

## 2.1 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 subject is to enable the diploma holders to acquire proficiency, both in spoken (oral) and written language. At the end of the subject, 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 Forgetting- Robert Lynd.
    - 1.2.3 A Dialogue on Civilization – C.E.M. Joad
    - 1.2.4 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
    - 1.3.4 No Men are Foreign- James Kirkup
    - 1.3.5 A Viewpoint – RP Chaddah
- 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 Vocabulary (04 hrs)**

- 6.1 Glossary of Technical and Scientific Terms
- 6.2 Glossary of words from common language (250 words)

**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

Note : Students may be given comprehension exercises based on prescribed textbook.

**LIST OF PRACTICALS**

1. Practice on browsing information from Internet on a given topic
2. Group Discussions (guided and supervised)
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 the practicals*
4. The practical exercises involving writing may also be included in Theory Examination.

### **INSTRUCTIONAL STRATEGY**

Looking into the present day needs of effective communication in every field, it is imperative to develop necessary competencies in students by giving practical tips and emphasis on grammar, vocabulary and its usage in addition to practical exercises. The teacher should give assignments on writing of paragraphs, notices, drafting of letters, report-writing projects etc. while teaching this subject.

### **RECOMMENDED BOOKS**

1. English and Communication Skills, Book-II By Kuldeep Jaidka, Alwinder 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 Grout 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 R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

### **SUGGESTED DISTRIBUTION OF MARKS**

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

## GLOSSARY OF TECHNICAL & SCIENTIFIC TERMS

1. Absolute	ਪਰਮ, ਅਚਰ, ਪੂਰਨ, ਸਿੱਧਰ	ਪੂਰਣ
2. Acceleration	ਤਵਰਣ, ਪ੍ਰਵੇਗ	ਪ੍ਰਵੇਗ
3. Acid	ਅਮਲ	ਤੇਜਾਬ/ ਤੇਜ
4. Alkaline	ਖ਼ਾਰੀਯ, ਖ਼ਾਰਾ	ਖ਼ਾਰਾ
5. Air Compressor	ਵਾਯੂ-ਸੰਪੀਡਕ	ਹਵਾ-ਦਬਾਅਕ
6. Air Conditioning	ਵਾਤਾਨੁਕੂਲਨ	ਹਵਾ-ਅਨੁਕੂਲਣ
7. Alignment	ਸਰੇਖਨ	ਕਤਾਰਬੰਦੀ
8. Alternating Current	ਪ੍ਰਤਿਆਵਰਤੀ ਧਾਰਾ	ਪਰਤਵੀ ਬਿਜਲੀ ਧਾਰਾ
9. Altimeter	ਊਚਾਈ ਮਾਪਨੇ ਕਾ ਯੰਤਰ	ਉਚਾਈ ਮਾਪਕ
10. Alum	ਫਿਟਕਰੀ	ਫਿਟਕਰੀ
11. Ammeter	ਏਮਮੀਟਰ	ਐਮਮੀਟਰ
12. Ampere	ਏਂਪਿਯਰ	ਐਮਪੀਅਰ
13. Amplification	ਪ੍ਰਵਰਧਨ	ਵਰਧਨ
14. Amplitude	ਆਯਾਮ	ਆਯਾਮ
15. Angle	ਕੋਣ	ਕੋਣ
16. Angular Velocity	ਕੋਣੀਯ ਵੇਗ	ਕੋਣ ਦਾ ਵੇਗ
17. Angular Momentum	ਕੋਣੀਯ ਸੰਵੇਗ	ਕੋਣ ਦਾ ਸੰਵੇਗ
18. Annealing	ਤਾਪਾਨੁਸ਼ੀਤਨ	ਅਨੀਲੀਕਰਣ
19. Anode	ਏਨੋਡ	ਐਨੋਡ
20. Apex	ਸ਼ੀਰ੍ਸ਼, ਸਿਖਰ, ਸਿਖਾਗ੍ਰ	ਸਿਰਾ, ਸਿਖਰ, ਨੋਕ
21. Apparent	ਸਪਸ਼ਟ	ਸਾਫ਼
22. Applied Mechanics	ਅਨੁਪ੍ਰਯੁਕਤ ਯਾਂਤ੍ਰਿਕੀ	ਵਿਹਾਰਕ ਯੰਤਰ-ਵਿਗਿਆਨ
23. Applied Science	ਅਨੁਪ੍ਰਯੁਕਤ ਵਿਜ਼ਾਨ	ਵਿਹਾਰਕ ਵਿਗਿਆਨ
24. Archimedes Principle	ਆਰਕਿਮੀਡੀਜ਼ ਕਾ ਸਿਧਾਂਤ	ਆਰਕਿਮੀਡੀਜ਼ ਦਾ ਸਿਧਾਂਤ
25. Architecture	ਵਾਸਤੁਕਲਾ, ਸਥਾਪਤਕਲਾ	ਇਮਾਰਤ-ਕਲਾ, ਇਮਾਰਤ ਵਿਗਿਆਨ
26. Armature	ਆਰਮੈਚਰ	ਆਰਮੇਚਰ
27. Atom	ਪਰਮਾਣੂ	ਪਰਮਾਣੂ
28. Automatic	ਸਵਚਲਿਤ	ਸਵੈ-ਚਲਿਤ
29. Axis	ਅਖ਼	ਧੁਰਾ
30. Axle	ਧੁਰੀ	ਧੁਰੀ, ਧੁਰਾ
31. Balance (Scale)	ਤੁਲਾ, ਤਰਾਜ਼ੂ	ਤਕੜੀ, ਤਰਾਜ਼ੂ, ਤੁਲਾ
32. Ball Bearing	ਬਾਲ-ਬੇਯਰਿੰਗ	ਬਾਲ ਬੈਰਿੰਗ
33. Bar magnet	ਚੜ-ਚੁੰਬਕ	ਛੜ-ਚੁੰਬਕ
34. Barometer	ਵਾਯੂਦਾਬਮਾਪੀ	ਹਵਾਦਬਾਅ ਮਾਪਕ
35. Base	ਆਧਾਰ	ਆਧਾਰ
36. Base Plate	ਆਧਾਰ ਪਟਿਟਕਾ	ਆਧਾਰ ਪਲੇਟ
37. Battery	ਬੈਟਰੀ	ਬੈਟਰੀ
38. Beaker	ਬੀਕਰ	ਬੀਕਰ
39. Bending Moment	ਬੰਕਨ ਆਘੂਰਨ	ਬੁਕਾਉ-ਘੁਮਣ
40. Blast Furnace	ਜ਼ੌਂਕਾ ਮਟ੍ਰੀ	ਬੁੱਕਾ-ਭੱਠੀ, ਬਲਾਸਟ ਭੱਠੀ
41. Bleach	ਵਿਰੰਜਕ, ਰੰਗਕਾਟ	ਰੰਗਕਾਟ
42. Boiler	ਚਬਾਲਕ	ਉਬਾਲਕ
43. Bridge	ਪੁਲ	ਪੁੱਲ
44. Burette	ਬ੍ਰੂਰੇਟ	ਬਿਬੂਰੇਟ
45. Callipers	ਕੈਲਿਪਰਜ਼	ਕੈਲੀਪਰਜ਼
46. Calorie	ਕੈਲੋਰੀ	ਕੈਲੋਰੀ
47. Canal	ਨਹਰ	ਨਹਿਰ
48. Capacitance	ਧਾਰਿਤਾ	ਧਾਰਣ-ਸਮਰਥਾ
49. Carburettor	ਕਾਰਬੂਰੇਟਰ	ਕਾਰਬਿਉਰੇਟਰ
50. Cast Iron	ਫਲਵਾਂ ਲੋਹਾ	ਦੇਗੀ ਲੋਹਾ

51. Catalyst	उत्प्रेरक	उत्प्रेरक
52. Cathode	कैथोड	कैथोड
53. Center of Gravity	गुरुत्वाकर्षण-केन्द्र	गुरुत्वाकर्षण-केन्द्र
54. Centrifugal	उपकेन्द्रीय	अपकेन्द्रीय
55. Centripetal	अभिकेन्द्रीय	केन्द्रीय
56. Centroid	केन्द्रीय	केन्द्रीय
57. C.G.S. System	सी.जी.एस. पद्धति	सी.जी.एस. पद्धति
58. Chemical Action	रासायनिक क्रिया	रासायनिक क्रिया
59. Chain	श्रृंखला, माला	श्रृंखला, माला
60. Change of State	अवस्था परिवर्तन	अवस्था परिवर्तन
61. Characteristics	लक्षण	लक्षण
62. Charge	आवेश	आवेश
63. Choke	चोक	चोक
64. Chord, Major	गुरु स्वर-संघात	गुरु (बड़ी) सुर-संयोजक,
65. Chord, Minor	लघु स्वर-संघात	लघु (छोटी) सुर-संयोजक
66. Circular	वृत्ताकार, वर्तुल	गोलाकार, गोल, चकरी
67. Clock-Wise	दक्षिणा वर्त	घड़ी चक्कर
68. Coagulation	स्कंदन	जमावट
69. Coefficient of Expansion	प्रसार गुणांक	प्रसार गुणांक
70. Coil	कुंडली	कुंडली
71. Combustion	दहन	जलट
72. Compass	दिशासूचक	दिशासूचक
73. Compound	यौगिक	यौगिक
74. Concave	अवतल	अवतल
75. Convex	उत्तल	उत्तल
76. Concentrated (Solution)	गाढ़ा/सांद्रित (घोल)	गाढ़ा/संयुक्त (घोल)
77. Concrete	कंक्रीट	कंक्रीट
78. Conduction	चालन	चालन
79. Conductor	चालक	चालक
80. Cone	शंकु	शंकु, कोन
81. Connection	सम्बन्ध, जोड़	जोड़, संयोज
82. Constant (Adj.)	स्थिर, अचल, एकसमान	अचल, स्थिर
83. Convection	संवहन	संवहन
84. Coulomb	कूलोम (विद्युत शक्ति की इकाई)	कूलोम (विद्युत शक्ति की इकाई)
85. Couple	बल युग्म	बल युग्म
86. Crane	क्रेन	क्रेन
87. Crystalline	रवेदार	रवेदार, टुकड़ीदार
88. Dehydrate	निर्जल करना	जल रहित करना
89. Distillation	आसवन करना, आसवन	आसवन
90. Effervescence	बुदबुदाहट	बुदबुदाहट
91. Element	तत्त्व, मूलतत्त्व	तत्त्व, मूल तत्त्व
92. Empirical Formula	मूल अनुपाती सूत्र	मूल अनुपाती सूत्र
93. Equivalent Weight	तुल्यांकी-भार	तुल्यांकी भार
94. Flame Test	ज्वाला-परीक्षण	लाट परीक्षण
95. Flash Point	प्रज्वलन-ताप	जलट तापमान
96. Flask	फलास्क	सुराही/फलास्क
97. Spring Balance	कमानी तुला	कमानीदार तुला/तकड़ी
98. Soluble	विलयशील	घुलनशील
99. Viscosity	गाढ़ापन	गाढ़ापन
100. Volumetric Analysis	आयतनी विश्लेषण	आयतनी विश्लेषण

## 2.2 APPLIED MATHEMATICS - II

L T P  
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### 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. Algebra (10 hrs)
  - 1.1 Determinants: Elementary properties of determinants up to 3<sup>rd</sup> order, consistency of equations, Cramer's rule.
  - 1.2 Matrix: Algebra of matrices, Inverse of a matrix, matrix inverse method to solve a system of linear equations in 3 variables.
  - 1.3 Application of Matrix in computer programming
2. Differential Calculus (24 hrs)
  - 2.1 Definition of function; Concept of limits.  
Four standard limits  $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$ ,  
 $\lim_{x \rightarrow 0} \frac{\sin x}{x}$ ,  $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$ ,  $\lim_{x \rightarrow 0} (1+x)^{1/x}$
  - 2.2 Differentiation of  $x^n$ ,  $\sin x$ ,  $\cos x$ ,  $\tan x$ ,  $e^x$ ,  $\log_a x$  (Please take one example of differentiation by definition)
  - 2.3 Differentiation of sum, product and quotient of functions. Differentiation of function of a function.
  - 2.4 Differentiation of trigonometric inverse functions. Logarithmic differentiation. Exponential differentiation, Successive differentiation (excluding nth order).
  - 2.5. Application of differential calculus in:
    - (a) Rate Measures
    - (b) Errors and increments
    - (c) Maxima and minima
    - (d) Equation of tangent and normal to a curve (for explicit functions only)

3. Integral (26 hrs)

3.1 Integration as inverse operation of differentiation with simple examples.

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

3.3 Evaluation of definite integrals (simple problems)-

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

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

3.4 Applications of integration for :

(a) Simple problem on evaluation of area bounded by a curve and axes.

(b) Calculation of volume of a solid formed by revolution of an area about axes. (Simple problems).

(c) To calculate average and root mean square value of a function and

(d) Area by Trapezoidal Rule and Simpson's Rule

4. Statistics and Probability (12 hrs)

4.1 Measures of Central Tendency: Mean, Median, Mode with example of daily life.

4.2. Measures of Dispersion: Mean deviation, Standard deviation

4.3. Probability definition and addition law of probability, theorem and simple numerical problems, General view of normal probability curve (No numericals)

4.4. Explanation of different sampling techniques ( No numericals )

5. Differential Equations (08 hrs)

5.1 Solution of first order and first degree differential equation by variable separation method (simple problems)

5.2. Differential equations of homogeneous equation

### INSTRUCTIONAL STATREGY

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

### RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi.
2. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
3. Applied Mathematics 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. Engineering Mathematics, Vol I, II & III by V Sundaram et.al, Vikas Publishing House (P) Ltd., New Delhi
9. 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
12. Applied Mathematics-II, Archana Sharma, Lords Publications, Jalandhar
13. Advanced Engineering Mathematics by Peter V.O,neil, University of Albama 2007 edition, Cengage Learning India Pvt. Ltd. Patparganj, New Delhi.

#### **SUGGESTED DISTRIBUTION OF MARKS**

<b>Topic No.</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	10	15
2	24	28
3	26	32
4	12	17
5	08	08
<b>Total</b>	<b>80</b>	<b>100</b>



## 2.3 APPLIED PHYSICS – II

L T P  
4 - 2

### RATIONALE

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

### DETAILED CONTENTS

- 1. Optics (12 hrs)**
  - 1.1 Review of basic optics laws: Reflection and Refraction
  - 1.2 Refractive index and magnification, image formation in lenses, lens formulae (thin lens only), power of lens, total internal reflection and their applications
  - 1.3 Simple concepts of interference, diffraction, Polarization and their applications like Commercial equipment, optic glasses and its manufacturing and use of Polarimeter in sugarcane industry and distilleries (No explanation required).
  - 1.4 Simple and compound microscope, astronomical telescope, magnifying power and its calculation (in each case) and their applications
- 2. Electrostatics (10 hrs)**
  - 2.1 Coulombs law, unit charge and electric lines of force
  - 2.2 Electric flux and Gauss's Law, Electric field intensity and electric potential
  - 2.3 Electric field due to point charge, straight charged conductor, plane charged sheet and charged sphere (Inside and outside the sphere)
  - 2.4 Capacitance, types of capacitors, capacitance of parallel plate capacitor, series and parallel combination of capacitors, Dielectric and its effect on capacitance, and dielectric break down
  - 2.5 Pollution, different types of pollution and polluting agents, Use of Electronics in reducing Air and Water pollution e.g. precipitation of microbes and moisture reparation from air and gases in industry (small explanation only)
- 3. DC Circuits (15 hrs)**
  - 3.1 Concept of electricity, various applications of electricity

- 3.2 Current, voltage, resistance, potential difference and e.m.f, power, electrical energy and their units, advantages of electrical energy over other forms of energy and Alternating Current and Direct Current
- 3.3 Ohm's law and its applications, specific resistance, effect of temperature on resistance, co-efficient of resistance, series and parallel combination of resistors an Resistance, Definitions of Conductance and Super Conductor's
- 3.4 Kirchoff's laws, Wheatstone bridge principle and its applications
- 3.5 Heating effect of current and concept of electric power, energy and their units, related numerical problems and their applications
- 3.6 Examples of DC Circuits e.g. Various electrical and electronic equipment CRO, T.V., Audio system, Computers (Only examples, no explanations)

**4. Electromagnetism (10 hrs)**

- 4.1 Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units
- 4.2 Permeability and susceptibility and their applications. Electromagnetic Induction, Lenz's law and its uses like dynamo, Right hand and left hand rules, Magnetic lines of force due to straight conductor, Solenoid and Circular coil. Force on a current carrying rectangular coil placed in magnetic field and its uses in moving coil galvanometer, electric motor (Concept only). Lorentz force, Force on a current carrying conductor (straight and rectangular)
- 4.3 Moving coil galvanometer its principle, construction and working.

**5. Semiconductor physics (07 hrs)**

- 5.1 Energy bands, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics
- 5.2 Diode as rectifier – half wave and full wave rectifier, semiconductor transistor pnp and npn (concept only)

**6. Modern Physics (10 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 their engineering and medical applications
- 6.2 Fibre optics: introduction to optical fiber materials, types, light propagation and applications in communication.

## **LIST OF PRACTICALS (To perform minimum eight experiments)**

1. To find the focal length of convex lens by displacement method.
2. To determine the magnifying power of an astronomical telescope
3. To verify ohm's laws by drawing a graph between voltage and current.
4. To verify laws of resistances in series and in parallel connection.
5. To find resistance of galvanometer by half deflection method
6. To measure very low resistance and very high resistance using Wheat Stone bridge
7. To determine the capacity of a parallel plate capacitor by discharging through a voltmeter and also find out the time constant of the given capacitor.
8. To draw characteristics of a pn junction diode and determine knee and break down voltages
9. To find wave length of He Ne semiconductor LASER.
10. Use of CRO in plotting AC/DC

## **INSTRUCTIONAL STRATEGY**

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

## **RECOMMENDED BOOKS**

1. Text Book of Physics for Class XI (Part-I, Part-II) N.C.E.R.T
2. Applied Physics, Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, Delhi
3. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
4. Fundamentals of Physics by Resnick, Halliday and Walker, Asian Book Pvt. Ltd., New Delhi
5. Fundamentals of Optics by Francis A. Jenkins & Harvey E White, McGraw Hill International Editions, Physics Series
6. A Text Book of Optics, Subramanian and Brij Lal, S Chand & Co., New Delhi
7. Comprehensive Practical Physics, Vol, I & II, JN Jaiswal, Laxmi Publishers
8. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
9. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar
10. Applied Physics Vol II by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar
11. Basic Electronics and Linear Circuits by NN Bhargava et al Tata Mc Graw Hill Publishers, New Delhi
12. Principles of Electronics by SK Sahdev, Dhanpat Rai and Co, New Delhi
13. Engineering Physics by Vanchna Singh and Sheetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi (year 2008)

### Suggested Distribution of Marks for Facilitating Paper Setter

<b>Sr No</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	Optics	12	20
2	Electrostatics	10	15
3	DC Circuits	15	20
4	Electromagnetism	10	20
5	Semiconductor Physics	07	10
6	Modern Physics	10	15
	<b>Total</b>	<b>64</b>	<b>100</b>

## 2.4 APPLIED CHEMISTRY - II

L T P  
4 - 2

### RATIONALE

Every branch of engineering is expanding greatly. The contributions of chemicals and chemical products are playing important role in the field of engineering, biotechnology, agriculture and pharmacology etc. The numbers of such chemical products are exponentially increasing each successive year. This results in enhancing the responsibility of engineers while choosing engineering materials for converting them into finished products. Now a days, choosing engineering material is not only based conventional qualitative and quantitative testing of their chemical composition and behavior under service conditions, but also based on environmental and eco-friendly factors. To achieve such objectives it is essential to apply applied aspects of chemistry. In order to educate and train Engineers and skilled work force applied chemistry syllabus for diploma students in various engineering and technology courses is designed to develop scientific temper and appreciate physical and chemical properties of engineering materials, which are used in their professional career. Best efforts should be made to teach and train the skilled engineers and work force by imparting essential knowledge required from this subject through demonstrations, and minor projects.

### DETAILED CONTENTS

1. Metallurgy (10 hrs)
  - 1.1 General metallurgical terms/operations
  - 1.2 Free energy change( $\Delta G$ ) criteria in metallurgical operation – Ellingham diagram – oxides, usefulness and limitations
  - 1.3 Extraction of pure iron, copper and aluminium from their chief ores
  - 1.4 Manufacture of wrought iron, steel by open hearth process and L.D. process
  - 1.5 Alloys- types of alloys (ferrous and non ferrous) purposes of alloying, composition, properties and applications of – invar steel, nichrome, stain less steel, alnico, german silver, brass, bronze, gun metal, duralumin, magnalium and solder
  - 1.6 Definition, classification, composition, advantages and industrial applications of composites materials.
  
2. Corrosion (08 hrs)
  - 2.1 Definition of corrosion, erosion and distinctions, cause of corrosion, types of corrosion – dry and wet corrosion
  - 2.2 Theories of corrosion- Pilling Bedworth rule of dry corrosion, electrochemical theory of corrosion-  $H_2$  evolution,  $O_2$  absorption, definition of passivation, galvanic series
  - 2.3 Other forms of corrosion – high temperature corrosion, stress corrosion, caustic embrittlement, filiform corrosion
  - 2.4 Factors influencing rate of corrosion
  - 2.5 Preventions and control measures:
    - 2.5.1 Internal measures- purification of metals, alloying with corrosion resistant elements, heat treatment
    - 2.5.2 External measures –
      - a) Modification of corrosion environments, Application of anodic, cathodic and organic inhibitors,

- b) Protective coatings – (a) Metallic coatings (b) Non-metallic coating (c) Sacrificial anode
    - 2.5.3 Prevention of corrosion by material selection and design
  - 2.6 Application of corrosion protection and erosion protection in boilers, fluid flow, industries and commercial organizations.
- 3. Fuels (14 hrs)
  - 3.1 Definition of fuel, combustion, classification of fuels, characteristics of good fuel, merits and demerits of gaseous fuels over solid and liquid fuels
  - 3.2 Calorific value, - HCV, LCV and relation between both, determination of calorific value by Bomb calorimeter, and Dulong's formula (equation to be assumed, numerical problems)
  - 3.3 Coal and proximate analysis of coal, Bergius process of converting coal into gasoline, power alcohol – advantages and disadvantages
  - 3.4 Fuel rating: octane and cetane numbers, influence of chemical composition and structure on fuel quality
  - 3.5 Gaseous fuels: chemical composition usefulness and limitations of Natural gas, CNG, producer gas, water gas and carbureted water gas, coal gas, oil gas LPG, and biogas (manufacturing details are excluded)
  - 3.6 Future fuels –Hydrogen, CNG + propane, LNG.
  - 3.7 Numerical problems on 3.2 and 3.3 sections only.
  - 3.8 Advantages and limitations of flue gases in industries
  - 3.9 Energy Conservation programmes.
- 4. Lubricants (08 hrs)
  - 4.1 Definition of lubricants and lubrication
  - 4.2 Functions of lubricant
  - 4.3 Mechanism of lubrication- hydrodynamic and thin film lubrication
  - 4.4 Classification of lubricants
    - 4.4.1 Lubricating oils,
    - 4.4.2 Greases
    - 4.4.3 Solid lubricants
  - 4.5 Properties of lubricants
    - 4.5.1 Physical properties- viscosity and viscosity index, flash point and fire point, cloud and pour point, oiliness, volatility, colour, emulsification
    - 4.5.2 Chemical properties- total acidity number (TAN), soaponification value, iodine value, aniline point, precipitation number, coke number
  - 4.6 Application of various lubricating oils, greases, solid lubricants in automobile, mechanical and chemical industry.
- 5. Engineering materials and Refractories (08 hrs)
  - 5.1 Superconductors- Types, properties of and applications of superconductors Types-I -Al, In and Pb and Type -II Nb-Zr alloy
  - 5.2 Introduction and characteristics of good refractory materials Types and chemical composition of acidic, basic and neutral refractories Applications of refractories
  - 5.3 Glass – chemical composition, types of glasses and their applications
  - 5.4 Constituent of paints, characteristics of good paint Constituent and characteristics of varnishes Constituent of enamels Uses of paints varnishes and enamels
  - 5.5 Applications

- 5.5.1 Application of Geo synthetic and ceramic materials in industry, road and dam construction and high rise building construction.
- 5.5.2 Application of Marine paints in ships, submarines and Navy equipments.

- 6. Polymers, Plastics and Adhesives. (10 hrs)
  - 6.1 Polymerization, degree of polymerization (DP). Addition and condensation polymers with suitable examples
  - 6.2 Definition, structure and applications of thermoplastics{PE (HDP, LDP), PVC, Polystyrene} and thermosetting (Buna-S, Nylon-6, Nylon-66, Nylon- 10, Bakelite, teflon) plastics with examples of each type
  - 6.3 Additive for plastics - Plasticizer, fillers, cross linking agents, blowing agents colourants, stabilizers and binders
  - 6.4 Definition and examples of fibers and elastomers (natural and synthetic rubber) gutta percha,
  - 6.5 Adhesives, synthetic resins (both thermosetting and thermoplastic)
  - 6.6 Chemical factors influencing adhesive action (polarity, DP, branching of chain and pH)
  - 6.7 Applications
    - 6.7.1 Application of Polymers, plastics and adhesives in automobile, mechanical, chemical, textile and construction industries.
    - 6.7.2 Application of plastics as packaging material in food, dairy, confectionary products. Application of synthetic resins in plywood, wood furniture, house windows & doors and building decorative
- 7. Environmental Pollution and its control. (06 hrs)
  - 7.1 Introduction
  - 7.2 Causes and control of air, water, and soil pollutions
  - 7.3 Noise pollution
  - 7.4 Radio active pollution and its control
  - 7.5 Sewage and its treatment
  - 7.6 Chemical analysis and treatment of industrial effluent

## LIST OF PRACTICALS

**Note:** Experiments at sr. no 1 to 11 are to be performed compulsorily and maintain laboratory manual, in addition every student will compulsorily submit a separate hand written inventory report on any four topics among the list at no. 12.1 to 12.7 at the end of session.

1. Estimation of copper in the given copper ore solution volumetrically or spectrophotometrically.
2. Estimation of moisture and ash in the given coal sample gravimetrically
3. Determination of viscosity of given liquid by Red Wood viscometer
4. Determination of flash / fire point of the given lubricant using Able' s flash point apparatus
5. To study the effect of metal coupling on corrosion of iron.
6. Study of the role of emulsifying agents in stabilizing the emulsion of different oils.
7. Volumetric estimation of total acid value (Total acid number TAN) of a lubricating oil
8. Determination of molecular mass of polystyrene (high polyester) by viscometry.
9. Study of effect of acids and bases on tensile strength of natural (use cotton, wool, and silk) and synthetic polymer fibres.
10. Application of  $\text{FeCl}_3$  in etching process for PCB
11. To construct Daniel cell and measure its e.m.f. using voltmeter.

12. A compulsory hand written inventory report need to be submitted by the students for any four
- 12.1 determination of viscosity of given lubricant,
  - 12.2 total acid number (TAN) of a lubricating oil,
  - 12.3 metal ions present in the water,
  - 12.4 estimation of hardness of water collected from different water sources
  - 12.5 estimation of chloride and alkalinity of water collected from different water sources
  - 12.6 Collecting technical data on lubricating oils, edible oils etc
  - 12.7 Ores of different metals and non metals available in India along with chemical composition and locating the places on self drawn India's map
  - 12.8 Collection and presentation of statistical data on water quality of your district/ state / country

### INSTRUCTIONAL STATREGY

Teacher may take help of various models and charts while imparting instructions to make the concepts clear. More emphasis may be laid on discussing and explaining practical applications of various chemical processes and reactions. In addition, students should be encouraged/motivated to study those processes in more details, which may find practical applications in their future professional life.

### RECOMMENDED BOOKS

1. Chemistry in Engineering by J.C. Kuricose and J. Rajaram, Tata McGraw Hill, Publishing Company Limited, New Delhi.
2. Engineering Chemistry by P.C.Jain and Monika Jain, Dhanapat Rai Publishing Company New Delhi.
3. Engineering Chemistry by Shashi Chawla.
4. Progressive Applied Chemistry – II by Dr. G.H. Hugar, Eagle Prakashan Jalandhar.
5. Engineering Chemistry – A text Book by H. K. Chopra and A Parmer- Narosa Publishing House New Delhi.
6. Engineering Chemistry by Dr. Himanshu Pandey, Goel Publishing House, a unit of Krishna Prakashan Pvt. Ltd. Meerut, India, (year 2008)
7. Rapid Chemistry for peak performance by Anil Ahlawat, MTE books, 503, Taj Apartments, Ring Road, New Delhi (year 2008)
8. Applied Chemistry (Theory and Practice) by Vermani OP and Narula A.K., Cengage International Pvt. Ltd. New Delhi (year 2008)
9. Engineering Chemistry by Shelli Oberoi and Monica Malik, Cengage International Pvt. Ltd. New Delhi (year 2008)

### SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
1	Metallurgy	10	15
2	Corrosion	10	15
3	Fuel	12	20
4	Lubricants	08	15
5	Engineering materials and Refractories	08	15
6	Polymers, Plastics and Adhesives.	10	15
7	Environmental Pollution and its control	06	05
	Total	64	100



## 2.4 BASIC ELECTRICAL ENGINEERING

[Common in ECE, I&C, Eltx. (Microprocessor) Computer Engg. & IT]

L T P  
4 - 2

### RATIONALE

A diploma holder may be involved in various jobs ranging from preventive maintenance of electrical installation to fault location. In addition, he/she may be working in testing laboratories where he/she uses measuring instruments. To carry out these and similar jobs effectively, knowledge of basic concepts, principles and their applications is very essential. This course will enable the students to understand the basic concepts and principles of dc and ac fundamental, ac circuits, batteries, electromagnetic induction, voltage and current sources etc

### DETAILED CONTENTS

1. Overview of DC Circuits (06 hrs)
  - 1.1 Simple problems on series and parallel combination of resistors with their wattage consideration,
  - 1.2 Application of Kirchoff's current law and Kirchoff's voltage law to simple circuits. Star – Delta connections and their conversion.
2. DC Circuit Theorems (06 hrs)

Thevenin's theorem, Norton's theorem, application of network theorems in solving d.c circuit problems.
3. Voltage and Current Sources (04 hrs)
  - a) Concept of voltage source, symbol and graphical representation characteristics of ideal and practical sources.
  - b) Concept of current sources, symbol, characteristics and graphical representation of ideal and practical current sources.
4. Electro Magnetic Induction (10 hrs)
  - a) Concept of electro-magnetic field produced by flow of electric current, magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit.
  - b) Faraday's laws of electro-magnetic induction, principles of self and mutual induction, self and mutually induced e.m.f, simple numerical problems.
  - c) Concept of current growth, decay and time constant in an inductive (RL) circuit.
  - d) Energy stored in an inductor, series and parallel combination of inductors.

5. Batteries (06 hrs)
- 5.1 Basic idea of primary and secondary cells
  - 5.2 Construction, working principle and applications of Lead-Acid, Nickel-Cadmium and Silver-Oxide batteries
  - 5.3 Charging methods used for lead-acid battery (accumulator )
  - 5.4 Care and maintenance of lead-acid battery
  - 5.5 Series and parallel connections of batteries
  - 5.6 General idea of solar cells, solar panels and their applications
  - 5.7 Introduction to maintenance free batteries
6. AC Fundamentals (10 hrs)
- 6.1 Concept of alternating quantities
  - 6.2 Difference between ac and dc
  - 6.3 Concepts of: cycle, frequency, time period, amplitude, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor.
  - 6.4 Representation of sinusoidal quantities by phasor diagrams.
  - 6.5 Equation of sinusoidal wave form for an alternating quantity and its derivation
  - 6.6 Effect of alternating voltage applied to a pure resistance, pure inductance and pure capacitance.
7. AC Circuits (16 hrs)
- 7.1 Concept of inductive and capacitive reactance
  - 7.2 Alternating voltage applied to resistance and inductance in series.
  - 7.3 Alternating voltage applied to resistance and capacitance in series.
  - 7.4 Impedance triangle and phase angle
  - 7.5 Solutions and phasor diagrams for simple RLC circuits (series and parallel).
  - 7.6 Introduction to series and parallel resonance and its conditions
  - 7.7 Power in pure resistance, inductance and capacitance, power in combined RLC circuits. Power factor, active and reactive power and their significance, definition and significance of power factor.
  - 7.8 j-notation and its application in solving series and parallel ac circuits
  - 7.9 Definition of conductance, susceptance, admittance, impedance and their units
8. Various Types of Power Plants (06 hrs)
- 8.1 Brief explanation of principle of power generation practices in thermal, hydro and nuclear power stations and their comparative study. A Visit to a nearby Power Station(s) may be organized for better understanding and exposure.
  - 8.2 Elementary block diagram of above mentioned power stations

## LIST OF PRACTICALS

1. Familiarization of measuring instruments viz voltmeter, ammeter, CRO, Wattmeter, multi-meter and other accessories

2. Determination of voltage-current relationship in a dc circuit under specific physical conditions and to draw conclusions.
3. Measurement of resistance of an ammeter and a voltmeter
4. Verification of dc circuits:
  - a.. Thevenin's theorem,
  - b. Norton's theorem,
5. Observation of change in resistance of a bulb in hot and cold conditions, using voltmeter and ammeter.
6. Verification of Kirchhoff's Current and Voltage Laws in a dc circuit
7. To find the ratio of inductance of a coil having air-core and iron-core respectively and to observe the effect of introduction of a magnetic core on coil inductance
8. Computation of the voltage current relationship in single phase R-L and R-C series circuits, drawing of their impedance triangles and determination of the power factor in each case .
9. Charging and testing of a lead - acid storage battery.
10. Measurement of power and power factor in a single phase R-.L-.C. Circuit and calculation of active and reactive powers in the circuit.
11. Visit to a nearby Power Station(s) may be arranged

## **INSTRUCTIONAL STRATEGIES**

Basic electrical engineering being a fundamental subject, it needs to be handled very carefully and in a manner such that students develop clear understanding of the related concepts and principles. The teacher may lay more emphasis on laboratory work and give home assignments to students to inculcate self-study and problem solving abilities amongst them.

## **RECOMMENDED BOOKS**

1. Electrical Technology, Fifth Edition by Edward Hughes, Longman Publishers.
2. Basic Electrical and Electronics Engineering by SK Sahdev; Dhanpat Rai and Co, New Delhi.
3. Experiments in Basic Electrical Engineering by SK Bhattacharya, KM Rastogi; New Age International (P) Ltd.; Publishers New Delhi.
4. Electrical Science by Choudhury S.; Narosa Publishing House Pvt Ltd, Darya ganj, New Delhi.
5. Basic Electrical and Electronics Engineering by Kumar KM, Vikas Publishing House Pvt Ltd, Jang pura, New Delhi.
6. Electrical Technology by BL Theraja, S Chand and Co, New Delhi.
7. Basic Electricity by BR Sharma; Satya Prakashan; New Delhi.
8. Principles of Electrical Engineering by BR Gupta, S Chand and Co, New Delhi.
9. Basic Electrical Engineering by PS Dhogal, Tata Mc Graw-Hill publishing Company Ltd., New Delhi.
10. Basic Electrical Engineering by JB Gupta; SK Kataria and Sons, New Delhi.
11. Experiments in Basic Electrical Engineering by GP Chhalhotra, Khanna Publishers, New Delhi

12. Basic Electrical Engineering by J.S. Katre, Technical Max. Publication, Pune.

**SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER**

<b>Sr No</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1.	Overview of DC Circuits	06	8
2.	DC Circuit Theorems	06	10
3.	Voltage and Current Sources	04	08
4.	Electro Magnetic Induction	10	15
5.	Batteries	06	12
6.	AC Fundamentals	10	15
7.	AC Circuits	16	20
8	Various Types of Power Plants	06	12
	<b>Total</b>	<b>64</b>	<b>100</b>

## 2.5 BASIC ELECTRONICS

[Common in ECE, I&C, Eltx. (Microprocessor) Computer Engg. & IT]

L P  
4 2

### RATIONALE

This subject gives the knowledge of fundamental concepts and principles of basic electronics and aims at providing the students with basic understanding of various types of materials such as conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers, significance and use of filters in rectifiers, basic structure and working principle of tunnel diodes, LEDs, varactor diodes, LCD; working of transistors in various configurations; fundamental knowledge of FETs and MOSFETs etc. and their applications. The teacher should give emphasis on understanding of concepts by explaining the various terms used in the subject. Practical exercises have been included in order to reinforce various concepts. Industrial/field exposure must be given by organizing industrial visit.

### DETAILED CONTENTS

1. Semi conductor physics: (12 hrs)
  - 1.1 Review of basic atomic structure and energy levels, concept of insulators, conductors and semi conductors, atomic structure of Germanium (Ge) and Silicon (Si), covalent bonds
  - 1.2 Concept of intrinsic and extrinsic semi conductor, process of doping.
  - 1.3 Energy level diagram of conductors, insulators and semi conductors; minority and majority charge carriers.
  - 1.4 P and N type semiconductors and their conductivity, effect of temperature on conductivity of intrinsic semi conductors.
  
2. Semi conductor diode: (12 hrs)
  - 2.1 PN junction diode, mechanism of current flow in PN junction, forward and reverse biased PN junction, potential barrier, drift and diffusion currents, depletion layer, concept of junction capacitance in forward and reverse biased condition.
  - 2.2 V-I characteristics, static and dynamic resistance and their value calculation from the characteristics.
  - 2.3 Application of diode as half-wave, full wave and bridge rectifiers. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC and RC filters.
  - 2.4 Types of diodes, characteristics and applications of Zener diodes. Zener and avalanche breakdown.
  
3. Introduction to Bipolar-transistors: (12 hrs)
  - 3.1 Concept of a bipolar transistor, its structure, PNP and NPN transistors, their symbols and mechanism of current flow; Current relations in a transistor; concept of leakage current;
  - 3.2 CB, CE, CC configurations of a 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;

- 3.4 Transistor as an amplifier in CE Configuration; concept of dc load line and calculation of current gain and voltage gain using dc load line.
4. Transistor biasing Circuits: (06 hrs)  
Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits.
5. Single stage transistor amplifier: (10 hrs)  
Single stage transistor amplifier circuit, ac load line and its use in calculation of current and voltage gain of a single stage amplifier circuit. Explanation of phase reversal of output voltage with respect to input voltage. H-parameters and their significance.
6. Field effect Transistors (12 hrs)  
Construction, operation and characteristics of FETs and their applications.
- 6.1 Construction, operation and characteristics of a MOSFET in depletion and enhancement modes and its applications.
- 6.2 C MOS - advantages and applications
- 6.3 Comparison of JFET, MOSFET and BJT.
- 6.4 FET amplifier circuit and its working principle. (Excluding Analysis).

## LIST OF PRACTICALS

1. Familiarization with operation and use of the following instruments.  
Multi-meter, CRO, Signal generator, LCR meter, Regulated Power Supply by way of taking readings of relevant quantities with their help.
2. Plotting of V-I characteristics of a PN junction diode
3. Plotting of V-I characteristics of a Zener diode
4. Measurement of the voltage gain, input and output impedance in a single state CE amplifier circuit.
5. Fabrication of:
  - a. Half-wave rectifier circuit using one diode
  - b. Full-wave rectifier circuit using two diodes
  - c. Bridge-rectifier circuit using four diodes
6. Observation of the wave shapes for the following rectifier circuit
  - d. Half-wave rectifier
  - e. Full-wave rectifier
  - f. Bridge-rectifier
7. Plotting of the wave shape of full wave rectifier with
  - a. Shunt capacitor filter
  - b. Series inductor filter

- c. RC filter
- 8. Plotting of input and output characteristics and calculation of parameters of transistors in CE configuration.
- 9. Plotting of input and output characteristics and calculation of parameters of transistors in CB configuration.
- 10. Plotting of V-I characteristics of a FET based amplifier.
- 11. Measurement of the Q-point and observation of variation of Q-point by:
  - a. By increasing the base resistance in fixed bias circuit.
  - b. By changing out of bias resistance in potential divider circuit.
- 12. Measurement of voltage gain, input and output impedance in a single state CE amplifier circuit.

### **INSTRUCTIONAL STRATEGY**

The aim of this subject is to provide the knowledge of the fundamental concepts related to basic electronics. The teacher should give more emphasis on understanding of concepts and the measuring of various terms used in the subject. The students be made familiar with diodes, transistors, resistors, capacitors, inductors etc. and various measuring instruments such as Multi-meter, CRO, Signal generator, LCR meter, Regulated Power Supply etc. Practical exercises should be included to reinforce the various concepts. Practical applications of semiconductor diodes, transistors, field effect transistors etc must be elucidated to the students.

### **RECOMMENDED BOOKS**

1. Basic Electronics and Linear Circuit by NN Bhargava, Kulshreshta and SC Gupta, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi.
2. Principles of Electrical and Electronics Engineering by VK Mehta; S Chand and Co., New Delhi
3. Electronic Components and Materials by SM Dhir, Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi.
4. Electronics Devices and Circuits by Millman and Halkias; McGraw Hill.
5. Principles of Electronics by Albert Paul Malvino; Tata McGraw Hill Publishing Company Pvt Ltd, New Delhi.
6. Basic Electronics by J.S. Katre, Sandeep Bajaj, Tech. Max. Publications, Pune.





### SUGGESTED DISTRIBUTION OF MARKS FOR FACILITATING PAPER SETTER

<b>Sr No</b>	<b>Topic</b>	<b>Time Allotted (Hrs)</b>	<b>Marks Allotted (%)</b>
1	Semi Conductor Physics	12	20
2	Semi Conductor Diode	12	20
3	Introduction To Bipolar-Transistors	12	20
4	Transistor Biasing Circuits	6	5
5	Single Stage Transistor Amplifier	10	15
6	Field Effect Transistors	12	20
	<b>Total</b>	<b>64</b>	<b>100</b>

## 2.6 WORKSHOP PRACTICE - II

L T P

- - 6

### RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices.

This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

### DETAILED CONTENTS (PRACTICALS)

The following shops are included in the syllabus:

1. Welding Shop
2. Electronic Shop
3. Sheet Metal Shop

#### Note:

The contents of various shops prescribed under workshop Practice –I are same as that of General Workshop Practice-I which is common for most of engineering diploma programmes except for Computer Engineering and Information Technology.

The instructor is to first explain the introductory part given at the beginning under each shop followed by demonstration and practice by students.

#### 1. Welding Shop

- 1.1 Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, Electrode holder, electrodes and their specifications, welding screens and other welding related equipment and accessories.
- 1.2 Electric arc welding, (ac. and dc.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc.

Job I Practice of striking arc while using electric arc welding set.

Job II Welding practice on electric arc welding for making uniform and Straight weld beads

1.3 Various types of joints and end preparation.

Job III Preparation of butt joint by electric arc welding.

Job IV Preparation of lap joint by electric arc welding.

Job V Preparation of corner joint by using electric arc welding.

Job VI Preparation of Tee joint by electric arc welding.

## 2. Electronic Shop

2.1 Identification and familiarization with the following tools used in electronic shop:

Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Philips Screw Driver (Star Screw Driver), L- Keys, Soldering Iron and their demonstration and uses.

2.2 Identification and familiarization with the following electronic instruments:

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

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

c) Audio-oscillator having sine and square wave output

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

Job I Practice in the use of above-mentioned equipment. For this small experimental as set up may be done

2.3 Various types of protective devices such as : Wire fuse, cartridge fuse etc.

2.4 Identification and familiarization with ear phone speaker connector, telephone jacks and similar male and female connectors

2.5 Safety precautions to be observed in the electronic shop

**NOTE: Demonstration Boards for the above components should be made.**

Job II Cut, strip, join and insulate two lengths of wires/ cables (repeat with different types of cables/wires)

Job III Cut, strip, connect/solder/crimp different kinds of wires/ cables (including co-axial and shielded cable) to different types of power/general purpose/Audio Video/Telephone plugs, sockets,

jacks, terminals, binding posts, terminal strips, connectors. The tasks should include making complete recording/ playback/ antenna/ speaker leads for common electronic products such as Radio, TV, CD Players, VCD/DVD Players, Cassette Recorder and Players, Hi-Fi equipment, Hand- set, microphone

Job IV Cut, bend, tin component, Leads, inserts and solder components (resistor, capacitor, diodes, transistors, FETs, IFT coils, ICs etc) on a PCB

### 3. Sheet Metal Shop

Introduction to sheet metal shop, use of hand tools and accessories e.g. different types of hammers, hard and soft mallet, sheet and wire gauge, necessary allowance required during job fabrication, selection of material.

- 3.1 Introduction and demonstration of hand tools used in sheet metal shop.
- 3.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. Shearing Machine, Bar Folder, Burring Machine, Turning Machine, Wiring Machine, Setting Down Machine, Forming Machine , Brake etc.
- 3.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g. black-plain sheet, galvanized-iron plain sheet, galvanised corrugated sheet, aluminium sheets etc.
- 3.4 Study of various types of Nuts, Bolts, Rivets, Steel Screws etc.

Job I Shearing practice on a sheet using hand shears.

- a) Practice on making Single riveted lap joint/Double riveted lap Joint.
- b) Practice on making Single cover plate chain type, zig-zag type and single rivetted Butt Joint

### RECOMMENDED BOOKS

- 1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Chaoudhary. Media Promoters and Publishers Pvt. Ltd., Bombay
- 2. Workshop Technology by Manchanda Vol. I,II,III India Publishing House, Jalandhar.
- 3. Manual on Workshop Practice by K Venkata Reddy, KL Narayana et al; MacMillan India Ltd. New Delhi
- 4. Basic Workshop Practice Manual by T Jeyapoovan; Vikas Publishing House (P) Ltd., New Delhi
- 5. Workshop Technoogy by B.S. Raghuwanshi, Dhanpat Rai and Co., New Delhi
- 6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi

## 2.7 DESK TOP PUBLISHING (DTP) FUNDAMENTALS

(Common in Computer Engineering and Information Technology)

L T P  
- - 4

### **RATIONALE**

This course will enable the students to familiarize with the features and use of application packages such as Page Maker, Corel Draw or any other equivalent latest package(s). They will develop skills in handling the software.

Note: Since this is a practical oriented subject, there will be no theory paper. It is suggested that the teacher should explain the following topics during the practical classes itself.

### **TOPICS TO BE EXPLAINED THROUGH DEMONSTRATION**

1. Introduction  
Overview of Desk Top Publishing (DTP), Introduction of various keys in the keyboard and their functions.
2. Page Maker  
Document needs, creating a document, editing and formatting a document, saving and printing a document, inserting text and graphics, inserting columns, fonts and styles, integrating images and graphics from a drawing package in the document, making transparencies, elements, frame option, arrange text, image control, expert tracking, indent/tabs, styles, type styles, layout, tool bar (page setting)
3. Corel Draw
  - 3.1 Introduction, exploring Corel Draw screen, using dialog boxes, using roll ups, create/open file, save file, import/export files, print file
    - Use of ribbon bar, use of tool box, select object, shaping objects using zoom tool, filling objects, outline objects, use of line tool
    - Setting up new drawing, setting multi-page document, undo/redo mistakes, repeat, cut, copy, paste, delete, duplicate, clone
    - Insert object, paste special, copy attributes from select all, drawing objects, selecting objects

- Page setup, insert/delete page, use of layers, roll up, grid and scale set up, guideline set up
- 3.2 Formatting objects
- Arranging objects: align, order, group, ungroup
  - Arranging objects: combine, break apart, weld, intersection, trim, separate
  - Mode edit: to line, to curve, stretch, rotate, align, convert to curves
  - Creating special effects: Transform roll up, clear transformation, add perspective, envelope roll up
  - Creating special effects: blend roll-up, extrude roll up, counter roll up, power line, power-clip clear effects
  - Working with text: Character, paragraph text, frame, setting of tabs, indents, bullets, spacing in paragraph text

### ***LIST OF PRACTICALS***

1. Using windows explorer and other windows elements
2. Creating and opening a document in page maker
3. Formatting and editing a document
4. Saving and printing a given document
5. Insertion of text and graphics in a given document from external source
6. Using columns utility, to give the document column look
7. Using various fonts and styles to make a document more beautiful
8. Use of page maker to make transparencies
9. Saving and printing a file that has been created
10. Formatting a given file by using undo/redo, repeat, cut, copy, paste, delete, duplicate and clone utilities
11. Inserting objects in the drawing, aligning, ordering, grouping and ungrouping of those objects
12. Use of combine, break apart, weld, intersection, trim and separate tools in a given drawing
13. Use of mode edit tools i.e. to line, to curve, to stretch, and rotate
14. Creating special effects i.e. transform roll-up, envelop roll up, add perspective, extrude roll up, contour roll up, power line, power clip, clear effects
15. To insert character and paragraph text in a drawing and frame, setting of tabs, indents, bullets and spacing in paragraph text
16. Filling of text to a given path, aligning it to base line, straighten text and edit text
17. Using tools such as spell checker, and thesaurus
18. Using find and replace text utility and type assist
19. Adding various symbols to a drawing and creating different pattern

## **INSTRUCTIONAL STRATEGIES**

*This subject is completely practical oriented. Stress is to be given to impart hands on experience to the students. With this subject, the students will be able to create, edit, format and print a document with the help of page maker, corel-draw etc.*

## **RECOMMENDED BOOKS**

1. Desk Top Publishing From A to Z by Bill Grout and Osborne; McGraw Hill
2. DTP (Desk Top Publishing) for PC user by Houghton; Galgotia Publishing House Pvt. Ltd., Daryaganj, 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