

2.1 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

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

2.2 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

2.3 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

2.4 ELEMENTS OF BASIC AND DIGITAL ELECTRONICS

L T P Cr
4 - 2 5

RATIONALE

The objective of this subject is to enable the students to know the basic concepts of digital electronics. This subject aims at providing the students with basic understanding of the working of transistors in various configurations for effective functioning in the field of electronic service industry. The students will learn about number system, logic gates, codes and parities, latches, counters, shift-registers etc. This will form a broad base for studying digital systems design and microprocessors in 3rd year and further studies.

DETAILED CONTENTS

1. Introduction to Bipolar Transistor (8 hrs)

Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow; Current relations in transistor; concept of leakage current;

CB, CE, CC configuration of the transistor; Input and output characteristics in CB and CE configurations; input and output dynamic resistance in CB and CE configurations; Current amplification factors. Comparison of CB CE and CC Configurations;

Transistors as an amplifier in CE Configurations; d.c load line and calculation of current gain, voltage gain using d.c load line.
2. Analog and Digital Signals (2 hrs)
 - a) Basic difference between analog and digital signal.
 - b) Applications and advantages of digital signals.
3. Number System (2 hrs)
 - a. Binary and hexadecimal number system; conversion from decimal and hexadecimal to binary and vice-versa. BCD representation.
 - b. Binary addition, subtraction, multiplication and division including binary points. BCD addition. 1's and 2's complement method of addition/subtraction.
4. Logic Gates (4 hrs)
 - a) Concept of negative and positive logic.
 - b) Definition, symbols and truth table of NOT, AND, OR, NAND, NOR, EXOR Gates. NAND and NOR as universal gates.

5. Logic Simplification (4 hrs)
- Postulates of Boolean algebra, De Morgan's Theorems. Various identities. Formulation of truth table and Boolean equation for simple problem implementation of Boolean (logic) equations with gates.
 - Karnaugh map (up to 4 variables) and simple application in developing combinational logic circuits.
6. Codes and Parity (6 hrs)
- Concept of code, weighted and non-weighted codes examples of 8421, BCD, excess-3 and Grey code.
 - Concept of parity, single and double parity and error detection.
 - Alpha-numeric codes: ASCII and EBCDIC.
7. Arithmetic Circuits (4 hrs)
- Half adder and Full adder circuit, design and implementation.
 - Half and Full subtracter circuit, design and implementation.
 - 4 bit adder/subtracter.
8. Multiplexers and de-multiplexers (4 hrs)
- basic function and block diagram of MUX and DEMUX. Different types
9. Latches and Flip Flops (10 hrs)
- Concept and types of latch with their working and applications.
 - Operation using waveforms and truth tables of RS, T, D, JK, Master/Slave JK flip-flops.
 - Difference between a latch and a flip-flop.
10. Counters (10 hrs)
- Binary counters.
 - Divide by N ripple counters (including design), Decade counters.
 - Presentable and programmable counters.
 - Down counter, up/down counter.
 - Synchronous counters (only introduction)
 - Difference between Asynchronous and Synchronous counter
 - Ring counter with timing diagram.
11. Shift Register (10 hrs)
- Introduction and basic concepts including shift left and shift right.
 - Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out.

- c) Universal shift register.
- d) Buffer register, tri-state Buffer register.

LIST OF PRACTICALS

1. Plot input and output characteristics and calculate parameters of transistors in CE configuration
2. Plot input and output characteristics and calculate parameters of transistors in CB configuration
3. Verification and interpretation of truth tables for AND, OR, NOT, NAND and Exclusive OR (EX-OR) gates.
4. Logic functions using Universal gates.
 - Realization of logic functions with the help of NAND or NOR gates.
 - Construction of a NOR gate latch and verification of its operation.
5. Half-adder and full adder Circuit :
 - Construction of half adder using EX-OR and NAND Gates and verification of its operation.
 - Construction of a full adder circuit using EX-OR and NAND gates and verify its operation.
6. 4 bit adder/subtractor circuits :

Construction of a 4-bit adder 2's complement subtractor circuit using a 4-bit adder IC and an EX-OR IC and verify the operation of the circuit.
7. IC Flip Flop

Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flop (At least one IC each of D latch, D flip-flop, edge triggered and master slave JK flip-flops).
8. Tristate gate ICs

Verification of truth table and study the operation of tristate buffer IC 74126 or equivalent.

Construction of a 4/b bit bi-directional bus by using an appropriate IC.

9. Shift Register :

Construction of a 4 bit serial-in-serial-out/serial in - parallel-out right shift register using JK flip and verification of its operation.

Construction and testing for its operation of a 4-bit ring counter using JK flip-flops.

Construction and testing for its operation of a 4 bit ring counter using JK flip-flops.

10. Universal Shift Registers IC

Verification of truth table for any one universal shift register IC.

11. Asynchronous Counter ICs

Use of 7490 equivalent TTL (a) divide by 2 (b) divide by 8 (c) divide by 10 counter.

OR

Use of 7493 equivalent TTL (a) divide by 2 (b) divide by 8 (c) divide by 16 counter.

Note: The students should be exposed to different digital ICs, related to the experiments and the data book.

INSTRUCTIONAL STRATEGY

As the subject is of fundamental nature teacher should stress upon clearing the concepts and making them understand transistor configurations, different number systems, logic gates and should give sufficient exercises to the students. All the practicals listed should preferably be performed on bread-boards using different types of ICs and discrete components.

RECOMMENDED BOOKS

1. Basic Electronics and Linear Circuit by NN Bhargava and Kulshreshta, Tata McGraw Hill, New Delhi
2. Electronics Devices and Circuits by Millman and Helkias, McGraw Hill, New Delhi
3. Digital systems by Sanjay K. Bose ; Wiley Eastern (P) Ltd., New Delhi
4. Digital Systems: Principles and Applications by Ronald J. Tocci. Prentice Hall of India, New Delhi

5. Digital Electronics and Microprocessors by RP Jain ; Tata McGraw Hills.
6. Digital Computers by John O Malley. Holt Rinehart and Winstern Inc.
7. Digital Fundamentals by Floyd.
8. Digital Fundamentals by Malvino and Leach : Tata McGraw Hill.
9. Digital Electronics by Terry LM Bartlet
10. Digital Electronics by Rajaraman V, Prentice Hall of India, New Delhi
11. Digital Logic and Computer Design by Morris Mano; Prentice Hall of India, New Delhi
12. Principles of Electronics by Albert Paul Malvino, Tata McGraw Hill, New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	8	10
2	2	5
3	2	5
4	4	5
5	4	5
6	6	10
7	4	10
8	4	10
9	10	15
10	10	15
11	10	10
Total	64	100

2.5 PROGRAMMING IN 'C'

L	T	P	Cr
3	-	6	6

RATIONALE

Computers play a vital role in present day life, more so, in the professional life of technician engineers. People working in field/ computer industry use computers in solving problems more easily and effectively. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposition to various applications of computers. The knowledge of C language will be reinforced by the practical exercises.

DETAILED CONTENTS

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|----|---|----------|
| 1. | Algorithm and Programming Development | (04 hrs) |
| | 1.1 Steps in development of a program | |
| | 1.2 Flow charts, Algorithm development | |
| | 1.3 Program Debugging | |
| 2. | Program Structure | (04 hrs) |
| | 2.1 I/o statements, assign statements | |
| | 2.2 Constants, variables and data types | |
| | 2.3 Operators and Expressions | |
| | 2.4 Standards and Formatting | |
| 3. | Control Structures | (08 hrs) |
| | 3.1 Introduction | |
| | 3.2 Decision making with IF – statement | |
| | 3.3 IF – Else and Nested IF | |
| | 3.4 While and do-while, for loop | |
| | 3.5 Break and switch statements | |
| 4. | Functions | (6 hrs) |
| | 4.1 Introduction to functions | |
| | 4.2 Global and Local Variables | |
| | 4.3 Function Declaration | |
| | 4.4 Standard functions | |
| | 4.5 Parameters and Parameter Passing | |
| | 4.6 Call – by value/reference | |
| | 4.7 Recursion | |

- 5. Arrays (4 hrs)
 - 5.1 Introduction to Arrays
 - 5.2 Array Declaration and initialization
 - 5.3 Single and Multidimensional Array
 - 5.4 Arrays of characters

- 6. Pointers (08 Hrs)
 - 6.1 Introduction to Pointers
 - 6.2 Address operator and pointers
 - 6.3 Declaring and Initializing pointers
 - 6.4 Assignment through pointers
 - 6.5 Pointers and Arrays

- 7. Structures and Unions (06 Hrs)
 - 7.1 Declaration of structures
 - 7.2 Accessing structure members
 - 7.3 Structure Initialization
 - 7.4 Arrays of structure
 - 7.5 Unions

- 8. Strings (4 Hrs)
 - 8.1 Introduction
 - 8.2 Declaring and Initializing string variables
 - 8.3 Reading and writing strings
 - 8.4 String handling functions

- 9. Files (4 Hrs)
 - 9.1 Introduction
 - 9.2 File manipulation using standard function types

LIST OF PRACTICALS

1. Programming exercises on executing and editing a C program.
2. Programming exercises on defining variables and assigning values to variables.
3. Programming exercises on arithmetic and relational operators.
4. Programming exercises on arithmetic expressions and their evaluation
5. Programming exercises on formatting input/output using printf and scanf.
6. Programming exercises using if statement.

7. Programming exercises using if – Else.
8. Programming exercises on switch statement.
9. Programming exercises on do – while statements.
10. Programming exercises on for – statement.
11. Programs on one-dimensional array.
12. Programs on two-dimensional array.
13. Programs using function calls
14. Programs illustrating string handling function
15. Simple programs using structures.
16. Simple programs using pointers.
17. Simple programs on reading from a file and writing into a file.

RECOMMENDED BOOKS

1. Exploring C by Yashwant Kanetkar – BPB Publications, New Delhi
2. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi
3. Programming with C Language by C Balaguruswami, Tata McGraw Hill, New Delhi
4. Application Programming in C by RS Salaria, Khanna Book Publishing Co(P) Ltd. New Delhi
5. Programming in C by Schaum Series, McGraw Hills Publishers, New York
6. Programming in C by Stefin G. Coachin
7. Programming in C by R Subburaj, Vikas Publishing House Pvt. Ltd., Jangpura, New Delhi
8. Elements of C by M.H. Lewin, Khanna Publishers, New Delhi
9. Programming in C by Stephen G Kochan

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	4	10
2	4	10
3	8	15
4	6	10
5	4	10
6	8	15
7	6	10
8	4	10
9	4	10
Total	48	100

2.7 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

ECOLOGY AND ENVIRONMENTAL AWARENESS CAMP

A diploma holder must have knowledge of different types of pollution caused due to industries and constructional activities so that he may help in balancing the eco system and controlling pollution by pollution control measures. He should also be aware of environmental laws related to the control of pollution.

This is to be organized at a stretch for 3 to 4 days. Lectures will be delivered on following broad topics. There will be no examination for this subject.

1. Basics of ecology, eco system and sustainable development
2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table
3. Sources of pollution - natural and man made, their effects on living and non-living organisms
4. Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms
5. Pollution of air-causes and effects of man, animal, vegetation and non-living organisms
6. Sources of noise pollution and its effects
7. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods
8. Mining, blasting, deforestation and their effects
9. Legislation to control environment
10. Environmental Impact Assessment (EIA), Elements for preparing EIA statements
11. Current issues in environmental pollution and its control
12. Role of non-conventional sources of energy in environmental protection