Pimpri Chinchwad Education Trust's
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Pimpri Chinchwad College of Engineering

(An Autonomous Institute, affiliated to Savitribai Phule Pune University)

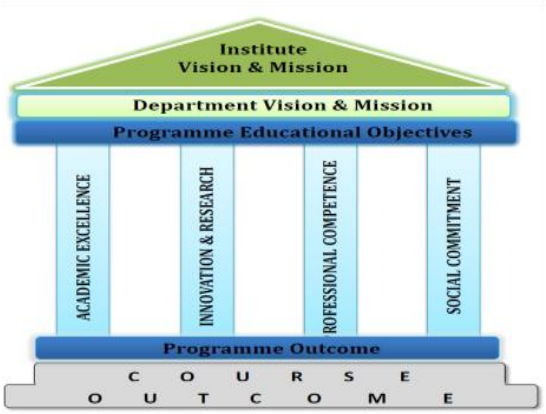
Curriculum Structure & Syllabus of

FY B.Tech

Civil Engineering

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

With effect from Academic Year 2022-2023
(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
CIE	Continuous Internal Evaluation /Examination
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
LS	Life Skills
UHV	Universal Human Values
Eng.	English
Jap.	Japanese
Ger.	German

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

B.TECH. Semester –I

Course Code	Course Type	Course Name	Teaching Scheme				Credit	Evaluation Scheme						
			Lec	Prac	Tut	Hrs		CIE		ETE	T W	P R	O R	Total
								IE	MTE					
BFE1207	BSC	Linear Algebra &Univariate Calculus	3	-		3	3	20	30	50		-	-	100
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
BFE1318	ECC	Basic Civil Engineering	2	-	-	2	2	20	30	50	-	-	-	100
BFE1208	BSC	Linear Algebra &Univariate Calculus tutorial	-	-	1	1	1	-	-	-	50	-	-	50
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
BFE1319	ECC	Basic Civil Engineering Lab	-	2	-	2	1	-	-	-	50	-	-	50
BFE1101/ 02/03/09	HSMC	HSMC-1(Eng./Jap./Ger./Business story telling)	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						
			Lec	Prac	Tut	Hrs		CIE		ETE	T W	P R	O R	Total
								IE	MTE					
BFE2209	BSC	Multivariate Calculus	3	-	-	3	3	20	30	50	-	-	-	100
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	2	-	-	2	2	20	30	50	-	-	-	100
BFE2303	ECC	Workshop practices	-	2	-	2	1	-	-	-	50	-	-	50
BFE2702	PROJ	Mini project & basics of innovation	-	4	-	4	2	-	-	-	50	-	-	50
BFE2210	BSC	Multivariate Calculus tutorial	-	-	1	1	1	-	-	-	50	-	-	50
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	-	2	-	2	1	-	-	-	50	-		50
BFE2104/05/06/ 10/BHM2107/ 08/	HSMC	HSMC-2 (Eng./Jap./Ger./ Technical writing /Marathi Self-healing psychology/)	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: BFE1207	
Teaching Scheme				Evaluation Scheme			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**
3	-	-	3	20	30	50	100

Prior knowledge:

1. Elementary Mathematics. 2. Elementary Calculus is essential

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 Modeling 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** EigenValues and EigenVectors 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 models 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:** Eigenvalues, Eigen vectors, Cayley – Hamilton theorem, diagonalization, application to problems in the 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 ErwinKreyszig, 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.

E-sources:

1. **NPTEL Course lectures links:**
   https://www.youtube.com/watch?v=4QFsiXfgbzM&list=PLbRMhDVUMngeVrxtbBz-n8HvP8KAWBpI5

Program:	B. Tech			Semester:			II
Course:	Engineering Physics			Course Code:			BFE2202
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	Internal Evaluation	MTE	ETE	Total
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 application

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.

Unit	Description	Duration (Hrs)
I	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
II	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
III	Laser & Fiber Optics Laser: Introduction, interaction of light with matter- absorption, spontaneous emission, 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	8
IV	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 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 -	8

	alpha decay, tunnel diode & scanning tunneling microscope (STM)	
V	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**
VI	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); aerogels-types, properties and applications, applications of nanomaterials in medical, energy, automobile, space, defense; introduction to quantum computing.	**8**
	Total	**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.
3. Nanotechnology -Principles & Practices - Sulabha K. Kulkarni -Third edition -Capital Publishing Company.

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.

Program : **B. Tech**				**Semester: I**			
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

Program:	B. Tech.			Semester :		I	
Course :	Engineering Graphics			Code :		BFE1301	
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	Internal Evaluation	MTE	ETE	Total
1	-	-	1	-	20	30	50

Prerequisite: 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 engineering objects and draw orthographic projections
3. Read 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.**

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	2

	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.	
	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.

Program:	**B. Tech.**			**Semester:**	**I**		
Course:	**Basic Civil Engineering**			**Code:**	**BFE1318**		
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total Marks**
2	-	-	2	20	30	50	100

Prior knowledge of : 1. Basic Mathematics 2. Geography 3.Environmental Studies

Course Objectives:

1. To provide knowledge of basic areas in Civil Engineering and their applications along with role of civil engineer.
2. To impart hands on experience of leveling instruments and area measuring devices for field survey.
3. To build conceptual knowledge of various materials used for construction and building components.
4. To build conceptual knowledge of planning principles of building, green building and smart city/ village.

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

1. Recognise different areas of civil engineering and relate them with other fields of engineering.
2. Use modern surveying equipment for calculation of area of irregular figures, determination of coordinates etc.
3. Classify various basic and advanced construction materials, smart and eco-friendly materials & types of structures.
4. Draw building plan applying principles of building planning and bye-laws

Detailed Syllabus: (UG – 4 Units)

Unit	**Description**	**Duration (Hrs)**
1.	**Unit I - Introduction to Civil Engineering** **a.** Introduction to basic areas of civil engineering: surveying and planning, structural engineering, hydraulics and water resources engineering, geotechnical and foundation engineering, environmental engineering, transportation engineering, construction technology and management. **b.** Significance of infrastructural engineering, transportation modes. **Roads:** types, cross section and components of road. **Railway**: cross section and components of permanent way and functions. Role and responsibilities of civil engineer in any type of construction projects. Importance of interdisciplinary approach in civil engineering, need of automation in civil engineering.	**6**
2.	**Unit II - Field Surveys** a. Principles of surveying, classification of surveys (including remote sensing, or arial survey), plain scale and representative fraction (R.F), terms used in levelling, use of dumpy level, temporary adjustments. Types of levels, Methods of reduction of levels, contours, characteristics of contours, use of contour maps b. Introduction and use of Digital Planimeter, Global Positioning System (GPS) and Total Station, Electronic (Electromagnetic) Distance Measurement (EDM).	**6**
3.	**Unit III - Materials and Components of Buildings** a. Use of basic and advanced materials: Cement, concrete (PCC, RCC), pre-stressed and pre-cast concretes, bricks, stone, sand, reinforcing steel, smart and eco-friendly materials (recycled C&D waste) **b**. Substructure- Concept of bearing capacity of soil and settlement, foundation, functions of foundation, types of shallow foundation and introduction to pile foundation**.** **c.** Superstructure - Types of construction- load bearing, framed (RCC Structures) and composite structure.	**6**
4.	**Unit IV – Planning of Built Environment** **a.** Principles of building planning, viz. aspect, prospect, roominess, grouping, privacy, circulation, sanitation, orientation, elegance, economy, furniture requirement. b. Introduction to building bye laws and role of bye laws in regulating the environment, concepts of built-up area, carpet area and floor space index. Concept of green building, smart city/village.	**6**
	Total Hours	**24**

Text Books:

1.G K Hiraskar, Basic Civil Engineering, Edition 2004, Danpat Rai Publication
2.Surveying- N.N. Basak, Edition 2014 Tata Mc-Graw Hill
3. Building Construction and Drawing- Bindra and Arora, Edition 2012, Dhanapat Rai Publications.

Reference Books:

1. Building Construction and Drawing- Sushil Kumar, Edition 2010, Standard Publications, Delhi.
2. Surveying and Levelling- Kanetkar and Kulkarni, Edition 2014, PVG Publications.

3. Water Supply Engineering- S.K. Garg, 33rd edition 2019, Khanna Publishers, Delhi
4. Sewage Disposal and Air Pollution Engineering, S.K. Garg, 37th edition 2019, Khanna Publishers, Delhi
5. Irrigation and Water Power Engineering- B. C. Punmia, 16th edition 2019, Laxmi Publications
6. Highway Engineering -Khanna, C.E. G Justo, A.Veersrsgavan, Edition 2018, Nem Chandand Bros Publication.
7. Railway Engineering -S.C.Saxena, S.P.Arora, Edition 2015, Dhanpat Rai Publication.
8. National Building Code –Bureau of Indian Standards (latest)

Course: Linear Algebra & Univariate Calculus (Tutorial)						Code: BFE1208	
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	OR	PR	Total
		1	1	50	-	-	50

Prior knowledge of :

1. Elementary Mathematics. 2. Elementary Calculus is essential is essential

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 Modeling 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. **Solve** problems related to Linear Algebra & Univariate Calculus.
2. **Demonstrate** the related knowledge with understanding of formulae and their applications.

Detailed Syllabus:

Unit	List of Topics	Duration (Hrs)
I	**Assignment 1 on Matrices-I: Problems on** Rank, normal form, system of linear equations with applications in Electrical circuits, linear dependence and independence, linear and orthogonal transformations.	2
II	**Assignment 2 on Matrices-II: Problems on** Eigen values, Eigen vectors, Cayley – Hamilton theorem, diagonalization, application to problems to mass spring system.	2
III	**Assignment 3 on Differential Calculus-I: Problems on** Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Successive differentiation, Leibnitz theorem, application to find curvature.	2
IV	**Assignment 4 on Differential Calculus-II: Problems on** Taylor's series, Maclaurin's series, Indeterminate forms, L' Hospital rule, evaluation of limits.	2
V	**Assignment 5 on Differential equations: Problems on** Exact differential equations, differential equations reducible to Exact form, Linear differential equations, differential equations reducible to Linear form.	2
VI	**Assignment 6 on Application of DE: Problems on** Applications of differential equations to orthogonal trajectories, Kirchhoff's law of electrical circuits, rectilinear motion, one-dimensional conduction of heat, Newton's law of cooling.	2
	Total	12

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 ErwinKreyszig, 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.

Program:	B. Tech.			Semester: I		
Course:	Engineering Physics Laboratory			Code: BFE1203		
Teaching Scheme				Evaluation Scheme		
Lecture	Practical	Tutorial	Credit	TW	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. Evaluate the process and results of an experiment quantitatively and qualitatively- by performing experiments related to optics, semiconductors, magnetism & Laser

Units	Description (Any 10 experiments from following list)	Duration (Hrs)
1	Experiment based on Newton's rings (determination of wavelength of monochromatic light, determine 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	Any experiment based on Double Refraction (Determination of refractive indices, identification of types of crystal)	2
5	Any experiment based on Laser (Thickness of wire, determination of 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 find out 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
	Total	**24**

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.

Program: B.Tech						Semester : I	
Course :Engineering Mechanics Laboratory						Code :BFE1311	
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	OR	PR	Total
-	2	-	1	50	-	-	50

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 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 : After learning the course, 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.

Unit	List of Experiments: Experimental work comprises of the following 6 experiments & 4 assignments.	Duration (Hrs)
	Part - A	
1	Verification of law of polygon of forces.	2
2	Support reactions of simple beam.	2
3	Determination of coefficient of friction for belt.	2
4	Determination of forces in space force system (concurrent)	2
5	Curvilinear motion.	2
6	Determination of coefficient of restitution.	2
	Part - B	
7	Assignment on Each Unit (considering application based problems)	2
	Total	14

Program :	**B. Tech**			**Semester:**			**I**
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.**

Unit	**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**	**Duration (Hrs)**
1	Types of lines and dimensioning	**2**
2	Engineering Curves (min.5 problems)	**2**
3	Orthographic projections (min.2 problems)	**2**
4	Isometric views (min. 2 problems)	**2**
5	Free hand sketching of any existing/innovative product	**2**
6	Development of lateral surface of solids (min.3 problems)	**2**
7	One sheet using CAD software package (min. 2 problems)	**2**
	Total	**14**

Program:	**B. Tech.**			**Semester :**	**I**		
Course : Basic Civil Engineering Lab				**Code :**	**BFE1319**		
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total Marks**
-	2	-	1	50	-	-	50

Course Objective :

1. To provide hands-on experience on various survey equipment.
2. To equipped the students with practical knowledge, building drawing and presentation skills.

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

1.To use various survey equipment like Electronic (Electromagnetic) Distance Measurement (EDM), Planimeter, Dumpy Level and GPS.

2.To prepare building drawing plan as per building bye laws, detailed site visit report and presentation.

Units	**Description (Any 10 experiments from following list)**	**Duration (Hrs)**
1	Pimpri Chinchwad College of Engineering Preparation of drawing on A4 size paper- types of stone and brick masonry work ; roadways & railways	2
2	Study of types of maps and writing their uses.	2
3	Hands on use of dumpy level by height of instrument & rise & fall method.	2
4	Measurement of area of irregular shapes by digital planimeter.	2
5	Measurement of coordinates of a traverse using Global Positioning System (GPS) for area determining.	2
6	Measurement of distance by Electronic (Electro-Magnetic) Distance Measurement (EDM) and comparing it with the distance measured using tape.	2
7	Visit to a construction site for studying the various construction materials used, type of structure, type of foundation and components of superstructure – submission of visit report.	2
8	Drawing line plan and developed plan for a residential building, single storied framed/load bearing structure [On half imperial sheet]	2
9	Drawing of plan elevation & section for a residential building, single storied framed/load bearing structure. Preparing schedule of openings [On half imperial sheet]	2
10	Demonstration in a group of 4 students on green building concept, smart city/village.	2
11	Poster presentation/ model making (full imperial sheet size/e-poster) in a group of 4 students on any topic content from Unit 1 (as per discussion on specific topic with subject faculty).	2
12	Graphical representation of building elements (components) (group of 4 students)	2
	Total	**20**

Program:	B.TECH			Semester:		I	
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: This course aims at enabling students,

1. To develop reading effective communication
2. To develop a sense of confidence among students to present themselves at professional as well as societal level
3. To enhance the language competence

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

1. **Develop** effective listening skills
2. **Formulate** grammatically correct sentences and **Enrich** their vocabulary
3. **Develop** reading skills to comprehend various documents
4. **Communicate** effectively and enhance their phonetic skills

Unit	Description	Duration (Hrs)
I	**Listening Skills** : Importance of Listening Skills, Listening and Hearing, Types of Listening : Active / Selective / Passive Listening, Barriers to Listening, Tips to Improve Listening Skills	9
II	**Grammar & Vocabulary:** Common Errors - Articles, Prepositions, Tenses, Subject - Verb Agreement; Prefix and Suffix, Processes of Word Formation, Root Words from Foreign Languages, One Word Substitutions, Synonyms & Antonyms, Words often Confused, Usage of Idioms	9
III	**Reading Skills:** Importance of Reading, Scanning, Skimming, Reading between the Lines, Reading Comprehension**:** Narrative, Descriptive, Factual / Expository / Informative. Lesson No.1 *The Story of An Hour* by Kate Chopin Lesson No.2 *The Classical Student* by Anton Chekhov	9
IV	**Speaking Skills:** Basic Sounds, Word Stress, Intonation, Art of Referring to Dictionary, Language Functions (Requesting, Apologizing, Complaining, Complementing, Thanking etc) Role Playing	9
	Total	**36**

Text Books:

1. Raymond Murphy, Essential English Grammar in Use, Cambridge University Press; 2015

Reference Books:

1. Thomsen and Martinet, Practical English Grammar, Oxford University Press; 1986
2. Sunita Mishra, C. Muralikrishna, Communication Skills for Engineers, Pearson Education; 2011

Lynch, Listening, Cambridge; 1992

3. Michael Swan, Practical English Usage, Oxford, 3rd Edition; 2005

E Sources -

1. https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs19/&sa=D&source=editors&ust=1654924489543365&usg=AOvVaw0vWlA1-FXdmtGD4TbPCXo-
2. https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs22/&sa=D&source=editors&ust=1654924489545718&usg=AOvVaw1JiV6Z4RihjTKbm8Sd2HDC
3. https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-practice-tests/listening/section-1

Program:	**B. Tech**				**Semester:**		**I**	
Course :	**HSMC-1(Japanese)**				**Code:**		**BFE1102**	
Teaching Scheme					**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Hrs**	**Internal Evaluation**	**MTE**	**ETE**	**Total**
1	1	-	2	3	30	-	20	50

Prior knowledge of : 1.English/Marathi/Hindi language for learning Japanese language.

Course Objectives: This course aims at enabling students

1. To be aware of Japanese Scripts (Hiragana,Katakana) and basic Kanjis
2. To familiarize themselves with the Japanese language and use basic greetings in day-to-day life
3. To develop language skills namely Listening,Speaking,Reading and Writing skills for socializing, providing andobtaining information
4. To express themselves using basic sentences and 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 culture and etiquettes.
4. Develop language skills namely speaking, reading and writing skills for providing and obtaining information.

Unit	**Description**	**Duration (Hrs)**
I	Introduction: **Hiragana Script.** Listening: Short video skit on self-introduction.Speaking: Song of greetings. Reading: Hiragana words Writing: Japanese scripts (Hiragana)Test on Hiragana	**6**
II	Katakana script Listening: English words Speaking: Song on body parts.Reading: Katakana words Writing: Locating countries on map , Word hunt.Grammar: Test on Katakana.	**8**
III	わたしは マイク. ミラー です。 Listening: Conversation based on L-1Speaking: Self introduction Reading: Lesson reading no.-1 Writing: Writing about yourself. Grammar: Introduction to 1. Particles (は、か、も、か) 2. Verbs (です、では ありません)	**10**

IV	これから お世話に なります。 Listening: Conversation based on L-2Speaking: Greetings. Reading: Lesson reading no. 2 Writing: Numbers (0-100) in Japanese. Grammar: Verbs (past,negative form)、Introduction to questioning words(なん、だれ、どなた). 2. この、その、あの、どの 3. Particle の Test on grammar	**12**
	Total	**36**

Text book:

1.Minna no Nihongo Part I and II Publication: GOYAL PUBLISHERS & DISTRIBUTORSPVT. LTD. , Author: Tsuruo Yoshiko (Compiled) , Edition: 2018

2. Nihongo Shoho Publication: JALTAP , Author: JALTAP(With permission of Japan Foundation, Tokyo), Edition: April 2008

Reference Books:

1. MO MO Author: Japan Foundation,New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd.,Edition: October 2007
2. MO MO Japanese workbook Japan Foundation,New Delhi, Publication: Goyal Publisher &Distributors (P) Ltd., Edition: October 2007
3. MO MO Japanese workbook Japan Foundation,New Delhi, Publication: Goyal Publisher &Distributors (P) Ltd., Edition: October 2007

Program:	B. Tech.			Semester:			I
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 : English Language

Course Objectives: This course aims at enabling students,

1. To get familiar with the basics of German language and develop their interest in the language
2. To get equipped with basic language skills namely listening, speaking, reading, and writing for the purpose of socializing, providing and obtaining information, expressing personal feelings and opinions
3. To develop one's intercultural competence and understanding of perceptions, gestures, family and community dynamics

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

1. Understand simple sentences which involve vocabulary related to self-introduction, hobbies, professions, food-beverages and day-to-day things
2. Write simple sentences using grammar and vocabulary effectively
3. Communicate in a simple way about day-to-day activities
4. Get to know about Germany and its culture

Unit	Description	Duration (Hrs)
I	**Guten Tag!** [Good day!] Greetings, Alphabets, Numbers, Introducing oneself & others; Grammar: Verbs & Personal Pronouns, Declarative & Interrogative 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; Conversations at Cafeterias and Shops; Grammar: Singular & Plural; Nominative & Accusative case	9
IV	**In der Stadt** [In the city] Information about Germany, Hamburg City, Orientation in the city; Grammar: Irregular verbs, Imperative sentences (Formal)	9
	Total	36

Text Books:

1. Netzwerk A1: Dengler, Rusch, Schmitz, Sieber, Ernst Klett Sprachen, Stuttgart Germany, Goyal Publishers & Distributors, Delhi, 2015

Reference Books:

1. Linie 1: Kaufmann, Moritz, Rodi, Rohrmann, Sonntag,Klett-Langenscheidt GmbH, München Germany, Goyal Publishers & Distributors, Delhi, 2018
2. Tangram aktuell 1: Dallapiazza, Eduard von Jan, Schönherr, Max Hueber Verlag, Ismaning, Germany, Goyal Publishers & Distributors, Delhi, 2005

e-sources:
1. **NPTEL Course lectures (IIT Madras) link:** https://onlinecourses.nptel.ac.in/noc22_hs88/preview
2. **Udemy Course lectures link:** https://www.udemy.com/courses/search/?q=learn+german&src=sac&kw=germ

Program:	B. Tech.			Semester:			I
Course:	Business Storytelling			Code:			BFE1109
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: This course aims at enabling students,

1. To understand storytelling as one of the tools of influential communication
2. To strengthen their creativity, critical thinking and social skills.
3. To use stories to face leadership, management and professional challenges

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

1. Understand nuances of storytelling methods as influential communication
2. Develop the ability to engage and inspire others through the development of narratives, tone and style
3. Apply storytelling techniques to communicate effectively
4. Develop stories to build, maintain professional relationships, deliver messages and motivate others toward action.

Unit	Description	Duration (Hrs)
I	**Concept and Scope:** What is a story? A Brief History & Importance of Storytelling, Basics of Storytelling - Entertainment, Engagement, Personalization, Critical Thinking, Observation Skills in Storytelling, Benefits of Storytelling, Storytelling in Engineering, Business Storytelling, **Activity:** Analysis of Steve Jobs Commencement Speech at Stanford (2005)	9
II	**Process of storytelling:** Elements of a Story - Context and Relevance, Style and Detailing, Plot, and Characters, The Flow of the Story - Relevance - Action - Result, Know the Purpose - Inspire Action, Educate People, Showcase Values, Build Collaboration, Know your Audience - Educational, Social Background and Age, Developing Narratives: Characteristics of a Narrative, Data Visualization, Presenting a Word Picture, Triggering Emotions of the Audience, Choosing Media - Audio, Written, Oral and Digital Storytelling **Activity:** Analysis of a Short Story '***The Three Hermits by Leo Tolstoy', The Last Painting by O' Henry***	9
III	**Business / Corporate storytelling** Types of Stories - Customer Story, Origin Story, Event Story, Product Stories, Storytelling Techniques for Presentations, Using Power Words Effectively, Using Narratives to Manage Conflicts, Using a Narrative to Interpret the Past and Shape the Future, Storytelling in Marketing, Story Strategies - Using Anchor Stories **Case studies -** Brand storytelling -Steve Jobs / Jack Maa - Product Presentation, Lido Anthony "Lee" Iacocca.	9
IV	**Crafting a Story** Crafting a Story from a Picture/an Idea/Situation/Artifacts, Storyline - Beginning / Motive / Struggle / Achievement, Six-word Story - Memoirs to Being with, Detailing of Character and the Context, Delivering a Story – Tone / Emotions / Voice Modulation **Activity-** Developing and Delivering Presentation through Storytelling on the Given Situation/Context	9
	Total	**36**

Text Books:

1. Kendall Haven, Story Smart, Libraries Unlimited, 2014

Reference Books:

1. Kendall Haven, Story Proof, Libraries Unlimited, 2007
2. Rob Biesenbach, Unleash the Power of Storytelling: Win Hearts, Change Minds, Get Results, Eastlawn Media, 2018
3. Yiannis Gabriel, Storytelling in Organizations: Facts, Fictions, and Fantasies, Oxford University Press, 2011

E-resources

1. The Art of Business Storytelling | Ameen Haque | Talks at Google , https://www.youtube.com/watch?v=77FUr6ZsWjY
2. Marketing Storytelling - https://www.referralcandy.com/blog/storytelling-examples/
   5 examples of great storytelling from Jack Ma https://www.youtube.com/watch?v=3nHOxONWfEs
3. Six words story - Nicole Kahn https://www.youtube.com/watch?v=16sY1iLc2d4
4. Kevin Hart - Telling great stories https://www.youtube.com/watch?v=vn_L4OPU_rg

Program:	**B. Tech.**	**Semester :**	**I**
Course :	**Life Skill course I**	**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 different activities.

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, Understand social need and act accordingly
3. Express their thoughts for the situation in real life
4. Develop skills to get along with others and to create and maintain satisfying relationships.

Detailed Syllabus:

Unit	Description	Duration (Hrs)
1.	**Physical Activity (Any Two)** **Yoga:** Physical activities and Meditation **Sports:** Basketball, Table tennis, Football and Volleyball **Performing arts:** Painting/ Sketching/ Drawing	**6**
2.	**Impersonal & Social Skills (Any Three)** Assertiveness : 1.Self Realization (SWOT analysis and introduction) 2. Team Building Activity (Activity) 3. Group Discussion Skills 4. Stage performance (Role play/Skit). (Class start with Meditation)	**8**
3.	**Cognitive or Thinking Skills** 1.Problem Solving (Activity) 2.Critical Thinking (Activity) 3.Creative Thinking (Activity) (Class start with Meditation)	**6**
4.	**Emotional Skills (Any Two)(Guest Lectures)** 1.Managing Stress 2. Managing time 3.Managing Emotions 4. Effective use of Social Media 5. Making Connections outside world (Activity) 6. Financial Knowledge/Money Management/Budgeting etc.	**4**
	Total Hrs	**24**

Syllabi

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

SEM II

Course: Multivariate Calculus							Code: BFE2209
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	Internal Evaluation	MTE	ETE	Total
3	-	-	3	20	30	50	100

Prerequisites:

1. Elementary Mathematics.
2. Elementary Calculus.

Course Objectives: This course aims at enabling students,:

1. To strengthen the concepts of multivariable calculus and its application in maxima & minima, error & approximation area, volume, CG and MI.
2. To familiarize with continuous and discrete systems, where knowledge of Fourier series and Harmonic analysis is required.
3. To get 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 variables 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 engineering.	6
IV	**Integral Calculus:** Beta and Gamma functions, differentiation under integral sign (DUIS), Error functions.	6
V	**Multiple Integration:** Introduction of curve tracing,**d**ouble 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.

E-sources:

1. **NPTEL Course lectures links:**

https://www.youtube.com/watch?v=XzaeYnZdK5o&list=PLtKWB-wrvn4nA2h8TFxzWL2zy8O9th_fy

Program:	B. Tech.	Semester :	II
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 theimportance of green chemistry.
2. To lead students to investigate the advancement in engineering materials, batteries and structural elucidationby 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

5. Analyze the water quality, interpret techniques of water purification and compare green over traditional chemical synthesis.

6. Apply basic principles of various electro-analytical techniques for qualitative and quantitative analysis andunderstand battery technology.

7. Apply the principles, instrumentation of UV & IR spectroscopy for structural elucidation.

8. Interpret the chemical structure, properties and synthesis of various polymers and nanomaterials and their uses.

9. Perceive and analyze fuel quality and identify the scope of derived alternate fuels.

10. 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. 3. Electrochemistry: fundamentals of an electrochemical cell, EMF of cell, reference and indicator electrodes and Nernst Equation. 4. Basic principles, instrumentation and applications of :- 5. 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. 6. pHmetry: theory of buffers and preparation, standardization of pH-meter, titration of weak acid versus strong base, simple and differential plots. 7. Potentiometry: Introduction, principle and application: potentiometric titration of Fe^{2+} versus Ce^{4+} 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 5. 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. 6. 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 1. 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. 2. 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 numericals. i) Solid fuels: coal, classification of coal, proximate and ultimate analysis of coal, numericals 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 alcoholand 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 1. 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. 2. 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. PHILearning (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 thEdition, CBS Publisher.
3. Organic Spectroscopy by William Kemp, 3 rd edition, , John Wiley and Sons, Palgravepublication.
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)
Engineering Chemistry by Wiley India Pvt. Ltd,First edition 2011.

Program:	**B. Tech**			**Semester:**	**II**		
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

Prior Knowledge of : 1.Electron theory, 2. Ohms law, 3. Magnetism, 4. Number system,5.Semiconductor theory

Course 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.

Course 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.

Unit	**Description**	**Duration (Hrs)**
I	**Chapter 1: 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	**Chapter 2: 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	**Chapter 3: 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, voltage and current ratios. Losses, Efficiency and regulation, Auto-transformer.	**6**
IV	**Chapter 4: Analog and digital electronics**	**6**

	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** **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

Program:	**B. Tech.**	**Semester :**	**II**
Course : Programming & Problem Solving		**Code : BFE2308**	

Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Continuous Evaluation**	**MTE**	**ETE**	**Total**
2	-	-	2	20	30	50	100

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

Course Objectives:

1. To acquaint with problem solving, problem solving aspects, programming and various program design tools.
2. To develop basic python programs using fundamental programming constructs.
3. To develop competency for the design, coding and debugging.
4. To build programming skills using Python language.

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

1. Acquire problem solving and basic programming skills in Python.
2. Apply decision control structures in python programming.
3. Demonstrate functions, modules and libraries to facilitate code reuse.
4. Make use of various operations on strings in python programs.

Unit	**Description**	**Duration**
1.	**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	**4**
2.	**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.	**6**
3.	**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.	**8**
4.	**Strings and Operations:** concatenation, appending, multiplication and slicing. Strings are immutable, string formatting operators, built in string methods and functions. Slice operation, ord() and chr() functions, in and not in operators, comparing strings, iterating strings, the string module.	**6**
	Total	**24**

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.

Program:	B. Tech.			Semester :	II		
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.

Unit	List of Experiments:	Duration
1	Introduction to safety measures.	2
2	Demonstration of Manufacturing processes (Machining: Turning, Drilling, Milling and grinding using one simple machine component and sheet metal operations): Working, operation and types	2
3	Demonstration of sand casting and plastic molding: Preparation of sand mold and molding of simple plastic component	2
4	Finishing, inspection and assembly of machine components using different tools (Finishing, assembly) and measuring instruments. (For jobs made during preceding practical)	2
5	Demonstration of Advanced Manufacturing processes (CNC Machining, Additive manufacturing using one simple machine component)	2
6	Demonstration of electrical and electronic component assembly	2
7	Carpentry-1 Job involving joint and wood turning	2
8	Fitting – 1 Job involving fitting to size, male female fitting with drilling and tapping.	2
9	Joining – 1 Job involving welding (Arc), soldering, brazing etc.	2
10	Dismantling and Assembly of simple machines.	2
	Total	20

Note:1. Assignment one is mandatory.

1. Any four from experiment number 2to 6.
2. 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

Program:	**B. Tech**			**Semester :**		**II**	
Course: Mini Project and Basics of Innovation						**Code: BFE2702**	
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**TW**	**OR**	**PR**	**Total**
-	4	-	2	50	-	-	50

Prerequisites: Knowledge of basic sciences till higher secondary level.

Course Objectives:

1. To develop innovative thinking, research attitude and project-based learning ability.
2. To provide every student the opportunity to get involved either individually or as a group so as to develop the team skillsand learn professionalism.

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

1. Understand concepts of Research, Innovation, Invention and IPR.
2. Identify projects relevant to societal needs/conservation of environment/scope of the subject.
3. Apply the technological knowledge to find feasible solutions for the selected problem.

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

Activities: (Any 3 of the following)

1. Assignment on Identifying International/National Journals in your project domain.
2. Assignment on patent search in your project domain through Google patents.
3. Presentation/Report based on literature survey for the project.
4. Small activity based on SCAMPER technique for DT.

Mini Project:

1. Idea Inception.
2. Model/poster (A3 Size)/report writing/research article based on the project.
3. Demonstration/exhibition based on carried out work.

Books:

1. Herman Tang, Engineering Research: Design, Methods, and Publications, John Wiley & Sons, Inc, 1 st edition, 2021

2. C.R. Kothari, Research Methodology: Methods & Techniques, New Age International (p) Limited, Publishers,2 nd edition 2004

3.Ranjit Kumar, Research Methodology, A Step-by-step guide for Beginners, SAGE Publications, 4 th edition,2015

4. Ramakrishna B, Anil Kumar H.S, Fundamentals of Intellectual Property Rights: For Students, Industrialist and

Patent Lawyers, Notion Press, First edition,2017.

5. Rupinder Tewari & Mamta Bhardwaj, Intellectual Property A Primer for Academia, Publication Bureau Panjab

University Chandigarh. edition: 2021

6. Robert D. Hisrich, Michael P. Peters, and Dean Shepherd, Entrepreneurship, McGraw-Hill Publisher, 11 th edition 2020

Course: Multivariate Calculus (Tutorial)							**Code: BFE2210**
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	TW	OR	PR	Total
-	-	1	1	50	-	-	50

Prior knowledge:

1. Elementary Mathematics.
2. Elementary Calculus.

Course Objectives: This course aims at enabling students to solve the problems based on concepts in

1. Multivariable calculus and its application in maxima & minima, error & approximation area, volume, CG and MI.
2. Continuous and discrete systems, where knowledge of Fourier series and Harmonic analysis is required.
3. Advanced techniques to evaluate multiple integrals.

Course Outcomes:

After learning the course, the students will be able to:

1. Solve problems related to Multivariate Calculus.
2. Demonstrate the related knowledge with understanding of formulae and their applications.

Detailed Syllabus:

Unit	**List of Topics**	**Duration (Hrs)**
I	**Assignment 1 on Partial Differentiation: Problems on** Partial derivatives, Euler's theorem on homogeneous functions, implicit functions, and variables treated as constant, total derivatives.	2
II	**Assignment 2 on Jacobian: Problems on** Jacobians and their applications, errors, and approximations. **Maxima and Minima:** maxima and minima of functions of two and three variables.	2
III	**Assignment 3 on Fourier Series: Problems on** Definition, Dirichlet's conditions, full range Fourier series, half range Fourier series, Harmonic analysis, and application to engineering.	2
IV	**Assignment 4 on Integral Calculus: Problems on** Beta and Gamma functions, differentiation under integral sign (DUIS), Error functions.	2
V	**Assignment 5 on Multiple Integration: Problems on** Introduction of curve tracing, **d**ouble integration, change of order of integration, conversion into polar form, Triple integration: with limits and without limits, Dirichlet's theorem.	2
VI	**Assignment 6 on Application of Multiple Integration: Problems on** Rectification of curves, Area, Volume, CG, and MI	2
	Total	12

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.

Program:	B. Tech.	Semester :	II
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 laboratoryexperiments.
2. To develop experimental skills to acquire insight into societal and environmental issues.

Course outcome: After learning the course, the students will be able to:

1. Analyze the quality of water for its hardness and alkalinity.
2. Apply various instrumental methods like pH-metry, conductometry, spectroscopy and electrochemical techniques for quantitative and qualitative chemical analysis.
3. Acquire skill for the synthesis of engineering material like polymer and analyze quality of coalby proximate analysis.
4. Employ the chromatographic technique for separation of mixture of compounds.
5. Get acquainted with awareness of safety, ethical, societal and environmental issues with greenchemistry approach.

Units	Description	Duration(Hrs)
1	Determination of total hardness of water sample by EDTA method	**2**
2	Determination of total alkalinity of the water sample	**2**
3	To determine the dissociation constant of a weak acid (acetic acid) using pH meter	**2**
4	Titration of mixture of weak acid and strong acid with strong base using Conductivity meter.	**2**
5	To determine the maximum wavelength of absorption of $CuSO_4$, verify Beer's law and findunknown concentration in the given sample.	**2**
6	Study Practical:- Structural identification of unknown compounds by UV and IR spectroscopy..	**2**
7	To prepare the Phenol formaldehyde resin or polypropylene	**2**
8	Proximate analysis of Coal.	**2**
9	To determine the electrochemical equivalent (ECE) of Cu.	**2**
10	Chromatographic separation of ortho- and para nitro-phenol	**2**
11	Study of corrosion of metals in a medium of different pH.	**2**
12	Microwave assisted solid phase organic synthesis	**2**
13	Soil analysis.	**2**
Total		**20**

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 ageInternational (P) Ltd.

Program:	**B. Tech.**			**Semester :**	**II**		
Course : Basic Electrical and Electronics Engineering Laboratory				**Code :**	**BFE2305**		
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

Course 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.

Unit	**List of Experiments:** **Group A**	**Duration(Hrs)**
	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**
2	Study of Electricity bill of LT consumer.	**2**
3	Study of Different parts of DC Machine.	**2**
4	To study various electronics circuit components and allied accessories.	**2**
5	To study digital multimeter, digital trainer kit and CRO.	**2**
	Group B From following any **seven** Practical are to be performed:	
1	To verify Kirchhoff law in a DC network	**2**
2	To measure steady state response of series RL and RC circuits on AC supply and observations of voltage and current waveforms.	**2**
3	To verify the relation between phase and line quantities in three phase balanced star and delta connections of load.	**2**
4	Perform load test on DC Shunt Motor to determine the efficiency.	**2**
5	Perform speed control of DC Shunt Motor to plot characteristics.	**2**
6	To determine efficiency and regulation of single-phase transformer by direct loading test.	**2**
7	To Plot V-I characteristics of P-N Junction Diode and Zener Diode.	**2**
8	To Plot input and output characteristics of CE Transistor configuration.	**2**
9	Implementation of Half Adder & Full Adder using Logic Gate IC's.	**2**
10	Verify its truth table SR, JK & T flip flops.	**2**
	Total	**20**

Program:	B. Tech.	Semester :	II
Course : Programming & Problem Solving Laboratory		Code : BFE2309	

Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	TW	OR	PR	Total
-	2	-	1	50	-	-	50

Course Objectives:

1.To acquaint with problem solving, problem solving aspects, programming and various program design tools.
2. To develop basic python programs using fundamental programming constructs.
3. To develop competency for the design, coding and debugging.
4. To develop python functions to achieve code reuse.
5. To build programming skills using Python language.

Course Outcomes:

After learning the course, the students will be able to:

1. Acquire problem solving and basic programming skills in Python.
2. Apply decision control structures in python programming.
3. Demonstrate functions, modules and libraries to facilitate code reuse.
4. Make use of various operations on strings in python programs.

	Detailed Syllabus	
Units	**Suggested List of Experiments(Any 7)** **Write a program in Python (with function as applicable)**	**Duration (Hrs)**
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 the salary of an employee given his basic pay (take input from user). Calculate salary of employee. Let HRA be 10 % of basic pay and TA be 5% of basic pay. Let employees pay professional tax as 2% of total salary. Calculate salary payable after deductions	**1**
3	To accept the 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 p=mv where m is the mass of the object and v 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 the 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 the internal examination of a student. She has conducted programming & problem solving course test with maximum marks 25 where students have to score at least 12 marks to clear the test. Now she wants to find top scorer, lowest scorer, total number of pass and fail students. Apply the logic and perform the given task.	**1**
10	Write a program to simulate a simple calculator that performs basic tasks such as addition, subtraction, multiplication and division with special operations like computing x^y 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 employee ids of all employees represented in 6 digit numbers. She wants to make two groups of employees 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 the user. Accept password from user with following condition: 1. Minimum characters 6 and maximum are 12. 2. At least one digit and one character. 3. At least one special symbol(@, $,#) .	**2**
	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

Program:	B. Tech			Semester:			II
Course :	HSMC-English 2			Code:			BFE2104
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	Internal Evaluation	MTE	ETE	Total
1	2	-	2	30	-	20	50

Prior knowledge of : Basic English Vocabulary

Course Objectives: This course aims at enabling students,

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 level
3. To enhance English language competence

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

1. **Develop** reading skills to comprehend the given text
2. **Develop** the skills to write effectively
3. **Write** and communicate effectively in formal and informal situations
4. **Communicate** effectively and deliver presentations and speeches

Detailed Syllabus:

Unit	Description	Duration (Hrs)
I	**Reading Skills:** Barriers to Reading , Techniques to Improve Reading Reading Comprehension: Narrative, Descriptive, Factual/Expository/Informative. Lesson No.1 *At the End of the Ambulance Run* by Ernest Hemingway Lesson No.2 *A Chameleon* by Anton Chekhov	**9**
II	**Writing Skills-1:** Elements of Effective Writing, Cohesion and Coherence in Writing, Effective Writing, Punctuation, Writing Styles (Formal & Informal), Paragraph Writing, Letter Writing	**9**
III	**Writing Skills -2:** Scientific & Technical Writing, Report Writing; Accident Report, Progress Report, Summary and Abstract Writing	**9**
IV	**Speaking Skills:** Delivering Introductory Speech, Vote of Thanks, Introduction of Guest, Anchoring a Program/Event, Group Discussion, Effective Public Speaking	**9**
	Total	**36**

Text Books:

1. English for Technical Communication by K.R.Lakshminarayana,SCITECH

Reference Books:

1. Michael Swan, Practical English Usage, Oxford, 3rd Edition; 2005
2. Thomsen and Martinet, Practical English Grammar Oxford University Press; 1986
3. Sunita Mishra, C. Muralikrishna, Communication Skills for Engineers, Pearson Education; 2011
4. Raymond Murphy, Essential English Grammar in Use, Cambridge University Press; 2015
5. Creative English for Communication by Krishnaswami, N and Sriraman, T,Macmillan
6. Written Communication in English by Saran Freeman, Orient Longman

E-sources:

1.https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs19/&sa=D&source=editors&ust=1654924489543365&usg=AOvVaw0vWlA1-FXdmtGD4TbPCXo-

2.https://www.google.com/url?q=https://onlinecourses.nptel.ac.in/noc19_hs22/&sa=D&source=editors&ust=1654924489545718&usg=AOvVaw1JiV6Z4RihjTKbm8Sd2HDC

3. https://takeielts.britishcouncil.org/take-ielts/prepare/free-ielts-practice-tests/listening/section-1

Program:	**B. Tech**			**Semester:**	**II**		
Course :	**HSMC-2(Japanese)**			**Code:**	**BFE2105**		
Teaching Scheme				**Evaluation Scheme**			
Lecture	**Practical**	**Tutorial**	**Credit**	**Internal Evaluation**	**MTE**	**ETE**	**Total**
1	2	-	2	30	-	20	50

Prior knowledge of : 1. English/Marathi/Hindi language for learning Japanese language, 2. Basic Japanese language.

Course Objectives: This course aims at enabling students,

1. To be aware of basic Kanjis.
2. To understand counting and basic verbs.
3. To 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

Unit	**Description**	**Duration (Hrs)**
I	**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	**6**
II	**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**
III	**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 (**に,が**) 2. Verb (**います,あります**)	**10**
IV	**Unit IV: Timing and Verbs** Speaking: Talking about daily routine. Listening: Conversation based on L-5 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	**12**

	Total	36

Text book:

1. Minna no Nihongo Part I and II Publication: GOYAL PUBLISHERS & DISTRIBUTORS PVT. LTD. , Author: Tsuruo Yoshiko (Compiled) , Edition: 2018
2. Nihongo Shoho Publication: JALTAP , Author: JALTAP(With permission of Japan Foundation, Tokyo), Edition: April 2008

Reference Books:

1. MO MO Author: Japan Foundation,New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd., Edition: October 2007
2. MO MO Japanese workbook Japan Foundation,New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd., Edition: October 2007
3. MO MO Japanese workbook Japan Foundation,New Delhi, Publication: Goyal Publisher & Distributors (P) Ltd., Edition: October 2007

Program:	**B. Tech**			**Semester:**		**II**	
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 : 1. English Language, 2. Basic knowledge of German Language

Course Objectives: This course aims at enabling students,

1. To get familiar with the basics of German language and develop their interest in the language
2. To get equipped with basic language skills namely listening, speaking, reading, and writing for the purpose of socializing, providing and obtaining information, expressing personal feelings and opinions
3. To develop one's intercultural competence and understanding of perceptions, gestures, family and community dynamics

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

1. Understand elementary-level sentences that involve vocabulary related to routine activities, company, health, and habitation
2. Write elementary-level sentences using grammar and vocabulary effectively
3. Communicate in formal & informal situations at the company, office, clinic and home
4. Express themselves through written communication

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, an invitation to housewarming Grammar: Adjectives; locative prepositions	**9**
IV	**Gesund und munter** [Hale & hearty] Body parts, ailments & health tips, a visit to a doctor Grammar: Imperative sentences (formal), modal auxiliaries II	**9**
	Total	**36**

Text Books:

1. Netzwerk A1: Dengler, Rusch, Schmitz, Sieber, Ernst Klett Sprachen, Stuttgart Germany, Goyal Publishers & Distributors, Delhi, 2015

Reference Books:

1. Linie 1: Kaufmann, Moritz, Rodi, Rohrmann, Sonntag,Klett-Langenscheidt GmbH, München Germany, Goyal Publishers & Distributors, Delhi, 2018
2. Tangram aktuell 1: Dallapiazza, Eduard von Jan, Schönherr, Max Hueber Verlag, Ismaning, Germany, Goyal Publishers & Distributors, Delhi, 2005

e-sources:

1. NPTEL Course lectures (IIT Madras) link: https://onlinecourses.nptel.ac.in/noc22_hs88/preview
2. Udemy Course lectures link: https://www.udemy.com/courses/search/?q=learn+german&src=sac&kw=germ

Program:	B. Tech			Semester:	II		
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 and phonetics, 2. Basic word power, speaking and listeningskills

उद्दिष्टे :

१. भाषाव्यवहारआणिभाषिककौशल्येह्यांचेज्ञानहोणे.
२. विविधकौशल्यांशीनिगडितकार्यक्षेत्रांचेज्ञानहोणे.
३. श्रवण, संभाषण, लेखनआणिवाचनहीकौशल्येप्रगतहोणे.
४. प्रशासकीयक्षेत्रातीलभाषाव्यवहाराचेस्वरूपसमजणे.
५. प्रशासकीयक्षेत्रातीलभाषाव्यवहारकरण्याचीक्षमताप्राप्तहोणे

Course Outcome:

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

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.
3. केळकर, अशोक : रुजुवात, लोकवाङ्मयप्रकाशन, मुंबई, २००८.
4. ग्रामोपाध्ये, सुरेंद्र (संपा) : भाषाव्यवहारवभाषाशिक्षण, कासेगावएज्युकेशनसोसायटी, कासेगाव, २००६.
5. जोशी, श्रीपाद : संवादशास्त्र, विजयप्रकाशन, नागपूर, १९९८.
6. नेमाडे, भालचंद्र : साहित्याचीभाषा, साकेतप्रकाशन, औरंगाबाद, १९८९.
7. पाटील, आनंद : सृजनात्मकलेखन, पद्मगंधाप्रकाशन, पुणे, २००५.

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.

Program:	B. Tech			Semester:		II	
Course :	Self-Healing Psychology			Code :		BHM2108	
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	Continuous Evaluation	MTE	ETE	Total
1	1	-	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-Efficacy, Self-efficacy's Influence in life arenas.	6
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,	6

	Scales. 3.3: Altruism: Defining Altruism, Egotism Motive, Empathy Motive, Cultivating Altruism.	
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

Program:	B.Tech			Semester:			II
Course :	Technical Writing			Code:			BFE2110
Teaching Scheme				Evaluation Scheme			
Lecture	Practical	Tutorial	Credit	Internal Evaluation	MTE	ETE	Total
1	2	-	2	30	-	20	50

Prior knowledge of : Basic language skills

Course Objectives: This course aims at enabling students,

1. To understand the scope and domain of technical writing as a part of any professional organization
2. To prepare students to design effective technical documents for both written and digital media
3. To understand how to critically analyze data from research; incorporate it into assigned writing clearly, concisely, and logically; and attribute the source with proper citation

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

1. **Understand** the importance and scope of technical writing
2. **Use** methods of process of data collection for technical writing
3. **Develop** necessary skills required for technical writing
4. **Use** various tools to develop and format technical documents

Unit	Description	Duration (Hrs)
I	**Importance of Technical Writing :** What is Writing- Misconceptions , What is Technical Writing, Scope for Technical Writers, Skills Required: Critical Thinking, Communication Skills, Presentation Skills, Language Skills	9
II	**Information Collection:** Ways to Collect Information , Interviewing SME , Brainstorming , Concept Mapping, Copyright Infringement, Plagiarism, Managing the Data - Importance, Relevance	9
III	**Fundamentals of Technical Writing:** Audience Analysis**,** Collaborating with Experts, Technical Writing Process, Document Lifecycle - Planning, Drafting, Revising, Testing, Filetype, Documents Designed by Technical Writers : Proposal, Brochures, Training Material , Installation Guide, Administrator's Guide, User's Guide	9
IV	**Writing Styles and tools:** Concept of Styles and Importance of Style Guide, Editing Tool - MS Word , FrameMaker Help Authoring Tools - Robohelp Graphic Tools - Paint , Photoshop, Screen Capturing Tools -Snagit, Guidelines for Publishing Documents	9
	Total	36

Text Books:

1. Kieran Morgan, Technical Writing Process;Illustrated edition, 2015

Reference Books:

1. Muralikrishna C., Sunita Mishra, Communication Skills for Engineers, Pearson; 2010
2. Alan S. Pringle, Technical Writing 101: A Real-World Guide to Planning and Writing Technical Documentation; Scriptorium Publication; 2003
3. Microsoft Manual of Style, Microsoft Press - A Division of Microsoft Corporation; 2012
4. Mike Markel Bedford/St. Martin's, Technical Communication, Illustrated Edition; 2009
5. Sharon J. Gerson and Steven M. Gerson, Technical writing – process and product ,Pearson Education Asia;2006
6. Pfeiffer, W.S. and T.V.S. Padmaja. Technical Communication. Pearson;2012
7. Andrea J. Rutherford, Basic Communication Skills for Technology, Pearson Education, Inc. New Delhi, 2001.

e-sources: https://www.youtube.com/results?search_query=technowrite+

Program:	**B. Tech**	**Semester :**	**II**
Course :	**Life Skill course II**	**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 different activities.

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, Understand social need and act accordingly
3. Express their thoughts for the situation in real life
4. Develop skills to get along with others and to create and maintain satisfying relationships.

Unit	Description	Duration (Hrs)
1	**Physical Activity (Any Two)** **Yoga:** Physical activities and Meditation **Sports:** Basketball, Table tennis, Football and Volleyball **Performing arts:** Painting/ Sketching/ Drawing	6
2	**Impersonal & Social Skills** Assertiveness: 1. Presentation Skills 2. Team Building Activity (Role play). 3. Current affairs (Performance) 4. Stage performance (Class start with Meditation)	8
3	**Cognitive or Thinking Skills** 1.Decision Making (Activity) 2. Perspective Thinking (Activity) 3. Picture Depiction (Performance) (Class start with Meditation)	6
4	**Emotional Skills (Any Two) (Guest Lecture)** 1.Managing Stress 2. Managing time 3.Managing Emotions 4. Effective use of social media 5. Making Connections outside world (Activity) 6. Financial Knowledge/Money Management/Budgeting etc.	4
	Total Hrs	**24**