2.1   ENGLISH AND COMMUNICATION SKILLS - II

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RATIONALE

Communication skills play an important role in career development. This subject aims at introducing basic concepts of communication besides laying emphasis on developing listening, speaking, reading and writing skills.

LEARNING OUTCOME

 After undergoing the subject, the students will be able to:

- Make proper oral presentations.
- Speak confidently.
- Debate properly.
- Write accurate official/business letters.
- Respond to telephone calls effectively.
- Overcome communication barriers.

DETAILED CONTENTS

1.   Functional Grammar and Vocabulary   (12 hrs)

       Theory and Practical exercises on following:
       1.1   One word substitution
       1.2   List of words misspelt
       1.3   Prefixes and Suffixes
       1.4   Punctuation
       1.5   Narration
       1.6   Idioms and Phrases

2.   Reading   (12 hrs)

       Comprehension, Vocabulary enrichment and grammar exercises based on the following readings:

       Section-I

       ▪   The Refund - Friotz Karinthy
       ▪   Riders to the Sea - J.M. Synge

Section-II

- Night of the Scorpion - Nissim Ezekiel
- Palanquin Bearers - Sarojini Naidu
- Ode on a Grecian Urn – John Keats

3.   Writing   (24 hrs)

3.1   Precis Writing
3.2   Correspondence: Business and Official
3.3   Report Writing: Project report
3.4   Press Release
3.5   Memos and Circulars
3.6   Notices, Agenda and Minutes of Meetings
3.7   Filling-up different forms such as bank form and on-line form for placement etc.

LIST OF PRACTICALS

1. Group discussion on some current topic of interest.
2. Small speech using voice modulation.
3. Seminar
4. Debate
5. Use of recorded CDs of speeches for comprehension.
6. Manners and etiquettes
7. Paper presentation
8. Telephonic conversation: General etiquette for making and receiving calls.

INSTRUCTIONAL STRATEGY

Use of pre-recorded CDs/DVDs should be made to help the students in developing listening skills. Student centred activities such as group discussions, role play should be used to ensure active participation of students in the classroom.

RECOMMENDED BOOKS

1.   Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2.   Professional Communication by Kavita Tyagi & Padma Misra; Published by PHI Learning Pvt. Ltd; New Delhi.
3.   Developing Communication Skills (2nd Edition) by Krishna Mohan & Meera Banerji; Published by Macmillan Publishers India Ltd; New Delhi.
4.   Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.

5. Business correspondence and report writing by RC Sharma and Krishna Mohan; Tata McGraw Hill, New Delhi.
6. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
7. Communication Skills by Sanjay Kumar & Pushp Lata; Oxford University Press, New Delhi

Websites for Reference:

1. http://www.mindtools.com/ page 8.html – 99k
2. http://www.letstalk.com.in
3. http://www.englishlearning.com
4. http://learnenglish.britishcouncil.org/en/

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	12	25
2	12	25
3	24	50
Total	**48**	**100**

2.2   APPLIED MATHEMATICS – II

L T P
5 - -

RATIONALE

Applied mathematics forms the backbone of engineering students. Basic elements of Differential calculus and Integral calculus and Operations Research have been included in this course. This will develop analytical abilities to apply in engineering field and will provide continuing educational base to the students.

LEARNING OUTCOMES

After undergoing the subject, students will be able to:

- Calculate the effect of one variable with respect to another variable and write the equation of tangent and normal to a curve at a point by understanding and application of basics concepts of derivatives. After understanding the concept of derivatives they will be able to calculate the maximum and minimum values of a function.
- Calculate the area of a curve bounded by axes, by understanding the applications of basic concepts of integration. They will also be able to find the velocity from acceleration and displacement from velocity.
- Evaluate complex integrals in a simpler way by applying definite integral.
- Calculate the approximate area under a curve by applying Numerical Integration by using Trapezoidal and Simpson's Rules.
- Optimize the utilization of limited resources by applying basics concepts of Linear Programming.
- Solve Engineering and Industrial Problems by understanding and applying the solution of differential equations.
- Apply differential Equations and Numerical methods for higher learning of Mathematics and Engineering Applications.

DETAILED CONTENTS

1.   Differential Calculus   (26 hrs)

    1.1   Definition of function; Concept of limits (Introduction only).

    1.2   Standard Differentiation of x^n , sin x, cos x, tan x, e^x, $\log_a x$ and related formule.

1.3   Differentiation of sum, product and quotient of functions, differentiation of implicit functions, differentiation of parametric functions. Differentiation of function of a function.

1.4   Differentiation of trigonometric, inverse trigonometric functions. Logarithmic differentiation. Exponential differentiation, Successive differentiation (excluding nth order).

1.5   Application of differential calculus in:
- (a)   Rate Measures
- (b)   Maxima and minima
- (c)   Equation of tangent and normal to a curve (for explicit functions only)

2.   Integral Calculus   (30 hrs)

2.1   Integration as inverse operation of differentiation with simple examples.

2.2   Standard integrals and related simple problems

2.3   Simple integration by substitution, by parts and by partial fractions (for linear factors only)

2.4   Evaluation of definite integrals (simple problems)

Evaluation of $\int_{0}^{\pi/2} Sin^n x\, dx,\quad \int_{0}^{\pi/2} Cos^n x\, dx,\quad \int_{0}^{\pi/2} Sin^m x\ Cos^n x\, dx$

using formulae without proof (m and n being positive integers only).

2.5   Applications of integration for evaluation of area bounded by a curve and axes (Simple problem).

2.6   Numerical integration by Trapezoidal Rule and Simpson's $1/3^{rd}$ Rule and $3/8^{th}$ Rule.

3.   Operations Research   (12 hrs)

3.1   Linear Programming Problems formulations.

3.2   Graphical Method

4.   Differential Equations   (12 hrs)

4.1   Definition, order, degree of ordinary differential equations.

4.2   Formation of differential equation (upto 2nd order). Solution of Differential equations with Variable separation and Linear Differential equations.

INSTRUCTIONAL STATREGY

Basic elements of Differential Calculus, Integral Calculus, Operations research and Differential Equations can be taught in the light of their applications in the field of engineering and technology. By laying more stress on applied part, teachers can also help in providing continuing education base to the students.

RECOMMENDED BOOKS

1.   Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi

2.   Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar

3.   Applied Mathematics, Vol. I & II by SS Sabharwal &Dr Sunita Jain, Eagle Parkashan, Jalandhar

4.   Engineering Mathematics, Vol I, II & III by V Sundaram et al, Vikas Publishing House (P) Ltd., New Delhi

5.   Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd., Delhi

6.   Applied Mathematics I, Archana Sharma, Lords Publications, Jalandhar.

7.   Engineering Mathematics by Srimanta Pal and Subodh C. Bhunia; Oxford University Press, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	26	34
2	30	38
3	12	16
4	12	12
Total	**80**	**100**

2.3   APPLIED PHYSICS – II

L T P
4 - 2

RATIONALE

Applied physics includes the study of a large number of diverse topics related to things that go in the world around us. It aims to give an understanding of this world both by observation and prediction of the way in which objects behave. Concrete use of physical principles and analysis in various fields of engineering and technology

LEARNING OUTCOME

After undergoing this subject, the student will be able to;

a)   Define wave motion its types (Transverse and Longitudinal), Periodic and Simple Harmonic Motion, solve simple problems.

b)   Define the terms: frequency, amplitude, wavelength, velocity of a wave. They will be able to explain diffraction, interference, polarization.

c)   Explain various Engineering, Medical and Industrial applications of Ultrasonics.

d)   Apply acoustics principles to various types of buildings to get best sound effect.

e)   State the laws of reflection and refraction of light, calculate the location of the final image for a concave mirror single thin converging lens**,** design and assemble a microscope using 2 lenses

f)   Measure the refractive index of a liquid or a solid. They will be able to explain total internal reflection as applied to optical fibers.

g)   Define capacitance and its unit. They will be able to explain the function of capacitors in simple circuits, solve simple problems using $C=Q/V$

h)   Explain the role of free electrons in insulators, conductors and semiconductors, qualitatively the terms: potential, potential difference, electromotive force.

i)   Explain electric current as flow of charge, the concept of resistance, measure correctly, using a multimeter, the following: electric current, potential difference, resistance.

j)   List the effects of an electric current and their common applications, State and apply Ohm's law, calculate the equivalent resistance of a variety of resistor combinations, determine the energy consumed by an appliance, distinguish between AC and DC electricity

k)   State the laws of electromagnetic induction, describe the effect on a current-carrying conductor when placed in a magnetic field

l)   Explain how the following operate: moving coil galvanometer, simple DC motor

m)   Apply the knowledge of diodes in rectifiers, adapters IC's and various electronic circuits. Use the knowledge of semiconductors in various

technical gadgets like mobile phones, computers, LED, LCD, solar lights etc.

n)   Apply the concept of light amplification in designing of various LASER based instruments and optical sources.

o)   Apply the use of optical fibre in Medical field and optical fibre Communication.

DETAILED CONTENTS

1.   Wave motion and its applications   (08 hrs)

1.1   Wave motion, transverse and longitudinal wave motion with examples, sound and light waves, relationship among wave velocity, frequency and wave length and its application

1.2   Wave equation $y = r \sin wt$, phase, phase difference, principle of superposition of waves

1.3   Simple Harmonic Motion (SHM): definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M. concept of simple harmonic progressive wave

1.4   Study of vibration of Cantilever and determination of its time period

1.5   Free, forced and resonant vibrations with examples

1.6   Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications

1.7   Ultrasonics – Introduction and their engineering and medical applications.

2.   Optics   (10 hrs)

2.1   Laws of reflection and refraction, refractive index, lens for thin lenses, power of lens, magnification

2.2   Total internal reflection and its applications, Critical angle and conditions for total internal reflection

2.3   Simple and compound microscope, astronomical telescope in normal adjustment, magnifying power.

2.4   Applications of Total Internal Reflection in optical fiber, uses of microscope and telescope.

3.   Electrostatics   (12 hrs)

3.1   Coulombs law, unit of charge,

3.2   Electric field, Electric lines of force and their properties, Electric flux, Electric potential and potential difference.

3.3   Gauss law: Application of Gauss law to find electric field intensity of straight charged conductor, plane charged sheet and charged sphere.

3.4 Capacitor and its working principle, Capacitance and its units. Capacitance of parallel plate capacitor. Series and parallel combination of capacitors (numericals)

3.5 Dielectric and its effect on capacitance, dielectric break down

3.6 Application of electrostatics in electrostatic precipitation of microbes and moisture separation from air and gases in industry for pollution control (Brief explanation only)

4. Current Electricity   (12 hrs)

4.1 Electric Current and its Unit, Direct and alternating current,

4.2 Resistance and its Units, Specific Resistance, Conductance, Specific Conductance, Series and Parallel combination of Resistances. Factors affecting Resistance, Colour coding of carbon Resistances

4.3 Ohm's law and its verification, superconductivity

4.4 Kirchhoff's laws, Wheatstone bridge and its applications (slide wire bridge only)

4.5 Concept of terminal potential difference and Electro motive force (EMF)

4.6 Heating effect of current, Electric power, Electric energy and its units (related numerical problems), Advantages of Electric Energy over other forms of energy

4.7 Examples of application of DC circuits in various electrical and electronics equipment such as C.R.O, T.V., Audio-Video System, Computers etc.

5. Electromagnetism   (10 hrs)

5.1 Introduction to magnetism, Types of magnetic materials. Dia, para and ferromagnetic materials with their properties,

5.2 Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units

5.3 Concept of electromagnetic induction, Faraday's Laws

5.4 Lorentz force (force on moving charge in magnetic field). Force on current carrying conductor, force on rectangular coil placed in magnetic field

5.5 Moving coil galvanometer its principle, construction and working. Conversion of a galvanometer into ammeter and voltmeter

5.6 Application of electromagnetism in ac/dc motors and generators.

6. Semiconductor physics   (06 hrs)

6.1 Energy bands, Types of materials (insulator, semi conductor, conductor), intrinsic and extrinsic semiconductors, p-n junction diode and its V-I characteristics

6.2 Diode as rectifier – half wave and full wave rectifier (centre taped), semiconductor transistor; pnp and npn (concept only)

6.3 Application of semiconductor diodes (Zenor, LED) and that of transistor as amplifier and oscillator.

7.   Modern Physics   (06 hrs)

    7.1   Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; laser and its characteristics, population inversion, Types of lasers; Ruby and He-Ne lasers, engineering and medical applications of lasers.

    7.2   Fibre optics: introduction to optical fibers, light propagation, types, acceptance angle and numerical aperture and applications in communication.

    7.3   Introduction to nanotechnology, nanoparticles and nano materials.

LIST OF PRACTICALS (To perform minimum Eight experiments)

1.   To find the time period of a simple pendulum
2.   To determine and verify the time period of Cantilever
3.   To find the focal length of convex lens by displacement method.
4.   To determine the magnifying power of an astronomical telescope
5.   To verify ohm's laws by drawing a graph between voltage and current.
6.   To verify laws of resistances in series and parallel combination.
7.   To find resistance of galvanometer by half deflection method
8.   Conversion of Galvanometer into an Ammeter and Voltmeter of given range.
9.   To measure very low resistance and very high resistances using Slide Wire bridge
10.   To draw characteristics of a pn junction diode and determine knee and break down voltages
11.   Use of CRO in plotting AC and DC waveforms.
12.   To find wave length of the laser beam.
13.   To find numerical aperture of a plastic optical fiber.

INSTRUCTIONAL STATREGY

Teacher may use various instructional media like models, charts and graphs while imparting instructions. The field application should be made clear before teaching the basics of waves, sound, light, electrostatics, dc circuits, electromagnetism, and semiconductor physics etc to develop proper understanding of the physical phenomenon**.** Use of demonstration can make the subject interesting and develop scientific temper in the students.

RECOMMENDED BOOKS

1.   Text Book of Physics (Part-I, Part-II); N.C.E.R.T., Delhi
2.   Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
3.   A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
4.   Practical Physics, by C. L. Arora, S Chand publications
5.   Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (hrs)	Marks Allotted (%)
1	08	12
2	10	16
3	12	18
4	12	18
5	10	16
6	06	10
7	06	10
Total	**64**	**100**

2.4   ENERGY CONSERVATION

L T P
3 - 2

RATIONALE

The requirement of energy has increased manifolds in last two decades due to rapid urbanization and growth in industrial/service sector. It has become challenging task to meet ever increasing energy demands with limited conventional fuels and natural resources. Due to fast depletion of fossil fuels and a tremendous gap between supply and demand of energy, it is essential to adopt energy conservation techniques in almost every field like industries, commercial and residential sectors etc. Energy conservation has attained priority as it is regarded as additional energy resource. Energy saved is energy produced. This course covers the concepts of energy management and its conservation. It gives the insight to energy conservation opportunities in general industry and details out energy audit methodology and energy audit instruments.

LEARNING OUTCOMES

After undergoing the subject, student will be able to:

- Define principles and objectives of energy management and energy audit.
- Understand Energy Conservation Act 2001 and its features.
- Understand various forms & elements of energy.
- Identify electrical and thermal utilities. Understand their basic principle of operation and assess performance of various equipments.
- Identify areas of energy conservation and adopt conservation methods in various systems.
- Evaluate the techno economic feasibility of the energy conservation technique adopted.

DETAILED CONTENTS

1.   Basics of Energy   (03 hrs)

1.1 Classification of energy- primary and secondary energy, commercial and non-commercial energy, non-renewable and renewable energy with special reference to solar energy
1.2 Global fuel reserve
1.3 Energy scenario in India and state of Punjab, Sector-wise energy consumption (domestic, industrial, agricultural and other sectors)
1.4 Impact of energy usage on climate

2.   Energy Conservation and EC Act 2001   (04 hrs)

2.1 Introduction to energy management, energy conservation, energy efficiency and its need

2.2 Salient features of Energy Conservation Act 2001 & The Energy Conservation (Amendment) Act, 2010 and its importance

2.3 Standards and Labeling

    2.3.1   Concept of star rating and its importance

    2.3.2   Types of product available for star rating

3.   Energy Audit   (03 hrs)

3.1 Types and methodology

3.2 Energy auditing reporting format

3.3 Energy audit instruments

4.   Electrical Supply System and Motors   (06 hrs)

4.1 Types of electrical supply system

4.2 Single line diagram

4.3 Transformers

    4.3.1   Introduction

    4.3.2   Losses in transformer

    4.3.3   Transformer loading

    4.3.4   Tips for energy savings in transformers

4.4 Electric Motors

    4.4.1   Types of motors

    4.4.2   Losses in induction motors

    4.4.3   Estimation of motor loading

    4.4.4   Variation in efficiency and power factor with loading

    4.4.5   Tips for energy savings in motors

5.   Energy Efficiency in Electrical Utilities   (07 hrs)

5.1 Understanding Electricity Bill

    5.1.1   Tariff structure

    5.1.2   Components of power (kW, kVA and kVAR) and power factor

    5.1.3   Concept of sanctioned load, maximum demand, contract demand and monthly minimum charges (MMC).

5.2 Pumps

    5.2.1   Introduction to pump and its applications

    5.2.2   Efficient pumping system operation

    5.2.3   Energy efficiency in agriculture pumps

    5.2.4   Tips for energy saving in pumps

5.3 Compressed Air System

    5.3.1   Types of air compressor and its applications

      5.3.2   Leakage test

      5.3.3   Energy saving opportunities in compressors.

  5.4 Energy Conservation in HVAC and Refrigeration System

      5.4.1   Introduction

      5.4.2   Concept of Energy Efficiency Ratio (EER)

      5.4.3   Energy saving opportunities in Heating, Ventilation and Air Conditioning (HVAC) and Refrigeration Systems.

6.   Lighting and DG Systems   (04 hrs)

  6.1 Lighting Systems

      6.1.1   Basic definitions- Lux, lumen and efficacy

      6.1.2   Types of different lamps and their features

      6.1.3   Energy efficient practices in lighting

  6.2 DG Systems

      6.2.1   Introduction

      6.2.2   Energy efficiency opportunities in DG systems

      6.2.3   Loading estimation and power factor

7.   Energy Efficiency in Thermal Utilities   (06 hrs)

  7.1 Thermal Basics

      7.1.1   Types of fuels

      7.1.2   Thermal energy

      7.1.3   Energy content in fuels

      7.1.4   Energy Units and its conversions in terms of Metric Tonne of Oil Equivalent (MTOE)

  7.2 Energy Conservation in boilers and furnaces

      7.2.1   Introduction and types of boilers

      7.2.2   Energy performance assessment of boilers

      7.2.3   Concept of stoichiometric air and excess air for combustion

      7.2.4   Energy conservation in boilers

      7.2.5   Do's and Don'ts for efficient use of boilers

      7.2.6   Furnaces

8.   Punjab Energy Conservation Building Code   (07 hrs)

  8.1 Punjab ECBC and its salient features including thermal behavior of buildings

      8.1.1   Punjab ECBC Guidelines on Building Envelope

      8.1.2   Punjab-ECBC Prescriptive Requirements for Building Envelope

8.1.3 Punjab-ECBC Guidelines on Heating, Ventilation and Air Conditioning

8.1.4 Punjab-ECBC Guidelines on Service Hot Water and Pumping

8.1.5 Punjab-ECBC Guidelines on Lighting

8.1.6 Punjab-ECBC Guidelines on Electrical Power

8.1.7 Punjab-ECBC Guidelines on Star Labelling and Minimum Star rating

8.2 Tips for energy savings in buildings
   8.2.1 New Buildings
   8.2.2 Existing Buildings

9. General Energy Saving Tips   (08 hrs)

9.1 Lighting System
9.2 Room Air Conditioners
9.3 Refrigerators
9.4 Water Heater
9.5 Computers
9.6 Fans, Heaters, Blowers and Washing Machines
9.7 Colour Television
9.8 Water Pumps
9.9 Kitchens
9.10 Transport

PRACTICAL EXERCISES

1. To conduct load survey and power consumption calculations of small building

2. To check efficacy of different lamps by measuring power consumption and lumens using lux meter

3. To measure energy efficiency ratio (EER) of an air conditioner

4. To measure effect of valve throttling on energy consumption by centrifugal pumps

5. To measure and calculate energy saving by arresting air leakages in compressor

6. To measure the effect of blower speed on energy consumed by it

STUDENT ACTIVITIES ON ENERGY CONSERVATION/ENERGY EFFICIENCY

1.   Presentations of Case Studies
2.   Debate competitions
3.   Poster competitions
4.   Industrial visits
5.   Visual Aids

INSTRUCTIONAL STRATEGY

Teachers are expected to lay considerable stress on understanding the basic concepts in energy conservation, principles and their applications. For this purpose, teachers are expected to give simple problems in the class room so as to develop necessary knowledge for comprehending the basic concepts and principles. As far as possible, the teaching of the subject must be supplemented by demonstrations and practical work in the laboratory. Visits to industries must be carried out.

REFERENCE BOOKS

1.   Guide book on General Aspects of Energy Management and Energy Audit by Bureau of Energy Efficiency, Government of India. Edition 2015
2.   Guide book on Energy Efficiency in Electrical Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
3.   Guide book on Energy Efficiency in Thermal Utilities, by Bureau of Energy Efficiency, Government of India. Edition 2015
4.   Handbook on Energy Audit & Environmental Management by Y P Abbi & Shashank Jain published by TERI. Latest Edition

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (hrs)	Marks Allotted (%)
1	03	04
2	04	08
3	03	06
4	06	12
5	07	16
6	04	08
7	06	12
8	07	16
9	08	18
Total	**48**	**100**

2.5   ENVIRONMENTAL STUDIES

L T P
3   - -

RATIONALE

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by various control measures. He should also be aware of environmental laws related to the control of pollution. He should know how to manage the waste. Energy conservation is the need of hour. He should know the concept of energy management and its conservation.

LEARNING OUTCOME

After undergoing the subject, the student will be able to:

- Comprehend the importance of ecosystem and sustainable
- Demonstrate interdisciplinary nature of environmental issues
- Identify different types of environmental pollution and control measures.
- Take corrective measures for the abetment of pollution.
- Explain environmental legislation acts.
- Define energy management, energy conservation and energy efficiency
- Demonstrate positive attitude towards judicious use of energy and environmental protection
- Practice energy efficient techniques in day-to-day life and industrial processes.
- Adopt cleaner productive technologies
- Identify the role of non-conventional energy resources in environmental protection.
- Analyze the impact of human activities on the environment

DETAILED CONTENTS

1. Basics of ecology, eco system and sustainable development   (03 hrs)

2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table, rain water harvesting, maintenance of ground water, deforestation – its effects and control measures
(04 hrs)

3. Pollution: Sources of pollution - natural and man made, causes, effects and control measures of pollution (air, water, noise, soil, radioactive and nuclear) and their units of measurement. Prevention of Pollution :Introduction to Cleaner Production Technologies, , Waste Minimization Techniques, Concept of Zero Discharge
(12 hrs)

4. Solid waste management, classification of refuse material, sources, effects and control measures.Introduction to E-waste Management   (06 hrs)

5.   Environmental Legislation - Water (prevention and control of pollution) Act 1974, Air (Prevention and Control of Pollution) Act 1981 and Environmental Protection Act 1986, Role and Function of State Pollution Control Board, Environmental Impact Assessment (EIA)   (08 hrs)

6.   Energy Conservation: Introduction to Energy Management, Energy Conservation, Energy efficiency & its need. Introduction to Energy Conservation Act 2001 and Energy Conservation (Amendment) Act 2010 & its importance. Role of Non-conventional Energy Resources (Solar Energy, Wind Energy, Bio Energy, Hydro Energy) in environmental protection.   (10 hrs)

7.   Impact of Energy Usage on Environment: – Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings,   (05 hrs)

INSTRUCTIONAL STRATEGY

In addition to theoretical instructions, different activities pertaining to Environmental Studies like expert lectures, seminars, visits etc. may also be organized.

RECOMMENDED BOOKS

1.   Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2.   Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
3.   Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi
4.   Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.
5.   Engineering Chemistry by Jain and Jain; Dhanpat Rai and Co. (P) Ltd. Delhi.
6.   Environmental Studies by Erach Bharucha; University Press (India) Private Ltd., Hyderabad.
7.   Environmental Engineering and Management by Suresh K Dhamija; SK Kataria and Sons, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	03	05
2	04	08
3	12	25
4	06	12
5	08	18
6	10	22
7	05	10
Total	**48**	**100**

2.6   ENGINEERING DRAWING - II

L T P
- - 6

RATIONALE

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

Note:

1)   First angle projection is to be followed.
2)   Minimum 16 sheets to be prepared. At least 2 sheets in AutoCAD.
3)   Instructions relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students.
4)   Continuous evaluation be done by the teachers for exercises/work done on CAD software. For this proper record may be maintained for its inclusion in the internal assessment.

LEARNING OUTCOMES

After undergoing the subject, the students will be able to:

- Draw and learn different types of wooden joints used in furniture.
- Draw the assembly from part details of objects
- Identify and draw different types of screw threads used in various machines and assemblies as per domestic and international standards
- Draw different types of nuts, bolts and washers
- Draw various locking devices and foundation bolts
- Draw different section of various types of keys and cotter joints
- Draw various riveted joints
- Draw various types of couplings used in power transmission.
- Prepare drawing of given joints/couplings using AutoCAD

DETAILED CONTENTS

1.   Detail and Assembly Drawing   (02 sheets)

1.1   Principle and utility of detail and assembly drawings
1.2   Wooden joints i.e. corner mortice and tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortice and Tenon joint, furniture drawing - freehand and with the help of drawing instruments.

2. Screw Threads (03 sheets)

    2.1   Thread Terms and Nomenclature

        2.1.1   Types of threads-External and Internal threads, Right and Left hand threads (Actual and Conventional representation), single and multiple start threads.

        2.1.2   Different Forms of screw threads-V threads (B.S.W threads, B.A thread, American National and Metric thread), Square threads (square, Acme, Buttress and Knuckle thread)

3. Nuts and Bolts (02 sheets)

    3.1   Different views of hexagonal and square nuts. Square and hexagonal headed bolt
    3.2   Assembly of Hexagonal headed bolt and Hexagonal nut with washer.
    3.3   Assembly of square headed bolt with hexagonal and with washer.

4. Locking Devices (02 sheets)

    4.1   Different types of locking devices-Lock nut, castle nut, split pin nut, locking plate, slotted nut and spring washer.
    4.2   Foundations bolts-Rag bolt, Lewis bolt, curved bolt and eye bolt.
    4.3   Drawing of various types of studs

5. Keys and Cotters (03 sheets)

    5.1   Various types of keys and cotters - their practical application, drawings of various keys and cotters showing keys and cotters in position

    5.2   Various types of joints
        -   Spigot and socket joint
        -   Gib and cotter joint
        -   Knuckle joint

6. Rivets and Riveted Joints (04 sheets)

    6.1   Types of general purpose-rivets heads
    6.2   Caulking and fullering of riveted joints
    6.3   Types of riveted joints
        (i)   Lap joint-Single riveted, double riveted (chain and zig-zag type)
        (ii)   Single riveted, Single cover plate butt joint
        (iii)   Single riveted, double cover plate butt joint
        (iv)   Double riveted, double cover plate butt joint(chain and zig-zag type)

7.   Couplings   (02 sheets)

    7.1   Introduction to coupling, their use and types
    7.2   Flange coupling (protected)
    7.3   Flexible Coupling

*8.   Use of CAD software   (02 sheets)

Draw any two joints/coupling using CAD software from the following:
i)   Sleeve and cotter joint
ii)   Knuckle joint
iii)   Spigot and socket joint
iv)   Gib and cotter joint
v)   Flange coupling
vi)   Muff coupling

   *   Auto CAD drawing will be evaluated internally by sessional marks and not by final theory paper.

INSTRUCTIONAL STRATEGY

Teacher should show model of realia of the component/part whose drawing is to be made. Emphasis should be given on cleanliness, dimensioning and layout of sheet. Focus should be on proper selection of drawing instruments and their proper use. The institute should procure AutoCAD or other engineering graphics software for practice in engineering drawings. Teachers should undergo training in AutoCAD/Engineering Graphic. Separate labs for practice on AutoCAD should be established.

RECOMMENDED BOOKS

1.   A Text Book of Engineering Drawing by Surjit Singh; Dhanpat Rai & Co., Delhi

2.   Engineering Drawing by PS Gill; SK Kataria & Sons, New Delhi

3.   Elementary Engineering Drawing in First Angle Projection by ND Bhatt; Charotar Publishing House (Pvt. Ltd.), Anand

4.   Engineering Drawing I & II by JS Layall; Eagle Parkashan, Jalandhar

5.   AutoCAD 2010: For Engineers & Designers by Prof. Sham Tickoo & D. Sarvanan; Wiley India Pvt. Ltd., Delhi.

2.7   GENERAL WORKSHOP PRACTICE - II
(Common for Electronics and Communication Engineering,
Electronics & Telecommunication Engineering, Electrical Engineering)

L   T   P
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RATIONALE

Psychomotor skills are mastered through practice, an opportunity therefore, has been extended to students through this course to refine their skills in different trades. The basic skills developed during first semester will be refined during this course by doing higher order skills jobs. In addition to developing general manual and machining skills in the students, the objective of development of sense of dignity of labour, precision, safety at work places, team working and right attitude among the students will also be met.

LEARNING OUTCOME

After undergoing the subject, the students will be able to:

- Follow safety procedures and measures.
- Maintain good housekeeping practices.
- Select materials, sequence of operations, select tools to make a given job based on interpretation of drawing as per given specification with close tolerances using at least the resources of three shops.
- Prepare a job using at least the resources of three shops and compare the job with the specifications given.
- Specify and read/understand specifications of different types of tools, equipment and machines used in various shops.
- Inspect visually to identify various types of defects in different type of materials.
- Analyze a given job and identify various operations required to make it.

DETAILED CONTENTS (PRACTICAL EXERCISES)

Note: The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

The following shops are included in the syllabus.

1.   Welding Shop – II
2.   Fitting Shop – II
3.   Sheet Metal Shop – II
4.   Electric Shop – II
5.   Electronic Shop – II
6.   Computer Shop – II

1. **WELDING SHOP - II**

1.1 Introduction to gas welding, gas welding equipment, introduction to soldering and brazing, introduction to resistance welding, safety precautions.

1.2 Jobs to be prepared

Job I   Identification and adjustment of various types of gas flames.

Job II   Preparation of lap joint on 75 mm × 35 mm × 3mm M.S. plate using gas welding.

Job III   Preparation of butt joint on 75mm×35mm×3mm M.S.flat using gas welding process.

Job IV   Preparation of a small cot frame (M.S. steel bed frame) from M.S. conduit pipe using arc/gas welding process.

Job V   Preparation of a square pyramid from M.S. rod by welding (Arc or Gas welding).

Job VI   Practice of Spot/Seam welding.

2. **FITTING SHOP - II**

2.1 Care and maintenance of various measuring tools.

2.2 Handling of measuring instruments, finding least count and checking of zero error.

2.3 Description and demonstration of various types of drills, taps and dies.

2.4 Selection of dies for threading, selection of drills and taps.

2.5 Precautions while drilling soft metals (Aluminium, Copper, Brass etc.).

2.6 Introduction to various types of threads (internal, external, single start, multi-start, left hand and right hand threads).

Job I   Drilling practice on soft metals-Aluminium or Copper or Bronze.

Job II   Preparation of a job by filing on non ferrous metals upto an accuracy of ± .1 mm.

Job III   Making internal and external threads on a job (GI Pipe, PVC pipe, Steel bars etc.) by tapping and dieing operations (manually) and fixing of different types of elbow, tee, union, socket.

3. **SHEET METAL SHOP - II**

3.1 Introduction to various metal forming processes e.g. Spinning, Punching, Blanking, cup drawing

3.2 Introduction to soldering and brazing.

3.3 Introduction to metal spinning process.

Job I   Preparation of job involving shearing, circular shearing, rolling, folding, beading and soldering process e.g. Funnel or any other job involving above operations.

Job II	Exercise on job involving brazing process
Job III	Spinning a bowl/cup/saucer
Job IV	Visit to a sheet metal industry e.g. coach builders etc.

4. ELECTRIC SHOP- II

4.1 Introduction to single phase and three phase supply and wiring system. Importance of three phase supply and wiring system.

Job I Laying 3 phase wiring for an electric motor or any three phase machine.

4.2 Estimating and costing of power consumption

Job II Connecting single phase energy meter with supply and load. Reading and working out power consumption and cost of energy.

Job III Finding faults in electric circuits, machines, with series testing lamp and multimeter.

4.3 Demonstration of dismantling, servicing and reassembling of table/ceiling fan, air-cooler, auto electric iron, heater etc.

Job IV Dismantling, servicing and reassembling of any of the above electrical appliances.

4.4 Testing and reversing direction of rotation of single phase and three phase motors.

Job V Testing single phase/three phase motors by using voltmeter, ammeter and tachometer.

Job VI Reversing direction of rotation of single phase and three phase motors.

5. ELECTRONIC SHOP - II

5.1 Identification and familiarization with the following electronic instruments:

a) Multimeter analog and digital (Three and half digit)

b) Single beam simple CRO, Signal Generator and Function Generator; function of every knob on the front panel

c) Audio-oscillator having sine and square wave output

d) Regulated Power supply -- fixed voltage and variable voltage, single output as well as dual output.

5.2 Identification and familiarisation with active and passive components; colour code and types of resistor, capacitors and potentiometers (including VDR, LDR, and thermistor). Identification of components including LED, LCD, UJT, FET, Coils, transformers (mains, audio and RF, etc), MOSFET, SCR, DIAC, TRIAC, Photodiode and Photo transistor.

5.3   Job Practice

Job I	Use of multimeters to test components and measurement of circuits, voltage, resistance.
Job II	Use of familiarisation with CRO, signal generator, function generator and Audio oscillator.
Job III	To make regulated power supply on general purpose PCB.
Job IV	Identification and familiarisation of datasheets of the following components: UJT, FET, MOSFET, SCR, DIAC, TRIAC, Photodiode and Photo transistor.
Job V	Safety precautions to be observed in the electronic shop.

6.   COMPUTER SHOP – II

EXERCISE - I

6.1   Optical Devices

- CD-R, DVD, CD-W
- Working
- Copying
- CD/DVD drives
- Pen drive (copying data, formatting scanning)

6.2   Microphones and Speakers

- Types and Interfacing

EXERCISE – II

6.3   Projectors

- Types
- Settings
- Interfacing

6.4   Hard disks

- Different makes of Hard disks
- Retrieval of Hard disk data

6.5   Graphic Card connection

6.6   Sound Card Connection

EXERCISE – III

6.7   Different types of network interface cards, cables such as data cables, printer cables, network cables, power cables etc.

6.8   Networking tools such as cutter, connector (RJ45)

6.9   Network Cable

- Straight Cable
- Cross Cable
- Roll Cable

EXERCISE – IV

6.10   Types of cables

- UTP Cables: CAT3, CAT5, CAT6, CAT7
- Fibre optic cable
- Structured cabling

RECOMMENDED BOOKS

1.   Workshop Technology I,II,III, by SK Hajra, Choudhary and AK Choudhary; Media Promoters and Publishers Pvt. Ltd. Mumbai.
2.   Workshop Technology Vol. I, II, III by Manchanda; India Publishing House, Jalandhar.
3.   Workshop Training Manual Vol. I, II by S.S. Ubhi; Katson Publishers, Ludhiana.
4.   Manual on Workshop Practice by K Venkata Reddy; MacMillan India Ltd., New Delhi
5.   Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
6.   Workshop Technology by B.S. Raghuwanshi; Dhanpat Rai and Co., New Delhi
7.   Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi

TRAFFIC AWARENESS & ROAD SAFETY CAMP (II)

A diploma holder must have knowledge of various types of traffic rules and regulations. Road safety education is vital for people of all ages. As a responsible citizen, you should be aware of each and every road safety rules. Observation is the key skill you need in ensuring road safety By obeying safety rules and regulations, you can save yourself and others on the road. This camp covers the basic concepts of traffic rules and safety. Lectures will be delivered on following broad topics with the coordination of Distt. Traffic police. There will be no exam for this camp.

1. **Time management**
2. **Traffic light signals**
3. **Speed limits of vehicles**
4. **Schedule of offences**
5. **Dividing lines**
6. **Proper road Maintenance and Warnings**
7. **Test yourself**