SCHEME AND SYLLABUS

B.TECH. Courses (common to all Disciplines)

(Ist & IInd Semesters)

w.e.f. 2016-17

Credit Based System

(70:30)

GURU JAMBHESHWAR UNIVERSITY
OF SCIENCE & TECHNOLOGY, HISAR

I-Semester

Subject Area	Subject Code	Subject Name	Contact Hours per Week			Credits
			Lecture	Tutorial	Practical	
HS-1	HUM-101-L	Essentials of Communication-I	3	-	-	3.0
HS-2	HUM-103-L	Principles of Economics	3	-	-	3.0
BS-1	PHY-101-L	Physics-I	3	1	-	3.5
BS-2	MAT-101-L	Mathematics-I	3	2	-	4.0
BS-3 OR ES-1	CHY-101-L OR EE-101-L	Chemistry (G-B) OR Basics of Electrical Engineering (G-A)	3	1	-	3.5
ES-2 OR ES-3	ME-101-L OR ECE-101-L	Workshop Technology (G-A) OR Basics of Electronics Engineering (G-B)	3	-	-	3.0
HS-1	HUM-101-P	Essentials of communication-I Lab	-	-	2	1.0
BS-1	PHY-101-P	Physics-I Lab	-	-	2	1.0
BS-3 OR ES-1	CHY-101-P OR EE-101-P	Chemistry Lab (G-B) OR Basics of Electrical Engineering Lab (G-A)	-	-	2	1.0
ES-2 OR ES-4	ME-101-P OR ME-103-P	Workshop Technology Lab (G-A) OR Engineering Drawing (G-B)	-	-	4	2.0
		Total	18	04	10	25.0
			32			25.0
MC-1 OR MC-2	PEY-101-L OR EMV-101-L	Physical Education and Yoga (G-A) OR Professional Ethics for Engineers and Moral Values (G-B)	1 2	-	2 -	2 units 2 units

II-Semester

Subject Area	Subject Code	Subject Name	Contact Hours			Credits
			Lecture	Tutorial	Practical	
HS-3	HUM-102-L	Essentials of Communication-II	2	-	-	2.0
BS-4	PHY-102-L	Physics-II	3	1	-	3.5
BS-5	MAT-102-L	Mathematics-II	3	2	-	4.0
BS-3 OR ES-1	CHY-101-L OR EE-101-L	Chemistry (G-A) OR Basics of Electrical Engineering (G-B)	3	1	-	3.5
ES-2 OR ES-3	ME-101-L OR ECE-101-L	Workshop Technology (G-B) OR Basics of Electronics Engineering (G-A)	3	-	-	3.0
ES-5	CSE-101-L	Programming in C	3	-	-	3.0
HS-3	HUM-102-P	Essentials of communication-II Lab	-	-	2	1.0
ES-5	CSE-101-P	Programming in C Lab	-	-	2	1.0
BS-4	PHY-102-P	Physics-II Lab	-	-	2	1.0
BS-3 OR ES-1	CHY-101-P OR EE-101-P	Chemistry Lab (G-A) OR Basics of Electrical Engineering Lab (G-B)	-	-	2	1.0
ES-2 OR ES-4	ME-101-P OR ME-103-P	Workshop Technology Lab (G-B) OR Engineering Drawing (G-A)	-	-	4	2.0
		Total	17	04	12	25.0
			33			25.0
MC-1 OR MC-2	PEY-101-L OR EMV-101-L	Physical Education and Yoga (G-B) OR Professional Ethics for Engineers and Moral Values (G-A)	1 2	-	2 -	2 units 2 units

Group (G)	Disciplines
A	Mechanical Engineering Electronics and Communication Engineering Printing Technology Packaging Technology
B	Computer Science and Engineering Information Technology Biomedical Engineering Food Technology EE, CE

Subject Area	Abbreviation
Humanities and Social Sciences	HS
Basic Sciences	BS
Engineering Sciences	ES
Professional subjects-Core	PC
Professional subjects-Electives	PE
Open subjects-Electives	OE
Project Work, Seminar and/or Internship in industry or elsewhere	PW
Mandatory Courses (Qualifying) – Non Credit	MC

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ESSENTIALS OF COMMUNICATION-I

General Course Information:

Course Code: HUM-101-L Course Credits: 03 Mode: Lecture (L) Contact Hours: 03hours (L) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

About the Course and its Objectives and Outcomes:

The objectives of this course are to:

1. Inculcate minimum level of language proficiency among the students of engineering and technology.
2. To improve comprehension and expression skills of the students required for day to day; and classroom, academic, professional and cultural situations.

By the end of the course a student is expected to:

1. At the end of the course, a student will be able to express himself and to participate in the classroom discussions and other such academic or academic support activities.
2. The student will also be able to comprehend whatever he/she receives from informal interactions with the family, teachers and friends; and from formal communications taking place in lectures, laboratories and the like.
3. In general, the students will develop the ability to communicate effectively using suitable styles and techniques.

Course Contents

UNIT-I

Semantics: Synonyms, Antonyms, Homophones, Homonyms, Form and function of words.
Syntax: Sentence structures, Verb patterns and their usage, Phonetics-Symbols and structure.

UNIT-II

Comprehension: Listening and Reading comprehension: Note taking, Reviewing, Summarising, Interpreting, Paraphrasing and Précis Writing.

UNIT-III

Composition: Descriptive, Explanatory, Analytical and Argumentative, Writing, description of simple objects like instruments, appliances, places, persons, principles; description and explanation of processes and operations; analysis and arguments in the form of debate and group discussion.

UNIT-IV

Text: *English for Students of Science* by A.Roy and P.L. Sharma (Orient Longman)

Chapters for Study:
i) "The year 2050" by Theodore J. Gordon.
ii) "The Mushroom of Death" by A. Bandhopadhyay.

"The Discovery" by Herman Ould.

The prescribed text will be used as a case study for various components of the syllabus.

Text and Reference Books:

1. A. Roy and P.L. Sharma, "English for Students of Science" , Orient Longman
2. R.K. Bansal and J.B. Harrison, "Spoken English for India", Orient Longman.
3. M.L. Tickoo and A.E. Subramanian, "Intermediate Grammar, Usage and Composition", Orient Longman.
4. M.A. Pink and S.E. Thomas, "English Grammar, Composition and Correspondence", S. Chand and Sons Pvt. Ltd.,Delhi.
5. Thomson and Martinet, "A Practical English Grammar", OUP, Delhi.
6. A.S. Hornby, "Guide to Patterns and Usage in English", OUP, Delhi.
7. T. Balasubramanian, "A Textbook of English Phonetics for Indian Students", MacMillan, Chennai.
8. J.D.O'Connor, "Better English Pronunciation", Cambridge Univ. Press, London.
9. McCarthy, "English Vocabulary in Use", Foundation Books (Cambridge University Press), Delhi.
10. Buck, "Assessing Listening", Foundation Books (Cambridge University Press), Delhi.
11. McRae, "Reading Between the Lines", Foundation Books (Cambridge university Press), Delhi.

PRINCIPLES OF ECONOMICS

General Course Information:

Course Code: HUM-103-L Course Credits: 03 Mode: Lecture (L) Contact Hours: 03hours (L) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives and Outcomes:

The objectives of this course are to:

1. Acquaint the students with concepts and techniques used in the field of economics.
2. Enable them to apply this knowledge in the field of engineering.
3. To equip the students with the necessary techniques and skills that can be applied to enhance productivity.

By the end of the course a student is expected to:

1. Take better decisions in their field
2. Able to apply resources in more optimal way

Course Contents

UNIT-I

Definition of Economics, Various Definitions, Nature of Economic Problem, Concept of Micro and Macro Economics, Production Possibility Curve, Economic Laws and their nature, Relation between Science, Engineering, Technology and Economics, Time Value of Money, Concepts and Application, Capital Budgeting, Traditional and Modern Methods.

Concepts and Measurement of Utility, Law of Diminishing Marginal Utility, Law of Equi-Marginal Utility and their Practical Applications and Importance.

UNIT-II

Meaning of Demand; Individual and Market Demand Schedule, Law of Demand, Shape of Demand Curve. Elasticity of Demand, Measurement of Elasticity of Demand, Factors Affecting Elasticity of Demand, Practical Importance and Applications of the Concept of Elasticity of Demand, A Brief Note on Demand Forecasting.

Meaning and Factors of Production; Law of Variable Proportions, Returns to Scale. Internal and External Economies. Diseconomies of Scale.

UNIT-III

Various Concepts of Cost; Fixed Cost, Variable Cost, Average Cost, Marginal Cost, Money Cost, Real Cost, Opportunity Cost. Shapes of Average Cost, Marginal Cost, Total Cost in Short Run and Long Run. Break Even Analysis, Relevance of Depreciation towards Industry.

Meaning and types of Market, Perfect Competition, Monopoly, Oligoply, Monoplistic Competition (Main Features of these Markets).

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UNIT-IV

Supply and Law of Supply, Role of Demand and Supply in Price Determination, Effect of Changes in Demand and Supply on Prices.

Nature and Characteristics of Indian Economy (Brief and Elementary Introduction), Basic Concepts of Fiscal and Monetary Policy, Privatization, Globalization and Liberalization, Meaning, Merits and Demerits, Brief Explanation of VAT, WTO, GATT, IMF & TRIPS Agreement.

Text and Reference Books:

1. P.N. Chopra, "Principles of Economics", Kalyani Publishers
2. K.K. Dewett, "Modern Economic Theory", S.Chand
3. M.L. Jhingan, "Micro Economic Theory", S.Chand
4. H.L. Ahuja, "Micro Economic Theory", S.Chand
5. S.K. Mishra, "Modern Micro Economics", Pragati Publications
6. A.B.N. Kulkarni and A.B. Kalkundrikar, "Economic Theory", S.Chand & Co
7. Rudar Dutt and K.P.M. Sundhram, "Indian Economy", S.Chand

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PHYSICS - I

General Course Information:

Course Code: PHY-101-L Course Credits: 3.5 Mode: Lecture (L) and Tutorial (T) Contact Hours: 03hours (L)+01hour (T) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives and Outcomes:

The objectives of the course are:

Course introduces the students to the following topics:

1. Optics and its behaviour viz; diffraction, polarization, LASER etc.
2. Waves and Oscillations, the famous Maxwell's equation will be covered along with Fibre optics.
3. Special theory of relativity, Doppler shift, variation of mass with velocity.
4. Concepts of Nuclear Physics, Nuclear reactors, GM Counter, solid state detectors, etc. will be taught.

By the end of course a student is expected to:

1. Create awareness about the vital role played by science and engineering in the development of new technologies with the blend of understanding old technology and approach to latest techniques,
2. Provide the necessary exposure to the practical aspects, which is an essential component for learning science. The acquaintance of basic physics principles would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.

Course Contents

UNIT- I

Interference: Division of wave front, Fresnel's biprism, Lloyd's mirror, Division of amplitude, Newton's rings, Michelson interferometer, Applications.

Diffraction: Difference between Fraunhofer and Fresnel diffraction, Fraunhofer diffraction through single slit, two slits. Plane transmission diffraction grating, its dispersive and resolving powers.

UNIT- II

Polarisation: Polarised and unpolarised light, Brewster law, Malus law, Polaroid, Optic axis, Double refraction, Nicol prism, quarter and half wave plates, Polarimetry; Biquartz and Laurent's half-shade polarimeters,

Laser: Coherence (spatial, temporal) , Spontaneous and stimulated emissions, Laser action, Population Inversion, Einstein's coefficients, characteristics of laser beam- He-Ne and Semiconductor lasers , Applications in Holography.

UNIT- III

Fibre Optics; Propagation of light in fibres, numerical aperture, Attenuation in optical fibres , single mode and multi mode fibres, simple concepts of wave guides and co-axial cables, Applications in Optical Communication (Elementary idea).

Waves and Oscillations: Simple harmonic motion (expression and differential equation) superposition of two linear SHM's (with same frequency), Simple concepts of Harmonic Oscillator, resonance, quality factor. E.M. wave theory, review of basic ideas, Maxwell's equations, simple plane wave equations, Poynting vector, Continuity equations.

UNIT-IV

Special Theory of Relativity: Einstein's theory of relativity, Michelson-Moreley experiment, Lorentz transformations, variation of mass with velocity, mass energy equivalence, Doppler shift, Longitudinal and transverse doppler shift.

Nuclear Physics: Neutron Cross-section, Nuclear fission, Moderators, Nuclear reactors, Reactor criticality, nuclear fusion. Interaction of radiation with matter: basic concepts, radiation detectors-ionisation chamber, G.M. Counter, Scintillation and solid state detectors, cloud chamber, and bubble chamber.

Text and Reference Books:

1. Wehr. Richards and Adair, "Physics of the Atom", NarosaPublication
2. Arthur Beiser, "Perspectives of Modern Physics", TMH Publication
3. A.S. Vasudeva, "Modern Engineering Physics", S. Chand and Co. Ltd. Publication
4. Brij Lal and Subramanyam, "A Text Book of Optics", S.Chand and Co. Ltd. Publication
5. F.W. Sears, "Electricity and Magnetism", Narosa Publication
6. Resnick & Halliday, "Physics Vol-I & II", Wiley Eastern Publication

MATHEMATICS-I

General Course Information:

Course Code: MAT-101-L Course Credits: 04 Mode: Lecture (L) and Tutorial (T) Contact Hours:03hours (L)+02hours (T) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives and Outcomes:

The objectives of this course are:

1. To familiarize students with differentiation, Partial differentiation, integrations and vector calculus.
2. To familiarize students with application of differentiation and integrations.

By the end of the course a student is expected:

Get acquainted with use of various mathematical tools in engineering and sciences.

Course Contents

UNIT-I

Applications of Differentiation: Taylor's and Maclaurin's series, Asymptotes, Asymptotes parallel to coordinate axes and oblique asymptotes. Asymptotes by inspection method, Intersection of curve and its asymptotes. Asymptotes for polar curves, Curvature, radius of curvature for Cartesian, intrinsic, pedal and polar form of equations. Radius of curvature at origin, Newton's method, method of expansion, Centre of curvature, evolute and Involute.

UNIT-II

Partial Differentiation and its Applications : Functions of two or more variables; partial derivatives, Total differential and differentiability, Derivatives of composite and implicit functions, Jacobians, Higher order partial derivatives, Homogeneous functions, Euler's theorem, Taylor's series for functions of two variables (without proof), maxima-minima of function of two variables, Lagrange's method of undetermined multipliers, Differentiation under integral sign.

UNIT-III

Applications of Single and Multiple Integration: Applications of single integration to find volume of solids and surface area of solids of revolution, Double integral, change of order of integration, Double integral in polar coordinates, Applications of double integral to find area enclosed by plane curves, Triple integral, change of variables, Beta and gamma functions and relationship between them.

UNIT-IV

Vector Calculus: Differentiation of vectors, scalar and vector point functions Gradient of a scalar field and directional derivative, divergence and curl of a vector field and their physical interpretations. Integration of vectors, line integral, surface integral, volume integral, Green, Stoke's and Gauss theorems (without proof) and their simple applications.

Text and Reference Books:

1. E. Kreyszig, "Advanced Engineering Mathematics", Wiley Publication
2. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers
3. Paras Ram, "Engineering Mathematics through Applications", CBS Publishers
4. S.S. Sastry, "Engineering Mathematics", Part-I, PHI Learning
5. N. Piskunov, "Differential and Integral Calculus", Mir Publisher
6. R.K. Jain and S.R.K.Iyengar, "Advanced Engineering Mathematics", Taylor & Francis
7. Michael D. Greenberg, "Advanced Engineering Mathematics", Pearson Publication

BASICS OF ELECTRICAL ENGINEERING

General Course Information:

Course Code: EE-101-L Course Credits: 3.5 Mode: Lecture (L) and Tutorial (T) Contact Hours: 03hours (L)+01hour(T) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives and Outcomes:

The objectives of this course are to:

1. Impart the fundamentals of electrical circuits.
2. Provide the comprehensive idea about working principles of electrical machines (Transformers, DC, Induction, and Synchronous machines), and measuring instruments.

By the end of the course a student is expected to:

1. Ggain the knowledge of basic concepts of DC/ 1-phase and 3-phase AC circuits.
2. Learn the principle and working of Transformer/ Electrical machine/measuring instruments.

Course Contents

UNIT-I

D.C. Circuits, Ohm's Law, Kirchoff's Laws, D.C. Circuits, Nodal and Loop methods of analysis, Network Theorems, Thevenin's theorem, Norton's theorem, superposition theorem, maximum power transfer theorem, Reciprocity theorem, Tellegen's theorem, Millman's theorem, Star to Delta and Delta to Star transformation.

UNIT-II

A.C. Circuits, Sinusoidal signal, instantaneous and peak values, RMS and average values, phase angle, polar & rectangular, exponential and trigonometric representations, R, L and C components, behaviors of these components in A.C. circuits, Concept of complex power, power factor, Transient responses of RL, RC and RLC Circuits with step input, Series and Parallel A.C. Circuits, Series and Parallel resonance, Q factor, cut-off frequencies and bandwidth.

UNIT III

Three Phase Circuits, Phase and line voltages and currents, balanced star and delta circuits, power equation, measurement of power by two wattmeter method, Importance of earthing, Measuring Instruments, Voltmeter, Ammeter, Watt meter, Energy meter.,

UNIT IV

Transformers, Principle, construction and working of transformer, Efficiency and regulation, Electrical Machines, Introduction to D.C. Machines, Induction motor, Synchronous machines.

Text and Reference Books:

1. Kothari and Nagarath, "Basic Electrical Engineering", 2nd Edition, TMH
2. B.L Theraja and A K Theraja, "Electrical Technology", Vol-I, S.Chand
3. Deltoro, "Electrical Engineering Fundamentals", PHI
4. Valkenburg, "Network Analysis", PHI

CHEMISTRY

General Course Information:

Course Code: CHY-101-L Course Credits: 3.5 Mode: Lecture (L) and Tutorial (T) Contact Hours: 03hours (L)+01hour (T) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

About the Course and its Objectives and Outcomes:

The objectives of this course are to:

1. To make the students familiarize about the basics of Chemistry.
2. Topics include the chemical aspects of engineering.

By the end of the course a student is expected to:

1. Students are expected to critically assess and solve Industrial problems requiring the application of chemical principles.
2. Students are expected to be well versed with applied chemistry involved in engineering.

Course Contents

UNIT-I

Thermodynamics: Concept of Entropy, free energy and work functions, Free energy change, Chemical Potential, Gibb's Helmholtz equation, Claudius - Clapeyron equation.

Phase Equilibrium: Definitions of phase, component and degree of freedom, Gibb's phase rule, One Component System (H_2O System), Two Components Systems (Pb-Ag & Zn-Mg).

UNIT-II

Water and its treatment: Hardness of water and its determination (EDTA method), units of hardness, alkalinity of water and its determination, scale and sludge formation (methods of prevention).

Treatment of water for domestic use, coagulation, sedimentation, filtration and disinfection, water softening, Ion-exchange process, Desalination (reverse osmosis).

UNIT-III

Corrosion: Dry and wet corrosion, electrochemical theory of corrosion, Galvanic corrosion, differential aeration corrosion, factors affecting corrosion, Preventive measures (cathodic protection, protective coatings).

Batteries: Introduction, characteristics of batteries, primary and secondary battery systems, lead storage and lithium batteries.

Lubricants: Introduction, classification and properties of lubricants.

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UNIT-IV

Polymers: Monomers and polymers, polymerization, types of polymerization, effect of structure on properties of polymers, preparation, properties, and applications of thermoplastics (PVC), thermoset (PF), and elastomer (SBR).

Analytical Methods: Principle and application of Thermogravimetric analysis and Differential thermal analysis (Experimental details are excluded).

Spectral analysis: Electromagnetic radiation, Lambert-Beer's Law, principle and applications of UV-VIS and IR spectroscopy (Experimental details are excluded).

Text and Reference Books:

1. P.C. Jain and Monica Jain, "Engineering Chemistry", Dhanpat Rai and Co.
2. H.C.Srivastava, "Engineering Chemistry", Pragati Prakashan
3. B.K.Ambasta, "Chemistry for Engineers", University Science Press
4. Rajaram and Kuriacose, "Chemistry in Engineering and Technology", Vol. I and II, TMH
5. Meritt and Willard, "Instrumental methods of Chemical Analysis", East-West Press
6. P.W. Atkin, "Physical Chemistry", ELBS, Oxford Press

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WOKKSHOP TECHNOLOGY

General Course Information:

Course Code: ME-101-L Course Credits: 03 Mode: Lecture (L) Contact Hours: 03hours (L) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives and Outcomes:

The objectives of this course are to:

1. Expose the students to the basic overview of manufacturing processes and idea about engineering materials with their properties and applications.
2. Provide to the students an understanding of industrial safety methods, different types of accidents that may occur in industry, their causes and sources.
3. Impart knowledge of basic metal casting processes and checking of casting for quality.
4. Study metal forming techniques, extrusion, rolling, drawing and sheet metal forming and shearing operations.
5. Impart in depth knowledge of commonly used machine tools in a workshop and metal cutting mechanic.
6. Expose the students to the principles of the metal joining methods and getting familiar with different welding techniques (fusion and non-fusion), resistance and others.
7. Impart knowledge to the students about objectives of layout, types of plant layouts along with their advantages.

By the end of the course a student is expected to:

1. Identify basic manufacturing processes and to ascertain the types of products that are cost effectively produced with each process.
2. Understand different industrial safety methods, different types of accidents that occur in industry with their sources and causes.
3. Understand the manufacturing of product by casting processes as well as checking the casted product for its quality.
4. Understand different metal forming techniques, extrusion, rolling, drawing and sheet metal forming and shearing operations.
5. Understand the working and applications of machine tools such as lathe, shaper, planer, milling, drilling and slotter used in a workshop.
6. Understand the application of the different joining techniques, and be able to select an appropriate technique according to a specific requirement.
7. Identify the plant layout and to ascertain the types of products that are cost effective to produce on each plant layout.

Course Contents

UNIT-I

Introduction: Introduction to Manufacturing Processes and their Classification. Industrial Safety: Introduction, Types of Accidents, Causes and Common Sources of Accidents, Methods of Safety, First Aid.
Engineering Materials: General Properties and Applications of Engineering Materials, Cast Iron, Mild Steel, Medium Carbon Steel, High Carbon Steel and High Speed Steel.

UNIT-II

Foundry: Introduction to Casting Processes, Basic Steps in Casting Process, Pattern, Types of Patterns, Pattern Allowances, Risers, Runners, Gates, Moulding Sand and its Composition, Sand Preparation, Molding Methods, Core Sands and Core Making, Core Assembly, Mold Assembly, Melting (Cupola) and Pouring, Fettling, Casting Defects and Remedies.
Cold Working (Sheet Metal Work): Sheet Metal Operations, Measuring, Layout Marking, Shearing, Punching, Blanking, Piercing, Forming, Bending and Joining.

UNIT-III

Hot Working Processes: Introduction to Hot Working, Principles of Hot Working Processes, Forging, Rolling, Extrusion, Wire Drawing.
Introduction to Machine Tools: Specifications and Uses of commonly used Machine Tools in a Workshop such as Lathe, Shaper, Planer, Milling, Drilling, Slotter. Introduction to Metal Cutting: Nomenclature of a Single Points Cutting Tool and Tool Wear, Mechanics of Chips Formations, Type of Chips, Use of Coolants in Machining.

UNIT-IV

Welding: Introduction to Welding, Classification of Welding Processes, Gas Welding: Oxy-Acetylene Welding, Resistance Welding: Spot and Seam Welding, Arc Welding: Metal Arc, TIG and MIG Welding, Welding Defects and Remedies, Soldering and Brazing.
Plant Layout: Plant Layout, Objectives of Layout, Types of Plant Layout and their Advantages.

Text and Reference Books:

1. Hazra and Chaudhary, "Workshop Technology", Volume I and II, Asian Book Company, New Delhi.
2. Lindberg, R.A., "Process and Materials of Manufacture", Prentice Hall of India, New Delhi.
3. Campbell, J.S., "Principles of Manufacturing Materials and Processes", McGraw - Hill.
4. Amitabh Ghosh and Ashok Kumar Malik, "Manufacturing Science", East-West Press.
5. Ostwald, M, "Manufacturing Process and Systems", John Wiley.
6. Chapman, W.A.J., "Workshop Technology", Volume I, II, and III, Edward A.

BASICS OF ELECTRONICS ENGINEERING

General Course Information:

Course Code: ECE-101-L Course Credits: 03 Mode: Lecture (L) Contact Hours: 03hours (L) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives and Outcomes:

The main objectives of this course are:

1. To make the students familiar with the concept of semiconductor materials, devices and its properties.
2. To explain the construction, characteristics, and operation of PN diode, BJT and FETs.
3. To familiarize with the application of different semiconductor devices.

By the end of the course a student is expected to:

1. Understand the significance of semiconductor materials in electronics.
2. Develop the understanding of basic concepts of diodes and transistors.
3. Become capable of using diode, BJT and FETs in their lab experiments.

Course Contents

UNIT-I

Introduction to Semiconductor Electronics

Energy band in solids, Semiconductor materials, Classification of semiconductors, Energy distribution of electrons. Mass action law, Effect of temperature on semiconductors, Charge densities in a semiconductor, drift current and diffusion current density, total current density, conductivity.

UNIT-II

PN Junction diode and its Applications

PN junction theory, Depletion layer, V-I equation and characteristics, Resistance Levels, Piece-wise linear characteristics & equivalent circuits, Transition and Diffusion capacitance, Reverse recovery time, Varactor diode, Zener diode , LED, Photodiode, Load line analysis of a diode circuit.

Applications: Half wave and Full wave Rectifier, Bridge Rectifier, Clippers, Clampers, Voltage multiplying circuits, Zener voltage regulator.

UNIT-III

Bipolar Junction Transistor

Introduction, Physical Structure and its Operation, Transistor equations, Transistor amplifying action, Types of Configurations and their characteristic curves, Comparison between three configurations, Thermal runaway and heat sink, Operating point of a transistor, Requirement of biasing, fixed bias and potential divider bias circuit.

UNIT-IV

MOSFET and Special Devices

Types of FETs, Construction, Governing equations and characteristic curves of FETs, Comparison of BJT, JFET and MOSFET, MOSFET as an amplifier, Introduction to Thermistor, Optocoupler, SCR, DIAC, TRIAC, UJT.

Text and Reference Books:

1. Boylstad & Neshishkey, "Electronic Devices & Circuit Theory", 9th Edition, PHI.
2. S Salivahanan, N Suresh Kumar, "Electronics Devices and Circuits", 3rd Edition, McGraw Hill.
3. Millman, Halkias and Satyabarta, "Millman's Electronic Devices and Circuits", Tata McGraw Hill, 2010.
4. Donald A Neamen, "Semiconductor Physics and Devices", 4th ed., Tata McGraw Hill.
5. S.M. Sze, Kwok K. Ng, "Physics of Semiconductor Devices", Third Edition, Wiley.

ESSENTIALS OF COMMUNICATION-I LAB

General Course Information:

Course Code: HUM-101-P Course Credits: 01 Mode: Practical Contact Hours: 02 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70):** Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

Lab Contents

Good command on the language and communication skills has become need of the hour. The time has come to focus equally on the communicative part of the language besides the conventional teaching. The language lab is very helpful tool with which a student can practice and assess one's own speech in any language.

In this lab, a student is supposed to do the practice of pronunciation of words, grammar rules, tenses, phonemic alphabets, speaking and listening using computer software available in the language lab.

PHYSICS-I LAB

General Course Information:

Course Code: PHY-101-P Course Credits: 01 Mode: Practical Contact Hours: 02 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70):** Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

Lab Contents

1. To find the wavelength of sodium light by Newton's rings experiment.
2. To find the wavelength of sodium light by Fresnel's biprism experiment.
3. To find the wavelength of various colours of white light with the help of a plane transmission diffraction grating.
4. To find the refractive index and cauchy's constants of a prism by using spectrometer.
5. To find the wavelength of sodium light by Michelson interferometer.
6. To find the resolving power of a telescope
7. To find the pitch of a screw using He-Ne laser.
8. To find the specific rotation of sugar solution by using a polarimeter.
9. To compare the capacitances of two capacitors by De'sauty bridge and hence to find the dielectric constant of a medium.
10. To find the flashing and quenching potentials of Argon and also to find the capacitance of unknown capacitor.
11. To study the photo conducting cell and hence to verify the inverse square law.
12. To find the temperature co-efficient of resistance by using platinum resistance thermometer and Callender and Griffith bridge.
13. To find the frequency of A.C. mains by using sonometer.
14. To find the velocity of ultrasonic waves in non-conducting medium by piezo-electric method.
15. To find the Refractive Index of a given liquid by Newton' ring
16. To find the height of an object using sextant.
17. To find the wavelength of a given LASER by diffraction grating.

NOTE: The list is indicative. The teacher can alter/add more number of experiments as per the requirement.

Recommended Books:

1. B.L. Worshnop and H.T. Flint, "Advanced Practical Physics", KPH publication
2. S.L.Gupta and V.Kumar, "Practical Physics", Pragati Prakashan
3. Chauhan and Singh, "Advanced Practical Physics, Vol. I & II", Pragati Prakashan
4. K. Murlaleedhara Varier, J.Antony, and P.P.Pradyumnan, "Advanced experimental Techniques in Modern Physics", Pragati Prakashan

BASICS OF ELECTRICAL ENGINEERING LAB

General Course Information:

Course Code: EE-101-P Course Credits: 01 Mode: Practical Contact Hours: 02 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70):** Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

Course Objectives and Outcomes:

The objectives of this course are to:

1. Provide the students a chance to put theory into practice.
2. Become familiar with dc circuit and theorem with their verification.
3. Understand the basic principles of operation of electric machines and their classification

By the end of the course a student is expected to:

1. Understand the basic concepts of DC/AC circuits.
2. Learn the principle and working of Transformer/ Electrical machine/measuring instruments.
3. Identify an appropriate suitable measuring instrument for measurement of AC/DC electrical quantity

Lab Contents

1. To verify KCL and KVL.
2. To verify Thevenin's and Norton's Theorems.
3. To verify maximum power transfer theorem in D.C. Circuit & A.C circuit.
4. To verify reciprocity and Superposition theorems.
5. To study frequency response of a series R-L-C circuit and determine resonant frequency& Q- factor for various values of R, L, and C.
6. To study frequency response of a parallel R-L-C circuit and determine resonant frequency and Q - Factor for various values of R, L, and C.
7. To perform direct load test of a transformer and plot efficiency Vs load characteristic.
8. To perform direct load test of a D.C. shunt generator and plot load voltage Vs load current curve.
9. To plot V-curve of a synchronous motor.
10. To perform O.C. and S.C. tests of a three phase induction motor.
11. To study various type of meters.
12. Measurement of power by 3-voltmeter / 3-ammeter method.
13. Measurement of power in a 3 phase system by two watt meter method.

NOTE: The list is indicative. The teacher can alter/add more number of experiments as per the requirement.

CHEMISTRY LAB

General Course Information:

Course Code: CHY-101-P Course Credits: 01 Mode: Practical Contact Hours: 02 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70):** Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

Lab Contents

1. To prepare standard oxalic acid solution from crystalline oxalic acid.
2. Determination of Ca^{++} and Mg^{++} hardness of water using EDTA solution.
3. Determination of alkalinity of water sample.
4. Determination of dissolved oxygen (DO) in the given water sample.
5. Determination of concentration of $KMnO_4$ solution spectrophotometrically.
6. Determination of viscosity of lubricant by Red Wood viscometer (No. 1 and No. 2).
7. To determine flash point and fire point of an oil by Pensky - Marten's flash point apparatus.
8. To prepare Phenol-formaldehyde and Urea formaldehyde resin.
9. To determine Rf value of compounds by Thin Layer Chromatography.
10. To determine TDS of water samples.
11. To determine the surface tension of given liquid by means of Stalagmometer by drop number method.
12. Determination of strength of HCl solution by titrating it against NaOH solution conductometrically.
13. Determination of strength of strong acid by titrating it against weak base conductometrically.
14. Estimation of total iron by internal indicator method.

NOTE: The list is indicative. The teacher can alter/add more number of experiments as per the requirement.

Text and Reference Books:

1. S.S. Dara, "A Text Book on Experimental and Calculation - Engineering Chemistry", S. Chand & Co.
2. Shashi Chawla, "Essentials of Experimental Engineering Chemistry", Dhanpat Rai Publishing Company.
3. R.M.Verma, "Analytical Chemistry-Theory and Practice", CBS Publisher
4. O.P. Virmani and A.K. Narula "Applied Chemistry- Theory and Practice", (New Age
5. Sunita Rattan, "Experiments in Applied Chemistry", S K Kataria & Sons

20/7/16
20/7/18

WORKSHOP TECHNOLOGY LAB

General Course Information:

Course Code: ME-101-P Course Credits: 02 Mode: Practical Contact Hours: 04 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70):** Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

Course Objectives and Outcomes:

The objectives of this course are to:

1. Expose the students to various measuring instruments and tools used in various workshops, working of machine tools like Lathe, Milling, Drilling, and Shaper etc.
2. Practice of the students in for different shops such as welding, foundry, sheet metal, machine, carpentry etc.
3. Impart the knowledge on types of wood used for joints and patterns, mould making, casting etc.

By the end of the course a student is expected to:

1. Understand the basic operations and working of various machine tools, mould making and casting process, various types of welding processes, types of woods and their properties/ use, wooden joints, use of precise measuring instruments.

Lab Contents

I - Machine Shop

1. To prepare a job involving V-groove, slot cutting etc. on Shaper Machine.
2. To prepare a job on the Lathe Machine involving facing, turning, step turning and taper turning.
3. To prepare a job involving side and face milling on Milling Machine.

II - Welding Shop

4. Practice of arc welding, gas welding, MIG welding and TIG welding.
5. To prepare butt and lap joints using Electric Arc welding.

III - Fitting Shop

6. To study different type of measuring/ marking/fitting tools used in fitting shop and determine least count of Vernier Calliper and Micrometer.
7. To prepare a job involving cutting, marking, filing, drilling etc.

IV - Foundry Shop

8. To prepare a mould assembly using single piece pattern.
9. To prepare a mould and core assembly using split pattern for casting.

V - Carpentry Shop

10. To study different type of tools and woods used in carpentry shop.
11. To prepare at least two simple wooden joints like Cross-lap Joint, Dovetail joint, T – joint.

NOTE: The list is indicative. The teacher can alter/add more number of experiments as per the requirement.

ENGINEERING DRAWING

General Course Information:

Course Code: ME-103-P Course Credits: 02 Mode: Practical Contact Hours: 04 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70):** Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

Course Objectives and Outcomes:

The objectives of this course are to:

1. Enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient.
2. Introduce universally accepted conventions and symbols for their usage in technical drawings.
3. Impart knowledge about principles/methods related to projections of one, two and three dimensional objects.
4. Inculcate the ability to translate geometric and topological information of common engineering object (two/three dimensional) into engineering drawing using standard graphical techniques.
5. Expose students to computer aided drafting tools.

By the end of the course a student is expected to:

1. Understand and appreciate the importance of engineering graphics and drawing in engineering.
2. Understand the theory of projection.
3. Produce geometric construction, multi-view, sectional view, dimensioning and detail drawings of two and three dimensional objects.
4. Improve their visualization skills so that they can apply these skills in developing new products.

Course Contents

UNIT-I

Introduction and Projection of Points: Importance, Significance and Scope of Engineering Drawing, Lettering, Dimensioning, Scales, Various Types of Projections, First and Third Angle Systems of Orthographic Projections, Projection of Points in Different Quadrants.

Projections of Straight Lines: Projection of Line Parallel to One or Both Reference Planes, Projection of Line Contained by One or Both Planes, Projection of Line Perpendicular to One of the Planes, Projection of Line Inclined to One Plane but Parallel to Other Plane, Projection of Line Inclined to Both Planes, True Length of a Line and Its Inclination with Reference Planes, Traces of a Line.

UNIT-II

Projections of Planes: Projection of Plane Parallel to One Reference Plane, Projection of Plane Inclined to One Plane but Perpendicular to the Other, Projection of Plane Inclined to Both Reference Planes.

Projections of Solids: Projection of Solid in Simple Positions with Axis Perpendicular to a Plane, Projection of Solid with Axis Parallel to Both Planes, Projection of Solid with Axis Parallel to One Plane and Inclined to the Other.

UNIT-III

Projections of Sections of Solids: Projection of Section of Cube, Prism, Pyramid, Cylinder and Cone, True Shape of Section.

Development of Surfaces: Development of Surfaces of Various Solids such as Cube, Prism, Pyramid, Cylinder and Cone with and without Sectioning.

UNIT-IV

Orthographic Drawings: Orthographic Drawings of Machines Components and Nuts, Bolted Joints, Screw Threads, Screw Joints.

Isometric Projections: Introduction, Isometric Scale, Isometric Views of Plane Figures, Cube, Prisms, Pyramids. Cone and Cylinders. Introduction to Computer Aided Drafting Tools.

Text and Reference Books:

1. N.D. Bhatt and V.M.Panchal, "Engineering Drawing Plane and Solid Geometry", Charotar Publishing House.
2. Basant and Aggarwal, "Engineering Drawing", Tata McGraw-Hill Publication.
3. P.S. Gill, "Engineering Graphics and Drafting", S.K. Kataria and Sons.
4. S.B. Mathur, "A Text Book of Engineering Drawing", Vikas Publishing House.
5. J.D.Bethune, "Engineering Graphics with Auto CAD 2015", Pearson Education.

PHYSICAL EDUCATION AND YOGA

General Course Information:

Course Code: PEY-101-L Course Credits: NIL Mode: Lecture (L) and Practical (P) Contact Hours:01hours (L)+02 hours (P) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30+70)** **This is a non credit course of qualifying nature. The complete internal evaluation is to be done by the Course coordinator.** Internal evaluation (30 marks) will be based on continuous assessment throughout the semester. End semester examination will be of 70 marks that includes theory examination and practical both. The student will be evaluated based upon his/her performance in the theory exam and active participation and performance in sports and/or Yoga activities

Course Objectives and Outcomes:

The objectives of this course are to:

1. Appreciate and understand the value of physical education and yoga and its relationship to a healthy, active lifestyle.
2. Work to their optimal level of physical fitness.
3. Show knowledge and understanding in a variety of physical activities and evaluate their own and others' performances.

By the end of the course a student is expected to:

1. Demonstrate an understanding of the principles and concepts related to a variety of physical activities.
2. Apply health and fitness principles effectively through a variety of physical activities.
3. Support and encourage others (towards a positive working environment).
4. Show self-motivation, organization and responsible behaviour.

Course Contents

UNIT-I

History of physical education: Olympics, Asian games, Cricket, history and records.

UNIT-II

Health education: importance of physical education in modern society, meaning and importance of health, factors influencing health, fitness education, diet plans, body composition etc.

UNIT-III

Measurements and evaluation: measurements of grounds (outdoor- athletic track, football, basketball), indoor games, badminton, table tennis – ground measurements, basic playing skills.

UNIT-IV

Yoga: meaning and types, importance of yoga for healthy life, pranayama,

Text and Reference Books:

1. A. K. Uppal, "Physical Education and Health",
2. M.L.Kamlesh, "Fundamental Elements of Physical Education",
3. Swami Ramdev, "Yog its philosophy and practice", Divya Prakashan
4. V K Sharma, "Health and Physical Education",

PROFESSIONAL ETHICS FOR ENGINEERS AND HUMAN VALUES

General Course Information:

Course Code: EMV-101-L Course Credits: NIL Mode: Lecture (L) Contact Hours: 02hours (L) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30+70)** **This is a non credit course of qualifying nature. The complete internal evaluation is to be done by the Course coordinator.** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

About the Course and its Objectives and Outcomes:

The objectives of this course are to:

1. To help students distinguish between values and skills, and understand the need, basic guidelines, content and process of value education.
2. To create an awareness on professional ethics and human values.
3. To inculcate moral, ethical and social values and loyalty
4. To appreciate the rights of others.

By the end of the course a student is expected to:

1. Understand the significance of value inputs in a classroom and start applying them in their life and profession.
2. Possess entrepreneurial approach and ability for life-long learning.
3. Have education necessary for understanding the impact of engineering solutions on society and demonstrate awareness of contemporary issues.

Course Contents

UNIT-I

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education.
Morals, Values and Ethics: Basic Understanding of the concept of Integrity, Work Ethic, Service Learning, Civic Virtue, Respect for Others, Living Peacefully, Caring, Sharing, Honesty, Courage, Valuing Time, Co-operation, Commitment, Empathy, Self-Confidence, Character and Spirituality, Meaning Theories, Perception Theories, Interpretation of Events, Images and Videos of current time

UNIT-II

Engineering ethics: Understanding of 'Engineering Ethics, variety of moral issued, types of inquiry, moral dilemmas, moral autonomy, Kohlberg's theory, Gilligan's theory, consensus and controversy, Models of Professional Roles, theories about right action, Self-interest, customs and religion, uses of ethical theories.
Engineering as social experimentation: Engineering as experimentation, engineers as responsible experimenters, codes of ethics, a balanced outlook on law, the challenger case study.

UNIT-III

Safety, responsibilities and rights: Safety and risk, assessment of safety and risk, risk benefit analysis and reducing risk, the Three Mile Island and Chernobyl case studies.

Collegiality and loyalty: respect for authority, collective bargaining, confidentiality, conflicts of interest, occupational crime, professional rights, employee rights, Intellectual Property Rights (IPR), discrimination.

UNIT-IV

Global issues: Multinational corporations, Environmental ethics, computer ethics, weapons development, engineers as managers, consulting engineers, engineers as expert witnesses and advisors, moral leadership, sample code of Ethics like ASME, ASCE, IEEE, Institution of Engineers (India), Indian Institute of Materials Management, Institution of Electronics and Telecommunication Engineers (IETE), India, Media Ethics etc.

Text and Reference Books:

1. Mike Martin and Roland Schinzinger, "Ethics in Engineering", McGraw-Hill, New York 1996.
2. Govindarajan M., Natarajan S., Senthil Kumar V. S., "Engineering Ethics", Prentice Hall of India, New Delhi, 2004.
3. Charles D. Fleddermann, "Engineering Ethics", Pearson Education / Prentice Hall, New Jersey, 2004 (Indian Reprint).
4. Charles E Harris, Michael S. Protchard, Michael J Rabins, "Engineering Ethics-Concepts and Cases", Wadsworth Thompson Learning, United States, 2000 (Indian Reprint now available).
5. John R. Boatright, "Ethics and the Conduct of Business", Pearson Education, New Delhi, 2003.
6. Edmund G Seebauer and Robert L Barry, "Fundamentals of Ethics for Scientists and Engineers", Oxford University Press, Oxford, 2001.

ESSENTIALS OF COMMUNICATION-II

General Course Information:

Course Code: HUM-102-L Course Credits: 02 Mode: Lecture (L) Contact Hours: 02hours (L) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives and Outcomes:

The objectives of this course are to:

1. Sharpen communication skills of the students with reference to organizational structure.
2. Expose them to the modern modes of communication.
3. Show the students importance of team work and give practice in group communication with reference to group dynamics.
4. Prepare the students for campus interviews.

By the end of the course a student is expected to:

1. Be able to express himself through the modern modes of communication and to participate in the group discussion and other such academic or academic support activities.
2. The student will also be able to perform well during GDs, presentations, and interviews.
3. The course, in particular, will enable the students to be effective language user with reference to communication in groups and group behaviour.

Course Contents

UNIT-I

Communicative Grammar: Spotting the errors pertaining to nouns, pronouns, adjective and adverbs; Concord grammatical concord, notional concord and the principle of proximity between subject and verb.
Lexis: Idioms and phrases; Words often confused; One-Word Substitutes; Formation of words (suffixes, prefixes and derivatives); Foreign Words (A selected list).

UNIT-II

Oral Communication:
Part-A: Introduction to principal components of spoken English – Word-stress patterns, Intonation, Weak forms in English.
Part-B: Developing listening and speaking skills through various activities, such as (a) role play activities (b) Practising short dialogues (c) Group discussion (d) Debates (e) Speeches (f) Listening to news bulletins (g) Viewing and reviewing T.V. programmes etc.

UNIT-III

Written Communication:
Developing reading and writing skills through such tasks/activities as developing outlines, key expressions, situations, slogan writing and theme building exercises

Reading verbal and non-verbal texts; like cartoons, Graphs and tabulated data etc.

UNIT-IV

Technical Writing:

(a) Business Letters, Format of Business letters and Business letter writing
(b) E-mail writing
(c) Reports, Types of Reports and Format of Formal Reports
(d) Press Report Writing

Text and Reference Books:

1. A. Roy and P.L. Sharma, "English for Students of Science" , Orient Longman
2. R.K. Bansal and J.B. Harrison, "Spoken English for India", Orient Longman.
3. M.L. Tickoo and A.E. Subramanian, "Intermediate Grammar, Usage and Composition", Orient Longman.
4. M.A. Pink and S.E. Thomas, "English Grammar, Composition and Correspondence", S. Chand and Sons Pvt. Ltd.,Delhi.
5. Thomson and Martinet, "A Practical English Grammar", OUP, Delhi.
6. A.S. Hornby, "Guide to Patterns and Usage in English", OUP, Delhi.
7. T. Balasubramanian, "A Textbook of English Phonetics for Indian Students", MacMillan, Chennai.
8. J.D.O'Connor, "Better English Pronunciation", Cambridge Univ. Press, London.
9. McCarthy, "English Vocabulary in Use", Foundation Books (Cambridge University Press), Delhi.
10. Buck, "Assessing Listening", Foundation Books (Cambridge University Press), Delhi.
11. McRae, "Reading Between the Lines", Foundation Books (Cambridge university Press), Delhi.

PHYSICS –II

General Course Information:

Course Code: PHY-102-L Course Credits: 3.5 Mode: Lecture (L) and Tutorial (T) Contact Hours: 03hours (L)+01hour (T) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives and Outcomes:

The objectives of the course are:

Course introduces the student to the following topics.

1. Elements of Crystallography, Dielectrics and their behaviour in circuit.
2. In Quantum Mechanics students will learn de-broglie hypothesis, Heisenberg uncertainty principle.
3. Free electron theory will make them understand the properties of Solid, Superconductivity, and band theory.
4. To have the glimpses of latest technology; Nanoscience and its approach towards material has been incorporated.

By the end of course a student is expected:

1. The course would provide the necessary exposure to the practical aspects, which is an essential component for learning science.
2. The acquaintance of basic physics principles would help engineers to understand the tools and techniques used in the industry and provide the necessary foundations for inculcating innovative approaches.

Course Contents

UNIT- I

Elements of Crystallography: Space lattice, unit cell, types of unit cell and translation vectors, Miller indices, simple crystal structure, Atomic Bonding (Ionic, Covalent, Metallic, vanderwaals and hydrogen bonding), x-ray diffraction & Bragg's law, Laue method, powder Method, Point defects in solids.

Quantum Mechanics: Difficulties with Classical physics, Introduction to quantum mechanics, simple concepts, discovery of Planck's constant, de-Broglie hypothesis, Group velocity and phase velocity, Schrodinger wave equations, time dependant and time independent Schrodinger equations, Heisenberg Uncertainty principle, Applications.

UNIT- II

Free Electron Theory: Elements of classical free electron theory and its limitations, Drude's Theory of Conduction, quantum theory of free electrons, Fermi level, Density of states, Fermi-Dirac distribution function, hermionic emission, Richardson's equation.

Magnetic Properties of solids: Atomic magnetic moments, orbital diamagnetism, Classical theory of Paramagnetism, Ferromagnetism, antiferromagnetism, and ferrimagnetism, hysteresis, domain theory

UNIT- III

Dielectrics: Molecular theory, polarization, displacement, susceptibility, dielectric coefficient, permitivity and various relations between these, Gauss's law in the presence of a dielectric, Energy stored in a dielectric. Behaviour of dielectrics in a.c. field, simple concepts, dielectric losses

Band Theory of Solids: Origin of energy bands, Kronig, Penney Model (qualitative), E-K diagrams, Brillouin Zones, Concept of effective mass and holes, Classification of solids into metals, Semiconductors and insulators, Fermi energy and its variation with temperature in metal, semiconductors and insulators. Hall Effect and its Applications, Photoconductivity and applications.

UNIT- IV

Super Conductivity: Introduction, Meissner effect, London equation, Curie's Law- Curie temperature, Critical field (H_c), Type I and Type II superconductors, and formation of superconducting gap at Fermi level, Electron-Phonon interaction and BCS theory.

Nano Science: Nanoscale, Nanoparticles (introduction to Quantum Dot, Quantum wire, Quantum well); Properties of nanomaterials, Bucky ball, Carbon Nano tube, Basics of synthesis., Top down- bottom up approach, Ball milling.

Text and Reference Books:

1. Charles Kittel, "Introduction to Solid State Physics", VII Ed., John Wiley
2. Powell and Crasemann, "Quantum Mechanics", Oxford & IBH
3. B.S.Saxena, R.C.Gupta and P.N.Saxena, "Fundamentals of Solid State Physics", Pragati Prakashan
4. Ajoy Ghatak, "Introduction to Quantum Mechanics", Macmillan India Ltd
5. MA Wahab, "Solid State Physics Structure and Properties of Materials", Narosa Publishing House Pvt. Ltd.)
6. C N R.Rao, "Nanoworld: An introduction to Nanoscience and Technology", NPP Ltd.
7. Pillai, "Solid State Physics", New Age
8. Avadhanulu and Kshirsagar, "A text book of Engineering Physics", S.Chand

MATHEMATICS-II

General Course Information:

Course Code: MAT-102-L Course Credits: 04 Mode: Lecture (L) and Tutorial (T) Contact Hours:03hours (L)+02hours (T) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

Course Objectives and Outcomes:

The objectives of this course are:

1. To familiarize students with infinite series, matrices, Laplace transformation, ordinary and partial differential equations.
2. To familiarize students with applications of matrices, Laplace transformation, ordinary and partial differential equations.

By the end of the course a student is expected to:

Get acquainted with use of various mathematical tools in engineering and sciences.

Course Contents

UNIT-I

Infinite series : Convergence and divergence, Comparison, D' Alembert's ratio, Integral, Raabe's, Logarithmic and Cauchy root tests, Alternating series, Absolute and conditional convergence.

Matrices and its Applications : Rank of a matrix, elementary transformations, elementary matrices, inverse using elementary transformations, normal form of a matrix, linear dependence and independence of vectors, consistency of linear system of equations, linear and orthogonal transformations, eigen values and eigen vectors, properties of eigen values, Cayley - Hamilton theorem and its applications.

UNIT-II

Ordinary Differential Equations & its Applications : Exact differential equations, Equations reducible to exact differential equations, Applications of Differential equations of first order & first degree to simple electric circuits, Newton's law of cooling, heat flow and orthogonal trajectories, Linear differential equations of second and higher order, Complete solution, complementary function and particular integral, method of variation of parameters to find particular Integral, Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications of linear differential equations to simple pendulum, oscillatory electric circuits.

UNIT-III

Laplace Transform and its Applications: Laplace transforms of elementary functions, properties of Laplace transforms, existence conditions, transforms of derivatives, transforms of integrals, multiplication by t^n, division by t. Evaluation of integrals by Laplace transforms. Laplace transform of Unit step function, unit impulse function and periodic function. Inverse transforms, convolution theorem, application to linear differential equations and simultaneous linear differential equations with constant coefficients.

UNIT-IV

Partial Differential Equations and Applications: Formation of partial differential equations, Lagrange's linear partial differential equation, First order non-linear partial differential equation, Charpit's method, Method

of separation of variables and its applications to wave equation and one dimensional heat equation, two dimensional heat flow (steady state solutions only).

Text and Reference Books:

1. E. Kreyszig. "Advanced Engineering Mathematics", Wiley Publication
2. B.S. Grewal. "Higher Engineering Mathematics", Khanna Publishers
3. Paras Ram. "Engineering Mathematics through Applications", CBS Publishers
4. S.S. Sastry. "Engineering Mathematics", Part-I, PHI Learning
5. R.K. Jain and S.R.K.Iyengar, "Advanced Engineering Mathematics", Taylor & Francis
6. Michael D. Greenberg, "Advanced Engineering Mathematics", Pearson Publication

PROGRAMMING IN C

General Course Information:

Course Code: CSE-101-L Course Credits: 03 Mode: Lecture (L) Contact Hours: 03hours (L) per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)** Two minor tests each of 20 marks, Class Performance measured through percentage of lectures attended (4 marks), assignments, quiz etc. (6 marks), and end semester examination of 70 marks. For the end semester examination, nine questions are to be set by the examiner. Question number one will be compulsory and based on the entire syllabus. It will contain seven short answers type questions. Rest of the eight questions is to be given by setting two questions from each of the four units of the syllabus. A candidate is required to attempt any other four questions selecting one from each of the four units. All questions carry equal marks.

About the Course and its Objectives and Outcomes:

The objectives of this course are to:

1. Introduce students to basic terminology of computer.
2. Make them understand different problem solving techniques.
3. To make students learn art of C programming.
4. Make students capable of using pointers, files etc. for solving problems.

By the end of the course a student is expected to:

1. Understand the terminology related to computers.
2. To understand the concepts of Algorithms and flowcharts for their possible use in problem solving.
3. Write, compile and debug programs in C language.
4. Understand the concepts of memory by the use of pointers and to handle different type of files.
5. Analyse problems and write programs for solving them with the help of case studies.

Course Contents

UNIT-I

Computer Fundamentals, Block Diagram along with Computer components, characteristics and generation, classification of computers, .Hardware and software, types of software. Programming Languages, Machine, Assembly, High Level Language, Introduction to Compiler, Assembler, and Interpreter, Operating System, Definition, functions, different types, single user, multi user, time sharing, multiprogramming, batch processing, real time etc., Representation of information inside the computers, Problem solving techniques, Algorithms, Flowcharts, Programming methodologies, top-down and bottom-up programming, Debugging, Types of errors in programming.

UNIT-II

C Programming language, C fundamentals, formatted input/ output, expressions, selection statements, loops and their applications; Basic types, arrays, functions, including recursive functions, program organization, local and external variables and scope, pointers and arrays.

UNIT-III

Strings, strings literals, string variables, I/O of strings, arrays of strings, applications, Preprocessor, preprocessor directives, macro definition, conditional compilation, Structures, Unions and Enumerations, Structure variables and operations on structures, Structured types, nested array structures, unions, enumeration as integers, tags and types. Declaration, Declaration syntax.

UNIT-IV

Storage classes, types of qualifiers, declarators, initializers, Program Design: modules, information hiding, abstract data types, difference between C & C++, Low level programming: Bitwise operators, Bit fields in structures, other low level techniques, Standard library: Input / output; streams, file operations, error handling.

Text and Reference Books:

1. Brian K Williams and Stacey C. Sawyer, "Using Information Technology", 5th Edition, TMH, 2003.
2. Kernighan,B.W and Ritchie,D.M, "The C Programming language", 2nd Edition, PH, 2006
3. E. Balaguruswami, "Programming in ANSI C", TMHl, 5th Edition, 2011
4. Yashavant P. Kanetkar, " Let Us C", BPB Publications, 2011
5. Byron S Gottfried, "Programming with C", Schaum's Outlines, 2nd Edition, 2006.
6. P. K. Sinha and Priti Sinha, "Computer Fundamentals", BPB, 6th edition, 2011.
7. Dennis P. Curtin, Kim Foley, Kunal Sen, Cathleen Morin, "Information technology",TMH, 1998.
8. Barry Press and Marcia Press, "Teach yourself all about computers", IDG Books India, 2000.

ESSENTIALS OF COMMUNICATION-II LAB

General Course Information:

Course Code: HUM-102-P Course Credits: 01 Mode: Practical Contact Hours: 02 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70):** Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

Lab Contents

Good command on the language and communication skills has become need of the hour. The time has come to focus equally on the communicative part of the language besides the conventional teaching. The language lab is very helpful tool with which a student can practice and assess one's own speech in any language.

In this lab, a student is supposed to practice pronunciation of words, grammar rules, tenses, phonemic alphabets, speaking and listening using computer software available in the language lab.

PROGRAMMING IN C LAB

General Course Information

Course Code: CSE-101-P Course Credits: 01 Mode: Practical Contact Hours: 02 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70):** Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

The objectives of this lab are to:

1. Give students hands on training of C language
2. Learn programming terminology and the syntax of various functions of C
3. Learn C to solve problems given.

By the end of the course a student is expected to be able to:

1. Write, compile and debug programs in C language
2. Use various data types, pointers and file handling functions
3. To formulate problems and implement algorithms in C

Lab Contents

1. Write a program to find the largest of three numbers. (if-then-else)
2. Write a program to find the largest number out of ten numbers (for-statement)
3. Write a program to find the average mail height & average female heights in the class (input is in form of sex code, height).
4. Write a program to find roots of quadratic equation using functions and switch statements.
5. Write a program using arrays to find the largest and second largest no. out of given 50 nos.
6. Write a program to multiply two matrices
7. Write a program to read a string and write it in reverse order
8. Write a program to concatenate two strings
9. Write a program to sort numbers using the quick sort algorithm.
10. Represent a deck of playing cards using arrays.
11. Write a program to check that the input string is a palindrome or not.

NOTE: The list is indicative. The teacher can alter/add more number of experiments as per the requirement.

PHYSICS-II LAB

General Course Information:

Course Code: PHY-102-P Course Credits: 01 Mode: Practical Contact Hours: 02 hours per week Examination Duration: 03 hours	**Course Assessment Methods (internal: 30; external: 70)**: Internal practical evaluation is to be done by the course coordinator. The end semester practical examination will be conducted jointly by external and internal examiners.

Lab Contents

To find the low resistance by carey - Foster's bridge.
To find the resistance of a galvanometer by Thomson's constant diffelction method using a post office box.
3. To find the value of high resistances by Substitution method.
4. To find the value of high resistances by Leakage method.
5. To study the characteristics of a solar cell and to find the fill factor.
6. To find the value of e/m for electrons by helical method.
7. To find the ionisation potential of Argon/Mercury using a thyratron tube.
8. To study the variation of magnetic field with distance and to find the radius of coil by Stewart and Gee's apparatus.
9. To study the characteristics of (Cu-Fe, Cu-Constantan) thermo couple.
10. To find the value of Planck's constant using a photo electric cell.
11. To find the value of co-efficient of self-inductance by using a Rayleigh bridge.
12. To find the value of Hall Co-efficient of semi-conductor.
13. To study the V-I characteristics of a p-n diode.
14. To find the band gap of intrinsic semi-conductor using four probe method.
15. To calculate the hysteresis loss by tracing a B-H curve.

NOTE: The list is indicative. The teacher can alter/add more number of experiments as per the requirement.

Recommended Books:

1. B.L. Worsnop and H.T. Flint, "Advanced Practical Physics", KPH
2. S.L.Gupta and V.Kumar, "Practical Physics", Pragati Prakashan
3. Chauhan and Singh, "Advanced Practical Physics", Vol. I & II, Pragati Prakashan
4. K. Murlaleedhara Varier, J. Antony, and P. P. Pradyumnan, "Advanced experimental Techniques in Modern Physics", Pragati Prakashan.