



**PUNYASHLOK AHILYADEVII HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR**

**FACULTY OF
ENGINEERING & TECHNOLOGY
ALL BRANCHES**

**CBCS Syllabus for
First Year B. Tech. (All Branches)
w.e.f.
Academic Year 2020-21**



PUNYASHLOK AHILYADEVI HOLKAR
SOLAPUR UNIVERSITY, SOLAPUR
FACULTY OF ENGINEERING & TECHNOLOGY
CBCS Curriculum for First Year B.Tech. (All Branches)
W.E.F. 2020-21

● Semester I : Theory Courses

Course Code	Name of the Course	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
C011/ C012	Engineering Physics / Engineering Chemistry \$	3			3	70	30		100
C112	Engineering Mathematics-I	3			3	70	30		100
C113	Basics of Civil and Mechanical Engineering	4			4	70	30		100
C114	Engineering Mechanics	3			3	70	30		100
C115	Universal Human Values	2			2	50			50
C116	Communication Skills	1			1		25		25
Total		16			16	330	145		475

● Semester I : Laboratory / Tutorial Courses

Course Code	Name of the Course	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
C011/ C012	Engineering Physics / Engineering Chemistry \$			2	1			25	25
C112	Engineering Mathematics-I		1		1			25	25
C113	Basics of Civil and Mechanical Engineering @			2	1			25	25
C114	Engineering Mechanics			2	1			25	25
C116	Communication Skills			2	1			25	25
C117	Creativity & Design Thinking			2	1			50	50
C118	Workshop Practice			2	1			50	50
Total				12	7			225	225
Grand Total		16	1	12	23	330	145	225	700
C119	Induction Program	** Please see note below							

- Semester II : Theory Courses

Course Code	Name of the Course	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE	ISE	ICA	
C011/ C012	Engineering Physics / Engineering Chemistry \$	3			3	70	30		100
C122	Engineering Mathematics - II	3			3	70	30		100
C123	Basic Electrical & Electronics Engineering	3			3	70	30		100
C124	Programming for problem solving	2			2		25		25
C125	Engineering Graphics and CAD	2			2	70	30		100
C126	Professional Communication	1			1		25		25
Total		14			14	280	170		450

Semester II: Laboratory / Tutorial Courses

Course Code	Name of the Course	Engagement Hours			Credits	FA	SA		Total
		L	T	P		ESE (POE)	ISE	ICA	
C011/ C012	Engineering Physics / Engineering Chemistry\$			2	1			25	25
C122	Engineering Mathematics- II		1		1			25	25
C123	Basic Electrical & Electronics Engineering			2	1			25	25
C124	Programming for problem solving			4	2	50#		50	100
C125	Engineering Graphics and CAD			4	2			50	50
C126	Professional Communication			2	1			25	25
Total				14	8	50		200	250
Grand Total		14	1	14	22	330	170	200	700
C127	Democracy, Elections and Good Governance *					50			50

- Legends used–

L	Lecture	FA	Formative Assessment
T	Tutorial	SA	Summative Assessment
P	Lab Session	ESE	End Semester Examination
		ISE	In Semester Evaluation
		ICA	Internal Continuous Assessment

- Notes-

1. \$ - Indicates approximately half of the total students at F. Y. will enroll under Group A and remaining will enroll under Group B.

Group A will take up course of Engineering Physics (theory & laboratory) in Semester I and will take up course of Engineering Chemistry (theory & laboratory) in semester II.

Group B will take up course of Engineering Chemistry (theory & laboratory) in Semester I and will take up course of Engineering Physics (theory & laboratory) in semester II.

2. # - Indicates the subject 'Programming for Problem Solving' shall have a University 'Practical and Oral Examination' at the end of the semester assessing student's programming skills.
3. @ - For the Course (C113) Basics of Civil and Mechanical Engineering, Practicals of Basics of Civil Engineering and Basics of Mechanical Engineering will be conducted in alternate weeks.
4. In Semester Evaluation (ISE) marks shall be based upon student's performance in minimum two tests & mid-term written test conducted & evaluated at institute level.

Internal Continuous Assessment Marks (ICA) are calculated based upon student's performance during laboratory sessions / tutorial sessions.

5. *- Democracy, Elections & Good Governance is mandatory course. The marks earned by student with this course shall not be considered for calculation of SGPA/CGPA. However, student must complete End Semester Examination (ESE) of 50 marks (as prescribed by university) for fulfillment of this course. This course is not considered as a passing head for counting passing heads for ATKIT. However, student must pass this subject for award of the degree.
6. Student must complete induction program of minimum five days before commencement of the regular academic schedule at the first semester.

**** GUIDELINES FOR INDUCTION PROGRAM (C119)**

New entrants into an Engineering program come with diverse thoughts, mind set and different social, economic, regional and cultural backgrounds. It is important to help them adjust to the new environment and inculcate in them the ethos of the institution with a sense of larger purpose.

An induction program for the new UG entrant students is proposed at the commencement of the first semester. It is expected to complete this induction program before commencement of the regular academic schedule.

Its purpose is to make new entrants comfortable in their new environment, open them up, set a healthy daily routine for them, create bonding amongst the peers as well as between faculty and students, develop awareness, sensitivity and understanding of the self, people around them, society at large, and nature.

The Induction Program shall encompass (but not limited to) below activity –

1. Physical Activities
2. Creative Arts
3. Exposure to Universal Human Values
4. Literary Activities
5. Proficiency Modules
6. Lectures by Experts / Eminent Persons
7. Visit to Local Establishments like Hospital /Orphanage
8. Familiarization to Department

Induction Program Course do not have any marks or credits however performance of students for Induction Program is assessed at institute level using below mandatory criteria –

1. Attendance and active participation
2. Report writing



P. A. H. Solapur University, Solapur
First Year B. Tech (All Branches) Semester-I/II

C011 ENGINEERING PHYSICS

Teaching Scheme

Theory– 3Hrs. /Week,3Credits

Laboratory– 2 Hrs./Week,1Credit

Examination Scheme

Theory – ESE- 70Marks

ISE –30Marks

ICA-25Marks

• **Course Objectives:**

C011.01	To make students understand fundamentals of crystal system, classification of solids depending on energy gap with their electronic properties
C011.02	To introduce students sound engineering through basic concepts of acoustics and ultrasonic
C011.03	To make students understand the basic concepts of relativistic mechanics
C011.04	To make students recall and discuss the concepts of wave optics through diffraction and polarization
C011.05	To make students comprehend basics, working of laser and optical fiber
C011.06	To introduce students basic concepts of quantum mechanics and nanotechnology

• **Course Outcomes:**

At the end of this course, students will be able to

C011.1	Describe the concepts of semiconducting material and crystal structure.
C011.2	Apply basic concepts of acoustics and ultrasonic in engineering field.
C011.3	Relate space, time, mass and energy equations.
C011.4	Express the concepts of diffraction, polarization and can relate them to day to day observable phenomena.
C011.5	Explain the fundamental concepts, advantages and applications of laser and optical fiber in the field of science, engineering and medical.
C011.6	Express the basic concepts of quantum mechanics and nanotechnology.

- **Course Curriculum**

Section I

Unit No. 01: Semiconductor Physics		Hours:05		Marks: 12	
<i>Sr.No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
1.1	Classification of solids, Fermi level (definition), Fermi-Dirac probability distribution function (introduction only)	03	01	Explanation, Definition, Classification	Remembering, Understanding
1.2	Fermi level in intrinsic and extrinsic semiconductors, effect of impurity concentration on Fermi level, derivation for $E_{F_{in}}$	09	04	Explanation, Derivation Numerical	Remembering, Understanding Applying
1.3	Hall effect and applications, numerical on this chapter				
Unit No. 02: Crystallography		Hour :06		Marks: 13	
<i>Sr.No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
2.1	Introduction to crystal systems, characteristics of cubic unit cell: number of atoms per unit cell, atomic radius, co-ordination number	04	02	Explanation, Definition	Remembering, Understanding
2.2	Atomic packing factor, void space, density of crystal, symmetry elements (axis, center and plane), Bragg's Law	04	02	Explanation, Describe, Numerical	Remembering, Understanding
2.3	Miller indices, inter planner distance (by using Miller indices), numericals on this chapter	05	02	Explanation, Derivation, Numerical	Remembering, Understanding, Applying
Unit No. 03: Sound Engineering		Hours: 06		Marks: 13	
<i>Sr.No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
3.1	Acoustics: Introduction, reverberation, reverberation time, absorption coefficient (definition only), Sabine's formula, basic requirements for acoustically good hall	04	02	Explanation, State Define Numerical	Remembering, Understanding, Applying
3.2	Factors affecting acoustics of auditorium and their remedies, numericals on this chapter	05	02	Explanation, Numerical	Remembering, Understanding,

3.3	Ultrasonic: Introduction, piezoelectric effect and magnetostriction effect (introduction), properties of ultrasonic waves, detection methods of ultrasonic waves and applications.	04	02	Explanation, State	Remembering, Understanding, Applying
Unit No. 04: Relativistic Mechanics		Hours:06		Marks:12	
<i>Sr.No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
4.1	Introduction, postulates of special theory of relativity, Lorentz transformation of space and time, numericals on this chapter	05	02	Explanation, Derive, State Numerical	Remembering, Understanding, Applying
4.2	Length contraction, time dilation,	04	02	Explanation, Derivation, Numerical	Remembering, Understanding, Applying
4.3	Equivalence of mass and energy	04	02	Explanation, Derivation, Numerical	Remembering, Understanding, Applying

Section II

Unit No. 05: Wave Optics		Hours: 06		Marks:13	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	Diffraction: Introduction, resolving power, Rayleigh criterion, theory of diffraction grating and its resolving power.	04	02	Explanation, State Define	Understanding, Applying
5.2	Polarization: concept, optic axis, Malus law, positive and negative crystals	04	02	Explanation, State, Differentiate	Remembering, Understanding, Applying
5.3	Optical activity, specific rotation, Laurent's half shade Polarimeter, Numericals on this chapter	05	02	Explanation, Define Numerical	Remembering, Understanding
Unit No. 06: LASER		Hours: 06		Marks:13	
<i>Sr.No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
6.1	Interaction of radiation with matter- Stimulated absorption, spontaneous and stimulated emission, population inversion, pumping, metastable state, properties of laser	04	02	Explanation, State, Define	Remembering, Understanding

6.2	He-Ne gas laser Holography (construction and reconstruction), applications of laser (science, engineering and medical),	09	04	Explanation, Describe	Remembering, Understanding
6.3				Explanation	Remembering, Understanding, Applying
Unit No. 07: Optical Fibers		Hours: 05		Marks:12	
<i>Sr.No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
7.1	Introduction, structure of optical fiber, basic principle of optical fiber (total internal reflection)	03	01	Explanation, State,	Remembering, Understanding
7.2	Derivation for acceptance angle, acceptance cone and numerical aperture, fractional refractive index change, numericals on this chapter	05	02	Define, Derive, Numerical	Remembering, Understanding, Applying
7.3	Classification of optical fibers- single mode and multi-mode fiber, step index and graded index fibers, advantages of optical fibers over conducting wires	05	02	Explanation, Classify	Remembering, Understanding
Unit No. 08: Introduction to Quantum Mechanics and Nanotechnology		Hours:05		Marks: 12	
<i>Sr.No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
8.1	De Broglie hypothesis, De Broglie wavelength of matter waves: in terms of kinetic energy and associated with particle in thermal equilibrium, properties of matter waves	05	02	Explanation , Numerical	Remembering, Understanding, Applying
8.2	Davisson-Germer experiment (apparatus, investigations and analysis), numericals on this chapter	07	03	Explanation , Numerical	Remembering, Understanding, Applying
8.3	Nanotechnology: introduction, carbon Nanotubes and its classification, applications of nanotechnology- electronics, energy, automobiles, space and defense, medical, environmental, textile, cosmetics			Define, State, Classify	

- **In Semester Evaluation (ISE):**

In Semester Evaluation (ISE) marks shall be based upon student's performance in minimum two tests & mid-term written test conducted & evaluated at institute level.

- **Internal Continuous Assessment (ICA):**

*Internal Continuous Assessment (ICA) marks are calculated based on student's performance during laboratory sessions (minimum **eight** experiments out of below list).*

1. Measurement of band gap energy of a semiconductor diode.
2. To determine Hall coefficient and charge carrier concentration by Hall Effect.
3. Study of Crystal structures.
4. Determination of velocity of sound using Kundt's tube apparatus.
5. Determination of wavelength of light by using diffraction grating.
6. Resolving power of a telescope/ diffraction grating.
7. Verification of inverse square law of intensity of light (Maluslaw).
8. To determine specific rotation by using Laurent's Half Shade Polarimeter.
9. Calculation of divergence of LASER beam.
10. Determination of wavelength of LASER using diffraction grating.
11. Determination of inter-planar distance 'd' using XRD pattern.
12. Study of Fiberoptics.
13. To determine the Numerical Aperture of the optical fiber.

- **Text / Reference Books:**

1. Engineering Physics, R.K. Gaur and S.L. Gupta, DhanapatRai Publications
2. A Text Book of Engineering Physics, M.N. Avadhanulu, P.G. Kshirsagar, S. Chand and Company Ltd.
3. Modern Physics, B.L. Theraja, S. Chand and Company Ltd.
4. A Text Book of Optics, Subramanya and BrijLal, S. Chand and Company Ltd.
5. Nanotechnology: Principles and Practices, Sulabha K. Kulkarni, Capital Publishing Company
6. Nanoscience and Nanotechnology: Fundamentalsto Frontiers –M.S. RamachandraRao, Shubra Singh, Wiley India Pvt Ltd, New Delhi
7. Engineering Physics, D.K. Bhattacharya, PoonamTandon, Oxford University Press
8. Solid State Physics, S.O. Pillai, McGraw Hill Publications.



P. A. H. Solapur University, Solapur
First Year B. Tech (All Branches) Semester-I/II

C012 ENGINEERING CHEMISTRY

Teaching Scheme

Theory– 3Hrs. /Week,3Credits
Laboratory– 2 Hrs./Week,1Credit

Examination Scheme

Theory – ESE- 70Marks
ISE –30Marks
ICA-25Marks

• **Course Objectives:**

C012.O1	To impart knowledge of importance of quality of water and appropriate water treatment process
C012.O2	To impart knowledge of corrosion & its prevention techniques
C012.O3	To equip students with the required analytical skills
C012.O4	To introduce students different engineering materials and their applications
C012.O5	To make students apply knowledge for determining quality of water, fuel, Polymer& oils
C012.O6	To introduce students to different energy storage systems and cells

• **Course Outcomes:**

At the end of this course, students will able to

C012.1	Describe importance of quality of water and appropriate water treatment process.
C012.2	Recognize various types of corrosion & propose a suitable prevention technique.
C012.3	Describe various instrumental techniques.
C012.4	Identify and explain different engineering materials like metals, ceramics, fuels, Lubricants, polymers for various engineering and day to day applications.
C012.5	Calculate hardness of water, concentration of unknown solution, calorific value of fuels, saponification & acid value of oils, molecular weight of polymers etc.
C012.6	Describe various types of energy storage systems with their applications.

- **Course Curriculum**

Section I

Unit No. 01: Water Chemistry		Hours :07		Marks: 16	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
1.1	Introduction, water quality parameters like pH, acidity, alkalinity, total solids, Dissolved oxygen, chlorides (definitions & permissible limits as per BIS), BOD, COD, (Definition, Determination &Significance).	3	1	Explanation	Understanding remembering
1.2	Hardness: types of hardness (temporary/ permanent), Calcium carbonate equivalent hardness and its calculations. (Numericalproblems on hardness),	4	2	Explanation, numerical	Remembering, understanding, applying
1.3	Scale and sludge in boilers: Formation, disadvantages and prevention. Softening of water by Ion exchange process and reverse osmosis process.	5	2	Explanation	Understanding, remembering
1.4	Treatment of water for domestic purpose by aeration, sedimentation with coagulation process. Disinfection of water by chloramine, bleaching powder, chlorine and ozone.	4	2	Explanation, applications	Remembering, understanding

Unit No. 02: Energy Storage system		Hours :04		Marks: 08	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
2.1	Introduction and Overview, Basic Principles of electrochemistry, Batteries –Characteristics, Li-ion Batteries, Fuel cell-Principle, Component of Fuel Cell	4	2	Explanation	Remembering, understanding
2.2	Various types of Fuel Cell AFC, PEFC, methanol Based Fuel Cell and their applications, Hydrogen Production and hydrogen Storage System	4	2	Explanation, applications	Remembering, understanding

Unit No. 03: Lubricants		Hours: 05		Marks:13	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
3.1	Lubricants & lubrication, functions, classification of lubricants: Solid, semisolid and liquid.	3	1	Explanation	Remembering, understanding
3.2	Characteristic properties of lubricants (only definition) such as viscosity, viscosity index, flash point & fire point, cloud point & pour point, aniline point, oiliness, saponification value & acid value (numerical problems on saponification & acid value)	5	2	Explanation, numerical	Remembering, understanding, applying
3.3	Types of lubrication such as fluid film, boundary (thin film) and extreme pressure. Selection of lubricants for cutting tools, I.C. engine, gears, transformers, delicate instruments & refrigeration system.	5	2	Explanation application	Remembering, understanding

Unit No. 04: Corrosion		Hours :06		Marks:13	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
4.1	<i>Corrosion</i> : definition, classification <i>Dry corrosion</i> : oxidation corrosion: nature of oxide film. <i>Wet corrosion</i> – electrochemical corrosion: Hydrogen evolution mechanism, oxygen absorption mechanism.	5	2	Explanation	Remembering, understanding
4.2	Factors influencing corrosion, testing and measurement of corrosion by weight loss method and electrical resistance method	4	2	Explanation	Remembering, understanding
4.3	<i>Prevention of corrosion by</i> : <i>cathodic</i> protection, anodic protection by anodizing and potentiostat. <i>Protective coatings</i> : methods of application of metal coatings such as hot dipping (galvanization & tinning), metal cladding.	4	2	Explanation	Remembering, understanding

Section II

Unit No. 05: : Metals, Alloys & Ceramics		Hours :05		Marks:10	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	<i>Metallic Materials:</i> types of iron: cast iron, steel and wrought iron: composition, properties and applications. <i>Alloys:</i> definition, purposes of making alloys.	4	2	Explanation, application	Remembering, understanding
5.2	<i>Ceramics:</i> definition, classification, properties. <i>Glass:</i> general properties, general method of manufacture of glass, types of glasses: soft, hard, borosilicate, optical, laminated and safety glass.	6	3	Explanation, application	Remembering, understanding

Unit No. 06: Fuels		Hours:07		Marks:15	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
6.1	Introduction, classification, characteristics of good fuel, comparison between solid, liquid and gaseous fuel, calorific value (gross and net),	4	2	Explanation,	Remembering, understanding,
6.2	Determination of calorific value by bomb calorimeter and Boy's calorimeter. Dulong's formula for calorific value. (numerical problems on calorific value.)	7	3	Explanation, Application, Numerical	Remembering, understanding, Applying
6.3	<i>Petroleum:</i> introduction, composition, classification, origin, refining of crude oil. <i>Biodiesel:</i> Introduction, preparation, advantages and disadvantages.	4	2	Explanation	Remembering, understanding

Unit No. 07: Polymers		Hours :07		Marks:16	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
7.1	Polymerization, types of polymerization (no mechanism), degree of polymerization (DP), numerical problems on degree of polymerization, number average molecular weight (definitions and numerical problems)	5	2	Explanation, application, numerical	Remembering, understanding, applying
7.2	<i>Plastics:</i> definition, properties, types of plastics (thermo softening and thermosetting), properties and applications of PVC and PET, molding of plastic into articles: compression, extrusion and injection.	5	2	Explanation, application	Remembering, understanding

7.3	<i>Rubber</i> : Classification, isolation of natural rubber, vulcanization, properties and applications of Buna-S and Thiokol rubbers. <i>Biodegradable Polymers</i> : Introduction, examples with applications.	6	3	Explanation, application	Remembering, understanding
Unit No. 08: Modern Analytical Techniques Hours:04				Marks:09	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
8.1	<i>Concentration of solution</i> :- molarity, normality, mole fraction (definition and numerical problems),	4	2	Explanation, application, numerical	Remembering, understanding, applying
8.2	<i>Chromatography</i> : definition, types. <i>GLC</i> : definition, instrumentation and application of GLC. <i>Thermal analysis</i> : definition of TGA, instrumentation and application of TGA.	5	2	Explanation	Remembering, understanding

- **In Semester Evaluation (ISE):**

ISE shall be based upon student's performance in minimum two tests & mid-term written test conducted & evaluated at institute level

- **Internal Continuous Assessment (ICA):**

ICA shall be based on minimum **Eight** experiments out of below list

1. Determination of Hardness of water.
2. Determination of Alkalinity of water.
3. Determination of Chloride content in given water.
4. Determination of dissolved oxygen in water.
5. Determination of viscosity of a lubricant by Ostwald's viscometer.
6. Estimation of Copper in Bronze metal alloy.
7. Preparation of phenol formaldehyde resin.
8. Preparation of urea Formaldehyde resin.
9. Determination of COD of water sample.
10. Separation of mixture of organic compounds by TLC.
11. Determination of oil and grease from waste water.
12. Hands on Determination of pH by pH meter.
13. Hands on Determination of EMF of acid base titration by potentiometer.

- **Text Books:**

1. A text book of Engineering Chemistry, S.S. Dara, S Sumare, SChand
2. A text book of Engineering Chemistry, ShashiChawala, Dhanpat Rai&Co
3. A text book of Experiments and Calculations in Engineering Chemistry, S.S. Dara. S Chand

- **Reference Books:**

1. Engineering Chemistry, Jain and Jain, Dhanpat Rai& Co
2. Engineering Chemistry, M. Subha Ramesh, Dr. S. Vairan-Ed.-IInd Wiley
3. Instrumental Methods of chemical analysis, Chatwal and Anand, Himalaya Pub House
4. Industrial Chemistry, B.K. Sharma, Goyal
5. Chemistry for Engineers, Rajesh Agnihotri, Wiley
6. Fundamentals of Engineering Chemistry, S.K.Singh, New AgeInt.
7. Engineering Chemistry (NPTEL Web book), B. L. Tembe, Kamaluddin& M. S.Krishnan.
8. Fuel Cells-ShripadRevankar, Pradeep Majumdar
9. Fuel Cell Fundamentals-Ryan O'Hayre, Suk-Won Cha,Johnwiley& Sons
10. Recent trends in Fuel Cell Science and Technology-SuddhasatwaBasu, Anamaya Publishers, NewDelhi.



P. A. H. Solapur University, Solapur
First Year B. Tech (All Branches) Semester-I

C112 ENGINEERING MATHEMATICS - I

Teaching Scheme

Theory– 3Hrs. /Week,3Credits
Tutorial– 1 Hrs./Week,1Credit

Examination Scheme

Theory – ESE- 70Marks
ISE- 30Marks
ICA-25Marks

• **Course Objectives:**

C112.O1	To introduce the students to higher order derivatives of various standard functions and Mean Value Theorems.
C112.O2	To introduce the students to the expansion of functions about any point and to evaluate the indeterminate forms of limits.
C112.O3	To introduce the students to rank of matrix, solution of simultaneous equations, Eigen values and Eigen vectors.
C112.O4	To introduce the student to Multivariable differentiation and its applications.
C112.O5	To introduce the student to vector differentiation and applications.

• **Course Outcomes:**

At the end of this course, students will be able to

C112.1	Compute higher order derivative of standard functions and verify Mean Value Theorems.
C112.2	Describe the power series expansion of a given function and evaluate limits
C112.3	Apply matrices techniques for solving system simultaneous linear equations, Eigen values and Eigen vectors of the matrix
C112.4	Evaluate Multivariable derivatives and can implement to estimate maxima and minima of multivariable function
C112.5	Compute velocity vector, gradient, divergence, curl and applications.

• Course Curriculum

Section I

Unit No. 01: Successive Differentiation and Mean Value Theorems		Hours : 06		Marks: 13	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
1.1	Definition & symbol, nth derivatives of standard functions like $e^{ax}, \frac{1}{ax+b}, (ax+b)^m, \frac{1}{(ax+b)^m}, \log(ax+b), \sin(ax+b), \cos(ax+b), a^x, e^{ax} \sin(bx+c)$ and $e^{ax} \cos(bx+c)$	01	01	Definition	Remembering
1.2	n^{th} derivatives of algebraic functions, n^{th} derivatives of functions belongs to polar form	03	01	Determination of n^{th} order derivative	Remembering, understanding, applying
1.3	Statement of Leibnitz's Theorem (without proof), nth derivative of product of two functions by Leibnitz theorem, formation of higher order differential equations for the given functions,	06	03	Determination of n^{th} order derivative	Remembering, understanding, applying
1.4	Mean Value Theorem (MVT) (Without Proof) : Rolles MVT, Lagranges MVT, Cauchys MVT	03	01	Verification, finding value of Constant	Remembering, understanding, applying
Unit No. 02: Expansion of Functions and Indeterminate forms		Hours : 07		Marks: 19	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
2.1	Statement of Maclaurin's series (without proof), expansion of standard functions and examples using Maclaurin's series. Expansion of functions by standard series method, differentiation and integration, method of substitution.	08	03	Numerical example, evaluate	Remembering, understanding, applying
2.2	Statement of Taylor's series (without proof), expansion of functions $f(x)$ about any point	03	01	Numerical example, evaluate	Remembering, applying

2.3	Indeterminate forms of the type $\frac{0}{0}, \frac{\infty}{\infty}, 0 \times \infty, \infty - \infty, 1^\infty, 0^0, \infty^0$ by L_e . Hospital's rule.	08	03	Evaluate, applications	Understanding, applying
Unit No 03: Matrices			Hours : 09	Marks: 20	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
3.1	Definition of Symmetric, Skew-Symmetric and orthogonal Matrices, Rank of matrix, canonical form or normal form of matrix	03	01	Numerical example, evaluate	Remembering, understanding
3.2	System of Simultaneous Linear Equations - homogeneous and non-homogeneous	05	02	Numerical example, evaluate	Understanding, applying
3.3	Linear dependence and independence of vectors, Cayley - Hamilton Theorem (without proof) Inverse by Cayley Hamilton Theorem	06	03	Definition application	Understanding, applying
3.4	Eigen values , Eigen vectors and their properties	06	03	Definition , determination	Remembering, understanding, applying

Section II

Unit No.04: Multivariable Differential Calculus			Hours:09	Marks: 18	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
4.1	Partial(Multivariable) derivatives of first and higher order , variable to be treated as constant	06	03	Evaluate	Remembering, understanding
4.2	Total derivative, Partial(Multivariable) differentiation of composite function	06	03	Determination	Remembering, understanding,
4.3	Homogeneous functions and Euler's Theorem (without proof)	06	03	Applications	Remembering, applying

Unit No. 05 : Applications of Multivariable Differential Calculus				Hours : 07	Marks: 17
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	Jacobians, properties of Jacobians i.e., $J.J^*=1$, Jacobians of composite functions	05	02	Definition, applications	Remembering, understanding, applying
5.2	Errors and approximations	03	01	Application, numerical example, evaluate	Remembering, understanding, applying
5.3	Maxima & minima of functions of two variables	06	03	Definition, applications	Remembering, understanding, applying
5.4	Lagrange's method of Undetermined multipliers (one condition)	03	01	applications	Understanding, applying
Unit No. 06: Vector Differential Calculus				Hours : 07	Marks: 17
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
6.1	Velocity vector, acceleration vector, tangential and normal component of acceleration	03	01	Evaluate	Remembering, understanding,
6.2	Vector differential operator, gradient, directional derivatives, angle between surfaces,	07	03	Evaluate/ numerical	Understanding, applying
6.3	Divergence and curl, solenoidal and irrotational field	07	03	Evaluate/ apply Standard results	Understanding, applying

- In Semester Evaluation (ISE):**
 ISE shall be based upon student's performance in minimum two tests & mid-term written test conducted & evaluated at institute level
- Internal Continuous Assessment (ICA):**
ICA shall be based on student's performance during tutorial sessions and on completion of minimum six assignments assignment

- **Text Books:**

1. A Text Book of Applied Mathematics, P.N. and J.N. Wartikar, Vol.1, Pune VidyanthiGrihaPrakashan.
2. Advanced Engineering Mathematics, H. K. Dass, S. Chand Publications, Delhi.
3. Engineering Mathematics (Volume I), ITL Education, Cengage Learning.
4. Engineering Mathematics, Ravish R Sing and Mukul Bhatt, McGraw Hill.
5. Applied Mathematics-I,II, Kreyzig's, Wiley.
6. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications,2008

- **Reference Books:**

1. Higher Engineering Mathematics (42nd Edition), B.S. Grewal, Khanna Publications ,Delhi.
2. Engineering Mathematics, Srimanta Pal and Subodh C. Bhunia, Oxford HigherEducation.
3. Mathematics for Engineering Applications, Kuldip S. Rattan and Naathan W. Klingbeil Wiley. (Modeling and Core Engineering Application)
4. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill New Delhi,2010.



P. A. H. Solapur University, Solapur
First Year B. Tech (All Branches) Semester-I

C113 BASICS OF CIVIL AND MECHANICAL ENGINEERING

Teaching Scheme

Theory– 4Hrs. /Week, 4 Credits

Laboratory –2 Hrs./Week, 1Credit

Examination Scheme

Theory – ESE- 70Marks

ISE –30Marks

ICA-25Marks

• **Course Objectives:**

C113.O1	To acquaint students with the relevance of Civil Engineering for various applications in different branches of Engineering and Technology
C113.O2	To introduce students to the Environment & Water Resources Management, transportation engineering, various elements of buildings, concepts of Green Buildings, Remote sensing Techniques, GIS & GPS.
C113.O3	To introduce basic streams of mechanical engineering such as Design Engineering, Production Engineering and Thermal Engineering
C113.O4	To make the students identify different mechanical engineering applications in day to day life.

• **Course Outcomes:**

At the end of course, students will be able to

C113.1	Describe the role of civil engineer in the development of the society and Relationship of civil engineering with other branches of engineering and technology.
C113.2	Explain various elements of Environment & Water Resources Management, transportation engineering, buildings, concepts of Green Buildings, Remote sensing Techniques, GIS &GPS..
C113.3	Identify power producing/absorbing systems and related transmission systems.
C113.4	Explain various machining/joining processes implemented in everyday life.
C113.5	To determine heat and work quantum during different thermodynamic processes.

• **Course Curriculum**

Section-I

BASICS OF CIVIL ENGINEERING

Unit No. 01: Introduction to Civil Engineering & Infrastructure				Hours:05	Marks: 8
<i>Sr. No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
1.1	Definition and various sub domains of civil engineering.	02	01	Explanation	Remembering understanding
1.2	Relevance of Civil Engineering branch with other branches of engineering.	03	03	Explanation	Remembering understanding
1.3	Role of civil engineer in various construction activities	03	01	Explanation	Remembering, understanding
1.4	Introduction to roads, IRC classification, typical functional cross sections.	04	02	Explanation	Remembering, understanding
Unit No 02: Environmental Engineering & Water Management & Infrastructure				Hours : 05	Marks: 08
<i>Sr. No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
2.1	Environmental Engineering: Water treatment systems; Effluent treatment systems; Solid waste management	04	03	Definition, Explanation	Remembering, understanding
2.2	Sources of water, Dams and storage reservoirs, rain water harvesting	04	02	Definition, Explanation	Remembering, understanding
2.3	Various modes of transportation, Bridges, tunnels, railways, airports, docks and harbors. Introduction to intelligent	04	03	Explanation	Remembering, understanding

	transport systems- Interdisciplinary applications				
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Unit No 03: Buildings, Green Buildings & Modern Building Services				Hours : 05	Marks: 8
<i>Sr.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
3.1	General idea about substructure, super structure and their various elements and their functions (Foundation types, plinth, lintel, chajja, roof, parapet, spout etc.)	05	03	Definition, explanation	Remembering, understanding
3.2	Superstructure: principle of load transfer, frame action, loads bearing wall action.	03	02	Definition, explanation	Remembering, understanding
3.3	Green Building: concept of planning and construction of green building, Sustainable development	04	02	Explanation	Remembering, understanding
3.4	Heating, ventilation, and air conditioning, elevators, escalators and ramps (Civil Engineering aspects only), fire safety for buildings.	04	03	Explanation	Remembering, understanding
Unit No 04: Surveying, Remote Sensing and GIS				Hours : 05	Marks: 9
4.1	Definition, general principles of surveying, classification of surveying.	03	01	Definition, explanation	Remembering, understanding
4.2	Fundamentals of remote sensing and its application in various fields	03	02	Explanation	Remembering, understanding

4.3	Geo Informatics, introduction to Geographic Information system (GIS), Fundamentals of Global Positioning System (GPS)	03	02	Explanation	Remembering, understanding
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Section-II
BASICS OF MECHANICAL ENGINEERING

Unit No 05: Pumps, Compressors & Turbines				Hours :04 Marks: 11	
<i>Sr. No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	Power absorbing devices Pumps: definition, classification, construction, working and applications of reciprocating pump, centrifugal pump. Compressors: construction, working and applications of reciprocating compressor, rotary compressors (vane blower)	06	03	Definition, explanation	Remembering Understanding
5.2	Power producing devices Turbines: construction, working and applications of Pelton wheel, Francis and Kaplan turbines.	05	01	Definition, explanation	Remembering, understanding
Unit No 06: Machine Tools and Joining Processes				Hours: 06 Marks:13	
6.1	Machine tools: Centre lathe – basic elements, construction, working, operations on lathe-(Only turning, facing). Drilling machine - basic elements of pillar drilling machine.	05	03	Explanation	Remembering understanding
6.2	Metal Joining Processes: Welding process: definition, Types- manual metal arc welding, spot welding, oxy acetylene	08	03	Explanation	Remembering understanding

	welding Introduction to Brazing and Soldering and difference between them.				
Unit No 07:Power Transmission System			Hours:05 Marks:12		
<i>Sr. No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hou rs</i>	<i>Assessm ent</i>	<i>Bloom 's Level</i>
7.1	Belt drives: open and cross belt drives, materials of belt, types of belts, length of belt for open and cross drive, velocity ratio of simple and compound belt drive, centrifugal tension, maximum power transmitted (numerical on simple belt drive only)	07	03	Explanation, derivations, numerical on simple belt drives	Remembering Understanding applying
7.2	Other Transmission Systems: chain drive, gear, types of gears (excluding gear terminology), gear trains-simple and compound, epicyclical gear train.	05	02	Explanation	Remembering, understanding
Unit No 08:Thermodynamics			Hours :06 Marks:13		
<i>Sr. No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hour s</i>	<i>Assessme nt</i>	<i>Bloom 's Level</i>
8.1	Definition of thermodynamics, thermodynamic Systems, surrounding, universe, types of systems, state of system, properties- intensive and extensive, thermodynamic equilibrium, process and cycle, Zeroth Law of thermodynamics	04	02	Explanation	Remembering understanding
8.2	Work and forms of work, heat, first law of thermodynamics, first law applied to flow processes, steady flow process, steady flow energy equation (SFEE), (numerical on first law of thermodynamics, cyclic and non	09	04	Explanation, derivations, numerical on P-V relations, work done	Remembering, understanding, applying

	cyclic processes, SFEE), Limitations of first law, Kelvin Plank and Clausius statements of second law of thermodynamics.			and SFEE applications	
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- **In Semester Evaluation (ISE):**

ISE shall be based upon student's performance in minimum three tests conducted and evaluated at institute level.

- **In Semester Continuous Assessment
Section-1**

ICA shall include total eight assignments (2 assignments per unit). Any appropriate experiment based on above curriculum may also be carried out. As a part of the completion of ICA, student shall submit completed Journal and drawings at the end of the course.

Section-II

ICA shall be based on minimum six experiments out of below list

1. Hands on- domestic refrigerator and split air conditioner
 2. Hands on- Pumps
 3. Hands on – Compressors and Turbine Models
 4. Demonstration of Power Plant equipment.
- **Text Books:**
 1. Elements of Civil Engineering, S. S. Bhavikatti, New Age International Publishers.
 2. Building Construction and Drawing, Bindra and Arora, Dhanpat Rai Publications
 3. Essentials of Civil Engineering, Rangwala, S. C., Charotar Publishing House
 4. Building Construction, Volumes 1 to 4, Mckay, W.B. and Mckay, J. K., Pearson India
 5. Basic Civil Engineering, L. G. Gole, Mahalaxmi Publications
 6. Elements of Civil Engineering, Kandya A A, Charotar Publishing house
 7. Basics of Remote Sensing & GIS, S. Kumar, University Sc. Press
 8. Thermal Engineering, P.L. Ballaney, Khanna Publishers
 9. Thermal Engineering, Domkundwar, Kothandaraman, Domkundwar, Dhanpat Rai & Co.
 10. Elements of Workshop Technology, Vol-I & II, S.K. Hajra Choudhury , A K, HajraChoudhury, Nirjhar Roy , Media Promoters & Publishers Pvt. Ltd.
 11. Design of Machine Elements, V.B. Bhandari, Tata McGraw Hill Publications

- **Reference Books:**

1. Manual on Green Building, Kolhatkar.
2. Energy-efficient buildings in India, Mili Majumdar, TERI Press.
3. Basic Civil and Mechanical Engineering, G Shanmugam, M S Palanichamy, McGraw Hill Education; First edition, 2018
4. The Civil Engineering Handbook. II Edition, Chen W.F and Liew J Y R (Eds), CRC Press (Taylorand Francis)
5. Building construction handbook, Chudley, R and Greeno R, Addison Wesley, Longman group, England
6. Construction Technology, Vol. I to IV, Chudley, R, Longman group, England Course Plan
7. Mamlouk, M. S., and Zaniewski, J. P., Materials for Civil and Construction Engineering, Pearson Publishers
8. Engineering Thermodynamics, P K Nag, The Tata McGraw-HillCompanies
9. Mechanical Engineering Design, Joseph E Shigley, Charles R Mischke, The TataMcGraw- HillCompanies



P. A. H. Solapur University, Solapur
First Year B. Tech (All Branches) Semester-I

C114 ENGINEERING MECHANICS

Teaching Scheme

Theory– 3Hrs. /Week, 3 Credits

Tutorial – 2 Hrs./Week, 1Credit

Examination Scheme

Theory – **ESE**- 70Marks

ISE –30Marks

ICA-25Marks

• **Course Objectives:**

C114.O1	To impart knowledge of basic phenomena in Engineering Mechanics and to lay a foundation for its Engineering applications by studying Statics and Dynamics
C114.O2	To develop scientific approach amongst the students towards analysis and design of various structural elements
C114.O3	To enable problem solving abilities and inculcate experimental, observational, and investigatory skills amongst the learners
C114.O4	To prepare the student for higher level courses in analysis and design of Engineering structures

• **Course Outcomes:**

At the end of this course, the student will be able to:

C114.1	Apply fundamentals of Engineering Mechanics for analyzing effects of a system forces acting on a rigid body.
C114.2	Analyze various types of statically determinate beams, pin jointed trusses by analytical and graphical methods.
C114.3	Locate centroid and centre of Gravity and calculate moment of Inertia of plane lamina.
C114.4	Apply knowledge of Kinematics and Kinetics of rigid body motion to solve problems of bodies in motion.
C114.5	Use Work Energy methods for analyzing linear and rotational motion.

• **Course Curriculum**

Section I

Unit No. 01: Resultant of coplanar forces		Hours : 05			Marks: 10	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>	
1.1	Basic units, SI units, body, rigid body, particle, scalar quantities, vector quantities, Idealization of engineering problems, force, law of transmissibility of force, moment of a force, couple, moment of a couple, resultant, parallelogram law of forces, triangle law of forces, polygon law of forces. Varignon's theorem	04	02	Definition, explanation, derivations	Remembering, understanding, applying, analyzing	
1.2	Composition of co-planar concurrent and non-concurrent forces: analytical method, graphical method, Bow's notation.	06	03	Explanation, derivations, numerical examples	Remembering, understanding, applying	

Unit No. 02: Equilibrium of Rigid Bodies		Hours : 07			Marks: 16	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>	
2.1	Equilibrium of co-planar forces, analytical and graphical conditions of equilibrium, different type of supports, free body diagrams, Lami's theorem	05	02	Definition, explanation, derivations, numerical examples	Remembering, understanding, applying	
2.2	Friction, types of friction, limiting friction, laws of Friction, Static and Dynamic friction, inclined planes, ladders, support reactions of statically determinate beams with point loads, inclined loads, uniformly distributed load, uniformly varying loads and couples.	09	04	Definition, explanation, derivations, numerical examples	Understanding, applying, analyzing	
2.3	Principle of virtual work (concept only), introduction to forces in space.	02	01	Explanation	Remembering, understanding	

Unit No. 03: Analysis of Pin-Jointed Plane Frames				Hours:06	Marks:12
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
3.1	Pin-jointed statically determinate plane trusses-perfect frames, assumptions, determination of nature and magnitude of a force in a member, simple trusses; zero force members.	04	02	Definition, explanation	Understanding, applying, analyzing
3.2	Analysis of trusses by method of joints, method of sections and graphical method.	08	04	Explanation, numerical examples	Applying, analyzing
Unit No. 04: Center of Gravity and Moment of Inertia				Hours :05	Marks:11
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
4.1	Centre of gravity, centroid of a composite area, Centroid of simple figures from first principle, Centroid of composite sections; Centre of Gravity and its implication	03	02	Definition, explanation, derivations, numerical examples	Remembering, understanding, applying
4.2	Moment of inertia- Definition, moment of inertia of plane, sections from first principles, Theorems of moment of inertia, perpendicular axis theorem, parallel axis theorem, moment of inertia of symmetrical and unsymmetrical sections, radius of gyration, polar moment of inertia. Concept of Centre of mass.	09	04	Explanation, numerical examples	Understanding, applying, analyzing

Section II

Unit No. 05: Kinematics of particles		Hours : 08		Marks: 16	
<i>Sr. No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	Rectilinear motion, equations of motion, motion curves and their applications, relative velocity- simple problems.	06	03	Definition, explanation, derivations, numerical examples	Remembering, understanding, applying
5.2	Curvilinear motion, angular motion, relation between angular motion and linear motion, equation of angular motion, tangential and radial acceleration.	10	05	Definition, explanation, derivations, numerical examples	Remembering, understanding, applying, analyzing
Unit No. 06: Kinetics of Particles		Hours : 06		Marks: 12	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
6.1	Newton's laws of motion for linear motion and angular motion, D'Alembert's principle, rectilinear motion on a rough inclined plane, motion of a lift, motion of connected bodies.	10	05	Definition, explanation, derivations, numerical examples	Understanding, applying
6.2	Circular motion, kinetics of rotation-torque, mass moment of inertia, problems on centroidal rotation	06	03	Definition, explanation, derivations, numerical examples	Understanding, applying, analyzing
Unit No. 07: Work Energy Methods		Hours : 06		Marks: 16	
<i>Sr. No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
7.1	Potential energy, kinetic energy of linear motion, principle of conservation of energy, work energy equation.	08	03	Definition, explanation, derivations, numerical Examples	Remembering, understanding, applying, analyzing

7.2	Impulse momentum method, collision, Impact- central, eccentric, direct, oblique, elastic, plastic, coefficient of restitution, Loss of kinetic energy due to impact	08	03	Definition, explanation, derivations, numerical examples	Remembering, understanding, applying, analyzing
Unit No 08: Mechanical Vibrations		Hours: 02		Marks: 05	
<i>Sr. No</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
8.1	Mechanical Vibrations: - Basic terminology, free and forced vibrations, resonance and its effects, Degree of freedom.	05	02	Explanation, derivations, numerical examples	Remembering, understanding, applying

Note: Scope of Graphical methods in unit 1, 2, 3 is limited to ICA only.

- **In Semester Evaluation (ISE):**

ISE shall be based upon student's performance in minimum three tests conducted and evaluated at institute level.

- **Internal Continuous Assessment (ICA):**

ICA shall be based on the following experiments and assignments

A. Experiments:

1. Law of parallelogram of forces
2. Triangle Law of forces using Jib crane apparatus
3. Law of polygon of forces
4. Law of Moments using Bell crank lever
5. Support reaction of beams
6. Newton's Second law using Fletcher's trolley

B. Graphic Statics : Problems on

1. Finding resultant of forces (2 Problems)
2. Evaluating support reactions (2 Problems)
3. Finding forces in the members of statically determinate truss. (2 Problems)

C. Assignments based on the various units in curriculum.

- **Text Books:**

1. Engineering Mechanics, Bhavikatti S. S., New Age International Pvt. Ltd.
2. Engineering Mechanics, K. L. Kumar, Tata McGraw Hill Publications
3. Engineering Mechanics, Basudeb Bhattacharyya, Oxford University Press.
4. Engineering Mechanics - Statics and Dynamics, A. Nelson, McGraw Hill Education (India) Pvt. Ltd.
5. Engineering Mechanics Statics and Dynamics, A.K. Dhiman, P. Dhiman & D.C. Kelshreshtha, McGraw Hill Education (India) Pvt. Ltd
6. A Text book of Engineering Mechanics, R.S. Khurmi, S. Chand Publications
7. Engg Mechanics by Sadhu Singh (Khanna Publishers)

- **Reference Books:**

1. Vector Mechanics for Engineers: Statics and Dynamics by Beer and Johnson, Tata McGraw Hill Education (India) Pvt. Ltd.
2. Engineering Mechanics by Irving H. Shames, Prentice Hall of India, New Delhi.
3. Engineering Mechanics Statics and Dynamics by Ferdinand Singer, Harper & Row Publications.
4. Engineering Mechanics Statics, Vol.1, SI Version, 7th Edition – J. L. Meriam, L. G. Kraige, Wiley India Pvt. Ltd., New Delhi.
5. Engineering Mechanics Dynamics, SI Version, 7th Edition – J. L. Meriam, L. G. Kraige, Wiley India Pvt. Ltd., and New Delhi.



P. A. H. Solapur University, Solapur
First Year B.Tech (All Branches) Semester-I
C115 UNIVERSAL HUMAN VALUES

Teaching Scheme
Theory– 2Hr /Week,2Credit

Examination Scheme
Theory ESE – 50Marks

● **CourseOutcomes:**

Upon completion of this course, students will be able to,

C115.1	Appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.
C115.2	Develop holistic perspective towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence.
C115.3	Appreciate the Universal Human Values and movement towards value-based living in a natural way.
C115.4	Highlight ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

● **Course Curriculum:**

UNIT 1: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education (7)

1. Understanding the need, basic guidelines, content and process for Value Education
2. Self-Exploration–what is it? - its content and process; ‘Natural Acceptance’ and Experiential Validation- as the mechanism for self-exploration
3. Continuous Happiness and Prosperity- A look at basic Human Aspirations.
4. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority.
5. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario
6. Method to fulfill the above human aspirations understanding and living in **harmony** at various levels.

UNIT 2: Understanding Harmony in the Human Being - Harmony in Myself! (7)

1. Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’
2. Understanding the needs of Self (‘I’) and ‘Body’ –*SukhandSavidha*
3. Understanding the Body as an instrument of ‘I’ (I being the doer, seer andenjoyer)
4. Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
5. Understanding the harmony of I with the Body: *SanyamandSwasthya*; correct appraisal of Physical needs, meaning of Prosperity indetail.
6. Programs to ensure *SanyamandSwasthya*

UNIT 3: Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship (8)

1. Understanding Harmony in the family – the basic unit of human interaction
2. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship
3. Understanding the meaning of Vishwas; Difference between intention and competence
4. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship
5. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals
6. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!

UNIT 4: Understanding Harmony in the Nature and Existence - Whole existence as Co-existence (8)

1. Understanding the harmony in the Nature
2. Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature
3. Understanding Existence as Co-existence (Sah-astitva) of mutually interacting units in all-pervasive space
4. Holistic perception of harmony at all levels of existence

• Text Books

1. R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics, Excel books, New Delhi, 2010, ISBN 978-8-174-46781-2
2. The teacher's manual: R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

• Reference Books

1. B L Bajpai, 2004, *Indian Ethos and Modern Management*, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, *Science and Humanism*, Commonwealth Publishers.
3. Susan George, 1976, *How the Other Half Dies*, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, *Energy & Equity*, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
6. Subhas Palekar, 2000, *How to practice Natural Farming*, Pracheen (Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, *Jeevan Vidyaek Parichay*, Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, *Small is Beautiful: a study of economics as if people mattered*, Blond &

Briggs, Britain.

9. A.N. Tripathy, 2003, *Human Values*, New Age International Publishers.

- **Relevant websites, movies and documentaries**

1. Value Education websites, <http://uhv.ac.in>, <http://www.uptu.ac.in>

2. Story of Stuff, <http://www.storyofstuff.com>

3. Al Gore, *An Inconvenient Truth*, Paramount Classics, USA

4. Charlie Chaplin, *Modern Times*, United Artists, USA

5. IIT Delhi, *Modern Technology – the Untold Story*

6. Gandhi A., *Right Here Right Now*, Cyclewala Productions

7. AICTE On-line Workshop on Universal Human Values Refresher Course-I Handouts

- UHV-I handouts

<https://drive.google.com/drive/folders/16eOka8AoBpLGICDajRvk4MXgfXQWzFCB?usp=sharing>

- UHV-II handouts

<https://drive.google.com/drive/folders/15eHkMVguzRBDrb65GFj7jMN6UEP5JEk1?usp=sharing>



P. A. H. Solapur University, Solapur
First Year B.Tech (All Branches) Semester-I
C116 COMMUNICATION SKILLS

Teaching Scheme

Theory– 1 Hr /Week,1Credit

Laboratory– 2 Hrs. /Week,1Credit

Examination Scheme

ISE – 25Marks

ICA– 25Marks

• **Course Objectives:**

C116.O1	To make students understand English Grammar and its application in Communication
C116.O2	To develop writing skills amongst students
C116.O3	To develop and enhance oral communication skills of students
C116.O4	To nurture reading and comprehension skills of the students
C116.O5	To prepare students for professional written communication
C116.O6	To prepare students for competitive exams with focus on verbal ability

• **Course Outcomes:**

At the end of this course, students will be able to

C116.1	Frame grammatically correct sentences for day to day Communication.
C116.2	Use numerous appropriate words and sentences in written communication.
C116.3	Demonstrate effective oral communication skills in various situations.
C116.4	Read, comprehend and answer the questions based on a passage.
C116.5	Draft letters, emails, write paragraphs and essays with appropriate content and context.
C116.6	Solve verbal ability questions in competitive exams

- **Course Curriculum**

Unit No. 01: English Grammar		Hours : 06		
<i>Sr.No.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
1.1	Articles, nouns, pronouns, verbs, modal verbs, auxiliary verbs & tenses	03	Sentence formation, corrections / error finding	Remembering, understanding, applying, creating
1.2	Adjectives, adverbs, prepositions, conjunctions	02	Sentence formation, corrections / error finding	Remembering, understanding, applying, creating
1.3	i. Idioms & phrases ii. Clichés iii. Redundancies	01	Identifying Meaning of the idioms, phrases and Clichés and using them appropriately. Sentence Correction/ error finding	Remembering Understanding Applying, creating
Unit No. 02: Vocabulary		Hours : 02		
<i>Sr.No.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
2.1	Synonyms & antonyms	01	Synonym / antonym of the given word	Remembering, understanding, applying
2.2	Prefixes & suffixes	01	Word formation.	Remembering, understanding, apply
Unit No. 03: Oral Communication		Hours : 02		
<i>Sr.No.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
3.1	Situational conversation	01	Role play based on formal or informal conversation, writing a conversation based on a situation	Applying, creating
3.2	Impromptu speaking – extempore	01	extempore speech	Applying, creating, evaluating

Unit No. 04: Reading Comprehension		Hours :02		
<i>Sr.No.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
4.0	Reading comprehension	02	Questions based on a passage	understanding, evaluating, applying,
Unit No. 05: Writing Practices-1		Hours :03		
<i>Sr.No.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	Writing business letters	01	Writing a professional / business letter	Understanding, applying, creating
5.2	E-mail communication	01	Writing a professional e-mail	Understanding, applying, creating
5.3	Paragraph writing & Essay writing	01	Writing a paragraph of about 120 words & an essay of about 300 words	Understanding, applying, Creating

- **In Semester Evaluation (ISE)–**

ISE shall be based on three theory examination conducted at institute level covering above curriculum. Examinations shall include sufficient questions covering all topics / subtopics

- **Internal Continuous Assessment (ICA)-**

ICA shall be based on performance of the student during the laboratory sessions in Language Lab covering minimum 12 exercises out of blow-

1. Grammar Exercise –I based on articles, nouns and pronouns.
2. Grammar Exercise –II based on verbs, modal verbs, auxiliary verbs & tenses
3. Grammar Exercise –III based on adjectives, adverbs, prepositions, conjunctions
4. Grammar Exercise –IV based on idioms and phrases, clichés & redundancies
5. Vocabulary – Based on the synonym of the given word
6. Vocabulary – Find the antonym of the given word
7. Exercise on word formation (prefixes / suffixes)
8. Writing conversation based on a formal situation
9. Writing conversation based on a formal situation
10. Exercise based on reading comprehension
11. Professional / business letter writing
12. Professional / business E mail writing
13. Writing a paragraph of about 120 words / an essay of about 300 words on a given topic.
14. Extempore speech on a given topic

- **Text Books:**

1. English Grammar Just for You. RajeevanKarat. Oxford University Press
2. Technical English. Dr. M. Hemamalini. Wiley India Pvt.
3. English for Practical Purposes, Z. N. Patil, B.S. Valke, A.R. Thorat, Zeenath Merchant
4. Study Writing. Liz Hamp-Lyons and Ben Heasley. Cambridge University Press.2006.
5. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.
6. Communication Skills, Sanjay Kumar and PushpaLata. Oxford University Press.2011

- **References Books:**

1. English Grammar & Composition , Wrenn& Martin, S.Chand
2. Practical English Usage . MichaelSwan.OUP.1995.
3. Remedial English Grammar. F.T Wood.Macmillan.2007.
4. On Writing Well. William Zinsser. Harper ResourceBook.2001.
5. Business Communication, ShaliniKalia, ShailjaAgarwal,Wiley
6. Communication Skills for Technical Students, T. M. Farhathullah, Orient Black Swan
7. Longman Dictionary of Contemporary English
8. Essential Activator, Longman
9. Word Power Made Easy, Norman Lewis



P. A. H. Solapur University, Solapur
First Year B. Tech. (All Branches) Semester-I
C117 CREATIVITY AND DESIGN THINKING

Teaching Scheme
Laboratory- 02 Hrs/Week,1Credit

Examination Scheme
ICA -50 Marks

• **Course Outcomes:**

At the end of the course, students will be able to-

C117.1	Relate with and Compare the various learning styles and memory techniques and Apply them in their engineering education.
C117.2	Analyze emotional experience and Experiment with emotional expressivity to better understand users while designing products.
C117.3	Appreciate the importance creativity and design thinking, Develop new ways of thinking and Learn the innovation cycle for creating innovative products.
C117.4	Understand individual differences and its impact on everyday decisions so as to demonstrate frameworks, strategies, techniques while creating innovative products.
C117.5	Develop skills for evaluating, articulating, refining, and creating an innovative engineering product that solves customer problems(s).

• **Course Curriculum:**

Unit No.	Contents
1	An Insight into Learning, Remembering & Emotions Understanding the Learning Process, Understanding the Memory process, Memory enhancement techniques. Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers.
2	Introduction to Creativity and Tools for creativity The creative person, Lateral & vertical Thinking concept, Creative style- adaptor & Innovator. Tools for creativity: Brain storming, Six hat technique, TRIZ, Divergent and Convergent,
3	Basics of Design Thinking: Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Stages of Design Thinking Process (explain with examples) – Empathize, Define, Ideate, Prototype, Test

4	<p>Being Ingenious & Fixing Problem:</p> <p>Understanding Creative thinking process, Understanding Problem Solving, Testing Creative Problem Solving, Zoom in Zoom Out, TRIZ Contradiction matrix, Combined practices</p>
5	<p>Process of Product Design, Prototyping & Testing</p> <p>Process of Engineering Product Design, Stages of Product Design, Examples of best product designs and functions, Prototyping- need & its types, Rapid Prototype Development process, Testing.</p> <p>Assignment: Engineering Product Design. Sample Example</p>
6	<p>Celebrating the Difference:</p> <p>Understanding Individual differences & Uniqueness, Group Discussion and Activities to encourage the understanding, acceptance and appreciation of Individual differences</p>
7	<p>Design Thinking & Customer Centricity:</p> <p>Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design</p>
8	<p>Feedback, Re-Design & Re-Create:</p> <p>Feedback loop, Focus on User Experience, Address “ergonomic challenges, User focused design, rapid prototyping & testing, final product</p> <p>Final Presentation – “Solving Practical Engineering Problem through Innovative Product Design & Creative Solution”</p>

- **Internal Continuous Assessment (ICA):**

Activities are to be conducted using various tools of creative thinking and design thinking. Typical case studies shall be done to understand process of design thinking and product development.

Minimum 8 Experiments shall be carried out and students shall complete eight assignments based on the syllabus /experiments.

In addition to the above, the institute may prescribe additional modes of assessment such as Case study, Quiz, Presentation, Course seminar etc. for ensuring continuous assessment of the students.

- **TEXT BOOKS:**

1. Thinking Design by S. Balaram (Author), Publisher : Sage India; ISBN-10 : 8132103149
2. The Creative thinker’s Toolkit: Course Guidebook by Gerard Puccio, The great courses, 2014
3. Six Thinking Hat by Marcela Pandolfo,
4. Basic Design Thinking by Gavin Ambrose &Paul Harris, AVA Publishing
5. Design Thinking for Beginners: Innovation as a factor for entrepreneurial success,Publisher : Personal Growth Hackers (18 August 2019),ISBN-10 : 3967160629

- **REFERENCE BOOKS:**

1. HassoPlattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011 (Unit I).
2. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013. (Unit III).
3. Design Thinking for Educators: Unleashing Imagination Ideas Being Student Centric, D.M. ,ArvindMallik, Publisher : Notion Press; 1st edition (17 September 2019), ISBN-10 : 1646506928
4. Cracking the Creativity code: Zoom in Zoom out framework for creativity, fun and success by ArieRuttenberg and ShlimoMaital, Publisher- SAGE, 2014

- **WEB REFERENCES:**

1. <https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>
2. <https://dschool.stanford.edu/use-our-methods/>
3. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process>
4. <http://www.creativityatwork.com/design-thinking-strategy-for-innovation/>
5. <https://www.nngroup.com/articles/design-thinking/>
6. <https://designthinkingforeducators.com/design-thinking/>
7. www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf



P. A. H. Solapur University, Solapur
First Year B. Tech. (All Branches) Semester-I

C118 WORKSHOP PRACTICE

Teaching Scheme

Laboratory- 02 Hrs/Week, 1 Credit

Examination Scheme

ICA -50 Marks

• **Course Objective:**

C118.O1	To make a student learn hardware and software of a computer.
C118.O2	To make student assemble a desktop PC from its components and also using alternatives.
C118.O3	To make the students acquainted with various skills and tools involved in electronics.
C118.O4	To make students aware of various circuit building techniques, acquaint with the knowledge for tools and to have hands on for the same.
C118.O5	To make the students acquainted with various skills involved in manufacturing and assembly.
C118.O6	To make student aware of various cutting and joining processes and to have hands on for the same.

• **Course Outcomes:**

At the end of this course, the student will be able to

C118.1	Identify various hardware and software components of a computer and compare between them.
C118.2	Assemble a desktop from components supplied and Setup a working desktop system using a Raspberry Pi board.
C118.3	Identify and use various electronic components and instruments.
C118.4	Develop basic electronic circuits on breadboards.
C118.5	Demonstrate the use of an Arduino board using basic circuits.
C118.6	Prepare different shaped metal work piece joints from the given metal blanks by selecting different tools and machines.
C118.7	Perform different types of welding of metal components.
C118.8	Select different engineering tools required to perform, fitting, machining, welding and joining processes.

- **Course Curriculum:**

Unit No.	Unit Title	No. of Lab/ Task Sessions	Assessment	Bloom's Level
From Computer Science Engineering Domain				
01	1.Name and identify various PC hardware components: USB Mouse, PS/2 Mouse, Keyboard, LCD/LED Monitor, VGA, HDMI, CAT5, CAT6, server, routers, fiber cable, Hard disk, RAM, CMOS battery, SMPS, cache, ROM, BIOS 2.Type using all your fingers and achieve a speed of 30 words per minute	03	Demonstration, Hands-on experience, report writing	Perception (LI), Set (L2), Guided response(L3),
02	1.Introduction to various important software: Ubuntu, Windows, Mac, Libre office and Microsoft Office; Firefox, Google Chrome, Tor; Linux Command Line (few basic commands); Photoshop, Gimp Understand the broad structure and functioning of the Internet; Learn the following terms and concepts: LAN, DNS, Proxy, Router, Hub, Switch, Server, Client, Website, Web-server; Understand basic networking commands, applications and services: ssh, telnet, ftp, winscp, ping, http, https, various search services (google, start page, aggregator search services) 2.Prepare a working LAN cable by using crimping tools.	03	Explaining, and hands-on experience, report writing	Perception (LI), Set (L2), Guided response(L3)
03	1.Assemble a Desktop PC from it's Components: Install any two operating systems on a PC making it dual boot, including latest version of Ubuntu Linux, Windows 7/8 2. Connect 2-4 computers together using a network hub to create a LAN	04	Explaining, and hands-on experience, report writing	Perception (LI), Set (L2), Guided response(L3)
04	1.Setup a working desktop system using a Raspberry Pi board. Download the OS image from web. 2.Try installing one of the various operating systems on the board: Raspbian,	04	Explaining, and hands-on experience, report	Perception (LI), Set (L2), Methodology

	Ubuntu Mate, Openelec, OSMC, Pidora, RISC OS, Arch Linux ARM, etc.		writing	(L4)
From Electronics Engineering Domain				
05	<p>Introduction to Basic Electronic Components and Devices : Introduction to various electrical passive components such as Resistors, inductors and capacitors, introduction to active components, introduction to breadboard, Measurement of resistance using the colour code, series and parallel connection of the resistances and its implementation on breadboard.</p> <p>Timer IC: Application of IC-555 as an Astable mode Calculation of duty cycle and frequency of IC 555 in a stable mode.</p>	03	<p>Components introduction identification, Series-Parallel resistor identification and reduction, implementation, Timer calculations, report writing</p>	<p>Introduce (L1) Identify (L2) Calculate / Solve (L3)</p>
06	<p>Introduction to Electronics Instruments: Exposure to usual electronic equipment/instruments such as Soldering iron, Multimeter, Oscilloscope, Function generator, Power supply, Information about their front panels, Demonstrations on their working, Hands-on for measurement of component values and DC voltage using multimeter, measurement of amplitude, time period and frequency of the waveform Square wave/any small signal from function generator on Oscilloscope (DSO), Measurement of the voltage and current in the circuit implemented on breadboard using multimeter.</p>	03	<p>Ability to state and demonstrate the use of electronics tools and classify, report writing</p>	<p>State/Demonstrate (L1) Classify (L2)</p>
07	<p>Introduction to Arduino: Arduino Configuration and architecture, Device and platform features, Concept of digital and analog ports, Familiarizing with Arduino Interfacing Board, Introduction to Embedded C and Arduino platform (IDE), Arduino data types (Variables and constants, Operators, Control Statements, Arrays, Function).</p>	04	<p>Demonstration of Arduino Platform with ability to discriminate analog and digital pins and its usage, report writing</p>	<p>Demonstrate (L1) Classify (L2)</p>
08	<p>Arduino I/O & Sensors : Arduino I/O Functions (Pins Configured as INPUT, Pull-up Resistors, Pins Configured as OUTPUT,FUNCTIONS: pinMode(), digitalWrite(), analogRead(),Arduino Interrupts), SENSORS: Humidity Sensor, Temperature Sensor, Water</p>	04	<p>Configuring I/O pins, Interfacing simple sensors, report writing</p>	<p>Classify (L2) Interface (L3)</p>

	Detector / Sensor, PIR Sensor, Ultrasonic Sensor, Magnetic relay switches.			
From Mechanical and Civil Engineering Domain				
09	Assembly: assembly of the following assemblies/sub-assembly-Three and Four jaw chuck.	01	Assembly job, team working, report writing	Perception (LI), Set (L2), Guided response(L3), Mechanism (L4)
10	Assembly: assembly of the following assemblies/sub-assembly- Lathe Tailstock	01	Assembly job, team working, report writing	Perception (LI), Set (L2), Guided response(L3), Mechanism (L4)
11	Assembly: assembly of the following assemblies/sub-assembly- Apron of Lathe	01	Assembly job, team working, report writing	Perception (LI), Set (L2), Guided response(L3), Mechanism (L4)
12	Assembly: assembly of the following assemblies/sub-assembly-Cross Slide assembly	01	Assembly job, team working, report writing	Perception (LI), Set (L2), Guided response(L3), Mechanism (L4)
13	Assembly: assembly of the following assemblies/sub-assembly-Tumbler Gear assembly for different types of threads	01	Assembly job, team working, report writing	Perception (LI), Set (L2), Guided response(L3), Mechanism (L4)
14	Welding: demonstration and hands on- arc welding, gas welding, resistance welding, gas cutting, spot welding.	03	Explaining, and hands-on experience, report writing	Perception (LI), Set (L2), Guided response (L3)
15	Fitting job :One job on fitting, to size, male-female fitting including, marking, cutting, shearing, chipping sizing of metals, drilling and tapping to know concept of inter changeability.	03	Fitting job, report writing	Perception (LI), Set (L2), Mechanism (L4)
16	Machine Tools: demonstration and hands on- Lathe Machine, Drilling Machine, Milling Machine	03	Explaining, and hands-on experience, report writing	Perception (LI), Set (L2), Guided response(L3)

- **Internal Continuous Assessment (ICA):**

ICA shall be based on completion of any of the eight LAB Sessions/Taskson the above-mentioned units along with the report writing.

- **Text Books:**

1. Building Your Own Computer Made Easy: The Step By Step Guide (Computers Made Easy) by James Bernstein.
2. Raspberry Pi Cookbook: Software and Hardware Problems and Solutions 3rd Edition by Simon Monk .
3. A text book of Computer Hardware and Networking (DJ 5) [Print Replica] Kindle Edition by Ms. JyotikaDeshmukh .
4. Principles of Electronics by V.K Mehta (Author), Rohit Mehta (Author).
5. Basic Electronics: Devices, Circuits and it Fundamentals by Kal.
6. The Basic Soldering Guide Handbook: Learn to solder electronics successfully by Alan R Winstanley.
7. Engineering Practices, M Karthik.
8. Workshop Technology, Raghuvanshi.
9. Workshop Technology, HajraChowdhary, Media Promoters & Publishers Pvt. Ltd.



P. A. H. Solapur University, Solapur
First Year B. Tech. (All Branches) Semester-II
C122 ENGINEERING MATHEMATICS -II

Teaching Scheme

Theory – 3 Hrs. /Week,3Credits

Tutorial– 1 Hr. /Week,1Credit

Examination Scheme

Theory – ESE -70Marks

ISE - 30Marks

ICA–25Marks

• **Course Objectives:**

C122.O1	To introduce to student some methods to find the solution of first order & first degree ordinary differential equations with its applications
C122.O2	To introduce to student awareness of concept of convergence of sequences and series
C122.O3	To introduce the tools of differentiation of functions of complex variable that are used in various techniques dealing engineering problems
C122.O4	To make familiar to tracing of Cartesian, polar and parametric curves
C122.O5	To acquaint the student with mathematical tools needed in evaluating improper integrals, multiple integrals and their usage

• **Course Outcomes:**

At the end of this course, student will be able to

C122.1	Solve first order ordinary differential equation and able to apply in different Engineering applications.
C122.2	Test divergence & convergence of infinite series.
C122.3	Use the tools of differentiation of functions of a complex variable that are used in various techniques dealing engineering problems.
C122.4	Draw approximate shape of planer curve with justification.
C122.5	Evaluate improper and multiple integrals and their usage.

• **Course Curriculum**

Section I

Unit No. 01: ODE of First order and Degree and Application		Hours : 09			Marks: 22
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
1.1	Order, degree and general solution of differential equations, non-homogeneous differential Equations.	03	01	Solution of differential equations.	Remembering, understanding,
1.2	Exact differential equations, non- exact reducible to exact, linear differential equations, non linear reducible to linear.	10	04	Solution of differential equations.	Understanding, applying
1.3	Applications to orthogonal trajectories, electrical and mechanical engineering (projectile motion and Newton's law of cooling)	09	04	Application of ordinary differential equations.	Remembering, understanding, applying
Unit No. 02: Infinite Series		Hours : 06			Marks: 13
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
2.1	Infinite sequences, infinite series, types of series	01	01	Examine	Remembering, understanding,
2.2	Test of convergence, absolute and conditional convergence,	05	02	Apply standard results	Remembering, applying
2.3	Cauchy test, comparison test and De Alembert's test	07	03	Numerical, apply standard results	Remembering, understanding, applying
Unit No. 03: Complex Variable (Differentiation)		Hours : 08			Marks: 17
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
3.1	Statement of De-Moivre's Theorem (without proof), application of De-Moivre's theorem –roots of algebraic equations,	04	02	Numerical example, evaluate, applications	Remembering, understanding Applying
3.2	Circular and Hyperbolic functions	01	01	Definition,	Remembering, applying

3.3	Differentiation, Cauchy Riemann Equations (Without Proof), Analytic Functions, Elementary Analytic Functions (Exponential, Trigonometric and Logarithmic function)	06	02	Simplification, applications	Remembering, applying
3.4	Harmonic Functions and Conjugates, Construction of Analytic Function	06	03	Definition, Evaluate, applications	Remembering, applying

Section II

Unit No. 04: Integral Calculus		Hours : 07		Marks: 16	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
4.1	Gamma function and properties,	04	02	Evaluate/numerical,	Remembering, understanding, applying
4.2	Beta function and properties, duplication formula with proof.	09	03	Evaluate/numerical,	Remembering, understanding, applying
4.3	Differentiation under integral sign with constant limit	03	02	Evaluate/numerical,	Remembering, understanding, applying
Unit No. 05: Curve Tracing		Hours : 06		Marks: 13	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	Tracing of Cartesian curves-	05	02	Trace of curve	Understanding, applying
5.2	Tracing of polar curves	04	02	Trace of curve	Understanding, applying
5.3	Tracing of parametric curves	04	02	Trace of curve	Remembering, understanding, applying

Unit No. 06: Multivariable Integral Calculus		Hours :09		Marks: 23	
<i>Sr.No..</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
6.1	Direct evaluation of Double integral, Evaluation over the given region,	05	02	Evaluate/numerical,	Understanding, applying
6.2	Change of order of integration, change to polar, triple integration	09	04	Evaluate/numerical,	Understanding, applying
6.3	Application of double integral to find area and mass of lamina.	09	03	Application/numerical	Remembering, understanding, applying

- **In Semester Evaluation (ISE):**

ISE shall be based upon student's performance in minimum two tests & mid-term written test conducted & evaluated at institute level

- **Internal Continuous Assessment (ICA):**

ICA shall be based on student's performance during tutorial sessions and on completion of minimum six assignments based on above curriculum.

- **Text Books:**

1. A Text Book of Applied Mathematics, P.N. and J.N. Wartikar, Vol.1, Pune VidyarthiGrihaPrakashan.
2. Advanced Engineering Mathematics, H. K. Dass, S. Chand Publications, Delhi.
3. Engineering Mathematics (Volume I), ITL Education, Cengage Learning.
4. Engineering Mathematics, Ravish R Sing and Mukul Bhatt, McGraw Hill.
5. Applied Mathematics-I,II, Kreyzig's, Wiley.
6. A text book of Engineering Mathematics, N.P. Bali and Manish Goyal, Laxmi Publications,2008.

- **Reference Books:**

1. Higher Engineering Mathematics (42nd Edition), B.S. GrewalKhanna Publications, Delhi.
2. Engineering Mathematics, Srimanta Pal and Subodh C. Bhunia, Oxford Higher Education.
3. Mathematics for Engineering Applications, Kuldip S. Rattan and Naathan W. Klingbeil Wiley. (Modeling and Core Engineering Application)
4. Higher Engineering Mathematics, Ramana B.V., Tata McGraw Hill New Delhi,2010.



P. A. H. Solapur University, Solapur
First Year B. Tech. (All Branches) Semester-II
C123 BASIC ELECTRICAL AND
ELECTRONICS ENGINEERING

Teaching Scheme

Theory– 3 Hrs. /Week, 3 Credits

Tutorial –2 Hr. /Week, 1 Credit

Examination Scheme

Theory –ESE-70Marks

ISE –30Marks

ICA–25Marks

● **Course Objectives:**

C123.01	To introduce to student various simplification methods for dc circuits so as student can analyze dc circuits and can solve numerical problems based on it
C123.02	To introduce to student fundamentals of magnetic circuits and electromagnetic induction and its application.
C123.03	To make student comprehend generation and behavior of single phase ac circuits for R,L,C load.
C123.04	To introduce to student analysis of poly phase ac circuit.
C123.05	To emphasize on working and applications of diode.
C123.06	To make student comprehend working of bipolar junction transistor with basic configurations.
C123.07	To make student understand different types of transducers & application areas of transducers.
C123.08	To introduce to student fundamental of digital electronics.

● **Course Outcomes:**

At the end of this course, students will be able to

C123.1	Apply the various simplification methods to analyze dc circuits.
C123.2	Use the concept of magnetic circuits to calculate parameters of magnetic circuits and single phase transformer.
C123.3	Apply knowledge of ac fundamentals and poly phase to analyze ac circuits.
C123.4	Explain working, characteristics and applications of diode and BJT.
C123.5	Select appropriate transducers to measure various physical parameters like distance, temperature etc.
C123.6	Perform arithmetic operations on digital number system.

● **Course Curriculum**

Section I

Unit No. 01:DCCircuits		Hours : 06		Marks: 15	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
1.1	Ohm's law, Resistance, specific resistance, energy sources, concepts of open circuit and short circuit	03	01	Explanation, Understandings, applications	Understanding, applying
1.2	Kirchhoff's Voltage and Current law & it's applications for circuit solutions	05	02	Explanation, simplification of circuits (numerical), applications	Remembering, understanding, applying
1.3	Simplifications of circuits using series, parallel combinations, Star-delta, delta-star conversions	07	03	Explanation, simplification of circuits (numerical), applications	Remembering, understanding, applying

Unit No. 02: Magnetic Circuit and Single Phase Transformer		Hours:06		Marks: 16	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
2.1	Basic definitions related to magnetic circuit (flux, mmf, reluctance, flux density, magnetic field strength, permeability) Comparison between electric and magnetic circuit.	05	02	Explanation, Understandings,	Understanding,
2.2	Series magnetic circuits with air gap, magnetic leakage and fringing	03	01	Explanation, Understandings	Remembering, Understanding
2.3	Faraday's law of electromagnetic induction, Lenz's law, concept of self and mutual inductance	03	01	Selection, discussion	Remembering, understanding
2.4	Working principle and construction of Single Phase transformer, EMF-equation of Single phase transformer	05	02	Explanation, Understandings, Derivation, Numerical	Remembering, Understanding, applying
Unit No. 03: Single Phase AC Circuits		Hours :06		Marks:14	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>

3.1	Introduction to AC, Generation of alternating voltage and current, concept of cycle, period, frequency, phase difference, Instantaneous value, Peak value	03	01	Explanation, Understandings, applications	Understanding, applying
3.2	RMS value of an alternating quantity, average value of an alternating quantity, form factor, peak factor.	04	02	Explanation, understandings, applications	Remembering, understanding, applying
3.3	AC through pure resistance, pure inductance and pure capacitance, Phasor diagram, Series AC circuit (RL, RC and RLC): impedance	07	03	Explanation, simplification of circuits (numerical), applications	Remembering, Understanding, applying

Unit No. 04: Poly-Phase Circuits		Hours :03		Marks:05	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
4.1	Generation of three phase voltages	01	01	Explanation	Understanding, Remembering
4.2	Relations of voltage and current in star and delta connections for balanced systems.	04	02	Explanation, simplification of circuits (numerical), applications, Derivation	Remembering, understanding, applying

Section II

Unit No. 05: Semiconductor Diodes		Hours: 06		Marks:14	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	<i>Semiconductors and p-n junction diode</i> -Doping, depletion layer, barrier potential, construction, working, biasing, V-I characteristics, ratings.	04	02	Explain, define	Recalling, understanding

5.2	<i>Diode applications</i> -Circuit diagram & working of half wave rectifier, full wave rectifier, bridge rectifier, capacitor filter using full wave rectifier- circuit diagram, working and formula of ripple factor.	05	02	Explain, define, apply	Recalling, understanding, applying
5.3	<i>Special Purpose Diodes</i> - photo diode, LED- application of LED as 7- segment display , Zener diode- Working principle, V-I characteristics, ratings, application of Zener as voltageregulator	05	02	Explain define, apply	Recalling, defining, understanding

Unit No 06: Bipolar Junction Transistor

Hours: 04

Marks: 10

<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
6.1	<i>Bipolar Junction Transistor</i> - construction, biasing, configuration with I/O characteristics for -CB,CE,CC, comparison between CB,CE,CC configurations, ratings of transistor	05	02	Explain, define, numerical	Recall, understanding
6.2	<i>Application of transistor</i> -BJT as switch and amplifier	05	02	Explain, apply	Recall, understanding, applying

Unit No 07: Electrical Transducers

Hours: 04

Marks: 10

<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
7.1	Introduction, parameters for selection of transducers, wire type strain gauge , load cell ,LVDT	05	02	Explain, define, apply,select	Recall, understanding, applying
7.2	Temperature & other transducers- thermocouple , thermistor, LDR , solar cell	05	02	Explain,define, select	Recall, understanding, applying

Unit No 08: Introduction to Digital Electronics

Hours: 07

Marks: 16

<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
8.1	<i>Number system</i> - decimal, binary, octal, hexadecimal & their inter- conversion , BCD code	05	02	Numerical	Recalling, understanding, applying

8.2	<i>Binary Arithmetic-</i> addition, subtraction, subtraction using 2's complement	04	02	Numerical	Recalling, understanding, applying
8.3	<i>Logic Gates-</i> AND, OR, NOT, NAND,NOR,EX-OR, EX-NOR Gates - symbol, output equation, truth table, realization of basic gates using universal gates	05	02	Explain, define, numerical	Recalling, understanding, applying
8.4	<i>Boolean Algebra-</i> laws & rules, De- Morgan theorem	02	01	Explain, define, simplify	Recalling understanding, applying

- **In Semester Evaluation(ISE):**

ISE shall be based upon student's performance in minimum two tests & mid-term written Test conducted & evaluated at institute level

- **Internal Continuous Assessment (ICA):**

ICA shall be based on :

Basic Electrical Engineering:(Minimum 5 experiments from the following)

1. Hands on types of wires, wiring systems and wiring exercises.
2. Verification of KVL and KCL
3. Verification of voltage relation of RL, RC and RLC series connected AC circuits
4. Verification of line and phase relation for star connected load.
5. Verification of line and phase relation for delta connected load
6. Verification of transformation ratio of single phase transformer.

Basic Electronics Engineering:(Minimum 5 experiments from the following)

1. Identification, testing and measurement of electronic components -resistors, capacitors, inductors.
2. V-I characteristics of PN junction diode.
3. Half and full wave rectifier.
4. Controlling relay using transistor as a switch.
5. Measurement of distance using LVDT.
6. Verification of truth table of basic gates and universal gates using IC's.

- **Text-Books:**

1. Electrical Technology (Volume I & 2), B L Theraja, 22nd edition, S Chand & Company Ltd
2. Basic Electrical Engineering, V K Mehta, Revised edition, S Chand & Company Ltd.
3. Basic Electronics Solid State, B L Thereja, Revised edition, S Chand & Company Ltd.

4. Digital Principles and Applications, Albert Malvino , Donald Leach, Tata McGraw Hills Publication
5. Principles of Electronic Devices and Circuits (AnalogandDigital) ,B.L.Theraja , R.S.Sedha, S. Chand publication

• **Reference-Books:**

1. Basic Electrical Engineering, Dr.Debashisha Jena, Revised Edition, Wiley Engineering Press
2. Electrical Engineering Fundamentals, V Del Toro, 2nd edition,Prentice-Hall
3. Electrical Technology, E Hughes, 10th edition, ELBS, Longman
4. Laboratory courses in Electrical Engineering, S G Tarnekar, P K Kharbanda, S B Bodhe and S D Naik, S Chand & Company Ltd
5. Basic Electronics Engineering, V. Baru , R. Kaduskar, S.Gaikwad , Dreamtech Publication
6. Electronic Devices and Circuits , David A. Bell ,Oxford University, Press India, Fifth edition
7. Electronic Devices, Floyd, Pearson Education publication
8. Electronic Device & Circuits, MillmanHalkias ,Tata McGraw Hill, Third edition
9. Electronic Components and Materials, M. A. Joshi (Wheeler publication)



P. A. H. Solapur University, Solapur
First Year B. Tech. (All Branches) Semester-II
C124 PROGRAMMING FOR PROBLEM SOLVING

Teaching Scheme

Theory – 2Hrs. /Week, 2 Credits

Laboratory– 4Hrs. /Week, 2 Credit

Examination Scheme

POE –ESE-50Marks

ISE–25Marks

ICA-50Marks

• **Course Objectives:**

C124.O1	To introduce the concepts of algorithm & flowchart for problem solving
C124.O2	To introduce the fundamentals of structured programming
C124.O3	To formulate simple C programs using various control structures & loop structures
C124.O4	To apply the concept of functions & pointers to solve the problems
C124.O5	To apply the concept of arrays to solve the problems
C124.O6	To apply concept of structures, unions and files to solve the problems

• **Course Outcomes:**

At the end of this course, students will be able to

C124.1	Design the flowcharts and algorithms for the given problem .
C124.2	Translate the algorithms into C programs and test & execute the programs.
C124.3	Implement C programs by appropriately selecting control and loop structures.
C124.4	Implement C programs using functions and pointers.
C124.5	Implement C programs using arrays, structure and unions and files.
C124.6	Develop small applications using C Programming concepts.

- **Course Curriculum**

UNIT 1: Fundamentals of Computers & Structure of a 'C' Program		Hours: 05		ICA Marks: 7	
Sr. No.	Subunit	ISE Marks #	Hours	Assessment	Bloom's Level(Cognitive)
1.1	Block Diagram of computer with description, Algorithm, sequence, selection, Flowchart Structure of 'C' program, building blocks of 'C' program (pre-processor, compilation and execution of 'C' program)	02	02	Explanation, Formulation	Remember, Understand Apply
1.2	C character set, tokens, constants, variables, keywords , primitive data types , 'C' operators (arithmetic, unary, binary , ternary ,Logical, assignment, relational, increment and decrement, conditional, bit wise, sizeof)	03	02	Explanation, Formulation	Remember, Understand
1.3	Operator precedence, expressions, type casting and type conversion, formatting input and output (getchar, putchar ,printf, scanf), Storage Classes - Automatic, Register, Static, External storage classes.	02	01	Explanation Application	Understand, Apply

UNIT 2: Control Structures		Hours:05 ICA Marks:8			
2.1	Loops using (i) if (ii) if-else (iii) nested if –else (iv) else if ladder (v) while (vi) do-while (vii) for, break, continue, goto statement, nesting of loops, (vi) switch-case.	08	05	Programming	Understand, Apply,

UNIT 3: Arrays and Strings		Hours:05		ICA Marks:9	
3.1	Declaration and initialization of one dimensional array, accessing elements and displaying, finding element from array	04	02	Programming	Understand, Apply
3.2	Declaration and initialization of two			Programming	Understand,

	dimensional arrays, accessing and displaying elements.				Apply
3.3	Declaration and initialization of strings, Display of strings with different formats, string library function (strlen, strcpy, strcmp, strcat, gets, puts).	05	03	Programming	Understand, Apply

UNIT 4: Structures and Unions		Hours:03		ICA Marks:6	
4.1	Definition of structure and union, declaration	02	01	Programming	Understand, Apply
4.2	Accessing elements and displaying elements, difference between structure and union.	04	02	Programming	Understand, Apply

UNIT 5: Pointers		Hours:04		ICA Marks:7	
5.1	Introduction, Declaration of pointer, initialization, accessing pointer, pointer to basic data types, pointer to array (one dimensional)	02	01	Programming	Understand, Apply
5.2	Pointers of Arrays, Array of Pointer , Pointer to Pointer , Pointer and String, Pointer and Structures, Pointer to Functions in C, Pointers and Dynamic memory.	05	03	Programming	Understand, Apply

UNIT 6: Functions		Hours:05		ICA Marks:8	
6.1	Declaration & definition, passing parameters to functions, pass by value, scope of variable, return statement.	02	02	Programming	Understand, Apply
6.2	function using call by value and call by reference	02	01	Programming	Understand, Apply
6.3	Recursion: Processes and Recursion in C. How recursion works, Factorial, Fibonacci sequence, Towers of Hanoi, Advantages and Disadvantages of recursive techniques	04	02	Programming	Understand, Apply

UNIT 7: Files		Hours:03		ICA Marks:5	
7.1	Introduction, Streams and file types, File operations, File I/O, Structures of read and write, other file functions, command file arguments.	05	03	Programming	Understand, Apply

- **End Semester Evaluation (ESE):**
University ESE of ‘Practical and Oral Examination’ at the end of the semester, assessing student’s programming skills.
- **In Semester Evaluation (ISE):**
ISE shall be based upon student’s performance in minimum three tests conducted & evaluated at institute level
Test-I – Written paper based on Unit-I of minimum of 30 marks
Test-II & Test-III – Practical & Oral Examination based on remaining units.
- **Internal Continuous Assessment (ICA):**
ICA shall be based on the following programming assignments.
 1. Assignment based on fundamentals of algorithm & flowcharts
 - Formulate simple algorithms & flowcharts for arithmetic and logical problems
 2. Fundamentals of C programming & IDE
 - Programming, debugging and execution
 - Structure of C program (documentation section, header section, main function, declaration of variables, set of instructions)
 - C character set, tokens, constants, variables, keywords
 - C operators
 3. Formatted input output functions in C
 - Programs based on simple arithmetic & logical operators
 - Programs based on getchar() and putchar() functions
 4. Different operators in C
 - Programs based on multiple arithmetic operations (+, -, /, * and %)
 - Programs based on left shift (<<), right shift (>>), and(&), or(|) and xor(^) bitwise operators.
 - Programs based on increment, decrement operators.
 - Programs based on type casting using cast operator.
 - Programs based on sizeof () operator.
 5. Decision control statement (if, if-else, nested if-else, else if ladder)
 - Programs based on use of single control statement
 - Programs based on multiple control statement
 - Programs based on nested control statements combined with other operators.
 6. Loop statement (for, while, do-while, nested loop)
 - Programs based on for loop.
 - Programs based on while loop.
 - Programs based on do-while loop.
 - Program demonstrating difference in while & do-while loop.
 - Programs based on nested loops.
 - Programs demonstrating use of break, continue & goto statements.

7. Switch-case statement
 - Programs based on switch-case statement.
 - Programs demonstrating variations in switch-case statement.
 - Menu driven programs.
8. Functions
 - Programs based on simple use of functions.
 - Programs demonstrating function call by passing parameters by value.
 - Programs on iterative and recursive functions
 - Programs on customized string handling functions
9. Pointers
 - Program demonstrating basics of pointers.
 - Programs based on pointer arithmetic & operations.
 - Program based on pointers & array
10. Arrays
 - Programs based on single dimension array manipulations.
 - Programs based on two dimension array manipulations & matrix operations.
 - Programs based on string handling & manipulations.
11. Structures & Unions
 - Programs based on Structure & its manipulation operations.
 - Programs demonstrating use of Unions.
 - Program demonstrating the difference between structure & union.
12. Programs based on functions, pointers and recursion.
13. Programs based on file operations
14. To develop small application (mini project) using C Programming concepts.

- Text Books:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. Simplifying C – HarshalArolkar&Sonal Jain, Dreamtech (ForUnit-01)
3. Let s 'C' – YaswantKanetkar , BPB Publication
4. Programming in ANSI C- C Balgurusamy, Tata McGrawHill

- Reference Books:

1. The C Programming Language (ANSI C Version), Brian W. Kernighan, Dennis M. Ritchie, PHI Publications
2. Programming in C – B.L. Juneja, Cengage Learning
3. Projects using C- PVN Varalaxmi, Scitech Publications
4. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

- Web resource: https://onlinecourses.nptel.ac.in/noc18_cs31/preview



P. A. H. Solapur University, Solapur
First Year B. Tech. (All Branches) Semester-II
C125 ENGINEERING GRAPHICS AND CAD

Teaching Scheme

Theory – 2Hrs. /Week, 2Credits

Laboratory – 4Hrs. /Week, 2Credit

Examination Scheme

Theory ESE – 70Marks

ISE – 30 Marks

ICA – 50 Marks

● **Course Objectives:**

C125.O1	Draw the projections of oblique lines and planes
C125.O2	Interpret and draw the cut sections of solids
C125.O3	Visualize and draw the orthogonal views
C125.O4	Draw the developments of truncated solids and construct the solids from given developed surface
C125.O5	Draft the machine components and related parts by using commercial drafting software

● **Course Outcomes:**

At the end of this course, students will be able to

C125.1	Draw projection of lines and planes for engineering applications.
C125.2	Draw regular and sectional views of various types of solids.
C125.3	Draw the 2 D view (orthogonal views) given 3D drawing.
C125.4	Draw the development of the regular and truncated solids.
C125.5	Draft the 2-D drawing of machine components.

• **Course Curriculum**

Unit No. 01: Projections of Lines		Hours :06		Marks:20	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
1.1	Introduction to first and third angle method of projection, Projections of points on Principal reference planes and on auxiliary planes including coordinate system of points. Horizontal, frontal, profile and oblique lines, true length of line. Projections of lines with its inclination to one reference plane and with two reference planes (oblique lines). True length and inclination with the reference planes, point view of line.	10	03	Graphical problem horizontal, frontal and oblique lines, problems on TL of line	Remembering(L1) Understanding(L2), Applying(L3)
1.2	Grade and bearing of line. Angle between lines, intersecting, skew, parallel and Perpendicular lines	10	03	Problems on intersecting, skew, parallel lines and perpendicular lines	Remembering(L1) Understanding(L2), Applying(L3)

Unit No. 02: Projections of Planes		Hours :06		Marks:20	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
2.1	Projections of planes (regular polygons, circle, Isosceles triangle, Rhombus and Rectangle) Plane inclined to one reference plane and with two reference planes	10	03	Graphical problem on oblique planes by three stage and auxiliary plane methods	Remembering(L1) Understanding(L2), Applying(L3) 53

2.2	True shape, edge view, angle with reference plane dip & strike of plane (for objective type question only)	10	03	Graphical problem	Remembering (L1) Understanding (L2), Applying (L3)
Unit No 03: Projections of Solids		Hours :06		Marks:20	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
3.1	Classification of solids, projections of solids (cylinder, cone, pyramid and prism) Solid inclination to one reference plane and with two reference planes (excluding composite solids)	20	06	Graphical problem on oblique planes by three stage and auxiliary plane methods	Remembering(L1) Understanding(L2), Applying(L3)

Unit No 04: Orthographic Projections		Hours:06		Marks:20	
<i>Sr.No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
4.1	Fundamental of projection along with classification, type of lines used in drawing, conventions used in sectional drawings Projections from the pictorial - view of the objects on the principal planes by viewing from front, top and sides using first angle projection method ,full sectional view Introduction to Computer aided drafting to draft 2-D drawings for simple object using Draw and Modify Commands.	20	06	Graphical problem to draw principal views of objects.	Remembering(L1) Understanding(L2) Applying(L3)

Unit No 05: Sections of Solids			Hours:06	Marks:20	
<i>Sr. No.</i>	<i>Subunit</i>	<i>Marks</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	Sections of above solids by cutting planes inclined to one reference plane and perpendicular to other	20	06	Drawing views of solids cut by section plane inclined to one reference plane	Remembering (L1) Understanding (L2),Applying(L3)

- **In Semester Evaluation (ISE):**

ISE shall be based upon student's performance in minimum two tests & mid-term written test conducted & evaluated at institute level.

- **Internal Continuous Assessment (ICA):**

ICA shall be based on below drawing assignments

<i>Sr. No.</i>	<i>Name of Sheet</i>	<i>No. of Sheets</i>
1.	Projection of lines and planes	01
2.	Projection of solids and sections	01
3.	Orthographic projections	01
4.	Computer aided drafting: Introduction to computer aided drafting package to make 2-D drawings. (For simple object using Draw and Modify Commands)	02

- **Text Book:**

1. Engineering Drawing, D.N. Jolhe, TATA McGraw Publishing Co-Ltd.
2. Engineering drawing, N.D. Bhatt, Charotar Publishing House Pvt. Ltd.
3. Natarajan, K. V., A text book of Engineering Graphics, Pub.: Dhanalakshmi Publishers, Chennai, 2006
4. Engineering Graphics - I, M. L. Dabhade, Vision Publication.

- **Reference Book:**

1. Engineering Drawing, N. S. Parthasarathy & Vela Murali, Oxford Publication.
2. Engineering Drawing, K. L. Narayana & P. Kannaiah, Scitech Publication.
3. Engineering Graphics, A. M. Chandra, New Age International Publishers.
4. Venugopal, K. and Prabhu Raja, V., Engineering Drawing and Graphics + AutoCAD, Pub.: New Age International, 2009.



P. A. H. Solapur University, Solapur
First Year B.Tech (All Branches) Semester-II
C126 PROFESSIONAL COMMUNICATION

Teaching Scheme

Theory– 1 Hr /Week, 1Credit

Laboratory– 2 Hrs. /Week, 1Credit

Examination Scheme

ISE – 25 Marks

ICA – 25 Marks

• **Course Objectives:**

C126.O1	To nurture student's effective presentations skills
C126.O2	To equip student with skills for participating effectively in group discussion
C126.O3	To equip student with skills for performing effectively in personal interview
C126.O4	To develop resume writing skills of students
C126.O5	To develop and enhance the report writing skills of the students
C126.O6	To inculcate soft skills in students for personal and professional success

• **Course Outcomes:**

At the end of this course, student will able to

C126.1	Prepare good quality presentation and deliver it effectively.
C126.2	Participate effectively in group discussion
C126.3	Perform effectively in personal interview
C126.4	Prepare effective resume for job interviews
C126.5	Draft and write various reports professionally.
C126.6	Demonstrate various soft skills like team skills, leadership, creativity, etc. in different situations.

- **Course Curriculum**

Unit No 01: Presentation Skills		Hours : 02		
<i>Sr.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
1.1	Pronunciation, Intonation, Stress and Rhythm	01	Making a Presentation	Understanding, applying, evaluating, creating
1.2	Presentation- effective planning, preparing & delivering	01	Preparing and delivering presentations	Understanding, applying, evaluating, creating
Unit No 02: Group Discussion		Hours : 02		
<i>Sr.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
2.0	Group Discussion- introduction, traits evaluated, types, tips for successful participation, individual Traits	02	Mock group discussion	Remembering, understanding, applying, evaluating, creating
Unit No 03: Personal Interview		Hours : 02		
<i>Sr.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
3.0	Introduction, types of interviews, preparatory steps for employment interviews, skill tips, frequently asked questions during interviews	02	Mock personal interview	Remembering, understanding, applying, evaluating, creating
Unit No 04: Writing Practices -II		Hours : 03		
<i>Sr.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
4.1	Resume Writing	01	Writing resume for campus placement	Remembering, understanding, applying, evaluating, creating
4.2	Technical report writing- types, structures, data collection, content, form	01	Write a report on event / industrial visit / project	Remembering, understanding, applying, evaluating, creating
4.3	Précis Writing	01	Précis Writing	Remembering, understanding, applying, evaluating, creating

Unit No 05: Induction to Soft Skills		Hours :06		
<i>Sr.</i>	<i>Subunit</i>	<i>Hours</i>	<i>Assessment</i>	<i>Bloom's Level</i>
5.1	Personal SWOC analysis	06	Assessment through presentation, exercise, case study, role play, skit and group activity	Remembering, understanding, applying, evaluating, creating
5.2	Goal setting			
5.3	Motivation			
5.4	Leadership and team working			
5.5	Ethical values			
5.6	Stress management			
5.7	Emotional intelligence			
5.8	Positive thinking and attitude			
5.9	Decision making			
5.10	Creativity			

- **In Semester Evaluation (ISE)–**

ISE shall be based on three theory examination conducted at institute level covering above curriculum. Examinations shall include sufficient questions covering all topics / subtopics

- **Internal Continuous Assessment (ICA)-**

ICA shall be based on performance of the student during the laboratory sessions in language Lab covering minimum 12 exercises out of the following exercises:

1. Power point presentation and a delivery
2. Writing views on a topic for group discussion in about 180 words
3. Participation in a group discussion
4. Writing responses to the frequently asked questions in personal interview
5. Mock personal interview.
6. Resume writing for campus placement
7. Industrial visit report writing
8. Other technical report writing
9. Self SWOC analysis
10. Oral presentation on self-short term and long term goals
11. Writing self-short term and long term goals
12. Role play on leadership and teamworking
13. Exercise on Précis Writing
14. Case study on decision making, stress management, success stories, positive thinking, entrepreneurship, etc.

✓ *Note – Students shall be encouraged to use ICT tools for compilation, analysis, report writing and presentation.*

- **Text Books:**

1. Soft Skills: An Integrated Approach to Maximize Personality, Gajendra Singh Chauhan & Sangeeta Sharma, Willy Indian Pvt. Ltd.
2. On Writing Well. William Zinsser. Harper ResourceBook.2001.
3. Technical English. Dr. M. Hemamalini, Willy Indian Pvt. Ltd
4. Professional Speaking Skills. Aruna Koneru. Oxford University Press

- **References Books:**

1. Soft Skills. K. Alex., S. Chand Publications
2. Soft Skills – A Text book for Undergraduates. Ajay R Tengse, Orient Black Swan
3. Communication Skills Sanjay Kumar Pushpa Lata Oxford University Press
4. Managing Soft Skills for Personality Development, B N Ghosh- McGraw Hill Publication
5. Soft Skills for Everyone Jeff Butterfield, Cengage Learning
6. Soft Skills for Managers. Dr. T. Kalyana Chakravarthi & Dr. T. Latha Chakravarthi, Biztantra Publication.