2.1. ENGLISH LANGUAGE – II

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RATIONALE

Knowledge of English Language plays 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 as parts of Communication Skill.

LEARNING OUTCOMES

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

- Frame correct sentences with illustrations
- Modify the language correctly
- Comprehend the language correctly
- Interpret the language correctly
- Use given material in new situations.
- Correspond effectively using various types of writings like letters, memos etc.
- Communicate effectively in English with appropriate body language making use of correct and appropriate vocabulary and grammar in an organised set up and social context.

DETAILED CONTENTS

1. Functional Grammar   (15 periods)

      1.1   Prepositions
      1.2   Framing Questions
      1.3   Conjunctions
      1.4   Tenses

2   Reading   (15 periods)

      2.1   Unseen Passage for Comprehension (Vocabulary enhancement - Prefixes, Suffixes, one word substitution,Synonym and Antonym) based upon the passage should be covered under this topic.

3   Writing Skill   (18 periods)

      3.1.   Correspondence
           a)   Business Letters- Floating Quotations, Placing Orders, Complaint Letters.
           b)   Official Letters- Letters to Government and other Offices
      3.2.   Memos, Circular, Office Orders
      3.3.   Agenda & Minutes of Meeting

LIST OF PRACTICALS

Note: Teaching Learning Process should be focused on the use of the language in writing reports and making presentations.
Topics such as Effective listening, effective note taking, group discussions and regular presentations by the students need to be taught in a project oriented manner where the learning happens as a byproduct.

Speaking and Listening Skills

1. Debate
2. Telephonic Conversation: general etiquette for making and receiving calls
3. Offering- Responding to offers.
4. Requesting – Responding to requests
5. Congratulating
6. Exploring sympathy and condolences
7. Asking Questions- Polite Responses
8. Apologizing, forgiving
9. Complaining
10. Warning
11. Asking and giving information
12. Getting and giving permission
13. Asking for and giving opinions

INSTRUCTIONAL STRATEGY

Student should be encouraged to participate in role play and other student centered activities in class rooms and actively participate in listening exercises

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests
- Actual practical work, exercises and viva-voce
- Presentation and viva-voce

RECOMMENDED BOOKS

1. Communicating Effectively in English, Book-I by RevathiSrinivas; Abhishek Publications, Chandigarh.
2 Communication Techniques and Skills by R. K. Chadha; DhanpatRai Publications, New Delhi.
3 High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
4. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

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/
5. http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Periods)	Marks Allotted (%)
1	15	30
2	15	30
3	18	40
Total	**48**	**100**

2.2   APPLIED MATHEMATICS – II

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RATIONALE

Applied mathematics forms the backbone of engineering students. Basic elements of Differential calculus, Integral calculus and Differential Equations 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, the students will be able to:

- Compute slope, the equation of tangent and normal to a curve at a point using differentiation.
- Find maximum and minimum values of a function by application of differential calculus..
- Calculate simple integration by using concepts of integration.
- Find the velocity from acceleration and displacement from velocity using integration.
- Evaluate area under curves by using definite integrals
- Calculate the area under a curve and axes.
- Calculate the approximate area under a curve by applying numerical integration using Trapezoidal and Simpson's rules.
- Solve engineering and industrial problems using differential equations.
- Apply differential Equations and numerical methods for higher learning of mathematics and engineering applications.

DETAILED CONTENTS

1.   Differential Calculus   (40periods)

   1.1   Definition of function; Concept of limits (Introduction only) and problems related to four standard limits only.

   1.2   Differentiation of x^n, sin x, cos x, tan x, e^x by first principle.

   1.3   Differentiation of sum, product and quotient of functions.

   1.4   Differentiation of trigonometric functions, inverse trigonometric functions. logarithmic differentiation, successive differentiation (upto2nd order)

   1.5   Application of differential calculus in:

(a) Rate measures

(b) Maxima and minima

2. Integral Calculus (26 periods)

   2.1 Integration as inverse operation of differentiation with simple examples.

   2.2 Simple standard integrals and related problems

   2.3 Evaluation of definite integrals with given limits.

   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) using pre-existing mathematical models.

   2.4 Applications of integration: for evaluation of area under a curve and axes (Simple problems).

   2.5 Numerical integration by Trapezoidal Rule and Simpson's $1/3^{rd}$ Rule using pre-existing mathematical models.

3. Differential Equations (04 periods)

   Definition, order, degree and linearity, of an ordinary differential equation.

4. Statistics (10 periods)

   4.1 Measures of Central Tendency: Mean, Median, Mode
   4.2 Measures of Dispersion: Mean deviation, Standard deviation
   4.3 Co-efficient of rank correlation

INSTRUCTIONAL STRATEGY

Basic elements of Differential Calculus, Integral Calculus, 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.Students need to be taught the skills needed to use software tools built by experts through multiple problem solving based on the topics that the industry requires. For example they need to know how to use mathematical models that use integration as opposed to learning how integration can be used. Diploma students need to know which tools to use and how to do the job.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making

RECOMMENDED BOOKS

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

2. Engineering Mathematics 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 Sundarametal, Vikas Publishing House (P) Ltd., New Delhi

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

6. Engineering Mathematics by Srimanta Pal and Subodh C. Bhunia; Oxford University Press, New Delhi
7. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (Periods)	Marks Allotted (%)
1	40	40
2	26	40
3	04	05
4	10	15
Total	**80**	**100**

2.3   APPLIED PHYSICS – II

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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 OUTCOMES

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

- Differentiate between Transverse and Longitudinal, Periodic and Simple Harmonic Motion.

- Explain the terms: frequency, amplitude, wavelength, wavevelocity,frequency and relation between them.

- Explain various Engineering and Industrial applications of ultrasonics.

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

- Explain the laws of reflection and refraction of light.

- Explain total internal reflection as applied to optical fibers.

- Define capacitance and its unit and solve simple problems using C=Q/V

- Explain the role of free electrons in insulators, conductors and semiconductors.

- Explain electric current as flow of charge, the concept of resistance.

- State and apply Ohm's law.

- Calculate the equivalent resistance of a variety of resistor combinations.

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

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

DETAILED CONENTS

1. Wave motion and its applications   (12 periods)

    1.1   Wave motion, transverse and longitudinal wave motion with examples,Terms used in wave motion like displacement, amplitude, time period,frequency,wavelength,wave velocity, relationship among wave velocity, frequency and wave length .

    1.2   Simple Harmonic Motion (SHM): definition,examples

    1.3   Cantilever (definition ,formula of time period(without derivation).

    1.4   Free, forced and resonant vibrations with examples

1.5 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time.

1.6 Ultrasonics – Introduction and their engineering applications(cold welding,drilling,SONAR)

2. Optics   (06 periods)

2.1 Reflection and refraction with laws, refractive index, lens formula(no derivation),power of lens(related numerical problems).

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

2.3 Microscope,Telescope(definition)

2.4 Uses of microscope and telescope.

3. Electrostatics   (12 Periods)

3.1 Coulombs law, unit charge,

3.2 Electric field, Electric lines of force(definition and properties),Electric flux,Electric Intensity and Electric potential(definition,formula).Electric field intensity due to a point charge.

3.3 Gauss law(Statement and derivation)

3.4 Capacitor and Capacitance (with formula and units), Series and parallel combination of capacitors (simple numerical problems)

4. Current Electricity   (12 Periods)

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

4.2 Resistance and Specific Resistance(definition and units) Conductance, Series and Parallel combination of Resistances.

4.3 Ohm's law (statement and formula),superconductivity(definition only).

4.4 Heating effect of current, Electric power, Electric energy and its units

4.5 Kirchhoff's laws(statement and formula)

5. Electromagnetism   (08 periods)

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

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

5.3   Electromagnetic induction (definition)

6.   Semiconductor physics   (08 periods)

      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 tap only)

      6.3   Semiconductor transistor; pnp and npn (Introduction only).

7.   Modern Physics   (06 periods)

      7.1   Lasers: full form, characteristics, engineering and medical applications of lasers.

      7.2   Fibre optics: Introduction to optical fibers(definition ,parts),applications of optical fibers in different fields.

      7.3   Introduction to nanotechnology(definition of nanomaterials with examples) and its applications.

LIST OF PRACTICALS (To perform minimum seven experiments)

1.   To find the time period of a simple pendulum
2.   To determine and verify the time period of Cantilever
3.   To verify ohm's laws by plotting a graph between voltage and current.
4.   To verify laws of resistances in series combination.
5.   To verify laws of resistance in parallel combination.
6.   To find resistance of galvanometer by half deflection method
7.   To verify laws of reflection of light using mirror.
8.   To identify different components like resistance,capacitor,diode.
9.   To study colour coding scheme of resistance.

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.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, exercises and viva-voce

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) Practical Physics, by C. L. Arora, S Chand Publication
4) Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
5) e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:
    http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allowed (Periods)	Marks Allotted (%)
1	12	20
2	06	10
3	12	16
4	12	16
5	08	12
6	08	14
7	06	12
Total	**64**	**100**

2.4   APPLIED CHEMISTRY – II

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RATIONALE

The use of various chemicals and chemical products in diverse technical and engineering fields have repeatedly proved the importance of Applied Chemistry, which enhances its role to a new peak. On the other hand, ever increasing use of such materials will compel engineers, technocrats to acquire essential applied chemistry knowledge in order to select engineering materials, which not only suit them but also provide more environmental compatibility.   This situation demands principles of Applied Chemistry in diploma-engineering courses. Principles of Applied Chemistry will enable budding engineers and technocrats to develop scientific temper and appreciate physical, chemical and engineering properties of materials. Hence the subject of Applied Chemistry.

LEARNING OUTCOMES

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

- explain chemistry and technology of industrial metal extraction processes.
- explain chemical nature and causes of corrosion
- apply correct and efficient methods of corrosion prevention.
- explain chemistry of fuels and their relative advantages.
- select most efficient fuel for the engine and engineering applications.
- explain mechanism of lubrication and their advantages.
- select most efficient lubricant and lubrication technique required for various engineering applications.
- explain chemistry of engineering materials
- verify suitability of materials and select suitable material for engineering applications.
- explain the chemistry of various polymers and plastics
- verify suitability and select polymer/plastic materials for engineering applications.

DETAILED CONTENTS

1.   Metallurgy   (10 periods)

   1.1   General metallurgical terms and operations with reference to iron, copper and aluminium
   1.2   Manufacture of steel- Open hearth process.

   1.3   Alloys- definition and purpose of alloying, Type of alloys – ferrous and non-ferrous alloys, properties and applications of ferrous alloys- invar, nichrome, stainless steel, alnico and non-ferrous alloys – brass, bronze, duralumin, magnalium and solder.

2. Corrosion and its Control   (08 periods)

2.1 Definition of corrosion, its types and factors affecting corrosion rate.
2.2 Theories of
   a) Dry (chemical) corrosion- Pilling Bedworth rule
   b) Wet corrosion in acidic atmosphere by hydrogen evolution mechanism
2.3 Definition of passivity in metals as per galvanic series
2.4 Corrosion control:
   a) Metal coatings – Cathodic protection(Sacrificial protection and impressed current voltage), Cementation on Base Metal Steel – Application of Metal Zn (Sheradizing),Cr (Chromozing) and Al (Calorizing),
   b) Inorganic coatings – Anodizing and phosphating,
   c) Organic coatings - use of paints varnishes and enamels
   d) Internal corrosion preventive measures- alloying (with reference to passivating, neutralizing and inhibition) and heat treatment (quenching, annealing)

3. Fuels   (10 periods)

3.1 Definition of fuel, classification of fuels, characteristics of good fuel, relative merits of gaseous, liquid and solid fuels
3.2 Calorific value-higher calorific value, lower calorific value, determination of calorific value of solid or liquid fuel using Bomb calorimeter and numerical examples.
3.3 Coal - types of coal and proximate analysis of coal
3.4 Fuel rating – Octane number and Cetane number, fuel-structural influence on Octane and Cetane numbers
3.5 Gaseous fuels – chemical composition, calorific value and applications of natural gas (CNG), LPG, producer gas, water gas and biogas.
3.6 Elementary ideal on – hydrogen as future fuels, nuclear fuels.

4. Lubricants   (08 periods)
4.1 Definition of Lubricant and lubrication, type of lubrications –hydrodynamic, boundary lubrication with illustrative diagrams
4.2 Classification of lubricants –liquid lubricants, solid lubricants, semi-solid lubricants and synthetic lubricants with examples
4.3 Properties of lubricant
   a. Physical properties –viscosity and viscosity index, cloud point and pour point, flash point and fire point, oiliness.
   b. Chemical properties- total acid value or number (TAV or TAN), carbon residue, emulsification factor and iodine value
4.4 Designation of lubricating oils according to Society of Automotive Engineers (SAE)
4.5 Cutting fluids – applications of cutting fluids, types and the factors that govern the selection of cutting fluids

5.   Engineering Materials and Refractories   (06 periods)

     5.1   Definition and types with suitable examples and applications of- Ceramics, Refractory and Composite materials
     5.2   Glass-chemical composition and application of Soda, Borosilicate and lead glasses only
     5.3   Paint, varnish and enamels- definition, constituents and advantages of these organic coatings

6.   Polymers and Plastics   (06 periods)

     6.1   Definition of polymer, monomer and degree of polymerization
     6.2   Brief introduction to addition and condensation polymers with suitable examples (PE, PS, PVC, Teflon, Nylon -66 and Bakelite)
     6.3   Definition of plastics, thermo plastics and thermo setting plastics with suitable examples, distinctions between thermo plastics and thermo settings
     6.4   Applications of polymers in industry and daily life

Note: Hand written report need to be submitted as assignment on any one of the three topics:
     i)   List of iron, aluminium and copper metal ores and place of occurrences in India
     ii)   Names of steel plants situated in India.
     iii)   Enlist hydro power plants and nuclear power plants in India.

LIST OF PRACTICALS

1.   Gravimetric analysis and apparatus used in gravimetric analysis

2.   Determination of percentage purity of commercial sample of blue vitriol using N/20 Na2S2O3.

3.   Gravimetric estimation of moisture in the given coal sample (proximate analysis)

4.   Determination of percentage composition of volatile/non volatile matter in the given coal sample

5.   Gravimetric estimation of ash content in the given coal sample (proximate analysis)

6.   Determination of viscosity of given liquid using Redwood viscometers

7.   Determination of flash point of given lubricating oil using Able's flash point apparatus

8.   To study the effect of metal coupling on corrosion of iron

9.   Detection of iron metal in the given solution of rust(solution of rust in HCl be provided)

INSTRUCTIONAL STRATEGY

Teachers may take help of various models and charts while imparting instructions to make the concept clear. Awareness of the contents should be done through examples using you-tubes and subsequent discussions. More emphasis should be laid on discussing and explaining practical applications of various chemical process and reactions. In addition, students should be encouraged or motivated to study those processes in more details, which may find practical application in their future professional career.

MEANS OF ASSESSMENT

- Assignments and quiz/class tests, mid-term and end-term written tests, model/prototype making
- Actual laboratory and practical work, exercises and viva-voce

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuricose& J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.
2. Engineering Chemistry by P.C. Jain & Monika Jain, DhanapatRai Publishing Company, New Delhi.
3. Eagle's Applied Chemistry - II by S. C. Ahuja & G. H. Hugar, Eagle Prakashan, Jalandhar.
4. Engineering Chemistry – A Text Book by H. K. Chopra & A. Parmar, Narosa Publishing House, New Delhi.
6 Engineering Chemistry by Dr.Himanshu Pandey, Goel Publishing House, Meerut.
7 e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:

http://swayam.gov.in

SUGGESTED DISTRIBUTION OF MARKS

Topic	Time Allotted (periods)	Marks Allotted (%)
1	10	20
2	08	16
3	10	20
4	08	16
5	06	14
6	06	14
Total	**48**	**100**

2.5   ENVIRONMENTALSTUDIES

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RATIONALE

Adiplomaholdermusthaveknowledgeofdifferenttypesofpollutioncausedduetoindustries   and constructionalactivitiessothathemayhelpinbalancingtheecosystemandcontrollingpollutionbyvarious controlmeasures.Heshouldalsobeawareofenvironmentallawsrelatedtothecontrolofpollution. 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 OUTCOMES

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- concept, structure and importance of ecosystem, Carbon, Nitrogen, Sulphur cycle. Sustainable development   (03 periods)

2.

   Conservationoflandreforms,preservationofspecies,preventionofadvancementof desertsandloweringofwatertable, rain water harvesting, Acid Rain, maintenance of ground water, Water supply engineering, Deforestation – its effects and control measures.(04 periods)

3. Pollution: Sources of pollution - natural and man made. Classification of pollutants, Causes, effects and control measures of pollution (air, water, noise, soil, radioactive and nuclear). Prevention of Pollution: Introduction to Cleaner Production Technologies,   physical,   chemical   and   biological   treatment   of   pollutants,

photocatalytic degradation of pollutants, Waste Minimization Techniques – Chemical degradation of waste, Concept of Zero Discharge.   (12 periods)

4.   Solidwastemanagement, classificationofrefusematerial,sources, effects and control measures.Introduction to E-waste Management   (06 periods)

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). Introduction to Energy Conservation Act 2001 and Energy Conservation (Amendment) Act 2010 & its importance.   (08 periods)

6.   Energy Conservation: Introduction to Energy Management, Energy Conservation, Energy efficiency & its need.. Role of Non-conventional Energy Resources (Solar Energy, Wind Energy, Bio Energy, Hydro Energy) in environmental protection. Impact of Energy Usage on Environment – Global Warming, Green House Effect, Depletion of Ozone Layer.   (10 periods)

7.   Eco-friendly Material: Recycling of Material, Concept of Green Buildings,
                    (05periods)

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.   EnvironmentalandPollutionAwareness bySharmaBR;SatyaPrakashan,NewDelhi.
2.   EnvironmentalProtectionLawandPolicyinIndiabyThakurKailash;DeepandDeep Publications,NewDelhi.
3.   Environmental Pollution by Dr. RK Khitoliya; S Chand Publishing, New Delhi
4.   Environmental Science by Deswal and Deswal; DhanpatRai and Co. (P) Ltd. Delhi.
5.   Engineering Chemistry by Jain and Jain; DhanpatRai and Co. (P) Ltd. Delhi.
6.   Environmental Studies by ErachBharucha; University Press (India) Private Ltd., Hyderabad.
7.   EnvironmentalEngineeringandManagementbySureshK Dhamija;SKKatariaand Sons, NewDelhi.

8.   e-books/e-tools/relevant   software   to   be   used   as   recommended   by AICTE/HSBTE/NITTTR.

Websites for Reference:

http://swayam.gov.in

SUGGESTEDDISTRIBUTIONOFMARKS

TopicNo.	TimeAllotted (Hrs)	MarksAllotted(%)
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

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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 20 sheets to be prepared.
3)   Instructions relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students.
4)   Students should be encouraged to use engineering graph book for free hand and orthographic projection practice.

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.

DETAILED CONTENTS

1.   Detail and Assembly Drawing   (05 sheets)

    1.1   Principle and utility of detail and assembly drawings
    1.2   Wooden joints i.e. corner mortise and tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortise 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   (03 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   (03sheets)

   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   (04 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

* The teacher should instruct the students to show dimensioning(in different views) relative to the size of shaft, label them and then calculate and show them in tabular form in a separate column of Bill of Material tables, by calculating themselves the values of dimensions.

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   (03 sheets)

    7.1   Introduction to coupling, their use and types

    7.2   Muff coupling

    7.3   Flange coupling (protected)

    7.4   Flexible Coupling

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.

Relevant IT tools to be used to state that 3D solid modelling, which is to be taught at the starting point. Also how 2D views can be obtained from 3D solid modelling to 2D views rather than the conventional method of making the students visualize the 3D view of an object by mentally constructing it from the 2D views.

MEANS OF ASSESSMENT

- Design and drawing
- Assignments and quiz/class tests, mid-term and end-term written tests

RECOMMENDED BOOKS

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

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

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

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

5. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

Websites for Reference:
    http://swayam.gov.in

2.7   GENERAL WORKSHOP PRACTICE - II

(Common for Mechanical Engineering, Automobile Engineering and Civil Engineering)

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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 OUTCOMES

After completing the course, the students will be able to:

- 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 as per given specifications for a given shop.
- 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.
- Follow safety procedures and measures.
- Maintain good housekeeping practices.

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   Carpentry Shop – II

6   Smithy Shop – II (Not for Civil Engg Branch)

7   Plumbing Shop

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. Practice them on pipe joint in round and linear fashion

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 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 or repair of an iron furniture of institute or demo of Gas cutting process

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. Use of dial gauges and feeler gauges.

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

2.4   Selection of drills and taps.

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

Job I   Drilling practice on soft metals-Aluminium

Job II   Preparation of a job by filing on non ferrous metals upto an accuracy of   ±0.1 mm.

2.6 file and make angle, surfaces (Bevel gauge accuracy 1 degree) make simple open and sliding fits Inside square fit, make combined open and sliding fit, straight sides

    Job III   Step fit(.02mm accuracy) or angular V fit(30 minute) or radius fitting(40x40x3mm MS sheet)

2.7 Sliding fitting, Diamond fitting, Lapping flat surfaces using lapping plate. Application of lapping, material for lapping tools, lapping abrasives, charging of lapping tool. Surface finish importance, equipment for testing-terms relation to surface finish

    Job IV   T fit or H fit with highest lapped accuracy to be checked by feeler gauge or any as deemed to be.

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/oil can/bucket 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 (RYB)& its sequence and wiring system.

    Job I   Connecting Generator and 3 phase wiring through Change over Switch.

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.

4.3 Study of internal wiring diagram of common electrical appliances such as auto electric iron, electric kettle, ceiling/table fan, desert cooler etc.Demonstration

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

Job III   Dismantling, servicing and reassembling of any of the above electrical appliances, finding faults with series testing lamp and multimeter.

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

Job IV   Acceptance Testing of single phase/three phase motors by using voltmeter, ammeter and tachometer.

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

4.5   Identification and familiarisation with the following tools:

Tweezers, Screw Drivers (Different sizes), Insulated pliers, Cutters, Sniper, Philips Screw driver (star screw driver), L-Keys, Soldering Iron and their demonstration and uses.

Job VI   Practice on joining using soldering flux and removing components/wires by desoldering

5.   CARPENTRY SHOP – II

5.1   Introduction to joints, their relative advantages and uses.

Job I   Preparation of glued joint. *

Job II   Preparation of mitre joint *

Job III   Preparation of a lengthening joint *

* These jobs should be more prepared for utility articles like coat-hanger, shoe-rack, book-shelf etc.

5.2   Demonstration of job showing use of Rip Saw, Bow saw and Tenon saw, method of sharpening various saws.

5.3   Demonstration of job on Band Saw and Circular Saw, Chain and Chisel, Universal wood working machine, Saw re-sharpening machine, Saw Brazing unit.

5.4   Importance and need of polishing wooden items, Introduction to polishing materials.

5.5   Practice on Wood Working Lathe

a) Safety precaution on wood working machines
b) Study of wood working lathe
c) Sharpening of lathe tools
d) Setting of jobs and tools
e) Different type of wood turning practice

Job IV   a)   Making Handles of chisels/files/screw drivers etc.

b)   Making legs of cabinets: Straight, Tapered and Ornamental

Job V   Repair of wooden furniture of the Institute

6.   SMITHY SHOP – II(Not for Civil Engg Branch)

6.1   Introduction to various heat treatment processes e.g annealing, hardening, tempering, normalizing etc.

6.2   Description of various types of power hammers and their usage (Demonstration only).

Job I   To forge a ring to acquaint the students with forge welding.

Job II   To forge a chisel and acquaint the students with simple idea of hardening and tempering.

Job III   To forge squares on both ends of a circular rod.*

Job IV   To prepare a job involving drawing down process*

* Prepare utility articles like screw drivers, hinges, hexagonal nut, gib head key, chain links

7.   PLUMBING SHOP

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

7.2 Description and demonstration of various types of drills, taps and dies. Selection of dies for threading, selection of drills, taps and reamers for tapping operations.

7.3Introduction to use of plumbing tools like pipe wrench , plumber vice and materials like Putty, thread, duct(Teflon) tape, epoxy resin, araldite, m-seal.

Job I   Making internal and external threads on a job by tapping and

dieing operations (manually)

7.4 Precautions while drilling soft metals, e.g. copper, brass, aluminium

etc.

Job II Fitting of all components of wash basin and ball valve in a tank

Job III Practice on opening a jammed pipe(MS or PVC) joint with least damage and repair of a leaking joint, reconditioning of a tap.

Job IV Preparation of job involving thread on GI pipe/ PVC pipe and fixing of at least 5 types of fittings (viz. elbow, tee, union, socket, reducer, nipple, stopcock, taps etc)

MEANS OF ASSESSMENT

- Workshop jobs
- Report writing, presentation and viva voce

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; DhanpatRai and Co., New Delhi
7. Workshop Technology by HS Bawa; Tata McGraw Hill Publishers, New Delhi
8. e-books/e-tools/relevant software to be used as recommended by AICTE/HSBTE/NITTTR.

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