

SAVITRIBAI PHULE PUNE UNIVERSITY



First Year Engineering Credit System Syllabus 2015 Course

\$: Mandatory subjects of first, second and third semester must include at least 40 credits for Engineering Physics, Engineering Chemistry, Engineering Mathematics, social science and soft skills In addition to above credits, there should be audit courses in semester five, six and seven to develop the various skills. The detail structure is given in Tables

TABLE - 2 Structure for Semester-1

Code	Subjects	Short Name	Weekly Work Load (in Hrs)			Semester Examination Scheme of Marks						Credits
			Lectures	Tutorials	PR/DRG	Theory		TW	PR	OR	Max. Marks	
						In-Semester Exam	End-Semester Exam					
107001	Engineering Mathematics I		4	1	-	50	50	25	-	-	125	5
# 107002 / 107009.	Engineering Physics OR Engineering Chemistry		4	-	2	50	50	25	-	-	125	5
102006	Engineering Graphics I		3	-	2	50	50	-	-	-	100	4
# 103004 / 104012	Basic Electrical Engineering OR Basic Electronics Engineering		3	-	2	50	50	25	-	-	125	4
101005	Basic Civil and Environmental Engineering		3	-	2	50	50	25	-	-	125	4
110003	Fundamentals of Programming Languages I		1	-	2	-	-	-	50*	-	50	2
111007	Workshop Practice		-	-	2	-	-	50	-	-	50	1
Total of Semester I			18	1	12	250	250	150	50	-	700	25

TABLE - 3 Structure for Semester-2

Code	Subjects	Short Name	Weekly Work Load (in Hrs)			Semester Examination Scheme of Marks						Credits
			Lectures	Tutorials	PR/DRG	Theory		TW	PR	OR	Max. Marks	
						In-Semester Exam	End-Semester Exam					
107008	Engineering Mathematics II		4	-	-	50	50	-	-	-	100	4
# 107009 / 107002	Engineering Chemistry OR Engineering Physics		4	-	2	50	50	25	-	-	125	5
102013	Basic Mechanical Engineering		3	-	2	50	50	25	-	-	125	4
101011	Engineering Mechanics		4	-	2	50	50	25	-	-	125	5
# 104012 / 103004.	Basic Electronics Engineering OR Basic Electrical Engineering		3	-	2	50	50	25	-	-	125	4
110010	Fundamentals of Programming Languages II		1	-	2	-	-	-	50*	-	50	2
102014	Engineering Graphics II		-	-	2	-	-	50	-	-	50	1
Total of Semester II			19	-	12	250	250	150	50	-	700	25

Instructions:

- 1. PR/Tutorial must be conducted in minimum three batches (batch size 22 maximum) per division**
- 2. Minimum number of required Experiments/Assignments in PR/DRG/Tutorial be carried out as mentioned in the syllabi of related subjects.**
- 3. * for FPL-I and FPL-II: S.P. Pune University Online Practical Examination shall be conducted at the semester end.**
- 4. # Every student should appear for Engineering Physics, Engineering Chemistry, Basic Electronics Engineering and Basic Electrical Engineering during the year.**
- 5. # College is allowed to distribute Teaching Workload of subjects Physics, Chemistry, BEE, BXE in semester I and II by dividing number of FE divisions appropriately in two groups.**

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107001 – Engineering Mathematics I

Teaching Scheme:

Lectures – 4 Hrs./Week

Tutorials – 1 Hr/Week

Examination Scheme:

Paper – 50 Marks(2 Hrs.)

Online – 50 Marks

Term Works: 25 Marks

Course Objectives:

After completing this course student will have adequate background to understand & solve the problem involving:

- 1) System of Linear equation arising in all Engineering fields, using matrix methods, stability of Engineering systems where knowledge of Eigen values and Eigen vectors are essential.
- 2) Algebraic and transcendental equations.
- 3) Error analysis and approximations
- 4) Ordinary and partial differential equation.
- 5) Engineering applications such as vibration theory, heat transfer, electrical circuits, etc.
- 6) Stationary values of functions (maxima and minima), arising in optimization problems

UNIT I

(9 hours)

Matrices: Rank ,Normal form, System of linear equations, Linear dependence & Independence, Linear & orthogonal transforms, Eigen values ,Eigen vector, Caley Hamilton theorem, Applications to problems in engineering

UNIT II

(9 hours)

Complex numbers & applications: Argand diagram, De Moivers theorem & its applications, Hyperbolic & inverse Hyperbolic functions, Logarithm of complex number, Separation into real & imaginary parts, Applications to Engineering problems

UNIT III

(9 hours)

Infinite series: Infinite sequences, Infinite series, Alternating series, Test for convergence, Absolute & Conditional convergence, Range of convergence

Differential Calculus: Successive differentiation, Leibnitz theorem,

UNIT IV

(9 hours)

Expansion of functions: Taylor's series, Maclaurian series, indeterminate forms,

Differential Calculus: L'Hospital rule, Evaluation of limit

UNIT V

(9 hours)

Partial Differentiation & Applications: Partial Differentiation, Euler's theorem on homogeneous function, Implicit functions, Total derivatives, Change of Independent variables

UNIT VI

(9 hours)

Jacobian: Jacobians & their Applications, Error & Approximation

Maxima & Minima: Maxima & minima of function of two variables, Lagrange's method of undetermined multipliers

Tutorial & Term Work:

i) Tutorial for the subject shall be engaged in minimum three batches (batch size of 22 students maximum) per division.

ii) Term Work shall consist of 6 assignments on each Unit I to Unit VI and is based on performance and continuous internal assessment

Text Books:

1. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson learning)
2. Higher Engineering Mathematics by B. S. Grewal (Khanna publication, Delhi)

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)
2. Advanced Engineering Mathematics, Wylie C. R. and Barrett L. C. (McGraw-Hill, Inc.)
3. Higher Engineering Mathematics by B. V. Ramana (Tata McGraw-Hill)
4. Advanced Engineering Mathematics, 2e, by M. B. Greenberg (Pearson Education)

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107002 – Engineering Physics

Teaching Scheme:

Lectures – 4 Hrs./Week

Tutorials – 2 Hr/Week

Examination Scheme:

Paper – 50 Marks(2 Hrs.)

Online – 50 Marks

Term Works: 25Marks

Course Objectives:

- 1) To provide the basic concepts to resolve many engineering and technological problems.
- 2) After completing this course student will be able to appreciate and use the methodologies to analyze and Design a wide range of engineering systems.
- 3) To use various techniques for measurement, calculations, control and analysis of engineering problems Based on the principle of optics, ultrasonic, acoustics, quantum physics, superconductivity, laser, physics of nano particles and semiconductor physics.
- 4) To understand the recent trends and advance in technology, this requires precise control over the dynamics of microscopic engineering system.
- 5) Basic science like physics also invoke manipulation of process over micro and even nano scale level as there is a growing demand of solid understanding of principles of basic science.
- 6) Physics provide the basic ideas and gives the solution for developing mathematical and analytical abilities with higher precision.

UNIT I: Interference, diffraction and its Engineering Application

(8 hours)

Interference: Introduction, Concept of thin film, Interference due to thin films of uniform thickness (with derivation), Interference due to wedge shaped thin films (qualitative), fringe width (with derivation), Formation of colors in thin films, Newton's rings, its applications, i) for the determination of wavelength of incident light or radius of curvature of a given Plano-convex lens , ii) for the determination of refractive index of a given liquid, Applications of Interference for i) Testing of optical flatness of surfaces, ii) Thickness of thin film, iii) anti-reflection coating

Diffraction : Diffraction of waves, classes of diffraction, Fraunhofer diffraction at single slit (geometrical method), Conditions for maxima & minima, Intensity pattern due to single slit, diffraction at circular aperture, plane diffraction grating(qualitative only), Conditions for maxima & minima, Intensity pattern, Scattering of light as an application of diffraction (qualitative only).

UNIT II Sound Engineering

(8 hours)

Definitions: Velocity, frequency, wavelength, intensity, loudness (expression), timber of sound, reflection of sound, echo, reverberation, reverberation time, Sabine's formula(qualitative only), remedies over reverberation Absorption of sound, absorbent materials, conditions for good acoustics of building, Noise, its effects and remedies, Ultrasonics – Production of ultrasonics by Piezo-electric, magnetostriction oscillator, Detection of ultrasonic's, Engineering applications of ultrasonic's (Nondestructive testing, cavitations, measurement of gauge).

UNIT III Polarization & Laser

(8 hours)

Polarization: Introduction, Polarization of waves, Polarization of light, Representation of PPL, UPL & partially polarized light, Production of PPL by i) Reflection, ii) Refraction (pile of plates), iii) Selective absorption (dichroism) iv) Double refraction, Law of Malus, Huygen's theory of double refraction cases of double refraction of crystal cut with the optic axis lying in the plane of incidence & i) Parallel to surface ii) Perpendicular surface iii) Inclined to surface, retardation plates, QWP, HWP, optical activity, specific rotation (qualitative only), optically active materials, LCD (as an example of polarization)

Laser : Absorption, spontaneous emission, requirement for lasing action (stimulated emission, population inversion, metastable state, active medium, resonant cavity, pumping) characteristics of laser: - monochromaticity, coherence, directionality, brightness, various levels of laser systems with examples i) two levels laser system – semiconductor laser, ii) three level laser system :- ruby laser, iv) four level laser system :- He-Ne laser.

Applications in Industry (drilling, welding, micromachining etc), Medicine (as a surgical tool), Communication (Principle and advantages only), Information Technology (Holography- Recording and reconstruction).

UNIT IV: Solid State Physics

(8 hours)

Band theory in solids, free electron theory (qualitative) electrical conductivity in conductor and semiconductor, influence of external factors on conductivity (temperature, light and impurity), Fermi energy, density of state (qualitative), concept of effective mass, electrons and holes, Fermi-Dirac probability distribution function (effect of temperature on Fermi level with graph), Position of Fermi level in intrinsic semiconductor (with derivation) and extrinsic semiconductors, Dependence of Fermi level on temperature and doping concentration (qualitative), diffusion and drift current (qualitative), band structure of PN junction diode under i) zero bias, ii) forward bias, iii) reverse bias, Working of transistor (NPN only) on the basis of Band diagram, Hall effect (with derivation), photovoltaic effect, working of solar cell on the basis of band diagram and its applications.

UNIT V: Wave Mechanics

(8 hours)

Wave Particle duality of radiation & matter, De Broglie's concept of matter waves, expressing De Broglie wavelength in terms of kinetic energy and potential, concept and derivation of group and phase velocity, group and phase velocity of matter waves, Heisenberg's uncertainty principle, Illustration of it by electron diffraction at single slit, why an electron cannot exist in the nucleus, concept of wave function ψ and probability interpretation, Schrodinger's time independent and time dependent wave equations, application of Schrodinger's time independent and time dependent wave equations, i) Particle in 1-D rigid box (infinite potential well), Comparison of quantum mechanical and classical mechanical predictions ii) Particle in 1-D non rigid box (finite potential well- qualitative, result only), tunneling effect, example of tunneling effect in tunnel diode and scanning tunneling microscope.

UNIT VI: Superconductivity & Physics of nanoparticle

(8 hours)

Superconductivity: Introduction to Superconductivity, properties of superconductor (zero resistance, Meissner effect, critical field, persistent currents), Isotope effect, BCS theory, Type 1 & type 2 superconductor, Applications (super conducting magnets, transmission line etc.) DC & AC Josephson Effect

Physics of nanoparticle: Introduction, Nanoparticles, Properties of nanoparticles : Optical, electrical(quantum dots, quantum waves) , magnetic, structural, mechanical, Brief introduction of different methods of synthesis of nanoparticles , Synthesis of metal nano-particles by colloidal routes, Applications of nanotechnology-electronics , energy, automobiles, space & defense, medical, environmental, textile, cosmetics

List of experiments:

Conduct any eight experiments from the following

1. Newton's Ring
2. Plane diffraction grating for the determination of unknown wavelength
3. Law of Malus
4. Brewster's Law
5. Double reflection (Determination of refractive indices, identification of types of crystal)
6. Half shade polarimeter
7. Laser based experiment (beam divergence)
8. Laser based experiment (thickness of wire/determination of number of lines or cm of grating)
9. Ultrasonic interferometer for the determination of compressibility of liquid
10. Measurement of sound pressure level
11. Determination of band gap of a given semiconductor
12. Hall effect
13. Solar cell characteristics, measurement of V_{oc} , I_{sc} , fill factor
14. Temperature dependence characteristics of semiconductor laser
15. Determination of absorption coefficient of sound of given material

Text Books:

1. Engineering Physics Avadhanulu, Kshirsagar, S. Chand publications
2. Engineering Physics, Gaur, Gupta, Dhanpat Rai and Sons publications

Reference Books:-

1. Optics, Jenkins and White (Tata McGraw Hill)
2. Fundamentals of Physics, Resnick and Halliday (John Wiley and Sons)
3. Principle of Physics, Serway and Jewett (Saunders college publishing)
4. Introduction to solid state physics, Kittel C (Wiley and Sons)
5. Laser and non linear optics, B.B. Laud (Oscar publication)
6. Nano technology, Principles and Practices, Dr. S.K. Kulkarni (Capital publishing company)

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107009 – Engineering Chemistry

Teaching Scheme:

Lectures – 4 Hrs./Week

Tutorials – 2 Hr/Week

Examination Scheme:

Paper – 50 Marks(2 Hrs.)

Online – 50 Marks

Term Works: 25 Marks

Course Objective:

After competing this course students will be able to understand:

- 1) Technology involved in improving quality of water for its industrial use.
- 2) Basic concepts of electro analytical techniques that facilitate rapid and reliable measurements.
- 3) Chemical structure of polymers and its effect of on their various properties when used as engineering materials. To lay foundation for the application of polymers for specific application and composite materials.
- 4) Study of fossil fuel and derived fuel with its properties and application
- 5) An insight into nano materials aspect of modern chemistry.
- 6) The principles of chemical and electrochemical reactions causing corrosion and methods used for minimizing corrosion.

UNIT I: Water technology & Green Chemistry

(8 hours)

Water technology: Impurities in water, Hardness of water, Determination of hardness of water by EDTA, Alkalinity of water and its determination, Numerical, III effects of hard water in boiler, Boiler feed water treatment -1) Internal treatment Calogen, colloidal, conditioning, phosphate 2) External Treatment a) Zeolite process and it's numerical b) Ion exchange method, Desalination of brackish water/ purification of water by Reverse osmosis and Electrodysis

Green Chemistry: Definition, Goals of Green chemistry, Efficiency parameter, Need of green chemistry Major Uses- Traditional and green pathways of synthesis Synthesis of adipic acid, polycarbonate, indigo dye.

UNIT II Electro Analytical Technique

(8 hours)

Introduction, Types of reference electrode (Calomel electrode), indicator electrode (Glass electrode), Ion selective electrodes, half cell reaction, complete cell reaction

Conductometry: Introduction, Kohlrausch's law, conductivity cell, Measurement of conductance

Application: Conductometric titrations , acid-basetitrations ,Precipitation titrations

PH metry: Preparation of Buffers, standardization of pH meter, mixture of acid Vs strong base titration, differential plots

Potentiometry : Introduction, potentiometric Titration, differential plots, Application- redox titration, Fe/Ce titration,

Uv/Visible Spectroscopy: interaction of radiation with matter, Beer Lambert's law, chromophore and auxochrome, types of electronic transitions, Instrumentation and principle, Block diagram, single and double beam spectrophotometer, Application of uv-visible spectroscopy.

UNIT III Synthetic organic Polymers

(8 hours)

Introduction, functionality of monomers, polymerization, free radical mechanism and step growth polymerization Concept of significance of- Average molecular weight, crystallinity in polymers, T_m and T_g . Thermoplastic and Thermosetting polymers. Compounding of Plastic, Techniques of polymerization, preparation, properties and Engineering application of: Polyethylene (LDPE and HDPE) and Epoxy resin, Elastomers-Natural rubber- Processing and Vulcanization by Sulphur. Synthetic rubber-SBR

Speciality Polymers: Engineering thermoplastic- Polycarbonate, Biodegradable polymers-poly (hydroxybutarate-hydroxyvalanate), conducting polymers-polyacetylene, electro luminiscent polymers, polyphenylenevinylene, Liquid crystalline polymers-Kevlar, polymer composites- Fibre reinforced plastic (FRP)

UNIT IV Fuel and Combustion

(8 hours)

Fossil fuels: Definition, Calorific values, Determination - Bomb calorimeter, Boy's gas calorimeter, Numerical. Solid fuel- Coal- proximate and ultimate analysis. Numericals. Liquid fuels- Petroleum-Composition and refining. Octane number of Petrol, Cetanenumero of Diesel, Power alcohol, Bio-diesel.

Gaseous fuel-Composition, properties and application of NG, CNG, and LPG Combustion: Chemical reaction Calculations for air required Numericals.

Fuel Cell definition, advantages and limitations, phosphoric acid fuel cell polymer electrolyte membrane fuel cell

UNIT V Chemistry of Hydrogen and Carbon

(8 hours)

Chemistry of Hydrogen: The elements- isotopes- importance. Methods of preparation-

1) Laboratory- from aqueous acid and alkali. 2) Industrial- Steam reforming and methane and coke, electrolysis of water. 3) From Solar energy (water splitting). Storage- chemical (Sodium alanates), physical (carbon materials), difficulties in storage and transportation. Compounds of hydrogen, methods of preparations and applications- a) Molecular hydrides - hydrocarbons, silane Germane, ammonia. b) Saline hydrides-LiH, NaH. Applications of Hydrogen, Hydrogen as a future fuel.

Chemistry of Carbon: Position in periodic table, occurrence, isotopes. Allotropes crystalline and amorphous- occurrence, structure based on bonding and applications in detail

UNIT VI Corrosion Science

(8 hours)

Introduction, Types of corrosion, Dry corrosion- mechanism, Pilling-bedworth rule, Wet corrosion, mechanism, galvanic corrosion, concentration cell corrosion, factor affecting on corrosion- Nature of metal, nature of environment, Methods of corrosion control, Pourbaix diagram, Cathodic protection, anodic protection, Use of Inhibitors, protective coatings: Surface preparation, a) Metallic coatings: Types of coating, methods of application (hot dipping, cladding, electroplating & cementation), Electroless coating b) Non metallic coating: chemical conversion coatings, powder coatings.

Text Books:

1. Engineering Chemistry by O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd.
2. A Text books of Engineering Chemistry by Dr. S.S. Dara, Dr. S.S. Umare, S. Chand & Company Ltd.

Reference Books:

1. Engineering Chemistry, Wiley India Pvt. Ltd, First edition 2011
2. Inorganic Chemistry 5e, by Shriver and Atkins, Oxford University Press.
3. Hydrogen Fuel- Production transport and storage, Ram Gupta, CRC Press.
4. Basic concept of Analytical Chemistry, 2e, by S.M. Khopkar, New Age International Publishers.

Term Work: Any Eight Experiments:

1. Determination of Hardness of water by EDTA method.
2. Determination of alkalinity of water.
3. Determination of Dissociation constant of weak acid using pH meter.
4. To determine maximum wavelength of absorption of CuSO_4 / FeSO_4 , verify Beers law and find unknown concentration in given sample.
5. Titration of mixture of weak acid and strong acid with strong base using conductometer.
6. Preparation of polystyrene and phenol-formaldehyde/urea-formaldehyde resin and its characterization.
7. Determination of molecular weight/radius of macromolecule polystyrene/polyvinyl alcohol by viscosity measurements.
8. Proximate analysis of Coal.
9. Preparation of Nickel coating on copper metal using both methods, Electroplating & Electroless plating.
10. Determination of electrochemical equivalent (ECE) of copper.

Term work based on performance and regular checking of the experiments.

Laboratory Manual:

1. Vogel's Text book of Quantitative Chemical Analysis, 6e, by J. Mendham, R.C. Denney, J.D. Barnes, M.J.K. Thomas, Pearson Education Ltd.
2. Applied Chemistry Theory and Practice, 2e, by O.P. Virmani and A.K. Narula, New age International (P) Ltd.

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107003 – FPL-I

Teaching Scheme:

Lectures – 4 Hrs./Week

Examination Scheme:

Paper – 50 Marks(2 Hrs)

Online – 50 Marks

Course Objectives:

To acquire the fundamental principles, concepts and constructs of computer programming

- To develop competency for the design, coding and debugging
- To build the programming skills using 'C' to solve real world problems

Course Outcomes:

On completion of the course, learner will be able to–

Use modular programming approach in diversified problem domains

- Apply programming logic to solve real world problems
- Decide effectiveness of computer based solutions

Course Contents

Unit I

(02 Hrs)

Introduction to Computer, Block diagram of Computer, hardware, software. Introduction to System Software- Operating System, Editor, Compiler, Assembler, Linker, Loader. Problem solving using computers, Introduction to computer programming, Introduction to program planning tools- algorithm, flowcharts, pseudo codes, Software Development Life Cycle, Introduction to open source operating systems and programming languages, Introduction to program development environments: BOSS and GCC.

Unit II

(03 Hrs)

Programming language 'C': Types of programming languages-machine-level, assembly, high-level languages. Features of C, basic concepts, structure of a C program, declarations, constants, variables, data types, Operators and expressions, conditional expressions. Operators- assignment, arithmetic, relational, logical, increment and decrement, precedence and associativity of operators, type conversions, Input and Output functions- scan f and print f.

Unit III

(03 Hrs)

Decision Control Structures in 'C': if, if-else, nested if-else, cascaded if-else and switch statement, loop control structures: for, while, do-while loops, break and continue. **Pointers in 'C':** Concept, address operators, pointer variable declaration, pointer assignment, pointer initialization,

Unit IV

(04 Hrs)

Arrays in 'C': Concept, declaration, initialization, accessing elements, operations, multidimensional array

Functions in 'C': definition, function call, call by value and call by reference, return statement, standard library functions and user defined functions, passing array as function parameter.

Strings in 'C': Concept, declaration, initialization and string manipulation functions, library functions.

Text Books:

1. Donald E. Knuth, "The Art of Computer Programming", Vols. 1, Addison-Wesley, ISBN- 13: 978-0201485417, ISBN-10: 0201485419
2. T. E. Bailey, "Program design with pseudo code", Brooks/Cole Publisher, ISBN-10: 0534055745, ISBN-13: 978-0534055745
3. Brian W. Kernighan, Dennis M. Ritchie, "The C Programming Language", Prentice Hall, ISBN 0131103628, Second Edition

Reference Books:

1. Lamey Robert, "Logical problem solving", Prentice Hall, ISBN: 9780130618825
2. Herbert Schildt, "C/C++ Programmer's Reference", McGraw-Hill, ISBN-13: 978- 0072127065, ISBN-10: 0072127066
3. Henry Mullish, Herbert L. Cooper, "The Spirit of C", Thomson Learning, ISBN 0314285008
4. Carlo Ghezzi, Mehdi Jazayeri, "Programming Language Concepts", John Wiley and Sons, ISBN-0471104264, Third Edition
5. Subrata Saha and Subhodip M., "Basic Computation and Programming with C", Cambridge University of Press, India, ISBN:9781316601853

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include prologue (about University/program/ institute/ department/foreword/ preface etc), University syllabus, conduction & Assessment guidelines, topics under consideration concept, objectives, outcomes, set of typical applications/assignments/ guidelines, references etc. The feedback seeking sheet for enhancement of instructor's manual may be added as annexure.

Guidelines for Student Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of prologue, Certificate, table of contents, and write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade and assessor's sign, Theory- Concept, algorithm, flowchart, test cases, conclusion/analysis, program code and exercises -MCQs, assignments, quizzes etc and references).

Guidelines for Assessment

Each assignment will be assigned grade based on parameters with appropriate weightage. Suggested parameters include- timely completion, performance, innovation, punctuality and neatness

Guidelines for Laboratory Conduction

The instructor is expected to frame the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. The assignment framing policy need to address the average students and inclusive of an element to attract and promote the intelligent students. The instructor may set multiple sets of assignments and distribute among batches of students. It is appreciated if the assignments are based on real world problems/applications. Encourage students for appropriate use of Hungarian notation, Indentation and comments. Use of open source software is encouraged.

In addition to these, instructor may assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus.

Set of suggested assignment list is provided in 4 groups- A, B, C, D. Each student must perform at least 8 assignments as –study assignment, at least 3 from group A, 2 from group B, 1 from group C, 1 from group D.

Suggested List of Laboratory Assignments

Study Assignment

Draw block diagram of typical computer system. Describe functions of each component. Study computer available in your laboratory and write its configuration. Install Ubuntu. Define terms Operating System, Application Software, System Software, Compiler, Assembler, Linker, Loader, Editor, Algorithm, Flowchart, Computer Programming, Programming Language and Software Development Life Cycle.

Group A

1. Write a C program to compute the roots of given quadratic equation for non-zero coefficients.
2. Write a C program to calculate the sum of all positive even numbers and the sum of all negative odd numbers from the set of input numbers
3. A customer is offered 15% discount on the printed price of a laptop. The customer has to pay 7% sales tax on the remaining amount. Write a program in C to calculate the amount to be paid by the customer,
4. Write a C program to accept the length of three sides of a triangle and to test and print the type of triangle as equilateral, isosceles or right angled or none
5. Write a C program to accept cost price and sales price of an item and calculate the profit percentage or loss percentage.
6. Write a C program to find out if the number is a Pythagoras triplet. Ex $a^2=b^2+c^2$
7. Write a C program to implement Euclid's algorithm to find the GCD and LCM of the given two integers.
8. Write a C program to check whether input number is Prime or not.
9. Write a C program to check if (any one)
 - a) The number is perfect number or not. Hint: If sum of the factors (including 1 and excluding the number itself) is same as that of original number then the number is said to be perfect number.
 - b) The number is 'neon' number or not. Hint: If the sum of the digits of square of the number is the number itself, then the number is said to be neon. For example- 9, square is 81 and $8+1=9$.
 - c) The number is 'Armstrong' number or not. Hint: If sum of cubes of digits is equal to original number then the number is said to be Armstrong. For example- Number 153 is Armstrong number $(1)^3 + (5)^3 + (3)^3 = 153$
10. Write a C program to separate digits of input 4 digit integer, separate & display its digits.
11. Write a C program to generate first 20 Fibonacci numbers.

12. Write a C program to check if the entered 3 digit number is twisted prime or not. Hint: If the number obtained after reversing the number is also a prime then the number is twisted prime. Example 167, twisted 761, so 167 is twisted prime.
13. Write a C program to calculate the sum of all numbers from 1 to 100 that are divisible by 4

Group B

14. Write a C program to store the N data samples in an array and calculate mean, mode and median
15. Write a C program to store N numbers in an array and display only those numbers that are perfect squares
16. Write a C program to store N numbers in an array and search particular number
17. Write a C program to store N numbers in an array and display the square of each number in the array
18. Write a C program to sort the roll numbers of present students. Mark the attendance of the present students roll numbers randomly in an array.
19. Write a C program to store N numbers in an array and reverse the elements of the array
20. Write a C program to store Chemistry subject test marks of N students in an array and find the Minimum and Maximum score. Test maximum marks
20. Your program should accept marks ranging between 0 to 20 only.
21. Write a C program to store N numbers in an array and compute the sum of all even and odd numbers in an array.

Group C

22. Write a C program to accept a string and to display the following:
 - (a) Total number of characters in the string
 - (b) Total number of vowels in the string
 - (c) Total number of occurrence of particular character in the string
23. Write a C program to accept a string and change the case of each character of the string. Example "THIS Is a C Program" changes to "this is A c PROGRAM"
24. Write a C program to accept a string and print the string in alphabetical order. Example COMPUTER will be CEMOPRTU
25. Write a C program to accept a string with complete name of the employee and display the string eliminating the middle word. Example "Mayor Kumar Kulkarni" would be displayed as "Mayur Kulkarni"
26. Write a C program that will check whether given string is palindrome or not.
27. Write a C program that will check whether one string is substring of other string or not.
28. Write a C program to enter a string. Frame a word by joining all the first characters of the words in the string. Example- input "Just Allow Me" will give output as "JAM"
29. Write a C program to accept a string and replace all the vowels in the string with *.

Group D

30. A class teacher wants to keep record of 10 students in the class along with the names and marks obtained in 5 subjects. Write a C program with function that displays)
 - a) Name of the student with highest marks in a particular subject
 - b) Overall percentage result of the class
 - c) Total number of passing students in the class

- d) Total number of students failing in one subject
 - e) Total number of distinctions in the class
30. Write a C program to carry out following operations on strings using library functions
- a) To concatenate a string S2 to string S1
 - b) To find the length of a given string
 - c) To compare two strings S1 and S2
 - d) To copy a string S2 to another string S1
31. Write a C program to compute the factorial of the given positive integer using function
32. Write a C program with functions to compute addition and subtraction of two matrices
33. Write a C program that stores 12 city names in a single dimensional array. Write function to display only those words that begin with a consonant and end with a vowel example Begaluru, Mumbai
34. A mall has 5 stores and 3 departments. Write a C program with function to find the monthly sale of a particular store or department and the total monthly sale of each store and each department.
35. Write a C program that declares and initializes a double, an int and a char variable and a pointer to each of the three variables and one double pointer to store pointer address. Your program should print the address of, and value stored in, and the memory size (in bytes) of each of seven variables.
36. Write a C program with function to swap values of two elements (call by reference)

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BASIC ELECTRICAL ENGINEERING (103004)

Teaching Scheme:

Lectures – 3 Hrs./Week

Practicals - 2 Hrs./Week

Examination Scheme:

Paper – 50 Marks(2 Hrs)

Online – 50 Marks

Term Work – 25 Marks

Unit I : Elementary Concept

(6 hours)

Prerequisites: Concept of emf, potential difference, current and resistance

Ohm's law ,effect of temperature on resistance, resistance temperature coefficient,insulation resistance, S.I.unit of work, power & energy, Conversion of energy from one to another electrical,mechanical & thermal systems

Unit II : Electromagnetism

(6 hours)

Magnetic effect of an electric current, cross & dot conventions, right hand thumb rule & cork screw rule, Nature of magnetic field of long straight conductor, solenoid & toroid, Concept of m.m.f, flux, flux density, reluctance, permeability & field strength their units & relationships, 4 Simple series & parallel magnetic circuits, Comparison of electrical & magnetic circuit, force on carrying conductors placed in magnetic field, 6 force on carrying conductors placed in magnetic field, Fleming Left hand rule
Faraday's law of electromagnetic induction, Fleming right hand rule, statically & dynamically induced e.m.f, self & mutual inductance, coefficient of coupling, energy stored in magnetic field.

Unit III: Single phase transformers & Electrostatics

(6 hours)

Single phase transformer: Construction ,Principle of working, e.m.f equation, Voltage & current ratios, losses, Definition of regulation & efficiency, determination of these by direct loading method, descriptive treatment of autotransformer, Electrostatics : Electrostatic field ,electric flux density, Electric field strength, absolute permittivity & Capacitance, Capacitor ,Composite dielectric capacitors ,capacitor in series & parallel, Energy stored in capacitors, charging & discharging of capacitors & time constant

Unit IV: AC fundamentals

(6 hours)

sinusoidal voltages & current ,their mathematical & graphical representation, Concept of cycle , period, frequency, instantaneous, peak(maximum),average & r.m.s. values, peak factor & form factor, Phase difference ,lagging , leading & in phase quantities & phasor representation, Rectangular and polar representation of phasors.
Study of AC circuits consisting of pure resistance, pure inductance, pure capacitance & corresponding voltage-current phasor diagrams, Voltage-current & power waveform.

Unit V: Single phase A.C. circuits & Polyphase A.C. circuits

(6 hours)

A) Single phase A.C. Circuits: study no series & parallel R-L, R-C, R-L-C circuits, concept of impedance, admittance in case of above combination, wave form & relevant voltage-current phasor diagram, Concept of active ,reactive apparent, complex power & power factor, Resonance in series RLC circuit
B) Polyphase A.C. circuits: Concept of three phase supply & phase sequence, balanced & Unbalanced load, Voltages , current & power relations in three phase balanced star connected loads & delta connected loads along with phasor diagram

Unit VI: D.C. circuits

(6 hours)

Classification of electrical networks, Kirchhoff's laws & their applications for network solution using loop analysis, Simplification of networks using series & parallel combinations & star-delta conversions, Energy sources-ideal & practical voltage & current sources, Superposition theorem, Thevenin's theorem.

Term Work

The term work shall consist of a record minimum eight exercises and experiments, out of which group A is compulsory and any five experiments from group B should be conducted.

Group A

1. Writing Exercise:

- a) Study of various writing components (wire, switches, fuses, sockets, plugs, lamp, holders, etc.their uses and ratings)
 - b) Control of two lamps from two switches (looping system).
 - c) Staircase wiring.
 - d) Use of megger for insulation test and continuity test of wiring installation and machines.
2. a) Study of fluorescent tube circuit
b) Study of compact fluorescent Lamp (CFL) and Light Emitting Diode (LED) lamps. C) Study of HID lamps such as mercury vapour lamp/sodium vapour lamp.
3. a) Study of safety precautions while working on electric installation and necessity of earthing.
b) Introduction to energy conservation and simple techniques to achieve it.

Group B

4. Determination of temperature rise of medium resistance such as shunt field winding.
5. Verification of-a) Kirchhoff's laws and b) superposition theorem.
6. Verification of Thevenin's Theorem.
7. Study of R-L-C series resonance circuit.
8. Verification of voltage and current relations in three phase balanced star and delta connected loads.
9. Determination of performance of single phase transformer by direct loading for
 - a) Voltage and current ratios and
 - b) Efficiency and regulations.

Text Books:

1. Principles of Electrical Engineering by Del. Toro, PHI Learning Pvt. Ltd.
2. Theory and Problems of Basic Electrical Engineering I.J. Nagrath and Kothari, PHI Learning Pvt. Ltd.
3. Basic Electrical Engineering V. K. Mehta, S. Chand and Company Ltd. New Delhi

Reference Books:

1. Electrical Technology-H.cotton, C.B.S. Publications
2. A Textbook of Electrical Technology: Volume- I-B.L. Theraja, S.Chand and company Ltd. New Delhi
3. Basic Electrical & Electronics Engineering by S K Bhattacharya, Pearson.
4. Basic Electrical Engineering by D.C. Kulshershta, Tata McGraw Hill.
5. Electrical Technology-Edward Hughes, Pearson.

BASIC ELECTRICAL ENGINEERING

COURSE OBJECTIVES:-

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

1. Understand and demonstrate the fundamentals of electromagnetism, single phase transformers, electrostatics, and A.C. and D.C. circuits.
2. Apply concept of electromagnetism for the working of transformer.
3. Differentiate between electrical and magnetic circuits.
4. Compare between D.C and A.C circuits.
5. Draw the phasor diagrams for single phase and three phase A.C circuits.
6. Provide solution for the network by applying various laws and theorems.
7. Obtain solutions for electrical networks analytically and verify these results experimentally in laboratory.
8. Demonstrate the awareness on social issues like conservation of electrical energy, electrical safety etc.
9. Develop abilities to excel in competitive exams required for post graduation and research.

UNIVERSITY OF PUNE

BASIC ELECTRONICS ENGINEERING (103012)

Teaching Scheme:

Lectures – 3 Hrs./Week
Practicals - 2 Hrs./Week

Examination Scheme:

Paper – 50 Marks(2 Hrs)
Online – 50 Marks
Term Work – 25 Marks

Course Objectives:

This course is designed to give exposure and knowledge of Basic Electronics component and circuits to the first year Engineering of all branches. The course begins with introduction of basic diodes and transistors based circuits, to the OP-AMP based simple linear applications, power supply ICs, Digital logic circuit and concludes with introduction to industrial electronics and electronics communication.

- 1) To give knowledge of some basic electronic components and its circuit
- 2) To introduce basics of diode and transistor circuits.
- 3) To understand working of some IC based circuits.
- 4) To study logic gates and their uses in digital circuit
- 5) To expose the students to working of some power electronic devices, transducers and application of transducers.
- 6) To introduce basic aspect of electronic communication system.
- 7) The associated Laboratory Practical course is designed to understand working of various Electronic circuits. The students will understand how to use the basic test and measuring instruments to test the circuits.

Unit I : Diodes Circuit

(6 hours)

Half wave rectifiers, Full wave rectifiers, Power supply filters and capacitor filters, Clippers and clampers circuits, Voltage multipliers, Zener diode and its applications, LED and Photodiodes

Unit II: Bipolar junction transistor circuits

(6 hours)

BJT structure and its operation with normal biasing, Transistor characteristics and parameters, DC operating points, Transistor as an amplifier, Transistor as a switch, Type MOSFET

Unit III: Linear Integrated circuits

(6 hours)

Introduction to Operational amplifier, Opamp input modes and parameters, negative feedback, Opamp with negative feedback, Comparators, Summing amplifier, Integrators and Differentiators, IC 555 as an oscillator, Voltage regulation, IC Voltage Regulators(Three Pin)

Unit IV: Digital Electronics

(6 hours)

Introduction, Digital signals, Basic digital circuits AND ,OR,NOT,NAND,NOR,EX-OR, Boolean Algebra, Example of IC gates, Standard representation for logic function, Half adder, full adder, Multiplexer, Demultiplexer, Flip flop, Shift Registers , counters , Block diagram of Microprocessor and Microcontroller and their application.

Unit V: Power devices and transducers

(7hours)

Power devices: Basics of 4- layer devices –Silicon Controlled Rectifier (SCR), DIAC, TRIAC

Transducers: Introduction, Electrical Transducer, Selecting a transducer, Resistive transducer, Thermistor,

Inductive Transducer, Linear Variable Differential Transducer (LVDT), Load cell, phototransistor, temperature Transducer, Flow measurements (Mechanical Transducer), Application of Transducer: Digital Thermometer, Block diagram of weighing machine.

Unit VI: Electronics Communication

(7 hours)

Importance of communication system, Elements of communication system, Bandwidth requirement, IEEE frequency spectrum, Transmission media, Wired (Twisted Pair, Coaxial & optical Fiber Cable) and wireless, need for Modulation, Analog Modulation schemes AM and FM, Mobile Communication System, Cellular Concept, Simple block diagram of GSM System

Text Books:

- 1) Floyd Electronics Devices and circuits, Pearson Education India (for unit I,II,III)
- 2) R.P. Jain Modern Digital Electronics third edition, 12th reprint TMH publication, 2007 (For Unit IV)
- 3) H.S. Kalasi Electronics Instrumentation, Tata McGraw Hill (For Unit V)
- 4) Frenzel, Communication Electronics –Principle & Application, Tata McGraw Hill (For Unit VI)

Reference Books:

- 1) Jacob Milman, C. Chalkias, Chetan Parikh, "Integrated Electronics", Tata McGraw Hill
- 2) Paul Horowitz, Winfield Hill, "Art of Electronics", Cambridge Univ Press Low Price Edition.
- 3) Debashish De, Kamakhya Prasad Ghatak, "Basic Electronics", Pearson Education.
- 4) J R Cogdell, "Foundation of Electronics", Pearson Education. 5) Santiram Kal, "Basic Electronics Devices circuits and IT Fundamentals"

List of Practical:

1. Study of Different Electronics components.

- a. Resistors (Carbon Film, Metal Film, Wire Wound, Variable)
- b. Capacitor (Electrolytic, Mica, Ceramic, Variable)
- c. Inductor Transformers
- d. Connectors, Switches

2) Study of different electronic measuring instruments.

- a. To study different controls of DMM and measurement of parameter like AC and DC voltage current.
- b. To study controls of CRO, Measurements of frequency, phase, AC & DC Voltages.
- c. To study various controls of a signal generator

3) Study of Regulated power supply.

For a given regulated power supply circuit with bridge rectifier, capacity filter and three terminal regulator:

- a. Identified pins of rectifier diode (such as 1N4001) and study of its data sheet specification.
- b. Identify pins of three pin regulator (such as LM 78XX or LM 79XX) and study of its data sheet specification
- c. to measure voltage and observe waveforms at transformer secondary, output of bridge rectifier, output of Regulator.

4) Study of Single Stage BJT Common Emitter amplifier circuit.

For a given BJT CE Amplifier circuit

- a. Identify pins of a BJT (such as BC 547) and study of its data sheet specifications.
- b. To measure voltage and observe waveforms at input and output terminals of single stage BJT Common Emitter amplifier circuit.
- c. Calculate voltage gain of the amplifier.

5) Study of Op-amp based amplifiers circuits.

- a. Identify pins of an Opamp (such as LM 741)
- b. Implement given voltage equation for 2 inputs with Opamp based Summing and Difference amplifier (such as $V_0=2V_1+3V_2$ and $V_0=4V_1-V_2$)

6) Study of IC555 Timer circuit.

- a. Identify pins of IC 555 Timer
- b. Observe output waveform and measure frequency of output wave for IC 555 Timer used in Astable mode.

7) Study of digital circuit.

- a. Identify pins of digital logic gates ICs such AND, OR, NOT, Ex-OR, NAND.
- b. Implement half and full Adder circuit with basic logic gate ICs

8) Build and test simple application circuit

Build and test any circuit using IC such as Opamp LM741 IC 555 Timer, LM78XX/79XX or any digital logic gate IC.

UNIVERSITY OF PUNE

BASIC Civil And Environmental Engineering (103005)

Teaching Scheme:

Lectures – 3 Hrs./Week
Practicals - 2 Hrs./Week

Examination Scheme:

Paper – 50 Marks(2 Hrs)
Online – 50 Marks
Term Work – 25 Marks

Section I

Unit I : Introduction to Civil Engineering

(6 hours)

- a) Basic Areas in Civil Engineering Surveying, Construction Engineering, Transportation Engineering, Fluid Mechanics, Transportation Engineering, Irrigation Engineering, Project Management, Structural Engineering, Geotechnical and Foundation Engineering, Environmental Engineering, Quantity Surveying, Town Planning Earthquake Engineering, Infrastructure Development
- b) Role of Civil Engineer in the construction of buildings, dams, expressways and infrastructure projects for 21st century. Importance of interdisciplinary approach in Engineering

Unit II : Materials and Construction

(6 hours)

basic materials for Construction - cement, bricks, stone, natural and artificial sand, Reinforcing Steel-Mild, Tor and High Tensile Steel. Concrete types - PCC, RCC Prestressed and Precast. Introduction to smart materials. Recycling of materials.

Substructure- Definition and Function of Foundations, (Only concepts of settlement and Bearing capacity of soils.) Types of shallow foundations, (only concept of friction and end bearing pile).

Superstructure- Types of loads: - DL and LL, wind loads, earthquake considerations. Types of Construction- Load Bearing, Framed, Composite. Fundamental requirements of masonry.

Introduction to automation in construction- Concept, need, examples related to different civil engineering projects.

Unit III : Uses of maps and field surveys

(6 hours)

- a) Principles of survey. Various types of maps and their uses. Modern survey methods using levels, Theodolite, EDM, lasers, total station and GPS. Introduction to digital mapping. Measuring areas from maps using digital planimeter.
- B) Simple and differential levelling for setting out various benchmarks, determining the elevations of different points and preparation of contour maps. Introduction to GIS Software and its application areas.

Section II

Unit IV: Ecology and Eco System

(6 hours)

- a) Concept of Environment: biotic and abiotic factors. Impact of the human behavior and the technological advancements on the environment. Need for conserving natural resources and preserving the environment. Engineer's role in achieving sustainable development. Environmental Impact Assessment (EIA).
- b) Introduction to solid waste management: electronic wastes and its Disposal.

Unit V: Planning for the Built Environment

(6 hours)

- a) Concept of an integrated build Environment: natural and manmade. Principles of planning, viz. Aspect, Prospect, Roominess, Grouping, Privacy, Circulation, Sanitation, Orientation, Economy.
- B) Use of various eco-friendly materials in construction. Concept of green buildings.
- C) Role of by-laws in regulating the environment, Concept of build up area, carpet area, plinth area, plot area, FSI.

Unit VI: Energy and Environmental Pollution

(6 hours)

- a) Types of energy: conventional and non-conventional. Need for harnessing alternative energies to meet the increased demand. Methods of harnessing energies.
- b) Sources, causes, effects and remedial measures associated with
 1. Air Pollution
 2. Water treatment
 3. Noise Pollution
 4. Land Pollution

Term Work:

Any 8 practical exercise from those given below should be carried out, record to be submitted in the field book and file which will form a part of term work.

1. Study of any 4 types of maps and writing their uses.
2. Exercise on use of dumpy level and laser level.
3. Measurement of area of irregular figures by digital planimeter
4. Drawing of plan elevation and section for a residential building, single storeyed, framed/load bearing structure. Preparing schedule of opening [on half imperial sheet].
5. Determination of coordination of a travels using global positioning system.
6. Measurement of distance by EDM and comparing it with the distance measure using tape.
7. Visit to a construction site for studying the various constructions material used, type of structure, type of foundation and components of superstructure-submission of visit report.
8. Demonstration of use of any four civil Engineering software.
9. Making a poster in a group of 4 students, related to energy/environment.
10. Presentation in a group of 4 students, any case study related to energy/environment.

Text Books:

- 1) Surveying and leveling by Kanetkar, Kulkarni-Pune Vidyarthi Prakashan.
- 2) Build Planning and Build environment by Shah, Kale, Patki-Tata McGraw Hill.
- 3) Civil Engineering materials by Dr. S.V. Deodhar-Khanna Publications

Reference Books:

- 1) Basic Civil Engineering by M.S. Palanichamy Tata Mc Graw Hill publishing Co.Ltd.N.D.
- 2) Basic Civil Engineering by Shatheesh Gopi-Pearson.
- 3) Elements of Civil Engineering and Engg. Mech. By R.V.Raikar-PHI learning Pvt. Ltd.

UNIVERSITY OF PUNE

Engineering Graphics -I (103006)

Teaching Scheme:

Lectures – 3 Hrs./Week
Practicals - 2 Hrs./Week

Examination Scheme:

Offline Test I – 25 Marks(2 Hrs)
Offline Test II – 25 Marks(2 Hrs)
Theory paper – 50 Marks

Course Objective:

1. To develop imagination of physical objects to be represented on paper for Engineering Communication.
2. To develop the manual drawing skill, drawing interpretation Skill.
3. To develop the physical realisation of the dimension of the objects.

Unit I : Fundamentals of Engineering Drawing

(7 hours)

Introduction to Drawing Instruments & their uses, Engineering Lettering, Drawing Sheet - Layout of drawing sheets, sizes of drawing sheets, Line - Types of lines and their applications in Mechanical Engineering Drawing, Dimensioning – Dimensioning terminology and method of execution, Placing of dimensions, General rules for dimensioning, Method of dimensioning: Linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

Projections of Points: Theory of Projections (Reference Planes and Auxiliary Planes, First and Third Angle Method of projections), Projections of point only in First & Third quadrant with all possible positions

Projections of Lines: [First Angle Method of projections] Projections of a line inclined to horizontal plane, frontal plane and both i.e. oblique lines, on reference planes or on auxiliary planes, locate the true length of a line and its traces

Unit II : Projections of planes

(6 hours)

Projections of plane on reference planes or on auxiliary planes, [First Angle Method of projections only] Projections of plane [Triangle- all cases Quadrilateral, Pentagon, Hexagon and circle] by reference planes and auxiliary plane methods, Plane inclined to horizontal reference plane, frontal reference plane and oblique plane, True shape of a Plane, Angles made by the plane with Principle reference planes. [*Note: No combination of planes & no HT, VT of plane*].

Unit III : Projections of Solids

(6 hours)

Introduction to Solids, Types of Solids, Projections of Solids resting in HP only, inclined to one & both reference plane, Projection of Solids (Tetrahedron, Cube, Prisms, Pyramid with maximum six sided base)

Unit IV : Engineering Curves

(6 hours)

Conic section – Ellipse, Parabola, Hyperbola by Focus-diretrix, Ellipse, Parabola by rectangle method, Rectangular Hyperbola, Helix of a Cylinder, Involutés of a circle, Cycloid, Archemidian Spiral

Development of Solids : Development of prism (maximum six sides) , Development of cone

Unit V : Orthographic views

(6 hours)

Orthographic projections of given pictorial view by First Angle Method of Projections only, Study of Types of sections, Sectional orthographic projections

Unit VI : Isometric projections

(6 hours)

Introduction to Isometric View with the example of Cube, Isometric axes, scale, Isometric projections and Isometric views Construction of isometric, non-isometric Lines, Angles, Circles, Sphere, Arc etc. Drawing isometric views of simple solids and objects Dimensioning - only Length, Width & Height of Isometric Views

Term Work:

The following 5 sheets to be drawn based on the above topics. All these sheets should be drawn on A2 size (594X420mm) (Half Imperial) drawing sheets only.

1. Projection of lines/plane (minimum Two problems each)
2. Projection of solid (minimum Two problems)
3. Engg. Curves (minimum four problems)
4. Development of solids (minimum Two problems)
5. Orthographic projection (minimum Two problems) 5. Isometric projections (minimum two problems)

Text Books:

1. N.D.Bhatt and V.M. Panchal. Engineering drawing, Plane and Solid Geometry, Charotar Publication House, Anand, Gujrat, India.
2. Dhananjay A. Jolhe, Engg. Drawing with an Introduction to Auto CAD, Tata McGraw Hill publishing Co.Ltd. New Delhi, India.
3. Basant Agarwal and C. N. Agarwal Engg. Drawing, ata McGraw Hill Publication Co. Ltd. New Delhi, India.
4. K.L.Narayana and P.L.Kannainh, Text Books of Engg. Drawing, second edition Scitech publication India Pvt. Ltd. Chennai, 2011.
5. K.C. John, Engg. Graphics for degree, PHI learning Pvt.Ltd. New Delhi, 2009.

Reference Books:

1. W.J.Luzadder, fundamental of Engineering drawing, Prentice Hall of India.
2. Basudeb Bhattacharya, Machine drawing includes AutoCAD Supplements, Oxford University Press, India.
3. French and Vierek, Graphic Science, Mc-Graw Hill International.
4. K.Venugopal Engg. Drawing and Graphics, New age Publication.
5. R.K.Dhawan, Atextbooks of Engg. Drawing, S.Chand Company Ltd. New Delhi, India
6. N.B. Shaha and B.C.Rana Engg. Drawing, Pearson education.
7. C. Jensen J.D. Helsel and D.R.Short, Engg. Drawing and design, Tata McGraw Hill Education Pvt. Ltd, New Delhi, 2012.
8. T. Jeyapooan, Engg. Drawing and graphics using AutoCAD, Vikas publication House Pvt.Ltd. New Delhi, 2011.

UNIVERSITY OF PUNE

First Year Engineering (2012 Course)

107008 – Engineering Mathematics II

Teaching Scheme:

Lectures – 4 Hrs./Week

Examination Scheme:

Paper – 50 Marks(2 Hrs)

Online – 50 Marks

Course Objectives:

After completing this course student will have adequate background to understand the concept of

- 1) Modeling of various physical systems such as Newton's law of cooling L-C-R circuits, rectilinear motion, mass spring system, heat transfer, etc.
- 2) Design and analysis of continuous and discrete system, where knowledge of Fourier series and harmonic analysis is required
- 3) Advanced techniques to evaluate integrals
- 4) Measurement of arc lengths of various curves
- 5) Sphere, cone and cylinder that arise in vector calculus, electromagnetic field theory, CAD CAM, computer graphics, etc.
- 6) Multiple integrals which are used in calculating areas, volumes, mean and RMS values, mass, moment of inertia and centre of gravity.

UNIT I:

(9 hours)

Differential equation (DE): Definition, order and degree of DE, formation of DE, solution of variable separable DE, exact DE, linear DE and reducible to these types

UNIT II:

(9 hours)

Application of DE: application of DE to orthogonal trajectories, Newton's law of cooling, Kirchhoff's law of Electrical Circuits, Motion under Gravity, Rectilinear motion, Simple Harmonic Motion, One-Dimensional, Conduction of Heat, Chemical Problems

UNIT III:

(9 hours)

Fourier series: Definition, Dirichlet's conditions, Full Range Fourier Series, Half Range Fourier Series, Harmonic Analysis and application to Problem in Engineering

Integral calculus: Reduction Formulae, Beta- and Gamma Function

UNIT IV:

(9 hours)

Integral calculus: Differentiation under the integral sign, error functions

Curve tracing: tracing of curves, Cartesian, polar parametric curves, rectification curves

UNIT V:**(9 hours)**

Solid geometry: Cartesian spherical polar and cylindrical coordinate system sphere, cone and cylinder

UNIT VI:**(9 hours)**

Multiple integrals and their applications: Double and Triple integrations, applications to area, volume, mean and route mean, square values, mass, center of gravity and moment of inertia

Text Books:

1. Advanced Engineering Mathematics, 7e, by Peter V. O'Neil (Thomson learning)
2. Higher Engineering Mathematics by B. S. Grewal (Khanna publication, Delhi)

Reference Books:

1. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.)
2. Advanced Engineering Mathematics, Wylie C. R. and Barrett L. C. (Mcgraw-Hill, Inc.)
3. Higher Engineering Mathematics by B. V. Ramana (Tata Mcgraw-Hill)
4. Advanced Engineering Mathematics, 2e, by M. B. Greenberg (Pearson Education)

UNIVERSITY OF PUNE
First Year Engineering (2012 Course)
1070010 – FPL-II

Teaching Scheme:

Lectures – 4 Hrs./Week

Examination Scheme:

Paper – 50 Marks(2 Hrs)

Online – 50 Marks

Course Objectives:

To develop competency for the logic, design, coding and debugging

- To acquire fundamental knowledge of Object Oriented Programming
- To get familiar with the fundamentals of World Wide Web and HTML
- To get familiar with fundamentals of Embedded C programming

Course Outcomes:

On completion of the course, learner will be able to–

Develop programs using object oriented concepts

- Design and develop web pages using HTML
- Design and develop mobile application using Android SDK
- Design and develop simple application using Embedded Programming

Course Contents

Unit I **(03 Hrs)**

Structure and Union in C: Introduction to structure and enumeration, declaration of structure, initialization, declaration of structure variables and accessing members, declaration of union and accessing members, array of structure, typedef.

Unit II **(04 Hrs)**

Introduction to Object Oriented Programming: classes, objects, methods, abstraction, inheritance, encapsulation, public, private and protected access specifier. Introduction to data structure, Introduction to Abstract Data Type (ADT), Introduction to C++ as Object Oriented Programming Language.

Unit III **(02 Hrs)**

Introduction to Internet, World Wide Web & Search Engine, HTML: Basic structure of an HTML document, creating an HTML document, Introduction to elements of HTML, working with text, lists, hyperlinks and images.

Unit IV **(03 Hrs)**

Android: Overview of Android OS, Overview of Wireless Application Protocol (WAP), Introduction to open handset alliance, Introduction to android platform differences, Introduction to Android SDK.

Embedded C: Programming embedded systems in C, Case study of typical embedded system like Intruder alarm system (exclude questions on case study for online examination)

Text Books:

1. Bjarne Stroustrup, "The C++ Programming Language", Pearson Education, ISBN 8131705218, third Edition
2. HTML5: The Black Book, DT Editorial Services, Paraglyph Press, USA, ISBN13: 9789350040959 (Indian Edition by DreamTech Publishers)
3. Android Wireless Application Development, Shane Conder, Lauren Darcey, Pearson Education, ISBN:0321813839
4. Michael Pont, "Embedded C", Pearson Education, ISBN 0-201-79523-X, ISBN 8131715892

Reference Books:

1. Robert Lafore, "Object-Oriented Programming in C++", Sams Publishing, ISBN: 0672323087 (ISBN 13: 9780672323089)
2. Walter Savitch, "Problem Solving with C++", Addison Wesley- Pearson Education, ISBN 0201703904, third Edition
3. Wendy Willard, "HTML: A Beginner's Guide", McGraw Hill, ISBN 0072263784, third Edition
4. Chuck Hellebuyck, "Beginner's Guide to Embedded C Programming", Electronics Products, USA
5. Sumit Mittu, "A Workbook on C++", Cengage Learning India, ISBN 10: 8131520668 / ISBN 13: 9788131520666

Guidelines for Instructor's Manual

The instructor's manual is to be developed as a hands-on resource and reference. The instructor's manual need to include prologue (about University/program/ institute/ department/foreword/ preface etc), University syllabus, conduction & Assessment guidelines, topics under consideration concept, objectives, outcomes, set of typical applications/assignments/ guidelines, references etc. The feedback seeking sheet for enhancement of instructor's manual may be added as annexure.

Guidelines for Student Journal

The laboratory assignments are to be submitted by student in the form of journal. Journal consists of prologue, Certificate, table of contents, and write-up of each assignment (Title, Objectives, Problem Statement, Outcomes, software & Hardware requirements, Date of Completion, Assessment grade and assessor's sign, Theory- Concept, algorithm, flowchart, test cases, conclusion/analysis, program code; exercises -MCQs, assignments, quizzes etc and references).

Guidelines for Assessment

Each assignment will be assigned grade based on parameters with appropriate weightage. Suggested parameters include- timely completion, performance, innovation, punctuality and neatness.

Guidelines for Laboratory Conduction

The instructor is expected to frame the assignments by understanding the prerequisites, technological aspects, utility and recent trends related to the topic. The assignment framing policy need to address the average students and inclusive of an element to attract and promote the intelligent students. The instructor may set multiple sets of assignments and distribute among batches of students. It is appreciated if the assignments are based on real world problems/applications. Encourage students for appropriate use of Hungarian notation, Indentation and comments. Use of open source software is encouraged.

In addition to these, instructor may assign one real life application in the form of a mini-project based on the concepts learned. Instructor may also set one assignment or mini-project that is suitable to respective branch beyond the scope of syllabus.

Set of suggested assignment list is provided in 4 groups- A, B, C, D. Each student must perform at least 8 assignments as – at least 3 from group A, 2 from group B, 1 from group C, 2 from group D.

Suggested List of Laboratory Assignments

Group A (Any 3 - one of which is based on use of Union)

1. Write a program in C to define a structure for Customer bank account that holds Information like Account Number, Name of account holder, balance, Internet banking facility availed(Yes or No), Pin code (422001 to 422013) , Account type(saving, recurring, deposit).

- a) Read account details for N customers
- b) Identify the golden, silver and general customers.

Golden customers: Balance > 10,00000

Silver Customers: Balance >500000 and 10,00000

General customers: Balance <500000

- c) Display the list of customers availing the Internet banking facility
- d) Display the customers belonging to a particular geographical location depending on postal code
- e) Display the customer list as per their account type.

2. Write a program in C to define a structure that holds Information of items like- Item Number, Item Names, Item Category (Electronics, Food, and Cosmetics etc), and Available stock. Display the available items.

3. Write a Menu driven program in C for a cricket player's display board. The information of the cricketer can be (not limited to) Name, Age, Country, Category (Batsman, Bowler, Wicket keeper, All rounder), Number of ODI's played, Number of International 20-20's played, Average batting score, Total number of wickets taken, etc. (Optional- Use pointer to structure to read and display information of a player.)

Perform following queries

- a) Number of batsman of a particular country
- b) Batsman with highest average score
- c) Number of bowlers of a particular country
- d) Bowler that has taken maximum no of wickets
- e) Show a particular players entire “ Display board information”

4. Write a program in C using structure for maintaining extracurricular activities of students (roll, name, year, activity name, and prize). The prize can be either cash prize or memento but not both. Cash prize is to be recorded as integer and memento is to be recorded as character string. Use union within structure for prize. Read extracurricular activity record for n students and Display extracurricular activities.

5. Write a program in C using structure for maintaining departmental library information book record (Accession number, title, edition, author and tag. The tag can be either purchase cost or name of the donor. Use union within structure for tag. Display list of purchased and donated books separately. Group B

6. Write a C++ program to define a class to represent a Matrix. Write constructor to initialize all matrix values to 0. Include member functions to perform the following tasks:

To read the Matrix

- To display the Matrix
- To add two matrix.

- Subtract one matrix from other
- Matrix Multiplication

7. The customers of the Maharashtra State Electricity Board are charged depending on the number of units consumed. The electricity tariff is calculated as follows

Units Consumed	Charges
Up to 100 units	90 Paise per unit
More than 100 and up to 200 Units	Rs. 1 per unit
More than 200 units	Rs. 1.30 per unit

In addition to above every person has to pay Rs75 as service charge per month. Write a program in C++ using control structures to calculate the Electricity bill.

8. Diwali festival discounts are announced by a showroom. Based on the total cost of the purchase, the following discounts are offered

Total Cost	Discount
Less than Rs. 1000	5%
More than Rs1000 and upto Rs2000	15%
Rs 2000 to Rs 5000	20%
Above Rs 5000	35%
Above Rs 10000	50%

Write a program in C++ to compute and display the amount to be paid by the customer after availing the discounts. The total cost can be taken as input.

9. “XYZ Transport Company” charges the parcels from Nashik to Pune and vice versa as per the given tariff

Total Cost	Discount
Up to 15kg	Rs. 20 per kg
For next 20 kg	Rs. 10 per kg
For next 20 kg	Rs. 8 per kg
More than that	Rs. 5 per kg

Taking the weight of the parcel as input, write a program in C++ to calculate the charges.

Group C

10. Design webpage for personal information (personal information, photo, qualification, experience, etc) using images, tables and hyperlinks

11. Design web page for promoting city as a tourist destination using images, tables, hyperlinks etc.

12. Design web page for builder to showcase the various projects with various specifications using images, tables, hyperlinks etc.

Group D (Any 2- one each for Embedded C and Android)

13. A pizza parlor accepts maximum N orders. A total current order is displayed using LED/LCD display connected to PC. Write an embedded C program to increment or decrement count based on order placed or order served.
14. An USB light is used to work in dark for keyboard attached to your PC/Laptop. Write an embedded C program to switch off the light after 10 minutes of keyboard inactivity
15. Write an embedded C program to rotate stepper motor in clock wise or anti-clock wise direction by providing the angle of rotation.
16. Write an embedded C program to generate rolling display of your institutes name using LED/LCD display connected to PC.
17. Installation of Android SDK for Eclipse and Write a program to read user name and display the message with user name such as “ Welcome dear XYZ to the world of Android”
18. Write a program to implement simple calculator using Android programming
19. Write a program to develop mobile app using Android programming for collecting opinion showing numerical calculator for particular issue such as “whether Net neutrality should be permitted or not”

UNIVERSITY OF PUNE
Engineering Mechanics (101011)

Teaching Scheme:

Lectures – 4 Hrs./Week
Practicals – 2 Hrs./Week

Examination Scheme:

Online – 50 Marks(2 Hrs)
Theory – 50 Marks
Term Works – 25 marks

Unit I: **(6 hours)**

a) Principle of statics, force system, resolution and composition of force. Resultant of concurrent forces. Moment of force, Varignon's theorem, resultant of parallel force system. Couple, equivalent force couple system

b) Resultant of general force system, Distributed forces, Centroid of plane lamina and wire bends

Unit II: **(7 hours)**

a) Kinematics – basic concept, equation of motion for constant acceleration and motion under gravity. Variable acceleration and motion curves. Relative motion and dependent motion.

b) Kinetics- Newton's second law of motion and its applications.

Unit III: **(7hours)**

a) Kinematics – basic concept, equation of motion in Cartesian coordinates. Path and polar coordinates. Motion of projectiles.

b) Kinetics- Newton's second law of motion in Cartesian and path of coordinates for curvilinear motion of particles.

Unit IV: **(6hours)**

a) Work, power, energy, conservative and non conservative forces. Conservation of energy and work energy principle for motion of particles.

b) Impulse, momentum, direct central impact and coefficient of restitution. Conservation of momentum and Impulse momentum principle of particle.

Unit V: **(7 hours)**

a) Free body diagram, equilibrium of concurrent, parallel and general forces in a plane. Equilibrium of three forces in a plane. Types of beams: simple and compound beams, type of support and reaction

b) resultant of concurrent and parallel forces in a space, equilibrium of concurrent and parallel forces in a space.

Unit VI: **(7 hours)**

a) Two force members: analysis of plane trusses by method of joint and method of section, cables subjected to point loads. Multi force members: plane frames

b) Friction: laws of Friction, application of Friction on inclined plane. Wedges and ladders Friction, application of flat belt.

Text Books:

- 1) Vector mechanics for Engineers by Beer & Johnson – Mc Graw Hill
- 2) Engineering mechanics: S. Timosenko, Dtp. Young and J.V. Rao- Tata Mc Graw Hill education Pvt. Ltd. New Delhi
- 3) Engineering mechanics by Basudeb Bhattacharya- Oxford University Press,

Reference Books:

- 1) Engineering mechanics by I.H. Shames & G.K. M. Rao – Pearson
- 2) Fundamental of Engineering mechanics by S. Rajasekaran and G. Sankarsubramanian: Vikas publishing house Pvt.Ltd. 3) Engineering mechanics by K.L. Kumar & Veenu Kumar- Tata Mc Graw Hill education Pvt. Ltd. New Delhi.
- 4) Engineering mechanics by Soutas, little Inman – India Edition Cengage Learning.

UNIVERSITY OF PUNE

Basic Mechanical Engineering (102013)

Teaching Scheme:

Lectures – 4 Hrs./Week
Practicals – 2 Hrs./Week

Examination Scheme:

Online – 50 Marks(2 Hrs)
Theory – 50 Marks
Term Works – 25 marks

Course Objectives:

- 1) This Course will help the student to acquire knowledge of mechanical engineering.
- 2) Describe the scope of mechanical engineering with multidiscipline industries.
- 3) Understand and identify common machine elements with their functions and power transmission devices.
- 4) Learn conservational machine tools and understand concept of design in mechanical engineering.
- 5) Impart knowledge of basic concept of thermodynamics applied to industrial applications.
- 6) Understand laying principles of energy conversion system and power plants.

Unit I: Introduction to mechanical Engineering

(6 hours)

Mechanical elements: Function, sketch, description, uses of shaft, axle, key (parallel key), coupling, (rigid flanged coupling), bearing (ball Bearing), clutch-single plate clutch, break – disc break.

Power transmission devices: construction, working, comparison and application of: belt drive (flat and V belt), Chain drive and spur gear arranged with simple gear train.

Unit II: Design fundamental

(6 hours)

Design: Steps in design process, mechanical properties (strengths, toughness, hardness, ductility, melability brittleness, elasticity, plasticity, resilience, fatigue, creep) selection of engg. Materials, application of following materials in engg. Alumina, plastic, steel, brass, cast iron, copper, rubber.

Mechanism (descriptive treatment only): definition and comparison of mechanism and machine, four bar mechanism, slider crank mechanism

Unit III: Manufacturing Process

(6 hours)

Intoduction to manufacturing process and their applications(casting, forging, sheet metal working and metal joining process), description of the casting process: Sand casting (Cope and drag), Sheet metal forming(shearing, bending, drawing), forging (hot working and cold working comparison), electric arc welding, comparison of welding soldering and brazing

Unit IV: Machine Tools

(6 hours)

Basic elements, working principle, types of operation with block diagram: Lathe machine- central lathe, drilling machine, grinding machine

Unit V: Thermal engineering

(6 hours)

Thermodynamics: Thermodynamics system (open, close, isolated), Thermodynamics properties: definition and units of – temperature, pressure(atmospheric, absolute and gauge), volume, internal energy enthalpy, concept of mechanical work, Thermodynamics laws with examples- Zeroth law, first law, limitation of first law, concept of heat sink, source, heat engine, heat pump, refrigeration engine, Second law of Thermodynamics statement

(Kelvin plank claussius), numerical on second law only.

Measurement: Measurement of temp. (thermocouple- type according to temp. range and application), Measurement of pressure (Barometer bourdon pressure gauge, simple U tube manometer with numerical).

Unit VI: Applied Thermal engineering

(6 hours)

Power Plant Engineering: Conventional and non conventional energy resources, hydroelectric, thermal, nuclear, wind solar (with block diagram).

Power producing devices: boiler- water tube and fire tube, internal combustion engine- two stroke and four stroke(spark ignition and compression ignition), turbines- impulse and reaction.

Power absorbing devices: pump- reciprocating and centrifugal, compressor- single acting, single stage reciprocating air compressor, refrigeration- vapour compression refrigeration process, household refrigerator, wind air conditioner (working with block diagrams).

Term Work:

Term Work shall consist of following:

1. Study of power transmitting elements: Couplings, Gears and Bearings.
2. Study of mechanisms: Four Bar Mechanism, Slider Crank Mechanism.
3. Study demonstration and working of center lathe machine.
4. Study of any one power plant.
5. Study Demonstration on two stroke and four stroke engine.
6. Study domestic refrigerator and window air conditioner.
7. Study of Package type boiler.
8. Report on Visit or guest lecture related to mechanical Engineering.

Text Books:

1. G.Shanmugan, S.Ravindran. Basic Mechanical Engineering, Tata Mc Graw Hill publisher Co.Ltd.
2. R.K.Purohit, Foundation of mechanical Engineering, Scientific Publishers.
3. C.S.Chetankumar, B.P.Mahesh, Elements of Mechanical Engineering, S. Chand Publications.
4. P.K. Nag, Engineering Thermodynamics Tata Mc Graw Hill Co.Ltd.
5. Chaudhari, Hajra, Elements of Workshop Technology, Volume I and II, Media Promoters and publishers, Mumbai.

Referance Book:

1. P.K. Nag, Engineering Thermodynamics Tata Mc Graw Hill Co.Ltd.
2. V.B. Bhandari, Design of Machine Elements, Tata Mc Graw Hill Co.Ltd.
3. S.S. Ratan, Theory of Machine, Tata Mc Graw Hill Co.Ltd.
4. Yunus A. Cengel and Boles, Thermodynamics, Tata Mc Graw Hill Co.Ltd.
5. Arora and Domkunwar, Thermal Engineering, Dhanpat Rai and Sons.
6. Surinder Kumar, Basics of Mechanical Engineering, Ane. Books Pvt. Ltd. New Delhi. 2011.
7. T. J. Parbhu, V. Jaiganesh and S. Jebraj, Basics of Mechanical Engineering, Scitech publications Pvt. Ltd. Chennai, 2010.

UNIVERSITY OF PUNE

Engineering Graphics - II (102014)

Teaching Scheme:

Practicals – 2 Hrs./Week

Examination Scheme:

Term Works – 50 marks

Drafting Technology and Introduction to Any Drafting Software/ Package:

Advantages of using computer Aided Drafting (CAD) packages, Applications of CAD, Introduction to GUI of CAD software, Basic Operation of Drafting Packages, Use of various Commands for drawing, Dimensioning, editing, modifying, Saving, and Printing / Plotting the drawing. Introduction to 3D primitives.

Term Work:

Term Work Should be prepared on five A2 size (594X420mm) (Half Imperial) drawing sheet using any drafting software/package as detailed below.

1. Projection of solids (minimum 2 problems).
2. Engineering Curves (minimum 2 problems).
3. Development of Solids (minimum 2 problems).
4. Orthographic Projections (minimum 2 problems).
5. Isometric Projections (minimum 2 problems).

Text Books

1. N.D.Bhatt and V.M.Panchal, Engineering drawing, Plane and solid geometry, Charotar publication house, Anand, Gujarat, India.
2. Dhanjay A. Jolhe, Engineering drawing with introduction to Auto CAD, Tata Mc Graw Hill Co.Ltd, New Delhi, India.
3. Basant Agarwal and C.M.Agarwal, Engineering drawing Tata Mc Graw Hill Co.Ltd, New Delhi, India.
4. K.L.Narayana and P.L.Kannaiah, Text books on engineering drawing, Second edition SciTech publication (INDIA), pvt.Ltd.Chennai, 2011.
5. K.C.John Engineering graphics for degree, PHI, Learning pvt.Ltd.Delhi, 2009.

Reference Books:

1. Basudev Bhattacharya, Machine drawing includes, Auto CAD Supplements, Oxford University Press, New Delhi, India.
2. K.Venugopal, Engineering drawing and graphics, New age Publication.
3. R.K.Dhavan, A text book of engineering drawing, S.Chand and company Ltd., New, Delhi, India.
4. N.B.Shaha and B.C.Rana, Engineering Drawing, Pearson Education.
5. T.Jeyapooan, Engineering drawing and graphics using Auto CAD, Vikas publication House pvt.Ltd.New Delhi, 2011

UNIVERSITY OF PUNE

Workshop Practices

Teaching Scheme:

Practicals – 2 Hrs./Week

Examination Scheme:

Term Works – 50 marks

Objective:

Introduction on different materials in Engineering Practices with respect to their workability, formability and machinability with hand tools and power tools and to develop skills through on experience.

I. Any two Utility Jobs.

a) Carpentry- 1 Job

Introduction to wood working, kinds of woods, hand tools and machines, types of joints, wood turning. Pattern making, types of patterns, contraction, draft and machining allowances, Term work to include one job involving joint and woodturning.

b) Fitting – 1 Job

Types Fits, Concepts of interchangeability, Datum selection, Location layout, marking, cutting, shearing, chipping, sizing of metals, drilling and tapping. Term work to include one job involving Fitting to size, male-female fitting with drilling and tapping

c) Sheet Metal Practice- 1 Job

Introduction to primary technology processes involving bending, punching and drawing various sheet metal joints, Development of joints. Term work to include a utility job in sheet metal.

d) Joining -1 Job

Includes making temporary and permanent joints between similar and dissimilar material by processes of chemical bonding, mechanical fasteners and fusion technologies. Term work to include one job involving various joining processes like riveting, joining of plastics, welding, brazing, etc.

II. Broad Guideline for Demonstration [any four]

Each Demonstration will be of 2 hours duration.

a) Assembly and Inspection

Assembly and Disassembly of some products, tools used. Videos of advancement in manufacturing technology. Inspection of various components using different measuring instruments. Introduction to measuring equipments used in quality control.

b) Safety in Workshop

Fire hazards, electric short circuit-causes and remedies, Machine protection, Human Protection, Accident prevention method, developing ability, to observe safe working habits.

c) Forging

Hot Working, cold Working processes, forging materials, hand tools & appliances , Hand forging , Power forging

d) Moulding

Principles of moulding, Methods, Core & core boxes, Preparation of foundry sand, casting, plastic moulding.

e) Plumbing

Types of pipe joints, threading dies, pipe fittings.

f) PCB Making

Layout drawing, positive & negative film making, PCB etching & drilling

g) Machine tools

Turning, milling, grinding, Shaping, planning – machines, tools and accessories.

III. Submissions

1. Two jobs as mentioned above.
2. Brief write-up with illustration/sketches on the demonstrations. (Not more than three pages for each demonstration)

Text Book:

Chaudhas, Hazra, Elements of workshop technology, Volume I & II media promoters & publishers, Mumbai.