Revised Syllabus to be implemented from the Academic Year 2010
(for the new batch only)
First Year First Semester

Sl. No.	Field	Theory	L	T	P	Total	Credit Points
A. THEORY							
1	HU101	ENGLISH LANGUAGE & TECHNICAL COMMUNICATION	2	0	0	**2**	2
2	PH101/ CH101	Chemistry -1 (Gr-B) / Physics – 1 (Gr-A)	3	1	0	4	4
3	M101	Mathematics-1	3	1	0	4	4
4	ES101	Basic Electrical & Electronic Engineering – 1 (GrA+GrB)	3	1	0	4	4
5	ME101	Engg. Mechanics	3	1	0	4	4
		Total of Theory				**18**	**18**
B. PRACTICAL							
6	PH191/ CH191	Chemistry -1 (Gr-B)/ Physics – 1 (Gr-A)	0	0	3	3	**2**
7	ES191	Basic Electrical & Electronic Engineering -1	0	0	3	3	**2**
8	ME191 /192	Engg Drawing & Computer Graphics (Gr-B) / Workshop Practice (Gr-A)	1	0	3	4	**3**
		Total of Practical				**10**	**7**
C. SESSIONAL							
9	HU181	Language Laboratory	0	0	2	2	**1**
10	XC181	Extra Curricular Activities(NSS/NCC/NSO etc)	0	0	2	2	**1**
		Total of Sessional				**4**	**2**
		Total of Semester				**32**	**27**

Physics based branches divided in to Gr-A & Gr-B, Gr-A= Phys in sem-I , Gr-B = Phys in sem-II; Chemistry based branches Physics in sem-1.
Group division:
Group-A: Chemistry based subjects: [Bio-Technology, Food Technology, Leather Technology, Textile Technology, Ceramic Technology, Chemical Engineering and any other Engineering that chooses to be Chemistry based] + Physics based subjects: [Mechanical Engineering, Production Engineering, Civil Engineering, Automobile Engineering, Marine Engineering, Apparel Production Engineering, Computer Science & Engineering, Information Technology.]
Group-B: All Physics based subjects which are also Electrical & Electronics based [Electrical Engineering, Electronics & Communication Engineering, Applied Electronics & Instrumentation Engineering, Power Engineering, Electrical & Electronics Engineering, Bio-Medical Engineering, Instrumentation & Control Engineering]

First Year Second Semester

Sl. No.	Field	Theory	L	T	P	Total	Credit Points
A. THEORY			**Contact Hours/Week**				
1	**CS201**	Basic Computation & Principles of Computer Programming	3	1	0	4	**4**
2	**PH201/ CH201**	Physics - 1(Gr-B) / Chemistry-1(Gr-A)	3	1	0	4	**4**
3	**M201**	Mathematics-2	3	1	0	4	**4**
4	**ES201**	Basic Electrical & Electronic Engineering-II	3	1	0	4	**4**
5	**ME201**	Engineering Thermodynamics & Fluid Mechanics	3	1	0	4	4
		Total of Theory				**20**	**20**
B. PRACTICAL							
7	**CS291**	Basic Computation & Principles of Computer Programming	0	0	3	3	**2**
8	**PH291/ CH291**	Physics – 1 (Gr-B) /Chemistry-1 (Gr-A)	0	0	3	3	**2**
9	**ES291**	Basic Electrical & Electronic Engineering- II	0	0	3	3	**2**
10	**ME291/ 292**	Workshop Practice (Gr-B) / Basic Engg Drawing & Computer Graphics (Gr-A)	1	0	3	4	**3**
		Total of Practical				**13**	**9**
		Total of Semester				**32**	**29**

	Group-A	Group-B
1ˢᵗ Sem	Physics-I; Workshop Practice	Chemistry –1; Engg Drawing & Computer Graphics
2ⁿᵈ Sem	Chemistry –1; Engg Drawing & Computer Graphics	Physics-I; Workshop Practice

Syllabus
First Semester
Theory

HU

English
PAPER CODE: HU 101
CONTACT: 2L
CREDIT: 2
PAPER NAME: ENGLISH LANGUAGE & TECHNICAL   COMMUNICATION

Guidelines for Course Execution:
Objectives of the Course: This Course has been designed

1. To impart advanced skills of Technical Communication in English through Language Lab. Practice Sessions to 1st Semester UG students of Engineering &Technology.
2. To enable them to communicate confidently and competently in English Language in all spheres.

Desired Entry Behaviour:
    The students must have basic command of English to
 Talk about day-to-day events and experiences of life.
Comprehend Lectures delivered in English.
Read and understand relevant materials written in English.
Write grammatically correct English.

Strategies for Course Execution:
1. It is a Course that aims to develop Technical Communication Skills. It is, therefore, *Lab*- based and practical in orientation. Students should be involved in Practice Sessions.
2. The content topics should be conveyed through real-life situations. Lecture classes should be conducted as Lecture cum Tutorial classes.
3. Keeping in view the requirements of students, the teachers may have to prepare some learning aids task materials.
4. Some time should be spent in teaching stress and intonation.
5. In teaching 'Speaking skill,' emphasis should be on *clarity, intelligibility, fluency,(as well as accepted pronunciation).*
6. Micro Presentation and Group Discussion Sessions should be used for developing Communicative Competence
7. The Language Lab, device should be used for giving audio-visual inputs to elicit students' responses by way of Micro-Presentation, Pair Conversation, Group Talk and Class Discussion.
8. The teacher must function as *a creative monitor in the Language Lab for the following:*

 A. Developing Listening   Comprehension   Skill;

1. Developing Listening Comprehension through Language Lab Device
2. Developing sub skills of the Listening Skill by Conversational Practice Sessions
3. Focusing on intelligent and advanced Listening Sessions e.g. Seminars, Paper Presentation, Mock Interviews etc.
4. Conducting Conversational Practice: Face to Face & Via Media (Telephone, Audio, Video + Clips)

 B. Developing Speaking Competence:

a) Helping students in achieving *clarity and fluency* ; manipulating paralinguistic features of speaking (*voice modulation ,pitch , tone stress , effective pauses*)
Conducting *Task oriented interpersonal ,informal and semiformal Speaking / Classroom Presentation*

b) *Teaching strategies for Group Discussion*
Teaching Cohesion and Coherence
Teaching effective communication & strategies for handling criticism and adverse remarks
Teaching strategies of Turn- taking, effective intervention, kinesics (use of body language) and courtesies and all componentss of softskills.

C. Developing Reading Comprehension Skill:

a) Developing Reading Skill through Non Technical (Literary) Texts
 (See Recommended Book 5)
1. The Thief   by   Ruskin Bond
2. The Open Window   by   Saki
3. Marriage is a private Affair   by   Chinua Achebe
4. The Moon in the Earthen Pot   by   Gopini Karunakar

b) Developing Reading Skill through Radio Commentary, Technical Texts and Case Studies (Refer to Recommended Book 1.)
 * Freedom   by G. B. Shaw (Radio Commentary)
 a)   Guiding students for Intensive & Extensive Reading(See Recommended Book 1)

D.   Developing Writing Competence:

a) Teaching all varieties of Technical Report, Business Letters and Job Application (Expressing Ideas within restricted word limit through paragraph division, Listing Reference Materials through Charts , Graphs ,Tables and Diagrams);

 b) Teaching correct Punctuation & Spelling, Semantics of Connectives, Modifiers and Modals, variety of sentences and paragraphs

c) Teaching   Organizational   Communication: Memo, Notice, Circular, Agenda / Minutes   etc.

SYLLABUS -- DETAILED   OUTLINES

 A. ENGLISH   LANGUAGE   GRAMMAR: 5L
Correction of Errors in Sentences
 Building Vocabulary
 Word formation
 Single Word for a group of Words
Fill in the blanks using correct Words
 Sentence Structures and Transformation
Active & Passive Voice
 Direct & Indirect Narration
        (MCQ Practice during classes)

B. READING COMPREHENSION:
 Strategies for Reading Comprehension   1L
Practicing Technical & Non Technical Texts for   Global/Local/Inferential/Referential comprehension; 3L
Précis Writing

 C.   TECHNICAL COMMUNICATION
 The Theory of Communication –Definition & Scope
 Barriers of Communication
 Different Communication Models
 Effective Communication (Verbal / Non verbal)
 Presentation / Public Speaking   Skills   5L
        (MCQ Practice during classes)

D. MASTERING TECHNICAL COMMUNICATION

Technical Report (formal drafting)	3L
Business Letter (formal drafting)	4L
Job Application (formal drafting)	3L
Organizational Communication (see page 3)	3L
Group Discussion –Principle & Practice	3L

Total Lectures   30

MARKS   SCHEME (Written Examination)   Total Marks 70

1. 10 Multiple Choice Questions(Communication & Eng. Language-Vocabulary & Syntax)
                                                                                Marks 10
2.   Short Questions & Précis writing   on unseen passages   Marks 15 (10+5)
3.   3 Essay type Questions on Technical Communication   (Technical Report / Business Letter / Job Application /
     Organizational Communication etc,)   Marks 45-15*3

MARKS   SCHEME (Internal   Examination)   Total Marks   30

1. Attendance   Marks   5
2. Testing Speaking Ability   Marks   5
3. Testing Listening Ability   Marks   5
4. 2 Unit Tests   Marks 15

BOOKS -- RECOMMENDED:
1. Board of Editors: Contemporary Communicative English
                      for Technical Communication
                             Pearson Longman,2010
2. Dr. D. Sudharani: Manual for English Language Laboratory
                      Pearson Education (W.B. edition), 2010
3. Technical Communication Principles and Practice by Meenakshi Raman, Sangeeta Sharma(Oxford Higher Education)
4. Effective Technical Communication by Barun K.Mitra(Oxford Higher Education)
5. V. Sashikumar (ed.): Fantasy- A Collection of Short Stories
                        Orient Black swan (Reprint 2006)

References:
1. D. Thakur: Syntax   Bharati Bhawan , 1998
2. Longman Dictionary of Contemporary English
              (New Edition) for Advanced Learners
3. Internet

Basic Science

Chemistry-1(Gr-A/Gr-B)
Code: CH101
Contacts: 3L + 1T = 4
Credits: 4

Module 1

Chemical Thermodynamics -I

Concept of Thermodynamic system: Definition with example of diathermal wall, adiabatic wall, isolated system, closed system, open system, extensive property, intensive property.

Introduction to first law of thermodynamics: different statements, mathematical form.

Internal energy: Definition, Example, Characteristics, Physical significance, Mathematical expression for change in internal Energy, Expression for change in internal energy for ideal gas.

Enthalpy: Definition, Characteristics, Physical significance, Mathematical expression for change in Enthalpy, Expression for change in enthalpy for ideal gas.   3L

Heat Capacity: Definition, Classification of Heat Capacity (C_p and C_V): Definition and General expression of C_p - C_V. Expression of C_p - C_V for ideal gas.

Reversible and Irreversible processes: Definition, Work done in Isothermal Reversible and Isothermal Irreversible process for Ideal gas,

Adiabatic changes: Work done in adiabatic process, Interrelation between thermodynamic parameters (P, V and T), slope of P-V curve in adiabatic and isothermal process.

Application of first law of thermodynamics to chemical processes: exothermic, endothermic processes, law of Lavoisier and Laplace, Hess's law of constant heat summation, Kirchoff's law.   3L

2nd law of thermodynamics: Statement, Mathematical form of 2nd law of thermodynamics (Carnot cycle). Joule Thomson and throttling processes; Joule Thomson coefficient for Ideal gas, Concept of inversion temperature.

Evaluation of entropy: characteristics and expression, entropy change in irreversible cyclic process, entropy change for irreversible isothermal expansion of an ideal gas, entropy change of a mixture of gases.

                                                                                                                    2L

Work function and free energy: Definition, characteristics, physical significance, mathematical expression of ΔA and ΔG for ideal gas, Maxwell's Expression (only the derivation of 4 different forms), Gibbs Helmholtz equation.

Condition of spontaneity and equilibrium reaction.   2L

Module 2

Reaction Dynamics

Reaction laws: rate and order; molecularity; zero, first and second order kinetics. Pseudounimolecular reaction, Arrhenius equation.

Mechanism and theories of reaction rates (Transition state theory, Collison theory:).

Catalysis: Homogeneous catalysis (Definition, example, mechanism, kinetics).   3L

Solid state Chemistry

Introduction to stoichiometric defects (Schottky & Frenkel) and non – stoichiometric defects (Metal excess and metal deficiency).

Role of silicon and germanium in the field of semiconductor.   2L

Module 3

Electrochemistry

Conductance

Conductance of electrolytic solutions, specific conductance, equivalent conductance, molar conductance and ion conductance, effect of temperature and concentration (Strong and Weak electrolyte).

Kohlrausch's law of independent migration of ions, transport numbers and hydration of ions.

Conductometric titrations: SA vs SB & SA vs WB; precipitation titration KCl vs $AgNO_3$.   2L

Electrochemical cell

Cell EMF and its Thermodynamic derivation of the EMF of a Galvanic cell (Nernst equation), single electrode potentials, hydrogen half cell, quinhydrone half cell and calomel half cell (construction, representation, cell reaction, expression of potential, Discussion, Application)

Storage cell, fuel cell (construction, representation, cell reaction, expression of potential, Discussion, Application).

Application of EMF measurement on a) Ascertain the change in thermodynamic function (ΔG, ΔH, ΔS) b) ascertain the equilibrium constant of a reversible chemical reaction c) ascertain the valency of an ion.

3L

Module 4

Structure and reactivity of Organic molecule

Electronegativity, electron affinity, hybridisation, Inductive effect, resonance, hyperconjugation, electromeric effect, carbocation, carbanion and free radicals.

Brief study of some addition, eliminations and substitution reactions.   3L

Polymerization

Concepts, classifications and industrial applications.

Polymer molecular weight (number avg. weight avg. viscosity avg.: Theory and mathematical expression only), Poly dispersity index (PDI).

Polymerization processes (addition and condensation polymerization), degree of polymerization, Co-polymerization, stereo-regularity of polymer, crystallinity (concept of T_m) and amorphicity (Concept of T_g) of polymer.

Preparation, structure and use of some common polymers: plastic (**PE**: HDPE, LDPE, LLDPE, UHMWPE)), rubber (natural rubber, SBR), fibre(nylon 6.6). Vulcanization.

Conducting and semi-conducting polymers.   5L

Module 5

Industrial Chemistry

Solid Fuel: Coal, Classification of coal, constituents of coal, carbonization of coal (HTC and LTC), Coal analysis: Proximate and ultimate analysis.

Liquid fuel: Petroleum, classification of petroleum, Refining, Petroleum distillation, Thermal cracking, Octane number, Cetane number, Aviation Fuel (Aviation Gasoline, Jet Gasoline), Bio-diesel.

Gaseous fuels: Natural gas, water gas, Coal gas, bio gas.   5L

Reference Books

1.   P. C. Rakshit, Physical Chemistry, Sarat Book House (7th Edition).
2.   S. Glasston, Text Book of Physical Chemistry, Macmillan India Limited.
3.   S. Pahari, Physical Chemistry, New Central Book Agency.
4.   S. Sarkar, Fuels and Combustion, Taylor & Francis (3rd Edition), 2009
5.   P. Ghosh, Polymer Science and Technology of Plastics and Rubbers, Tata McGraw Hill Publishing Company Limited.
6.   F.W.Billmeyer : Textbook of Polymer Science is published by Wiley India (is now an Indian Imprint.)
7.   Joel R. Fried, Polymer Science and Technology, Pearson Education (2nd Edition).
8.   I. L. Finar, Organic Chemistry, Addison Wesley Longman, Inc.
9.   Physical Chemistry, Atkins, 6th Edition, Oxford Publishers.
10.   Organic Chemistry, Mark Loudon, 4th Edition, Oxford Publishers.

Or

Physics-1(Gr-B/Gr-A)
Code: PH-101
Contacts: 3+1
Credit: 4L

Module 1:

Oscillation:

1.1 Simple harmonic motion: Preliminary concepts,   Superposition of S. H. Ms in two mutually perpendicular directions: Lissajous figure   2L

1.2 Damped vibration: Differential equation and its solution, Logarithmic decrement, Quality factor.
3L

1.3 Forced vibration: Differential equation and its solution, Amplitude and Velocity resonance, Sharpness of resonance. Application in L-C-R Circuit
3L

Module 2:
Optics 1:

2.1 Interference of electromagnetic waves: Conditions for sustained interference, double slit as an example. Qualitative idea of Spatial and Temporal Coherence, Conservation of energy and intensity distribution, Newton's ring
3L

2.2 Diffraction of light: Fresnel and Fraunhofer class. Fraunhofer diffraction for single slit and double slits. Intensity distribution of N-slits and plane transmission grating (No deduction of the intensity distributions for N-slits is necessary), Missing orders. Rayleigh criterion, Resolving power of grating and microscope. (Definition and formulae)
5L

Module 3:
Optics 2

3.1 Polarization: General concept of Polarization, Plane of vibration and plane of polarization, Qualitative discussion on Plane, Circularly and Elliptically polarized light, Polarization through reflection and Brewster's law, Double refraction (birefringence) -Ordinary and Extra-ordinary rays . Nicol's Prism, Polaroid. Half wave plate and Quarter wave plate
4L

3.2 Laser : Spontaneous and Stimulated emission of radiation, Population inversion, Einstein's A & B co-efficient (derivation of the mutual relation), Optical resonator and Condition necessary for active Laser action, Ruby Laser, He-Ne Laser- applications of laser.
4L

3.3 Holography: Theory of holography, viewing the hologram, Applications
3L

Module 4:
Quantum Physics:

4.1 Concept of dependence of mass with velocity, mass energy equivalence, energy- momentum relation (no deduction required). Blackbody radiation: Rayleigh Jeans' law (derivation without the calculation of number of states), Ultraviolet catastrophe, Wien's law, Planck's radiation law (Calculation of the average energy of the oscillator), Derivation of Wien's displacement law and Stephan's law from Planck's radiation law. Rayleigh Jean's law and Wien's law as limiting cases of Planck's law. Compton Effect (calculation of Compton wavelength is required).
5L

4.2 Wave-particle duality and de Broglie's hypothesis, Concept of matter waves, Davisson-Germer experiment, Concept of wave packets and Heisenberg's uncertainty principle.

4L

Module 5:

Crystallography:

5.1 Elementary ideas of crystal structure : lattice, basis, unit cell, Fundamental types of lattices – Bravais lattice, Simple cubic, f.c.c. and b.c.c. lattices, (use of models in the class during teaching is desirable] Miller indices and miller planes, Co-ordination number and Atomic packing factor. 4L

5.2 X-rays : Origin of Characteristic and Continuous X-ray, Bragg's law (No derivation), Determination of lattice constant. 2L

Recommended Text Books and Reference Books:

For Both Physics I and II

1. B. Dutta Roy (Basic Physics)
2. R.K. Kar (Engineering Physics)
3. Mani and Meheta (Modern Physics)
4.. Arthur Baiser (Perspective & Concept of Modern Physics)

Physics I (PH101/201)

Vibration and Waves
   c) Kingsler and Frey
   d) D.P. Roychaudhury
   e) N.K. Bajaj (Waves and Oscillations)
   f) K. Bhattacharya
   g) R.P. Singh (Physics of Oscillations and Waves)
   h) A.B. Gupta (College Physics Vol.II)
   i) Chattopadhya and Rakshit (Vibration, Waves and Acoustics)

Optics
10 Möler (Physical Optics)
11 A.K. Ghatak
12 E. Hecht (Optics)
13 E. Hecht (Schaum Series)
14 F.A. Jenkins and H.E. White
15 6. Chita Ranjan Dasgupta (Degree Physics Vol 3)

Quantum Physics
2 Eisberg & Resnick is published by Wiley India
3 A.K. Ghatak and S. Lokenathan
4 S.N. Ghoshal (Introductory Quantum Mechanics)
5 E.E. Anderson (Modern Physics)
6 Haliday, Resnick & Krane : Physics Volume 2 is Published by Wiley India
7 Binayak Dutta Roy [Elements of Quantum Mechanics]

Crystallography
1.   S.O. Pillai (a. Solid state physics b. Problem in Solid state physics)
2.   A.J. Dekker
3.   Aschroft and Mermin
4.   Ali Omar
5.   R.L. Singhal
6.   Jak Tareen and Trn Kutty (Basic course in Crystallography

Laser and Holography
      1   A.K. Ghatak and Thyagarajan (Laser)
      2   Tarasov (Laser)
      3   P.K. Chakraborty (Optics)
      4   B. Ghosh and K.G. Majumder (Optics)
      5   B.B. Laud (Laser and Non-linear Optics)
      6   Bhattacharyya [Engineering Physics] Oxford

Mathematics
Code: M101
Contacts: 3L + 1T = 4
Credits: 4

Note 1: The whole syllabus has been divided into five modules.

Note 2: U<u>Structure of the question paper</u>U

There will be three groups in the question paper. In Group A, there will be one set of multiple choice type questions spreading the entire syllabus from which 10 questions (each carrying one mark) are to be answered. From Group B, three questions (each carrying 5 marks) are to be answered out of a set of questions covering all the three modules. Three questions (each carrying 15 marks) are to be answered from Group C. Each question of Group C will have three parts covering not more than two topics (marked in bold italics face). Sufficient questions should to be set covering all modules.

Module I

Matrix: Determinant of a square matrix, Minors and Cofactors, Laplace's method of expansion of a determinant, Product of two determinants, Adjoint of a determinant, Jacobi's theorem on adjoint determinant. Singular and non-singular matrices, Adjoint of a matrix, Inverse of a non-singular matrix and its properties, orthogonal matrix and its properties, Trace of a matrix.

Rank of a matrix and its determination using elementary row and column operations, Solution of simultaneous linear equations by matrix inversion method, Consistency and inconsistency of a system of homogeneous and inhomogeneous linear simultaneous equations, Eigen values and eigen vectors of a square matrix (of order 2 or 3), Eigen values of A^{TP}, kA, A^{-1P}, Caley-Hamilton theorem and its applications.   **9L**

Successive differentiation: Higher order derivatives of a function of single variable, Leibnitz's theorem (statement only and its application, problems of the type of recurrence relations in derivatives of different orders and also to find $\left(y_n\right)_0$). **2L**

Mean Value Theorems & Expansion of Functions: Rolle's theorem and its application, Mean Value theorems – Lagrange & Cauchy and their application, Taylor's theorem with Lagrange's and Cauchy's form of remainders and its application, Expansions of functions by Taylor's and Maclaurin's theorem, Maclaurin's infinite series expansion of the functions: $\sin x, \cos x, e^x, \log(1+x), (a+x)^n, n$ being an integer or a fraction (assuming that the remainder $R_n \to 0$ as $n \to \infty$ in each case). **5L**

Reduction formula: Reduction formulae both for indefinite and definite integrals of types $\int \sin^n x, \int \cos^n x, \int \sin^m x \cos^n x, \int \cos^m x \sin nx, \int \dfrac{dx}{\left(x^2+a^2\right)^n}, m,n$ are positive integers.

2L

Module III

Calculus of Functions of Several Variables: Introduction to functions of several variables with examples, Knowledge of limit and continuity, Partial derivatives and related problems, Homogeneous functions and Euler's theorem and related problems up to three variables, Chain rules, Differentiation of implicit functions, Total differentials and their related problems, Jacobians up to three variables and related problems, Maxima, minima and saddle points of functions and related problems, Concept of line integrals, Double and triple integrals. **9L**

Module IV

Infinite Series: Preliminary ideas of sequence, Infinite series and their convergence/divergence, Infinite series of positive terms, Tests for convergence: Comparison test, Cauchy's Root test, D' Alembert's Ratio test and Raabe's test (statements and related problems on these tests), Alternating series, Leibnitz's Test (statement, definition) illustrated by simple example, Absolute convergence and Conditional convergence. **5L**

Module-V

Vector Algebra and Vector Calculus: Scalar and vector fields – definition and terminologies, dot and cross products, scalar and vector triple products and related problems, Equation of straight line, plane and sphere, Vector function of a scalar variable, Differentiation of a vector function, Scalar and vector point functions,

Gradient of a scalar point function, divergence and curl of a vector point function, Directional derivative. Related problems on these topics. Green's theorem, Gauss Divergence Theorem and Stoke's theorem (Statements and applications). **8L**

Total 40 Lectures
Suggested Reference Books

1. Advanced Engineering Mathematics 8e by Erwin Kreyszig is published by Wiley India

2. **Engineering Mathematics**: B.S. Grewal (S. Chand & Co.)

3. **Higher Engineering Mathematics**: John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)

4. **Mathematics Handbook**: for Science and Engineering, L. Rade and B. Westergren (5th edition, 1st Indian Edition 2009, Springer)

5. **Calculus**: M. J. Strauss, G. L. Bradley and K. L. Smith (3rd Edition, 1st Indian Edition 2007, Pearson Education)

6. **Engineering Mathematics**: S. S. Sastry (PHI, 4th Edition, 2008)

7. **Advanced Engineering Mathematics, 3E**: M.C. Potter, J.L. Goldberg and E.F. Abonfadel (OUP), Indian Edition.

Engineering Science

Basic Electrical and Electronics Engineering-I
Code: ES101
Contacts: 3L + 1T = 4
Credits: 4
Basic Electrical Engineering-I

DC Network Theorem: Definition of electric circuit, network, linear circuit, non-linear circuit, bilateral circuit, unilateral circuit, Dependent source, Kirchhoff's law, Principle of superposition. Source equivalence and conversion, Thevenin's theorem, Norton Theorem, nodal analysis, mesh analysis, star-delta conversion. Maximum power transfer theorem with proof. 7L

Electromagnetism: Biot-savart law, Ampere's circuital law, field calculation using Biot-savart & ampere's circuital law. Magnetic circuits, Analogous quantities in magnetic and electric circuits, Faraday's law, Self and mutual inductance. Energy stored in a magnetic field, B-H curve, Hysteretic and Eddy current losses, Lifting power of Electromagnet. 5L

AC fundamental: Production of alternating voltage, waveforms, average and RMS values, peak factor, form factor, phase and phase difference, phasor representation of alternating quantities, phasor diagram, behavior of AC series , parallel and series parallel circuits, Power factor, Power in AC circuit, Effect of frequency variation in RLC series and parallel circuits, Resonance in RLC series and parallel circuit, Q factor, band width of resonant circuit. 9L

Basic Electronics Engineering-I

Instruction: 1 credit means 1 hour; 1 lecture means a lecture of 1 hour duration.

Basic Electronics Engineering - I: 18L + 2L = 20L

Pre-requisites: Knowledge of Class XII level electronics, Physics & Mathematics.

13

Recapitulation and Orientation lectures: 2L

Module – 1: Semiconductors: 4L
Crystalline material: Mechanical properties, Energy band theory, Fermi levels; Conductors, Semiconductors and Insulators: electrical properties, band diagrams. Semiconductors: intrinsic and extrinsic, energy band diagram, electrical conduction phenomenon, P-type and N-type semiconductors, drift and diffusion carriers.

Module – 2: Diodes and Diode Circuits: 3L+3L = 6L
Formation of P-N junction, energy band diagram, built-in-potential forward and reverse biased P-N junction, formation of depletion zone, V-I characteristics, Zener breakdown, Avalanche breakdown and its reverse characteristics; Junction capacitance and Varactor diode.
Simple diode circuits, load line, linear piecewise model;
Rectifier circuits: half wave, full wave, PIV, DC voltage and current, ripple factor, efficiency, idea of regulation.

Module – 3: Bipolar Junction Transistors: 6L+2L = 8L
Formation of PNP / NPN junctions, energy band diagram; transistor mechanism and principle of transistors, CE, CB, CC configuration, transistor characteristics: cut-off active and saturation mode, transistor action, injection efficiency, base transport factor and current amplification factors for CB and CE modes.
Biasing and Bias stability: calculation of stability factor;

Outcome:
Students will be able to identify semiconductor materials, draw band-diagrams, distinguish between intrinsic and extrinsic semiconductors, n- and p- type semiconductors, calculate drift and diffusion current components.

Students must be able to explain the junction properties and the phenomenon of rectification, draw the I-V characteristics and identify operating points; Calculate ripple factors, efficiency of power supplies.

Students will be able to draw and explain the I-V characteristics of BJTs – both input and output; learn to bias transistors, both as amplifiers and switches; identify operating points.

Recommended Books:
Text:
   9.   Sedra & Smith: Microelectronics Engineering.
   10. Millman & Halkias: Integrated Electronics.
References:
            b)   Malvino: Electronic Principle.
            c)   Schilling & Belove: Electronics Circuits.
            d)   Millman & Grabal: Microelectronics.
            e)   Salivahanan: Electronics Devices & Circuits.
            f)   Boylestad & Nashelsky: Electronic Devices & Circuit Theory

Engineering Mechanics
Code: ME101
Contacts: 3L + 1T = 4
Credits: 4

Sl. No.	Syllabus	Contact Hrs.	Reference Books & Chapters and Problems for practice
Mod-1	Importance of Mechanics in engineering; Introduction to Statics; Concept of Particle and Rigid Body; Types of forces: collinear, concurrent, parallel, concentrated, distributed; Vector and scalar quantities; Force is a vector; Transmissibility of a force (sliding vector).	2L	Meriam & Kraig: Vol-I Chapt: 1/1, 2/2,1/3
	Introduction to Vector Algebra; Parallelogram law; Addition and subtraction of vectors; Lami's theorem; Free vector; Bound vector; Representation of forces in terms of i,j,k; Cross product and Dot product and their applications.	4L+1T	1. Meriam & Kraig: Vol-I Chapt: 1/3, 2/4, 2/7 2. I.H. Shames Chapt: 2.1 to 2.8 Probs: 2.1, 2.2, 2.3,2.6, 2.10, 2.48, 2.52, 2.54, 2.64, 2.68
	Two dimensional force system; Resolution of forces; Moment; Varignon's theorem; Couple; Resolution of a coplanar force by its equivalent force-couple system; Resultant of forces.	4L+2T	1. Meriam & Kraig: Vol-I Chapt: 2/3, 2/4, 2/5, 2/6, 2/9 Probs: 2/1 to 2/8; 2/13, 2/16, 2/20; 2/27, 2/31 to 2/33, 2/35, 2/37, 2/39; 2/53, 2/55, 2/57, 2/61, 2/66; 2/75, 2/77, 2/79, 2/78 to 2/82; 2/135 to 2/137, 2/139, 2/141, 2/146, 2/147,2/151, 2/157
Mod-II	Concept and Equilibrium of forces in two dimensions; Free body concept and diagram; Equations of equilibrium.	3L+1T	Meriam & Kraig: Vol-I Chapt: 3/2, 3/3 Probs: 3/1, 3/3, 3/4 to 3/7, 3/11, 3/13, 3/15, 3/21, 3/25, 3/27, 3/31,3/39
	Concept of Friction; Laws of Coulomb friction; Angle of Repose; Coefficient of friction.	3L+1T	Meriam & Kraig: Vol-I Chapt: 6/1, 6/2, 6/3 Probs: 6/1 to 6/6, 6/13, 6/15, 6/17; 2. I.H. Shames; Chapt: 7.1,7.2
Mod-III.	Distributed Force: Centroid and Centre of Gravity; Centroids of a triangle, circular sector, quadralateral, composite areas consisting of above figures.	4L+1T	1. Meriam & Kraig: Vol-I Chapt: 5/1, 5/2, 5/3 Sample probs: 5/1 to 5/5 Probs: 5/2, 5/5, 5/7, 5/9, 5/12, 5/20, 5/25, 5/30, 5/43,5/47
	Moments of inertia: MI of plane figure with respect to an axis in its plane, MI of plane figure with respect to an axis perpendicular to the plane of the figure; Parallel axis theorem; Mass moment of inertia of symmetrical bodies, e.g. cylinder, sphere, cone.	3L+1T	1. Meriam & Kraig: Vol-I Chapt: Appendix A/1, A/2 Sample Probs: A/1 to A/5; Probs: A/1, A/5, A/9, A/15, A/20

Sl. No.	Syllabus	Contact Hrs.	Reference Books & Chapters and Problems for practice
	Concept of simple stresses and strains: Normal stress, Shear stress, Bearing stress, Normal strain, Shearing strain; Hooke's law; Poisson's ratio; Stress-strain diagram of ductile and brittle materials; Elastic limit; Ultimate stress; Yielding; Modulus of elasticity; Factor of safety.	2L+1T	1.Elements of strength of Materials by Timoshenko & Young Chapt: 1.1,1.2,1.3, 2.2 Prob set 1.2 : Prob: 3,4,5,8,9,10 Prob set 1.3: Prob: 1,3,5,7 2. Nag & Chanda -3rd Part Chapt: 1.1, 1.2.1 to 1.2.3, 1.2.6, 1.2.7
Mod-IV	Introduction to Dynamics: Kinematics and Kinetics; Newton's laws of motion; Law of gravitation & acceleration due to gravity; Rectilinear motion of particles; determination of position, velocity and acceleration under uniform and non-uniformly accelerated rectilinear motion; construction of x-t, v-t and a-t graphs.	3L+1T	Meriam & Kriag: Vol-II Chapt: 1/3, 1/5,1/7, 2/1,2/2 Probs: 1/1 to 1/10; 2/1 to 2/14; 2/15, 2/17, 2/19, 2/25, 2/27;
	Plane curvilinear motion of particles: Rectangular components (Projectile motion); Normal and tangential components (circular motion).	3L+1T	Meriam & Kraig: Vol-II Chapt: 2/3, 2/4, 2/5, Probs: 2/59 to 2/65, 2/67, 2/71, 2/81, 2/84, 2/89; 2/97, 2/99 to 2/103;
Mod-V.	Kinetics of particles: Newton's second law; Equation of motion; D.Alembert's principle and free body diagram; Principle of work and energy ; Principle of conservation of energy; Power and efficiency.	5L+2T	Meriam & Kraig: Vol-II Chapt: 3/2, 3/3, 3/4,3/6, 3/7; Probs: 3/1, 3/3, 3/4,3/7, 3/11, 3/12; 3/17, 3/19, 3/23; 3/103 to 3/107, 3/113, 3/115, 3/116; Sample probs: 3/16, 3/17; Probs: 3/143,3/145, 3/158

Books Recommended

1. Engineering Mechanics [Vol-I & II]by Meriam & Kraige, 5th ed. – Wiley India
2. Engineering Mechanics: Statics & Dynamics by I.H.Shames, 4th ed. – PHI
3. Engineering Mechanics by Timoshenko , Young and Rao, Revised 4th ed. – TMH
4. Elements of Strength of Materials by Timoshenko & Young, 5th ed. – E.W.P
5. Fundamentals of Engineering Mechanics by Debabrata Nag & Abhijit Chanda– Chhaya Prakashani
6. Engineering Mechanics by Basudeb Bhattacharyya– Oxford University Press.
7. Engineering Mechanics: Statics & Dynamics by Hibbeler & Gupta, 11th ed. – Pearson

Sessional

HU

HU 181 (Practical)
LANGUAGE LABORATORY
CONTACTS: 2P
CREDIT: 1
LANGUAGE   LABORATORY   PRACTICE

a) Honing 'Listening Skill' and its sub skills   through Language Lab Audio device;   3P

b) Honing 'Speaking Skill' and its sub skills;   2P
c) Helping them master Linguistic/Paralinguistic features   (Pronunciation/Phonetics/Voice modulation/ Stress/ Intonation/ Pitch &Accent) of connected speech;   2P

j) Honing 'Conversation Skill' using Language Lab Audio –Visual input; Conversational Practice Sessions (Face to Face / via Telephone , Mobile phone & Role Play Mode);   2P

k) Introducing 'Group Discussion' through audio –Visual input and acquainting them with key strategies for success;   2P

f) G D Practice Sessions for helping them internalize basic   Principles (turn- taking, creative intervention, by using correct body language, courtesies & other   soft skills) of GD;   4P

   g) Honing 'Reading Skills' and its sub skills using Visual /   Graphics/Diagrams /Chart Display/Technical/Non Technical Passages;
   Learning Global / Contextual / Inferential Comprehension;   2P

h) Honing 'Writing Skill' and its sub skills by using   Language Lab Audio –Visual input; Practice Sessions   2P

                    Total Practical Classes   17

Books Recommended:
Dr. D. Sudharani: Manual for English Language Laboratory
                    Pearson Education (WB edition),2010
Board of Editors: Contemporary Communicative English
            for Technical Communication
                    Pearson Longman, 2010

Wxtra Curricular Activities(NSS/NCC/NSO etc)
Code: XC181
Code Credits: 1

   a) Creating awareness in social issues
   b) Participating in mass education programmes
   c) Proposal for local slum area development
   d) Waste disposal
   e) Environmental awareness
   f) Production Oriented Programmes
   g) Relief & Rehabilitation work during Natural calamities

   Creating awareness in social issues:
        1. Women's development – includes health, income-generation, rights awareness.
        2. Hospital activities – Eg. writing letters for patients, guiding visitors
        3. Old age home – visiting the aging in-mates, arranging for their entertainment.
        4. Children's Homes - visiting the young in-mates, arranging for their entertainment
        5. Linking with NGOs to work on other social issues. (Eg. Children of sex-workers)
        6. Gender issues- Developing an awareness, to link it with Women's Cell of college

   Participating in mass education programmes
   1.Adult education
   2. Children's education

   Proposal for local slum area development
   One or two slums to be identified and according to the needs, activities to be developed and proposals and reports are to be submitted.

   Environmental awareness
   • Resource conservation – Awareness to be developed on water, energy,soil.
   • Preservation of heritage monuments- Marches, poster campaigns

- Alternative energy consciousness amongst younger school-children.
- Plantation and beautification- Plantation of trees, their preservation and upkeep, developing NSS parks.
- Waste disposal- Proper methods of domestic waste disposal.

Production Oriented Programmes
5. Working with people and explaining and teaching improved agricultural practices
6. Rodent control land pest control practices;
7. Soil-testing, soil health care and soil conservation;
8. Assistance in repair of agriculture machinery;
9. Work for the promotion and strengthening of cooperative societies in villages;
10. Assistance and guidance in poultry farming, animal husbandry, care of animal health etc.;
11. Popularization of small savings and
12. Assistance in procuring bank loans

Relief & Rehabilitation work during Natural calamities

g) Assisting the authorities in distribution of rations, medicine, clothes etc.;
h) Assisting the health authorities in inoculation and immunization, supply of medicine etc.;
i) Working with the local people in reconstruction of their huts, cleaning of wells, building roads etc.;
j) Assisting and working with local authorities in relief and rescue operation;
Collection of clothes and other materials, and sending the same to the affected areas;

Practical
Basic Science

Chemistry-1(Gr-A/Gr-B)
Code: CH191
Contacts:
Credits: 2

1. To Determine the alkalinity in a given water sample.

2. Red-ox titration (estimation of iron using permanganometry)

3. To determine calcium and magnesium hardness of a given water sample separately.

4. To determine the value of the rate constant for the hydrolysis of ethyl acetate catalyzed by hydrochloric acid.

5. Heterogeneous equilibrium (determination of partition coefficient of acetic acid between n-butanol and water)

6. Viscosity of solutions (determination of percentage composition of sugar solution from viscosity)

7. Conductometric titration for determination of the strength of a given HCl solution by titration against a standard NaOH solution.

8. pH- metric titration for determination of strength of a given HCl solution against a standard NaOH solution.

9. Determination of dissolved oxygen present in a given water sample.

10. To determine chloride ion in a given water sample by Argentometric method (using chromate indicator solution)

At least **Six** experiments must perform in a semester out of above **Ten** experiments.

Or

Physics-1(Gr-B/Gr-A)
Code: PH191
Contacts: 3P
Credits: 2

Group 1: Experiment from Higher Secondary knowledge of Physics
13. Determination of thermal conductivity of a good conductor by Searle's method.
14. Determination of thermal conductivity of a bad conductor by Lees and Chorlton's method.
15. Determination of dispersive power of the material of given prism.
16. Use of Carry Foster's bridge to determine unknown resistance.

Group 2: Experiments on General Properties of matter

17. Determination of Young's modulus by Flexure method and calculation of bending moment and shear force at a point on the beam.
18. Determination of modulus of rigidity by static/ dynamic method.
19. Determination of co-efficient of viscosity by Poiseulle's capillary flow method.

Group 3: Optics
7. Determination of wavelength of light by Newton's ring method.
8. Determination of wavelength of light by Fresnel's bi-prism method
9. Determination of wavelength of light by Laser diffraction method.
10. Determination of numerical aperture and the energy losses related to optical fibre experiment

a) A candidate is required to perform 3 experiments taking one from each group. Initiative should be taken so that most of the Experiments are covered in a college in the distribution mentioned above. Emphasis should be given on the estimation of error in the data taken.

b) In addition, a student should perform one more experiments where he/she will have to convert the non-electrical signals (viz. Temperature, Intensity of Light, Pressure etc.) present in an Experiment into electrical signals and measure them with the help oh Multi-meters/ Oscilloscopes. Student should calibrate the Sensor for Experiment before use.

c) Innovative experiment: One more experiment designed by the student or the concerned teacher or both.

Note:

i. Failure to perform each experiment mentioned in b] and c] should be compensated by *two* experiments from two different groups mentioned in the above list.

ii. At the end of the semester report should sent to the board of studies regarding experiments, actually performed by the college, mentioned in b] and c]

iii. Experiment in b] and c] can be coupled and can be parts of a single experiment.

Engineering Science

Basic Electrical and Electronics Engineering-I
Code: ES191
Contacts:
Credits: 2

Basic Electrical Engineering Laboratory-I

List of Experiments:
Sl. No Name of the Experiments
1. Characteristics of Fluorescent lamps
2. Characteristics of Tungsten and Carbon filament lamps
3. (a) Verification of Thevenin's theorem.
   (b) Verification of Norton's theorems.
4. Verification of Maximum power theorem.
5. Verification of Superposition theorem
6. Study of R-L-C Series circuit
7. Study of R-L-C parallel circuit

Basic Electronics Engineering Laboratory-I

There will be a couple of familiarization lectures before the practical classes are undertaken where basic concept of the instruments handled Eg: CRO, Multimeters etc will be given. Lectures on measurement techniques and error calculation will also have to be organized.

3 hours per week must be kept, initially for practical lectures, and later for tutorials.

List of Experiments:

Familiarisation with passive and active electronic components such as Resistors, Inductors, Capacitors, Diodes, Transistors (BJT) and electronic equipment like DC power supplies, multimeters etc.
Familiarisation with measuring and testing equipment like CRO, Signal generators etc.
Study of I-V characteristics of Junction diodes.
Study of I-V characteristics of Zener diodes.
Study of Half and Full wave rectifiers with Regulation and Ripple factors.
Study of I-V characteristics of BJTs.

Engineering Drawing & Computer Graphics(Gr-A/GrB)
Code: ME191
Contacts: 1L+3P
Credits: 3

A. THEORETICAL PART

1. Introduction to Lines, Lettering, Dimensioning, Scales.   - 1L

2. Geometrical Construction and Curves   - 1L

3. Projection of Points, Lines and Surfaces   - 2L

4. Projection of Solids   - 2L

5. Isometric Views   - 1L

6. Sectional Views   - 1L

7. Development of Surfaces   - 1L

8. Introduction to Computer Aided Drafting   - 3L

B. PRACTICAL PART

1. LINES, LETTERING, DIMENSIONING, SCALES; Plain scale, Diagonal scale.

- 6hrs

2. GEOMETRICAL CONSTRUCTION AND CURVES; Construction of polygons, Parabola, Hyperbola, Ellipse. - 6hrs

3. PROJECTION OF POINTS, LINES, SURFACES; Orthographic projection- 1st and 3rd angle projection, Projection of lines and surfaces– Hexagon. - 3hrs

4. PROJECTION OF SOLIDS; Cube, Pyramid, Prism, Cylinder, Cone. - 6hrs

5. DRAWING ISOMETRIC VIEW FROM ORTHOGONAL/ SECTIONAL VIEWS OF SIMPLE SOLID OBJECTS. - 3hrs

6. FULL AND HALF SECTIONAL VIEWS OF SOLIDS. - 3hrs

7. DEVELOPMENT OF SURFACES; Prism, Cylinder, Cone. - 3hrs

8. COMPUTER AIDED DRAFTING (Using AutoCAD and/or similar softwares); Introduction: Cartesian and Polar coordinate system, Absolute and Relative coordinates; Basic editing commands: Line, Point, Trace, Rectangle, Polygon, Circle, Arc, Ellipse, Polyline; Editing methods; Basic object selection methods, Window and crossing window, Erase, Move, Copy, Offset, Fillet, Chamfer, Trim, Extend, Mirror; Display commands: Zoom, Pan, Redraw, Regenerate; Simple dimensioning and text, Simple exercises. - 6hrs

References / Books:

- Narayana, K.L. and Kannaiah, P. Text Book of Engineering Drawing"Engineering Graphics", Scitech Publication

- Bhatt, N.D. "Elementary Engineering Drawing", Charotar Book Stall, Anand, 1998

- Lakshminarayanan, V. and Vaish Wanar, R.S., "Engineering Graphics", Jain Brothers, New Delhi, 1998

- Chandra, A.M. and Chandra Satish, "Engineering Graphics", Narosa, 1998

- Jolhe, "Engineering Graphics", Tata McGraw-Hill- WBUT Series

- Gill, P.S., "A Text Book of Engineering Drawing", Katson Publishing House (Kataria and Sons)

- Venugopal, K., "Engineering Drawing & Graphics + AutoCAD", New Age International

- Ventaka Reddy K., "Text Book of Engineering Drawing (2nd Edition)", BS Publication.

Or

Workshop Practice(Gr-B/GrA)
Code: ME192
Contacts:
Contact Hours Per week: 1L+3P= 4
Credits: 3

A. THEORETICAL PART

1. INTRODUCTION TO MANUFACTURING; Socio-economic role, Definition, Major grouping and Examples.   - 1L

2. ENGINEERING MATERIALS; Classification / Major grouping, Physical, Chemical and Mechanical properties, Applications   - 1L

3. DIFFERENT CONVENTIONAL MANUFACTURING PROCESSES MAINLY COVERING BASIC PRINCIPLES, DIFFERENT METHODS AND GENERAL APPLICATIONS; Manufacturing by forming /shaping from solid (input) to solid (product); Forging, Rolling, Drawing, Extrusion; Press tool work- Bending, Shearing, Drawing and Coining.   - 3L

4. FORMING / SHAPING FROM LIQUID TO SOLID- CASTING; General principles, General classification or Types of casting; Sand mould casting- procedural steps and requirements; Pattern, Mould, Melting, Pouring, Solidification, Extracting and Fettling. Other casting processes (for larger volume and quality); Centrifugal casting, Investment casting, Die casting.   -3L

5. JOINING PROCESSES; Welding (Permanent Joining)- General classification and basis; Gas welding, Arc welding, Friction welding and Resistance welding, w.r.t. Principle, Requirements, Relative Advantages and Applications; Brazing and soldering.

<center>- 2L</center>

6. REMOVAL (MACHINING) PROCESS; Principle and purpose of machining, Machining requirements, Machine tools- Definition, General classification w.r.t, functional principles and applications; Major machining parameters (and responses)- Speed, Feed and Depth of cut; Tool geometry (Rake, Clearance and Cutting angles), Cutting fluid application; Elementary machining operations- Facing, Centering, Turning, Threading, Drilling, Boring, Shaping and Milling.

     -2L

B. SCHEDULE OF PRACTICAL CLASSES

Suggested apportionment / weigtage:

- Machining (and fitting)- 50% (6 days) 18 hrs
- Casting (including pattern making molding and preparation) - 25% (3 days 9hrs)
- Welding (gas, arc and resistance) (2 days 6hrs) and Sheet Metal Working (1 day 3hr)- 25% (3 days 9hrs)

FEASIBLE TYPES / MODELS OF ASSIGNMENTS

i) FITTING (in 2 days or 6 hours); Making a gauge from MS plate as shown in Fig.1.
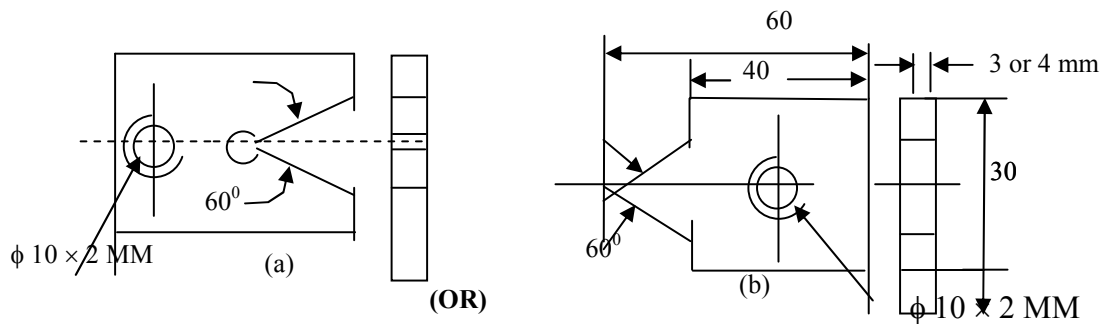

Fig.1: Job for fitting practice

Operations required:

11.   Squaring and finishing of the blank by filing
12.   Making the Vee-portion by sawing and filing
13.   Drilling (in machine) and tapping (hand)

ii) MACHINING (in 3 days or 9 hours); To make a pin as shown in Fig.2 from a □20mm mild steel rod in a lathe.
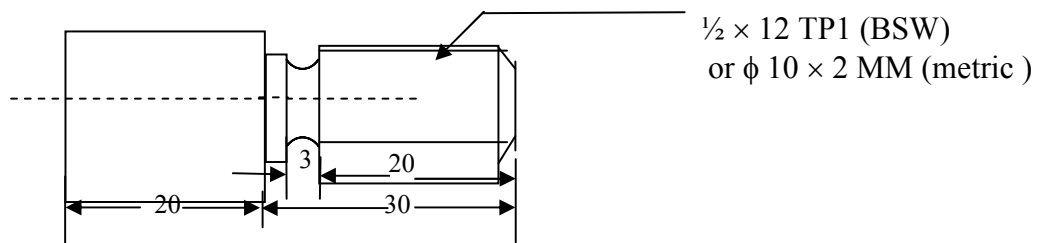

Fig.2: Job for practice on a lathe

iii) MACHINING (in 1 day or 3 hours); To make a MS prism as shown in Fig.3 from a ☐20mm mild steel rod in a shaping and / or milling machine.
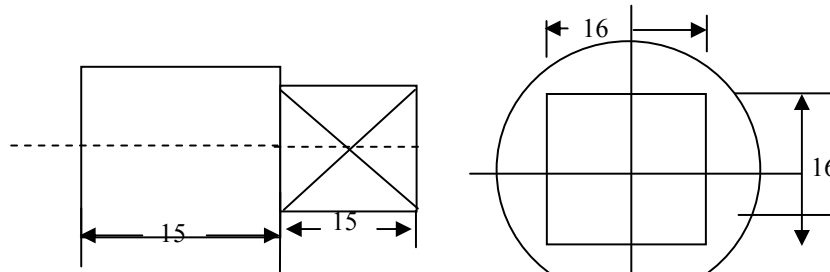

Fig.3: Job for practice on a shaping and/or milling machine

iv) PATTERN MAKING, SAND MOULDING AND CASTING (in 3 classes or 9 hours); To make a wooden pattern and a sand mould with that pattern for casting a cast iron block as shown in Fig.4.

Fig.4: Job for making a pattern
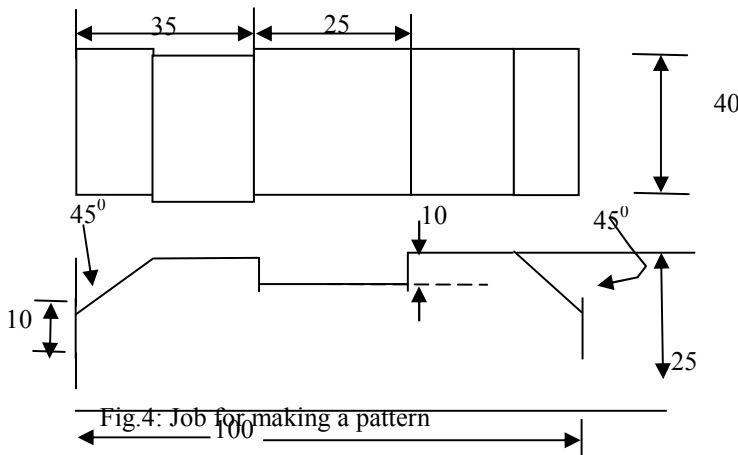
v) WELDING (GAS WELDING) (in 1 class or 3 hours); To join two thin mild steel plates or sheets (1 to 3 mm thick) as shown in Fig. 5 by gas welding.
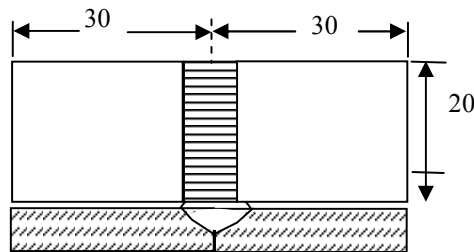

Fig.5: Welding specimen for practice

vi)   WELDING (ARC WELDING) (in 1 day or 3 hours); To join two thick (6mm) MS plate as shown in Fig. 5 by arc welding.

vii)   SHEET METAL WORK (in 1 day or 3 hours); Forming a cone, for example.

Theory

Basic Science

Basic Computation & Principles of Computer Programming
Code: CS 201
Contacts: 3L + 1T = 4
Credits: 4

Fundamentals of Computer:

History of Computer, Generation of Computer, Classification of Computers   2L

Basic Anatomy of Computer System, Primary & Secondary Memory, Processing Unit, Input & Output
devices   3L

Binary & Allied number systems representation of signed and unsigned numbers. BCD, ASII. Binary
Arithmetic & logic gates   6L

Assembly language, high level language, compiler and assembler (basic concepts)

                                                                                               2L

Basic concepts of operating systems like MS DOS, MS WINDOW, UNIX, Algorithm & flow chart

                                                                                               2L
C Fundamentals:
The C character set identifiers and keywords, data type & sizes, variable names, declaration, statements   3L
Operators & Expressions:
Arithmetic operators, relational and logical operators, type, conversion, increment and decrement
operators, bit wise operators, assignment operators and expressions, precedence and order of evaluation.
Input and Output: Standard input and output, formatted output -- printf, formatted input scanf.

                                                                                               5L

Flow of Control:
Statement and blocks, if - else, switch, loops - while, for do while, break and continue, go to and labels

                                                                                               2L

Fundamentals and Program Structures:
Basic of functions, function types, functions returning values, functions not returning values, auto,
external, static and register variables, scope rules, recursion, function prototypes, C preprocessor,
command line arguments.   6L
Arrays and Pointers:
One dimensional arrays, pointers and functions, multidimensional arrays.   6L
Structures Union and Files:
Basic of structures, structures and functions, arrays of structures, bit fields, formatted and unformatted
files.   5L
Recommended reference Books:
Introduction To Computing (TMH WBUT Series), E. Balagurusamy,TMH

Kerninghan, B.W.	The Elements of Programming Style
Yourdon, E.	Techniques of Program Structures and Design
Schied F.S.	Theory and Problems of Computers and Programming
Gottfried	Programming with C Schaum
Kerninghan B.W. & Ritchie D.M.	The C Programming Language
Rajaraman V.	Fundamental of Computers
Balaguruswamy	Programming in C
Kanetkar Y.	Let us C
M.M.Oka	Computer Fundamentals,EPH

Leon	Introduction to Computers,Vikas
Leon-	Fundamental of Information Technology,Vikas
Ram B.	Computer Fundamentals, New Age International
Ravichandran D.	Programming in C, New Age International
Xavier C.	C Language & Numerical Methods, New Age Inter.
Xavier C.	Introduction to Computers, New Age International
Rao S.B.	Numerical Methods with Programs in Basic Fortran Pascal & C++, Universities Press
Dutta N.	Computer Programming & Numerical Analysis, Universities Press
Bhanu Pratap	Computer Fundamentals
Rajaram	Computer Concepts & C Program, Scitech

Chemistry-1(Gr-B/Gr-A)
Code: CH201
Contacts: 3L + 1T = 4
Credits: 4

<div align="center">

Or

</div>

Physics-1(Gr-A/Gr-B)
Code: PH201
Contacts: 3L + 1T = 4
Credits: 4

Mathematics
Code: M201
Contacts: 3L + 1T = 4
Credits: 4

Note 1: The whole syllabus has been divided into five modules.

Note 2: U<u>Structure of the question paper</u>U

There will be three groups in the question paper. In Group A, there will be one set of multiple choice type questions spreading the entire syllabus from which 10 questions (each carrying one mark) are to be answered. From Group B, three questions (each carrying 5 marks) are to be answered out of a set of questions covering all the three modules. Three questions (each carrying 15 marks) are to be answered from Group C. Each question of Group C will have three parts covering not more than two topics (marked in bold italics faces). Sufficient questions should to be set covering all modules.

<div align="center">

Module I

</div>

Ordinary differential equations (ODE)- First order and first degree: Exact equations, Necessary and sufficient condition of exactness of a first order and first degree ODE (statement only), Rules for finding Integrating factors, Linear equation, Bernoulli's equation. General solution of ODE of first order and higher degree (different forms with special reference to Clairaut's equation).   **5L**

<div align="center">

Module II

</div>

ODE- Higher order and first degree: General linear ODE of order two with constant coefficients, C.F. & P.I., D-operator methods for finding P.I., Method of variation of parameters, Cauchy-Euler equations,Solution of simultaneous linear differential equations.   **6L**

Module III

Basics of Graph Theory: Graphs, Digraphs, Weighted graph, Connected and disconnected graphs, Complement of a graph, Regular graph, Complete graph, Subgraph,; Walks, Paths, Circuits, Euler Graph, Cut sets and cut vertices, Matrix representation of a graph, Adjacency and incidence matrices of a graph, Graph isomorphism, Bipartite graph.   **10L**

Module IV

Tree: Definition and properties, Binary tree, Spanning tree of a graph, Minimal spanning tree, properties of trees, Algorithms: Dijkstra's Algorithm for shortest path problem, Determination of minimal spanning tree using DFS, BFS, Kruskal's and Prim's algorithms.   **6L**

Module V

Improper Integral: Basic ideas of improper integrals, working knowledge of Beta and Gamma functions (convergence to be assumed) and their interrelations.   **3L**

Laplace Transform (LT): Definition and existence of LT, LT of elementary functions, First and second shifting properties, Change of scale property; LT of $\dfrac{f(t)}{t}$, LT of $t^n f(t)$, LT of derivatives of $f(t)$, L.T. of $\int f(u)du$. Evaluation of improper integrals using LT, LT of periodic and step functions, Inverse LT**:** Definition and its properties; Convolution Theorem (statement only) and its application to the evaluation of inverse LT, Solution of linear ODE with constant coefficients (initial value problem) using LT.   **10L**

Total 40 Lectures

Suggested Reference Books:

1**. Advanced Engineering Mathematics**, Erwin Kreyszig, (Wiley Eastern)

2. **Graph Theory**: V. K. Balakrishnan, (Schaum's Outline, TMH)

3. **A first course at Graph Theory**: J. Clark and D. A. Holton (Allied Publishers LTD)

4. **Introduction to Graph Theory**: D. B. West (Prentice-Hall of India)

5. **Graph Theory**: N. Deo (Prentice-Hall of India)

6. **Engineering Mathematics:** B.S. Grewal (S. Chand & Co.)

7. **Higher Engineering Mathematics**: John Bird (4th Edition, 1st Indian Reprint 2006, Elsevier)

8**. Calculus**: Strauss, Bradley and Smith (3P^rdP edition, Pearson Education)

9. **Engineering Mathematics (Volume 2):** S. S. Sastry (Prentice-Hall of India)

10. **Advanced Engineering Mathematics, 3E**: M.C. Potter, J.L. Goldberg and E.F. Abonfadel (OUP),
     Indian Edition

11. **An Introduction to Differential Equations**, R.K. Ghosh and K.C.Maity (New Central Book Agency)

Basic Electrical and Electronics Engineering-II
Code: ES201
Contacts: 3L + 1T = 4
Credits: 4

Basic Electrical Engineering-II

Electrostatics: Coulomb's law, Electric Field Intensity, Electric field due to a group of charges, continuous charge distribution, Electric flux, Flux density, Electric potential, potential difference, Gauss's law, proof of gauss's law, its applications to electric field and potential calculation, Capacitor, capacitance of parallel plate capacitor, spherical capacitor, isolated spheres, concentric conductors, parallel conductors. Energy stored in a capacitor.   5L

DC Machines: Construction, Basic concepts of winding (Lap and wave). DC generator: Principle of operation, EMF equation, characteristics (open circuit, load) DC motors: Principle of operation, Speed-torque Characteristics (shunt and series machine), starting (by 3 point starter), speed control (armature voltage and field control)   6L

Single phase transformer: Core and shell type construction, EMF equation, no load and on load operation, phasor diagram and equivalent circuit, losses of a transformer, open and short circuit tests, regulation and efficiency calculation.   4L

3 phase induction motor: Types, Construction, production of rotating field, principle of operation, equivalent circuit and phasor diagram, rating, torque-speed characteristics (qualitative only). Starter for squirrel cage and wound rotor induction motor. Brief introduction of speed control of 3 phase induction motor (voltage control, frequency control, resistance control)   5L

Three phase system: Voltages of three balanced phase system, delta and star connection, relationship between line and phase quantities, phasor diagrams. Power measurement by two watt meters method.   3L

General structure of electrical power system: Power generation to distribution through overhead lines and under ground cables with single lone diagram.   1L

Text books:
1. Basic Electrical engineering, D.P Kothari & I.J Nagrath, TMH, Second Edition
2. Fundamental of electrical Engineering, Rajendra Prasad, PHI, Edition 2005.
3. Basic Electrical Engineering, V.N Mittle & Arvind Mittal, TMH, Second Edition
4. Basic Electrical Engineering, J.P. Tewari, New age international publication

Reference books:
1. Basic Electrical Engineering(TMH WBUT Series), Abhijit Chakrabarti & Sudipta Nath, TMH
2. Electrical Engineering Fundamental, Vincent.D.Toro, Pearson Education,
Second Edition.
2. Hughes Electrical & Electronics Technology, 8/e, Hughes, Pearson Education.
3. Basic Electrical Engineering, T.K. Nagsarkar & M.S. Sukhija, Oxford
4. Introduction to Electrical Engineering, M.S. Naidu & S, Kamakshaiah, TMH
5. Basic Electrical Engineering, J.J. Cathey & S.A Nasar, TMH, Second Edition.

Basic Electronics Engineering - II: 20L

Pre-requisites: Knowledge of Basic Electronics Engineering – I.

Module – 1: Field Effect Transistors: 5L
Concept of Field Effect Transistors (channel width modulation), Gate isolation types, JFET Structure and characteristics, MOSFET Structure and characteristics, depletion and enhancement type; CS, CG, CD configurations; CMOS: Basic Principles.

Module – 2: Feed Back Amplifier, Oscillators and Operational Amplifiers: 5L+5L = 10L
Concept (Block diagram), properties, positive and negative feed back, loop gain, open loop gain, feed back factors; topologies of feed back amplifier; effect of feed back on gain, output impedance, input impedance, sensitivities (qualitative), bandwidth stability; effect of positive feed back: instability and oscillation, condition of oscillation, Barkhausen criteria.
Introduction to integrated circuits, operational amplified and its terminal properties; Application of operational amplifier; inverting and non-inverting mode of operation, Adders, Subtractors, Constant-gain multiplier, Voltage follower, Comparator, Integrator, Differentiator.

Module – 3: Digital Electronics: 5L
Introduction to binary number; Basic Boolean algebra; Logic gates and function realization with OPAMPs.

Outcomes:
Students will be able to distinguish the different Gate isolation techniques; draw and explain the I-V characteristics of FETs; Appreciate the utility of CMOS.

Student will analyse the different OPAMP circuits and apply the knowledge of network theory to OPAMP circuits.

Student must acquire the proficiency to express binary numbers, convert binary to decimal and vice versa, draw truth tables for different logic operations, design Gates and simple digital circuits using the Gates.

Recommended Books:

Text:
- Sedra & Smith: Microelectronics Engineering.
- Millman & Halkias: Integrated Electronics.

References:
- Malvino: Electronic Principle.
- Schilling & Belove: Electronics Circuits.
- Millman & Grabal: Microelectronics.
- Salivahanan: Electronics Devices & Circuits.
- Boyelstad & Nashelsky: Electronic Devices & Circuit Theory.

Engineering Thermodynamics & Fluid Mechanics
Code: ME201
Contacts: 3L + 1T = 4
Credits: 4

Module 1 :   8L+3T
 Basic Concepts of Thermodynamics
   Introduction: Microscopic and Macroscopic viewpoints
   Definition of Thermodynamic systems: closed, open and isolated systems
   Concept of Thermodynamics state; state postulate.

Definition of properties: intensive, extensive & specific properties.
Thermodynamic equilibrium
Thermodynamic processes; quasi-static, reversible & irreversible processes; Thermodynamic cycles.
Zeroth law of thermodynamics. Concept of empirical temperature.

Heat and Work
Definition & units of thermodynamic work.
Examples of different forms of thermodynamic works; example of electricity flow as work.
Work done during expansion of a compressible simple system
Definition of Heat; unit of Heat
Similarities & Dissimilarities between Heat & Work

Ideal Equation of State, processes; Real Gas
Definition of Ideal Gas; Ideal Gas Equations of State.
Thermodynamic Processes for Ideal Gas; P-V plots; work done, heat transferred for isothermal, isobaric, isochoric, isentropic & polytropic processes.
Equations of State of Real Gases: Van der Waal's equation; Virial equation of state.

Properties of Pure Substances
p-v & P-T diagrams of pure substance like H_2O
Introduction to steam table with respect to steam generation process; definition of saturation, wet & superheated status.
Definition of dryness fraction of steam, degree of superheat of steam.

Module 2 :   4L+3T
1st Law of Thermodynamics
Definition of Stored Energy & Internal Energy
1st Law of Thermodynamics for cyclic processes
Non Flow Energy Equation
Flow Energy & Definition of Enthalpy
Conditions for Steady State Steady flow: Steady State Steady Flow Energy Equation

Module 3 :   6L+3T
2nd Law of Thermodynamics
Definition of Sink, Source Reservoir of Heat.
Heat Engine, heat Pump & Refrigerator; Thermal efficiency of Heat Engines & co-efficient of performance of Refrigerators
Kelvin – Planck & Clausius statements of 2nd Law of Thermodynamics
Absolute or Thermodynamic scale of temperature
Clausius Integral
Entropy
Entropy change calculation for ideal gas processes.
Carnot Cycle & Carnot efficiency
PMM-2; definition & its impossibility

Module 4:   6L+3T
Air standard Cycles for IC engines
Otto cycle; plot on P-V, T-S planes; Thermal efficiency
Diesel cycle; plot on P-V, T-S planes; Thermal efficiency
Rankine cycle of steam
h-s chart of steam (Mollier's Chart)
Simple Rankine cycle plot on P-V, T-S, h-s planes
Rankine cycle efficiency with & without pump work
(Problems are to solved for each module)

Module 5:   9L+3T
Properties & Classification of Fluids
Ideal & Real fluids
Newton's law of viscosity; Newtonian and Non-Newtonian fluids

Compressible and Incompressible fluids

Fluid Statics
  Pressure at a point
Measurement of Fluid Pressure
  Manometers : simple & differential
  U-tube
  Inclined tube
Fluid Kinematics
  Stream line
  laminar & turbulent flow
  external & internal flow
  Continuity equation
Dynamics of ideal fluids
  Bernoulli's equation
  Total head; Velocity head; Pressure head
  Application of Bernoulli's equation
Measurement of Flow rate : Basic principles
  Venturimeter
  Pilot tube
  Orifice meter

33L+15T =48P

(Problems are to be solved for each module)

Engineering Thermodynamics

Text :
1   Engineering Thermodynamics - P K Nag, 4th edn, TMH.

References :

    1   "Fundamentals of Thermodynamics" 6e by Sonntag & Van Wylin published by Wiley India.

    2   Engineering Thermodynamics – Russel & Adeliyi (Indian edition), OUP

    3   Engineering Thermodynamics – Onkar Singhh, New Age International Publishers Ltd.

    4   Basic Engineering Thermodynamics – R Joel, 5th Ed., Pearson

Fluid Mechanics

Text :
    1   Fluid Mechanics and Hydraulic Machines - R K Bansal

References :

    1   Introduction to Fluid Mechanics and Fluid Machines - S.K.Som and G.Biswas. 2nd edn, TMH

    2   Fluid Mechanics by A.K.Jain.

Basic Science

Basic Computation & Principles of Computer Programming Lab
Code: CS 291
Contacts: Credits: 2

Exercises should include but not limited to:

1. DOS System commands and Editors (Preliminaries)
2. UNIX system commands and vi (Preliminaries)
3. Simple Programs: simple and compound interest. To check whether a given number is a palindrome or not, evaluate summation series, factorial of a number , generate Pascal's triangle, find roots of a quadratic equation
4. Programs to demonstrate control structure : text processing, use of break and continue, etc.
5. Programs involving functions and recursion
6. Programs involving the use of arrays with subscripts and pointers
7. **Programs using structures and files.**

Chemistry-1(Gr-B/Gr-A)
Code: CH291
Contacts:
Credits: 2

Or

Physics-1(Gr-A/Gr-B)
Code: PH291
Contacts:
Credits: 2

Engineering Science

Basic Electrical and Electronics Engineering-II
Code: ES291
Contacts:
Credits: 2

Basic Electrical Engineering Laboratory-II

List of Experiments:
Sl. No Name of the Experiments
1. Calibration of ammeter and voltmeter.
2. Open circuit and Short circuit test of a single phase Transformer.
3. No load characteristics of D.C shunt Generators
4. Starting and reversing of speed of a D.C. shunt
5. Speed control of DC shunt motor.
6. Measurement of power in a three phase circuit by two wattmeter method.

Basic Electronics Engineering Laboratory-II

There will be a couple of familiarization lectures before the practical classes are undertaken where basic concept of the instruments handled will be given.

3 hours per week must be kept, initially for practical lectures, and later for tutorials.

List of Experiments:

1. Study of I-V characteristics of Field Effect Transistors.
2. Determination of input-offset voltage, input bias current and Slew rate of OPAMPs.
3. Determination of Common-mode Rejection ratio, Bandwidth and Off-set null of OPAMPs.
4. Study of OPAMP circuits: Inverting and Non-inverting amplifiers, Adders, Integrators and Differentiators.
5. Study of Logic Gates and realization of Boolean functions using Logic Gates.
6. Study of Characteristic curves for CB, CE and CC mode transistors.

Engineering Drawing & Computer Graphics(Gr-B/Gr-A)
Code: ME291
Contacts:
Credits: 3

Or

Workshop Practice(Gr-A/Gr-B)
Code: ME292
Contacts:
Credits: 3