

CM-201 ENGLISH AND COMMUNICATION SKILLS – II

L	T	P	Cr
3	-	2	4

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

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|-------|---|----------|
| 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 | |

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| 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	10
4	4	10
5	6	10
6	4	10
7	8	20
Total	48	100

BS-210 APPLIED MATHEMATICS - II

L	T	P	Cr
5	-	-	5

RATIONALE

Applied mathematics forms the backbone of engineering students. Basic elements of Differential calculus and integral calculus and statistics 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.

DETAILED CONTENTS

1. Differential Calculus (35 hrs)

1.1 Definition of function; Concept of limits.

$$\text{Four standard limits } \lim_{x \rightarrow a} \frac{x^n - a^n}{x - a},$$

$$\lim_{x \rightarrow 0} \frac{\sin x}{x}, \quad \lim_{x \rightarrow 0} \frac{a^x - 1}{x}, \quad \lim_{x \rightarrow 0} (1+x)^{1/x}$$

1.2 Differentiation by definition of x^n , $\sin x$, $\cos x$, $\tan x$, e^x , $\log_a x$ only

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

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

1.5 Applications:

(a) Maxima and minima

(b) Equation of tangent and normal to a curve (for explicit functions only)

2. Integral Calculus (35 hrs)

2.1 Integration as inverse operation of differentiation

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

2.3 Evaluation of definite integrals (simple problems)-

$$\text{Evaluation of } \int_0^{\pi/2} \sin^n x \cdot dx, \quad \int_0^{\pi/2} \cos^n x \cdot dx, \quad \int_0^{\pi/2} \sin^m x \cos^n x \cdot dx$$

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

2.4 Applications:

(a) Area bounded by simple curves and axes.

(b) Volume of a solid formed by revolution of an area about axes (simple problems).

3. Statistics (10 hrs)
- 3.1 Measures of Central Tendency: Mean, Median, Mode
- 3.2 Measures of Dispersion: Mean deviation, Standard deviation

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
4. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar
5. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
6. Engineering Mathematics by Dass Gupta
7. Engineering Mathematics by C Dass Chawla, Asian Publishers, New Delhi
8. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
9. 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
10. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
11. 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	35	40
2	35	40
3	10	20
Total	80	100

BS-211 APPLIED PHYSICS – II

L	T	P	Cr
4	-	2	5

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. Waves and vibrations (12 hrs)
 - 1.1 Generation of waves by vibrating particles
 - 2.2 Wave motion with examples
 - 3.3 Types of wave motion, transverse and longitudinal wave motion with examples
 - 4.4 Velocity, frequency and wave length of a wave (relationship $v = \eta\lambda$)
 - 4.5 Sound and Light waves
2. Applications of sound waves (08 hrs)
 - 2.1 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time
 - 2.2 Ultrasonics – production (magnetostriction and piezoelectric detection) and their engineering applications
3. Principle of optics (12 hrs)
 - 3.1 Introduction: reflection of light, image formation in mirrors (convex and concave), refraction and refractive index, image formation in lenses, lens formulae (thin lens only), power of lens, total internal reflection
 - 3.2 Defects in image formation by lenses and their correction
 - 3.3 Simple and compound microscope, astronomical and Galileo telescope, magnifying power and its calculation (in each case)
 - 3.4 Overhead projector and slide projector

4. Electrostatics (12 hrs)
 - 4.1 Coulombs law, unit charge and its SI units
 - 4.2 Gauss's Law
 - 4.3 Electric field intensity and electric potential, equi-potential surfaces and their properties
 - 4.4 Calculation of electric field of point charge, charged sphere (conducting and non-conducting), straight charged conductor, plane charged sheet
 - 4.5 Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors
 - 4.6 Dielectric and its effect on capacitors, dielectric constant and dielectric break down
5. Electricity (08 hrs)
 - 5.1 Ohm's law
 - 5.2 Resistance of a conductor, specific resistance, series and parallel combination of resistors, effect of temperature on resistance
 - 5.3 Kirchoff's law and its applications, wheatstone bridge principle
 - 5.4 Heating effect of current and concept of electric power
6. Modern Physics (12 hrs)
 - 6.1 Lasers: concept of energy levels, ionizations and excitation potentials; spontaneous and stimulated emission; lasers and its characteristics, population inversion, types of lasers, helium – neon and ruby lasers, applications of lasers
 - 6.2 Fibre optics: Introduction, optical fiber materials, types, light propagation and applications
 - 6.3 Superconductivity: Phenomenon of super conductivity.
 - 6.4 Energy sources – Conventional and non-conventional (wind, water, solar, bio, nuclear energy) (only elementary idea).

LIST OF PRACTICALS

1. To verify Ohm's law
2. To verify law of resistances in series and in parallel
3. To find the internal resistance of a cell by potentiometer
4. To convert a galvanometer into an ammeter of given range
5. To convert a galvanometer into voltmeter of given range
6. To find the velocity of sound in air by resonance apparatus
7. To find the frequency of a tuning fork by a sonometer
8. To set a model of an astronomical telescope and find its magnifying power
9. To set up a model of a compound microscope

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. A Text Book of Optics by Subramanian and Brij Lal
8. Physics Laboratory Manual by PK Palanisamy, Scitech Publications
9. Fundamentals of Physics by Resnick and Halliday, Asian Books Pvt. Ltd., New Delhi
10. Concepts in Physics by HC Verma; Bharti Bhawan Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

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

BS-212 APPLIED CHEMISTRY-II**L T P Cr**
2 - 2 3**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 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 (types), 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
 - 1.3 Definition of an alloy, purposes of alloying, composition, properties and uses of alloys-brass, bronze, monel metal, magnalium, duralumin, alnico and invar
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 determination of calorific value of a solid fuel with the help of Bomb calorimeter. Simple numerical problems based upon Bomb-calorimeter method of finding the Calorific values
 - 2.3 Brief description of 'Proximate' and 'Ultimate' analysis of a fuel. Importance of conducting the proximate and ultimate analysis of a fuel
 - 2.4 Qualities of a good fuel and merits of gaseous fuels over those of other varieties of fuels

- 2.5 Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas
- 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
1. (a) Alloying
 - (b) Providing metallic coatings
 2. Cathodic protections:
 - (a) Sacrificial
 - (b) Impressed voltage method
- 4 Lubricants (4 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
 - (iii) extreme pressure lubrication
- 4.4 Characteristics of a lubricant such as viscosity, viscosity index, volatility oiliness, acidity, emulsification, flash point and fire point and pour point.
- 5 Cement and Glass (2 hrs)
- 5.1 Manufacture of Portland Cement
- 5.2 Manufacture of ordinary glass and lead glass
6. Classification and Nomenclature of Organic Compounds (8 hrs)
- Classification of Organic Compounds, functional group, Homologous 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. Determine the viscosity of a given oil with the help of “Redwood viscometer”
4. Determine the flash point of the given oil with the help of Abel’s Flash Point Apparatus
5. Estimate the amount of moisture in the given sample of coal
6. Estimate the amount of ash in the given sample of coal
7. Electroplate the given strip of Cu with Ni
8. Confirmation test of alcohol, aldehydes, carboxylic acid, amine
9. To determination the amount of copper in the given sample of copper sulphate with the help of M/20 sodium thiosulphate solution.
10. Detection of metal iron in the rust (solution of rust in concentrated HCL may be given)

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-I by SS Kumar; Tata McGraw Hill, Delhi
4. A Text Book of Applied Chemistry-I 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	10
2	8	20
3	4	15
4	4	20
5	2	10
8	8	20
Total	48	100

ES-220 APPLIED MECHANICS

L	T	P	Cr
3	-	2	4

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

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 (elements) 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)
 - 3.4 Parallel forces (like and unlike parallel force), calculating their resultant
 - 3.5 Concept of couple, its properties and effects
 - 3.6 General conditions of equilibrium of bodies under coplanar forces
 - 3.7 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. Applied Mechanics By TL Singla, Harbhajan Singh Parmod Kumar Singla
Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. A Text Book of Engineering Mechanics (Applied Mechanics) by RK Khurmi; S
Chand and Co. Ltd., New Delhi.
3. Text Book in Applied Mechanics by MM Malhotra, R Subramanian, PS Gahlot
and BS Rathore; Wiley Eastern Ltd., New Delhi.
4. Engineering Mechanics by SS Bhavikatti, KG Rajashekarappa; Wiley Eastern
Ltd., New Delhi.
5. Engineering Mechanics and Strength of Materials by S Ramamurtham; Dhanpat
Rai Publishing Co. (P) Ltd., Delhi.
6. Engineering Mechanics by AB Basu; Tata McGraw Hill Publishing Co. Ltd.,
Delhi.
7. Engineering Mechanics - Volume I and II by VS Mokashi; Tata McGraw Hill
Publishing Co. Ltd., Delhi.
8. A Text Book of Applied Mechanics by NL Arora and RK Dhawan; India
Publishing House, Delhi.
9. A Text Book of Applied' Mechanics by RK Rajput; Laxmi Publications, New
Delhi..
10. Text Book of Applied Mechanics by Birinder Singh, Kaption Publishing House,
New Delhi.

ES-221 ENGINEERING DRAWING – II

L	T	P	Cr
-	-	6	3

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. Detail and Assembly Drawing (2 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
2. Threads (2 sheets)
 - 2.1 Nomenclature of threads, types of threads (metric), single and multiple start threads
 - 2.2 Forms of various external thread sections such as V, square and acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads
 - 2.3 Simplified conventions of left hand and right hand threads, both external and internal threads
3. Locking Devices (1 sheet)

Lock nut, castle nut, split pin nut, sawn nut, slotted nut
4. 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

5. Screws, Studs and Washers (1 sheet)
 - 5.1 Drawing various types of machine screws
 - 5.2 Drawing various types of studs and set screws
6. Keys and Cotters (2 sheets)
 - 6.1 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
 - 6.2 Cotter joints (i) gib and cotter joint (ii) knuckle joint
7. Rivets and Riveted Joints (2 sheets)
 - 7.1 Types of structural and general purposes rivet heads
 - 7.2 Caulking and fullering of riveted joints
 - 7.3 Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting
8. Welded Joints (1 sheet)
 - 8.1 Various conventions and symbols of welded joints (IS 696)
 - 8.2 Practical applications of welded joints say joints on steel frames, windows, doors and furniture
9. Couplings (2 sheets)
 - 9.1 Muff or Box coupling, half lap muff coupling
 - 9.2 Flange coupling (Protected and non-protected)
 - 9.3 Flexible coupling
10. Symbols and Conventions (2 sheets)
 - 10.1 Civil engineering sanitary fitting symbols
 - 10.2 Electrical fitting symbols for domestic interior installations
 - 10.3 Building plan drawing with electrical and civil engineering symbols

11. AUTO CAD (for practical and viva-voce only)
 - 11.1 Concept of AutoCAD, Tool bars in AutoCAD, coordinate system, snap, grid, and ortho mode
 - 11.2 Drawing commands – point, line, arc, circle, ellipse
 - 11.3 Editing commands – scale, erase, copy, stretch, lengthen and explode
 - 11.4 Dimensioning and placing text in drawing area
 - 11.5 Sectioning and hatching
 - 11.6 Inquiry for different parameters of drawing entity

Note: A minimum of 15 sheets should be prepared by each student

RECOMMENDED BOOKS

1. Elementary Engineering Drawing (in first angle projection) by ND Bhatt, Charotar Publishing House
2. A Text Book of Engineering Drawing by Surjit Singh Published by Dhanpat Rai and Co. Delhi
3. Engineering Drawing by PS Gill; published by SK kataria and Sons, New Delhi
4. Machine Drawing by RB Gupta published by Satya Prakashan, New Delhi.

ME-230 GENERAL WORKSHOP PRACTICE - II

L	T	P	Cr
-	-	6	3

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. Sheet metal shop
5. Electric shop-II
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 IV Preparation of atleast one utility job with and without lamination.
- 1.2 Demonstration of job showing use of Rip Saw, Bow saw and Tramme, method of sharpening various saws.
- 1.3 Demonstration of job on Band Saw and circular saw, chain and diesel universal wood working machine, saw resharpening machine, Saw Brazing unit.
- 1.4 Demonstration of various methods of painting wooden items.
 - Job V Preparation of surface before painting.
 - Job VI Application of primer coat
 - Job VII Painting wooden items by brush/roller/spray

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.
- 3.3 Demonstration of various methods adopted for painting steel items.
Job VI Painting steel items by brush/roller/ spray

4. Sheet metal shop

Introduction to sheet metal process and tools

- Job I Making sheet metal joints
- Job II Making sheet metal tray or a funnel or a computer chassis
- Job III Preparation of sheet metal jobs involving rolling, shearing, creasing, bending and cornering
- Job IV Prepare a lap riveting joint of sheet metal pieces

5. 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.

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

RECOMMEND 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