Pimpri Chinchwad Education Trust's

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Pimpri Chinchwad College of Engineering

(An Autonomous Institute, affiliated to Savitribai Phule Pune University*)*
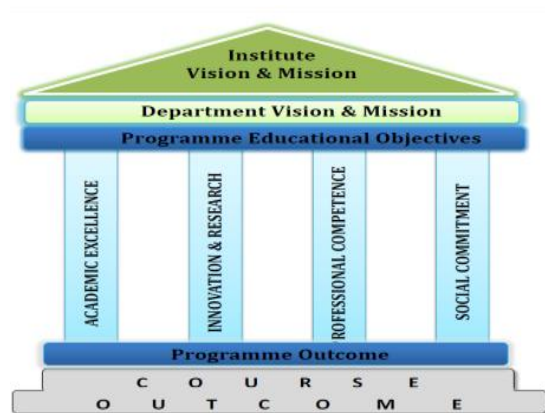
Curriculum Structure & Syllabus of

FY B.Tech

Mechanical Engineering

Department of Applied Sciences & Humanities
(Course 2020-21)

With effect from Academic Year 2021-2022

(Updated with Minor Changes)

Institute Vision

To Serve the Society, Industry and all the Stakeholders through the **Value-Added Quality Education.**

Institute Mission

To serve the needs of society at large by establishing State-of-the-Art Engineering, Management and Research Institute and impart attitude, knowledge and skills with quality education to develop individuals and teams with ability to think and analyze right values and self-reliance.

Quality Policy

We at PCCOE are committed to impart Value Added Quality Education to satisfy the applicable requirements, needs and expectations of the Students and Stakeholders. We shall strive for academic excellence, professional competence and social commitment in fine blend with innovation and research. We shall achieve this by establishing and strengthening state-of- the-art Engineering and Management Institute through continual improvement in effective implementation of Quality Management System.

List of Abbreviations

SPPU	Savitribai Phule Pune University
A.Y.	Academic Year
HSMC	Humanities/ Social Sciences/Management Courses
B.Tech	Bachelor of Technology
Lec	Lecture
Prac/PR	Practical
Tut	Tutorial
Hrs	Hours
IE	Internal Evaluation
MTE	Mid Term Evaluation
ETE	End Term Evaluation
TW	Termwork
OR	Oral
BSC	Basic Science Courses
ECC	Engineering Common Courses
PROJ	Project
HSMC	Humanities
LS	Life Skills
CIE	Continuous Internal Evaluation /Examination
EME	Elementary Mechanical Engineering
UHV	Universal Human Values
Eng.	English
Jap.	Japanese
Ger.	German

Structure of B.Tech. First Year [Mechanical Engineering]

B.TECH.   Semester –I

Course Code	Course Type	Course Name	Teaching Scheme				Credit	Evaluation Scheme						
								CIE		ETE	T W	P R	O R	Total
			Lec	Prac	Tut	Hrs		IE	MTE					
BFE 1201	BSC	Linear Algebra &Univariate Calculus	3	-	1	4	4	20	30	50	50	-	-	150
BFE1202	BSC	Engineering Physics	4	-	-	4	4	20	30	50	-	-	-	100
BFE1310	ECC	Engineering Mechanics	2	-	-	2	2	20	30	50	-	-	-	100
BFE1301	ECC	Engineering Graphics	1	-	-	1	1	-	20	30	-	-	-	50
BFE1312	ECC	Elements of Mechanical Engineering	2	-	-	2	2	20	30	50	-	-	-	100
BFE1203	BSC	Engineering Physics Laboratory	-	2	-	2	1	-	-	-	50	-	-	50
BFE1311	ECC	Engineering Mechanics Laboratory	-	2	-	2	1	-	-	-	50	-	-	50
BFE1302	ECC	Engineering Graphics Laboratory	-	4	-	4	2	-	-	-	50	-	-	50
BFE1313	ECC	Elements of Mechanical Engineering Laboratory	-	2	-	2	1	-	-	-	50	-	-	50
BFE1101/ 02/03	HSMC	HSMC-1(Eng./Jap./Ger.)	1	2	-	3	2	30		20		-	-	50
BFE1901	LS	Life Skill-1	-	2	-	2	-	GRADE						
Total			**13**	**14**	**1**	**28**	**20**							**750**

B.TECH   Semester –II

Course Code	Course Type	Course Name	Teaching Scheme				Credit	Evaluation Scheme						
								CIE		ETE	T W	P R	O R	Total
			Lec	Prac	Tut	Hrs		IE	MTE					
BFE2206	BSC	Multivariate Calculus	3	-	1	4	4	20	30	50	50	-	-	150
BFE2204	BSC	Engineering Chemistry	4	-	-	4	4	20	30	50	-	-	-	100
BFE2304	ECC	Basic Electrical & Electronics Engineering	2	-	-	2	2	20	30	50	-	-	-	100
BFE2308	ECC	Programing & problem solving	1	-	-	1	1	-	20	30	-	-	-	50
BFE2303	ECC	Workshop practices	-	2	-	2	1	-	-	-	50	-	-	50
BFE2701	PROJ	Mini project & basics of innovation	-	4	-	4	2	-	-	-	100	-	-	100
BFE2205	BSC	Engineering Chemistry Laboratory	-	2	-	2	1	-	-	-	50	-	-	50
BFE2305	ECC	Basic Electrical & Electronics Engineering Laboratory	-	2	-	2	1	-	-	-	50	-	-	50
BFE2309	ECC	Programing & problem solving Laboratory	-	4	-	4	2	-	-	-	50	-		50
BFE2104/ 05/06BHM2 107/08	HSMC	HSMC-2(Eng./Jap./Ger./Marathi/self-healing psychology)	V)1	2	-	3	2	30		20		-	-	50
BFE2902	LS	Life Skill-2	-	2	-	2	-	GRADE						
Total			**11**	**18**	**1**	**30**	**20**							**750**

Syllabi

B. Tech. First Year
[Course 2020-21]

SEM I

Course: Linear Algebra &Univariate Calculus						Code: BFE1201	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**
3	-	-	3	20	30	50	100
				Evaluation Scheme			
				TW	**OR**	**PR**	**Total**
		1	1	50	-	-	50

Prior knowledge of:
1. Elementary Mathematics. 2. Elementary Calculus.

Course Objectives: This course aims at enabling students,
1. To familiarize with concepts and techniques in Calculus and Matrices.
2. To get acquainted with Mathematical Modelling of physical systems using differential equations.
3. To acquire techniques of advanced level mathematics and its applications that would enhance analytical thinking power.

Course Outcomes: After learning the course, the students will be able to:
1. Apply the concept of rank to solve linear equation systems and analyze electrical circuits.
2. Evaluate Eigen Values and Eigen Vectors to diagonalize the matrix and find natural frequencies & modes of vibrations.
3. Apply the intermediate value theorems for continuous functions.
4. Expand a function in infinite series using Taylor's and Maclaurin's theorems and apply L'Hospital rule to evaluate the limits of indeterminate forms.
5. Solve ordinary differential equations of first order and first degree using appropriate techniques.
6. Develop mathematical model and analyze different problems related to electrical circuits, cooling problems, rectilinear motion and heat flow.

Detailed Syllabus:

Unit	Description	Duration (Hrs)
I	**Matrices-I:** Rank, normal form, system of linear equations with applications in Electrical circuits, linear dependence and independence, linear and orthogonal transformations.	**6**
II	**Matrices-II:** Eigen values, Eigen vectors, Cayley–Hamilton theorem, diagonalization, and application to problems to mass spring system.	**6**
III	**Differential Calculus-I:** Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Successive differentiation, Leibnitz theorem, application to find curvature.	**6**
IV	**Differential Calculus-II:** Taylor's series, Maclaurin's series, Indeterminate forms, L' Hospital rule, evaluation of limits.	**6**
V	**Differential equations:** Exact differential equations, differential equations reducible to Exact form, Linear differential equations, differential equations reducible to Linear form.	**6**
VI	**Application of DE:** Applications of differential equations to orthogonal trajectories, Kirchoff's law of electrical circuits, rectilinear motion, one-dimensional conduction of heat, Newton's law of cooling.	**6**

			Total	36

Text Books:
1. Higher Engineering Mathematics by B.V. Ramana , 34e, Tata McGraw-Hill.

2. Linear Algebra & Univariate Calculus by Team Mathematics, PCCoE, Pune, 1e, Techknowledge Publication.

Reference Books:
1. Advanced Engineering Mathematics by Erwin Kreyszig, 9e, Wiley Eastern Ltd .
2. Higher Engineering Mathematics by H. K. Dass , 22e, S. Chand Publication, Delhi.

3. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd.

4. Advanced Engineering Mathematics, by Peter V. O'Neil, 7e, Thomson Learning.

5. Advanced Engineering Mathematics by M. D. Greenberg, , 2e, Pearson Education.

6. Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi.

Course:	Engineering Physics			Code:		BFE1202	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total Marks**
4	-	-	4	20	30	50	100

Prior-knowledge of :
1. Wave theory of light
2. Elasticity
3. Atom, molecule & nuclei
4. Current, electricity & magnetism
5. Electromagnetic Induction

Course Objectives:
1. To build strong conceptual understanding of Optics, Semiconductor Physics & Quantum Physics
2. To explore advances in Physics with introduction of Lasers, Nanotechnology & Superconductivity
3. To provide consciousness about the importance of Physics principles in various engineering applications

Course Outcomes:
After learning the course, students will be able to
1. Analyze intensity variation due to optical phenomena like interference and relate these concepts to various engineering applications
2. Analyze & interpret electrical behavior of materials & relate working of semiconductor devices with the concept of Fermi level
3. Apply working principle of lasing action & interpret working of lasers with its prominent applications
4. Interpret wave like behavior of matter and apply Schrodinger's wave equation to study quantum mechanical phenomenon
5. Interpret properties of superconductors & their applications in advanced technologies
6. Recognize properties, preparation methods of nanomaterials & explore their applications in various engineering fields.

Detailed Syllabus	(UG – 6 Units)	

Unit	Description	Duration (Hrs)
1	**Wave Optics** Interference: Interference, phase difference & path difference between waves, constructive & destructive interference, geometrical path & optical path, phase difference due to reflection at boundaries of optical interfaces, thin film, interference due to thin film of uniform thickness, conditions of maxima and minima, interference at wedge shaped film (without derivation), anti-reflection coating as an application of interference Diffraction: Diffraction, Fraunhofer diffraction at a single slit (Derivation)-condition of maxima and minima, resultant intensity distribution pattern, diffraction grating (Qualitative), Introduction to X-Ray diffraction	8
2	**Semiconductor Physics** Limitations of classical free electron theory, Kronig -Penny model (qualitative), band theory of solids, direct & indirect energy band gap, electrical conductivity of conductors & semiconductors, Hall effect (with derivation), Fermi Dirac probability distribution function, Fermi energy, position of Fermi level in intrinsic semiconductors (with derivation) & in extrinsic semiconductors, dependence of Fermi level on temperature & doping concentration, energy band diagram of P-N Junction diode, solar cell I-V characteristics	8
3	**Laser & Fiber Optics** Laser: Introduction, interaction of light with matter- absorption, spontaneous emission,	8

	stimulated emission, population inversion, metastable state, active system, resonant cavity, characteristics of laser, semiconductor hetero-junction laser, carbon dioxide laser, applications of laser-industrial, defense & medical; introduction to holography Fiber Optics: Propagation of light in optical fibers, acceptance angle, numerical aperture, modes of propagation, types of fibers- step index, graded index, single mode & multi-mode; Losses -attenuation, dispersion	
4	**Quantum Mechanics** Limitations of classical physics, need of quantum mechanics, wave particle duality of radiation & matter, De Broglie hypothesis, De Broglie wavelength in terms of kinetic & potential energy, concept of wave packet, phase and group velocity, properties of matter waves, Heisenberg's uncertainty principle, wave function & probability interpretation, well behaved wave function, Schrodinger's time independent wave equation, applications of time independent wave equation to the problem of (i) particle in rigid box, (ii) particle in a non-rigid box(qualitative),Tunneling effect, examples of tunneling effect -alpha decay, tunnel diode & scanning tunneling microscope (STM)	8
5	**Magnetism and Superconductivity** Magnetism: Classification of magnetic materials, temperature dependent magnetic transitions (Curie and Neel temperature), magnetic hysteresis loop, magneto-resistance, giant magneto-resistance (GMR), application of magnetic materials in magneto-optical recording, magnetocaloric effect, adiabatic demagnetization. Superconductivity: Introduction, critical temperature, properties of superconductors-zero electrical resistance, persistent current, Meissner effect, critical magnetic field, critical current, isotope effect, BCS theory, type I and II superconductors, low Tc and high Tc superconductors, Josephson effect, DC-SQUID-construction, working and applications, applications - superconducting magnets, maglev trains	8
6	**Introduction to Nanoscience** Introduction, surface to volume ratio, quantum confinement, properties of nanomaterials-optical, electrical, mechanical, magnetic; methods of preparation of nanomaterials- bottom-up and top-down approaches, physical methods- high energy ball milling, physical vapor deposition; chemical methods-colloidal method, chemical vapor deposition method (hybrid method); applications- aerogels-types, properties and applications, applications of nanomaterials in medical, energy, automobile, sensors, space, defense; introduction to quantum computing.	8
	Total Hrs.	**48**

Text Books:
1. A text book of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2015, S. Chand & Company Pvt. Ltd.
2. Engineering Physics-R.K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpatrai Publications(P) Ltd.

Reference Books:
1. Lasers & Nonlinear Optics-B. B. Laud-Third edition, New Age International (P)Ltd. Publishers.
2. Fundamentals of Optics- Francis A. Jenkins, Harvey E. White, Fourth edition, McGraw Hill Education (India) Pvt.
   Ltd.
3. Fundamentals of Physics- Resnick&Halliday (John Wiley &sons)
4. An Introduction to Laser's Theory and Applications – Dr. M. N. Avdhanulu, Dr. P.S. Hemne– Revised edition 2017-S. Chand & Company Pvt. Ltd.
5. Introduction to Quantum Mechanics. - David J. Griffiths, Darrell F. Schroeter, Third edition, Cambridge

University Press.
6. Introduction to Solid States Physics - Charles Kittel, Eighth Edition, Wiley India Pvt Ltd.
7. Nano: The Essentials. -T. Pradeep, First edition 2007, McGraw Hill Education.
8. Nanotechnology -Principles & Practices - Sulabha K. Kulkarni -Third edition -Capital Publishing Company.

Course :		Engineering Mechanics		Code :		BFE1310	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**
2	-	-	2	20	30	50	100

Prior knowledge of:
1. Basic principles of trigonometry
2. Geometry
3. Algebra
4. Linear differentiation and integration
5. Principles of Physics (equations of motions)

Course Objectives:
1. To provide adequate knowledge of mechanics to formulate and analyse problems based on real life situations.
2. To make aware about basic concepts of statics and dynamics for rigid bodies.
3. To impart fundamental knowledge of analysis of structures, equilibrium of force system and friction.
4. To build conceptual understanding of principles of kinetics and kinematics to solve various engineering problems.

Course Outcomes:
After learning the course, students will be able to
1. Draw Free Body Diagram (FBD), resolve and compose forces and analyze simple and compound beams.
2. Apply concept of equilibrium to analyze friction, trusses, cables and space force system.
3. Determine centroid of plane lamina, moment of inertia for standard shapes & composite figures and apply equations of motion for rectilinear and curvilinear path.
4. Apply Newton's second law in different forms like work energy principle and impulse momentum equation.

Detailed Syllabus:

Unit	Description	Duration (Hrs)
I	**Resultant and Equilibrium of Coplanar Force System** Introduction and Principle of statics, force systems, resolution and composition of forces, resultant of concurrent forces, moment of a force, Varignon's theorem, couple, resultant of general force system, free body diagram, equilibrium of three forces in a plane, equilibrium of concurrent forces, types of beams: simple and compound beams, type of loads, types of supports, equilibrium of general force system.	6
II	**Analysis of Structures , Friction and Space forces** Two force members: analysis of plane trusses by method of joint, analysis of plane trusses by method of section, cables with supports at same level subjected to point loads, Friction: law's of friction, ladders friction and application to flat belt, equilibrium of concurrent and parallel forces in a space, resultant of concurrent and parallel forces in a space.	6
III	**Centroid of Plane Lamina, Moment of Inertia and Kinematics of particle** Centroid of plane lamina, applications of centroid, moment of inertia(MI), perpendicular axis theorem, parallel axis theorem, MI of standard shapes, MI of composite figures. **Kinematics of particle**: constant acceleration, motion under gravity, equations of motions in cartesian and path coordinates for curvilinear motion, projectile motion.	6
IV	**Kinetics of Particle** Kinetics of particle: Newton's second Law and its applications to rectilinear motion, curvilinear motion, and introduction to work energy principle and impulse momentum equation, direct and central impact, coefficient of restitution.	6

	Total	24

Text Books:

1. Vector Mechanics for Engineers STATICS - Beer & Johnston, Tata McGrawHill Publications

2. Vector Mechanics for Engineers DYNAMICS - Beer & Johnston, Tata McGrawHill Publications

3. Engineering Mechanics - A. K. Tayal, Umesh Publications

4. Engineering Mechanics- Bhavikatti , Newage Publications

Reference Books:

1. Engineering Mechanics -Singer Harper & Row, Hill Publishers

2. Engineering Mechanics - Meriam and Crage , Wiley Publications

3. Engineering Mechanics -Timoshenko and Younge, McGraw Hill Publications

4. Introduction of Engineering Mechanics- S. Rajshekaran and G Sankarasubramanian, Vikas Publications

5. Engineering Mechanics- R.S. Khurmi, S. Chand Publications

Course :	Engineering Graphics				Code :		BFE1301	
Teaching Scheme				**Evaluation Scheme**				
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**	
1	-	-	1	-	20	30	50	

Prior knowledge of:
1. Basic geometry such as different types of planes, solids etc.
2. Virtual imagination.

Course Objectives:
1. Develop imagination of physical objects to be represented on paper for engineering communication.
2. Develop the interpretation and manual drawing skills.
3. Develop the physical realization of the dimension of the objects.
4. Get basic hands-on training on computer aided drafting (CAD) tool.

Course Outcomes*:
After learning the course, students will be able to
1. Understand the concept of engineering graphics and draw the engineering curves
2. Read 3D engineering objects and draw orthographic projections
3. Read 2D engineering objects and draw isometric views
4. Analyze the 3D objects and draw development of lateral surfeces of solid

*Attainment of the above course outcomes shall be computed on the basis of evaluation of theory and laboratory work of the same course.

Detailed Syllabus	(UG – 4 Units)	
Unit	**Description**	**Duration (Hrs)**
I	**Part A: Introduction to engineering drawing** Importance of engineering drawing, introduction to drawing instrument and their uses, drawing sheet layout and its sizes, types of lines and their applications, dimensioning terminology and methods, quadrant and its positions, first angle and third angle projection method and their comparison. **Part B: Engineering curves** Ellipse, parabola, hyperbola by focus-directrix method and rectangle method, cycloid, involute, spiral & helix.	3
II	**Orthographic projections** Orthographic projection of given pictorial view by first angle method of projection, types of sections, sectional orthographic projection (only full sectional orthographic view)	4
III	**Part A: Isometric view** Isometric axes, scale, difference between isometric projection and isometric view, isometric view of simple solids and its dimensioning. **Part B: Free hand sketching of innovative product** Free hand sketching of any existing/innovative product e.g. concept vehicles, computer hardware, bridge design etc.	4
IV	**Part A: Development of lateral surface of solids** Development of cut section of prism, pyramid, cylinder and cone using single cutting plane. **Part B:Introduction to computer aided drafting** Introduction to GUI of CAD software, basic operation of CAD software, use of various commands for drawing, dimensioning, editing, modifying and plotting.	2
	Total Hrs	13

Note: Hands on practice will be completed during practical sessions.

Text Books:
1. Engineering Drawing with an introduction to AutoCAD- Dhananjay A. Jolhe, 3rd Edition 2017, Tata Magraw Hill publishing company Ltd. New Delhi, India

2. A text book of Engineering Drawing- R.K. Dhawan, Revised Edition 2012, S. Chand and company ltd. New Delhi, India
3. Engineering Drawing- Basant Agarwal and C.M.Agarwal, 2nd Edition 2015, Tata Magraw Hill publishing company ltd. New Delhi, India

Reference Books:
1. Engineering Drawing, Plane and solid geometry- N.D.Bhatt and V.M.Panchal, 53rd edition 2019, Charotor publication house.
2. Engineering Drawing- M.B Shah and B.C Rana, 2nd edition 2009, Pearson Publications.
3. Engineering Graphics- P.J. Shah, Revised edition 2014, S Chand Publications.
4. Fundamentals of Engineering Drawing- Warren J. Luzzader, 11th edition 2015, Prentice Hall of India New Delhi.
5. Engineering Graphics for Degree- K.C.John, 2nd edition 2009, PHI learning Pvt. Ltd. New Delhi.
6. Auto CAD 2012- Prof. Sham Tickoo and GauravVerma, 7th edition 2012, (For engineers and Designers)", Dreamtech Press NewDelhi.

Course : Elements of Mechanical Engineering					Code :BFE1312			
Teaching Scheme				**Evaluation Scheme**				
Lecture	**Practical**	**Tutorial**	**Credit**	**Continuous Evaluation**	**MTE**	**ETE**	**Total**	
2	-	-	2	20	30	50	100	

Prior knowledge of:

1. Elementary mathematics
2. Basic Physics up to higher secondary class

Course Objectives:
1. Impart knowledge of mechanical engineering and describe the scope of mechanical engineering with multidisciplinary industries.
2. Impart knowledge of basic concepts of thermodynamics and heat transfer applied to industrial applications.
3. Understand, identify and get exposure to latest trends in manufacturing processes and materials.
4. Describe the fundamentals of automobile systems and the emerging trends of electric vehicles, hybrid electric vehicles and solar vehicles.

Course Outcomes:
After learning the course, students will be able to
1. Identify the basic mechanical elements and the power transmission drives based on their applications.
2. Apply the fundamentals of thermodynamics and heat transfer to real life applications.
3. Identify different manufacturing processes and materials for different applications.
4. Comprehend automotive system for the combustion vehicle, EV's, HEV's and solar vehicles.

Detailed Syllabus		(UG – 4 Units)	
Unit	**Description**		**Duration (Hrs)**
I	**Basics of Design Engineering** Introduction to mechanical engineering: use of mechanical engineering in day to day life and its interdisciplinary use, introduction to design thinking. Machine elements and power transmission drives: classification, function and applications of shaft, axle, key, bearing and coupling, belt drive, chain drive and gear drive. Mechanisms: four bar and slider crank mechanism with its inversions, robotics (configuration).		**6**
II	**Thermal Engineering** Introduction to thermodynamics: concept of a system, types of systems, Zeroth law of thermodynamics, energy interactions: heat and work, First law of thermodynamics & its limitations. Second laws of thermodynamics (simple numerials), modes of heat transfer, thermal resistance, insulation (simple numerials). Introduction to hydraulic turbines, centrifugal pumps, household refrigerator, window and split air conditioner.		**7**
III	**Materials and Manufacturing Engineering** Classification of materials, their properties and applications, phase change material (PCM), composite material. Introduction to manufacturing processes: classification and applications: sand casting, plastic moulding, sheet metal working and forging (hot working and cold working).		**6**

	Introduction to industry 4.0		
IV	**Mobility Engineering** Classification of automobile, specifications of two wheeler, four wheeler and multi axle vehicles, types of chassis layout and drives, working of I.C. Engine (two and four stroke), gear boxes, single plate clutch, drum and disc brakes, drive train system, simple numericals on gear train. Concept and environmental importance of electric vehicles, construction and working of EV, hybrid electric vehicles and solar vehicles, challenges and future scope of EV's and HEV's.	**7**	
		Total Hrs	**26**

Text Books:
1. Basic Mechanical Engineering- Basant Agarwal and C.M.Agarwal, First edition 2008, Wiley publication.
2. Engineering Thermodynamics- P.K.Nag, Sixth edition 2017, Tata McGraw-Hill publishing Co. Ltd.
3. Heat and mass transfer- R K Rajput, Revised edition 2007, S Chand publication.
4. A Textbook of Automobile Engineering- Khalil U Siddiqui, Fifth edition 2012, New Age International Publishers.

Reference Books:

1. Design of Machine Elements- V.B. Bhandari, Fourth edition 2017, Tata McGraw-Hill publishing Co. Ltd.
2. Theory of Machine- S.S.Ratan, Fifth edition 2019, Tata McGraw-Hill publishing Co. Ltd.
3. Thermal Engineering- Arora and Domkunwar Dhanpat Rai and Sons.
4. Elements of Workshop Technology- Hajra, Chaudhari Volume I, Fourteenth edition 2008 Media Promoters and Publishers, Mumbai.
5. Elements of Workshop Technology- Hajra, Chaudhari Volume II, Twelfth edition 2007, Media Promoters and Publishers, Mumbai.
6. Handbook of Industry 4.0 and SMART Systems- Diego Galar Pascual, Pasquale Daponte, Uday Kumar, First edition 2019, CRC Press.
7. Industry 4.0- Dr. Bhushan kelkar, First edition 2019, Neuflex Publication.
8. Automobile Engineering Volume I- Dr. Kripal Singh, Eleventh edition 2008, Standard Publishers Distributors.
9. Automation, production systems computer integrated manufacturing- Mikell Groover, Fourth edition 2014, Pearson Publication.
10. Automotive Electrical Equipment- P. L. Kohli, First edition 2001, McGraw Hill Education (India) Pvt Ltd.

Course:	Engineering Physics Laboratory			Code:		BFE1203	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Progressive assessment**	**oral**		**Total**
-	1	-	1	40	10		50

Prior-knowledge of:
1. Wave theory of light
2. Elasticity
3. Atom, molecule & nuclei
4. Current, electricity & magnetism
5. Electromagnetic Induction

Course Objectives:
1. To provide better understanding of concepts, principles of Physics by giving hands on experience
2. To develop an insight in scientific experimental methodologies

Course Outcomes:
After learning the course, students will be able to
1. Develop an ability to handle measuring instruments and understand uncertainty and errors involved in various measurements
2. Develop cognitive abilities such as predicting, observing, classifying, interpreting, inferring, verifying – by performing experiments related to optics, semiconductors, magnetism & Laser

List of Experiments

(Any 10 experiments from following list)		Duration (Hrs)
1	An experiment based on Newton's rings (Determination of wavelength of monochromatic light/ the radius of curvature of Plano-convex lens)	2
2	To determine unknown wavelength by using plane diffraction grating	2
3	To verify Malus Law	2
4	An experiment based on Double Refraction (Determination of refractive indices, identification of types of crystal)	2
5	Any experiment based on Laser (Determination of thickness of wire/ Number of lines on grating surface)	2
6	To study IV characteristics of Solar Cell and determine fill factor	2
7	To determine band gap of given semiconductor	2
8	To determine Hall coefficient and charge carrier density	2
9	To determine Magnetic susceptibility of given material	2
10	Ultrasonic Interferometer: Determination of velocity of ultrasonic waves in given liquid and its compressibility	2
11	Determination of specific rotation of a solution with Laurent's Half Shade Polarimeter	2
12	Determination of electrical resistivity of given semiconductor using four probe method	2

Text Books:
1. A text book of Engineering Physics-Dr. M.N. Avadhanulu, Dr. P.G. Kshirsagar- Revised edition 2015, S. Chand & Company Pvt. Ltd.
2. Engineering Physics-R. K. Gaur, S. L Gupta, -Eighth revised edition 2012, Dhanpatrai Publications(P) Ltd.

Reference Books:
1. Lasers & Nonlinear Optics-B. B. Laud-Third edition, New Age International (P)Ltd. Publishers.

2. Fundamentals of Optics- Francis A. Jenkins, Harvey E. White, Fourth edition, McGraw Hill Education (India) Pvt. Ltd.
3. Fundamentals of Physics- Resnick & Halliday (John Wiley &sons)
4. An Introduction to Laser's Theory and Applications – Dr. M. N. Avdhanulu, Dr. P.S. Hemne– Revised edition 2017-S. Chand & Company Pvt. Ltd.
5. Introduction to Solid States Physics - Charles   Kittel, Eighth Edition, Wiley India Pvt Ltd.

Course :	Engineering Mechanics Laboratory			Code :		BFE1311	
Teaching Scheme				**Evaluation Scheme**			
Lecture	Practical	Tutorial	Credit	TW	OR	PR	Total
-	2	-	1	50	-	-	50

Course Objectives :
1. To reintroduce students to Newton's three laws by performing experiments and verifying results.
2. To develop the capacity of predicting the effects of force and motion for analysis of various problems in engineering.

Course Outcomes :
Students will be able to
1. Apply knowledge of determination of resultant of force systems, equilibrium conditions and friction for result interpretation.
2. Apply Newton's second law and its application in various forms to understand kinetics of particle.

List of Experiments:
Experimental work comprises of the following 6 experiments & 4 assignments.
Part A :
1. Verification of law of polygon of forces.
2. Support reactions of simple beam.
3. Determination of coefficient of friction for belt.
4. Determination of forces in space force system (concurrent)
5. Curvilinear motion.
6. Determination of coefficient of restitution.

Part B :
7. Assignment on Each Unit (considering application based problems)

Course :	Engineering Graphics Laboratory			Code :		BFE1302	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**
-	4	-	2	50	-	-	50

Prior knowledge of:
1. Basic geometry such as different types of planes, solids etc.
2. Virtual imagination.

Course Objectives:
1. Develop imagination of physical objects to be represented on paper for engineering communication.
2. Develop the interpretation and manual drawing skills.
3. Develop the physical realization of the dimension of the objects.
4. Get basic hands-on training on computer aided drafting (CAD) tool.

Course Outcomes*:
After learning the course, students will be able to
1. Understand the concept of engineering Graphics; Interpret and draw different types of engineering curves and their application.
2. Imagine, interpret, analyze and draw different orthographic views of solids and it's development
3. Imagine, interpret, analyze and draw Isometric view from given orthographic view.
4. Draw, edit and modify basic drawings by using various tool bars of CAD software.

*Attainment of the above course outcomes shall be computed on the basis of evaluation of theory and laboratory work of the same course.

List of Drawing Sheets:
Sheet no. 1 to 6 should be drawn by students on A2 size drawing sheet and sheet no. 7 by using CAD software

1. Types of lines and dimensioning

2. Engineering Curves (min.5 problems)

3. Orthographic projections (min.2 problems)

4. Isometric views (min. 2 problems)

5. Free hand sketching of any existing/innovative product

6. Development of lateral surface of solids (min.3 problems)

7. One sheet using CAD software package (min. 2 problems)

Course : Elements of Mechanical Engineering Laboratory				**Code :**			BFE1313
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**
-	2	-	1	50	-	-	50

Prior knowledge of :
1. Elementary mathematics
2. Basic Physics up to higher secondary class

Course Objectives:
1. Impart knowledge of mechanical elements and materials.
2. Impart knowledge of basic concepts of thermodynamics and heat transfer.

Course Outcomes:
After learning the course, students will be able to
1. Analyze basic mechanical elements and materials.
2. Analyze the performance of basic thermal systems.

List of Experiments:

Compulsory experiments:
1. Demonstration on power transmission elements: couplings, bearings and gears.
2. Study of household refrigerator and window air conditioner.
3. Case study on selection of material for different engineering applications.
4. Demonstration of drive train system of vehicle.

Any 4 experiments from following list:
1. Case study on design thinking.
2. Study of mechanisms: four bar, slider crank mechanism and its inversions.
3. Determination of heat transfer rate through the wall.
4. Determination of COP of vapour compression refrigeration system.
5. Study and working of centrifugal pump.
6. Demonstration of electric vehicle.
7. Demonstration, assembly and dis-assembly of engine.
8. Industrial visit related to manufacturing industry.

Course		HSMC1 (English)			Code: BFE1101			
Teaching Scheme					**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**	
1	2	-	2	30	-	20	50	

Prior Knowledge of:
    1. Basic Knowledge of English grammar.
    2. Basic Vocabulary, Listening and Speaking Skills

Course Objectives:
    1. To develop listening and speaking skills for effective communication.
    2. To develop a sense of confidence among students to present themselves at professional as well as societal levels.
    3. To enhance language competence.

Course Outcomes: After learning the course, students will be able to
    1. Formulate grammatically correct and meaningful sentences to communicate effectively
    2. Understand the word-formation process, word nuances and enrich vocabulary to express effectively
    3. Develop effective listening skills and comprehension skills
    4. Present themselves and communicate confidently in front of large audiences in a variety of situations

Detailed Curriculum

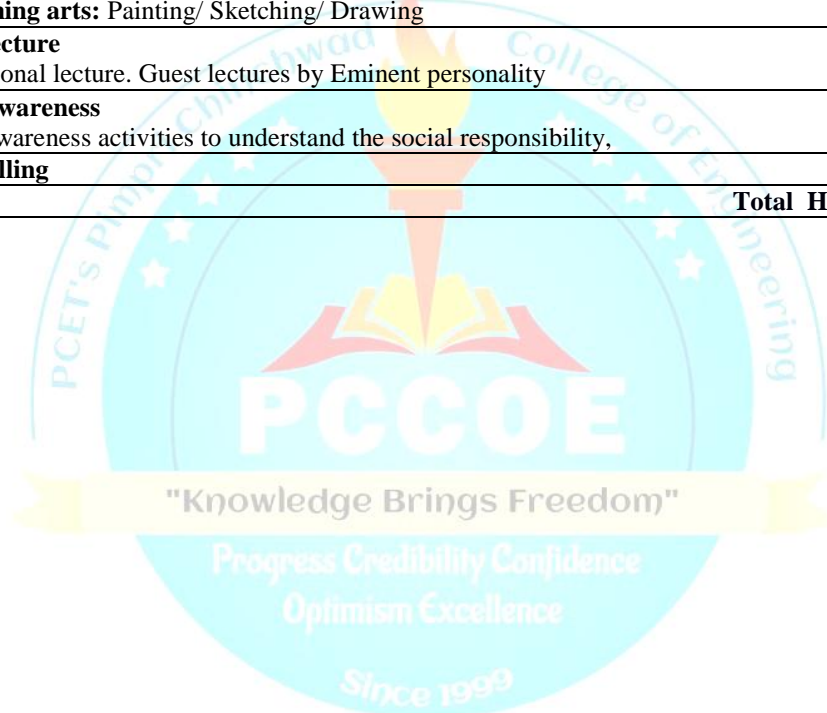| Unit	Description	Duration (Hrs)
I	**Application of Basic Grammar:** Articles, Prepositions, Tenses, Subject-verb agreement, Use of phrases & Clauses in sentences, Common errors	3
II	**Vocabulary Enrichment:** Ways of word formation, Foreign phrases, One word substitutions, Synonyms & antonyms, Words often confused, Indian English words, Usage of idioms & phrases.	3
III	**Listening Skills:** Importance of listening skills, Listening V/s hearing, Types of listening: active / selective / passive listening, Barriers to listening, Techniques of effective listening. **Comprehension:** Introduction to comprehension, Types of comprehension: literal comprehension, Inferential comprehension	3
IV	**Speaking Skills:** Fluency and accuracy - pronunciation, Intonation, Stress and rhythm, Neutral accent, Extempore, Effective public speaking	3
	Reference Books: **1.**Sharma, G.V.L.N., *English for Engineering Students.* *2.* Raymond Murphy, "Essential English Grammar (Elementary & Intermediate)", CUP and Martin, "English Grammer and Compositions" S. Chand Publications 3.Communication Skills for Engineers by S. Mishra & C. Muralikrishna (Pearson)	

Course:	HSMC-1(Japanese)				Code:		BFE1102	
Teaching Scheme					**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total Marks**	
2	-	1	2	30	-	20	50	

Prior Knowledge of:
1. To make use of learnt English/Marathi/Hindi language for learning Japanese language.
2. Willingness to learn a foreign language and positive attitude towards the language and culture of Japan.

Course Objectives:
1. To make students aware about Japanese Scripts (Hiragana,Katakana) and basic Kanjis.
2. To make students familiarize themselves with the Japanese language and use basic greetings in day-to-day life.
3. Students will develop language skills namely speaking, reading and writing skills for socializing, providing and obtaining information.
4. To make students able to express themselves using basic sentences.
5. To develop cross cultural skills and understanding of gestures, family and community, perceptions.

Course Outcomes:
After learning the course, the students will be able to:
1. Demonstrate Japanese scripts through oral and written communication.
2. Express themselves by using simple sentences and responses to questions.
3. Explore Japanese greetings, culture and etiquette.
4. Develop language skills namely speaking, reading and writing skills for providing and obtaining information.

Detailed Syllabus:		**(UG – 4 Units)**
Unit	**Description**	**Duration (Hrs)**
1	**Introduction** Speaking: Song of greetings. Listening: Short video skit on self-introduction. Writing: Japanese scripts (Hiragana) Reading: Hiragana words Test on Hiragana	8
2	**Katakana script** Speaking: Song on body parts. Listening: English words Writing: Locating countries on map , Word hunt. Reading: Katakana words Grammar: Test on Katakana	8
3	わたしは マイク．ミラー です。 Speaking: Self introduction Listening: Conversation based on L-1 Writing: Writing about yourself. Reading: Lesson reading no.-1 Grammar: Introduction to 　　　1. particles (は、か、も、か) 　　　2. Verb (です、では ありません)	10
4	Speaking: Listening: Conversation based on L-2 Writing: Numbers (0-100) in Japanese. Reading: Lesson reading 2 Grammar: Verbs (past,negative form), introduction to	12

	1. questioning words(なん、だれ、どなた).	
	2. この、その、あの、どの	
	3. Particle の	
	Test on grammar	

Text Books:
1. Minna no Nihongo Part I and II，Nihongo Shoho

Reference Books:
2. MO MO Japanese for Class VII
3. MO MO Japanese for Class VII
4. MO MO Japanese for Class VII workbook
5. MO MO Japanese for Class VIII workbook
6. Genki I,II
7. Japanese for busy people.

Course:		HSMC-1 (German)		Code: BFE1103			
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**
1	2	-	2	30	-	20	50

Prior Knowledge of:
  Willingness to learn a foreign language; Positive attitude towards and interest in foreign
  Cultures.

Course Objectives :
  1. To familiarize students with German language using day-to-day topics with the help of language
     skills namely listening, reading, speaking and writing.
  2. To equip students with basic language skills for the purpose of socializing, providing
     and obtaining information, expressing personal feelings and opinions.
  3. To develop intercultural competence and understanding of perceptions, gestures, family and
     community dynamics.

Course Outcomes:
  After the completion of the course, students will be able to
  1. Understand simple sentences which involve vocabulary related to self-introduction, hobbies,
     professions, and day-to-day things.
  2. Write simple sentences using grammar and vocabulary.
  3. Communicate in a simple way about day-to-day activities.
  4. Get to know about Germany and its culture.

Detailed Syllabus

Unit	Description	Duration (Hrs)
I	**Guten Tag!** [Good day!] Greetings, alphabets, numbers; introducing oneself & others Grammar: Verbs & personal pronouns; interrogative & declarative sentences	9
II	**Wie heißt das auf Deutsch?** [What is that called in German?] Naming things of day to day use in German Grammar: Articles, imperative sentences (informal)	9
III	**Ich möchte ...** [I would like have ...] Food & beverages in day to day life; in the cafeteria; in the shop Grammar: Singular & plural; nominative & accusative case	9
IV	**In der Stadt** [In the city] Information about Germany; city Hamburg; orientation in the city Grammar: Irregular verbs; imperative sentences (Formal)	9
	Total	36

Text Books:
  1. Netzwerk A1
  2. Linie A1

Reference Books:
  1. Starten wir!
  2. DaF im Unternehmen
  3. Berliner Platz neu
  4. Studio d A1
  5. deutsch üben A1

Course :	Life Skill course	Code : BFE1901

Course Objectives:
1. To understand importance of physical activities and awareness about the health.
2. To provide platform to express their mind, body and the emotions through performing arts.
3. To provide suggestions and guidance for their personality improvement.

Course Outcomes: Students will be able to
1. Develop their interest in terms of hobbies and physical health
2. Explore self-pace and use it in one's growth
3. Understand social need and act accordingly
4. Express their thoughts for the situation in real life

Detailed Syllabus:		
Unit	**Description**	**Duration (Hrs)**
1.	**Yoga:** Physical activities and Meditation **Sports:** Basket ball, Table tennis, Football and Volleyball **Performing arts:** Painting/ Sketching/ Drawing	16
2.	**Guest lecture** Motivational lecture. Guest lectures by Eminent personality	4
3.	**Social awareness** Social awareness activities to understand the social responsibility,	2
4.	**Story telling**	2
	Total Hrs	**24**

Syllabi

B. Tech. First Year [Course 2020-21]

SEM II

Course: Multivariate Calculus						Code: BFE2206	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**
3	-	-	3	20	30	50	100
				Evaluation Scheme			
				TW	OR	PR	Total
-	-	1	1	50	-	-	50

Prior knowledge of:
1. Elementary Mathematics.

2. Elementary Calculus.

Course Objectives:
1. To strengthen the concepts of multivariable calculus and its application in maxima & minima, error & approximation area, volume, CG and MI.

2. To familiarize the students with continuous and discrete systems, where knowledge of Fourier series and Harmonic analysis is required.

3. To make students acquainted with advanced techniques to evaluate integrals.

Course Outcomes:
After learning the course, the students will be able to:
1. Evaluate Partial Differentiation and apply the concept of PD in Euler's theorem.

2. Apply partial differentiation to evaluate Jacobian, Maxima & Minima, and Error & Approximation.

3. Apply Fourier series to represent the periodic time domain function to signal form.

4. Evaluate definite improper integrals using techniques like Gamma, Beta function, DUIS, and Error function.

5. Evaluate multiple integrals using the concepts of curve tracing.

6. Apply multiple Integration techniques to analyze area, volume, CG & MI.

Detailed Syllabus:

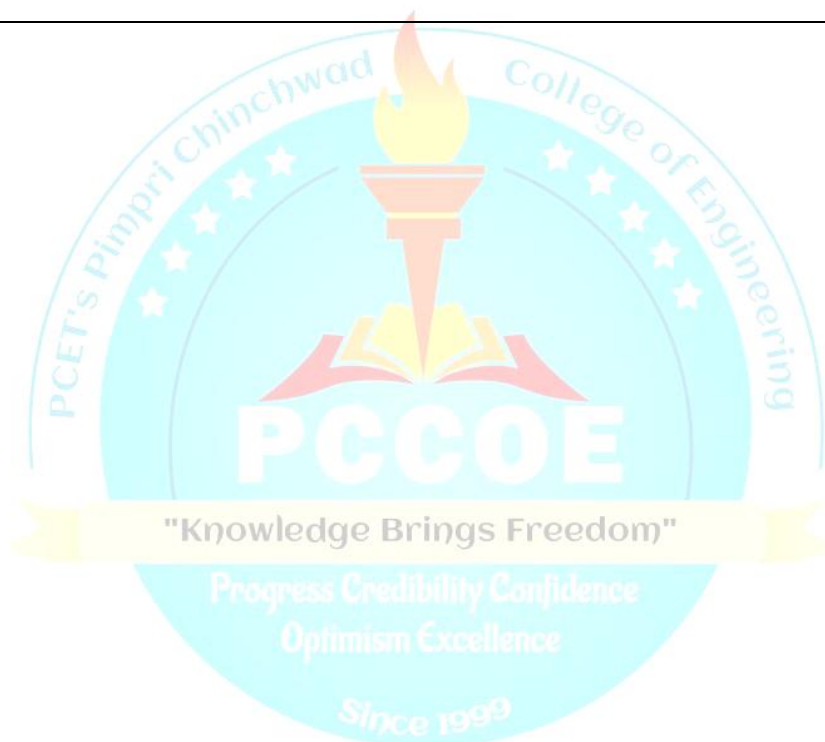| Unit	Description	Duration (Hrs)
I	**Partial Differentiation:** Partial derivatives, Euler's theorem on homogeneous functions, implicit functions, and variable treated as constant, total derivatives.	6
II	**Jacobian:** Jacobians and their applications, errors, and approximations. **Maxima and Minima:** maxima and minima of functions of two and three variables.	6
III	**Fourier Series:** Definition, Dirichlet's conditions, full range Fourier series, half range Fourier series, Harmonic analysis, and application to the engineering.	6
IV	**Integral Calculus:** Beta and Gamma functions, differentiation under integral sign (DUIS), Error functions.	6
V	**Multiple Integration:** Introduction of curve tracing, double integration, change of order of integration, conversion into polar form, Triple integration: with limits and without limits, Dirichlet's theorem.	6
VI	**Application of Multiple Integration:** Rectification of curves, Area, Volume, CG, and MI	6
	Total	36

Text Books:
1. Higher Engineering Mathematics by B.V. Ramana, 34e, Tata McGraw-Hill.

2. Advanced Engineering Mathematics by Erwin Kreyszig,9e, Wiley Eastern Ltd.

Reference Books:
1. Higher Engineering Mathematics by H. K. Dass, 22e, S. Chand Publication, Delhi.

2. Advanced Engineering Mathematics by S.R.K. Iyengar, Rajendra K. Jain, 4e, Alpha Science International, Ltd.

3. Advanced Engineering Mathematics by Peter V. O'Neil, 7e, Thomson Learning.

4. Advanced Engineering Mathematics by M. D. Greenberg, 2e, Pearson Education.

5. Higher Engineering Mathematics by B. S. Grewal, 43e, Khanna Publication, Delhi.

Course: Engineering Chemistry				**Code** : BFE2204			
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Continuous Evaluation**	**MTE**	**ETE**	**Total**
4	-	-	4	20	30	50	100

Prior knowledge of:
1. Structure of water.
2. Volumetric analysis.
3. Electromagnetic radiations.
4. Classification and properties of polymers.
5. Fossil and derived fuels.
6. Corrosion and its effects.
7. Electrochemical series.

Course Objectives:
1. To familiarize students with instrumental methods for qualitative and quantitative analysis and explore the importance of green chemistry.
2. To lead students to investigate the advancement in engineering materials, batteries and structural elucidation by spectroscopy.
3. To build consciousness about the recent development in alternate energy sources and corrosion control.
4. To develop experimental skills and thereby forge their conceptual lucidity.

Course Outcomes:
After learning the course, students will be able to
1. Analyze the water quality, interpret techniques of water purification and compare green over traditional chemical synthesis.
2. Apply basic principles of various electro-analytical techniques for qualitative and quantitative analysis and understand battery technology.
3. Apply the principles, instrumentation of UV & IR spectroscopy for structural elucidation.
4. Interpret the chemical structure, properties and synthesis of various polymers and nano materials and their uses.
5. Perceive and analyze fuel quality and identify the scope of derived alternate fuels.
6. Apply the preventive methods of corrosion to real-life problems.

Unit	Description	Duration (Hrs)
I	Water Technology and Green Chemistry.Impurities in water, hard water, hardness of water, its types, units of hardness and hardness calculation. Chemical analysis of water by determination of hardness by EDTA method. Alkalinity of water and its determination. Numericals on EDTA method and alkalinity. Disadvantages of hard water in boilers. Water softening techniques: Permutit and Ion exchange method. Water purification by reverse osmosis and electro-dialysis. Dissolved oxygen (DO), biological oxygen demand (BOD) and Chemical oxygen demand (COD). Introduction of Green Chemistry: Definition, goals, principles and green synthesis of Polycarbonate.	8
II	Instrumental Analysis and battery technology. a) Electrochemistry: fundamentals of an electrochemical cell, EMF of cell, reference and indicator electrodes and Nernst Equation. b) Basic principles, instrumentation and applications of :- i) Conductometry: introduction, Kohlrausch's law, measurement of conductance and conductometrictitrations of strong acid versus strong base, strong acid versus weak base and weak acid versus strong base. ii) pHmetry: theory of buffers and preparation, standardization of pH-meter, titration of weak acid versus strong base, simple and differential plots. iii) Potentiometry: Introduction, principle and application: potentiometric titration of Fe2+ versus Ce4+ along with simple and differential plots. Battery technology: introduction and types of batteries, construction, working and applications of Lithium ion battery, charging and discharging reactions at respective electrodes.	8

III	Spectroscopic techniques: Ultra Violet and IR spectroscopy a) UV Spectroscopy: nature of electromagnetic radiation and its characteristics. Interaction of matter with UV radiations leading to different electronic transitions. Beer's & Lambert's law, their derivations and applications. Instrumentation of UV -Visible spectrophotometer. Terms used in UV spectroscopy- chromophore, auxochrome, bathochromic shift (red shift), hypochromic shift (blue shift), hyper chromic and hypochromic effect. b) IR spectroscopy: principle, types of vibrations (stretching and bending), Hooks law. Different regions of IR spectrum such as fundamental group region, finger print region and aromatic region. Instrumentation of IR spectrophotometer with applications.		8
IV	Chemistry of Polymers and Novel Carbon Compounds a) Polymers : definition, classification of polymers on the basis of thermal behavior, properties of polymers: degree of polymerization, crystallinity, Tg & Tm and factors affecting Tg, reaction mechanism of free radical and condensation polymerization with suitable examples. Advanced polymeric materials: Structure, properties and applications of liquid crystal polymer – Kevlar, conducting polymers -Polyacetylene, electroluminescent polymer - PPV, biodegradable polymers - PHBV, polymer composite -fibre reinforced polymer and recycling of polymers. b) Nanomaterials: definition,types of nanomaterials and properties of nanomaterials. Quantum dots, structure, synthesis, properties and applications of CNTs, Fullerenes and Graphene.		8
V	Fuels and combustion a) Fuels: definition, classification of fuels, calorific value and its units. Calorific value (CV), gross calorific value (GCV), net calorific value (NCV). Determination of calorific value - Bomb calorimeter, Boy's colorimeter and numerical. i) Solid fuels: coal, classification of coal, proximate and ultimate analysis of coal, numerical based on analysis of coal. ii) Liquid fuels: origin of petroleum, composition of petroleum, refining of petroleum, Octane number of petrol and Cetane number of diesel. Synthesis reaction, properties, advantages and disadvantages of Power alcohol and Biodiesel. iii) Gaseous fuels: Hydrogen gas as a future fuel, production by steam reforming of methane and coke, storage and transportation. H_2- O_2 fuel cell. b) Combustion: chemical reactions, calculations on air requirement for combustion.		8
VI	Corrosion and Corrosion control a) Corrosion: introduction, types of corrosion, mechanism of atmospheric corrosion and wet corrosion. Electrochemical and galvanic series. Factors affecting corrosion: nature of metal and nature of environment. Different types of corrosion: Pitting corrosion, concentration cell corrosion, stress corrosion and soil corrosion. b) Corrosion control: methods of prevention of corrosion - cathodic and anodic protection, metallic coatings and its types - anodic and cathodic coatings. Method to apply metallic coatings - hot dipping, cladding, electroplating and cementation. Non-metallic coating - powder coating.		8
	Total		**48 Hrs.**

Text Books:
1. Engineering Chemistry by S.S. Dara, S.Chand Publications (2010).
2. Engineering Chemistry by B.S. Chauhan, UnivSc Press.(2015).
3. A Text Book Of Engineering Chemistry by ShashiChawla, DhanpatRai& Co. (2015).
4. Spectroscopy of Organic Compounds by P. S. Kalsi, New Age International (2007).
5. Nanotechnology: principles and practices by S.K. Kulkarni, Springer (2014).
6. Instrumental methods of Chemical Analysis by GurdeepChatwal, Himalaya publishing house (1996).
7. Engineering Chemistry byJain and Jain, DhanpatRai Publishing Co.(2016).
8. Engineering Chemistry by Wiley India (2012).
9. Engineering Chemistry by O.G. Palanna, McGraw-Hill Education.
10. Introduction to Nanoscience and Nanotechnology by K. K. Chattopadhyay, A. N. Banerjee. PHI Learning (2009).

Reference Books:
1. Hydrogen as a fuel by Ram D. Gupta, C.R.C.Publication (2009).
2. Instrumental Methods of Analysis by H. H. Willard, L. L. Merritt, J. A. Dean, F. A. Settle, 6 th Edition, CBS

Publisher.

3. Organic Spectroscopy by William Kemp, 3 rd edition, , John Wiley and Sons, Palgrave publication.

4. Polymer Science by V.R.Gowariker,, New Age International Publication (2015).

5. Nanotechnology by T. Gregory, Springer Verlog New York (1999).

6. Introduction to Nanotechnology by Charles P. Poole, Frank Owens, John Wiley & Sons (2003)

7. Engineering Chemistry by Wiley India Pvt. Ltd,First edition 2011.

Course:	Basic Electrical and Electronics Engineering			Code:		BFE2304	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Continuous Evaluation**	**MTE**	**ETE**	**Total**
2	-	-	2	20	30	50	100

Pre-requisite:
1. Electron theory
2. Ohms law
3. Magnetism
4. Number system
5. Semiconductor theory

Objectives:
1. To provide working knowledge for the analysis of basic DC circuits.
2. To build strong conceptual understanding of single phase and polyphase AC circuits with phasor diagram representation.
3. To impart basic knowledge for conceptual understanding of DC and AC machines.
4. To introduce fundamental concepts of analog and digital electronics.

Outcomes:
After learning the course, students will be able to
1. Apply the knowledge of DC circuits to solve the complex networks and to define the various terms related to magnetic circuits.
2. Apply the knowledge of single phase and three phase circuits to determine unknown electrical quantities.
3. Demonstrate the constructional features and operational details of DC and AC machines.
4. Identify type of diodes, transistor configurations as well as to build and test digital circuits using logic gates and flipflops.

Detailed Syllabus   **(UG – 4 Units)**

Unit	Description	Duration (Hrs)
I	**Electric and magnetic circuit** **Electric Circuits:** Classification of electrical networks, Source transformation, Simplification of networks using series and parallel combinations, Star delta transformation, Kirchhoff's laws (loop Current analysis), **Magnetic Circuit:** Flux, flux density, reluctance, MMF, permeability and field strength, their units and relationships; comparison of electric and magnetic circuit, Series magnetic circuit with air-gap.	**6**
II	**Single and three phase AC circuits** **Single phase AC Circuits:** AC Quantities, Single phase ac circuit analysis (R, L, C, R-L-C series) on the basis of impedance, admittance, concept of active, reactive, apparent power and power factor etc. **Three phase AC Circuits:** Introduction to 3 phase supply and its necessity, balance three phase system, relation between line and phase quantities (with phasor diagram), power in three phase circuits for star and Delta connection	**6**
III	**DC and AC machines** **DC Machines**: Construction, working principle of D.C. generator, emf equation of D. C. generator (derivation not expected), working principle of D.C. motor, types of D.C. motor, Back emf (Numerical), Industrial applications. **AC Machines: Single phase transformers:** Construction, operating principle, emf equation,	6

IV	**Analog and digital electronics**	
	Analog Electronics	
	Diode: Ordinary Diode, LED, Photodiode and Zener Diode: Construction, symbol, working, characteristics, applications etc.	
	Transistor: construction, types, operation; transistor configuration (CE, CB and CC): characteristics.	
	Digital Electronics	6
	Logic Gates: Fundamental, derived and exclusive logic gates: symbol, operation, truth table, timing diagram; concept of universal gates	
	Combinational Logic Circuit: Reduction of digital expressions by Boolean algebra and De Morgan's Theorem, half and full adder	
	Sequential Logic Circuit: Flip – Flop (SR, JK & T): construction, working, truth table; types of Triggering.	
	Total Hrs.	**24**

Text Books:
1. "Theory and problems of Basic Electrical Engineering" by I. J. Nagrath and Kothari (PHI learning Pvt.Ltd), Eastern Economy Edition.
2. "Fundamentals of Electrical Engineering" by Ashfaq Husain ,4th Edition. (Dhanpat Rai &Co.),
3. "Basic Electrical Engineering" by V. N. Mittal and Arvind Mittal, 2nd Edition. (McGrawHill),
4. "Basic Electrical Engineering" by V.K. Mehta, 1st Revised Edition (S. Chand & Co. Pvt. Ltd. NewDelhi)..
5. "Electronics Devices" by Thomas. L. Floyd, 9th Edition, Pearson
6. "Modern Digital Electronics" by R.P. Jain, 4th Edition, Tata McGrawHill

Reference Books:
1. "Basic Electrical Engineering" by D. C. Kulshreshta 1st Edition (Tata McGraw hill).
2. "A textbook of Electrical Technology Vol I "by B. L. Theraja and A. K. Theraja S. Chand & Co. Pvt. Ltd. New Delhi, 1st Edition.
3. A textbook of Electrical Technology Vol II "by B. L. Theraja and A. K. Theraja S. Chand & Co. Pvt. Ltd. New Delhi, 1st Edition
4. "Electrical Technology" by Edward Hughes, 10th Edition (Pearson).
5. "Digital Fundamentals" by Thomas L Floyd, 10th Edition (Pearson).
6. "Digital design" by M. Morris Mano, 3rd Edition (Pearson)
7. "Fundamentals of digital circuits" by Anand Kumar, 2nd Edition Prentice Hall of India

Course :	Programming & Problem Solving				Code :		BFE2308	
Teaching Scheme					**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**	
1	-	-	1	-	20	30	50	

Prerequisite: Students are expected to have a good understanding of basic computer principles.

Course Objectives:
- To acquaint with problem solving, problem solving aspects, programming and various program design tools.
- To develop problem solving skills with computers.
- To develop competency for the design, coding and debugging.
- To build the programming skills using 'Python Language'.

Course Outcomes*:
After learning the course, the students will be able to:
1. Apply skills in problem solving for finding solutions to real life problems.
2. Analyze the methods and apply the most appropriate one for solving problems.
3. Apply Programming logic/logical constructs of Python language for problem solving.
4. Demonstrate significant experience with the „Python" program development environment.

*Attainment of the above course outcomes shall be computed on the basis of evaluation of theory and laboratory work of the same course.

Detailed Syllabus:

Unit	Description	Duration (Hrs)
I	**Problem Solving Using Computers**: General problem solving strategies, Top down design, Introduction to program planning tools- algorithm, flowcharts, pseudo codes. Introduction to Logic Structures: Sequential structure, decision Structure, Basics of Python Programming: Features of Python, literal constants, variables and identifiers, input operation, Reserved words, Indentation, Operators and expressions. **Case Study:** Exchanging the values of two variables, summation of a set of numbers.	2
II	**Decision Control Statements:** Decision control statements, selection/conditional branching statements, loop Structures/Iterative statement, selecting appropriate loop. Nested loops, break, continue, pass, else statement used with loops. Other data types- Tuples, Lists and Dictionary. **Case Study:** Factorial Generation of the Fibonacci Sequence, reversing the digits of an integer.	3
III	**Functions and Modules:** Need for functions, Function: definition, call, variable scope and lifetime, the return statement. Defining functions, Lambda or anonymous function, documentation string, good programming practices. Introduction to modules and packages, Introduction to standard library modules and packages.	4
IV	**Strings and Operations:** concatenation, appending, multiplication and slicing. Strings are immutable, strings formatting operator, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, iterating strings, the string module.	3
	Total	12

Text Books:
1. How to Solve it by Computer, R. G. Dromey, First edition, Pearson Education
2. "Python Programming Using Problem Solving Approach", Reema Thareja, Second edition Oxford University Press.
3. "Core Python Programming", R. Nageswara Rao, Second edition, Dreamtech Press.

Reference Books:
1. Problem Solving and Programming Concepts, Maureen Spankle, 9th edition, Pearson
2. Head First Python- A Brain Friendly Guide, Paul Barry , 2nd Edition.
3. Python: The Complete Reference, Martin C, fourth edition Brown, McGraw Hill Education..
4. Programming and Problem Solving with Python ,Ashok Namdev Kamthane, , McGraw Hill Education

Course :	Workshop Practices			Code :	BFE2303		
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**
-	2	-	1	50	-	-	50

Prior Knowledge of :
1. Algebra
2. Geometry

Course Objectives:
1. To introduce various machine tools and demonstration on machining

2. To introduce different materials in engineering practices with respect to their workability, formability and machinability.

3. To develop skills through hands on experience.

Course Outcomes:
After learning the course, the students will be able to:
1. Select various manufacturing processes for given material.
2. Use various hand tools and basic measuring instrument used for carpentry, welding, fitting, and sheet metal operation.
3. Identify advanced manufacturing processes.
4. Apply safety practices on shop floor.

List of Experiments:
1. Introduction to safety measures.

2. Demonstration of Manufacturing processes (Machining: Turning, Drilling, Milling and grinding using one simple machine component and sheet metal operations): Working, operation and types

3. Demonstration of sand casting and plastic molding: Preparation of sand mold and molding of simple plastic component

4. Finishing, inspection and assembly of machine components using different tools (Finishing, assembly) and measuring instruments. (For jobs made during preceding practical)

5. Demonstration of Advanced Manufacturing processes (CNC Machining, Additive manufacturing using one simple machine component)

6. Demonstration of electrical and electronic component assembly

7. Carpentry-1 Job involving joint and wood turning

8. Fitting – 1 Job involving fitting to size, male female fitting with drilling and tapping.

9. Joining – 1 Job involving welding (Arc), soldering, brazing etc.

10. Dismantling and Assembly of simple machines.

Note:
1. Assignment one is mandatory.
2. Any four from experiment number 2to 6.
3. Students willperformany two utility jobs from experiment number 7 to 10.

Submission: Two jobs as mentioned above and write up of demonstration with sketches/illustration.

Reference Book:
1. Hajara Choudhari, Bose S.K. – Elements of workshop Technology Vol. I & II, Asian Publishing House.
2. Raghuvanshi, B. S. - Workshop Technology. Vol. 1 & 2, Dhanpat Rai & Co. (P) Ltd, Delhi.
3. P.N.Rao - Manufacturing Technology Volume I & II, McGraw Hill Education (India) Private Ltd

Course :		Mini Project with Basics of Innovations			Code : BFE2701			
		Teaching Scheme			**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**	
	4		2	50			50	

Prior knowledge of:
1Knowledge of basic sciences till higher secondary level.

Course Objectives:
1 To inculcate learning by doing approach in Mini Project will promote long-term retention of material and replicable skill, as well as improve teachers' and students' attitudes towards learning.
2To engage students in rich and authentic learning experiences.
3To provide every student the opportunity to get involved either individually or as a group so as to develop the team skills and learn professionalism.

Course Outcomes:
After learning the course, the students should be able to:
1. Understand concepts of discovery, invention, innovation and research.
2. Identify projects relevant to societal needs/conservation of environment/scope of the subject.
3. Apply the technological knowledge to design various feasible solutions.

Detailed Syllabus:

Unit	Description	Duration (Hrs)
5.	**Research Paper:** Conferences (national and international), journals (national and international), research paper (national and international), meaning of impact factor and citation index, Web of Science, Scopus, etc. **Research Ethics:** Plagiarism, authorship, use of language, protecting confidentiality, conflicts of interest. **Literature Review:** Effective searching of literature, summary of literature review.	2
2.	**Structure of Concept Note:** Title of an idea, introduction, brief description with sketch, goal and objectives, impact and uniqueness of idea, time required for developing the prototype, approximate cost analysis. **Structure of Research Paper**: Title and abstract, introduction, method, evaluation, conclusion, references, writing a research paper-style of writing and formatting.	2
3.	**Introduction to Innovation:** What is Innovation?, inter-disciplinary view, fundamental and applied with example and importance of both, engineering inventions, videos of great inventions	**2**
4.	**Design Thinking:** What is Design Thinking (DT)? Phases of DT, DT or 'Out of the Box' thinking, DT is an iterative and non-linear process, case studies.	2
5.	**Intellectual property (IP):** Introduction to IPR, overview & importance, patents, copyrights, role in commerce, importance, case studies in IPR. **Patent Search:**What is a patent search? Types of patent search, step to start a planet patent search, patent search in Google patent search	2
6.	**Basics of Entrepreneurship:**Introduction, types of entrepreneurs, process of entrepreneurship, theories of entrepreneurship, social responsibility of entrepreneur, startup policies.	2
	Total Hrs	**12**

Exercises:
1. Identify International/National Journals in your project domain and patent search in Google patents
2. Presentation based on literature survey for the project.
3. Model/poster (A3 Size)/report writing/research article based on project.
4. Demonstration/exhibition based on carried out work.

Course: Engineering Chemistry Laboratory				Code : BFE2205			
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**
-	2	-	1	50	-	-	50

Course Objective:
1. To help students to procure conceptual clarity of Engineering Chemistry through laboratory experiments.
2. To develop experimental skills to acquire insight into societal and environmental issues.

Course outcome:
Students will be able to:
1. Perform instrumental and non-instrumental experiments safely, collect and interpret the data and analyse the results.
2. Work effectively in team as well as independently to demonstrate excellent laboratory skills.
3. Acquire awareness of ethical, societal and environmental issues with green chemistry approach.

List of Experiments: (Any 10 experiments from the following list)

1. Determination of total hardness of water sample by EDTA method and softening using ion exchange resin.
2. Determination of total alkalinity of the water sample.
3. Titration of a mixture of weak acid and strong acid with strong base using a Conductivity meter.
4. To determine the dissociation constant of a weak acid (acetic acid) using pH meter
5. To determine the maximum wavelength of absorption of $CuSO_4$, verify Beer's law and find unknown concentration in the given sample.
6. Study Practical:- Structural identification of unknown compounds by UV and IR spectroscopy..
7. To prepare the Phenol formaldehyde resin or polypropylene.
8. Proximate analysis of Coal.
9. To determine the Electrochemical equivalent (ECE) of Cu.
10. Study of corrosion of metals in a medium of different pH.
11. Chromatographic separation of ortho- and para nitro-phenol.
12. Microwave assisted solid phase organic synthesis.
13. Soil analysis.

Laboratory manual :
1. Vogels Text book of Qualitative Chemical Analysis by J.Mendham, R,C,Denny, J.D.Barnes, M.J.K.Thomas, 6 e, Pearson Education ltd.
2. Applied Chemistry Theory and Practice by O.P.Virmani and A.K.Narula, 2e, New age International (P) Ltd.

Course : Basic Electrical and Electronics Engineering				Code :		BEFE2305	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**
-	2	-	1	50	-	-	50

Course Objectives:
1. To impart Comprehensive understanding of the fundamentals of electrical and electronic circuits.
2. To provide working knowledge for the analysis of basic DC and AC circuits.
3. To provide hands on experience for conceptual understanding of DC machines, AC machines & measuring instruments.
4. To provide knowledge of Building, Testing and analyzing concepts of basic electronic circuits

Curse Outcomes:
After learning the course, students will be able to
1. Be familiar with electrical safety, measuring instruments and energy calculations.

2. Demonstrate AC and DC circuits/ machines by performing different experiments.

3. Verify the theoretical characteristics of diodes, transistors experimentally and construct logic circuits.

List of Experiments:
Group A

 From following any **three** Practical are to be study:
1. To study of various wiring accessories, earthing system and safety precautions while working with electrical systems.
2. Study of Electricity bill of LT consumer.
3. Study of Different parts of DC Machine.
4. To study various electronics circuit components and allied accessories.
5. To study digital multimeter, digital trainer kit and CRO.

 Group B
 From following any **seven** Practical are to be performed:
1. To verify Kirchhoff law in a DC network
2. To measure steady state response of series RL and RC circuits on AC supply and observations of voltage and current waveforms.
3. To verify the relation between phase and line quantities in three phase balanced star and delta connections of load.
4. Perform load test on DC Shunt Motor to determine the efficiency.
5. Perform speed control of DC Shunt Motor to plot characteristics.
6. To determine efficiency and regulation of single-phase transformer by direct loading test.
7. To Plot V-I characteristics of P-N Junction Diode and Zener Diode.
8. To Plot input and output characteristics of CE Transistor configuration.
9. Implementation of Half Adder & Full Adder using Logic Gate IC's.
10. Verify its truth table SR, JK & T flip flops.

Course : Programming and Problem Solving Laboratory				Code :			BFE2309
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**
-	4	-	2	50	-	-	50

Course Objectives:

1 To make the student learn python programming language.

2 To implement decision and looping using python programming.

3 To implement string programs using python programming.

Course Outcomes:

After learning the course, the students will be able to:
1. Use basic python programming constructs to solve real life problems.
2. Illustrate the use of conditional statements in python programming language.
3. Apply the concepts of loops in python programs.
4. Implement python programming to work with advance data types.

Assign ment No.	**Suggested List of Experiments(Any 10)** **Write a program in Python (with function as applicable)**	Duration (Turns)
1	Give the values of the variables x,y and z, Write a program to rotate their values such that x has the value of y, y has the value of z and z has the value of x.	2
2	To calculate salary of an employee given his basic pay (take as input from user). Calculate salary of employee. Let HRA be 10 % of basic pay and TA be 5% of basic pay. Let employee pay professional tax as 2% of total salary. Calculate salary payable after deductions.	1
3	To accept total number of minutes as input and then output as hrs + minutes. Ex:- 90 minutes=1hr 30 mins	1
4	To accept an object mass in kilograms and velocity in meters per second and display its momentum. Momentum is calculated as e=mc2 where m is the mass of the object and c is its velocity.	1
5	To accept marks of five courses of students and compute his/her result. Student is passing if he/she scores marks equal to and above 40 in each course. If student scores aggregate greater than 75%, then the grade is distinction. If aggregate is 60>= and <75 then the grade is first division. If aggregate is 50>= and <60, then the grade is second division.If aggregate is 40>= and <50, then the grade is third division.	1
6	To read the coordinates (x, y) (in Cartesian system) and find the quadrant to which it belongs (Quadrant -I, Quadrant -II, Quadrant -III, Quadrant -IV).	1
7	A hotel has a pricing policy as follows: 2 people: 2500Rs. 3 people: 3500Rs. 4 people: 4500Rs. Additional people: 1000Rs. per person If the customer is staying on company business, there is a 20% discount. If the customer is over 60 year age, there is a 15% discount. A customer does not receive both discounts. Given the above data, print the cost of the room.	1
8	To check whether input number is Armstrong number or not. An Armstrong number is an integer with three digits such that the sum of the cubes of its digits is equal to the number itself. Ex. 371.	2
9	Teacher is doing the analysis of internal examination of a students. She has conducted programming & problem solving course test with maximum marks 25	2

	where students have to score at least 12 marks to clear the test. Now she wants to find top scorer, lowest scorer, total number pass and fail student. Apply the logic and perform the given task.		
10	Write a program to simulate simple calculator that performs basic tasks such as addition, subtraction, multiplication and division with special operations like computing xy and x!.	2	
11	Accept number from 1 to 12 and print equivalent month of a year.	1	
12	Write a program to accept the number and Compute a) square root of number, b) Square of number, c) Cube of number d) check for prime, d) factorial of number, e) prime factors.	2	
13	The students want to play a game in which blocks are used denoting some integer from 0 to 9. These are arranged together in a random manner without seeing to form different numbers keeping in mind that the first block is never a 0. Once they form a 5 digit number they read in the reverse order to check if the number and its reverse is the same. If both are same then the player wins.(Palindrome)	2	
14	Trainer is conducting a session for all 20 employees. She has a employee ids of all employee represented in 6 digit numbers. She wants to make two group of employee based on even number employee ID or odd number employee ID. Identify the steps to solve the problem and implement it.	2	
15	Programmer is teaching a course to students. There are N students attending the course, numbered 1 through N. Before each lesson, he has to take attendance, i.e. call out the names of students one by one and mark which students are present. Each student has a first name and a last name. In order to save time, He wants to call out only the first names of students. However, whenever there are multiple students with the same first name, he has to call out the full names (both first and last names) of all these students. Help him to decide, for each student, whether he will call out this student's full name or only the first name. Input: List of all student names(First & Last name)	2	
16	Consider you have created a website in which you are accepting details of users where you have to take password from user. Write a program in C to accept password from user with following condition: 1. Minimum characters 6 and maximum are 12. 2. At least one digit and one characters. 3. At least one special symbol (@, $,#) .	1	
Total		**24**	

Implement a Mini Project to use all the concepts of course

Text Books:
1. How to Solve it by Computer, R. G. Dromey, First edition, Pearson Education
2. "Python Programming Using Problem Solving Approach", Reema Thareja, Second edition Oxford University Press.
3. "Core Python Programming", R. Nageswara Rao, Second edition, Dreamtech Press.

Reference Books:
    1   "Problem Solving and Programming Concepts", Maureen Spankle, 9th edition, Pearson
    2   "Head First Python- A Brain Friendly Guide", Paul Barry , 2nd Edition.
    3   "Python: The Complete Reference", Martin C, fourth edition Brown, McGraw Hill
Education..
    4 "Programming and Problem Solving with Python" ,Ashok Namdev Kamthane, , McGraw Hill Education

Course: HSMC2 (English)				Code			BFE2104
Teaching Scheme				**Evaluation Scheme**			
Lecture	Practical	Tutorial	Credit	Internal Evaluation	MTE	ETE	Total
1	2	-	2	30	-	20	50

Prior knowledge of:
    1. Basic Knowledge of English grammar.
    2. Basic Vocabulary, Listening and Speaking Skills

Course Objectives:
    1. To develop reading and writing skills for effective communication.
    2. To develop a sense of confidence among students to present themselves at professional as well as societal levels.
    3. To enhance language competence.

Course Outcomes: After learning the course, students will be able to
    1. Formulate advanced, grammatically correct and meaningful sentences to communicate effectively
    2. Develop reading skills to comprehend the given text
    3. Write and communicate effectively in formal and informal situations
    4. Communicate effectively and deliver Presentations with appropriate body language.

Detailed Curriculum

Unit	Description	Duration (Hours)
I	**Application of Grammar:** Effective use of active/passive voice, Understanding usage of simple, compound & complex sentences, Misplaced modifiers, Determiners	3
II	**Reading Skills:** Importance of reading with punctuations, types of reading, Reading between and beyond the lines, Barriers to reading and techniques to improve reading, Skimming and scanning, Focus on syllable, stress, intonation and pitch, Reading comprehension	3
III	**Writing Skills:** Focus on writing structure, stages of writing (Pre, while and post), Cohesion and Coherence, Technical, writing, Importance of punctuations. Paragraph writing, Letters and Report Writing	3
IV	**Fundamentals of Communication:** Importance of communication, the process of communication, Barriers in communication, ways to improve, Principles of communication, Verbal-nonverbal communication, Writing CV, Email communication &email etiquettes, Effective presentations	3

Reference Books:

1. Effective Telecommunication Communication by Rizvi, M.Ashraf, McGraw- Hill
2. Communication Skills for Engineers by S.Mishra & C.Muralikrishna,Pearson Education
3. English for Technical Communication by K.R.Lakshminarayana,SCITECH
4. Creative English for Communication by Krishnaswami, N and Sriraman, T,Macmillan
5. Written Communication in English by Saran Freeman, Orient Longman3.Communication Skills for Engineers by S. Mishra & C. Muralikrishna (Pearson)

Course:	HSMC-2 (Japanese Language)			Code:		BFE2105	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total Marks**
2	-	1	2	30	-	20	50

Prior Knowledge of:
1. To make use of learnt English/Marathi/Hindi language for learning Japanese language.
2. Willingness to learn a foreign language and positive attitude towards the language and culture of Japan.

Course Objectives:
1. To make students aware about basic Kanjis.
2. To understand counting, time and basic verbs.
3. Students will develop language skills namely speaking, reading and writing skills for providing and obtaining information.
4. To express a basic schedule using time and days.

Course Outcomes:
After learning the course, the students will be able to:
1. Develop language skills namely speaking, reading and writing skills for socializing, providing and obtaining information.
2. Compose simple enquiry based conversation.
3. Recognize and write intermediate kanjis.
4. Express their feelings using time, days, dates and basic verbs.

Detailed Syllabus:		**(UG – 4 Units)**	
Unit	**Description**		**Duration (Hrs)**
1	**Unit I: Counting (Numbers and Kanjis)** Speaking: Counting numbers. Listening: Listening to the numbers. Writing: Writing numbers in Hiragana and Kanjis Reading: Reading price of tags. Test on Numbers.		**6Hrs.**
2	**Unit II: これ を ください。(Please give me this)** Speaking: Locating the things. Listening: Conversation (L-3) Writing: Dialogues between a shopkeeper and a customer.. Reading: Reading price of tags Grammar: Demonstratives(ここ、そこ、あそこ どこ,こちら、そちら、あちら どちら etc),particles.		**8 Hrs.**

3	**Unit III: Days and Dates**
	 Speaking: Reading the calendar.
	 Listening: Conversation based on L-4
	 Writing: Writing kanjis of days of the week.
	 Reading: Reading the clock, Lesson reading no.-4
	 Grammar: Introduction to
	    1. particles(は、か、も、か)
	    2. Verb(です、では ありません)
			10 Hrs.

4	**Unit IV: Timing and Verbs** Speaking: Talking about daily routine. Listening: Conversation based on L-5		**12 Hrs.**

	Writing: Writing daily routine using verbs and timing.	
	Reading: A clock	
	Grammar**:**	
	1. Verbs (Gr I,II ,,III)	
	2. Particle に,へ,を	
	Test on grammar	

Text Books:

1. Minna no Nihongo Part I and II , Nihongo Shoho

Reference Books:

2. MO MO Japanese for Class VII
3. MO MO Japanese for Class VII
4. MO MO Japanese for Class VII workbook
5. MO MO Japanese for Class VIII workbook
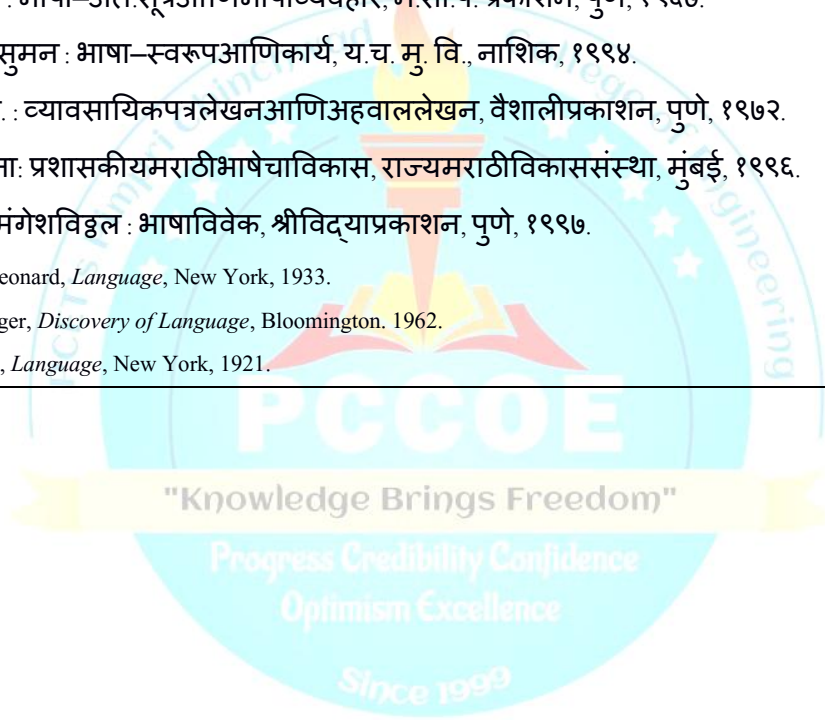6. Genki I,II
7. Japanese for busy people.

Course: HSMC-2 (German)						Code: BFE2106	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**
1	2	-	2	30	-	20	50
Prior Knowledge of:							
Willingness to learn a foreign language; Positive attitude towards and interest in foreign cultures.							
Course Objectives							
1. To familiarize students with German language using day-to-day topics with the help of language skills namely listening, reading, speaking and writing. 2. To equip students with basic language skills for the purpose of socializing, providing and obtaining information, expressing personal feelings and opinions. 3. To develop intercultural competence and understanding of perceptions, gestures, family and community dynamics.							
Course Outcomes:							
After the completion of the course, students will be able to 1. Understand intermediate level sentences which involve vocabulary related to routine activities, company, health, and habitation. 2. Write intermediate level sentences using grammar and vocabulary. 3. Communicate in formal situations at company, office, and clinic. 4. Express themselves through written communication.							
Detailed Syllabus							

Unit	Description	Duration (Hrs)
I	**Tag für Tag** [Day after day] Clock time; routine activities; time data; arranging informal meeting; SMS Grammar: temporal prepositions; modal auxiliaries I; separable verbs	9
II	**Neu in der Firma** [New in the company] Departments & posts in the company; formal letters; operating manuals Grammar: Dative case	9
III	**Die Wohnung** [The habitation] Furniture & household appliances; rented apartment advertisements; invitation to housewarming Grammar: Adjectives; locative prepositions	9
IV	**Gesund und munter** [Hale & hearty] Body parts; ailments; visit to a doctor; ailments & health tips Grammar: Imperative sentences (formal); modal auxiliaries II	9
	Total	**36**

Text Books:
3. Netzwerk A1
4. Linie A1

Reference Books:
6. Starten wir!
7. DaF im Unternehmen
8. Berliner Platz neu
9. Studio d A1
10. deutsch üben A1

Course :	Marathi						Code : BHM2107	
Teaching Scheme				**Evaluation Scheme**				
Lecture		**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**
1		2	-	2	30	-	20	50

Prior knowledge
1. Basic knowledge of grammar andphonetics
2. Basic word power, speaking and listeningskills

उद्दिष्टे :

१. भाषाव्यवहारआणिभाषिककौशल्येह्यांचेज्ञानहोणे.

२. विविधकौशल्यांशीनिगडितकार्यक्षेत्रांचेज्ञानहोणे.

३. श्रवण, संभाषण, लेखनआणिवाचनहीकौशल्येप्रगतहोणे.

४. प्रशासकीयक्षेत्रातीलभाषाव्यवहाराचेस्वरूपसमजणे.

५. प्रशासकीयक्षेत्रातीलभाषाव्यवहारकरण्याचीक्षमताप्राप्तहोणे

Outcome
1. भाषेच्यावापराचीसर्वसमावेशकक्षमता
2. मराठीभाषेचीश्रवण,संभाषण, लेखनववाचनक्षमतासंपादन
3. प्रशासनातीलमराठीभाषेचीउपयोजनक्षमता

Syllabus

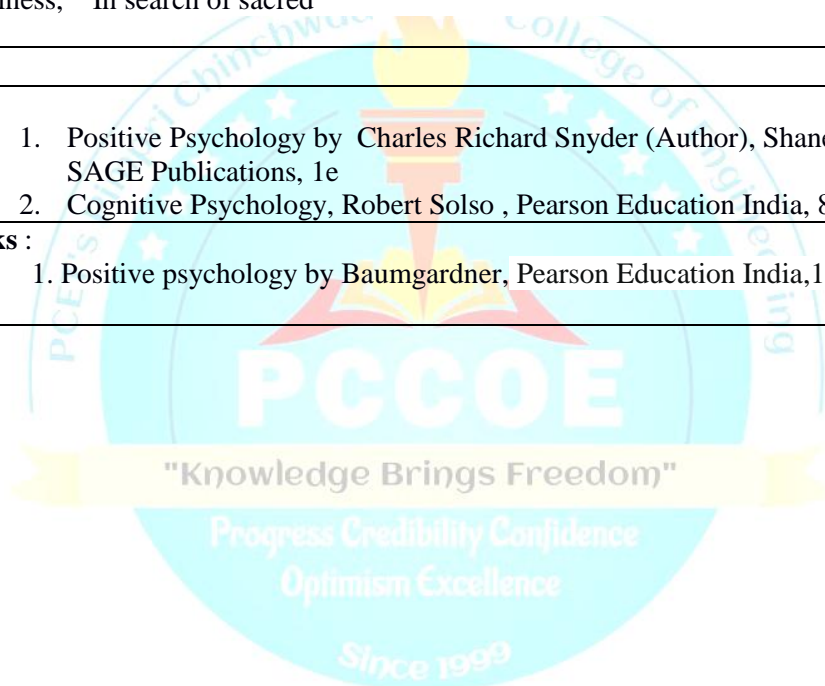| Unit	Description	Duration (Hrs)
I	**मानवीजीवनवभाषा** मानवीजीवनव्यवहारातीलभाषेचेवसंवादाचेमहत्त्व माहितीतंत्रज्ञान, संपर्कप्रक्रियेचावेगआणिभाषेचेवाढतेमहत्त्व भाषिककौशल्ये (श्रवण, संभाषण, वाचन, लेखन)	9
II	**मराठीभाषाकौशल्यांशीनिगडितकार्यक्षेत्रे** अ. जनसंपर्क, समुपदेशन, मुलाखत आ. संपादन, मुद्रितशोधन, परीक्षण	9
III	**मराठीभाषाकौशल्यांशीनिगडितकार्यक्षेत्रे** इ. काव्यवाचन, अभिवाचन, कथाकथन, सूत्रसंचालन, कार्यक्रमव्यवस्थापनातीलविविधप्रकारच्याजबाबदाऱ्या, आमंत्रण, संयोजन, आभारइ. यासाठीआवश्यकतोमौखिकलेखीसंपर्क ई. सारांश, निबंध, कल्पकलेखन - शुभेच्छापत्रे, आमंत्रणपत्रे, सन्मानपत्र, विज्ञानवतंत्रज्ञानकोशांच्यानोंदी, ध्वनिमुद्रण, जाहिरात.	9
IV	**प्रशासकीयक्षेत्रातीलसंस्थात्मकमराठीभाषाव्यवहार** अ.कार्यालयीनव्यवहाराचीपरिभाषा, कार्यालयीनअर्ज, सूचना, पत्र-मागण्यानोंदविणे, विनंतीपत्रे, तगादापत्रे आ.संस्थेच्यासर्वप्रकारच्याकामकाजाचे/सभांचे/बैठकींचेइतिवृत्त, निवेदन, अहवाल, प्रस्तावघटनांचीनोंद, कार्यवृत्त	9

		Total	**36**

संदर्भग्रंथ :

1. काळे,कल्याण (संपा.) : निवडकभाषाआणिजीवन, मेहतापब्लिशिंगहाऊस, पुणे, १९९८.

2. केळकर, अशोक : मध्यमा-भाषाआणिभाषाव्यवहार, मेहतापब्लिशिंगहाऊस, पुणे, १९९६.

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6. नेमाडे, भालचंद्र : साहित्याचीभाषा, साकेतप्रकाशन, औरंगाबाद, १९८९.

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8. पानसे, मु.ग. : भाषा–अंत:सूत्रआणिभाषाव्यवहार, म.सा.प. प्रकाशन, पुणे, १९६७.

9. बेलवलकर, सुमन : भाषा–स्वरूपआणिकार्य, य.च. मु. वि., नाशिक, १९९४.

10. बापट, श्री. ग. : व्यावसायिकपत्रलेखनआणिअहवाललेखन, वैशालीप्रकाशन, पुणे, १९७२.

11. भागवत,गीता: प्रशासकीयमराठीभाषेचाविकास, राज्यमराठीविकाससंस्था, मुंबई, १९९६.

12. राजाध्यक्ष, मंगेशविठ्ठल : भाषाविवेक, श्रीविद्याप्रकाशन, पुणे, १९९७.

13. Bloomfield, Leonard, *Language*, New York, 1933.

14. Pedersen, Holger, *Discovery of Language*, Bloomington. 1962.

15. Sapir, Edward, *Language*, New York, 1921.

Course :	Self-Healing Psychology					Code :		BHM2108
Teaching Scheme				**Evaluation Scheme**				
Lecture	**Practical**	**Tutorial**	**Credit**	**Continuous Evaluation**	**MTE**	**ETE**		**Total**
2	-	-	2	30	-	20		50

Course Objectives:

1. To bring an experience marked by predominance of positive emotions and informing them about emerging paradigm of Positive Psychology

2. To enable the students facilitation and enhancement of skills required for decision-making

3. To acquaint and enrich students understanding of major concepts and theories of cognitive psychology

4. To Explain social exchange theory in relationships

Course Outcomes: After learning the course, the students should be able to:

1. Becoming aware of strengths, Have greater insight into decision-making processes and use that insight to make more effective decisions

2. Developing memory skills, Describe cognition and problem-solving strategies

3. Understand benefits of optimism, hope and helping nature, Understand some of the cognitive processes in terms of current theories, models and applications

4. Awareness about spirituality Learn how intentionally to cultivate positive emotions such as gratitude, joy, kindness, compassion, equanimity, and forgiveness

Detailed Syllabus:

Unit	Description	Duration (in Hrs.)
1.	**UNIT 1: Positive Emotional States and Processes**: 1.1 Discovering your strengths: Classification and measures of strength, developmental assets, identifying your personal strengths. 1.2 Living well at every stage: What is resilience, Positive youth development, life tasks of adulthood, successful aging. 1.3 Concept formation logic and decision making: Association, Inferences and Deductive reasoning, Syllogistic Reasoning, Inductive reasoning, Decision Making in real world, Estimating Probabilities.	6
2.	**Unit-2 Thinking and Intelligence** 2.1: Problem solving: Gestalt psychology and problem solving, Representation of a problem, Internal representation and problem solving. 2.2 Mnemonics: Method of loci, Peg word system, Key Word method, Organizational schemes, Recall of Name, Recall of Words. 2.3 Self efficacy: Definition, Childhood Antecedents, The neurobiology of Self-	6

	Efficacy, Self-efficacy's Influence in life arenas.	
3.	**Unit-3 : Positive Cognitive States and Processes-I** 3.1 Optimism: Learned Optimism - Seligman , Optimism – Scheier and Carver, primary prevention, primary enhancement 3.2: Hope: Definition, Snyder Hope theory, Childhood Antecedents of Hope, Scales. 3.3: Altruism: Defining Altruism, Egotism Motive, Empathy Motive, Cultivating Altruism.	6
4.	**Unit-4: Prosocial Behavior** 4.1: Gratitude: Defining Gratitude, Cultivating Gratitude, Measuring Gratitude. 4.2: Forgiveness: Defining Forgiveness, Cultivating Forgiveness, Measuring Forgiveness 4.3: Mindfulness(Mindfulness: theory and practice) and spirituality: Mindfulness as a state of mind, Living with Mindfulness, Benefits of Mindfulness, In search of sacred	6
	Total	24

Text books :
1. Positive Psychology by Charles Richard Snyder (Author), Shane J. Lopez , SAGE Publications, 1e
2. Cognitive Psychology, Robert Solso , Pearson Education India, 8e

Reference books :
1. Positive psychology by Baumgardner, Pearson Education India,1e

Course :	Life Skill course	Code : BFE2902

Course Objectives:
1. To understand importance of physical activities and awareness about the health.
2. To provide platform to express their mind, body and the emotions through performing arts.
3. To provide suggestions and guidance for their personality improvement.

Course Outcomes: Students will be able to
1. Develop their interest in terms of hobbies and physical health
2. Explore self-pace and use it in one's growth
3. Understand social need and act accordingly
4. Express their thoughts for the situation in real life

Detailed Syllabus:

Unit	Description	Duration (Hrs)
3.	**Yoga:** Physical activities and Meditation **Sports:** Basket ball,Table tennis, Football and Volleyball **Performing arts:** Painting/ Sketching/ Drawing	16
4.	**Guest lecture** Motivational lecture. Guest lectures by Eminent personality	4
5.	**Social awareness** Social awareness activities to understand the social responsibility,	2
6.	**Story telling**	2
	Total Hrs	**24**