PLASTINDIA INTERNATIONAL UNIVERSITY

(Sponsored by Plastindia Foundation)

Dungra, GIDC, Vapi, Dist. Valsad - 396193, Gujarat, India

(Established under Gujarat Government Private Universities Act, 2016)

School of Engineering

B. Tech (Plastics and Polymer Engineering)

(w.e.f. Academic Year 2024-25 onwards)

BATCH 2024-2028

P-2024

FY B. Tech (Plastics and Polymer Engineering)

Course Category	Course Code	Course Name	Teaching Scheme (Hours/Week)			Examination Scheme and Marks							Credits			
			Theory	Practical	Contact Hr/Week	MSE- I	MSE - II	TA	ESE	TW	PR/OR	TOTAL	TH	TW/PR	TOTAL	In Line With UMI
Semester - I																
BSC	BSC101	Engineering Mathematics-I	3	-	3	15	15	20	50	-	-	100	3	-	3	√
BSC	BSC103	Engineering Physics	3	-	3	15	15	20	50	-	-	100	3	-	3	√
ESC	ESC106	Materials Science and Engineering	3	-	3	15	15	20	50	-	-	100	3	-	3	
ESC	ESC107	Engineering Graphics and Design	3	-	3	15	15	20	50	-	-	100	3	-	3	
ESC	ESC108	Engineering Workshop Practices-I	1	-	1	15	15	20	-	-	-	50	1	-	1	
HSMEC	HSMEC110	Professional Communication (English-I)	1	2	3	-	-	25	-	25	-	50	1	1	2	
VSEC	VSEC-112	Design Thinking and Innovation-I	-	2	2	-	-	-	-	25	-	25	-	1	1	
BSC	BSC141	Lab: Engineering Physics	-	2	2	-	-	-	-	-	25	25	-	1	1	
ESC	ESC142	Lab: Engineering Graphics and Design	-	2	2	-	-	-	-	-	25	25	-	1	1	√
IKS	IKS126	Yoga and Meditation	-	2	2	-	-	-	-	25	-	25	-	1	1	
		Total	**14**	**10**	**24**	**75**	**75**	**125**	**200**	**75**	**50**	**600**	**14**	**5**	**19**	

Year, Program, Semester	F.Y. B. Tech in Plastics and Polymer Engineering, Semester-I						
Course Code	BSC101						
Course Category	BSC (Basic Science Course)						
Course title	**Engineering Mathematics-I (Theory)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	03	01	-	04	04		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	15	15	50	20	-	-	100
Pre-requisites (if any)	Basics of Derivatives and Integration						
Course Objectives	• To study the properties of matrix algebra and apply them to solve the system of algebraic equations. • Able to formulate and solve various engineering problems using differential and integral calculus and ability to work with advanced engineering mathematics. • Summarize concept of calculus to enhance ability of analyzing mathematical problems. • Comprehend the concept of vector space and solve real world problem using linear transformations.						
Course Outcomes	• Understand and apply the knowledge of differential Calculus to solve the mathematical problems. • Determine partial derivatives and its application in related field of engineering. • To understand methods for solution of differential equations of higher order and higher degree. • Identify the real-world problems and solve it by various methods. • Identify the ordinary differentials and partial differentials and solve the maximum and minimum value of function.						

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Unit No.	Course Content	Hours
I	**Matrix Algebra** Introduction to determinant and matrices, System of linear equations, Rank of Matrix, Eigen values, Eigen Vector, Cayley-Hamilton Theorem, Inverse of a matrix, Gauss elimination, Gauss-Jordan elimination.	6
II	**Differential Calculus** Limit, Continuity, Types of discontinuity, Successive differentiation, Rolle's Theorem, LMVT, CMVT, Maxima and Minima.	6
III	**Integral Calculus** Definite and improper integrals, Beta-Gamma function and its properties, double-triple integral, change of variables, applications.	6
IV	**Ordinary Differential Equations** First order ODEs, Formation of differential equations, Exact, Linear, and Bernoulli's equations, ODEs of higher order, Homogeneous linear ODEs of higher order, Homogeneous linear ODEs with constant coefficients, Nonhomogeneous ODEs, Rules for finding C.F. and P.I., Method of Variation of Parameters.	6
V	**Partial Differential Equations** Formation of first and second order equations, Solution of first and second order linear and non-linear equations, Homogeneous linear PDEs of higher order with constant coefficients, Heat and Wave equation, Euler's Theorem, Jacobian.	6
VI	**Vector Space and Linear Transformation** Vector Space, Subspace, Linear Combination, LI – LD Set, basis, dimension, Linear transformations (maps), range and kernel of a linear map, Dimension Theorem, Inverse of a linear transformation.	6

Text Books

1. B. S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, New Delhi.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", John Wiley & Sons.
3. B. V. Ramana, "Higher Engineering Mathematics", Tata McGraw-Hill, New Delhi.

Reference Books

1. C. R. Wylie, "Advanced Engineering Mathematics", McGraw Hill Publication, New Delhi.
2. Shanti Narayan, "Differential Calculus" S. Chand and company, New Delhi.

3.	S. S. Sastry, "Engineering Mathematics (Volume-I)", Prentice Hall Publication, New Delhi.
4.	H. K. Dass, "Advanced Engineering Mathematics", S. Chand Publishing.
5.	N. P. Bali, Iyengar "A text book of Engineering Mathematics by", Laxmi Publications (P)Ltd., New Delhi.
6.	M. D. Greenberg, "Advanced Engineering Mathematics", Pearson Education.

Year, Program, Semester	First Year B. Tech in Plastics and Polymer Engineering, Semester-I							
Course Code	BSC103							
Course Category	BSC (Basic Science Course)							
Course title	**Engineering Physics (Theory)**							
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**		**Total Credits**		
	03	-	00	03		03		
Evaluation Scheme	**MSE-I**		**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	15		15	50	20	-	-	100
Pre-requisites (if any)	10+2 level Physics							
Course Objectives	• Understand the fundamental concepts of crystal structure. Also, to learn the properties of superconducting materials. • Understand properties of electric and magnetic fields in the presence of static charge and current distributions. They will also learn Maxwell's equations which govern the dynamics of electric and magnetic fields. • To study the physical properties, concepts and physical quantities required for the solution of complex engineering problems. • To identify the properties of fluids and various pressure measurement techniques. To achieve the basic skills to find out the losses in pipe flow. • Students will learn the concepts related to Newton's laws of mechanics and their application to many particle systems, small oscillations • In this course, students will be introduced to fundamental concepts of waves and classical optics with reference to the phenomena of interference and diffraction							
Course Outcomes	• CO1: Understand structures of solids and semiconductors, apply Bragg's law, to analyse the structural properties of elemental solids, to calculate electronic conductivity of solids • CO2: To formulate and solve the engineering problems based on Electromagnetism							

	• CO3: Understand the principle, production and transmission of ultrasonic waves and understand the working of various instruments based on ultrasonic • CO4: Describe principles of optical fibre communication, calculate resolving power of optical instruments. • CO5: The principles of lasers, types of lasers and applications, Analyse the intensity variation of light due to Polarization, interference and diffraction

Unit No.	Course Content	Hours
I	**Solid State Physics** Crystal structure of solids, Cubic crystals, Semiconductor Physics, Classification of solids, Types of semiconductors, effect of doping, mobility of charge carriers, conductivity, Hall effect.	6
II	**Electromagnetism** Introduction to electromagnetism, Electricity and magnetism including Coulomb's Law, Continuity Equation, electric field, Gauss' Law, electric potential, Ohm's law, DC circuits with resistors, magnetic field, Ampere's Law, Faraday's Law, inductance, Maxwell's equations, and electromagnetic waves	6
III	**Ultrasound** Introduction, Production of Ultrasonic Waves, Magnetostriction Effect, Piezoelectric Effect, Piezoelectric Oscillator, Properties, measurement of velocity & Applications of Ultrasound	6
IV	**Quantum mechanics** Newtons Laws, Debroglie Wavelength, - Introduction to quantum theory, wave particle duality-Davisson-Germer experiment, Heisenberg uncertainty principle, Schrodinger time independent wave equation, the free particle problem - particle in an infinite and finite potential well, quantum mechanical tunnelling – applications.	6
V	**Wave & Fibre Optics** Diffraction, Fraunhofer and Fresnel diffraction Fraunhofer diffraction at single slit, double slit, and multiple slits, Polarisation, Fibre Optics, optical fibre as a dielectric wave guide, application of optical fibres.	6

VI	**Lasers** Introduction to Lasers, Introduction to interaction of radiation with matter, Principles and working of laser, Types of lasers, applications of lasers, threshold population inversion, Holography and engineering application	**6**

Text Books	
1.	M. N. Avadhanulu and P. G. Kshirsagar "Engineering Physics," S. Chand Publication.
2.	R. K. Gaur and Gupta S. L, "Engineering Physics," Dhanapat Rai and Sons Publication.
3.	V. Rajendran, "Engineering Physics," Tata McGraw Hill Company Ltd, New Delhi
4.	Malik and Singh, "Engineering Physics", Tata Mc Graw Hill Company Ltd, New Delhi
5.	Naidu, "Engineering Physics", Pearson
6.	N.K. Bajaj, The Physics of waves and Oscillations, Tata McGraw Hill Company Ltd, New Delhi

Reference Books	
1.	P.K. Palanisamy, "Solid State Physics", SciTech Publications (India) Pvt. Ltd.
2.	Wahab, M.A. "Solid State Physics: Structure and Properties of Materials." Narosa Publishing House, 2009.
3.	Ultrasonics: Methods and Applications–J.Blitz, Butterworth.
4.	Brijlal and Subramanian, "Optics", 5006, 23rd Edition
5.	B. L. Theraja, "Modern Physics", S. Chand & Company Ltd., Delhi.
6.	Charles Kittle, "Introduction to Solid State Physics," Wiley India Pvt
7.	L. Tarasov, "Laser Physics and Applications," Mir Publishers.
8.	A. Ghatak, "Optics", S. Chand and Company Ltd
9.	Optical Fibre Communication – G. Keiser, McGraw-Hill.

Useful web links	
1.	**https://archive.nptel.ac.in/courses/122/107/122107035/**

Year, Program, Semester	First Year B. Tech in Plastics and Polymer Engineering, Semester-I						
Course Code	ESC106						
Course Category	Engineering Science Course						
Course title	**Materials Science and Engineering (Theory)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**		**Total Credits**	
	03	-	-	03		03	
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	15	15	50	20	-	-	100
Pre-requisites (if any)	• High school courses in science, such as physics, chemistry, and biology						
Course Objectives	• Providing basic knowledge on material science and engineering • Maintenance and corrective measures for various engineering materials.						
Course Outcomes	• Know the types of engineering materials and their applications. • Categorise polymeric materials. • Understand the materials strength and their processing techniques. • Understand the science and engineering of corrosion and degradation. • Summarize properties, applications, challenges and opportunities of engineering materials in future developments.						

Unit No.	Course Content	Hours
I	**Introduction to Materials** Introduction to glass and ceramics, metal and alloys, carbon-based materials, polymers, composites, elastomers, advance materials: nanostructured materials, composite materials, superconducting materials, smart materials, applications of materials in advance technologies	9
II	**Introduction to Polymeric Materials** History of polymeric materials, introduction and classification of polymers-based form, type and application; fundamental concept & definitions: monomer & functionality, oligomer, polymer, repeating unites, degree of polymerization, molecular weight; overview on recent developments in polymer industries.	6
III	**Strength of Materials**	6

	Concepts of stress and strain, displacement and strain, types of stress and strain, generalized elastic stress-strain relations, tensile test and stress-strain curve, bending (flexural) and impact strength, concepts of elasticity and plasticity: flow curve, ideal plastic flow, and hardening theories, rate-dependent plasticity, concept of fracture: modes of fracture and toughness in materials.	
IV	**Material Processing Techniques** Introduction to solidification, processing operations, conditions, sintering, diffusion, oxidation, photolithography, nanofabrication, nanomaterials, sputtering, additive manufacturing, atomic layer deposition (ALD), chemical vapor deposition (CVD), physical vapor deposition (PVD). Basic ideas on polymer processing techniques- injection, extrusion, compression, blow moulding, thermo-forming, rotational moulding, calendaring and milling.	6
V	**Corrosion and Degradation of Materials** Introduction, forms of corrosion, environmental effects, corrosion environments, corrosion prevention, oxidation, corrosion of ceramic materials, degradation of polymers, swelling and dissolution, bond rupture, weathering, ageing	6
VI	**Properties and Applications of Materials** Physical properties, thermal properties, electrical properties, magnetic properties, optical properties, mechanical properties of materials. Materials usage in modern technology, challenges and opportunities for future developments.	6
	Text Books	
1.	Materials Science and Engineering-An Introduction, William D. Callister, Jr., John Wiley & Sons, Inc., 2007, 7th Edition.	
2.	The Science and Engineering of Materials, Donald R. Askeland, Pradeep P. Phule, Thomson Learning, 2007, 5th Edition	
3.	An introduction to materials engineering and science: for chemical and materials engineers, Brian S. Mitchell, John Wiley & Sons, Inc., 2004	
4.	Materials Science and Engineering – A First Course, V. Raghavan, Prentice Hall of India Private Limited, 2015, 6th Edition.	

5.	Materials Science and Engineering, G. S. Upadhyaya and Anish Upadhyaya, Viva Books Private Limited, 2006
6.	Materials Science and Engineering, Van Vlack L.H.
7.	Polymer Science by V R Gowariker, N V Viswanathan and Jayadev Sreedhar
8.	Textbook of Polymer Science, 3ed by Fred W. Billmeyer
Reference Books	
1	Duncan W. B., Dermot O., and Richard I. W.
2	(2011). Energy Materials, 1st Edition, Wiley
3	2 Fahrenbruch A. L. and Bube R. H. (1983);
4	J. T. Black – Degormos Materials and process in manufacturing – John Willey and sons, 2019
5	Functional Materials by S. Banerjee, A.K. Tyagi, 1st edition, imprint by Elsevier
6	Handbook of Advanced Materials: Enabling New Designs by James K. Wessel, John Wiley & sons, 2004.

Year, Program, Semester	First Year B. Tech in Plastics and Polymer Engineering, Semester-I						
Course Code	ESC107						
Course Category	Engineering Science Course						
Course title	**Engineering Graphics and Design (Theory)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	03	-	-	03	03		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	15	15	50	20	-	-	100
Pre-requisites (if any)	Knowledge of plane geometry and solid geometry						
Course Objectives	• The course is aimed at developing Basic Graphic skills. • To learn the engineering graphics standards. • To develop Skills in Reading and Interpretation of Engineering Drawings. • To introduce Computer-Aided Drafting tools						
Course Outcomes	• Identify basic concepts of BIS conventions and their application. • Interpret first angle and third angle projection system. • Construct orthographic projections of points, lines and planes. • Apply principles of projection and construct orthographic and isometric views of an object. • Develop a skill of visualization to understand and read the drawing.						

Unit No.	Course Content	Hours
I	**Introduction to Engineering Graphics** Scope of Engineering Drawing in all Branches of Engineering, Introduction to Drawing Standards BIS-SP-46, Representative Fraction, Engineering Scales, Dimensioning Terms and Notations, Types of Lines used in Eng. Practice recommended by BIS (Bureau of Indian Standards) Principles of Engineering Graphics and their significance, usage of Drawing instruments, Conic sections, Cycloid, Involutes.	5
II	**Projections of Points, lines & Planes:** Projection of Points and lines inclined to both planes (line in first quadrant only	8

	Principles of Projections: Types of Projections - Oblique, Perspective, Orthographic and Isometric Projections **Projections of Points**: Projections of Points located in all four Quadrants **Projections of Lines**: Projections of lines inclined to one of the Reference Plane and inclined to two Reference Planes **Projections of Planes**: Projections of various planes 'Polygonal, Circular and Elliptical shape inclined to one of the Reference Plane and inclined to two Reference Planes; Concept of Auxiliary Plane of Projections.	
III	**Projections of Solids and Sections of Solids** Classifications of basic Solids, Projections of Solids - Right Regular Prism, Pyramid, Cone, Cylinder, Tetrahedron and Cube inclined to one of the Reference Plane and inclined to two Reference Planes; Frustum of Prism, Pyramid and Cone inclined to one of the Reference Plane; Types of Cutting Planes - Auxiliary Inclined Plane, Auxiliary Vertical Plane, Horizontal Cutting Plane, Profile Cutting Plane; Sections of Solids resting on H.P/V.P and Inclined to only one of the Reference Planes; Sectional Views, True Shape of the Sections	7
IV	**Development of Surfaces** Methods of Development of Lateral Surfaces of Right Regular Solids, Parallel Line Development and Radial Line Development, Applications of Development of Surfaces	4
V	**Orthographic Projections** Different types of lines, Selection of views, spacing of views, dimensioning and sections, Conversion of pictorial view into orthographic view including sectional orthographic view.	5
VI	**Isometric Projections** Principles of Isometric Projection, Isometric scale, Isometric projections and Isometric views / drawings. Circles in isometric view. Isometric views of simple solids and objects.	5
VII	**Introduction to Computer Aided Sketching** Introduction to CAD software, Graphical User interface of CAD software, Selection of Drawing size and scale, Standard Toolbars, Menus, Tabs,	2

	navigational tools, Basic Commands to draw 2D objects, Co-ordinate system and planes, Viewing Commands.	

Text Books	
1.	Bhatt N.D., Panchal V.M. & Ingle P.R., (2014), Engineering Drawing, Charotar Publishing House.
2.	Engineering Drawing and Graphics by K. Venugopal, New Age Publication.
3.	P. S. Gill, Engineering Drawing, S. K. Katariya & sons Publication.

Reference Books	
1	Shah, M.B. & Rana B.C. (2008), Engineering Drawing and Computer Graphics, Pearson Education
2	Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, SciTech Publishers
3	Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4	Jain, Maheshwari, Gautam (2021), Engineering Graphics & Design, Khanna Book Publishing.

Alternative NPTEL/SWAYAM Course

Sr. No.	NPTEL Course Name	Instructor	Host Institute
1.	Prof. Raja ram Lakkaraju	IIT Kharagpur	Engineering Drawing and Computer Graphics
2.	Prof. Nihar Ranjan Patra	IIT Kanpur	Engineering Graphics

Useful web links	
1.	https://nptel.ac.in/courses/112103019/National Programme on Technology Enhanced Learning (NPTEL) - Phase II Course Name: Engineering Drawing
2.	https://nptel.ac.in/courses/112/104/112104172/
3.	http://moodle.unishivaji.ac.in/course/search.php?search=engineering+graphics Moodle Services, Sivaji University, Kolhapur
4.	http://web.iitd.ac.in/~achawla/public_html/201/lectures/sp46.pdf

Year, Program, Semester	First Year B. Tech in Plastics and Polymer Engineering, Semester-I						
Course Code	ESC108						
Course Category	Engineering Science Course						
Course title	**Engineering Workshop Practices-I (Theory)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	1	-	-	1	1		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	15	15	-	20	-	-	50
Pre-requisites (if any)	• Knowledge of plane geometry and solid geometry						
Course Objectives	• Understanding Basic Manufacturing Processes • Hands-on Skills Development • Technical Drawing and Measurement Proficiency • Problem-Solving and Project Management						
Course Outcomes	• Comprehensive Understanding of Manufacturing Processes • Fabrication Techniques with Diverse Materials • Application of Industrial Practices • Integration of Theory and Practice • Adaptability to Industry Innovations						

Unit No.	Course Content	Hours
I	**Plant and Shop Layout:** Objectives and types of plant layout, important consideration for installation of plant **Industrial Safety:** Planning stage, objectives of industrial safety, Accidents: causes and preventive measure	2
II	**Metals and Alloys** Ferrous metals and its types, non-ferrous metals and its types, Properties and testing of metals	2

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III	**Pattern Making:** Objectives of pattern, Common pattern materials, factors affecting the selection of pattern material, types of patterns **Mould Making**: Types and properties of moulding sand, sand mould, gating, system **Core making:** Core and its types	2
IV	**Metal Casting:** Permanent mould casting, Die casting (hot die casting & cold die casting), shell mould casting, centrifugal casting, casting defects & its types, **Forging:** Forging methods, power forging **Sheet Metal work:** Metals used in sheet metal work, sheet metal tools. **Powder Metallurgy:** Process of powder metallurgy, application, advantages & disadvantages of powder metallurgy.	4
V	**Metrology & Measurement** Important terms in metrology, Basic methods of measurement, Standards of measurements, measuring instruments (vernier callipers, micrometres, slip gauges).	1
VI	**Inspection and Quality Control** Interchangeability, Size, limit of size, Fits, Surface finish, objectives function of quality control, advantages of quality control	1

	Text Books
1.	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2.	Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3.	Gowri P. Hari Haran and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008.
4.	Raghuwanshi B.S., "Course in Workshop Technology" Dhanpat Rai & Sons, New Delhi,1991.
	Reference Books
1.	Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
2.	Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw-Hill House, 2017

3.	Workshop Technology by Chapman, W.A.J. ELBS Low Price Text | Edward Donald Pub. Ltd
4.	Basic Machine Shop Practice Vol. I & II By Tejwani, V.K. | Tata McGraw Hill Pub. Co.

Alternative NPTEL/SWAYAM Course

Sr. No.	NPTEL Course Name	Instructor	Host Institute
1.	Fundamental of Manufacturing process	Prof. D K Dwivedi	IIT Roorkee
2.	Manufacturing Processes and Technology	Prof. Sounak Kumar Choudhury	IIT Kanpur

Useful web links

1.	https://archive.nptel.ac.in/courses/112/107/112107219/
2.	https://onlinecourses.nptel.ac.in/noc24_me84/preview

Year, Program, Semester	First Year B. Tech in Plastics and Polymer Engineering, Semester-I						
Course Code	HSMEC110						
Course Category	Humanities and Social Sciences, Management, Environment Courses						
Course title	**Professional Communication (English)- I**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	1	-	2	03	02		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	-	-	-	25	25	-	50
Pre-requisites (if any)	• Students must have the knowledge of basic English grammar, writing and reading skill.						
Course Objectives	• To help the students to understand the fundamental concepts of technical communication • To acquire the skill of effective use of grammar and vocabulary rules to enhance communication skill • To learn fluency in speech and correct pronunciation • To learn various techniques of technical writing.						
Course Outcomes	• The students will understand Basic concepts of communication and technical communication • The students will understand the nuance of phonetics, accent, intonation for improving pronunciation • The students will Improve the language proficiency of students in English with an emphasis on Vocabulary, Grammar and to identify the common errors in writing and speaking • The students will adopt various techniques of oral communication • The students will acquire better technical writing techniques.						

Unit No.	Course Content	Hours
I	**Technical Communication**: communication basics, communication process, verbal and non-verbal Communication, Technical Communication: Features, element of	2

	style, distinction between general and technical Communication, Level of communication: Interpersonal, organisation, Mass communication.	
II	**Introduction to phonetics**: Introduction, phonetic transcription, English pronunciation, guideline to consonant and vowel, word accent, silent and non-silent letter, Common errors in pronunciation, spelling rules words often misspelled.	2
III	**Communicative Grammar and Vocabulary building**: parts of speech, sentence structure, tense, change the voice, Direct and Indirect speech, framing questions Vocabulary: word formation, synonyms and antonyms, Idioms and abbreviation.	2
IV	**Identifying Common Error in writing and speaking English**: Common Errors: Subject–verb agreement, Noun –pronoun agreement, misplaced modifier, Article, prepositions, sequence of tense and identification of tense, word confused, misused.	2
V	**Oral communication**: Importance of effective oral communication, introducing oneself and others, oral expressions in various professional contexts, role play, Just A Minute (JAM) activity, speech,	2
VI	**Nature and style of Sensible writing**: Importance of effective writing, paragraph writing techniques, document writing, writing introduction and conclusion, proper punctuation, summarization, precise writing, common errors due to Indianism in English communication.	2

List of Practical

English Language and Communication Skills Lab (ELCS) shall have two parts:

a. Computer Assisted Language Learning (CALL) Lab

b. Interactive Communication Skills (ICS) Lab

1. Exercise – I CALL Lab:

- Understand: Listening Skill- Its importance – Purpose- Process- Types- Barriers of Listening.
- Practice: Introduction to Phonetics – Speech Sounds – Vowels and Consonants.

ICS Lab:

- Understand: Communication at Work Place- Spoken vs. Written language.
- Practice: Ice-Breaking Activity and JAM Session- Situational Dialogues – Greetings – Taking Leave – Introducing Oneself and Others.

2. Exercise – II CALL Lab:

- Understand: Structure of Syllables – Word Stress and Rhythm– Weak Forms and Strong Forms in Context.
- Practice: Basic Rules of Word Accent - Stress Shift - Weak Forms and Strong Forms in Context.

ICS Lab:

- Understand: Features of Good Conversation – Non-verbal Communication.
- Practice: Situational Dialogues – Role-Play- Expressions in Various Situations –Making Requests and Seeking Permissions - Telephone Etiquette.

3. Exercise - III CALL Lab:

- Understand: Intonation-Errors in Pronunciation-the Influence of Mother Tongue (MTI).
- Practice: Common Indian Variants in Pronunciation – Differences in British and American Pronunciation.

ICS Lab:

- Understand: How to make Formal Presentations.
- Practice: Formal Presentations.

4. Exercise – IV CALL Lab:

- Understand: Listening for General Details. Practice: Listening Comprehension Tests.

ICS Lab:

- Understand: Public Speaking – Exposure to Structured Talks.
- Practice: Making a Short Speech – Extempore.

5. Exercise – V CALL Lab:

- Understand: Listening for Specific Details. Practice: Listening Comprehension Tests.

ICS Lab:

- Understand: Interview Skills. Practice: Mock Interviews

Text Books	
1	Meenakshi Raman and Sangita Sharma's Technical Communication: Principles and Practice, 3rd Edition, Oxford University Press, 2017, replacing the 2nd Edition, 2011.
2	J.D.O Connor, "Better English Pronunciation", 2nd by Cambridge University Press, 1980

3	Wren and Martin, "High School English Grammar and Composition", S Chand and Company Ltd – 2015.
4	Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press
	Reference Books
1	Gajendra Singh Chauhan and Et al, "Technical Communication", Cengage learning India Pvt Limited, 019.
2	M Ashraf Rizvi's Effective Technical Communication, 2nd Edition, McGraw Hill Education (India), 2018
3	Word Power Made Easy by Norman Lewis, Goyal Publishers, 2020.
4	Randolph Quirk and S Greenbaum," A University Grammar of English Latest", Pearson 2007
5	Sanjay Kumar and Pushpalata Communication Skills", Oxford University Press India Pvt Ltd - 2019
6	Practical English Usage by Michael Swan, Oxford University Press – 2016
7	Functional English (As per AICTE 2018 Model Curriculum), Cengage Learning India Pvt Limited, Latest Revised Edition, 2020.
8	D Praveen Sam, KN Shoba, "A Course in Technical English", Cambridge University Press – 2020.
	Useful Web links
1	https://learnenglish.britishcouncil.org
2	https://www.fluentu.com

Year, Program, Semester	First Year B. Tech in Plastics and Polymer Engineering, Semester-I						
Course Code	VSEC-112						
Course Category	Engineering Science Course						
Course title	**Design Thinking and Innovation-I**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	-	-	02	02	01		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	-	-	-	-	25	-	25
Pre-requisites (if any)	Knowledge of Creative Problem Solving and Project Management						
Course Objectives	1. To explain the concept of design thinking for product and service development 2. To explain the fundamental concept of innovation and design thinking 3. To discuss the methods of implementing design thinking in the real world.						
Course Outcomes	1. Understanding Design Thinking for Development. 2. Comprehending Innovation and Design Thinking Fundamentals 3. Implementing Design Thinking in Real-world Scenarios 4. Evaluating and Repeating Design Thinking Processes						

List of Practical	
1.	To utilize Empathy Mapping for gaining insights into user needs and behaviors for informed, user-centred design decisions.
2.	To create detailed user personas that represent the target audience's characteristics, needs, and behaviours, enabling a deeper understanding of user requirements and guiding the design process effectively.
3.	To explore and apply various ideation techniques for generating innovative and diverse solutions, fostering creativity, and addressing user needs effectively in the design thinking process.

4.	To explore and apply collaborative brainstorming and mind mapping techniques to generate diverse ideas, encourage creative thinking, and organize complex information, fostering innovation and expanding the boundaries of solution development.
5.	To develop tangible prototypes that represent initial design concepts, facilitating the exploration, communication, and validation of ideas in alignment with user needs and design objectives.
6.	To understand and apply rapid prototyping techniques by creating a 3D-printed part, demonstrating the process of transforming designs into physical models quickly and efficiently.
7.	To understand the process of user testing and its significance in product development by conducting user testing sessions, gathering feedback, and analyzing insights to propose actionable improvements for a given prototype or product.
8.	To understand the process of Journey Mapping and its significance in analyzing user experiences by visualizing and evaluating the steps users go through while interacting with a product, service, or system.
9.	Design Sprint: Rapid Problem Solving
10.	Innovative Problem-Solving: Applying Design Thinking in Real-World Scenarios

The following activities will be planned

a) Brain teasers (aka Puzzle Busters, to be solved individually)

b) Cartoon captions (small teams)

c) TRIZ, a systematic ideation method, reading (individual)

d) Book readings and discussions (small teams)

e) Small teams' presentations on innovation:(1) innovative individual, (2) innovative company, (3) innovative movie / game, (4) sustainable innovation, (5) innovation in business, (6) innovation in art, (7) innovation in architecture, (8) innovative nation, (9) innovation in science, and (10) innovation in engineering.

f) Large groups hands-on projects

g) Eight-dimensional (8D) ideation method examples

h) Large teams' videos.

i) Students also will be taken to the **workshop** to experience some kind of hands on training to make carpentry, metal or smithy job.

Reference Books	
1.	Lockwood, T., & Papke, E. (2010). Design Thinking: Integrating Innovation, Customer Experience, and Brand Value. Allworth Press.
2.	Lewrick, M., Link, P., & Leifer, L. (2018). The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems. Wiley.
3.	Plattner, H., Meinel, C., & Leifer, L. (Eds.). (2020). Design Thinking Research: Building Innovation Eco-Systems (Understanding Innovation). Springer.
4.	Brown, T. (2009). Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation. Harper Business.
5.	Ramanathan, U., & Seth, R. (Eds.). (2018). Social Internship and Sustainable Community Development in India: Concepts, Strategies, and Best Practices. Springer.
Important web links	
1.	Stanford d.school - https://dschool.stanford.edu/
2.	IDEO U - https://www.ideou.com/

Year, Program, Semester	First Year B. Tech in Plastics and Polymer Engineering, Semester-I						
Course Code	BSC141						
Course Category	BSC (Basic Science Course)						
Course title	**Engineering Physics (Lab.)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	-	-	2	02	01		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	-	-	-	-	-	25	25
Pre-requisites (if any)	Physics Practical at Graduation level						
Course Objectives	• Conduct experiments to measure and analyze the properties of materials using ultrasonic and dielectric techniques • Investigate the behavior and characteristics of light through laser diffraction and fiber optics experiments. • Examine the photoelectric effect and semiconductor properties using photodiodes, LEDs, and laser diodes. • Employ various methods such as the four-probe technique and B-H curve tracing to study magnetic and electrical properties.						
Course Outcomes	• Apply theoretical principles to experimental results in physics. • Develop ability in operating and interpreting results from various physics laboratory instruments. • Analyze and interpret data to validate theoretical concepts and understand physical phenomena. • Relate laboratory findings to real-world applications in technology and engineering						

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Sr. No	Name of Practical	Hours
I	Ultrasonic Interferometer	2
II	Dielectric constant kit	2
III	Photoelectric effect	2
IV	Fiber optics	2
V	Laser diffraction	2
VI	Photodiode characteristics	2
VII	Four probe method	2
VIII	Universal B-H curve tracer	2
IX	Fermi energy apparatus model	2
X	LED and Laser diode characteristics	2

Reference Books

1	Neamen, D. A. (2012). *Semiconductor Physics and Devices: Basic Principles* (4th ed.). McGraw-Hill Education.
2	Sharma, K. K. (2006). *Optics: Principles and Applications*. Academic Press.
3	Born, M., & Wolf, E. (1999). *Principles of Optics: Electromagnetic Theory of Propagation, Interference and Diffraction of Light* (7th ed.). Cambridge University Press.
4	Prakash, S., & Dua, V. (2006). *Oscillations and Waves*. Pragati Prakashan.
5	Subrahmanyam, N., & Lal, B. (2001). *Waves and Oscillations*. S. Chand & Company Ltd.
6	Neamen, D. A. (2012). *Semiconductor Physics and Devices: Basic Principles* (4th ed.). McGraw-Hill Education.
7	Sharma, K. K. (2006). *Optics: Principles and Applications*. Academic Press.

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Year, Program, Semester	First Year B. Tech in Plastics and Polymer Engineering, Semester-I						
Course Code	ESC142						
Course Category	Engineering Science Course						
Course title	**Engineering Graphics and Design (Lab.)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	-	-	02	02	01		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	-	-	-	-	-	25	25
Pre-requisites (if any)	• Knowledge of plane geometry and solid geometry						
Course Objectives	• The course is aimed at developing basic graphic skills. • To learn the engineering graphics standards. • To develop skills in reading and interpretation of engineering drawings. • To introduce Computer-Aided Drafting tools						
Course Outcomes	• Identify basic concepts of BIS conventions and their application. • Interpret first angle and third angle projection system. • Construct orthographic projections of points, lines and planes. • Apply principles of projection and construct orthographic and isometric views of an object. • Develop a skill of visualization to understand and read the drawing.						

List of Practical	
1.	Introduction to Engineering Graphics: Types of lines, Letterings, Drawing Symbols, Numberings, Dimensioning Terms and Notations, Title Block, Geometric Constructions etc.
2.	Exercise Sheet on Engineering curves
3.	Exercise Sheet on Projections of Points and lines
4.	Exercise Sheet on Projections of planes
5.	Exercise Sheet on Projections of solids
6.	Exercise Sheet on Development of lateral surfaces of solids
7.	Exercise Sheet on Orthographic projections
8.	Exercise Sheet on Isometric projections
9.	Demonstration of drafting software with commands

<table>
<tr><td>Year, Program, Semester</td><td colspan="6">First Year B. Tech in Plastics and Polymer Engineering, Semester-I</td></tr>
<tr><td>Course Code</td><td colspan="6">IKS126</td></tr>
<tr><td>Course Category</td><td colspan="6">Indian Knowledge System</td></tr>
<tr><td>Course title</td><td colspan="6">Yoga and Meditation</td></tr>
<tr><td>Teaching Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td colspan="2">Total Contact Hours</td><td>Total Credits</td></tr>
<tr><td></td><td>-</td><td>-</td><td>2</td><td colspan="2">02</td><td>01</td></tr>
<tr><td>Evaluation Scheme</td><td colspan="6"><table><tr><th>MSE-I</th><th>MSE-II</th><th>ESE</th><th>TA</th><th>TW</th><th>PR/OR</th><th>Total</th></tr><tr><td>-</td><td>-</td><td>-</td><td>-</td><td>25</td><td>-</td><td>25</td></tr></table>IE at the course in charge end: (Preferred to have 4 assignments and conduct of an MCQ Test based on the course work. However, the course teacher will declare whether the students have passed it or not. Passing is mandatory to earn the credit.</td></tr>
<tr><td>Pre-requisites (if any)</td><td colspan="6">Basic physical fitness and flexibility for yoga postures (asanas) and meditation practices. Open-mindedness, willingness to learn, and a commitment to regular practice and self-reflection are essential.</td></tr>
<tr><td>Course Objectives</td><td colspan="6">• Gain a comprehensive understanding of yoga and meditation principles and practices for holistic well-being.
• Develop practical skills to incorporate yoga and meditation into daily life for stress reduction and emotional balance.
• Explore the scientific basis and applications of yoga and meditation in diverse contexts.
• Foster personal growth and self-awareness through regular practice, integrating yoga and meditation as a lifelong journey.</td></tr>
<tr><td>Course Outcomes</td><td colspan="6">• Develop a strong foundation in yoga and meditation techniques and principles.
• Cultivate mindfulness and self-awareness through regular practice.
• Enhance physical flexibility, strength, and overall well-being.
• Apply yoga and meditation practices to reduce stress and promote mental and emotional balance.</td></tr>
</table>

Unit No.	Course Content	Hours
I.	Introduction to Yoga and Meditation: a) Overview of yoga and its origins b) Introduction to meditation techniques and benefits	2
II.	Foundations of Yoga Practice: a) Understanding yoga asanas (poses) and their alignment b) Pranayama techniques for breath control and energy regulation	2
III.	Exploring Meditation Techniques: a) Mindfulness meditation and its practice b) Guided visualization and relaxation techniques	2
IV.	Yoga for Physical Health and Well-being: a) Yoga for flexibility and strength b) Yoga for stress reduction and relaxation	2
V.	Yoga Philosophy and Lifestyle: a) Introduction to the philosophy of yoga b) Applying yoga principles to daily life and relationships	2
VI.	Advanced Practices and Integration: a) Advanced yoga asanas and sequences b) Integrating yoga and meditation into a holistic lifestyle	2

Reference Books

1. Iyengar, B.K.S. Light on Yoga: The Bible of Modern Yoga. HarperCollins, 2001.
2. Khalsa, Gurucharan Singh. Kundalini Yoga: The Flow of Eternal Power. TarcherPerigee, 1999.
3. Lasater, Judith Hanson. Relax and Renew: Restful Yoga for Stressful Times. Rodmell Press, 2011.
4. Saraswati, Swami Satyananda. Asana, Pranayama, Mudra, Bandha. Bihar School of Yoga, 2008.
5. Satchidananda, Swami. The Yoga Sutras of Patanjali. Integral Yoga Publications, 2012.

6.	Zinn, Jon Kabat. Wherever You Go, There You Are: Mindfulness Meditation in Everyday Life. Hyperion, 2005.
Important web links	
1.	Yoga Journal: www.yogajournal.com
2.	Headspace: www.headspace.com
3.	The International Sivananda Yoga Vedanta Centres: www.sivananda.org
4.	Insight Timer: www.insighttimer.com

PLASTINDIA INTERNATIONAL UNIVERSITY

(Sponsored by Plastindia Foundation)

Dungra, GIDC, Vapi, Dist. Valsad - 396193, Gujarat, India

(Established under Gujarat Government Private Universities Act, 2016)

PLASTINDIA INTERNATIONAL UNIVERSITY

School of Engineering

B. Tech (Plastics and Polymer Engineering)

(w.e.f. Academic Year 2024-25 onwards)

BATCH 2024-2028

P-2024

Plastindia International University

FY.B. Tech (Plastics and Polymer Engineering)-2024-2028 Batch

Course Category	Course Code	Course Name	Teaching Scheme (Hours/Week)				Examination Scheme and Marks							Credits			
			Theory	Tutorial	Practical	Contact Hr/Week	MSE- I	MSE - II	TA	ESE	TW	PR/OR	TOTAL	TH	TW/PR	TOTAL	In Lieu With
Semester - II																	
BSC	BSC102	Engineering Mathematics-II	3	1	-	4	15	15	20	50	-	-	100	3	1	4	
BSC	BSC104	Engineering Chemistry	3	-	-	3	15	15	20	50	-	-	100	3	-	3	
ESC	ESC109	Engineering Workshop Practices-II	3	-	-	3	15	15	20	50	-	-	100	3	-	3	
PCC	PPE101	Introduction to Plastics Engineering	3	-	-	3	15	15	20	50	-	-	100	3	-	3	
HSMEC	HSME111	Professional Communication (English-II)	1	-	2	3	-	-	25	-	25	-	50	1	-	1	
PCC	PPE 143	Lab: Introduction to Plastics Engineering	-	-	2	2	-	-	-	-	25	-	25	-	1	1	
BSC	BSC144	Lab: Engineering Chemistry	-	-	2	2	-	-	-	-	-	25	25	-	1	1	
ESC	ESC145	Lab: Engineering Workshop Practices	-	-	2	2	-	-	-	-	-	25	25	-	1	1	
ESC	ESC146	Lab: Computer Programming	-	-	2	2	-	-	-	-	25	-	25	-	1	1	
Audit Course	-	Human Rights and Constitution	1	-	-	1	Non-Credit Mandatory Course										
Project Seminar Internship	-	Social Internship**	After Semester II, 10 days internship preferably in a rural area														
		Total	**14**	**1**	**10**	**26**	**60**	**60**	**105**	**200**	**75**	**50**	**550**	**13**	**5**	**18**	

Year, Program, Semester	F.Y. B. Tech in Plastics and Polymer Engineering, Semester-II							
Course Code	BSC102							
Course Category	BSC (Basic Science Course)							
Course title	**Engineering Mathematics-II (Theory)**							
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**		**Total Credits**		
	03	1	-	04		04		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**	
	15	15	50	20	--	--	100	
Pre-requisites (if any)	Basics of Derivatives and Integration							
Course Objectives	1. Apply the concept of calculus of complex function to construct analytic function. 2. Able to formulate and solve various engineering problems using calculus and ability to work with advanced engineering mathematics. 3. To formulate and solve various engineering problems using Complex Analysis. 4. To study the properties of Laplace Transforms to solve ODEs.							
Course Outcomes	1. Analyze sequences and series for convergence and apply series expansion techniques to solve problems. 2. Evaluate the continuity, differentiability, and analyticity of complex functions and solve related problems using mathematical tools and equations in various coordinate systems. 3. Apply concepts of complex integration to evaluate contour integrals and solve problems using fundamental theorems and formulas in complex analysis. 4. Analyze and apply Fourier series and Laplace transforms to represent functions and address engineering problems involving periodicity and system dynamics.							

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Unit No.	Course Content	Hours
I	**Sequence and Series - I** Convergence and Divergence, Oscillating and Infinite Series, Sandwich Theorem, p-Series, Comparison test, Integral test, Ratio test, Root test, Alternating Series, Absolute and Conditional Convergence.	6
II	**Sequence and Series – II** Power Series, Taylor and Maclurian Series, Indeterminate forms, and L'Hospital rule.	6
III	**Complex Differentiation** Limit, Continuity, Differentiability of functions of complex variable, Cauchy-Riemann equations, Cauchy-Euler equation (Cartesian and Polar coordinates), Analytic functions, Harmonic functions.	6
IV	**Complex Integration** Complex line integral, Contour Integral, Cauchy-Gaursat Theorem, Cauchy Integral Theorem (CIT), Cauchy Integral Formula (CIF), Cauchy Residue Theorem.	6
V	**Fourier Series - I** Fourier Coefficients, Convergence, Types of Fourier series, Linearity, Symmetric Property, Parseval's Theorem, Dirichlet's Condition	6
VI	**Laplace Transforms – I** Laplace Transform, Linearity, First Shifting Theorem, Existence Theorem, Second Shifting Theorem, Inverse Laplace Transform, Properties of Inverse Laplace Transforms, Convolution Theorem.	6

Text Books

1. B. S. Grewal, "Higher Engineering Mathematics", 45th edition, 1965, Khanna Publishers, New Delhi.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th edition, 2010, John Wiley & Sons.
3. B. V. Ramana, "Higher Engineering Mathematics", 2017, Tata McGraw-Hill, New Delhi.

Reference Books

1. C. R. Wylie, "Advanced Engineering Mathematics", McGraw Hill Publication, New Delhi.
2. Shanti Narayan, "Differential Calculus" S. Chand and company, New Delhi.

3.	S. S. Sastry, "Engineering Mathematics (Volume-I)", Prentice Hall Publication, New Delhi.
4.	H. K. Dass, "Advanced Engineering Mathematics", S. Chand Publishing.
5.	N. P. Bali, Iyengar "A text book of Engineering Mathematics by", Laxmi Publications (P)Ltd., New Delhi.
6.	M. D. Greenberg, "Advanced Engineering Mathematics", Pearson Education.

Year, Program, Semester	F.Y. B. Tech in Plastics and Polymer Engineering, Semester-II							
Course Code	BSC104							
Course Category	BSC (Basic Science Course)							
Course title	**Engineering Chemistry (Theory)**							
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**		**Total Credits**		
	03	-	-	03		03		
Evaluation Scheme	**MSE-I**	**MSE-II**		**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	15	15		50	20	-	-	100
Pre-requisites	Basics of Chemical Science							
Course Objectives	• To understand the basic concepts of chemistry such as atoms, molecules, and chemical bonding. • To study the reaction kinetics and activation energy. Laws of thermodynamics, enthalpy, entropy, and Gibbs free energy. • Understanding of various states and forces in matter, Industrial waste water and its treatment, Macromolecules and Industrial Chemicals. • To understand an electromagnetic radiation interaction with matter and spectrum. To know about Green Chemistry and Environment Sustainability.							
Course Outcomes	• Understanding of the principles and concepts of chemistry including atomic structure, chemical bonding and organic reactions • Student will be able to understand the reaction kinetics, factors, Laws of thermodynamics, components and Gibb's energy. • Student will be able to know the various states and forces in matter. Industrial waste water, macromolecules and various important industrial chemicals. • Student will be able to understand an electromagnetic radiation interaction with matter and spectrum. To learn about Green Chemistry and Environment Sustainability.							

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Unit No.	Course Content	Hours
I	**Atomic Structure and Chemical Bonding** Basic introduction of chemistry, chemistry of atoms, molecules, and compounds. Atomic and molecular masses, mole concept, bonding theories, hybridization, the periodicity. Chemical bonding, and intermolecular forces, hydrocarbons, types of organic reaction, functional groups, reactivity, and reaction intermediates. Acid-base theories and pH.	6
II	**Chemical Kinetics and Thermodynamics** Chemical reaction rate, rate constant, factors affecting, order of reaction and molecularity, activation energy (Ea.), Arrhenius equation, effects of temperature and catalyst. Laws of thermodynamics, work, energy, enthalpy, entropy, Gibbs free energy. Spontaneous and non-spontaneous processes.	6
III	**Matter, Water and Solution** States of matter, Gas laws, differences among solid, liquid, and gas based on molecular forces, Water, hydrogen bonding, hardness of water, pH, TDS, TOC, Industrial waste water and treatment, BOD, COD and DO determination. Types of solution, solubility, various terms of concentrations, and colligative properties.	6
IV	**Basic Principles of Spectroscopy** Electromagnetic radiation, Interaction of electromagnetic radiation with molecule, Beer-Lambert Law, UV spectrum, absorbance, emission, transmittance, and reflectance. Infrared spectroscopy, and other techniques. Applications to polymers.	6
V	**Macromolecule and Industrial Organic Chemicals** Monomer, oligomer and polymer. Homopolymer, copolymers, natural and synthetic. Addition and condensation, polymerization techniques, Molecular weight, thermoplastics and thermosetting, biodegradable and conductive polymers, bioplastic, plastic, elastomer (rubber), fibre, polymeric hydrogel, paint, emulsion, adhesives, and textile.	6
VI	**Green Chemistry and Environment Sustainability** Definition, 14 principles, green catalyst, green solvent, and various techniques for green synthesis of materials; understandings of sustainability of Environment,	6

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	Depletion, and 4R's. Environment Pollutions, Biomedical waste and e-waste. Plastic waste and Microplastic Pollution, Plastic waste management and Environment policies.	

	Text Books
1	S. S. Dara, and D.D. Mishra, "Textbook of Environmental Chemistry and Pollution Control", S Chand & Co Ltd
2	Dr. O.P. Tandon, A Text book of Inorganic Chemistry,", G.R. Bathla & Sons
3	Shashi Chawla, A Text Book of Eng. Chemistry, Dhanpat Rai & Co. (P) Ltd.
4	V.K. Ahluwalia, Green Chemistry and Environment, The Energy and Resources Institute, TERI.
	Reference Books
1	Jain & Jain "Engineering Chemistry" Dhanpat Rai Publishing Company
2	S. Agarwal "Engineering Chemistry" Cambridge University Press
3	Baskar, Engineering Chemistry, John Wiley & Sons
4	V. Gowariker "Introduction to Polymer Science" New Age International.
5	Puri, Sharma and Pathania, Principles of Physical Chemistry" Vishal Publishing Company
6	Bahl and Tuli, Essentials of Physical Chemistry, S. Chand Publishing

Year, Program, Semester	F.Y. B. Tech in Plastics and Polymer Engineering, Semester-II						
Course Code	ESC109						
Course Category	Engineering Science Course						
Course title	**Engineering Workshop Practices- II**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**		**Total Credits**	
	03	-	-	03		03	
Evaluation Scheme	**MSE-I**	**MSE-II**		**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	15	15		-	20	-	-	50
Pre-requisites (if any)	• Knowledge of plane geometry and solid geometry • Engineering Workshop Practices- I						
Course Objectives	• To provide exposure to the students with hands on experience on various basic engineering practices • To have a study and hands-on-exercise on plumbing and carpentry components. • To have a practice on gas welding, foundry operations and fitting • To have a practice on soldering.						
Course Outcomes	• Comprehensive understanding of manufacturing processes • Material-Specific fabrication techniques • Practical skills in component fabrication • Problem-solving in manufacturing • Industry-standard practices and safety						

Unit No.	Course Content	Hours
I	**Introduction** Workshop layout, Importance of various sections/shops of workshop, Types of jobs done in each shop, General safety rules and work procedure in workshop.	6

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II	**Fitting Operations and Power Tools** Study and use of Holding tools, Marking and Measuring tools, cutting tools, Finishing tools (Reamer and Files) and some other miscellaneous tools. Fitting operations: chipping filling, Drilling and tapping. Power tools, its types and their uses.	6
III	**Carpentry** Types of woods and their applications, Timber seasoning. Types, sketch, specification, material, methods and applications of carpentry tools like saws, planner, chisels, hammers, pallet, marking gauge, vice, try square, rule, etc.	6
IV	**Machining:** Machine tools and metal cutting Principles, Types of machining process. **Casting:** Pattern, Pattern materials, Pattern making, allowances of pattern and Pattern types, Casting process, Types of casting, Casting defects, Moulding process and its types. **Forming:** Metal Forming: Introduction, forming processes - Bending, Coining, embossing, rolling: types of Rolling and Roll mills, Strain Hardening, Recovery, Recrystallization and Grain growth. **Joining:** Introduction and types of joining process (welding, brazing, soldering, adhesive bonding)	6
V	**CNC:** Introduction, Elements, block diagram, Types of CNC machine, Working of CNC, Programming basics, G and M code, Advantages and challenges. **Advanced manufacturing methods:** Introduction to Rapid Prototyping, material, applications, limitations and Techniques: Photo polymerization, Stereo lithography, Powder Bed Fusion, Selective Laser Sintering, 3D Printing, Laminated Object Manufacturing	6

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VI	**Plastic moulding**: Introduction of Plastic moulding and Types (rotational moulding, injection moulding, blow moulding, compression moulding, extrusion moulding, and thermoforming). **Glass cutting:** Introduction, Evaluation of Glass Cut, Cutting with Wheels, cutting with CO_2 Laser, Cutting by Ablation, Filament Cutting.	6

Text Books	
1	Hajra Choudhury S.K., Hajra Choudhury A.K. and Nirjhar Roy S.K., "Elements of Workshop Technology", Vol. I 2008 and Vol. II 2010, Media promoters and publishers private limited, Mumbai.
2	Kalpakjian S. And Steven S. Schmid, "Manufacturing Engineering and Technology", 4th edition, Pearson Education India Edition, 2002.
3	Gowri P. Hari Haran and A. Suresh Babu," Manufacturing Technology – I" Pearson Education, 2008.
Reference Books	
1	Roy A. Lindberg, "Processes and Materials of Manufacture", 4th edition, Prentice Hall India, 1998.
2	Rao P.N., "Manufacturing Technology", Vol. I and Vol. II, Tata McGraw-Hill House, 2017.
3	Workshop Technology by Chapman, W.A.J. ELBS Low Price Text, Edward Donald Pub. Ltd, 2018
4	Basic Machine Shop Practice Vol. I & II By Tejwani, V.K., Tata McGraw Hill Pub. Co., 2020

Sr. No.	NPTEL Course Name	Instructor	Host Institute
1.	Fundamental of Manufacturing process	Prof. D K Dwivedi	IIT Roorkee
2.	Manufacturing Processes and Technology	Prof. Sounak Kumar Choudhury	IIT Kanpur

Useful web links	
1	https://archive.nptel.ac.in/courses/112/107/112107219/
2	https://onlinecourses.nptel.ac.in/noc24_me84/preview

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Year, Program, Semester	F.Y. B. Tech in Plastics and Polymer Engineering, Semester-II						
Course Code	PPE101						
Course Category	PCC (Professional Core Course)						
Course title	**Introduction to Plastics Engineering (Theory)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	03	-	-	03	03		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	15	15	50	20	-	-	100
Pre-requisites (if any)	• Fundamental knowledge of chemistry based on 10th and 12th standard • Basic Engineering Graphics/Design course						
Course Objectives	• General overview of polymers, their types, concept of molecular weight • General understanding of structure of polymers and predict polymer properties.						
Course Outcomes **(Th and Lab)**	• Recall fundamental concepts of polymer science, including the evolution of polymers, key definitions (monomers, oligomers, polymers), and the classification of polymers based on structure and properties. • Explain the relationship between polymer structures (linear, branched, crosslinked, crystalline, and amorphous) and their properties, along with the applications of different polymer types, such as rubbers, plastics, and fibers, in various industries. • Apply the principles of technical drawing to create accurate 2D drawings, adhering to standards and conventions, and incorporating basic dimensioning and tolerancing techniques. • Apply appropriate techniques to evaluate key physical and chemical properties of plastic materials, such as moisture content, volatile matter, bulk density, water absorption, ash content, amine value, and acid value.						

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Unit No.	Course Content	Hours
I	**Introduction to Polymers:** Historical Developments of Polymers: Overview of significant milestones in the development of polymers, evolution of polymer science and its applications; basic raw materials: natural and synthetic sources of polymer materials, role of monomers in polymerization; key concepts and definitions: monomers, oligomers, macromolecules, and polymers, repeating units and degree of polymerization, functionality concept and functional groups, molecular weight concept	6
II	**Classification of Polymers** Basic Concepts and Definitions: Organic and inorganic polymers. thermoplastics and thermosets, addition and condensation polymers, natural, semi-synthetic, and synthetic polymers, crystalline and amorphous polymers, homopolymers and copolymers, homochain and heterochain polymers; polymer structure and properties: linear, branched, and crosslinked polymers, conformation and configuration, tacticity of polymers	6
III	**Types of Polymers and Their Applications** Rubber, Plastic, Fibers and Liquid resins: concepts and properties of rubber, plastic, fibres and liquid resins; commodity, engineering and specialty polymers, applications of commodity and specialty polymers in various industries	6
IV	**Fundamentals of Technical Drawing and Design** Introduction to Technical Drawing: Basic principles and importance of technical drawing, types of drawings (orthographic, isometric, section views, etc.), standards and conventions; fundamentals of design: design process and problem-solving techniques, overview of design principles (aesthetics, function, and ergonomics), introduction to product design documentation and specifications	6

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V	**Computer-Aided Design (CAD) and Dimensioning** Introduction to Computer-Aided Design (CAD): Overview of CAD software and its applications in design, basic CAD tools and user interface, introduction to 2D and 3D modelling in CAD; dimensioning and tolerances: importance of dimensioning in technical drawings, types of dimensioning (linear, angular, radial, etc.), tolerances and their role in design and manufacturing; and geometric dimensioning and tolerancing	6
VI	**Manufacturing, Prototyping, and 3D Printing** Basic Concepts of Manufacturing: Overview of manufacturing processes (casting, machining, forming, etc.), material selection and its impact on the manufacturing process, introduction to manufacturing drawings and assembly instructions; rapid prototyping and 3D Printing: introduction to rapid prototyping techniques, overview of 3D printing technologies and their applications in design and prototyping, practical applications of 3D printing in the industry and product development	6
Text Books		
1	V R Gowariker, N V Viswanathan, Jayadev Sreedhar, Polymer Science, New Age International Publishers, Mumbai.	
2	V. K. Ahluwalia, Anuradha Mishra, Polymer Science: A Textbook, ANE Books, New Delhi	
3	A J Manna, Fundamentals of Polymer Science and Technology, Books and Allied Pvt Ltd. Kolkata.	
4	N. Parthasarathy, Engineering Drawing. Oxford, 2015.	
Reference Books		
1	P. Ghosh, Polymer Science and Technology: Plastics, Rubber, Blends and Composites, Tata McGraw Hill, 2nd Edition	
2	J. A. Brydson, Plastics Materials, Butterworth Heinemann, 7th Edition	
3	George Odian, Principles of Polymerization, Wiley Interscience, 4th Edition	
4	M. Tooley, Design Engineering Manual, Elsevier, 2010.	

Year, Program, Semester	F.Y. B. Tech in Plastics and Polymer Engineering, Semester-II						
Course Code	HSME111						
Course Category	HSMEC (Humanities and Social Sciences, Management, Environment Courses)						
Course title	**Professional Communication (English)-II**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	01	-	2	03	02		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	-	-	-	25	25	--	50
Pre-requisites (if any)	Students must have the knowledge of basic English grammar, writing and reading skill						
Course Objectives	1. To acquire the techniques of letter, E-Mail writing 2. To learn drafting CV, cover letter, report and proposal writing 3. Learn interview techniques and group discussion skill 4. To develop reading and listening skill for better communication 5. To be acquaint workplace communication and etiquettes.						
Course Outcomes	1. Students will enable to write various types of business letters and official correspondences and to make students familiar with E-communication. 2. Students will learn the essentials of communication skill for the employment 3. The students will get ample practice of listening and reading skill 4. The students will acquaint with various soft skills and etiquettes at work place						

Unit No.	Course Content	Hours
I	Professional Correspondence – Principles, Features, Types, Format and layout of Business letter. Types of Business Correspondence – letters of Enquiry, Quotation, Order, Instructions, Sales, Credit, Complaint, Collection etc. E-mail writing	2
II	Communication skill for Employment: Job Application letters -- Covering letter, Resume, C.V. Interview skill, Group Discussion skills - Features and Importance, presentation skills - Features, Types, Structure, Aids and Importance, Technical	2

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	Proposal- Writing technical proposals. Technical Report -- Writing Technical Reports.	
III	Developing listening skill: difference between Hearing and Listening, listening process, Traits of good listener, Techniques to improve listening skills with audio/ video sample.	2
IV	Reading skill: Importance of effective reading, types of reading, (Skimming; Scanning, Intensive reading, Extensive reading) Overcoming common obstacles, reading comprehension, tips and strategies to improve reading skill.	2
V	Professional Communication at workplace: Soft skills. Kinesics, Para language, Interpersonal communication skills – Role of Personality and its various attributes like EQ, attitude, motivation, stress management and accepting criticism in determining efficacy of interpersonal communication, oral expressions in various professional contexts, Telephonic Etiquette. Corporate communication skills – Role of business etiquette, conducting meetings, managing conflict, negotiation, team spirit, decision-making, time management and problem-solving skills.	2
VI	Professional Communication at workplace: Soft skills. Kinesics, Para language, Interpersonal communication skills – Role of Personality and its various attributes like EQ, attitude, motivation, stress management and accepting criticism in determining efficacy of interpersonal communication, oral expressions in various professional contexts, Telephonic Etiquette. Corporate communication skills – Role of business etiquette, conducting meetings, managing conflict, negotiation, team spirit, decision-making, time management and problem-solving skills.	2
Text Books		
1	A Textbook of English Language Communication Skills, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.	
2	Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.	
3	David Irwin, "Effective Business Communications" Viva- Thorogood.	
4	Dhanavel. S P, "English and Soft Skills", Orient BlackSwan. India 2018.	

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Reference Books	
1	Rajendra Pal and J S Korlaha, "Essentials of Business Communication" HI Sultan Chand and Sons, New Delhi
2	Goldsmith, "Soft Skills: Enhancing Employability", Marshall and M.S. Rao Dreamtech Press. India, 2020
3	Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93- 5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
4	Practical English Usage by Michael Swan, Oxford University Press – 2016.
5	Functional English (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].
Useful web links	
1	https://learnenglish.britishcouncil.org
2	https://www.fluentu.com

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Year, Program, Semester	First Year B. Tech in Plastics and Polymer Engineering, Semester-II						
Course Code	PPE143						
Course Category	PCC (Polymer Core Course)						
Course title	**Introduction to Plastics Engineering (Laboratory)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	-	-	2	02	01		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	-	-	-	-	25	-	25
Pre-requisites (if any)	• Fundamental knowledge of chemistry based on 10th and 12th standard • Basic Engineering Graphics/Design course						
Course Objectives	• To develop competency in material characterization techniques such as determining moisture content, volatile matter, bulk density, water absorption, ash content, amine value, and acid value of plastic samples. • To equip students with CAD proficiency by familiarizing them with fundamental tools and commands for creating accurate 2D technical drawings. • To enable students to apply engineering standards by learning dimensioning and tolerancing principles, along with advanced CAD features such as hatching, annotation, and layering for producing professional-quality technical drawings. • To introduce modern prototyping technologies through theoretical understanding and demonstration of the CAD-to-3D printing workflow, fostering knowledge of rapid prototyping processes.						
Course Outcomes **(Lab Only)**	• Apply appropriate techniques to evaluate key physical and chemical properties of plastic materials, such as moisture content, volatile matter, bulk density, water absorption, ash content, amine value, and acid value.						

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Sr. No.	Name of Practical	Hours
I	Determination of moisture and volatile content in plastics.	2
II	Determination of bulk density of plastic sample.	2
III	Determination of water absorption in plastics sample.	2
IV	Determination of ash content of a plastics sample.	2
V	Familiarize students with the basic tools and commands of CAD software for creating accurate 2D technical drawings.	2
VI	Introduce students to the principles of dimensioning and tolerances, enabling them to create precise and standardized 2D drawings	2
VII	Train students in advanced 2D CAD features such as hatching, annotation, and layering to create detailed and professional-quality technical drawings.	2
VIII	To provide students with an understanding of rapid prototyping processes and the CAD-to-3D printing workflow through theory and demonstration.	2
IX	Determination of Amine Value of a sample	2
X	Determination of Acid Value of a sample	2
Reference Books		
1	Vishu Shah, Handbook of Plastics Testing and Failure Analysis, 3rd Edition, Wiley, 2007.	
2	ASTM International, ASTM Standards for Plastics Testing, Latest Edition, ASTM International, Ongoing.	
3	Wolfgang Grellmann and Sabine Seidler, Polymer Testing, 2nd Edition, Carl Hanser Verlag, 2013.	
4	David A. Madsen and David P. Madsen, Engineering Drawing and Design, 6th Edition, Cengage Learning, 2016.	
5	Scott Onstott, Autodesk AutoCAD Essentials, 1st Edition, Wiley, 2015.	
6	Frederick E. Giesecke, Alva Mitchell, and Henry C. Spencer, Technical Drawing with Engineering Graphics, 15th Edition, Pearson, 2016.	
7	Gene Cogorno, Geometric Dimensioning and Tolerancing for Mechanical Design, 2nd Edition, McGraw-Hill, 2011.	

Year, Program, Semester	F.Y. B. Tech in Plastics and Polymer Engineering, Semester-II						
Course Code	BSC144						
Course Category	BSC (Basic Science Course)						
Course Title	Engineering Chemistry (Practical)						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	-	-	2	02	01		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	-	-	-	-	-	25	25
Pre-requisites (if any)	• Chemistry Practical at Graduation level						
Course Objectives	• To understand the basic guideline of chemistry laboratory practical and knowledge about glassware and apparatus used in chemistry laboratory. • To get practical knowledge of detection and qualitative analysis of acid, base, amine, alcohol, esters etc. • Quantitative analysis: to determine the concentration of unknown solution by titration. • Determination of concentration of unknown solution using Colorimeter. Study of acid-base reactions and pH determination and to determine the rate constant by hydrolysis of methyl acetate.						
Course Outcomes	• Student will learn basic guideline of laboratory practical and knowledge about glassware and apparatus used in chemistry laboratory. • Able to get practical knowledge of detection and qualitative analysis of acid, base, amine, alcohol, esters etc. • Student will learn to determine the concentration of unknown solution by titration. Study of acid-base reactions and pH determination and • Student will be able to determine the rate constant by kinetic study and synthesis of resin or polymeric compound.						

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Sr. No.	Name of Practical	Hours
1	To understand the Chemistry laboratory guidelines and know about glassware, accessories, apparatus, chemicals, and equipment used in Chemistry laboratory.	2
2	To study the characteristics and reactions of inorganic and organic acid, base, and salt. Qualitative detection and analysis of acid, base and functional groups.	2
3	To prepare the solutions of different molarity and normality. To determine the concentration and strength of unknown sodium hydroxide solution by *titrating* it with standard oxalic acid solution.	2
4	To determine the concentration of unknown sample using colorimeter based on specific wavelength.	2
5	To determine BOD/COD/DO in industrial waste water.	2
6	To determine the rate constant and order of reaction of hydrolysis of methyl acetate in acidic medium.	2
7	To determine the viscosity of polymeric solution of different molecular weight by Ostwald Viscometer.	2
8	Synthesis of polymer compound or resin by addition or condensation process and analysis.	2
9	Preparation of bioplastic film from plant based organic waste/fruit/crop waste material.	2
10	Green synthesis of organic compound using green catalyst or solvent and technique.	2
Reference Books		
1	Shashi Chawla, Theory and Practicals of Eng. Chemistry, Dhanpat Rai & Co.	
2	Preeti Jain and S.L. Garg, "Engineering Chemistry Practical Book" Variety Books Publishers Distributors	
3	Anupma Rajput, Laboratory Manual Engg. Chemistry, Dhanpat Rai & Co.	
4	Malviya A. and Jaspal D., "Engineering Chemistry: A Practical Book", Narosa Publishing House Pvt. Ltd. - New Delhi	
5	Abdul Rahman, Organic Chemistry Laboratory Manual, Caravan Book House.	

6	B.S. Furniss, Vogel's textbook of Practical Organic Chemistry, Pearson India.
7	Sanjay Kumar Batra, Shikha Gulati and Shefali Shukla, Green Chemistry: Strategies, Tools & Experiments. Shree Kala Prakashan, New Delhi.

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Year, Program, Semester	F.Y. B. Tech Semester - II						
Course Code	ESC145						
Course Category	Engineering Science Course						
Course title	**Engineering Workshop Practices- II (Lab.)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Total Credits**		
	-	-	02	2	01		
Evaluation Scheme	**MSE-I**	**MSE-II**		**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	-	-		-	-	-	25	25
Pre-requisites (if any)	• Workshop Practices I						
Course Objectives	Upon completion of this course, the students will gain knowledge of the different manufacturing processes which are commonly employed in the industry, to fabricate components using different materials.						
Course Outcomes	Upon completion of this laboratory course, students will be able: • to fabricate components with their own hands. • to relate practical knowledge of the dimensional accuracies and dimensional tolerances possible with different manufacturing processes. • to design small devices of their interest by assembling different components.						

List of Practicals		
1	Perform basic machining operations such as turning, milling, drilling, and grinding to create precise components.	2
2	Carry out fitting tasks including filing, sawing, and assembling metal parts to achieve accurate fits and tolerances.	2
3	Construct a wooden structure or component, applying techniques such as measuring, cutting, joining, and finishing.	2
4	Build and test a simple electronic circuit or electrical component, involving soldering, wiring, and troubleshooting.	2
5	Execute basic arc welding (4 hours) and gas welding (4 hours) tasks to join metal pieces, focusing on weld quality and safety.	2

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6	Create a metal casting using sand casting or another suitable method, including Mold preparation, pouring, and finishing.	2
7	Forge a simple component using smithy techniques, such as heating, hammering, and shaping metal.	2
8	Produce a plastic part using injection moulding or another plastic forming process, and perform precision glass cutting to create a specified shape.	2
9	Demonstrations of Jobs in following machine shops: Lathe Machine, Drilling Machine, Hacksaw Machine	2

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Year, Program, Semester	F.Y. B. Tech in Plastics and Polymer Engineering, Semester-II						
Course Code	ESC146						
Course Category	Engineering Science Course						
Course title	**Computer Programming (Lab.)**						
Teaching Scheme and Credits	**L**	**T**	**P**	**Total Contact Hours**	**Credits**		
	-	-	02	02	01		
Evaluation Scheme	**MSE-I**	**MSE-II**	**ESE**	**TA**	**TW**	**PR/OR**	**Total**
	-	-	-	-	25	-	25
Pre-requisites	• Physics, Mathematics						
Course Objectives	• Understand the basic terminology used in computer programming • To learn the syntax and semantics of the C programming language • Compile and debug programs in C and Implement data structures and algorithms in C • To be able to introduce core programming basics and various Operators of Python programming language.						
Course Outcomes	Upon the completion of this Lab course, the student will be able to: 1. Illustrate the flowchart and design of an algorithm for a given problem and to develop C programs using operators Develop conditional and iterative statements to write C programs 2. Design C programs with the use of Pointers to access arrays, strings, functions and Exercise user defined data types including structures and unions to solve problems 3. Design C programs using pointers and to allocate memory using dynamic memory management and demonstrate files concept to show input and output of files in C 4. Understand the basic concepts Python programming 5. Understand the basic concepts of scripting and the contributions of scripting language.						

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Sr. No.	Experiment Title	Hours
1	Programs on basic programming in C	2
2	Programs using Decision Controls in C	2
3	Programs using while, do-while and for Loop	2
4	Programs using Case Control Structure, odd loop	2
5	Programs illustrating use of function	2
6	Programs illustrating use of arrays	2
7	Python program to print "Hello Python"	2
8	Python program to find the area of a triangle	2
9	Write a program to demonstrate different number data types in Python.	2
10	Write a program to perform different Arithmetic Operations on numbers in Python	2
Text Books		
1	E Balguruswamy, "Programming with ANSI C", (TMH)	
2	Kernighan and Richie, "The C Programming Language" (PHI)/Pearson Education	
3	Yashwant Kanetkar, "Let us C", BPB Publications, 16th Edition 2017	
4	Learning Python, Mark Lutz, Orielly, 3 Edition 2007.	
5	Python Programming: A Modern Approach, Vamsi Kurama, Pearson, 2017.	
6	Anil B. Chaudhuri, "Flowchart and Algorithm Basics: The Art of Programming", Mercury Learning & Information, 2020	
Useful web links		
2	Problem Solving Through Programming in C:https://nptel.ac.in/courses/106/105/106105171/	
3	Introduction To Programming in C. https://nptel.ac.in/courses/106/104/106104128/	
4	https://www.javatpoint.com/python-programs	
5	https://www.w3schools.com/python/python_reference.asp	
6	https://www.python.org/doc/	
Reference Books		
1	Gottfried, "Programming in C", Shattern Series	
2	Herbert Schildt, "Complete 'C' Reference".	

Year, Program, Semester	F.Y. B. Tech in Plastics and Polymer Engineering, Semester-II				
Course Code	-				
Course Category	Project Seminar Internship				
Course title	**Social Internship**				
Teaching Scheme and Credits	L	T	P	Total Contact Hours	Total Credits
	After Semester-I, 10 Days Social Internship, preferably in a rural area				00
Pre-requisites (if any)	Design Thinking and Innovation-I and orientation by the Program before proceeding on to this internship.				
Course Objectives	1. Cultivate rural awareness and empathy among students. 2. Enable students to apply engineering skills effectively in underserved areas.				
Course Outcomes	1. Increased recognition of rural challenges and dynamics. 2. Demonstrated ability to devise and implement relevant solutions.				

Social Internship Course Description

After the First Semester of FY B. Tech, the students will undergo social internship of 10 days preferably in rural part of the country.

Here are some of the potential activities that students could engage in during their 10-day social internship:

1. **Community Needs Assessment:**

a) Conduct surveys and interviews to understand the specific needs and challenges of the community.

b) Identify priority areas for potential engineering interventions.

2. **Interactive Workshops:**

a) Organize workshops to share basic engineering concepts with community members, fostering mutual learning.

b) Collaborate on simple projects, like building low-cost solar cookers or water purification systems.

3. **Design Thinking Sessions:**

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a) Facilitate brainstorming sessions with locals to generate innovative ideas for solving local problems.
b) Prootype and refine potential solutions based on community input.

4. Infrastructure Evaluation:

a) Assess existing infrastructure (water supply, sanitation, roads, etc.) for maintenance needs or improvements.
b) Propose feasible upgrades using engineering principles.

5. Environmental Initiatives:

a) Participate in tree planting drives or waste management campaigns to promote environmental sustainability.
b) Educate the community about eco-friendly practices.

6. Skill Enhancement Workshops:

a) Teach basic technical skills, such as basic repairs, to empower locals to address minor challenges independently.
b) Provide training on digital literacy to bridge the technological gap.

7. Health and Hygiene Workshops:

a) Conduct workshops on personal hygiene, sanitation, and health awareness.
b) Collaborate with healthcare professionals to provide basic medical check-ups and guidance.

8. Documentation and Reporting:

a) Maintain a daily journal to document experiences, observations, and interactions.
b) Compile a comprehensive report outlining findings, proposed solutions, and lessons learned.

9. Cultural Exchange Activities:

a) Engage with the community through cultural activities, such as sharing traditional dances, songs, or cuisine.
b) Foster a sense of unity and understanding between students and locals.

10. Feedback and Reflection Sessions:

a) Regularly engage in discussions to reflect on the challenges faced, lessons learned, and potential

improvements.

b) Gather feedback from both students and community members to enhance the internship's impact.

The specific activities may vary based on the community's needs and the students' skills. The key is to create meaningful interactions that promote learning, collaboration, and positive impact.


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