ENGLISH AND COMMUNICATION SKILLS - II

L	T	P
3	-	2

RATIONALE

Language is the most commonly used medium of self-expression in all spheres of human life – personal, social and professional. A student must have a fair knowledge of English language and skills to communicate effectively to handle the future jobs in industry. The objective of this course is to enable the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the course, the student will be able to develop comprehension skills, improve vocabulary, use proper grammar, acquire writing skills, correspond with others and enhance skills in spoken English. It is expected that each polytechnic will establish a **communication skill laboratory** for conducting practicals mentioned in the curriculum.

DETAILED CONTENTS

1. Facets of Literature (14 hrs)

   1.1 Short stories

      1.1.1 The Portrait of a Lady - Khushwant Singh
      1.1.2 The Doll's House – Katherine Mansfield
      1.1.3 The Refugees – Pearl S. Buck

   1.2 Prose

      1.2.1 Walking Tours – R.L. Stevenson
      1.2.2 A Dialogue on Civilization – C.E.M. Joad
      1.2.3 The Sign of Red Cross – Horace Shipp

   1.3 Poems

      1.3.1 All The World's A Stage – W. Shakespeare
      1.3.2 Say Not, The Struggle Nought Availeth – A.H. Clough
      1.3.3 Pipa's Song – Robert Browning

2. The Art of Précis Writing (04 hrs)

3. Grammar and Usage (08 hrs)

   3.1 Narration
   3.2 Voice
   3.3 Idioms and Phrases

4. Correspondence (04 hrs)

4.1 Business Letters
4.2 Personal letters

5. Drafting (06 hrs)

5.1 Report Writing
5.2 Inspection Notes
5.3 Memos, Circulars and Notes
5.4 Telegrams
5.5 Press Release
5.6 Agenda and Minutes of Meetings
5.7 Applying for a Job

6. Glossary of Technical & Scientific Terms (04 hrs)

7. Communication (08 hrs)

7.1 Media and Modes of Communication
7.2 Channels of Communication
7.3 Barriers to Communication
7.4 Listening Skills
7.5 Body language
7.6 Humour in Communication

LIST OF PRACTICALS

1. Practice on browsing information from Internet
2. Group Discussions
3. Mock Interviews
4. Telephone Etiquette – demonstration and practice
5. Situational Conversation with feedback through video recording
6. Presentation on a given theme (using PowerPoint)
7. Exercises leading to personality development like mannerism, etiquettes, body language etc.
8. Reading unseen passages
9. Writing (developing) a paragraph
10. Exercises on writing notices and telephonic messages

Note:

1. The Text Book on "English and Communication Skills, Book-II By Kuldip Jaidka et. al. developed by NITTTR, Chandigarh is recommended to be used for teaching & setting-up the question papers.
2. A communication laboratory may be set up consisting of appropriate audio-video system with facility of playing CDs/DVDS and a video camera for recording the performance of each student with play back facility. A set of CDs from any language training organization e.g. British Council etc. may be procured for use of students.
3. Elements of body language will be incorporated in all practicals
4. The practical exercises involving writing may also be included in Theory Examination.

RECOMMENDED BOOKS

1. English and Communication Skills, Book-II By Kuldip Jaidka, Alwainder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh & Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. Essentials of Business Communication by Pal and Rorualling; Sultan Chand and Sons
3. The Essence of Effective Communication, Ludlow and Panthon; Prentice Hall of India
4. New Design English Grammar, Reading and Writing Skills by AL Kohli (Course A and course B), Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
5. New Design English Reading and Advanced Writing Skills for Class XI and XII by MK Kohli and AL Kohli; Kohli Publishers, 34 Industrial Area Phase-II, Chandigarh,
6. A Practical English Grammar by Thomson and Marlinet
7. Spoken English by V Sasikumar and PV Dhamija; Tata McGraw Hill
8. English Conversation Practice by Grount Taylor; Tata McGraw Hill
9. Developing Communication Skills by Krishna Mohan and Meera Banerji; MacMillan India Ltd., Delhi
10. Business Correspondence and Report Writing by RC Sharma and Krishna Mohan; Tata McGraw Hill Publishing Company Ltd. New Delhi
11. Communication Skills by Ms R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	14	30
2	4	10
3	8	15
4	4	10
5	6	15
6	4	5
7	8	15
Total	**48**	**100**

APPLIED MATHEMATICS – II

L	T	P
5	-	-

RATIONALE

Applied mathematics forms the backbone of engineering studies. In continuation to the basic elements of differential calculus and integral calculus taught in previous course and their applications, statistics and probability have been included in this course. This course will develop analytical abilities amongst the students and will provide base for continuing education base to the students.

DETAILED CONTENTS

1. Algebra (16 hrs)

   1.1 Matrix: Algebra of matrices, inverse, elementary row/column-transformation, linear dependence, rank of matrix, type of matrix, Eigen pairs, Cayley-Hamilton theorem

   1.2 Determinants: Elementary properties of determinants of second and third order, multiplication system of algebric equation, consistency of equation, Cramme's rule

   1.3 Vector Algebra: Definition of vector and scalar quantities, addition and substration of rectors. Dot and cross product of two vectors. Angle between two vectors, applications of dot and cross product in Engineering problems.

2. Co-ordinate Geometry (16 hrs)

   2.1 Point in space. Distance between two points, ratio

   2.2 Straight line, finding the equation of straight line, shortest distance between two points

   2.3 Plane

   2.4 Sphere in space

3. Differential Calculus (16 hrs)

   3.1 Successive differentiation. Libnez's theorem

3.2 Partial differentiation: Partial derivatives, total differential co-efficient, chain rule. Euller's theorem of homogeneous function, Jacobians, curl, gradience and divergent and some identities among them

3.3 Differential equation: Order, degree and meaning of solution of differential equations. Linear, non-linear differential equation, first order equation (separable forms, linear and Bernoulli's form, exact equation and their solutions), second order linear equations (linear equations with constant co-efficients homogeneous and non-homogeneous equation, equations reduciable to linear form with constant co-efficients)

4. Integral Calculus (18 hrs)

4.1 Laplace transform, solution of differential equation by Laplace transform

4.2 Beta and gamma function

4.3 Fourier series

5. Statistics and Probability (14 hrs)

10.1 Measure of central tendency: Mean, median, mode, mean derivation, strandard deviation, rank and rank correlation

10.2 Probability: Law of probability and conditional probability

10.3 Binomial distribution and poission distribution

10.4 Continuous and normal distribution

10.5 Curve fitting by least square method

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 by Dr. RD Sharma, Dhanpat Rai and Sons, Delhi
4. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar
5. Engineering Mathematics by Dass Gupta
6. Engineering Mathematics by C Dass Chawla, Asian Publishers, New Delhi
7. Comprehensive Mathematics, Vol. I & II by Laxmi Publications

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

10. Engineering Mathematics by N.Ch.S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi

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

10. Engineering Mathematics, Vol I & II by AK Gupta, Macmillan India Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	16	20
2	16	20
3	16	20
4	18	25
5	14	15
Total	**80**	**100**

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 at giving an understanding of this world both by observation and prediction in which objects will behave. Concrete uses of physical principles and analysis in various fields of engineering and technology are given prominence in the course content.

DETAILED CONTENTS

1. Classification of materials (4 hrs)

   Classification of materials into Conducting materials, Insulating materials, semiconducting materials with reference to their atomic structure, magnetic material (para, dia and ferro)

2. Fundamentals of D.C. and A.C. (8 hrs)

   2.1 D.C: Electric current, Ohm's Law, Series and parallel combination of resistances, Kirchoff's law and their simple applications. Principle of Wheatstone's bridge and its application in meter bridge and post office box

   2.2 A.C: Sinusoidal current and EMF. Peak, and r.m.s values, resistive, inductive, and capacitive circuits singularly and in combination, reactance, impedance

3. Moving Charge & Magnetic Field (10 hrs)

   Magnetic behaviour of current carrying conductor; Magnetic behaviour of current Carrying solenoid; concept of Magnetic Field: Magnetic line of forces;force on a current -carrying conductor in a magnetic field ; fleming's Left hand rule ; force on a charge moving in a magnetic field; motion of charged particles in a magnetic field; Magnetic field due to a current carrying conductor(Biot- Savart law); Force between two parallel current carrying conductors .

4. Modern Physics (12 hrs)

   Laser- Absorption and emission of energy by atom, spontaneous and stimulated emission, Population inversion, Main component of Laser and types of Laser: Ruby Laser, He,- Ne and semiconductor Laser and their applications. Super Conductivity- Phenomenon of super conductivity, effect of magnetic field, critical field, type I & type II super conductors and their applications. Radioactivity,

nuclear stability, radio active emission, radiation damage, concept of nuclear fission and fusion and their applications.

5. Application of Optics: (6 hrs)

5.1 Concept of interference and diffraction.
5.2 Optical slide film projector and OHP (principle and operation)
5.3 Introduction to fibre optics, optical fibre materials, types, light propagation. Critical angle, total internal reflection, optical sensor
5.4 Application of optical fibres in telecommunication

6. Semi Conductor Physics and its Application (12 hrs)

Energy band in solids, classification of solids into conductors, insulators and semiconductors on the basis of energy band structure. Intrinsic and extrinsic semiconductors, Electrons and holes as charge carriers in semiconductors, effect of temperature in conduction in semiconductors, P-type and N-type semiconductors, PN junction formation, barrier voltage, forward and reverse biasing of a junction diode, PN junction device characteristics, formation of transistor, transistor action, base, emitter and collector currents and their relationship, LEDs, photoelectric effect, photo devices and their applications..

7. Non Conventional Energy Sources (12 hrs)

7.1 Wind Energy: Introduction, scope and significance, measurement of wind velocity by anemometer, general principle of wind mill, India's wind energy programme.

7.2 Solar Energy: Solar radiation and potentiality of solar radiation in India, unit of solar radiation, solar constant measurement of solar radiation by pyranometer. Uses of solar energy: solar cooker, solar water heater, solar photovoltic cells, solar energy collector, solar by planets in India, Modern applications in technology (Qualitative only).

LIST OF PRACTICALS

1. To verify the Laws of Series and Parallel combination of resistances by P.O.Box
2. To verify the Laws of Series and Parallel combination of resistances by Meter Bridge.
3. Determination of wave length of He- Ne Laser
4. To draw the characteristics of a transistor
5. Verification of Ohm's law.
6. Verification of Kirchoff's laws.
7. Conversion of galvano meter into ammeter & voltmeter.
8. Calculation of peak and rms values of a given ac with the help of an oscilloscope.

9. To measure impedance of a given coil with the help of A-V method.
10. To Draw the characteristics of PN Junction Diode & Determination of Static & Dynamic Resistance.
11. Measurement of solar intensity with the help of pyranometer/ Lux meter
12. To measure thickness of paper by two optically plane glass plates using interferance fringes.

RECOMMENDED BOOKS

1. Applied Physics Vol. II, TTTI Publication Tata McGraw Hill, Delhi
2. Basic Applied Physics by RK Gaur; Dhanpat Rai Publications
3. Comprehensive Practical Physics - Volume I and II by JN Jaiswal; Laxmi Publishers
4. Numerical Problems in Physics - Volume I and II by RS Bharaj; Tata McGraw Hill
5. Simple Course in Electricity and Magnetism by CL Arora; S Chand and Co, New Delhi
6. Fundamental Physics - Volume I and II by Gomber and Gogia; Pardeep Publications, Jalandhar
7. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
8. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
9. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	5
2	8	10
3	10	15
4	12	20
5	6	10
6	12	20
7	12	20
Total	**64**	**100**

APPLIED CHEMISTRY-II

L T P
2 - 2

RATIONALE

The role of Chemistry and chemical products in every branch of engineering is expanding greatly. Now a days various products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive years. The strength of materials, the chemical composition of substances, their behaviour when subjected to different treatment and environment, and the laws of heat and dynamic energy have entered in almost every activity of modern life. Chemistry is considered as one of the core subjects for diploma students in engineering and technology for developing in them scientific temper and appreciation of chemical properties of materials, which they have to handle in their professional career. Effort should be made to teach this subject through demonstration and with the active involvement of students.

DETAILED CONTENTS

1. Metallurgy (06 hrs)

   1.1 A brief introduction of the terms: Metallurgy, mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), roasting calcination and refining as applied in relation to various metallurgical operations

   1.2 Metallurgy of (i) Aluminium (ii) Iron with their physical and chemical properties and uses

   1.3 Definition of an alloy, purposes of alloying, composition and uses of alloys-brass, bronze, magnalium, duralumin, alnico, invar and stainless steel

2. Fuels (08 hrs)

   2.1 Definition of a ‘Fuel’, characteristics of a good fuel and classification of fuels with suitable examples

   2.2 Definition of Calorific value of a fuel and its determination for a solid fuel with the help of Bomb calorimeter.

   2.3 Merits of gaseous fuels over those of other varieties of fuels

   2.4 Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas (iv) Compressed Natural gas (CNG)

   2.5 Octane Number and Cetane Number

3 Corrosion (04 hrs)

3.1 Meaning of the term ‘corrosion’ and its definition

3.2 Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory

3.3 Prevention of corrosion by
(a) Alloying
(b) Providing metallic coatings
(c). Sacrificial cathodic protections:

4 Lubricants (04 hrs)

4.1 Definition of (i) lubricant (ii) lubrication

4.2 Classification of lubricants

4.3 Principles of lubrication

(i) fluid film lubrication
(ii) boundary lubrication

4.4 Characteristics of a lubricant such as viscosity, viscosity index, volatility, oxidation, oiliness, acidity, emulsification, flash point, fire point and pour point.

4.5 Importance of additives in lubricants

5 Cement and Glass (02 hrs)

5.1 General introduction to cement and glass

5.2 Manufacture of Portland Cement

5.3 Manufacture of ordinary glass and lead glass

6. Classification and Nomenclature of Organic Compounds (08 hrs)

Classification of Organic Compounds, functional group, Homologus Series, Nomenclature, Physical and Chemical properties, and industrial use of Organic Compounds, IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines.

LIST OF PRACTICALS

1. Gravimetric analysis and study of apparatus used there in
2. To determine the percentage composition of a mixture consisting of a volatile and a non-volatile substances
3. Estimate the amount of moisture in the given sample of coal
4. Estimate the amount of ash in the given sample of coal
5. Esterification and ceric ammonium tests of alcohal
6. Solium carbonate and Ester test of carboxylic acids
7. To determination the amount of copper in the given sample of copper sulphate with the help of N/20 sodium thiosulphate solution.
8. Detection of metal iorn in the rust (solution of rust in concentrated HCL may be given)
9. Demonstration – to determine calorific value of a solid fuel with the help of Bomb Calorimeter

RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuriacose and J. Rajaram; Tata McGraw-Hill Publishing Company Limited, New Delhi
2. Engineering Chemistry by Dr. S. Rabindra and Prof. B.K. Mishra ; Kumar and Kumar Publishers (P) Ltd. Bangalore-40
3. A Text Book of Applied Chemistry-II by SS Kumar; Tata McGraw Hill, Delhi
4. A Text Book of Applied Chemistry-II by Sharma and Others; Technical Bureau of India, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M,
6. Chemistry of Engineering by Aggarwal CV,
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	15
2	8	25
3	4	20
4	4	20
5	2	10
6.	8	10
Total	**32**	**100**

APPLIED MECHANICS

L	T	P
3	-	2

RATIONALE

The subject Applied Mechanics deals with basic concepts of mechanics like laws of forces, moments, friction, centre of gravity, laws of motion and simple machines which are required by the students for further understanding of other allied subjects. The subject enhances the analytical ability of the students.

DETAILED CONTENTS

1. Introduction (06 hrs)

   1.1 Concept of engineering mechanics definition of mechanics, statics, dynamics, application of engineering mechanics in practical fields. Definition of Applied Mechanics.

   1.2 Definition, basic quantities and derived quantities of basic units and derived units

   1.3 Different systems of units (FPS, CGS, MKS and SI) and their conversion from one to another for density, force, pressure, work, power, velocity, acceleration

   1.4 Concept of rigid body, scalar and vector quantities

2. Laws of forces (08 hrs)

   2.1 Definition of force, measurement of force in SI units, its representation, types of force: Point force/concentrated force & Uniformly distributed force, effects of force, characteristics of a force

   2.2 Different force systems (coplanar and non-coplanar), principle of transmissibility of forces, law of super-position

   2.3 Composition and resolution of coplanar concurrent forces, resultant force, method of composition of forces, laws of forces, triangle law of forces, polygon law of forces - graphically, analytically, resolution of forces, resolving a force into two rectangular components

   2.4 Free body diagram

   2.5 Equilibrant force and its determination

   2.6 Lami's theorem (concept only)

[Simple problems on above topics]

3. Moment (08 hrs)

3.1 Concept of moment

3.2 Moment of a force and units of moment

3.3 Varignon's theorem (definition only)

3.4 Principle of moment and its applications (Levers – simple and compound, steel yard, safety valve, reaction at support)

3.5 Parallel forces (like and unlike parallel force), calculating their resultant

3.6 Concept of couple, its properties and effects

3.7 General conditions of equilibrium of bodies under coplanar forces

3.8 Position of resultant force by moment

[Simple problems on the above topics]

4. Friction (08 hrs)

4.1 Definition and concept of friction, types of friction, force of friction

4.2 Laws of static friction, coefficient of friction, angle of friction, angle of repose, cone of friction

4.3 Equilibrium of a body lying on a horizontal plane, equilibrium of a body lying on a rough inclined plane, friction in simple screw jack

4.4 Calculation of least force required to maintain equilibrium of a body on a rough inclined plane subjected to a force:

a) Acting along the inclined plane Horizontally
b) At some angle with the inclined plane

5. Centre of Gravity (06 hrs)

5.1 Concept, definition of centroid of plain figures and centre of gravity of symmetrical solid bodies

5.2 Determination of centroid of plain and composite lamina using moment method only, centroid of bodies with removed portion

5.3 Determination of center of gravity of solid bodies - cone, cylinder, hemisphere and sphere; composite bodies and bodies with portion removed

[Simple problems on the above topics]

6. Simple Machines (08 hrs)

6.1. Definition of effort, velocity ratio, mechanical advantage and efficiency of - a machine and their relationship, law of machines

6.2. Simple and compound machine (Examples)

6.3. Definition of ideal machine, reversible and self locking machine

6.4. Effort lost in friction, Load lost in friction, determination of maximum mechanical advantage and maximum efficiency

6.5. System of pulleys (first, second, third system of pulleys), determination of velocity ratio, mechanical advantage and efficiency

6.6. Working principle and application of wheel and axle, different pulley blocks, simple screw jack, worm and worm wheel, single and double winch crab. Expression for their velocity ratio and field of their application

[Simple problems on the above topics]

7. Moment of Inertia (04 hrs)

Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle *(without derivations)*. Second moment of area for L, T and I sections, section modulus.

LIST OF PRACTICALS

1. Verification of the following laws:
   a) Parallelogram law of forces
   b) Triangle law of forces
   c) Polygon law of forces
2. To verify the forces in different members of jib crane.
3. To verify the reaction at the supports of a simply supported beam.
4. To find the mechanical advantage, velocity ratio and efficiency in case of an inclined plane.
5. To find the mechanical advantage, velocity ratio and efficiency of a screw jack.
6. To find the mechanical advantage, velocity ratio and efficiency of worm and worm wheel.
7. To find mechanical advantage, velocity ratio and efficiency of single purchase crab.

8. To find out center of gravity of regular lamina.
9. To find out center of gravity of irregular lamina.
10. To determine coefficient of friction between three pairs of given surface.

RECOMMENDED BOOKS

1. A Text Book of Applied Mechanics by S Ramamurtham,Dhanpat Rai Publishing Co. Ltd.
2. Applied Mechanics By, Col. Harbhajan Singh, TL Singha and Parmod Kumar Singla Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
3. A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S Chand and Co. Ltd., New Delhi.
4. A Text Book of Applied Mechanics by RK Rajput; Laxmi Publications, New Delhi..
5. Text Book of Applied Mechanics by Birinder Singh, Kaption Publishing House, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	6	10
2	8	18
3	8	18
4	8	18
5	6	10
6	8	18
7	4	8
Total	**48**	**100**

ENGINEERING DRAWING – II
(Common with Electrical and Mechanical Engineering)

L	T	P
-	-	6

RATIONALE

Drawing is said to be the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation

Note:
1. First angle projection is to be followed
2. Minimum of 15 sheets to be prepared by each student
3. SP 46 – 1988 should be followed
4. Instructions relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students

DETAILED CONTENTS

1. Development of Surfaces (2 sheets)
   Development of surfaces – cubes, prisms, (square, pentagonal and hexagonal), cylinders, pyramids (square, pentagonal, hexagonal) and cones

2. Detail and Assembly Drawing (2 sheets)
   - 2.1 Principle and utility of detail and assembly drawings
   - 2.2 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 Mortise and Tenon joint

3. Threads (2 sheets)
   - 3.1 Nomenclature of threads, types of threads (metric), single and multiple start threads
   - 3.2 Forms of various external thread sections such as V, square and acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads
   - 3.3 Simplified conventions of left hand and right hand threads, both external and internal threads

4. Locking Devices (1 sheet)
   Lock nut, castle nut, split pin nut, sawn nut, slotted nut

5. Nuts and Bolts (3 sheets)

Different views of hexagonal and square nuts; Assembly of hexagonal headed, square headed, square headed with square neck, bolts with hexagonal and square nuts and washers. Foundations bolts – Rag bolt and Lewis bolt

6. Screws, Studs and Washers (1 sheet)
   - 6.1 Drawing various types of machine screws
   - 6.2 Drawing various types of studs and set screws

7. Keys and Cotters (2 sheets)
   - 7.1 Various types of keys and cotters and their practical application and preparation of drawing of various keys and cotters showing keys and cotters in position
   - 7.2 Cotter joints (i) gib and cotter joint (ii) knuckle joint

8. Rivets and Riveted Joints (2 sheets)
   - 8.1 Types of structural and general purposes rivet heads
   - 8.2 Caulking and fullering of riveted joints
   - 8.3 Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting

9. Welded Joints (1 sheet)
   - 9.1 Various conventions and symbols of welded joints (IS 696)
   - 9.2 Practical applications of welded joints say joints on steel frames, windows, doors and furniture

10. Couplings (2 sheets)
    - 10.1 Muff or Box coupling, half lap muff coupling
    - 10.2 Flange coupling (Protected and non-protected)
    - 10.3 Flexible coupling

11. AutoCAD (for practicals and viva only)

    - 11.1 Practice on drawing commands, editing commands
    - 11.2 Practice on sectioning and hatching
    - 11.3 Practice on preparing simple drawings

RECOMMENDED BOOKS

1. Elementary Engineering Drawing by ND Bhatt, Charotar Publishing House
2. A Text Book of Engineering Drawing by Surjit Singh, Dhanpat Rai and Co. Delhi
3. Engineering Drawing by PS Gill, SK Kataria and Sons, New Delhi
4. Machine Drawing by RB Gupta, Satya Prakashan, New Delhi.

Note:

1. A minimum of 15 sheets should be prepared by each student
2. No table is suggested for distribution of marks, instead it is emphasized that the examination paper should contain exercises for evaluation of all necessary skills envisaged in the curriculum.

3. It is also suggested that a comprehensive viva of each students should be conducted by an external examiner during or just after the examinations to ascertain understanding of the subject e.g. reading and interpreting drawings and development of necessary skills etc.

GENERAL WORKSHOP PRACTICE - II
(Common with Electrical and Mechanical Engineering)

L T P
- - 6

RATIONALE

Manual abilities to handle engineering materials with hand tools need to be developed in the students. This course aims at developing generic manual and machining skills in the students. They will be using different types of tools/equipment in different shops for fabrication purposes. Besides above, the development of dignity of labour, precision, safety at work places, team working and development of right attitude are other objectives.

DETAILED CONTENTS

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.

PRACTICAL EXERCISES

The following shops are included in the syllabus :

1. Carpentry and Painting shop – II
2. Fitting and Plumbing shop – II
3. Welding shop – II
4. Electric shop – II
5. Forging shop
6. Machine shop

1. **Carpentry and Painting Shop – II**

1.1 Introduction to joints, their relative advantages and uses.
Job I Preparation of Dovetail joint and glued joint.
Job II Preparation of Mitre Joint
Job III Preparation of a lengthening Joint
Job 1V Preparation of atleast one utility job with and without lamination.

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

1.3 Demonstration of job on Band Saw and circular saw, universal wood working machine, saw resharpening machine, Saw Brazing unit.

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

Job V Preparation of surface before polishing.
Job VI Application of primer coat.
Job VII Polishing on wooden items.

2. Fitting and Plumbing Shop – II

2.1 Description and demonstration of various types of drills, taps and dies
2.2 Selection of dies for tapping. Types of taps, tapping, dieing and drilling operations.
Job I Making internal and external threads on a job by tapping and dieing operations (manually)
2.3 Precautions while drilling soft metals, specially aluminum and lead.
Job II Drilling practice on soft metals (Aluminum, Brass and lead)
2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier, micrometer, height gauge, combination set, reading gauge. Handling of measuring instruments, checking of zero error, finding of least count.
Job III Preparation of a job by filing on non- ferrous metal.
Job IV Production of a utility job involving all the above operations.
Job V Preparation of job involving thread on GI pipe/ PVC pipe and fixing of different types of elbow T - Union, socket, stopcock, taps, etc
2.5 Description and demonstration of various types of drills, taps and dies; Selection of dies for tapping; Types of taps, Tapping and dieing operations.

3**. Welding Shop – II**

3.1 Introduction of the gas welding, gas welding equipment, adjustments of different types of flames, demonstration and precautions about handling welding equipment.
Job I Practice in handling gas welding equipment and welding practice.
3.2 Common welding joints generally made by gas welding.
Job II Preparation Butt joint by gas welding.
Job III Preparation of small cot conduit pipe frame by electric arc welding/gas welding.
Job IV Preparation of square pyramid from M.S rods by welding (type of welding to be decided by students themselves).
Job V Exercise job on spot/seam welding machine.

4. Electric Shop – II

5.1 Importance of three phase wiring and its effectiveness.
Job I Laying out 3 phase wiring for an electric motor or any other 3 phase machine.
5.2 Estimating and costing power consumption.
Job II Connecting single phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.
Job III Checking continuity of connection (with tester and bulbs), location of faults with a multimeter and their rectification in simple machines and/or other electric circuits fitted with earthing.
5.3 Demonstration of dismantling, servicing and reassembling of a table fan/ceiling fan/air cooler/mixer/electric iron, Electric heater, geaser, electric oven etc.

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

Job V Demonstration of testing single phase/three phase electrical motor by using voltmeters ammeter clip on meter technometer etc.

Job VI Reversing the rotation of motor.

5. Forging Shop

Introduction to forging, forging tools, tongs, blowers/pressure blowers, hammers, chisels, punch, anvil, swage-block etc. Forging operations.

Job I Forge a L hook or ring from MS rod 6 mm ϕ

Job II Forge a chisel and give an idea of hardening and tempering

Job III Lap joint with forge welding

Job IV High Strength Steel tools – forging of lathe and shaper tools

6. Machine Shop

Introduction to various machines used in machine shop.

Job I Exercise on simple turning

Job II Exercise on taper turning

Job III Marking and drilling practice on mild steel piece

Job IV Marking and drilling practice on aluminium piece

Job V Demonstration of various functions of CNC Machine

RECOMMENDED BOOKS

1. Manual on Workshop Practice by K Venkata Reddy, KL Narayana and P Kaunaioh; MacMillan India Ltd., New Delhi

2. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi