></tr><tr><td>SubjectB</td></tr><tr><td>SubjectC</td></tr><tr><td rowspan="3">Sem2</td><td>SubjectE</td></tr><tr><td>SubjectF</td></tr><tr><td>SubjectG</td></tr><tr><td rowspan="3">Sem3</td><td>SubjectH</td></tr><tr><td>SubjectI</td></tr><tr><td>SubjectJ</td></tr></table>			
3	Use HTML5 for performing following tasks: a. Draw a square using HTML5 SVG, fill the square with green color and make 6px brownstroke width b. Write the following mathematical expression by using HTML5 MathML.d=x^2-y^2 c. Redirecting current page to another page after 5 seconds using HTML5 meta tag.	-	-	1
4	Demonstrate the following HTML5 Semantic tags- <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <section> for a webpage that gives information about travel experience.	-	-	1
5	Create a class called **income** and make it a background color of #0ff. Create a class called **expenses** and make it a background color of #0ff. Create a class called **profit** and make it a background color of #0ff. Throughout the document, any text that mentions income, expenses, or profit, attach the appropriate class to that piece of text. Further create following line of text in the same document: ~~The current price is 50₹~~and new price is 40₹	-	-	1
6	Change the tag li to have the following properties: • A display status of inline • A medium, double-lined, black border • No list style type Add the following properties to the style for li: • Margin of 5px • Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left. Also demonstrate list style type with user defined image logos.	-	-	1
7	Create the following web page using HTML and CSS with tabular layout. 	-	-	1
8	Create the following calculator interface with HTML and CSS.	-	-	1

				
9	Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay.	-	-	1
10	Create a webpage containing 3 overlapping images using HTML, CSS, and JS. Further when the mouse is over any image, it should be on the top and fully displayed.	-	-	1
	Total No. of Lecture Hours	**25**	-	-
	Total No. of Tutorial Hours		**-**	**-**
	Total No. of Practical Hours			**15**

Self-learning topics identified:

1. CSS for Links
2. JavaScript: Form reset and focus Methods

Textbooks:

1. HTML & CSS: The Complete Reference Thomas A. Powell, 5th Edition, Tata McGraw Hill.
2. Web Programming with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, 1st Edition

Reference Books:

1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill, 2017.
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India.

Online Resources:

1. https://onlinecourses.swayam2.ac.in/aic20sp11/preview

Code: BPLCK105B **Course: Introduction to Python Programming**
Credits: 3 **L:T:P - 2:0:2**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	NIL
Learning objectives	To gain insights on Python language syntax & semantics and use lists, tuples, built-in functions & object-oriented programming concepts to solve problems.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Demonstrate proficiency in handling loops and creation of functions.	Apply
CO2	Use methods to create and manipulate lists, tuples, and dictionaries.	Apply
CO3	Develop programs for string processing and file organization	Analyze
CO4	Illustrate the concepts of Object-Oriented Programming as used in Python.	Analyze

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	2	-	-	-	2	-	-	-	-	-	-	-		To be identified for each branch by Course Instructor	
CO2	3	3	3	-	3	-	-	-	-	-	-	2			
CO3	3	3	3	-	3	-	-	-	-	-	-	-			
CO4	2	-	-	-	2	1	-	1	-	-	-	2			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1				
1.1	Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program	2	-	-
1.2	Flow control: Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules	2	-	-
1.3	Functions: def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number	2	-	-
Module – 2				
2.1	Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References	2	-	1
2.2	Dictionaries and Structuring Data: The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things	2	-	1
Module – 3				
3.1	Manipulating Strings: Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup	2	-	1
3.2	Reading and Writing Files: Files and File Paths, The os.path Module, The File Reading/ Writing Process, Saving Variables with the shelve Module, Saving Variables with the print.format()Function, Project: Generating Random Quiz Files, Project: Multiclipboard	3	-	1
Module – 4				
4.1	Organizing Files: The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module, Project: Renaming Files with American-Style Dates to European-StyleDates, Project: Backing Up a Folder into a ZIP File	3	-	1
4.2	Debugging: Raising Exceptions, Getting the Traceback as a String, Assertions, Logging	2	-	-
Module – 5				
5.1	Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying	2	-	-
5.2	Classes and functions: Time, Pure functions, Modifiers, Prototyping versus planning	1	-	-
5.3	Classes and methods: Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation	2	-	-
List of Experiments:				
1	a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks, and percentage with suitable messages. b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.	-	-	1
2	a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console. b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).	-	-	1
3	Read N numbers from the console and create a list. Develop a program to print mean, variance, and standard deviation with suitable messages.	-	-	1
4	Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.	-	-	1
5	Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]	-	-	1

6	Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].	-	-	1
7	Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.	-	-	1
8	Write a function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an exception for when b=0. Develop a suitable program which reads two values from the console and calls a function DivExp.	-	-	1
9	Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the addition of N complex numbers.	-	-	1
10	Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use __init__() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.]	-	-	1
	Total No. of Lecture Hours	**25**	**-**	**-**
	Total No. of Tutorial Hours		**00**	**-**
	Total No. of Practical Hours			**15**

Self-learning topics identified:

1. Ending a Program Early with sys.exit()
2. IDLE's Debugger

Textbooks:

1. Al Sweigart, "Automate the Boring Stuff with Python",1st Edition, No Starch Press, 2015. For lambda functions use this link: https://www.learnbyexample.org/python-lambda-function/
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015.

Online Resources:

1. https://www.learnpython.org/
2. https://nptel.ac.in/courses/106106145

Code: BPLCK105C **Course: Basics of JAVA programming**
Credits: 3 **L:T:P - 2:0:2**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	NIL
Learning objectives	To learn the features of java and write java programs to solve problems using object-oriented concepts and by importing packages.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Explain the features and object-oriented concepts in JAVA programming	Understand
CO2	Analyze working of bitwise operators in JAVA	Analyze
CO3	Illustrate simple programs based on polymorphism and inheritance	Analyze
CO4	Use concepts of importing packages and exception handling mechanism	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	2	2	2	-	1	-	-	-	-	-	-	-		To be identified for each branch by Course Instructor	
CO2	2	3	1	-	1	-	-	-	-	-	-	-			
CO3	3	3	1	-	1	-	-	-	-	-	-	2			
CO4	3	3	3	-	3	-	-	1	-	-	-	3			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1				
1.1	An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, TwoControl Statements, Using Blocks of Code, Lexical Issues	1	-	-
1.2	The Java Class Libraries, Data Types, Variables, andArrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters,Booleans	2	-	-
1.3	A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings	2	-	-
Module – 2				
2.1	Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, TheAssignment Operator, The ? Operator, Operator Precedence, Using Parentheses	2	-	-
2.2	Control Statements: Java's Selection Statements, Iteration Statements	3	-	1
Module – 3				
3.1	Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables,Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, AStack Class	3	-	1
3.2	A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final	2	-	-
Module – 4				
4.1	Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called	3	-	1
4.2	Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class	2	-	1
Module – 5				
5.1	Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces	2	-	-
5.2	Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally	2	-	1
5.3	Java's Built-in Exceptions, Creating Your Own ExceptionSubclasses, Chained Exceptions, Using Exceptions	1	-	-
List of Experiments:				
1	Write a JAVA program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read in a, b, c and use the quadratic formula.	-	-	1
2	Write a JAVA program for multiplication of two arrays.	-	-	1
3	Demonstrate the following operations and sign extension with Java programs a. << b. >> c. >>>	-	-	1
4	Write a JAVA program to sort list of elements in ascending and descending order	-	-	1
5	Create a JAVA class called Student with the following details as variables within it. USN NAME BRANCH PHONE PERCENTAGE	-	-	1
6	Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings.	-	-	1

7	Design a super class called Staff with details such as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a JAVA program to read and display at least 3 staff objects of all three categories	-	-	1
8	Demonstrate dynamic dispatch using abstract class in JAVA.	-	-	1
9	Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C. In package P2, create class D inherited from class A in package P1 and class E. Demonstrate the working of access modifiers (private, public, protected, default) in all these classes using JAVA.	-	-	1
10	Write a JAVA program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate the working of ArrayIndexOutOfBoundException.	-	-	1
	Total No. of Lecture Hours	**25**	-	-
	Total No. of Tutorial Hours		**-**	**-**
	Total No. of Practical Hours			**15**

Self-learning topics identified:

1. Jump Statements
2. Arrays Revisited

Textbooks:

1. Herbert Schildt, Java The Complete Reference, 7thEdition, Tata McGraw Hill, 2007.

Online Resources:

1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

Code: BPLCK105D **Course: Introduction to C++ Programming**
Credits: 3 **L:T:P - 2:0:2**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks:100**

Prerequisites if any	NIL
Learning objectives	To learn and apply object-oriented programming concepts such as class, objects, abstraction, encapsulation, inheritance, and polymorphism

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand and design the solution to a problem using object-oriented programming concepts.	Understand
CO2	Reuse the code with extensible Class types, User-defined operators and function Overloading.	Apply
CO3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism	Analyze
CO4	Implement the features of C++ including templates, exceptions, and file handling for providing programmed solutions to complex problems.	Analyze

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	-	2	-	2	-	-	-	-	-	-	3	To be identified for each branch by Course Instructor	
CO2	2	2	3	-	3	-	-	2	-	-	-	-		
CO3	3	3	3	-	3	-	-	2	-	-	-	2		
CO4	3	2	3	-	3	-	-	-	-	-	-	-		

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	Introduction to Object Oriented Programming: Computer programming background- C++ overview. First C++ Program -Basic C++ syntax	2	-	-
1.2	Object Oriented Programming: What is an object, Classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism.	3	-	-
	Module – 2			
2.1	Functions in C++: Tokens – Keywords – Identifiers and constants – Operators in C++ – Scope resolution operator – Expressions and their types – Special assignment expressions	2	-	1
2.2	Function prototyping – Call by reference – Return by reference – Inline functions -Default arguments –Function overloading	3	-	1
	Module – 3			
3.1	Inheritance & Polymorphism: Derived class Constructors, destructors	2	-	-
3.2	Types of Inheritance-Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance	3	-	1
	Module – 4			
4.1	I/O Streams: C++ Class Hierarchy- File Stream	3	-	1
4.2	Text File Handling- Binary File Handling during file operations	2	-	0
	Module – 5			
5.1	Exception Handling: Introduction to Exception - Benefits of Exception handling- Try and catch block	3	-	-
5.2	Throw statement- Pre-defined exceptions in C++	2	-	1
	List of Experiments:			
1	Write a C++ program to sort the elements in ascending and descending order.	-	-	1
2	Write a C++ program to find the sum of all the natural numbers from 1 to n.	-	-	1
3	Write a C++ program to swap 2 values by writing a function that uses call by reference technique.	-	-	1
4	Write a C++ program to demonstrate function overloading for the following prototypes. add(int a, int b) add(double a, double b)	-	-	1
5	Create a class named Shape with a function that prints "This is a shape". Create another class named Polygon inheriting the Shape class with the same function that prints "Polygon is a shape". Create two other classes named Rectangle and Triangle having the same function which prints "Rectangle is a polygon" and "Triangle is a polygon" respectively. Again, make another class named Square having the same function which prints "Square is a rectangle". Now, try calling the function by the object of each of these classes.	-	-	1
6	Suppose we have three classes Vehicle, FourWheeler, and Car. The class Vehicle is the base class, the class FourWheeler is derived from it and the class Car is derived from the class FourWheeler. Class Vehicle has a method 'vehicle' that prints 'I am a vehicle', class FourWheeler has a method 'fourWheeler' that prints 'I have four wheels', and class Car has a method 'car' that prints 'I am a car'. So, as this is a multi-level inheritance, we can have access to all the other classes methods from the object of the class Car. We invoke all the methods from a Car object and print the corresponding outputs of the methods. So, if we invoke the methods in this order, car(), fourWheeler(), and vehicle(), then the output will be I am a car I have four wheels I am a vehicle Write a C++ program to demonstrate multilevel inheritance using this.	-	-	1
7	Write a C++ program to create a text file, check file created or not, if created it will write some text into the file and then read the text from the file.	-	-	1
8	Write a C++ program to write and read time in/from binary file using fstream	-	-	1

9	Write a function which throws a division by zero exception and catch it in catch block. Write a C++ program to demonstrate usage of try, catch and throw to handle exception.	-	-	1
10	Write a C++ program function which handles array of bounds exception using C++.	-	-	1
	Total No. of Lecture Hours	**25**	-	-
	Total No. of Tutorial Hours		**-**	**-**
	Total No. of Practical Hours			**15**

Self-learning topics identified:
1. Special assignment expressions
2. Hybrid Inheritance

Textbooks:
1. Bhushan Trivedi, Programming with ANSI C++, Oxford Press, 2nd Edition, 2012.
2. Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt. Ltd, 4th Edition 2010.

Online Resources:
1. https://www.youtube.com/watch?v=BClS40yzssA
2. https://nptel.ac.in/courses/106101208

Code: BENGK106 **Course: Communicative English**
Credits: 1 **L: T:P: 1:0:0**
SEE: - **CIE: 50 Marks**
SEE Hours: - **Max. Marks: 50**

Prerequisites if any	
Learning objectives	1. To know about Fundamentals of Communicative English and Communication Skills in general. 2. To enhance with English vocabulary and language proficiency for better communication skills.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand and apply the Fundamentals of Communication in their communication skills.	Understand, Apply
CO2	Adopt the Techniques of Information Transfer through presentation	

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	2	-	3	3	3	1	2	To be identified for each branch by Course Instructor			
CO2	-	-	-	-	-	2	-	3	3	3	1	2				

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	**Introduction to Communicative English** Communicative English, Fundamentals of Communicative English	1	-	-
1.2	Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English.	2	-	-
1.3	Interpersonal and Intrapersonal Communication Skills.	2	-	-
	Module – 2			
2.1	**Introduction to Phonetics** English Pronunciation, Pronunciation Guidelines to consonants and vowels	2	-	-
2.2	Sounds Mispronounced, Silent and Non silent Letters, Word Accent, Stress Shift and Intonation	2	-	-
2.3	Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.	1	-	-
3.1	**Communication Skills for Employment** Information Transfer: Oral Presentation and its Practice. Difference between Extempore/Public Speaking	2	-	-
3.2	Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence	2	-	-
3.3	Reading and Listening Comprehensions – Exercises.	1	-	-
	Total No. of Lecture Hours	15	-	
	Total No. of Tutorial Hours		**-**	**-**
	Total No. of Practical Hours			**-**

Self-learning topics:

1. Basic English Communicative Grammar
2. Words formation - Prefixes and Suffixes

Textbooks:

3. Communication Skills by Sanjay Kumar &Pushp Lata, Oxford University Press India Pvt Ltd - 2019.
4. A Textbook of English Language Communication Skills, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.

Reference Books:

1. High School English Grammar & Composition by Wren and Martin, S Chandh& Company Ltd – 2015.
2. Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
3. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018. 3. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-93-86668-45-5), 2019.
4. Practical English Usage by Michael Swan, Oxford University Press – 2016.

Code: BICOK107 **Course: Indian Constitution**
Credits: 1 **L:T:P 1:0:0**
CIE: 50 Marks **Max. Marks: 50**

Prerequisites if any	NIL
Learning objectives	1. To imbibe the knowledge of the Constitution so that one can function effectively in a Democracy. 2. To fulfill the responsibilities of a Citizen with Constitutional support for development of oneself and of the nation.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Analyse the basic structure of Indian Constitution. Understand and remember their Fundamental Rights.	Understand
CO2	Understand the importance of Directive Principles of State Policy and Fundamental Duties of the citizens of India. Know about our Union Government, State Government, political structure and judicial system of India.	Apply
CO3	Analyse our State Executive and Elections system of India, Emergency Provisions. Remember the Amendments to our Constitution and their significance.	Analyze

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4
CO1	-	-	1	-	-	-	-	-	2	-	-	-		To be identified for each branch by Course Instructor			
CO2	-	-	2	-	-	1	2	-	-	-	-	-					
CO3	-	-	-	-	-	2	-	-	-	-	-	2					

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	Indian Constitution: Necessity of the Constitution, Introduction to the Indian Constitution, making of the Constitution, role of the Constituent Assembly.	1	-	-
1.2	Salient features of India Constitution. Preamble of Indian Constitution and key concepts of the Preamble.	1	-	-
1.3	Fundamental Rights, restrictions and limitations over them in different situations.	3		
	Module – 2			
2.1	Directive Principles of State Policy and its present relevance in Indian society. Funda Duties and its Scope and significance, Union Executive : Parliamentary System, Pres Minister and Union Cabinet.	2	-	-
2.2	Parliament - Lok Sabha and Rajya Sabha, Important parliamentary terminologies.	2	-	-
2.3	Judicial system of India , Supreme Court of India and other courts.	1	-	-
	Module – 3			
3.1	State Executive and Governer, Chief Minister, State Cabinet, State Legislature.	2	-	-
3.2	Election Commission, Elections and Electoral Process.	1	-	-
3.3	Amendment procedure to Constitution, and important constitutional amendments till today. Emergency Provisions.	2	-	-
Total No. of Lecture Hours		**15**	-	-
	Total No. of Tutorial Hours		**-**	**-**
	Total No. of Practical Hours			**-**

Self-learning topics identified:

1. Know the functioning of the course in India.
2. Enforcement of our Fundamental Rights before the Supreme Court.
3. Know the duties of a citizen of India.
4. Study the latest cases relating to Fundamental Rights.
5. Study the Judicial Activism in India.

Textbooks:

1. Durga Das Basu : "Introduction to the Constitution of India" (Student Edition) Prentice - Hall EEE, 19th /20th Edition, 2001.

Reference Books:

1. “The Constitution of India” by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru. “The Constitution of India” by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru.

2. V N Shukla, “Constitution of India” Eastern Book Company, Lucknow, 10thEdition,2001, Reprint, October 2004

Online Resources:

1.https://www.constitutionofindia.net/
2.https://www.india.gov.in/topics/law-justice

Code: BSFHK158 **Course: Scientific Foundations of Health**
Credits: 1 **L:T:P - 1:0:0**
SEE: 50% **CIE: 50%**
SEE Hours: 2 **Max. Marks: 50**

Prerequisites if any	NIL
Learning objectives	To gain insights on the concepts of health, wellness, positive mindset, healthy lifestyles, avoiding risks and harmful habits.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand the importance of Health, wellness, and its balance for positive mindset.	Understand
CO2	Build a healthy and caring relationships to meet the requirements of good/social/positive life and avoid risks & harmful habits	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	-	-	2	-	-	3	2	-	-	-	-	2		To be identified for each branch by Course Instructor	
CO2	-	-	2	-	-	3	2	-	-	-	-	2			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1				
1.1	Good Health & It's balance for positive mindset: Health -Importance of Health, Influencing factors of Health,Health beliefs	1	-	-
1.2	Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality	1	-	-
1.3	Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.	1	-	-
Module – 2				
2.1	Building of healthy lifestyles for better future: Developing healthy diet for good health, Food & health, Nutritionalguidelines for good health	2	-	-
2.2	Obesity & overweight disorders and its management, Eating disorders, Fitness components forhealth	1	-	-
Module – 3				
3.1	Creation of Healthy and caring relationships: Building communication skills, Friends, and friendship – Education	1	-	-
3.2	The value of relationship and communication skills, Relationships for Better or worsening of life	1	-	-
3.3	Understanding of basicinstincts of life (more than a biology), Changing health behaviors through social engineering	1	-	-
Module – 4				
4.1	Avoiding risks and harmful habits: Characteristics of health compromising behaviors, Recognizing, and avoiding ofaddictions, How addiction develops, Types of addictions	1	-	-
4.2	Influencing factors of addictions, Differences between addictivepeople and non-addictive people & their behaviors	1	-	-
4.3	Effects of addictions, how to recovery from addictions	1	-	-
Module – 5				
5.1	Preventing & fighting against diseases for good health: How to protect from different types of infections, How toreduce risks for good health	1	-	-
5.2	Reducing risks & coping with chronic conditions, Management of chronic illness for Qualityof life	1	-	-
5.3	Health & Wellness of youth: a challenge for upcoming future, Measuring of health & wealth status	1	-	-
	Total No. of Lecture Hours	**15**	**-**	**-**
	Total No. of Tutorial Hours		**-**	**-**
	Total No. of Practical Hours			**-**

Self-learning topics identified:

1. Wellness and physical function
2. How to avoid exercise injuries.

Textbooks:

1. Scientific Foundations of Health – Study Material Prepared by Dr. L Thimmesha, Published in VTU- University Website.
2. Scientific Foundations of Health, (ISBN-978-81-955465-6-5) published by Infinite Learning Solutions,Bangalore – 2022.
3. Health Psychology - A Textbook, 4th Edition by Jane Ogden McGraw Hill Education (India) PrivateLimited - Open University Press.

Reference Books:

1. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor –Published by Routledge 711 Third Avenue, New York, NY 10017.
2. HEALTH PSYCHOLOGY (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles,McGraw Hill Education (India) Private Limited - Open University Press

Online Resources:

1. https://nptel.ac.in/courses/109103182

SECOND SEMESTER COURSES

Code: BMATS201 **Course: Mathematics-II for CSE Stream**
Credits: 4 **L:T:P:- 2:2:2**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours:3 **Max. Marks:100**

Prerequisites if any	
Learning objectives	**Course objectives:** The goal of the course **Advanced Calculus, Vector Space and Numerical methods** (**22MATS21**) is to • **Familiarize** the importance of Integral calculus and Vector calculus. • **Learn** and linear transformations**.** • **Develop** the knowledge of numerical method and apply to solve transcendental and differential equations.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Apply the concept of multiple integral to compute area and volume also solve certain improper integrals using beta and gamma functions. Also compute vector line integral using Green's, Stoke's theorem	Understand, Apply, Analyze
CO2	Demonstrate the idea of linear transformation.	
CO3	Apply the knowledge of numerical methods in analysing the discrete data and for solving the physical and engineering problems.	
CO4	Get familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB	

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4
CO1	3	2	-	-	-	-	-	-	-	-	-	1		To be identified for each branch by Course Instructor			
CO2	3	2	-	-	-	-	-	-	-	-	-	1					
CO3	3	2	-	-	-	-	-	-	-	-	-	1					
CO4	3	2	-	-	-	-	-	-	-	-	-	1					

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1 Integral Calculus			
1.1	**Introduction to Integral Calculus in Computer Science & Engineering.** Multiple Integrals: Evaluation of double and triple integrals.	1	1	-
1.2	Evaluation of double integrals by change of order of integration	1		-
1.3	Evaluation of double integrals by changing into polar coordinates	1	1	-
1.4	Applications to find Area and Volume by double integral-Problems.			-
1.5	Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions-Problems.	2	1	-
1.6	Applications:Antenna and wave propagation, Calculation of optimum value in various geometries. Analysis of probabilistic models.			-
	Module – 2 Vector Calculus			
2.1	**Introduction to Vector Calculus in Computer Science & Engineering.** Scalar and vector fields.	1	1	-
2.2	Gradient, directional derivative, curl and divergence - physical Interpretation.	1		-
2.3	Solenoid and irrotational vector fields. Problems.			-
2.4	Curvilinear coordinates**:** Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates	1	1	-
2.5	Transformation between cartesian and curvilinear systems, orthogonality. Problems.	1		-
2.6	Applications:Conservation of laws, Electrostatics, Analysis of stream lines.	1	1	-
	Module – 3 Linear Transformations			
3.1	**Importance of Linear Transformations in the field of Computer Science & Engineering.** Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates.	1	1	-
3.2	Rank and nullity of a linear operator, rank-nullity theorem.	1		-
3.3	Eigen values and Eigen vectors, Rayleigh's power method to find the dominant Eigen value and Eigen vector- Problems.	1	1	-
3.4	Inner product spaces and orthogonality-Problems.	1	1	-
3.5	**Applications:** Graphs and networks, computer graphics.	1		-
	Module – 4 Numerical methods -1			
4.1	**Importance of numerical methods for discrete data in the field of computer science &Engineering.** Solution of algebraic and transcendental equations - Regula-Falsi and Newton-Raphson Methods (only formulae)-Problems.	1	1	-
4.2	Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula	1		-
4.3	**Numerical integration**: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules (without proof). Problems.	1	1	-
4.4	**Applications:** Estimating the approximate roots, Extremum values, Area, volume, surface area. Errors in finite precision.	2	1	-
	Module – 5 Numerical methods -2			
5.1	**Introduction to various numerical techniques for handling Computer Science & Engineering Applications.** **Numerical Solution of Ordinary Differential Equations (ODE's):** Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method,	2	1	-
5.2	Modified Euler's Method-Problems	1	1	-
5.3	Runge- Kutta method of fourth order and Milnes predictor-corrector formula (No derivations of formulae)-Problems.	1	1	-
5.4	**Applications:** Estimating the approximate solutions of ODE.	1		-
	List of Experiments:			
1	Program to compute area, surface area, volume and centre of gravity.	-	-	1
2	Evaluation of improper integrals	-	-	1

3	Finding gradient, divergent, curl and their geometrical interpretation	-	-	1
4	**Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method.**	-	-	1
5	Computing the inner product and orthogonality.	-	-	1
6	Solution of algebraic and transcendental equation by Ramanujan's, Regula-Falsi and Newton-Raphson method.	-	-	1
7	Interpolation/Extrapolation using Newton's forward and backward difference formula.	-	-	1
8	Computation of area under the curve using Simpson's (1/3)rd and (3/8)th rule.	-	-	1
9	Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method.	-	-	1
10	Solution of ODE of first order and first degree by Runge-Kutta 4th order and Milnes predictor-corrector method.	-	-	1
Total No. of Lecture Hours		**25**		
	Total No. of Tutorial Hours		**15**	**-**
	Total No. of Practical Hours			**10**

Self-learning topics identified: (Maximum of 5 topics)

1. Centre of gravity, duplication formula.
2. Volume integral
3. Angles and Projections.
4. Lagrange's inverse Interpolation, Weddle's rule.
5. Adam-Bashforth method.

Textbooks:

1. **B.S.Grewal**:"HigherEngineeringMathematics",Khannapublishers,44thEd.,2021.
2. **E.Kreyszig**:"AdvancedEngineeringMathematics",JohnWiley&Sons,10th Ed.,2018.

Reference Books:

1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
3. **Tom Apostol** "Calculus: One variable calculus with an introduction to Linear Algebra", Vol. 1, , Wiley publications, 2nd edition.
4. **Tom Apostol** "Calculus: Multi-Variable Calculus and Linear Algebra with applications to differential equations and Probability, Vol.2, , Wiley publications, 2nd edition.
5. **William Stallings:** "Cryptography and Network Security" Pearson Prentice Hall, 6th Ed., 2013.

Code: BPHYS202 **Course: Applied Physics for CSE stream**
Credits: 4 **L:T:P 2:2:2**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	None
Learning objectives	1. Learn the basic principles of Physics pertaining to Engineering field 2. To understand and explain the concepts of Physics relevant to Engineering and Technology 3. Applying the knowledge of Physics in solving problems

Course Outcomes:
On the successful completion of the course, the student will be able to

Cos	Course Outcomes	Bloom's level
CO1	Understand and discuss the Physical systems using theories in Physics	Understand
CO2	Apply the fundamental concepts to derive the expression and solve the problems	Analyze
CO3	Analyze the behavior of physical systems by applying the knowledge of Physics	Understand
CO4	Apply the knowledge of basic concepts and principles of experimental physics in measurements of various physical Quantities which in turn give insight into the behavioral properties of radiation and matter.	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	2										1		To be identified for each branch by Course Instructor		
CO2	3	2										1				
CO3	3	3										1				
CO4	3	1							2			1				

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

Module – 1: Lasers and Optical Fibers		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
1.1	Lasers: Interaction of radiation with matter: absorption, spontaneous emission and stimulated emission	1	0	
1.2	Basic properties of laser, Einstein's coefficients (expression for energy density)	1	0	
1.3	Requisites of a Laser system, Condition for Laser action, Construction and working of Ruby laser	1	0	
1.4	Applications of Laser - Holography: Principle of Recording and reconstruction of 3-D images, LIDAR (measurement of pollutants)	0	1	
1.5	Numerical problems	0	1	
1.6	Determination Wavelength of LASER using Grating	0	0	2
1.7	Principle and structure of optical fibers, Angle of acceptance, Numerical aperture	1	0	
1.8	Modes of propagation, V-number, Types of optical fibers, Attenuation, fiber losses	1	0	
1.9	Applications - Block diagram and discussion of point to point communication: Merits and demerits of optical fiber in communication	1	0	
1.10	Numerical problems	0	1	
1.11	Measurement of acceptance angle and numerical aperture of an optical fiber	0	0	2
SLE	Optical Fiber Sensors			
Module – 2: Quantum Mechanics				
2.1	de Broglie hypothesis – de Broglie wavelength, Matter waves, Compton effect	1	0	
2.2	Phase velocity, group velocity, expression for group velocity	1	0	
2.3	Relation between group velocity and particle velocity (relativistic method), Characteristic properties of Matter waves	1	0	
2.4	Heisenberg's uncertainty principle and its physical significance (with derivation), Application of uncertainty principle (Non - existence of electron in the nucleus)	0	1	
2.5	Numerical problems	0	1	
2.6	Wave function: Properties and Physical significance (including Probability density and Normalization of wave function)	1	0	
2.7	Setting up of one dimensional time independent Schrödinger wave equation	1	0	
2.8	Energy Eigen values and Eigen functions of a particle in a potential well of infinite depth	1	0	
2.9	Numerical problems	0	1	
SLE	Young's double slit experiment of electron and its significance			
Module – 3: Electrical properties of materials				
3.1	Salient features of classical free-electron theory (CFET), Expression for electrical conductivity in metals	1	0	
3.2	Drift velocity, mobility, relaxation time, Failure of classical free electron theory	1	0	
3.3	Numerical problems	0	1	
3.4	Quantum free-electron theory (QFET)-Assumptions, Fermi energy, Fermi factor, Variation of Fermi factor with temperature and energy	1	1	
3.5	Density of states (with derivation), Expression for Fermi Energy at zero Kelvin, Merits ofQuantum free electron theory	1	0	
3.6	Numerical problems	1	0	
3.7	Estimation of Fermi energy of copper	0	0	2
SLE	Drawbacks of Quantum Free Electron Theory			
Module – 4: Physics of Materials				
4.1	Introduction to superconductors, Temperature dependence of resistivity in superconducting materials, Meissner effect, critical field	1	0	
4.2	Types of superconductors, BCS theory (Qualitative), SQUIDs and Applications:	1	0	

	superconducting magnets and MAGLEV			
4.3	Numerical problems	0	1	
4.4	Semiconductors, Intrinsic and extrinsic semiconductors, Intrinsic semiconductors: Electron and hole concentration (only mention the expression),	0	1	
4.5	Fermi level in intrinsic semiconductors, direct and indirect band gap semiconductors	1	0	
4.6	Numerical problems	0	1	
4.7	Determination of energy gap of a given semiconductor	0	0	1
4.8	Introduction to dielectric materials, Dielectric constant and polarization of dielectric materials, Types of polarization	1	0	
4.9	Equation for internal fields in solids (one dimensional), Clausius - Mossotti equation	1	0	
4.10	Numerical problems	0	1	
4.11	Determination of dielectric constant of a material charging and discharging of a capacitor	0	0	2
SLE	LED			
Module – 5: Quantum computing				
5.1	Wave function in Ket notation: Matrix form of wave function, Identity operator, Determination of I|0> and I|1>	1	0	
5.2	Pauli matrices and its operations on 0 and 1 states, Mention of conjugate and transpose, Unitary matrix U	1	0	
5.3	Examples: Row and column matrices and their multiplication (Inner product), probability, orthogonality	0	1	
5.4	Introduction to quantum computing, Moore's law, Difference between classical and quantum computing, concept of qubit, Single qubit gate	1	0	
5.5	quantum not gate, Pauli- Z gate, Hadamard gate, Pauli matrices, Phase gate (or S gate), T gate	1	0	
5.6	Numerical problems	0	1	
SLE	Spintronics			
Experiments				
6.1	Verification of Stefan's Law			2
6.2	Determination of Planck's constant			2
6.3	Photo-Diode Characteristics			2
6.4	Simulation Experiment			
6.5	Determination of moment of inertia and rigidity modulus using Torsional pendulum			
6.6	Determination of thickness of small objects using Air wedge.			
6.7	Reverse Characteristics of Zener diode			
	Total No. of Lecture Hours	**25**	-	-
	Total No. of Tutorial Hours		**15**	**-**
	Total No. of Practical Hours			**15**

Text Books:

1. Concepts of Modern Physics by Arthur Beiser, Shobhit Mahajan & S. Rai Choudhury, Tata Mc Graw – Hill Publication, 7th Edition, 2017
2. Solid State Physics by S O Pillai, New Age International, 9th Edition, 2020

Reference Books:

1. Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint).
2. A text book of Engineering Physics by M .N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi-110055.
3. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge UniversitiesPress, 2010 Edition.
4. Laser Fundamentals-By Willam T Silfvast, Cambridge University Press.
5. Laboratory manual for Engineering Physics Lab by Department of Physics, NIE, Mysuru

Online Resources:

1. LASER :https://www.youtube.com/watch?v=WgzynezPiyc
2. Superconductivity :https://www.youtube.com/watch?v=MT5Xl5ppn48
3. Optical Fiber :https://www.youtube.com/watch?v=N_kA8EpCUQo
4. Quantum Mechanics :https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s
5. Quantum Computing :https://www.youtube.com/watch?v=jHoEjvuPoB8
6. Physics of Animation :https://www.youtube.com/watch?v=kj1kaA_8Fu4
7. Statistical Physics Simulation :https://phet.colorado.edu/sims/html/plinko-probability/latest/plinkoprobability_en.html
8. NPTEL Supercoductivity: https://archive.nptel.ac.in/courses/115/103/115103108/
9. NPTEL Quantum Computing :https://archive.nptel.ac.in/courses/115/101/115101092
10. Virtual LAB :https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
11. Virtual LAB :https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1

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

1. http://nptel.ac.in
2. https://swayam.gov.in
3. https://virtuallabs.merlot.org/vl_physics.html
4. https://phet.colorado.edu
5. https://www.myphysicslab.com

1. http://smartcities.gov.in/upload/uploadfiles/files/Smart City Guidelines(1).pdf

Code: BPOPS203 **Course: Principles of Programming Using C**
Credits: 3 **L:T:P - 2:0:2**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	NIL
Learning objectives	To learn the fundamental programming concepts, methodologies and structures which are essential to building good and efficient C programs.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Use the fundamental programming constructs of C language to solve problem.	Apply
CO2	Use functions and arrays to implement searching and sorting operations.	Apply
CO3	Demonstrate the use of structures, unions, and pointers to solve problems.	Apply
CO4	Implement modular programming using functions.	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	2	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	1	-	-	-	-	-	-	1
CO4	3	-	2	-	2	-	-	-	-	-	-	1

PSO1	PSO2	PSO3	PSO4
To be identified for each branch by Course Instructor			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	Introduction to C: Introduction to computers, input and output devices, designing efficient programs	2	-	-
1.2	Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants	3	-	-
1.3	Input/output statements in C	2	-	-
	Module – 2			
2.1	Operators in C, Type conversion and typecasting	2	-	1
2.2	Decision control and Looping statements: Introduction to decision control, Conditional branching statements, Iterative statements, nested loops, break and continue statement	2	-	1
	Module – 3			
3.1	Functions: Introduction using functions, Function definition, function declaration, function call, returnStatement, Passing parameters to functions, scope of variables, storage classes, recursive functions.	2	-	1
3.2	Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions	2	-	1
3.3	Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays.	2	-	-
	Module – 4			
4.1	Strings and Pointers: Introduction, string taxonomy, operations on strings, Miscellaneous string andcharacter functions, arrays of strings.	2	-	1
4.2	Pointers: Introduction to pointers, declaring pointer variables, Types of pointers, Passing arguments to functions using pointers	2	-	-
	Module – 5			
5.1	Structure, Union, and Enumerated Data Type: Introduction, structures and functions, Unions, unions inside structures, Enumerated data type.	2	-	-
5.2	Files: Introduction to files, using files in C, reading and writing data files, Detecting end of file	2	-	-
	List of Experiments:			
1	Simulation of a Simple Calculator.	-	-	1
2	Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.	-	-	
3	An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit: for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs.100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.	-	-	1
4	Write a C Program to display the following by reading the number of rows as input, 1 1 2 1 1 2 3 2 1 1 2 3 4 3 2 1 --- n^{th} row	-	-	1
5	Implement Binary Search on Integers	-	-	1
6	Implement Matrix multiplication and validate the rules of multiplication.	-	-	1
7	Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.	-	-	1
8	Sort the given set of N numbers using Bubble sort.	-	-	1
9	Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.	-	-	1

10	Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.	-	-	1
11	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.	-	-	1
12	Write a C program to copy a text file to another, read both the input file name and target file name.	-	-	
	Total No. of Lecture Hours	**25**	-	-
	Total No. of Tutorial Hours		**-**	**-**
	Total No. of Practical Hours			**15**

Self-learning topics identified:
1. Goto statement
2. Applications of arrays

Textbooks:
1. Computer Fundamentals and Programming in C, "Reema Thareja", 2nd Edition, Oxford University, 2017.

Reference Books:
1. E. Balaguruswamy, Programming in ANSI C, 7thEdition, Tata McGraw-Hill, 2017.
2. Fundamentals of Computers, V Rajaraman, 6thEdition, PHI, 2014

Online Resources:
1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/
3. https://sites.google.com/site/tojomathew/course-1/c-prgmng2020-21?authuser=0

Engineering Science Courses (ESC)

Code: BESCK104B/204B **Course: Introduction to Electrical Engineering**
Credits: 3 **L:T:P:- 3:0:0**
SEE: 50 Marks **CIE: 50 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	None
Learning objectives	3. Discuss the fundamentals of different components of power system along with safety aspects. 4. Use fundamental laws to solve electrical circuit parameters in DC and AC circuit and demonstrate the construction, operation and characteristics of DC and AC machines.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Understand the fundamentals of different components of power system along with safety aspects.	Understand
CO2	Analyse AC and DC circuits.	Analyse
CO3	Describe the construction, operation and characteristics of DC and AC machines.	Understand

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	3	-	-	-	-	1	-	-	-	-	-	2		To be identified for each branch by Course Instructor		
CO2	3	3	-	-	-	-	-	-	-	-	-	-				
CO3	3		-	-	-	-	-	-	-	-	-	-				

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1: Introduction to Electrical Engineering				
1.1	Concept of AC and DC	1	0	0
1.2	Generation of power from conventional energy sources	1	0	0
1.3	Generation of power from non-conventional	1	0	0
1.4	Single Line Diagram of Power System	1	0	0
1.5	Concept of power and energy	1	0	0
1.6	Tariff structure for electrical energy consumption	1	0	0
Module – 2: Electric Circuits				
2.1	Faraday's laws. Static and dynamically induced EMF	2	0	0
2.2	Fundamentals of AC and DC waveforms, representation of AC and DC quantities	1	0	0
2.3	Average and RMS values of Sinusoidal wave, Definition of form factor, and peak factor	1	0	0
2.4	Electric circuit analysis using Ohms law and Kirchhoff's laws	2	0	0
2.5	Current and Voltage division rule	1	0	0
2.6	Analysis of single-phase AC circuits with R, L, C, RL, RC and RLC series and parallel configuration, Power factor.	3	0	0
2.7	Numerical on AC circuit	2	0	0
Module – 3: DC Machines and Transformers				
3.1	Construction and working principle of DC Machine	1	0	0
3.2	DC Generator EMF equation. Back emf in DC motor	2	0	0
3.3	Classification of DC motor, DC Motor Characteristics and applications	1	0	0
3.4	Numerical	1	0	0
3.5	Construction and working principle of single-phase transformer.	1	0	0
3.6	EMF equation and losses in transformer	1	0	0
3.7	Numerical	1	0	0
Module – 4: Three-phase Induction Machines and Synchronous Machines				
4.1	Advantages of three phase circuits	1	0	0
4.2	Relation between line and phase quantities in STAR and DELTA connected systems (No derivation), Numerical	1	0	0
4.3	Construction and working principle of Synchronous Generator, EMF equation.	1	0	0
4.4	Numerical	1	0	0
4.5	Construction and working principle of three phase Induction Motor	1	0	0
4.6	Slip, slip speed and frequency of rotor EMF	1	0	0
4.7	Numerical	1	0	0
Module – 5: Special Machines, Electrical wiring and safety				
5.1	Construction and working principle of BLDC Motor and Stepper Motor and their applications.	2	0	0
5.2	Introduction to domestic wiring, Fuse, MCB, and Relay.	2	0	0
5.3	Necessity of earthing, difference between earthing and grounding and types of grounding	1	0	0
5.4	Electric shocks, hazards and safety precautions,	1	0	0
5.5	Standards of wiring as per BIS	1	0	0
	Total No. of Lecture Hours	**40**		
	Total No. of Tutorial Hours		**00**	
	Total No. of Practical Hours			**00**

Self-learning topics identified:

6. Need for conservation of energy
7. Methods for improving power factor
8. Necessity of starter in motors
9. Application of three phase induction motor
10. Earth leakage circuit breakers

Textbooks:

3. D. C. Kulshreshtha, ***"Basic Electrical Engineering",***McGraw Hill, Revised 1st Edition, 2013.
4. D. P. Kothari and I. J. Nagrath, ***"Electrical Engineering",***Tata McGraw Hill, 4th Edition, 2019.

Reference Books:

3. Vincent Del Toro, ***"Electrical Engineering Fundamentals",*** Prentice Hall Publications, 2nd Edition, 2015.
4. H Cotton, ***"Electrical Technology",*** CBS Publishers & Distributors, 2004.

Online Resources:

7. Structure of Electric Power Systems: https://electrical-engineering-portal.com/electric-power-systems
8. Kirchoff's Laws: https://nptel.ac.in/courses/108/108/108108076/
9. Analysis of single-phase AC circuits: http://elearning.vtu.ac.in/econtent/courses/video/BS/ELE1525.html
10. Working of DC machine: http://elearning.vtu.ac.in/econtent/courses/video/BS/15ELE25.html
11. Construction and working principle of transformer: https://nptel.ac.in/courses/108/108/108108076/
12. Three phase star and delta connected systems: http://elearning.vtu.ac.in/econtent/courses/video/BS/ELE1525.html

Code: BESCK104C/204C **Course: Introduction to Electronics Communication**
Credits: 3 **L:T:P 3:0:0**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	NIL
Learning objectives	Learn how to develop and employ electronic circuit models for elementary electronic components.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Acquire knowledge on fundamental blocks of analog electronic systems	Understand
CO2	Develop logic circuits of digital electronic systems using the basics of Boolean Algebra	Apply
CO3	Understand the basic concepts of embedded systems & electronic communication systems.	Understand

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	3	3	2	1								1		To be identified by course instructor	
CO2	3	3	2	1								1			
CO3	3	3	2	1								1			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	**Diodes:** PN junction diodes, Zener Diodes	2	-	-
1.2	**PowerSupplies**–Blockdiagram,Half-waverectifier,Full-waverectifiersandfilters,Voltage regulators.	3	-	-
1.3	**Bipolar Junction Transistors**– BJT as an amplifier, BJT as a switch	3	-	-
	Module – 2			
2.1	**Operational amplifiers** - Ideal op-amp; characteristics of ideal and practical op-amp; Practical op-amp circuits: Inverting and non-inverting amplifiers,	3	-	-
2.2	Voltage follower, summer, subtractor, integrator, differentiator.	2	-	-
2.3	**Oscillators**– Introduction to Oscillators, Crystal controlled oscillators	3	-	-
	Module – 3			
3.1	**Boolean Algebra and Logic Circuits:** Introduction to number systems, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and	2	-	-
3.2	Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations	4	-	-
3.3	Digital Logic Gates, Adders-Half adder, Full adder, Multiplexer, demultiplexer, encoder, decoder, Flip-flop's, counters.	2	-	-
	Module – 4			
4.1	**Embedded Systems** –Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System,	4	-	-
4.2	Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC.	4	-	-
	Module – 5			
5.1	**Introduction to communication systems:** Communication systems and types of modulation s Introduction satellite, mobile and wireless communication,	4	-	-
5.2	Introduction to standards of mobile and wireless communication systems. Working principle of Bluetooth and WI-FI.	4	-	-
	Total No. of Lecture Hours	40	-	-
	Total No. of Tutorial Hours		**0**	**-**
	Total No. of Practical Hours			**-**

Textbooks:

1. ElectronicDevicesandCircuits,DavidABell,5th Edition,Oxford,2016
2. DigitalLogicandComputerDesign,M.MorrisMano,PHILearning,2008ISBN-978-81-203-0417-8

Code: BESCK104D/204D **Course: Introduction to Mechanical Engineering**
Credits: 3 **L:T:P 3:0:0**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	
Learning objectives	1.To develop basic knowledge on mechanical engineering fundamentals 2.To acquire the knowledge of machine tools, manufacturing processes, hybrid vehicles, mechatronics, and automation

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Explain the role of mechanical engineering in society, energy sources, and machine tool operations.	Understand
CO2	Describe the basic concepts of IC engines, future mobility, engineering materials, and joining processes.	Understand
CO3	Explain the Concepts of Mechatronics, Robotics, and Automation in IoT	Understand

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	3	-	-	-	-	1	2	-	-	1	-	1		To be identified for each branch by Course Instructor	
CO2	3	-	-	-	-	1	1	-	-	1	-	1			
CO3	3	-	-	-	-	1	1	-	-	1	-	1			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	**Introduction**: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.	04	-	-
1.2	**Energy**: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, Environmental issues like Global warming and Ozone depletion	04	-	-
	Module – 2			
2.1	**Machine Tool Operations**: Working Principle of lathe, Lathe operations: Turning, facing, knurling.	02	-	-
2.2	Working principles of Drilling Machine, drilling operations: drilling, boring, reaming.	02	-	-
2.3	Working of Milling Machine, Milling operations: plane milling and slot milling.	02	-	-
2.4	**Introduction to Advanced Manufacturing Systems**: Introduction, components of CNC, advantages and applications of CNC.	02	-	-
	Module – 3			
3.1	**Introduction to IC Engines**: Components and Working Principles, 4-Strokes Petrol and Diesel Engines, Application of IC Engines.	04	-	-
3.2	**Insight into Future Mobility:** Hybrid Vehicles, Components of Hybrid Vehicles. Advantages and disadvantages of Hybrid vehicles.	04	-	-
	Module – 4			
4.1	**Engineering Materials**: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer, Shape Memory Alloys.	04	-	-
4.2	**Joining Processes:** Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.	04	-	-
	Module – 5			
5.1	**Introduction to Mechatronics and Robotics**: open-loop and closed-loop mechatronic systems.	02	-	-
5.2	Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages.	03	-	-
5.3	Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages.	01	-	-
5.4	**Introduction to IOT**: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.	02	-	-
	Total No. of Lecture Hours	**40**		
	Total No. of Tutorial Hours		**0**	**-**
	Total No. of Practical Hours			**0**

Self-learning topics identified:

1. Origin of IC engines
2. Identification of materials of objects for engineering domain
3. Use of Robots in advanced countries
4. IOT and mechanical engineering

Textbooks:

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012

Reference Books:

1. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.

2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.

3. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017

4. Robotics, AppuKuttan KK K. International Pvt Ltd, volume 1

5. Dr SRN Reddy, RachitThukral and Manasi Mishra, " Introduction to Internet of Things: A Practical Approach", ETI Labs

6. Raj kamal, " Internet of Things: Architecture and Design", McGraw hill.

Engineering Technology Courses (ETC)

Code: BETCK105S/205S **Course: Introduction to Robotics, Electric Vehicle System and 3D Printing**

Credits: 3 **L:T:P 3:0:0**

SEE: 100 Marks **CIE: 100 Marks**

SEE Hours: 3 **Max. Marks: 100**

Prerequisites if any	
Learning objectives	1. To familiarize with the concepts of robotics, automation and electric vehicles. 2. To acquire the basic concepts of additive manufacturing

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Explain the robot structure and various sensors	Understand
CO2	Discuss the basics of electric vehicles, materials used, and battery management	Apply
CO3	Explain additive manufacturing processes, comprehend the principle of operation for process of Stereolithography and fused deposition modelling.	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	3					2						2		To be identified by the course instructor	
CO2	3											2			
CO3	3					2						2			

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1				
1.1	Introduction to robotics, history of robotics, degrees of freedom, reference frames, robot joints.	2	-	-
1.2	Anatomy of a robot and robot configurations.	2	-	-
1.3	Reference frames attributed to the robot structure. Robot motions, wrist movements and various grippers.	1	-	-
1.4	Work volume, resolution, accuracy, payload and repeatability. Advantages and disadvantages of robots.	2	-	-
1.5	Artificial Intelligence based robotic arm, robot exoskeleton for disabled.	1	-	-
Module – 2				
2.1	Introduction to robotic sensors. Various sensor characteristics.	2	-	-
2.2	Potentiometer, strain gauge, torque sensor, micro switch and light sensor.	3	-	-
2.3	Touch and tactile sensor, proximity sensor, range sensor, camera sensor, Inertial Measurement Unit and accelerometer sensor.	3		
Module – 3				
3.1	Configurations of Electric Vehicles.	4	-	-
3.2	Performance of Electric Vehicles (Traction Motor, Characteristics, Tractive Effort and Transmission Requirement and Vehicle Performance)	4	-	-
Module – 4				
4.1	Electrochemical Reactions, Specific Power, Energy Efficiency.	4	-	-
4.2	Materials for Electric Vehicles: Steel, Aluminum, Composites; Solid Oxide Fuel Cells for Batteries	3	-	-
4.3	Intelligent battery management and charging for electric vehicles, vehicle to grid technology.	1	-	-
Module – 5				
5.1	General overview Introduction, history of AM systems	1	-	-
5.2	The Generic AM Process, The Benefits of AM, Distinction between AM and CNC machining, classification of AM Process.	2	-	-
5.3	Stereo Lithography Systems: Working Principle, Process details, advantages and disadvantages, Applications	2	-	-
5.4	Fusion Deposition Modeling: Working Principle, Process details, advantages and disadvantages, Applications	2	-	-
5.5	Concepts of “Design for Additive Manufacturing”.	1	-	-
	Total No. of Lecture Hours	**40**	-	-
	Total No. of Tutorial Hours		**00**	**-**
	Total No. of Practical Hours			**00**

Self-learning Topics:

1. Usage of robots in advanced countries
2. History of electric vehicles
3. 3D Printing
4. Study of robots available in the institute

Text Books:

1. Introduction to Robotics Analysis, Systems, Applications by Saeed B. Niku, Prentice Hall, 2001.
2. Modern Electric, Hybrid Electric, and Fuel Cell Vehicles - Fundamentals, Theory, and Design by Mehrdad Ehsani, Yimin Gao and Ali Emadi, CRC Press, London Second Edition (2nd ed.) 2010.
3. Pham D.T. &Dimov S.S "Rapid Manufacturing" Springer London 2011.

Reference Books:

1. Industrial Robotics (second edition), Technology, programming and applications, Mikell P Groover, McGraw Hill, Year 2012.
2. Electric and Hybrid Vehicles by Tom Denton, Taylor & Francis (Routledge), 2018.
3. Ian Gibson, David W. Rosen, Brent Stucker, Additive manufacturing technologies: rapid prototyping to direct digital manufacturing Springer, 2010.

Code: BETCK105T/205T **Course: Renewable Energy Technology**
Credits: 3 **L:T:P-3:0:0**
SEE: 100 Marks **CIE:100 Marks**
SEE Hours: 3 **Max. Marks:100**

Pre requisites if any	None
Learning objectives	1. To discuss various available Energy Sources and the impact of renewable energy generation on environment 2. Explain Solar Thermal Energy Conversion, Photovoltaic, Wind Energy, Biomass and Ocean Energy conversion technologies

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Discuss various available Energy Sources and the impact of renewable energy generation on environment.	Understand
CO2	Explain Solar Thermal Energy Conversions, Photovoltaic and Wind Energy Systems.	Understand
CO3	Discuss Biomass and Ocean Energy conversion technologies.	Understand

Mapping with Pos and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	3	1	1	-	-	3	3	-	-	-	-	1		To be identified by the course instructor	
CO2	3	1	1	-	-	3	3	-	-	-	-	1			
CO3	3	1	1	-	-	3	3	-	-	-	-	1			

Mapping Strength: Strong– 3 Medium–2 Low– 1

CourseStructure

		No. ofLecture Hours	No. ofTutorial Hours	No. ofPractical Hours
Module–1: Renewable Energy Sources				
1.1	Introduction, Importance of Energy in Economic Growth, Energy scenario in India	1	0	0
1.2	Green footprint, carbon footprint, ecological footprint concepts	1	0	0
1.3	National Green Tribunal (NGT) Act, NGT activities	1	0	0
1.4	Need for Renewable energy sources, advantages and limitations, Impact of renewable energy generation on environment	2	0	0
1.5	Initiatives, schemes, and policies by MNRE, Government of India	3	0	0
Module–2: Solar Energy Conversion Systems				
2.1	Solar Energy: Potential, Present Utilization, Solar terminologies, Pyranometer and Pyrheliometer	1	0	0
2.2	Principle of Conversion of Solar radiation into Heat, Liquid Flat Plate Collectors	1	0	0
2.3	Solar Water Heaters, Solar Air Heaters, Solar Thermal Electric Systems	1	0	0
2.4	Basics of Solar PV Cells, V-I characteristics, MPPT of PV arrays	2	0	0
2.5	Configuration of Interconnected panel, Applications of PV Systems, Sizing of solar PV panels for roof-top solar application	3	0	0
Module–3: Wind Energy Systems				
3.1	Wind Energy Potential in India, Factors governing location of site	2	0	0
3.2	Wind Energy Conversion Systems (WECS), Classification of WECS	2	0	0
3.3	Principle of working with block diagram	2	0	0
3.4	Characteristics of wind turbine, Power developed by wind turbine	2	0	0
Module–4: Biomass Energy Resources and Urban Waste Conversion				
4.1	Introduction to biomass resources, Products from biomass and their applications	2	0	0
4.2	Energy by Photosynthesis, Classification–Cultivated biomass, Waste Organic Matter	2	0	0
4.3	Biomass conversion processes – Direct, Thermo-chemical and Biochemical.	2	0	0
4.4	Urban Waste to Energy conversion, composition, gasification, conversion by incineration process, by pyrolysis, Landfill biogas plant, field visit	2	0	0
Module–5: Ocean Energy Technologies				
5.1	Potential of ocean energy in India, Tidal Energy Conversion system – principle and types	2	0	0
5.2	Site selection criteria, Single basin and double basin schemes	2	0	0
5.3	Wave energy conversion systems – principle, devices for harnessing wave energy	2	0	0
5.4	Ocean Thermal energy conversion – open and closed OTEC schemes	2	0	0
	TotalNo.of LectureHours	**40**	-	-
	TotalNo.ofTutorialHours		**00**	-
	Total No. of Practical Hours			**00**

Self-learning topics identified:

1. Environmental impact of fossil fuels
2. MPPT algorithms of solar PV cells
3. Power coefficient of wind turbines
4. Benefits of biomass
5. Challenges in Ocean Energy Technology in India

Textbooks:

1. S. Rao and Dr. B.B. Parulekar, ***"Energy Technology",*** 3rd edition, Khanna Publishers.
2. Rai G.D***, "Non-conventional Sources of Energy",*** 4th edition, Khanna Publishers, New Delhi, 2007.

ReferenceBooks:

1. Mukherjee D, and Chakrabarti S, ***"Fundamentals of Renewable Energy Systems",*** New Age International Publishers, 2005.
2. B.H. Khan, ***"Non-conventional energy resources",*** 2nd Edition, McGraw Hill, Education (India) Pvt. Ltd, 2009.
3. D.P. Kothari, K. C. Singal, Rakesh Ranjan**, "Renewable Energy Sources and Emerging Technology",** 2011.

Code: **BETCK105U/205U** **Course: Introduction to Smart City**
Credits: **3** **L:T:P-3:0:0**
SEE: **100 Marks** **CIE:100 Marks**
SEE Hours: **3** **Max. Marks:100**

Prerequisitesifany	None
Learningobjectives	1. Explain the fundamentals of smart city, policies and initiatives by government of India 2. Discuss various components and key technologies of smart city and conduct case study on smart city, document and present

CourseOutcomes:

Onthesuccessfulcompletionofthecourse,thestudentwillbeableto

COs	**CourseOutcomes**	**Bloom'slevel**
CO1	Explain the fundamentals of smart city, policies and initiatives by government of India	Understand
CO2	Discuss various components and key technologies of smart city	Understand
CO3	Conduct case study on smart city, document and present.	Apply

MappingwithPOsandPSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	1	1	-	2	3	3	-	-	-	-	1	To be identified for eachbranchbyCourseInstructor		
CO2	3	1	1	-	2	3	3	-	-	-	-	1			
CO3	3	1	1	-	2	3	3	-	2	2	-	1			

MappingStrength:Strong– 3 Medium–2 Low– 1

Course Structure

		No. ofLecture Hours	No. ofTutorial Hours	No. of Practical Hours
Module– 1: Fundamentals of smart city				
1.1	Introduction to smart city, Key components, Technology framework, Features and Elements of smart city	3	0	0
1.2	Government of India - policy for smart city, Mission statement & guidelines	3	0	0
1.3	Government of India - smart city Initiatives and its challenges	2	0	0
Module – 2: Building blocks of smart city architecture				
2.1	Large scale instrumentation – Widespread Sensors	2	0	0
2.2	High-speed Network Infrastructure - Wired Networks - cables, hubs etc.	3	0	0
2.3	High-speed Network Infrastructure - Wireless Networks – RFID, Wi-Fi, Bluetooth etc.	3	0	0
Module – 3: Green Energy and Smart Energy Management				
3.1	Energy and ecology, renewable energy for smart city	3	0	0
3.2	IoT, Big data analysis, Smart metering	3	0	0
3.3	Smart energy management systems to automate, monitor, and optimize energy distribution and usage	2	0	0
Module– 4: Intelligent Transport Systems				
4.1	Smart mobility systems - mass transit systems and individual mobility systems	3	0	0
4.2	Artificial Intelligence for Smart vehicles and fuels, GIS, GPS, Navigation system	3	0	0
4.3	Traffic safety management, E-ticketing	2	0	0
Module– 5: Infrastructure Management for Smart city				
5.1	Smart Health - Digital health records, home health services, remote diagnosis, treatment, and patient monitoring systems	2	0	0
5.2	Storage and conveyance system of water, Flood management, Smart waste management system	2	0	0
5.3	Smart home, sustainable green building	2	0	0
5.4	Smart cities in India - case study	2	0	0
TotalNo.of LectureHours		**40**	-	-
TotalNo.ofTutorialHours			**00**	**-**
Total No. of Practical Hours				**00**

Self-learning topics identified:

1. Smart citizens and smart governance
2. Selection of sensors, Sensor Characteristics
3. Key characteristics of smart devices
4. Types of Electric Vehicle charging systems
5. Smart building architecture

Textbook:

1. Anil Kumar, ***"Introduction to Smart Cities",*** Pearson India, 1st Edition, 2019.

Reference Books:

1. Nicos Komninos, ***"The Age of Intelligent Cities: Smart Environments and Innovation-for-all Strategies (Regions and Cities)"***
2. Xianyi Li, ***"Smart City on Future Life - Scientific Planning and Construction"***
3. Anthony Townsend, ***"Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia"***
4. Grig N.S., ***"Infrastructure engineering and management",*** Wiley-Interseience, 1988
5. Hudson W.R., Haas R., Uddin W., ***"Infrastructure Management"***, McGraw-Hill, 1997
6. Giffinger, Rudolf; Christian Fertner; Hans Kramar; Robert Kalasek; Nataša Pichler-Milanovic; Evert Meijers (2007). ***"Smart cities – Ranking of European medium-sized cities".*** Smart Cities. Vienna: Centre of Regional Science

Online Resources:

1. Mission statement & guidelines on Smart City Scheme". Government of India - Ministry of Urban Development http://smartcities.gov.in/upload/uploadfiles/files/Smart City Guidelines(1).pdf

Code: BETCK105J/205J **Course: Introduction to Embedded Systems**
Credits: 3 **L:T:P 3:0:0**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks:100**

Prerequisites if any	NIL
Learning objectives	To introduce students to the modern embedded systems and to show how to understand and program such systems using a concrete platform built around.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Explain basic concepts and applications of Digital Electronics and Embedded Systems.	Understand
CO2	Explain the concept of sensors, actuators and operating systems.	Understand
CO3	Apply the concepts of Embedded systems in different applications	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4
CO1	1	2	2									1		2	2	2	
CO2		3	2	2	2							1		2		2	
CO3	1	2	2									1		2	2	1	

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	**Logic Gates, Combinational and Sequential circuits:** Sum of products and products of sums, Minterms and Maxterms, Karnaugh map Minimization, simplification using map entered variables,	3	-	-
1.2	Half and Full Adders, Half and Full Subtractors, Multiplexer,	2	-	-
1.3	Demultiplexer, Decoders, Flip-flops, counters, shift registers	3	-	-
	Module – 2			
2.1	**Introduction to Embedded Systems:** Application Domain, Features and characteristics, Model of Embedded Systems	3	-	-
2.2	Microcontroller vs Microprocessor, Example, Figures of Merit, Classification of MCU	2	-	-
2.3	History and current trends, Microcontroller Unit, A popular 8-bit MCU, Memory for Embedded systems	3	-	-
	Module – 3			
3	**Sensors and Actuators:** Introduction, Sensors	2	-	-
3.2	Analog to Digital Converters, Types of sensors	3	-	-
3.3	Actuators, Types of Actuators and Examples	3	-	-
	Module – 4			
4	**Operating Systems**: Embedded Operating Systems, Network Operating Systems	3	-	-
4.2	Layers, History, Functions, Terminologies associated with OS and Computer Usage	2	-	-
4.3	Kernel, Tasks, Processes, Scheduling Algorithm	3	-	-
	Module – 5			
5	**Example of Embedded Systems:** Mobile Phones, Automotive Electronics	2	-	-
5.2	Radio Frequency Identification, Wireless Sensor Networks, Robotics	3	-	-
5.3	Bio Medical Applications, Brain Machine Interfaces	3	-	-
	Total No. of Lecture Hours	40	-	-
	Total No. of Tutorial Hours		**0**	**-**
	Total No. of Practical Hours			**-**

Text Books:

1. Mano, Morris. "Digital logic." *Computer Design. Englewood Cliffs Prentice-Hall* (1979).
2. Das, Lyla B. Embedded systems: An integrated approach. Pearson Education India, 2012.

Reference Books:

1. Kumar, A. Anand. **Fundamentals of Digital Circuits** *2Nd Ed*. PHI Learning Pvt. Ltd.,
2. Raj Kamal, **Embedded Systems**, Tata Mc Graw Hill, India, 2005.
3. Frank Vahid and Tony Givargis, "**Embedded Systems Design**" – A Unified Hardware/Software Introduction, John Wiley
4. Shibu K V, "**Introduction to Embedded Systems**", Second Edition, Mc Graw Hill

Code: BETCK105H/205H **Course: Introduction to Internet of Things**
Credits: 3 **L: T: P:- 3:0:0**
SEE: 100 Marks **CIE:100 Marks**
SEE Hours: 3 **Max.Marks:100**

Prerequisites if any	NIL
Learning objectives	Students will be able to learn: 1. Deployment strategies and networking technologies. *2.* Potential application of IoT in healthcare, environment, and self-aware things.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Explain basics of networking, IoT networking components and IoT Framework.	Understand
CO2	Understand the significance of various sensing devices and actuator types.	Understand
CO3	Explain different Protocols and analyse IoT in real world applications.	Analyse

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1		2			1							1		2	
CO2		2	2		2							1		2	2
CO3		2	2		2							1		2	2

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	**Basics of Networking:** Introduction, Network Types, Layered network models, IoT Networking Components.	4	0	-
1.2	IoT Definitions, IoT Frameworks, Internet of things application examples, Structural Aspects of the IoT.	**4**	0	-
	Module – 2			
2.1	**IoT Sensing and Actuation:** Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.	8	0	-
3.1	**IoT Processing Topologies and Types:** Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.	5	0	-
3.2	**IoT Connectivity Technologies:** LoRA, NB-IoT, Wifi and Bluetooth.	3	0	-
	Module – 4			
4.1	**IoT Communication Technologies:** Introduction and Infrastructural Protocols: IPV4/IPV6.	4	0	-
4.2	Data Protocols: MQTT, CoAP and REST.	4	0	-
	Module – 5			
5.1	**Associated IoT Technologies Cloud Computing:** Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.	4	0	-
5.2	**IoT case studies and future trends**: Vehicular IoT, Healthcare IoT, Agricultural IoT.	4	0	-
	Total No. of Lecture Hours	40	-	-
	Total No. of Tutorial Hours		**0**	--
	Total No. of Practical Hours			**-**

Textbook:

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "**Introduction to IoT"**, Cambridge University Press 2021.
2. Daniel Minoli, "**Building the Internet of Things with IPv6 and MIPv6: The Evolving World of M2M Communications**", Wiley, 2013.

Reference Books:

1. S. Misra, C. Roy, and A. Mukherjee, 2020. **Introduction to Industrial Internet of Things and Industry 4.**0 CRC Press.
2. Vijay Madisetti, ArshdeepBahga, "**Internet of Things A Hands-On- Approach**", 2014.
3. Francis da Costa, "**Rethinking the Internet of Things: A Scalable Approach to Connecting Everything**", 1st Edition, Apress Publications, 2013.

Code: BETCK105I/205I **Course: Introduction to Cyber Security**
Credits: 3 **L:T:P - 3:0:0**
SEE: 100 Marks **CIE: 100 Marks**
SEE Hours: 3 **Max. Marks:100**

Prerequisites if any	NIL
Learning objectives	To gain knowledge on cybercrime terminologies, tools, cyber offenses, cybercrime methods, phishing, and computer forensics.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Explain the cybercrime terminologies	Understand
CO2	Describe Cyber offenses and Botnets	Understand
CO3	Illustrate Tools and Methods used on Cybercrime	Analyze
CO4	Explain Phishing and Identity Theft and need for computer forensics	Understand

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4
CO1	1	-	2	-	-	1	-	-	-	-	-	-		To be identified for each branch by Course Instructor			
CO2	2	-	2	-	2	-	-	-	-	-	-	-					
CO3	2	2	3	3	3	-	-	3	-	-	-	2					
CO4	1	-	2	-	2	-	-	3	-	-	-	-					

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1				
1.1	Introduction to Cybercrime: Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals?	4	-	-
1.2	Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws., Global Perspectives	4	-	-
Module – 2				
2.1	Cyber Offenses: How Criminals Plan Them: Introduction, How criminals plan the attacks	2	-	-
2.2	Social Engineering, Cyber Stalking, Cybercafe & cybercrimes	3	-	-
2.3	Botnets: The fuel for cybercrime, Attack Vector	3	-	-
Module – 3				
3.1	Tools and Methods used in Cybercrime: Introduction, Proxy Servers, Anonymizers, Phishing	2	-	-
3.2	Password Cracking, Key Loggers and Spywares	2	-	-
3.3	Virus and Worms, Trojan Horses and Backdoors,	2	-	-
3.4	DoS and DDOS Attacks, Attacks on Wireless networks.	2	-	-
Module – 4				
4.1	Phishing and Identity Theft: Introduction, methods of phishing, phishing techniques, spear phishing	4	-	-
4.2	Types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft	4	-	-
Module – 5				
5.1	Understanding Computer Forensics: Introduction, Historical Background of Cyberforensics, Digital ForensicsScience	5	-	-
5.2	Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts	3	-	-
	Total No. of Lecture Hours	**40**	-	-
	Total No. of Tutorial Hours		-	-
	Total No. of Practical Hours			-

Self-learning topics identified:

1. Steganography
2. Network forensics

Textbooks:

4. Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives, SunitBelapure and Nina Godbole, Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)

Online Resources:

1. https://onlinecourses.swayam2.ac.in/nou19_cs08/preview
2. https://ocw.mit.edu/courses/6-858-computer-systems-security-fall-2014/pages/lecture-notes/

Code: BPWSK206 **Course: Professional Writing Skills in English**
Credits: 1 **L:T:P: 1:0:0**
SEE: NA **CIE: 50 Marks**
SEE Hours: NA **Max. Marks: 50**

Prerequisites if any	
Learning objectives	1. To Identify the correct method of Writing and Speaking in English. 2. To Achieve better technical writing and Presentation skills for employment. 3. To Acquire Employment and Workplace communication skills.

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	To understand and identify the correct method of Writing and Speaking English.	Understand
CO2	To read technical proposals properly and make them to Write good technical reports.	Apply
CO3	Acquire Employment and Workplace communication skills.	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3
CO1	-	-	-	-	-	2	-	3	3	3	1	2		To be identified for each branch by Course Instructor		
CO2	-	-	-	-	-	2	-	3	3	3	1	2				
CO3	-	-	-	-	-	2	-	3	3	3	1	2				

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
	Module – 1			
1.1	**Using Parts of Speech and Tenses in Writing And Speaking English** Introduction to Parts of Speech, Types of Parts of Speech and their use in Writing And Speaking English	2	-	-
1.2	Introduction to Tenses, Types of Tenses and their use in Writing And Speaking English	2	-	-
	Module – 2			
2.1	**Technical Reading and Writing Practices** Technical writing process, Introduction to Technical Reports writing	1	-	-
2.2	Types of Technical Proposals	1	-	-
2.3	Characteristics of Technical Proposals., Scientific Writing Process, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.	2	-	-
3.1	**Professional Communication for Employment** Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills.	1	-	-
3.2	Reading Comprehension, Tips for effective reading.	1	-	-
3.3	Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. Writing effective resume for employment, Emails, Blog Writing and Memos.	3	-	-
3.4	Facing Campus Interview/Other Interviews	2	-	-
	Total No. of Lecture Hours	15		
	Total No. of Tutorial Hours		**-**	**-**
	Total No. of Practical Hours			**-**

Self-learning topics:

1. Group Discussion and Professional Interviews,
2. Characteristics and Strategies of a GD

Textbooks:

1. High School English Grammar & Composition by Wren and Martin, S Chandh& Company Ltd – 2015.
2. "Functional English" (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].
3. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.

Reference Books:

1. Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
2. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.

Code:22KSK101 /201**Course: Samskrutika Kannada /ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ**
Credits:1 **L:T:P:S 1:0:0**
SEE:AN **CIE: 100%**
SEE Hours:AN **Max. Marks: 50**

ಪಠ್ಯಕ್ರಮ ಕೈಯುಡದ ೀಶಗಳ :	1. ವೃತ್ತಿಪರವಾದ ವಿಷಯಗಳಿಗೆ ಸಂಬಂಧಿಸಿದ ಕನ್ನಡ ಭಾಷೆ , ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವನ್ನು ಮಾಡಿಕೊಡುವುದು 2. ಜನನುಡಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಗ್ರಾಮೀಣ ಭಾಗಗಳಲ್ಲಿ ಆಡುವ ಭಾಷೆಯ ಪ್ರಭೇದಗಳ ಪರಿಚಯ ಮಾಡಿಸಿ ಅವುಗಳ ವೈಶಿಷ್ಟ್ಯವನ್ನು ಗುರುತಿಸುವ ಸಾಮರ್ಥ್ಯವನ್ನು ಬೆಳೆಸುವುದು . 3. ತಾಂತ್ರಿಕ ಕ್ಷೇತ್ರಗಳಲ್ಲಿ ಬಳಕೆಯಾಗುತ್ತಿರುವ ಹೊಸ ಪರಿಭಾಷೆಯ ಪರಿಚಯವನ್ನು ಮಾಡಿಸಿ ಅವುಗಳನ್ನು ಸಮರ್ಪಕವಾಗಿ ಬಳಸುವ ಕೌಶಲಗಳನ್ನು ಪರಿಚಯಿಸುವುದು . 4. ಕನ್ನಡ ಭಾಷೆಯಲ್ಲಿ ಕಂಪ್ಯೂಟರ್ ಬಳಕೆಯ ಪರಿಚಯ ಮತ್ತು ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಬಳಸಿಕೊಂಡು ಗಣಕಯಂತ್ರದಲ್ಲಿ ಕೆಲಸ ನಿರ್ವಹಿಸುವ ಕೌಶಲವನ್ನು ಹೆಚ್ಚಿಸಲು ಸಹಾಯ ಮಾಡುವುದು .

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	ಕನ್ನಡ ಭಾಷೆ , ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯವಾಗುತ್ತದೆ	ಪರಿಚಯ
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಭೇದಗಳಲ್ಲಿ ಪ್ರಮುಖವಾಗಿ ಗ್ರಾಮೀಣ ಪ್ರಭೇದಗಳ ಪರಿಚಯವಾಗಿ ತುಲನಾತ್ಮಕ ಅಧ್ಯಯನ ಮಾಡುವ ಸಾಮರ್ಥ್ಯ ಬೆಳೆಯುತ್ತದೆ .	ಗ್ರಹಿಕೆ
CO3	ತಾಂತ್ರಿಕ ಕ್ಷೇತ್ರಗಳಲ್ಲಿ ಬಳಕೆಯಾಗುತ್ತಿರುವ ಹೊಸ ಪರಿಭಾಷೆಯ ಪರಿಚಯ	ಅನ್ವಯಿಸುವಿಕೆ

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	1	-	2	-	1		To be identified for each branch by Course Instructor			
CO2	-	-	-	-	-	-	-	1	-	2	-	1					
CO3	-	-	-	-	-	-	-	3	-	2	-	1					

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

	ಘಟಕ1 ಲಿಖಿತಗಳ : ಕನ್ನಡ ಭಾಷೆ ಸಾಹಿತ್ಯ ಸಂಸ್ಕೃತಿ ಪರಿಚಯ	**No. of Lecture Hours**	**No. of Tutorial Hours**	**lacitcarP Hours**
1.1	ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪನಾಗರಾಜಯ್ಯ	1	0	0
1.2	ಕರ್ನಾಟಕದ ಏಕೀಕರಣ : ಒಂದು ಅಪೂರ್ವ ಚಿತ್ರಣ - ಜಿ ಪರಮೇಶ್ವರಪ್ಪ	1	0	0
1.3	ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್ . ತಿಮ್ಮೇಶಮೂರ್ತಿ . ಕಂಪ್ಯೂಟರ್ ಕನ್ನಡ	1	0	0
ಘಟಕ2 ಪದ್ಯ: ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾಲ				
2.1	ವಚನಗಳು : ಬಸವಣ್ಣ , ಅಕ್ಕಮಹಾದೇವಿ , ಅಲ್ಲಮಪ್ರಭು , ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ , ಜೇಡರದಾಸಿಮಯ್ಯ ,	2	0	0

	ಆಲಯಾಭಿಲೇಖನಮು			
2.2	ಕೃತಿಗಳು : ಅದೆರಡನೆಯಫಲಾಇದೆರಡನೆಯಫಲ - ಪುರಂದರದಾಸರು ತತ್ಸಮಪದಗಳು : ಸಾಹಿರಕ್ಕೆಡಗಳಸುಟ್ಟು - ಶಿ ಶುನಾಳಶರೀಫ	2	0	0
2.3	ಡಿ ಪಿಜಿಅವರಮುಕುತಿಮುಮಕ್ಕಗಿದಡಲಿಯಿಕೆಲುವಭುಗಗಳು	1	0	0
2.4	ಕುರುಡುಕಾಂಚಾಣ : ದ. ರಾ. ಬೆಂದ್ರೆ	1	0	0
2.5	ಹಂಸಬಾಳನಗಿತಿ - ಕುವೆಂಪು	1	0	0
ಘಟಕ 3ಗದ್ಯ: ತಾರತಮ್ಯವಿಲ್ಲದ ಬರಹ , ಕಥೆಮತ್ತುಪ್ರಬಂಧಸಂಕಲನ				
3.1	ಡಾ. ಸಲ . ಎಂ. ವೆಂಕಟೇಶಯ್ಯ : ವಿಜ್ಞಾನತಂತ್ರಜ್ಞಾನ - ಎ ಎಸವಾಮೀತರಾವ್	2	0	0
3.2	ಕರಕುಶಲಕರ್ಮಗಳುಮತ್ತುಪರಂಪರೆಯಿಜ್ಞಾನ :ಕರಗಿಶಬ್ದಿಸನಹಳ್ಳಿ	1	0	0
3.3	ಯು ಗಾದಿ : ವಸುಧೇಂದ್ರ ಮೆ ಗಾನಮಂಬಿಗರಜನಪಲ್ಲವ : ಹೆ . ಚೆ . ಬೈಲಾಂಗಲು	2	0	0
	Total No. of Lecture Hours	**15**		
	Total No. of Tutorial Hours		**0**	**-**
	Total No. of Self learning Hours			**0**

Textbooks:

ಸಾಂಸ್ಕೃತಿಕಕನ್ನಡ

ಲೇಖಕರು : ಹೆ . ಚೆ . ಬೈಲಾಂಗಲು ಮತ್ತು ಡಾ. ಎಲ . ತಿಪ್ಪೇಸ್ವಾ

ಪ ಡುರಾಂಗ , ವೆಂಕಟೇಶಯ್ಯ ತಂತ್ರಜ್ಞಾನ ಮತ್ತು ಸಮಾಜ , ಬೆಳಗಾವಿ .

Code: **22KBK102**/ 202Course: Balake Kannada **/ಬಳಕೆಕನ್ನಡ**

Credits: 1 **L:T:P 1:0:0**

SEE: AN **CIE: 100%**

SEE Hours:- **Max. Marks: 50**

Learning objectives	elbatrofmoc a rof (adannaK) egaugnal lacol fo esu eht ni stneduts esirailimaf oT eht rep sa adannak elpmis etirw dna daer ,kaeps ot meht ekam osla ;noitacinummoc deen

Course Outcomes:

On the successful completion of the course, the student will be able to

COs	**Course Outcomes**	**Bloom's level**
CO1	Understand the necessity of learning the local language for a comfortable ligniv and to listen and understand Kannada language properly.	Remember
CO2	Speak simple Kannada ot communicate with localpeople in their daily life	Understand
CO3	To read and write Kannada and speak in polite yaw	Apply

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2	PSO3	PSO4
CO1	-	-	-	-	-	-	-	-	1	2	-	1		To be identified for each branch by Course Instructor			
CO2	-	-	-	-	-	-	-	-	1	3	-	1					
CO3	-	-	-	-	-	-	-	-	1	3	-	1					

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

	Module – 1	No. of Lecture Hours	No. of Tutorial Hours	lacitcarP Hours
1.1	Introduction, Necessity of learning local language. Methods to learn the Kannada language.	1	0	0
1.2	Easy learning of Kannada Language: A few tips. Hints for correct and polite Conservation, Listening and Speaking Activities	1	0	0
1.3	Key to Transcription.	1	0	0
1.4	ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words	1	0	0
	Module – 2			
2.1	ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು - Possessive forms of nouns, dubitive question and Relative nouns ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals	2	0	0
2.2	ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು - ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ - (ಆ, ಅದು, ಅವು, ಅಲ್ಲಿ) Predictive Forms, Locative Case	1	0	0
2.3	ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕ - Dative Cases, and Numerals ನ್ಯೂನ / ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು - Defective / Negative Verbs and Colour Adjectives	1	0	0
2.4	ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences) ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication	2	0	0
2.5	“ಇರು ಮತ್ತು ಇರಲ್ಲ” ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು - Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧಸೂಚಕ ಮತ್ತು ವಸ್ತುಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ - Comparitive, Relationship, Identification and Negation Words	2	0	0
	Module – 3			
3.1	ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು - different types of forms of Tense, Time and Verbs	1	0	0
3.2	ದ್, -ತ್, -ತು, -ಇತು, -ಆಗಿ, -ಅಲ್ಲ, -ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ - Formation of Past, Future and Present Tense Sentences with Verb Forms	1	0	0
3.3	Kannada Vocabulary List :ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು - Kannada Words in Conversation	1	0	0
	Total No. of Lecture Hours	**15**		
	Total No. of Tutorial Hours		**0**	**-**
	Total No. of Self learning Hours			**0**

Textbooks:

ಬಳಕೆ ಕನ್ನಡ

ಲೇಖಕರು : ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರಸಾರಾಂಗ, ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ

Code: BIDTK258 **Course: Innovation and Design Thinking**
Credits: 1 **L:T:P 1:0:0**
SEE: NA **CIE: 100%**
SEE Hours: NA **Max. Marks:100**

Prerequisites if any	Nil
Learning objectives	1.To apply the concept of design thinking for product and service development 2. To use the design thinking approach in innovation process of engineering products

Course Outcomes:
On the successful completion of the course, the student will be able to

COs	Course Outcomes	Bloom's level
CO1	Describe the fundamental process and tools for design thinking	Understand
CO2	Apply design thinking for strategic innovation	Apply
CO3	Illustrate the business process and prototyping for engineering products	Analyze

Mapping with POs and PSOs:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12		PSO1	PSO2
CO1	2	-	-	-	2	-	-	-	-	-	-	3		1	-
CO2	2	-	-	-	2	-	-	-	-	-	-	3		3	-
CO3	2	-	-	-	2	-	-	-	-	-	-	3		3	2

Mapping Strength: Strong– 3 Medium – 2 Low – 1

Course Structure

		No. of Lecture Hours	No. of Tutorial Hours	No. of Practical Hours
Module – 1: Process of Design				
1.1	Shared model in team-based design	1	0	0
1.2	Theory and practice in Design thinking	1	0	0
1.3	Explore presentationsigners across globe – MVP or Prototyping	1	0	0
1.4	Real-Time design interaction captures and analysis	1	0	0
1.5	Enabling efficient collaboration in digital space	1	0	0
1.6	Empathy for design – Collaboration in distributed Design	1	0	0
Module – 2: DT For Strategic Innovations				
2.1	Growth, Storytelling representation, Strategic Foresight	1	0	0
2.2	Sense Making, MaintenanceRelevance, Value redefinition	1	0	0
2.3	Extreme Competition, experience design	1	0	0
2.4	Standardization, Humanization, Creative Culture	1	0	0
2.5	Rapid prototyping, Strategy and Organization, Business Modeldesign.	1	0	0
Module – 3: Design Thinking in Information Science and Engineering				
3.1	Case study: Usage of design thinking of IT solutions for industries	2	0	0
3.2	Group Activity: Identify the real-world problem and develop solution	2	0	0
3.3	Outcome of the activity: Analytical thinking, problem solving and presentation skills			
Total No. of Lecture Hours		**15**	**0**	**0**
	Total No. of Tutorial Hours		**0**	**0**
	Total No. of Practical Hours			**0**

Textbooks:

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengagelearning (International edition) Second Edition, 2013.
2. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve- Apply", Springer, 2011

Reference Books:

1. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, SecondEdition, 2011.
2. Jeanne Liedtka, Andrew King, Kevin Bennett, Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013
3. Study of the recent papers and journals related to Design Thinking in IT related field.

-End-