**DIPLOMA (ICD) IN CIVIL ENGINEERING**
**&**
**CERTIFICATE PROGRAMME IN BUILDING MAINTENANCE**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub. Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-121 | Workshop Practice-II | 0 | 0 | 4 | 4 | 2 |
| 6 | HU-122 | Principles of Management and Industrial Psychology | 3 | 0 | 0 | 3 | 3 |
| 7 | CV-121 | Building Materials | 2 | 0 | 2 | 4 | 3 |
| | | **Total** | **18** | **1** | **12** | **31** | **25** |

**DIPLOMA IN COMPUTER SCIENCE AND ENGINEERING**
**&**
**CERTIFICATE IN DATA ENTRY & WORD PROCESSING (CDE)**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-122 | Workshop Practice | 0 | 0 | 4 | 4 | 2 |
| 6 | CS-122 | Operating System Fundamentals | 3 | 0 | 2 | 5 | 4 |
| 7 | ME-121 | Engineering Drawing | 0 | 0 | 4 | 4 | 2 |
| | | **Total** | **16** | **1** | **16** | **33** | **25** |

**DIPLOMA (ICD) IN CHEMICAL TECHNOLOGY**
**&**
**CERTIFIATE IN PAPER TECHNOLOGY**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | CH-121 | Unit Operation Lab | 0 | 0 | 4 | 4 | 2 |
| 6 | CH-122 | Introduction of Paper Technology Lab | 0 | 0 | 4 | 4 | 2 |
| 7 | CS-121 | Computer Fundamentals | 3 | 0 | 2 | 5 | 4 |
| | | **Total** | **1** | **1** | **16** | **33** | **25** |

**DIPLOMA (ICD) IN ELECTRONICS AND COMMUNICATION ENGINEERING**
**&**
**CERTIFICATE PROGRAMME IN SERVICING & MAINTENANCE OF ELECTRONIC INSTRUMENTS(CSME)**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | ME-121 | Engineering Drawing | 0 | 0 | 4 | 4 | 2 |
| 5 | EC-121 | Digital Electronics | 3 | 0 | 4 | 7 | 5 |
| 6 | EC-122 | Electronics Workshop Practice-I | 0 | 0 | 4 | 4 | 2 |
| | | **Total** | **15** | **1** | **16** | **32** | **24** |

**DIPLOMA (ICD) IN ELECTRONICS AND COMMUNICATION ENGINEERING**
**&**
**CERTIFICATE PROGRAMME IN TELEVISION MECHANIC (CTV)**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | ME-121 | Engineering Drawing | 0 | 0 | 4 | 4 | 2 |
| 5 | EC-121 | Digital Electronics | 3 | 0 | 4 | 7 | 5 |
| 6 | EC-122 | Electronics Workshop Practice-I | 0 | 0 | 4 | 4 | 2 |
| | | Total | 15 | 1 | 16 | 32 | 24 |

**DIPLOMA (ICD) IN ELECTRICAL ENGINEERING**
**&**
**CERTIFICATE IN ELECTRICIAN (CEN)**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-122 | Workshop Practice | 0 | 0 | 4 | 4 | 2 |
| 6 | CS-121 | Computer Fundamentals | 3 | 0 | 2 | 5 | 4 |
| 7 | EE-121 | Electrical Engineering Drawing | 0 | 0 | 4 | 4 | 2 |
| | | **Total** | **16** | **1** | **16** | **33** | **25** |

**DIPLOMA (ICD) IN INSTRUMENTATION AND CONTROL ENGINEERING**
**&**
**CERTIFICATE IN SERVICING & MAINTENANCE OF MEDICAL INSTRUMENTS**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-122 | Workshop Practice | 0 | 0 | 4 | 4 | 2 |
| 6 | CS-121 | Computer Fundamentals | 3 | 0 | 2 | 5 | 4 |
| 7 | IE-121 | Measurement Science | 3 | 0 | 0 | 3 | 3 |
| | | **Total** | **19** | **1** | **12** | **32** | **26** |

**DIPLOMA (ICD) IN FOOD TECHNOLOGY**
**&**
**CERTIFICATE IN FOOD PROCESSING & PRESERVATION (CFP)**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-121 | Workshop Practice-II | 0 | 0 | 4 | 4 | 2 |
| 6 | CS-121 | Computer Fundamentals | 3 | 0 | 2 | 5 | 4 |
| | | **Total** | **16** | **1** | **12** | **29** | **23** |

**DIPLOMA (ICD) IN MECHANICAL ENGINEERING**

**&**

**CERTIFICATE IN AIR CONDITIONING MECHANIC (CAC)**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-121 | Workshop Practice-II | 0 | 0 | 4 | 4 | 2 |
| 6 | ME-121 | Machine Drawing | 0 | 0 | 4 | 4 | 2 |
| 7 | ME-122 | Thermal Engineering | 2 | 0 | 2 | 4 | 3 |
| | | **Total** | **15** | **1** | **16** | **32** | **24** |

**DIPLOMA (ICD) IN MECHANICAL ENGINEERING**

**&**

**CERTIFICATE IN AUTO AND FARM EQUIPMENT MECHANIC (CAF)**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-121 | Workshop Practice-II | 0 | 0 | 4 | 4 | 2 |
| 6 | ME-121 | Machine Drawing | 0 | 0 | 4 | 4 | 2 |
| 7 | ME-122 | Thermal Engineering | 2 | 0 | 2 | 4 | 3 |
| | | **Total** | **15** | **1** | **16** | **32** | **24** |

**DIPLOMA (ICD) IN MECHANICAL ENGINEERING**

**&**

**CERTIFICATE IN FOUNDRY AND FORGING (CFF)**

| Semester-II (ICD) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-121 | Workshop Practice-II | 0 | 0 | 4 | 4 | 2 |
| 6 | ME-121 | Machine Drawing | 0 | 0 | 4 | 4 | 2 |
| 7 | ME-122 | Thermal Engineering | 2 | 0 | 2 | 4 | 3 |
| | | **Total** | **15** | **1** | **16** | **32** | **24** |

**DIPLOMA (ICD) IN MECHANICAL ENGINEERING**

**&**

**CERTIFICATE IN TOOL AND DIE TECHNOLOGY (CTD)**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-121 | Workshop Practice-II | 0 | 0 | 4 | 4 | 2 |
| 6 | ME-121 | Machine Drawing | 0 | 0 | 4 | 4 | 2 |
| 7 | ME-122 | Thermal Engineering | 2 | 0 | 2 | 4 | 3 |
| | | **Total** | **15** | **1** | **16** | **32** | **24** |

**DIPLOMA (ICD) IN MECHANICAL ENGINEERING**
**&**
**CERTIFICATE IN WELDING (CWG)**

| Semester-II | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.No** | **Sub Code** | **Subject Name** | **L** | **T** | **P** | **Hrs.** | **Credits** |
| 1 | AM-121 | Mathematics- II | 4 | 1 | 0 | 5 | 5 |
| 2 | PH-121 | Physics-II | 4 | 0 | 2 | 6 | 5 |
| 3 | CY-121 | Chemistry-II | 4 | 0 | 2 | 6 | 5 |
| 4 | HU-121 | Communication Skills-II | 1 | 0 | 2 | 3 | 2 |
| 5 | WS-121 | Workshop Practice-II | 0 | 0 | 4 | 4 | 2 |
| 6 | ME-121 | Machine Drawing | 0 | 0 | 4 | 4 | 2 |
| 7 | ME-122 | Thermal Engineering | 2 | 0 | 2 | 4 | 3 |
| | | **Total** | **15** | **1** | **16** | **32** | **24** |

**INDEX**

**Title of the course** : **CHEMISTRY-II**
**Subject Code** : **CY-121**
Weekly load : 6 LTP 4-0-2
Credit : 5 (Lecture 4; Practical 1)

| | Course Outlines | Lectures |
|---|---|---|
| **UNIT-I** | **Chemical Kinetics**<br>Molecularity, Rate and order of reaction, Factors influencing rates of reaction, Rate equation for first and second order reaction, Pseudo-unimolecular reactions, Temperature dependence of rate of reaction, Activation energy, Arrhenius equation | 08 |
| | **Electrochemistry**<br>Electrolysis, Arrhenius theory, Faraday's Laws, Applications of electrolysis such as Electroplating, Electrorefining Electronic concept of Oxidation and Reduction, Balancing chemical equations by Ion-electron method, Electrolytic conduction, Specific and molar conductance, Variation with concentration, Kohlrausch's Law, EMF of a cell, Standard electrode potential, Nernst equation and its applications to chemical cells. Relation between Gibbs energy change and EMF of a cell, Electrochemical series and its application.<br>Electrochemical Cells, Primary Cell - Dry Cell, Secondary Cell - Lead storage cell | 14 |
| | **Surface Chemistry**<br>Surfaces: physisorption and chemisorptions, Factors affecting adsorption of gases on solids, Preparation of colloids and its general properties-Tyndall effect, Brownian movement, Electrophoresis, Coagulation, Emulsions, Micelles, Catalysis- Homogeneous and heterogeneous | 08 |
| **UNIT-II** | **Transition Metals and Coordination Chemistry**<br>General introduction, Electronic configuration, General trends in properties of the first row transition metals – metallic character, ionization enthalpy, oxidation states, ionic radii, colour, catalytic property, magnetic properties, interstitial compounds, alloy formation.<br>Coordination compounds- Nomenclature and bonding | 14 |
| | **Organic Chemistry**<br>General introduction to alkane, alkene, alkyne and aromatic compounds-preparation and properties, Halides and hydroxy compounds: Nomenclature of compounds containing halogen atoms and hydroxyl groups: haloalkanes, alcohols and phenols. physical, chemical properties and uses<br>Aldehydes, ketones-Nomenclature, physical, chemical properties and uses, carboxylic acids and their derivatives-physical, chemical properties and uses<br>Amines-Nomenclature of amino compounds and their methods of preparation, physical, chemical properties and uses | 16 |

**Recommended Books:**

| Author | Title | Publisher |
|---|---|---|
| | Chemistry for class XI and XII | NCERT New Delhi |
| SP Jauhar | Modern ABC of Chemistry (class XI and XII) | MBD |
| S C Khetarpal et.al. | Pardeep's New Course of Chemistry (class XI and XII) | Prdeep |
| P D Sharma et.al. | Effectual Chemistry (class XI and XII) | JBD |

**LIST OF PRACTICALS**

1. To determine Iron content in Mohr's salt by standard $K_2Cr_2O_7$ solution.
2. To study the adsorption of iodine from alcoholic solution by charcoal.
3. To study hydrolysis of methyl acetate in presence of hydrochloric acid.
4. To detect the extra elements (Nitrogen, Sulphur and Halogens) present in the given organic compound.
5. To detect the functional group (any one) Carboxylic acid (-COOH), Phenol, Alcohol (-OH), Aldehyde and Ketone, Ester (-COOR), Acid amide ($-CONH_2$), amino ($-NH_2$) present in the given organic compound.

**Title of the course** : **Communication Skills-II**
**Subject Code** : **HU-121**
Weekly load : 3 LTP 1-0-2
Credit : 2 (Lecture 1; Practical 1)
**Theory**

| Unit | Course Description | Lecture(s) |
|---|---|---|
| **Unit- I** | **Business Communication**<br>Inviting Quotations, Letters of placing an order, Letters of cancelling an order, Letters of complaint, Drafting an application for job along with a Resume. | 08 |
| **Unit- II** | **Composition Writing**<br>Paragraph Writing, Précis Writing, Reporting events | 04 |
| | **Correspondence Writing**<br>Personal Letters**,** Official Letters**,** Invitations-Formal and Informal, Acceptance and Refusal | 04 |

**Recommended Books:**

| Author | Title | Publisher |
|---|---|---|
| Sinclair, John | *Collins Cobuild English Grammar* | Collins |
| Allan, W. Stannard | *Living English Structure* | Orient Longman |
| Ghosh, R.N., K.W. Moody & S. R. Inthira | *A Course in Written English* | NCERT |
| Bhatnagar, Nitin and Mamta Bhatnagar | *Communicative English for Engineers and Professionals* | Pearson |

**List of Experiments (10-14):**

1. Introducing yourself.
2. Observing and analyzing your environment/ surroundings.
3. Paper Reading on a general topic.
4. Declamation/ Debates.
5. Learning Etiquettes in Social and Official Settings.
6. Summarizing newspaper reports.
7. Preparing a wall newspaper.
8. English Conversation Skills.
9. Translation from English to Vernacular.
10. Dialogue writing and delivery for the given situation.
11. Role Plays.
12. Grammar exercises.
13. Building of Vocabulary.
14. Watching videos/ movies and writing, presenting their summaries.

**Title of the course** : **Principles of Management and Industrial Psychology**
**Subject Code** : **HU-122**
Weekly load : 03 LTP 3-0-0
Credit : 03 (Lecture 3)

| | Course Description | Lectures |
|---|---|---|
| **Unit-I** | **Introduction**<br>Introduction to Management, It's Need ,Importance & Purpose, Evolution of Management thoughts, Different Schools/ approaches to Management: BehavioralQuantitative, Systems, Contingency Approach | **6** |
| | **Management Planning**<br>Management Planning, Importance of Planning,Types of Planning,Strategies,Policies,Procedure, Rules etc. in the context of Planning. | **8** |
| | **Organizing and Controlling**<br>Organizing : Organizing as a Management process, Principles of Organization, Different Structures of organizations such as line, Line & Staff, Functional, Matrix or project Organization Characteristics, Introduction to Organizationalclimate, Decision Making, Group Decision Making, Staffing: What is Staffing? Steps involved in Staffing, Recruitment, Staffing, Performance Appraisal Development.<br>Leading:Leadership,Characteristics, Motivation, Managing Conflicts, Leadership Traits And Styles, Different Approaches To Leadership. Controlling:Controlling as a Management function, Direct and Indirect Control, Elements of Control, Prerequisites for Effective Control. | **10** |
| **Unit-II** | **Industrial Psychology**<br>Introduction to Industrial Psychology – Definitions & Scope. Major influences on industrial. Psychology- Scientific management and human relations schools ,Hawthorne Experiments. Motivation and Job satisfaction, stress management. Organizational culture, Leadership & group dynamics. | **12** |
| | **Work Environment & Engineering Psychology**<br>Introduction, fatigue. Boredom, accidents and safety. Job Analysis, Recruitment and Selection – Reliability & Validity of recruitment tests Performance Management : Training & Development. | **12** |

**Recommended Books:**

| Author | Title | Publisher |
|---|---|---|
| Miner J.B | Industrial/Organizational Psychology | McGraw Hill |
| Blum & Naylor | Industrial Psychology: Its Theoretical& Social Foundation | CBS Publication |
| Aamodt, M.G, Belmont, C.A | Industrial/Organizational Psychology: An Applied Approach | Wadsworth/Thompson |
| Black and Porter | Management | Hitt |

**Title of the course** : **Mathematics - II**
**Subject Code** : **AM - 121**
Weekly load : 5 Hrs. LTP 4-1-0
Credit : 5 (Lecture 4; Tutorial 1; Practical 0)

| Unit | Course outlines | Lecture |
|---|---|---|
| 1 | **Functions**<br>Functions, types of functions, domain and range. Concept of limit. Standard limits. Continuity of a function. | 8 |
| | **Differentiation**<br>Physical & geometrical meaning of derivative of a function, differentiation of $x^n$, sin x, cos x, tan x, sec x, cosec x, cot x, $e^x$, $a^x$ and $\log_a x$ from the first principle. Differentiation of sum, difference, product and quotient of functions. Differentiation of function of a function. (Chain rule), differentiation of inverse trigonometric and hyperbolic functions. Logarithmic and parametric differentiation. Differentiation of implicit functions. | 10 |
| | **Application of Differentiation**<br>Expansion of functions using Taylor and Maclaurin's series(without proof). Maxima and minima of a function. Equations of tangent and normal (for explicit function only). Indeterminate forms, L'Hospital's Rule | 12 |
| 2 | **Integration**<br>Integration as anti-derivative, fundamental integrals involving algebraic, trigonometric, exponential and logarithmic functions. Integration by substitution, by parts and by partial fractions. Integration of rational and irrational functions. Four standard cases. | 16 |
| | **Definite Integration**<br>Definite integral. Evaluation of definite integral by substitution. Properties of definite integral (without proof) and simple problems. | 6 |
| | **Application of Integration**<br>Area under a curve. Area between two curves (involving line, circle, parabola and ellipse only). | 8 |

**Recommended Books:**

| Author | Title | Publisher |
|---|---|---|
| | Text books on Mathematics for XII | NCERT, New Delhi |
| Shanti Narayan | Differential Calculus | S. Chand & Co. |
| Shanti Narayan | Integral Calculus | S. Chand & Co |
| Thomas & Finney | Calculus | Pearson Education |

**Title of the course** : **PHYSICS- II**
**Subject Code** : **PH-121**
Weekly load : 6 LTP 4-0-2
Credit : 5 (Lecture 4; Practical 1)

| Unit | Course outlines | Lecture |
|---|---|---|
| **Unit-1** | **ELECTROSTATICS**<br>Coulomb's law (scalar & vector forms), electric field, electric field due to a point charge, electric dipole and its moment, electric fields along the axial and equatorial lines, concept of dielectric and dielectric constant, Gauss's theorem and its application to find electric field due to an infinitive wire and plane sheet of charge. Conductors and insulators, force and torque experienced by a dipole (in uniform electric field), capacitance, parallel plate capacitor with air/dielectric medium between the plates, series and parallel combinations of capacitors, energy of a capacitor. Numerical Problems | 10 |
| | **CURRENT ELECTRICITY**<br>Resistance, resistivity, combination of resistances in series and parallel, Kirchhoff's laws, principle of potentiometer and its application for comparing e.m.f. of two cells Numerical Problems | 06 |
| | **MAGNETISM**<br>Magnetic lines of force and magnetic dipole, earth's magnetic field and its source (elementary ideas), concepts and properties of Para, Dia and Ferro-magnetic substances with examples. Numerical Problems | 08 |
| | **ELECTROMAGNETIC INDUCTION AND ALTERNATING CURRENT**<br>Electromagnetic induction, Faraday's laws, Induced e.m.f., Lenz's law, Lorentz magnetic force, self and mutual inductance, alternating current & e.m.f., elementary idea of working of transformer. Numerical Problems. | 08 |
| **Unit-2** | **THERMAL AND MAGNETIC EFFECTS OF CURRENT**<br>Electric energy and power, Joule's law of heating, thermoelectricity (See back effect), Biot-Savart's law, magnetic field due to a straight wire and a circular loop. Definition of Ampere, elementary idea of moving coil galvanometer and its conversation into ammeter and voltmeter. Numerical Problems | 08 |
| | **WAVE OPTICS**<br>Wave front and Huygen's principle, interference of light, Young'sdouble slit experiment, coherent sources of light, diffraction of light, diffraction due to a single slit, polarization of light (general idea). Numerical Problems | 06 |
| | **MOMENT OF INERTIA**<br>Centre of mass, moment of inertia of rigid body, radius of gyration, theorem of parallel and perpendicular axes, moment of inertia of a straight rod, circular ring, circular disc, cylinder ( solid and hollow) sphere, relation between torque and moment of inertia, Kinetic energy and angular momentum , motion of cylinder and sphere rolling without slipping on an inclined plane. Numericals | 10 |
| | **RAY OPTICS AND OPTICAL INSTRUMENTS**<br>Lens and curved mirrors, lens and curved mirror formula, linear magnification, total internal reflection and its application in optical communication (elementary ideas)Numerical Problems | 08 |

**Recommended Books:**

| Author | Title | Publisher |
|---|---|---|
| K L Gomber and K L Gogia | Fundamental Physics Class (XII) | Pardeep Publications |
| Haliday and Resnick and Walker | Fundamental of Physics | John Wiley & Sons |
| S. K. Gupta | abc of Physics, Class (XII) | Modern Publications |

**List of Experiments**

1. To draw magnetic field lines of a bar magnet placed in magnetic meridian with the North Pole towards the south of the earth and to locate the position of the neutral points.
2. To measure the value of resistance by using multimeter and to compare with those written in colour code.
3. To establish current – voltage relationship and to verify Ohm's Law by using an ammeter and voltmeter and find the value of resistance.
4. a) To study the laws of combination of series and parallel for resistances by using a meter bridge.
   b) To find an unknownresistance by using a meter bridge.
5. To determine the resistance of a galvanometer by half deflection method and find it's figure of merit.
6. To determine the focal length of a concave lens by a telescope using the relation:
   $\frac{1}{v} - \frac{1}{u} = \frac{1}{f}$
7. To find the angle of prism and refractive index of prism by using Spectrometer.
8. To study the transverse nature of light using sodium light.
9. To find the height of an accessible object using Sextant.
10. To verify the Newton's law of cooling.
11. To study the seebeck effect of metal coupling.
12. To find the moment of inertia and torque of given flywheel.
13. To draw the Voltage-current characteristics of P-N junction diode.
14. To draw the characteristics of photo cell.
15. To determine the frequency of AC by electrically maintained tuning fork (Melde`s method).
16. To determine the bandgap of a semiconductor diode.
17. To observe the transistor characteristics using transistor apparatus kit.
18. To study the Peltier effect of metal coupling.

**Title of the course** **: Unit Operation Lab**
**Subject Code** **: CH-121**
Weekly load : 4 LTP 0-0-4
Credit : 2 (Practical 2)

**List of Experiments:**

1. Calibration of Venturimeter.
2. Calibration of Orificemeter.
3. Study of Jaw Crusher
4. Study of Ball Mill
5. Study of Rotary Drum Filter
6. Study of Filter Press
7. Study of flow through pipes of different cross-sectional shapes
8. Study of Fittings

**Title of the course** : **Introduction of Paper Technology Lab**
**Subject Code** : **CH-122**
Weekly load : 4 LTP 0-0-4
Credit : 2 (Practical 2)

**List of Experiments:**

1. Identification of different grades of paper.
2. Measurement of bulk density of raw material.
3. Determination of ash content of paper/raw material
4. To determine the moisture content of given raw material.
5. Visual inspection of dirt and speck content of paper.
6. Visual inspection of quality of paper.
7. Find out the gsm of given sample of paper.
8. Identification and qualitative description of different cellulosic raw materials used for paper making.
9. Chart preparation of different printing processes.
10. Chart preparation for an integrated paper mill.

**Title of the course** : **Building Materials**
**Subject Code** : **CV-121**
Weekly load : 04 LTP 2-0-2
Credit : 03 ((Lecture 2; Practical 1)

| Unit | Course Description | Lectures |
|---|---|---|
| **Unit-I** | **Building Stones:**<br>Classification of Rocks: Geological classification: Igneous, sedimentary and metamorphic rocks. Chemical classification; Calcareous, argillaceous and siliceous rocks. Physical classification: Unstratified, startified and foliated rocks. General characteristics of stones – Marble, Kota stone, Granite, Sand, Trap, Basalt stone, Lime stone and Slate. Requirements of good building stones. Identification of common building stones. Various uses of stones in construction. Quarrying of stones by blasting and its effect on environment. | **5** |
| | **Bricks and Tiles:**<br>Introduction to bricks. Raw materials for brick manufacturing and properties of good brick making earth. Manufacturing of bricks: Preparation of clay (manual/mechanically). Moulding: hand moulding and machine moulding, brick table; drying of bricks, burning of bricks, types of kilns (Bull's Trench Kiln and Hoffman's Kiln), process of burning, size and weight of standard brick; traditional brick, refractory brick, clay-flyash bricks, sun dried bricks, only line diagram of kilns. Classification and specifications of bricks as per BIS: 1077. Testing of common building bricks as per BIS: 3495. Compressive strength, water absorption – hot and cold water test, efflorescence, Dimensional tolerance, soundness. Tiles: Building tiles; Types of tiles-wall, ceiling, roofing and flooring tiles, ceramic, terrazo and PVC tiles: their properties and uses, Vitrified tiles, Paver blocks. Stacking of bricks and tiles at site | **5** |
| | **Cement:**<br>Introduction, raw materials, flow diagram of manufacturing of cement. Various types of Cements, their uses and testing: Ordinary portland cement, rapid hardening cement, low heat cement, high alumina cement, blast furnace slag cement, white and coloured cement, portland pozzolana cement, super sulphate cement, Tests of cement – fineness, soundness, initial and final setting time etc.as per B.I.S. Code. Properties of cement | **6** |
| **Unit-II** | **Lime:**<br>Introduction: Lime as one of the cementing materials. Classification and types of lime as per BIS Code. Calcination and slaking of lime | **5** |
| | **Timber and Wood Based Products**:<br>Identification and uses of differenttypes of timber: Teak, Deodar, Shisham, Sal, Mango, Kail, Chir, Fir, Hollock, Champ. Market forms of converted timber as per BIS Code. Seasoning of timber: purpose, methods of seasoning as per BIS Code. Properties of timber and specifications of structural timber. Defects in timber decay in timber. Preservation of timber and methods of treatment as per BIS. Other wood based products, their brief description ofmanufacture and uses: laminated board, block board, fibre board, hard board, sunmica, plywood, veneers, Cement Panel Board, moulded Door. | **5** |
| | **Paints and Varnishes**:<br>Introduction, purpose and use of paints. Types, ingredients, properties and uses of oil paints, water paints and cement paints. Covering capacity of various paints. Types, properties and uses of varnishes. Trade name of different products. | **6** |

**Recommended Books:**

| Author | Title | Publisher |
|---|---|---|
| Sharma, SK; and Mathur | Engineering Materials | S. Chand and Co |
| Surendra Singh | Engineering Materials | Vikas Publishing House Pvt. Ltd |
| Chowdhuri | Engineering Materials | Culcutta, TechnicalPublishers of India |
| Bahl, SK | Engineering Materials | Rainbow Book Co |

**Practical Exercises:**

1. To identify the stones used in building works by visual examination
2. To determine the crushing strength of bricks
3. To determine the water absorption of bricks and efflorescence of bricks
4. To identify various types of timbers such as: Teak, Sal, Chir, Sissoo, Deodar, Kail & Hollock by visual examination only
5. To determine fineness (by sieve analysis) of cement
6. To conduct field test of cement.
7. To determine normal consistency of cement
8. To determine initial and final setting times of cement
9. To determine soundness of cement
10. To determine compressive strength of cement
11. The students should submit a report work on the construction materials, covering water proofing material, cements, steel, paints and timber products available in the local market. They will also show the competitive study based upon the cost, brand name, sizes available in the local market.

**Title of the course** : **Computer Fundamentals**
**Subject Code** : **CS-121**
Weekly load : 5 LTP 3-0-2
Credit : 4 (Lecture 3, Practical 1)

| Unit | Course outlines | Lecture |
|---|---|---|
| **Unit-1** | **Introduction**<br>Definition of electronic Computer, Generations, Characteristic and Application of Computers, Block diagram of computer. | 06 |
| | **Input/output Devices**<br>Various I/O devices like keyboard, mouse etc. Plotter, Scanner, Printer and its types (Inkjet, Dot matrix, Laser printer etc). | 04 |
| | **Memory**<br>Primary and secondary memory, RAM, Types of RAM,ROM & types of ROM, cache, Registers ,Memory Hierarchy. | 06 |
| | **Basics of Computer**<br>Booting process, introduction to concepts-bit, nibble, byte, word, hardware, software, operating system, system software, application software. | 06 |
| **Unit-2** | **Computer Languages**<br>Generation of Language, Translators, Interpreters, Assemblers, Compilers. | 06 |
| | **Number System**<br>Various codes, decimal, binary, octal, hexadecimal, conversion from one number system to another. | 06 |
| | **Internet and its Applications**<br>Internet, Connecting to the internet, Internet services, Applications like E-commerce, entertainment, education etc<br>Threats: - Firewall, Virus, Worm, Trojan Horses. | 06 |
| | **Web Technologies**<br>World Wide Web, URL, Search engines, Web Browsers, Hypertext , Hypertext Marks Language, Gopher, FTP. | 08 |

**Recommended Books:**

| ***Author(s)*** | ***Title*** | ***Publisher*** |
|---|---|---|
| Yadav DS | Foundations of IT | New Age, Delhi |
| Curtin | Information Technology: Breaking News | TMH |
| Rajaraman V | Introduction to Computers | Prentice-Hall India |

**LIST OF PRACTICALS**

**Perform the following Practicals in MS-Word**

1. Create a document using functions: Save as, page number, Bullets and numbering.
2. Create a document using fonts, styles and Formatting options.
3. Create a document using Fill effects, Printed water mark under background option and also use Header and Footer.
4. Create a document, using the function page set up, page preview, and then print that document.
5. Use the concept of Mail Merge in MS Word.
6. Use the concept of Macro in MS Word
7. Create a document using table & perform various operations like Insert, delete, select and Table auto Format in it.

**Perform the following Practicals in MS-Excel**

8. Create Line, XY, Bar and Pie chart in excel sheet and compare the given data using these charts.
9. Implement all formula like addition, subtraction, Multiplication and division etc. in excel.
10. Use the concept of Macro in MS Excel.
11. Use the concept of Sorting, filter and hyperlink in Excel.
12. Use the concept of paste special and paste as hyperlink in Excel
13. Create a excel sheet using fonts, styles, Formatting options, Text wrap different row, column, and cell width.
14. Create a formulae using function to compare the values of two Rows or Columns.

**Perform the following Practicals in MS-PowerPoint**

15. Create a Power point presentation using slide designing and use Design Templates, Color schemes, and Animation schemes.
16. Create a Presentation using functions: Save as, page number, Bullets and numbering, pagesetup and take print in layout form.
17. Create a power point presentation using clipart, Word art gallery & then add transition &Animationeffects**.**
18. Use the concept of Macro in Power Point.
19. Use chart, diagram and table in Power Point.
20. Create a Power point presentation and use View show, Setup show, rehearse timing in presentation.

**Perform the following Practicals in MS-Access**

21. Create forms in MS-ACCESS**.**
22. Create reports in MS-ACCESS.
23. Create table and queries in MS-ACCESS using design view.
24. Create Data Access page in design view and by using wizard in MS-ACCESS.

**Apply different modification schemes using picture manager.**

**Organize different types of Data available using clip organizer.**

**Create Resume using various features of Microsoft Word.**

**Title of the course** : **Operating System Fundamentals**
**Subject Code** : **CS-122**
Weekly load : 5 LTP 3-0-2
Credit : 4 (Lecture 3; Practical 1)

| Unit | Course outlines | Lecture |
|---|---|---|
| **Unit-1** | **Introduction**<br>A brief history of Operating system, definition, Operating systemclassification; single user, multi-user, Mainframe Systems – Batch, Multi programmed, Multitasking, time sharing, Real time and Multi-processing Operating systems. | 08 |
| | **MS-DOS Structure**<br>Os files, Command Processor, booting from floppyand Hard Disk (HD), warm and cold reboot | 04 |
| | **Operating System Structures**<br>Process management, Main memory management, File Management, I/O system management, Secondary storage management | 12 |
| **Unit-2** | **Process Management**<br>Processes - Concept, process, state, process control block, Process scheduling - Scheduling queues, schedulers, context switch, Operations on processes - creation, termination, | 10 |
| | **File Management**<br>File concepts, Access methods, Directory structure, File protection, File System structure, Allocation methods. | 08 |
| | **Command Interpreter**<br>Internal and external DOS Commands, Config, Batch and Autoexec.bat Files. Introduction to Unix/ Linux, Basic shell commands of Unix/Linux. | 06 |

**Recommended Books:**

| Author | Title | Publisher |
|---|---|---|
| Silberschatz A & Galvin | Operating System Concepts | John Wiley & Sons |
| W. Stallings | Operating Systems: Internals and Design Principles | Pearson Pub |
| Andrew S Tanenbaum | Operating Systems - Design and Implementation | PHI |
| Dietel | an Introduction to Operating System | Addision Wesley |

**LIST OF PRACTICALS**

1) To study various Operating system and their comparison.
2) To study various language Translators and their comparison
3) To study the concept of DOS environment and various control structure.
4) To study various internal and external commands.
5) Use the DIR command to list the contents of the root directory on the drive.
6) Shutdown and Logoff computer using SHUTDOWN and LOGOFF commands.
7) Practice on PAUSE, FORMAT, PING, FIND commands for specific functions.
8) Practice on DELTREE, TYPE, DATE, EXIT, COPY, XCOPY commands.
9) Practice on CD command to switch between different directories in MS-DOS.
10) Study the various step to install Window XP, Window 2007 Operating system.
11) Use DEL and DELTREE command to delete files & folders from the computer.
12) Use REN and RENAME command to rename files and folder using MS-DOS.
13) Use MOVE command to move files, folders and pictures from one place to another using MS-DOS.
14) Use DATE and TIME command to see and change the date and time of system using MS-DOS.
15) Create, view or modify files using EDIT command.
16) Identify and correct the hard drive errors by using CHKDSK command.
17) Use CLS command to clear the screen in MS-DOS.
18) Study the boot up process from CD, Floppy disk using MS-DOS and discuss various phases comes during booting.
19) Installation of device drivers
20) Creating user accounts.

**Title of the course** : **Digital Electronics**
**Subject Code** : **EC-121**
Weekly load : 7 LTP 3-0-4
Credit : 5 (Lecture=3, Tutorial=0, laboratory=2)
**Theory**

| Unit | Course outlines | Lecture(s) |
|---|---|---|
| **Unit-1** | **Introduction**<br>Basic Difference between Analog and Digital Signals, Applications and Advantages of Digital Signals | 2 |
| | **Number System**<br>Binary, Octal and hexadecimal number system.<br>Signed and unsigned number, Binary operations-addition; Subtraction, Multiplication and divisionASCII code; Excess 3 code Gray code. | 6 |
| | **Logic Gates and Minimization**<br>Definitions Symbols and Truth Tables of OR, AND,NOT,NOR,NAND,EX-OR and Universal gates,Boolean equation for simple problem,Karnaugh map (upto 4 variables) | 6 |
| | **Combinational Circuits**<br>Combinational circuit design, multiplexers,De multiplexer, encoders, decoders, adders, sub tractors and code converters | 6 |
| **Unit-2** | **Latches and Flip Flops**<br>Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops. | 5 |
| | **Counters**<br>Introduction to Asynchronous and Synchronous counters<br>Binary counters Divide by N ripple counters, Decade counter. Up/down counter, Ring counter with timing diagram | 8 |
| | **Shift Registers**<br>Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out. Universal shift register | 5 |
| | **A/D and D/A Converters**<br>Binary Weighted D/A converter, R/2R ladder D/A converter,Stair step Ramp A/D converter, Dual Slope A/D converter<br>Successive Approximation A/D Converter | 5 |
| | **Logic Families**<br>TTL and C MOS families and their sub classificationCharacteristics of TTL and C MOS digital gates. Delay, speed, noise margin, logic levels, power dissipation, fan-in, power supply requirement and comparison between TTL and C MOS families | 5 |

Recommended Books:


1. Digital Electronics and Applications by Malvino Leach, Tata McGraw Hill Education Pvt Ltd, NewDelhi
2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi
3. Digital Electronics by Soumitra Kumar Mandal, Tata McGraw Hill Education Pvt Ltd,
4. Digital Electronics by V K Sangar , Raj Publishers, Jalandhar
5. Digital Electronics by RP Jain, Tata McGraw Hill Education Pvt Ltd, New Delhi
6. Digital Electronics by KS Jamwal, Dhanpat Rai and Co., New Delhi
7. Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala
8. Digital Electronics by BR Gupta, Dhanpat Rai & Co., New Delhi
9. Digital Systems: Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi
10. Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi
11. Fundamentals of Digital Electronics by Naresh Gupta, Jain Brothers, New Delhi


**List of Experiments:**

1. Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) and Exclusive NOR(EXNOR) gates.
2. Realization of logic functions with the help of NAND or NOR gates.
3. To design a half adder using XOR and NAND gates and verification of its operation.
4. Construction of a full adder circuit using XOR and NAND gates and verify its operation.
5. To design a NOR Gate Latch and verification of its operation.
6. Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch , D flip-flop, JK flip-flops).
7. Verification of truth table for encoder and decoder ICs, Mux and DeMux.
8. To design a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation.
9. To design a 4 bit ring counter and verify its operation.
10 Asynchronous Counter ICs Use of IC 7490 or equivalent TTL (a) divide by 2 (b) divide by 10 Counter.

| | | | |
|---|---|---|---|
| **Title of the course** | **: Electronics Workshop Practice-I** | | |
| **Subject Code** | **: EC-122** | | |
| Weekly load | : 4 | LTP | 0-0-4 |
| Credit | : 2 (Lecture 0, Tutorial 0, Practical 2) | | |

**List of Experiments**

1. **Study of meters** (Multimeter - Digital and Analog): This topic covers the use of multimeter to check voltage, current and also to check various electronic components.
2. **Study of CRO:** This topic covers the procedure to check the frequency and amplitude of a signal waveform.
3. **Study of electronic components:** This topic covers the familiarization of some basic electronic components and circuit symbols (Resistors, Capacitors, Diodes, Transistors, IC's etc.) and identification of component values using colour codes.
4. **Testing of electronic components:** This topic covers how to test electronic components using multimeters.
5. **Soldering practice:** Circuit assembling practice using printed circuit board with electronic components.
6. **Assembling of simple electronic circuits**: This topic covers the use of breadboards for assembly of the following circuits
   a. Half wave rectifier circuit
   b. Full wave rectifier circuit
   c. Simple LED flashing circuit using Transistors / ICs

**Title of the course** **:Electrical Engineering Drawing**
**Subject Code** **:EE-121**
Weekly load : 4 LTP-0 0 4
Credit : 2(Practical 2)

| Unit | Course Outlines | Lecture |
|---|---|---|
| **Unit-1** | **Electrical Symbols**<br>List of symbols for electrical equipments and accessories used in electrical works. Light, fan and power circuits, alarm and indicating circuit, contactor control circuits as per I.S.S. Different types of cables, switches, distribution board, switch board, boxes, batten and its accessories, conduit and its accessories, lamp holders, socket out lets, plug ceiling roses. Fuse and energy meter used in domestic and power wiring installations. | 10 |
| | **Light and fan circuits**<br>Fluorescent tube wiring Light and fan controlled by necessary switches and regulators wiring layout of a 2 bedroom house | 10 |
| | **Special Circuits**<br>.i) Godown wiring<br>(ii) Stair case wiring<br>(iii) Corridor lighting<br>(iv) One lamp controlled by three or more switches. | 10 |
| **Unit-2** | **Assembly Drawings**<br>(i) Assembly drawing of simple electrical equipment from actual piece or from a pictorial view (carbon brush holder, open knife switch, miniature circuit breaker, motor terminal block, and similar other electrical items<br>(ii) Poles, towers cables and insulators | 8 |
| | **Earthing metals**<br>Pipe earhing, Plate earthing | 6 |
| | **Substation layout**<br>Layout diagram of 66KV substation Circuit breakers | 8 |
| | **Power plants layout**<br>Hydro power plant layout Thermal power plant layout | 8 |

**Recommended Books-**


1. Electrical Engineering Design and Drawing by Surjeet Singh, DhanpatRai& Co.
2. Electrical Engineering Design and Drawing by S K Bhattacharaya, SK kataria and Sons.
3. Electrical Engineering Design and Drawing by Ubhi and Marwaha, IPH, New Delhi.
4. Electrical Engineering Design and Drawing by S K Sahdev, Uneek Publication

**Title of the course** : **Measurement Science**
**Subject Code** : **IE-121**
Weekly load : 3 LTP-3 0 0
Credit : 3(Lecture 3)

| Unit | Course Outlines | Lecture |
|---|---|---|
| **Unit-1** | **Introduction**<br>Introduction to measurements, classification of the methods of measurement, types of instruments, elements of a generalized measurement system, input/output configuration of measurement systems. | 08 |
| | **Static Characteristics of the instruments**<br>Measurement system performance, static characteristics in detail, error in measurement, loading effects, input/ output impedance, loading effects due to series and shunt connected instruments. | 08 |
| | **Dynamic characteristics of the instruments**<br>Dynamic response and analysis, mathematical models of the measurement system, zero, first and second order measurement systems, dynamic response to standard inputs, | 08 |
| **Unit-2** | **Measurement error and statistical analysis**<br>Introduction, Limiting errors, classification of errors, Limiting errors, combination of quantities with errors, types of errors, statistical analysis of data- average, dispersion and Gaussian distribution curve. | 08 |
| | **Units, Dimensions and standards**<br>Units, Dimensions, systems of electrical units, dimensions in electromagnetic and electrostatic systems, Determination of absolute units, standards of measurement and their classification. | 08 |
| | **Signals and noise in measurement systems**<br>Introduction, deterministic and random signals, statistical representation of the random signals, effects of noise and interference on the measurement system, noise sources , method of reducing effects. | 08 |

**Recommended Books-**

1. A K Ghosh: Introduction to Instrumentation and Control, Prentice Hall of India, New Delhi 2004.
2. A K Sawhney: A course on electrical and electronic measurements and instrumentation, Dhanpat
3. John P. Bentley: Principles of Measurement System, Pearson Education
4. David A Bell: Electronic Instrumentation and measurement, Prentice Hall of India

**Title of course** : **MACHINE DRAWING**
**Subject Code** : **ME- 121**
Weekly load : 04 LTP 0-0-4
Credit : 02(Lecture 0; Practical 2)

| | Course Description | Lecture |
|---|---|---|
| **Unit-I** | **Basics of Machine Drawing**<br>Machining symbols, surface finish characteristics, surface roughness symbols, limits, fits and tolerances. | **06** |
| | **Screw Threads**<br>Screw thread nomenclature, thread designation, conventional representation of screw threads, different types of threads and their representation. | **12** |
| | **Fastenings**<br>Nut, bolt and washer; types of nuts, types of bolts, Welding; types of welded joints, representation of a weld, welding symbols according to B.I.S. | **12** |
| **Unit-II** | **Keys, Cotters and Joints**<br>Introduction, proportions of a key, types of keys and their applications. A Cotter and a Gib with their uses. Types of joints used for connecting rods. | **12** |
| | **Rivets and Riveted Joints**<br>Types of rivets, types of riveted joints, general terms/rules used for riveted joints. | **10** |
| | **Assembly and detail drawings**<br>One assembly drawings of a Tail stock, details (drawings of different elements) of a screw jack assembly. | **12** |

**Recommended Books**

| ***Title*** | ***Author(s)*** | ***Publisher*** |
|---|---|---|
| Machine Drawing | N D Bhatt | Khanna |
| Machine Drawing | P S Gill | Standard |
| Machine Drawing | Goutam Pohit & Goutam Ghosh | Pearson Education |

**Title of course** : **Thermal Engineering**
**Subject code** : **ME-122**
Weekly load : 4 LTP- 202
Credit : 3 (Lecture-2, Practical-1)

| Unit | Course out line | Lectures |
|---|---|---|
| **Unit-I** | **Introduction:** Boyle‟s Law, Charle‟s Law, characteristics gas equation, universal gas constant Properties; intrinsic and extrinsic, system; open, closed and isolated. | **4** |
| | **Laws of thermodynamics:** Thermodynamic equilibrium, Zero th law of thermodynamics, first law of thermodynamics, concepts of enthalpy, internal energy, specific heat, work and heat, concept of entropy, caluses and Kelvin plank statement of second law of thermodynamics, Equivalence of Kelvin plank and clausius statements. Throttling and free expansion, non-flow work done under isothermal, polytropic, adiabatic, isobaric, isochoric processes, simple problems steady flow energy and its applications | **5** |
| | **Formation of Steam** Steam formation, wet steam, dry steam and saturated steam, dryness fraction, superheated steam; degree of superheat, latent heat of vaporization, Enthalpy of steam, entropy; entropy increase during evaporation, temperature entropy diagram mollier diagram (H-S diagram) | **5** |
| | **Steam Boilers** Steam generator, Classifications, comparison of fire tube and water tube boilers, construction and features of Lancashire boiler, locomotive and Babcock and Wilcox Boilers, Introduction to modern boilers. Rankine cycle. | **5** |
| **Units-II** | **Engine Cycles** Carnot cycle, Otto Cycle, diesel and dual cycle, derivation of efficiency and comparison of these cycles. | **4** |
| | **I.C Engine** Types, classification, CI and SI engines, Mechanical constructional details of two stroke petrol engine and diesel engine, four stroke petrol and diesel engines, valve timing diagrams. | **4** |
| | **Performance of IC engines:** Brake, indicated, frictional powers, brake mean effective pressure ,indicated map, engine efficiencies, air standard, brake, indicated, mechanical, volumetric ,scavenging, efficiency, characteristics of power, fuel consumption with engine speed, calculation of powers, efficiency and SFC for two and four stroke engine. LCV, HCV | **5** |

**Recommended Books:**

| | | |
|---|---|---|
| Thermal Engineering | RK Rajput | Laxmi publication. |
| Heat and thermodynamics | PL Ballany | Khanna Publisher |
| Thermal Scienec | Domkundwar | S.Chand Publisher |
| Heat Engineering | Kumar and Vasandani | S.Chand Publisher. |
| I.C Engine | Ganesan | McGraw Hill |

**List of Experiments**

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1. Construction Details and Operation of Babcock and Wilcox boiler.
2. Construction Details and Operation of Lanchashire boiler.
3. Construction Details and Operation of mounting and accessories of a boiler.
4. Construction Details and Operation of locomotive boiler.
5. Construction Details and Operation of 2-stroke petrol engine.
6. Construction Details and Operation of 4-stroke petrol engine.
7. Construction Details and Operation of 4-stroke diesel engine.
8. To find the performance parameters of a diesel engine (B.H.P, thermal efficiency, fuel consumption, air consumption.)
9. To find the performance parameters of a petrol engine (B.H.P, thermal efficiency, fuel consumption, air consumption.)

**Title of the course** : **Workshop Practice-II**
**Subject Code** : **WS-121**
Weekly load : 4 LTP 0-0-4
Credit : 2 (Lecture 0; Practical 2)

Practical: 10-14 jobs from the following list

**CARPENTRY SHOP**

1. Safety precautions in carpentry shop.
2. Introduction to wood and wood working operations.
3. Demonstration and use of carpentry shop tools and equipment.
4. Exercise on simple operations, viz. hand sawing, marking, planning and chiseling.
5. Cross lap joint, T-lap joint, Corner lap joint, Mortise and tenon joint, Dovetail joint

**FITTING SHOP**

1. Safety precautions in fitting shop.
2. Demonstration and use of fitting shop tools and equipment.
3. Study and use of instruments in fitting shop, like, vernier calipers, micrometer, height gauge and bevel protractor
4. Exercise on simple operation viz. cutting, chipping, sawing, filing, drilling

**FORGING SHOP**

1. Safety precautions in carpentry shop.
2. Familiarization with different tools used in forging.
3. Exercise on conversion of round to square with cold forging.
4. Exercise on conversion of round to square with hot forging.
5. Upsetting operation exercise.

**FOUNDRY SHOP**

1. Safety precautions in foundry shop.
2. Familiarization with different patterns and hand tools.
3. Preparations of green sand mould using single piece pattern three-four exercises.
4. Preparations of green sand mould using split pattern on bench moulding.
5. Preparations of green sand mould using solid pattern by bedded method.

**SHEET METAL SHOP**

1. Safety precautions in sheet metal shop.
2. Familiarization with different tools and processes in sheet metal shop.
3. Exercise on sheet cutting, development, folding, bending, piercing, punching, parting, notching and slitting.
4. Profile and circle cutting exercise.
5. Different types of joints excercise

**ARC WELDING SHOP**

1. To familiarize with safety aspects.
2. To familiarize with equipment and tools of the welding shop.
3. To learn about different positions of welding.
4. To practice of bead on plate in flat position
5. To practice making of a butt joint and lap joint on a flat piece

| | | | |
|---|---|---|---|
| Title of the course | : **Workshop Practice** | | |
| Subject Code | : **WS-122** | | |
| Weekly load | : 4 | LTP | 0-0-4 |
| Credit | : 2 (Lecture 0; Practical 2) | | |

Practical: 10-14 jobs from the following list

**FOUNDRY SHOP**

1. Safety precautions in foundry shop.
2. Familiarization with different patterns and hand tools.
3. Preparations of green sand mould using single piece pattern three-four exercises.
4. Preparations of green sand mould using split pattern on bench moulding.
5. Preparations of green sand mould using solid pattern by bedded method.

**WELDING SHOP**

1. To familiarize with safety aspects.
2. To familiarize with equipment and tools of the welding shop.
3. To learn about different positions of welding.
4. To practice of bead on plate in flat position
5. To practice making of a butt joint and lap joint on a flat piece
6. Identification of various gas flames
7. Practice of gas welding

**MACHINE SHOP**

1. To familiarize with safety aspects.
2. To familiarize with equipment and tools.
3. Practice of turning operation on lathe
4. Practice of facing operation on lathe
5. Practice of taper turning on lathe
6. Practice of knurling on lathe.
7. Practice of producing rectangular block on milling/shaper/planner m/c.

**PATTERN SHOP**

1. Safety precautions in pattern shop.
2. Study the layout and different equipment used in pattern shop.
3. Familiarization with different tools and patterns in pattern shop.
4. Exercise on making of solid piece pattern
5. Exercise on making of split piece pattern
6. Exercise on making of cored pattern.