STUDY AND EVALUATION SCHEME

FOR

1. **ELECTRONICS & COMMUNICATION ENGINEERING**
2. **ELECTRONICS ENGINEERING (DIGITAL ELECTRONICS)**
3. **ELECTRONICS ENGINEERING (MEDICAL ELECTRONICS)**

SEMESTER - I

Code No.	Subject	Study Scheme Period/Week			Evaluation Scheme						Total Marks
					Internal Assessment		External Assessment Exam				
		L	T	P	Theory	Practical	Written Paper		Practical		
					Max Marks	Max. Marks	Max. Marks	Hrs.	Max. Marks	Hrs.	
*1	Communication Techniques – I	3	2	-	50	-	100	3	-	-	150
*2	Applied Maths – I	3	2	-	50	-	100	3	-	-	150
*3	Applied Physics	4	-	3	50	25	100	3	50	3	225
4	Basic Electricity	4	-	3	50	25	100	3	50	3	225
5	Introduction to Computers	1	-	4	-	25	-		100	3	125
6	Mechanical Workshop	-	-	6	-	50	-	-	100	3	150
**	Student Centered activities	-	-	5							
	TOTAL	15	4	21	200	125	400		300		1025

*   Subjects common with Mechanical, Production, Automobile Engineering, Civil

**   Student centered activities will include: extension lectures, field visits, Soft Skills, seminars, debates, hobby clubs, library studies, awareness regarding ecology and environment, conservation of energy (Petroleum products, electricity etc), social service camps and other co-curricular activities including games. Advanced planning for each semester has got to be made

COMMUNICATION TECHNIQUES – I

L	T	P
3	2	-

RATIONALE

This course aims at developing reading, writing and communications skills in the students so as to develop confidence in them in written and oral techniques of communication in English language. This course will also help the students in their continuing education needs.

NOTE: Weightage of each topic for external examination is given in the brackets

DETAILED CONTENTS

1. The Prose Textbook entitled "A Book of English for Polytechnic Students", prepared by National Institute of Technical Teachers' Training and Research (NITTTR), Chandigarh and published by Macmillan India Limited.   (30%)
   Questions to test the comprehension and critical appraisal of the lesson are to be given. Three questions out of five are to be attempted. Word limit for answer is to be approximately 150 words each.

2. **Vocabulary**   (10%)
   Antonyms, synonyms, homonyms and one word substitution.

3. **Grammar**   (20%)
   A brief review of easy forms of tenses (present indefinite, present continuous, present perfect, present perfect continuous, past indefinite, past continuous, past perfect, past perfect continuous and future indefinite). Conversions of direct into indirect narration and vice versa (only simple sentence) Punctuation articles, prepositions, voice, auxiliary (be, have, do and models).

4. **Comprehension:**   (20%)
   A passage of 100 – 150 words may be given to test the comprehension skill of the students. Simple question to test the understanding of the contents and vocabulary may be given.

5. **Essay**   (20%)
   Choice of attempting one out of three topics may be given. The essay will be of 300 – 350 words. Descriptive, narrative and reflective topics from areas such as science, technology, environment, current problems, and socio-economic issues may be given.

Guidelines for Tutorials

1. Telephonic conversation – Making and Receiving Calls
2. Mock exercises on interview for a job.
3. Group discussions on current issues
4. Listening comprehension from Radio or TV talk in English
5. Extempore speech / Declaimation contest
6. Presentation of a report with the help of Audio-Visual aids.

APPLIED MATHEMATICS – I

	L	T	P
	3	2	-

RATIONALE

The course aims at developing analytical abilities in basics of applied mathematics such as: vector algebra, matrices, elementary numerical analysis, coordinate geometry, differential and integral calculus and solution of first order differential equations. Besides application of above the elements in engineering, the course of study will also provide continuing education base to them.

NOTE: Weightage of each topic for external examination is given in the brackets

DETAILED CONTENTS

1. **ALGEBRA**   15%
    (i)   Arithmetic Progression (A.P.) – its nth term, sum to n terms. Geometric Progression (G.P.) - its nth term, sum to n terms. And infinite Geometric series.
    (ii)   Partial Fractions.
    (iii) Binomial theorem for positive integral index (without proof), Binomial theorem for any index, Expansions.

2. **TRIGONOMETRY**   15%
    (i)   Sum and difference formulas for trigonometric ratios of angles and their application (without proof). Formula from product to sum, difference and vice-versa. Ratio of multiple angles, sub multiple angles (like 2A, 3A, A/2).
    (ii)   In a triangle sine formulas, cosine formulas, Napier's analogy. Solution of triangle.
    (iii) Simple problems on height and distance.
    (iv)   Plotting of curves y = f(x), f(x) being algebraic function (maximum upto third degree) or trigonometric functions (Sine, Cosine, Tangent).

3. **COORDINATE GEOMETRY**   40%
    (i)   Equation of straight line in various standard forms. Intersection of two straight lines and angle between them. Concurrent lines, perpendicular distance formula.
    (ii)   General equation of a circle and its characteristics. Equation of a circle given center and radius, three point form and diametrical form.
    (iii) Definition of a conic section, standard equation of a parabola equation of parabola given its focus and Directrix. Given the equation of parabola finding its focus axis, vertex, Directrix and latus section.
    (iv)   Ellipse and hyperbola (standard equation, without derivation) determining the equation of ellipse and hyperbola given the Directrix, focus and eccentricity. Given the equation of the ellipse and hyperbola finding the focii, Directrixes, axes, latus rectum, vertex and eccentricity.

4. **VECTOR ALGEBRA**   **10%**
   - (i) Concept of a vector, Position vector of a point. Addition and subtraction of vectors.
   - (ii) Multiplication of a vector by a scalar product and vector product of two vectors. Application to problems on work done and moment (torque)

5. **DETERMINANT AND MATRIX**   **20%**
   - (i) Definitions Evaluation of a determinant of order two and three. Minor and cofactors. Properties of determinants. Solving simultaneous equations by Cramer's rule.
   - (ii) Concept of a matrix, definitions, Transpose of a matrix, Symmetric and Skew Symmetric matrix, Diagonal matrix, Unit matrix, Addition and Multiplication of matrices, Adjoint and Inverse of a matrix, solving simultaneous equations by matrix methods.

APPLIED PHYSICS

L   T   P

4   -   3

RATIONALE

Applied physics is a foundation course. Its purpose is to develop proper understanding of physical phenomenon and scientific temper in the students. The course covers basics like Mechanics, Heat, Sound and Light.

DETAILED CONTENTS

1. **Measurement** (10%)
   (i) **Units and Dimensions**

   Fundamental and derived units, SI units, dimensions of physical quantities, dimensional formula and dimensional equation, principles of homogeneity of dimensions and applications of homogeneity principle in:

   a. Checking the correctness of physical equation.
   b. Deriving relations among various physical quantities.
   c. Conversion of numerical values of physical quantities from one system of units into other system.

   (ii) Errors in measurement accuracy, estimation of percentage error in the result of measurement.

2. **Waves** (20%)
   Generation of waves by vibrating particles, progressive wave, equation of waves, energy transfer by particles and waves, superposition of waves and its applications to interference, beats and stationary waves (graphical); sound and light as wave – range of frequencies, wavelengths, velocities and their nature, electromagnetic spectrum Doppler effect.

3. **Sound** (15%)
   (i) **Acoustics**
   Reflection, refraction and absorption of sound waves by materials; definition of pitch, loudness, quality and intensity of sound waves, units of intensity (bel and decibel); Echo and reverberation and reverberation time, control of reverberation time. Acoustic insulation (qualitative treatment only of reverberation).

   (ii) **Ultrasonic**
   Production of ultrasonic waves by magnetostriction and piezoelectric effect, detection and properties of ultrasonic; applications to drilling, cold welding, cleaning, flaw detection and exploration (sonar);

4. **Light**
   Geometrical Optics: (15%)

   Defect in image formation, eyepieces construction and principles of preparation of telephoto and zoom lens, principle of optical projectors, optical principles of OHP and slide film projectors.

5. **Wave Optics:** (15%)

Interference of light waves; Young's experiment; Newton's ring application of interference (Plainness testing measurement of small thickness), basic ideas about diffraction and polarization of light waves.

6. **Laser and its Applications** (10%)

Laser principle, types of Lasers; detailed study of the He-Ne and Ruby lasers and their applications. Fluorescent tube; mercury arc light, xenon source, sodium lamp.

7. **Atomic Structure and Energy Levels** (10%)

Bohr model of atomic structure,; Energy levels, ionization and resonance potentials, Energy levels of conductors, insulators and semiconductors. Atomic and crystal structure of silicon and germanium, covalent bonds. effect of temperature on conductivity of germanium and silicon.

8. **Radioactivy and Detection of Radiations** (5%)

Natural radioactivity; half-life; decay constant; mean life; radioactive transformation. Principles of nuclear fission and fusion; energy generation. Source of background radiations; health Hazards of radiations. Units of radiation.

LIST OF PRACTICALS

1. Use of Vernier calipers and micrometer for determination of diameter of a wire.
2. Study of interference of sound waves using Quincke's tube.
3. Study of resonance in air column and determination of velocity of sound in air.
4. To make a telescope by combination of suitable lenses and determine its magnifying power.
5. Measurement of small thickness by interference method (by Fresnel's Biprism method)
6. To make a compound microscope by suitable combination of lenses and determine its magnifying power.
7. To determine the wavelength of sodium light by Newton's ring method.
8. Setting an OHP lenses and mirrors for its best performance.
9. Determination of wavelength of various spectral lines of mercury lamp.
10. Measurement of illumination level of a white surface under: natural daylight, incandescent light and fluorescent light.
11. To compare the intensity of illumination by Bunsen's photometer.
12. Study of diffraction of He-Ne laser beam by markings on a Vernier scale and determination of its wavelength.
13. To measure the first ionization potential of Hg using a diode.

SUGGESTIONS

While teaching the subject, teacher should make maximum use of demonstration to make the subject interesting to the students.

BASIC ELECTRICITY

L   T   P
4 - 3

Rationale:

The course provides the student: (i) Understanding the basic concepts and principles of DC and AC power, Dc and AC circuits (ii) Familiarization with basic electrical circuits and devices (iii) Understanding the principles of working of various testing and measuring instruments and their effective use.

DETAILED CONTENTS

ELECTROSTATICS

1. Review of the following: (5%)

(a) Coulomb's law, Electric field, Electric intensity, Electric lines of force in simple charge configuration.

(b) Gauss's Theorem (no proof), Field around a charged conductor, plane sheet and a sphere.

(c) Concept of potential difference, potential due to a point charge, potential gradient, equipotential Surfaces, breaks down potential and dielectric strength.

2. Capacitor   (5%)

(a) Concepts of capacitance and capacitors, units of capacitance, capacitors ratings.

(b) Parallel plate, spherical and cylindrical capacitors and their capacities

(c) Energy stored in a capacitor

(d) Concept of dielectric and its effect on capacitance .

(e) Series and parallel combination of capacitors, simple problems of capacitors.

3. DC Circuits   (15%)

(a) Concept and units of electric current.

(b) Ohm's law, concept of resistance, conductance, resistivity and conductivity. Their units and dependence on temperature in conductor.

(c) Power and energy, heating effect of electric current and conversion of   mechanical to electrical units and vice versa.

(d) Kirchhoff's voltage and current laws, their applications in simple DC circuits.

(e) Series and parallel combination of resistors, wattage consideration, simple problems.

4. Basic Magnetism   (5%)

(a) Magnetism ,Nature of Magnetism,Magnetic field,Lines of Magnetic flux, coulomb's law ,magnetic intensity,permeability,reluictance,magnetic flux, magnetic density, intensity of magnetization,hysteris ,relation between B & H.

(b) Analogy between Electric and magnetic circuits.

5. Electro Magnetism   (15%)

(a) Magnetic effect of electric current, work law & its application,Biot savart law.

(b) Field outside a long current carrying conducter,field strength due to a solenoid, field strength of the axis of a circular loop.

(c) Force between two current carrying parallel conductors.

(d) Faraday's laws, Lenz's law and rules of electromagnetic induction, principles of self and   mutual induction. self and mutually induces emf, simple numerical problems

(e) Energy stored in a magnetic field, concept of current growth, decay and rise time constant in an inductive (RL) circuit.

(f) Energy stored in an inductor.

6. AC Theory   (15%)

(a) Concept of alternating voltage and current, difference between AC and DC.

(b) Concept of cycle, frequency, period, amplitude, Instantaneous value, average value, rms value and peak value, form factor.

(c) Equation of sinusoidal waveform representation of alternating quantities. Concept of phase difference.

7. Measuring Instruments ;-   (15%)

(a) Electrical Instruments, Essentials of Indicating type Instruments.

(b) Permanent magnet Moving coil Instrument.

(c) Difference between ammeter and voltmeter.

(d) Extension of their range and simple numerical problems.

(e) Dynamometer type moving coil instrument Principle and working of wattmeter (Dynamometer type)

(f) Moving Iron instruments (attraction type and repulsion type).

8. Voltage and current sources   (15%)

(a) Concept of constant voltage source, symbol and graphical representation, characteristics of ideal and practical voltage sources.

(b) Concept of constant current source, symbol, characteristics and graphical representation of ideal and practical current sources.

(c) Equivalence of current and voltage sources.

9. Circuit Theorems   (15%)

(i)   Thevenin's Theorem, Norton's Theorem, Superposition Theorem, Maximum Power Transfer Theorem, applications of network theorems in solving DC circuit problems.

List of Practical:

1. Verification of Ohm's law
2. (a)   Verification of R_{eq}=R1+R2+R3+.......... In circuit, where R1,R2,R3.....are in series.
   (b)   Verification of $1/R_{eq}$=1/R1+1/R2+1/R3+......... in circuit, where R1, R2,R3.......are in parallel
3. Verification of Kirchhoff's first and second laws
4. To measure the (very low) resistance of ammeter and (very high) resistance of voltmeter.
5. To measure resistance of galvanometer by half deflection method.
6. Conversion of galvanometer into (i) Ammeter (ii) Voltmeter.
7. To verify in DC Circuits :
   (i)   The venin's Theorem
   (ii)   Norton's Theorem
   (iii)   Superposition Theorem
   (iv)   Maximum Power Transfer Theorem.

8. To measure inductance of ferrite core coil by first removing the core and then by inserting the core gradually to the full extent and observe the effect of flux concentration on value of inductance.

9. (a) To verify $L_{eq}=L1+l2+l3+......$, where L1, L2, L3....... are connected in series.

   (b) To verify $1/L_{eq}=1/L1+1/L2+1/L3+......$ where L1,L2,L3,...........are connected in parallel.

10. To measure capacitance of tuning capacitor by gradually turning the plates inside one another and to observe effect of different overlaps.

11. (a) To verify $C_{eq}=C1+C2+C3+....$ Where C1,C2,C3,..... are connected in parallel.

   (ii) To verify $1/C_{eq}=1/C1+1/C2+1/C3+....$ Where C1,C2,C3,........are connected in series.

12. Plot current and voltage growth and decay in RL and RC circuits for different time constants.

INTRODUCTION TO COMPUTERS

L	T	P
1	-	4

Rationale

Computer have made great inroads into engineering design, personnel administration, project planning and monitoring, banking, transportation, automatic machine operation, and many other areas of human endeavour. During the past decade, the use of computers has been growing at fast rate. The time has now come when engineering technician has to familiarize themselves with computers to enable them to cope with the inevitable computerization of a significant portion of their job. This is a practical course. Theory, if any , may be dealt in the practical session only.

Detailed contents

1. Elements of Computers and its working –
   a) Block diagram of Computer & overview of its working.
   b) Computer Generations.
   c) Types of computers - Stand alone, multi-user, network/distributed, personal, micro computers, workstations, servers, mainframes and supercomputers.
   d) Input, output and storage devices – interconnections of various peripherals with computer.
   e) Memory – primary and secondary
   f) Classification of programming languages.
   g) Evolution of programming paradigm.
   h) Fourth generation languages(4GL).
   i) System s/w vs application software/programs.
   j) File organization, file types.

2. Familiarization with operating systems.
   Introduction to operating systems as DOS, Windows 95/98/2000/XP/ Vista/windows 2007 along with their comparisons.

3. Document preparation using word processing software – purpose and characterisation of documents, spell checking, mail merge, paragraph and page layout, alignment and justification, tables, charts, graphs, diagrams.

4. Document presentation using PowerPoint – Preparation of slides and its presentation, hyperlinks.

5. Concept of Spreadsheet – handling using spreadsheets formulae, graphs and charts.

6. Introduction to Internet
   a) What is Internet? Search engines.
   b) About Internet addresses.
   c) Hardware required for internet.
   d) server types, connectivity (TCP/IP, shell), applications of internet like: e-mail and browsing.

LIST OF PRACTICALS

1. Given a PC, name its various components and list their functions.
2. Identification of various parts of a computer and peripherals.

3. Practice in installing a computer system by giving connection and loading the system software and application software.
4. Installation of Windows98 or 2000 etc.
   - start
   - shutdown and restore
   - creating and operating on the icons
   - opening , closing and sizing the windows
   - using elementary job commands like-creating, saving, modifying, renaming, finding and deleting a file
   - creating and operating on a folder
   - changing setting like-date ,time ,color (background and foreground)
   - using shortcuts
   - using online help

5. **MS-WORD**
   - FILE MANAGEMENT:
     Opening, creating and saving a document, locating files, copying contents in some different file (s).
   - PAGE SETUP:
     Setting margins ,tab setting ,ruler ,indenting
   - EDITING A DOCUMEMNT:
     Entering text ,cut ,copy ,paste using toolbars.
   - FORMATTING A DOCUMENT:
     Using different fonts ,changing font size and color ,changing the appearance through bold /italic/underlined ,highlighting a text ,changing case ,using subscript and superscript ,using different underline methods
   - Aligning of text in a document ,justification of document ,inserting bullets and numbering
   - formatting paragraph ,inserting page breaks and column breaks
   - use of headers ,footers :inserting foot note ,endnote ,use of comments
   - inserting date ,time ,special symbols ,importing graphic images ,drawing tools
   - Tables and border:
     Creating a table, formatting cells ,use of different border styles ,shading in tables ,merging of cells ,partition of cells ,inserting and deleting a row in a table
   - print preview ,zoom ,page setup ,printing options
   - using find ,replace options
   - using tools like:
     Spellchecker, help ,use of macros ,mail-merge ,thesaurus word content and statistics ,printing envelops and labels
   - using shapes and drawing toolbar ,
   - working with more than one window in MS-WORD

6. **MS-EXCEL**
   - Starting excel ,open worksheet ,enter ,edit ,data ,formulas to calculate values ,format data ,create chart ,printing chart ,save worksheet ,switching from another spread sheet
   - Menu commands:

Create. format charts ,organize ,manage data ,solving problem by analyzing data ,exchange with another applications .Programming with ms-excel ,getting information while working

- Work books:
  Managing work books (create ,open ,close ,save).working in work books ,selecting the cells ,choosing commands ,data entry techniques ,formula creation and links ,controlling calculations ,working with array
- editing a worksheet ,copying ,moving cells ,pasting ,inserting ,deletion cells ,rows ,columns ,find and replace text ,numbers of cells ,formatting worksheet
- Creating a chart:
  Working with chart types, changing data in chart ,formatting a chart ,use chart to analyze data
- using a list to organize data ,sorting and filtering data in list

7. **Power Point**
    - Preparing presentation:
      Creating a new slide, sorting slides, inserting pictures, setting header and footer
    - Formatting:
      Setting fonts, alignments, slide design, slide layout
    - Slide show:
      View show, Rehearse timing. action buttons, slide transition, animations skills

8. **INTERNET AND ITS APPLICATIONS**

    a) Log-in to Internet
    b) Navigation for information seeking on Internet
    c) Browsing and downloading of information from Internet
    d) Sending and receiving e-mail
    - creating a message
    - creating an address book
    - attaching a file with e-mail message
    - receiving a message
    - deleting a message

Reference books
1. Introduction to Information Technology by ITL Education Solutions Ltd. Pearson Publications.
2. Computer Fundamentals by Prabhat Mittal & Ritendra Goel.
3. Fundamentals of Information Technology by Ritendra Goel.
4. Computer Fundamentals & Programming in C by Animesh Sahu, Bibhuti Sharan, L.K. Vishwamitra & G. Jagdeesh.
5. Fundamentals of Computers & Programming in C by G.S. Baluja & G.K. Baluja.
6. Fundamentals of Computers & Programming in C by A.K. Sharma.
7. Basic concept of Computer by Sumit Gupta & Vijay Sadana.

MECHANICAL WORKSHOP

L T P
- - 6

RATIONALE

This subject is gateway to the technological/industrial processes. The mental and manual abilities will be developed to handle engineering materials with hand tools with quality and safety consciousness. The elementary abilities developed in carpentry, fitting, sheet metal and jointing shops will find applications in the practice of this profession. The emphasis given on practical work will provide the students the primary experience of working in team.

DETAILED CONTENTS

The following trades are considered basic.
1. **Carpentry**
2. **Fitting**
3. **Sheet Metal & Jointing**

1. **CARPENTRY SHOP**
   Keeping in view the essential elements of knowledge and skill, the following exercises are planned:
   (i) Introduction to raw materials, various hand tools and safety measures to be observed.
   (ii) Exercise on Marking and Sawing
   (iii) Planning Practice.
   (iv) Chiseling practice
   (v) Introduction of joints, their relative advantages and uses.
   (vi) Preparing of half lap joint
   (vii) Preparing of mortise and tennon joint.
   (viii) Preparation of dovetail joint.
   (ix) Preparation of miter joint
   (x) Demonstration job showing use of rip saw, Tenon saw etc.
   (xi) Study of band saw & circular saw.

2. **FITTING SHOP**
   (i) Common materials used in fitting shop and description of work bench, holding devices and files.
   (ii) Filing practice (production of flat surfaces). Checking by straight edge.
   (iii) Filing a dimensioned rectangular or square piece to an accuracy of 0.25 mm.
   (iv) Description of chisels, hammers etc. and chipping practice
   (v) Simple operation of hack sawing, description of various types of blades, their uses and how to fit the blade and Hack sawing practice.
   (vi) Description of drills, selection of drills for tapping, types of taps, tapping and dieing operations.
   (vii) Drilling practice on soft metals (Al and Brass).
   (viii) Handling of measuring instruments, checking of zero error, finding of least count etc.
   (ix) Practice of filing on non ferrous metal

SHEET METAL & JOINTING SHOP

(i)   Introduction to sheet metal shop, use of hand tools and accessories, e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowances required during job fabrication. Selection of materials.

(ii)   Demonstration of the use of hand shears, sheet metal machines, creasing and grooving tools.

(iii)   Preparation of a sheet metal job involving rolling, shearing, creasing, binding, corner making and round cutting.

(iv)   Preparation of a sheet metal jobs involving shearing, grooving, greasing, circle cutting folding beading, etc.

(v)   Different types of rivets and their applications. Use in puncher and pullers.

(vi)   Practice of riveting in different fashion e.g. lap, butt, chain, zigzag etc.

(vii)   Preparation of utility jobs.

(viii) Introduction to soldering and brazing and; Demonstration on brazing by the instructor.