2.1   ENGLISH AND COMMUNICATION SKILLS - II

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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 STATREGY

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 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 R Datta Roy and KK Dhir; Vishal Publication, Jalandhar

SUGGESTED DISTRIBUTION OF MARKS

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

GLOSSARY OF TECHNICAL & SCIENTIFIC TERMS

#	English	Hindi	Punjabi
1.	Absolute	परम, अचर, पूर्ण, स्थिर	ਪੂਰਣ
2.	Acceleration	त्वरण, प्रवेग	ਪ੍ਰਵੇਗ
3.	Acid	अम्ल	ਤੇਜਾਬ/ ਤੇਜ਼
4.	Alkaline	क्षारीय, खारा	ਖਾਰਾ
5.	Air Compressor	वायु–संपीडक	ਹਵਾ-ਦਬਾਅਕ
6.	Air Conditioning	वातानुकूलन	ਹਵਾ-ਅਨੁਕੂਲਣ
7.	Alignment	सरेखन	ਕਤਾਰਬੰਦੀ
8.	Alternating Current	प्रत्यावर्ती धारा	ਪਰਤਵੀ ਬਿਜਲੀ ਧਾਰਾ
9.	Altimeter	ऊंचाई मापने का यंत्र	ਉਚਾਈ ਮਾਪਕ
10.	Alum	फिटकरी	ਫਿਟਕਰੀ
11.	Ammeter	ऐममीटर	ਐਮਮੀਟਰ
12.	Ampere	ऐम्पियर	ਐਮਪੀਅਰ
13.	Amplification	प्रवर्धन	ਵਰਧਨ
14.	Amplitude	आयाम	ਆਯਾਮ
15.	Angle	कोण	ਕੋਣ
16.	Angular Velocity	कोणीय वेग	ਕੋਣ ਦਾ ਵੇਗ
17.	Angular Momentum	कोणीय संवेग	ਕੋਣ ਦਾ ਸੰਵੇਗ
18.	Annealing	तापानुशीतन	ਅਨੀਲੀਕਰਣ
19.	Anode	ऐनोड	ਐਨੋਡ
20.	Apex	शीर्ष, शिखर, शिखाग्र	ਸਿਰਾ, ਸਿਖਰ, ਨੋਕ
21.	Apparent	स्पष्ट	ਸਾਫ਼
22.	Applied Mechanics	अनुप्रयुक्त यांत्रिकी	ਵਿਹਾਰਕ ਯੰਤਰ-ਵਿਗਿਆਨ
23.	Applied Science	अनुप्रयुक्त विज्ञान	ਵਿਹਾਰਕ ਵਿਗਿਆਨ
24.	Archimedes Principle	आर्किमिडीज़ का सिद्धांत	ਆਰਕਿਮੀਡੀਜ਼ ਦਾ ਸਿਧਾਂਤ
25.	Architecture	वास्तुकला, स्थापत्यकला	ਇਮਾਰਤ-ਕਲਾ, ਇਮਾਰਤ ਵਿਗਿਆਨ
26.	Armature	आर्मेचर	ਆਰਮੇਚਰ
27.	Atom	परमाणु	ਪਰਮਾਣੂ
28.	Automatic	स्वचलित	ਸਵੈ-ਚਲਿਤ
29.	Axis	अक्ष	ਧੁਰਾ
30.	Axle	धुरी	ਧੁਰੀ, ਧੁਰਾ
31.	Balance (Scale)	तुला, तराजू	ਤਕੜੀ, ਤਰਾਜ਼ੂ, ਤੁਲਾ
32.	Ball Bearing	बाल–बेयरिंग	ਬਾਲ ਬੈਰਿੰਗ
33.	Bar magnet	छड़–चुम्बक	ਛੜ-ਚੁੰਬਕ
34.	Barometer	वायुदाबमापी	ਹਵਾਦਬਾਅ ਮਾਪਕ
35.	Base	आधार	ਆਧਾਰ
36.	Base Plate	आधार पट्टिका	ਆਧਾਰ ਪਲੇਟ
37.	Battery	बैटरी	ਬੈਟਰੀ
38.	Beaker	बीकर	ਬੀਕਰ
39.	Bending Moment	बंकन आघूर्ण	ਝੁਕਾਉ-ਘੁੰਮਣ
40.	Blast Furnace	झोंका भट्टी	ਝੋਂਕਾ-ਭੱਠੀ, ਬਲਾਸਟ ਭੱਠੀ
41.	Bleach	विरंजक, रंगकाट	ਰੰਗਕਾਟ
42.	Boiler	उबालक	ਉਬਾਲਕ
43.	Bridge	पुल	ਪੁੱਲ
44.	Burette	ब्यूरेट	ਬਿਊਰਟ
45.	Callipers	कैलिपर्स	ਕੈਲੀਪਰਜ਼
46.	Calorie	कैलोरी	ਕੈਲੋਰੀ
47.	Canal	नहर	ਨਹਿਰ
48.	Capacitance	धारिता	ਧਾਰਣ-ਸਮਰਥਾ
49.	Carburettor	कार्बुरेटर	ਕਾਰਬਿਊਰੇਟਰ
50.	Cast Iron	ढलवां लोहा	ਢਲਵੀ ਲੋਹਾ

	English	Hindi	Punjabi
51.	Catalyst	उत्प्रेरक	ਉਤਪ੍ਰੇਰਕ
52.	Cathode	कैथोड	ਕੈਥੋਡ
53.	Center of Gravity	गुरुत्वार्षण–केन्द्र	ਗਰੁਤਾ ਕੇਂਦਰ
54.	Centrifugal	उपकेन्द्रीय	ਅਪਕੇਂਦਰੀ
55.	Centripetal	अभिकेन्द्रीय	ਕੇਂਦਰੀ
56.	Centroid	केन्द्रीय	ਕੇਂਦਰ ਬਿੰਦੂ
57.	C.G.S. System	सी.जी.एस. पद्धति	ਸੀ.ਜੀ.ਐਸ. ਪ੍ਰਣਾਲੀ
58.	Chemical Action	रासायनिक क्रिया	ਰਸਾਇਨਿਕ ਕ੍ਰਿਆ
59.	Chain	श्रृंखला, माला	ਲੜੀ
60.	Change of State	अवस्था परिवर्तन	ਹਾਲਤਬਦਲੀ
61.	Characteristics	लक्षण	ਲੱਛਣ
62.	Charge	आवेश	ਆਵੇਸ਼
63.	Choke	चोक	ਚੋਕ
64.	Chord, Major	गुरु स्वर–संघात	ਗੁਰੂ (ਵੱਡੀ) ਸੁਰ–ਸੰਯੋਜਕ,
65.	Chord, Minor	लघु स्वर–संघात	ਲਘੂ (ਛੋਟੀ) ਸੁਰ–ਸੰਯੋਜਕ
66.	Circular	वृत्ताकार, वर्तुल	ਗੋਲਾਕਾਰ, ਗੋਲ, ਚਕਰੀ
67.	Clock-Wise	दक्षिणा वर्त	ਘੜੀ ਚੱਕਰ
68.	Coagulation	स्कंदन	ਜਸਾਉਣ ਕ੍ਰਿਆ
69.	Coefficient of Expansion	प्रसार गुणांक	ਪ੍ਸਾਰ ਗੁਣਾਂਕ
70.	Coil	कुंडली	ਕੁੰਡਲੀ
71.	Combustion	दहन	ਜਲਣ ਕ੍ਰਿਆ
72.	Compass	दिशासूचक	ਦਿਸ਼ਾਸੂਚਕ
73.	Compound	यौगिक	ਯੋਗਿਕ
74.	Concave	अवतल	ਅਵਤਲ
75.	Convex	उत्तल	ਉਤੱਲ
76.	Concentrated (Solution)	गाढा / सांद्रित (घोल)	ਗਾੜ੍ਹਾ/ਸੰਘਣਾ (ਘੋਲ)
77.	Concrete	कंक्रीट	ਕੰਕਰੀਟ
78.	Conduction	चालन	ਚਾਲਨ
79.	Conductor	चालक	ਚਾਲਕ
80.	Cone	शंकु	ਸੰਕੁ, ਕੋਨ
81.	Connection	सम्बन्ध, जोड़	ਜੋੜ, ਸੰਬੰਧ
82.	Constant (Adj.)	स्थिर, अचल, एकसमान	ਅਚਲ, ਸਥਿਰ
83.	Convection	संवहन	ਸੰਵਹਿਣ
84.	Coulomb	कूलोम (विद्युत शक्ति की इकाई)	ਕੂਲਮ (ਬਿਜਲੀ ਸਕਤੀ ਦੀ ਇਕਾਈ)
85.	Couple	बल युगम	ਬਲ ਯੁਗਮ
86.	Crane	क्रेन	ਕ੍ਰੇਨ
87.	Crystalline	रवेदार	ਰਵੇਦਾਰ, ਟੁਕੜੀਦਾਰ
88.	Dehydrate	निर्जल करना	ਜਲ ਰਹਿਤ ਕਰਨਾ
89.	Distillation	आसहन करना, आसवन	ਕੀਸਦਣਾ
90.	Effervescence	बुदबुदाहट	ਬੁਦਬੁਦਾਹਟ
91.	Element	तत्त्व, मूलतत्त्व	ਤੱਤ, ਮੂਲ ਤੱਤ
92.	Empirical Formula	मूल अनुपाती सूत्र	ਮੂਲ ਅਨੁਪਾਤੀ ਸੂਤਰ
93.	Equivalent Weight	तुल्यांकी–भार	ਤੁਲਾਂਕੀ ਭਾਰ
94.	Flame Test	ज्वाला–परीक्षण	ਲਾਟ ਪਰੀਖਣ
95.	Flash Point	प्रज्वलन–ताप	ਜਲਣ ਤਾਪਮਾਨ
96.	Flask	फलास्क	ਸੁਰਾਹੀ/ਫਲਾਸਕ
97.	Spring Balance	कमानी तुला	ਕਮਾਨੀਦਾਰ ਤੁਲਾ/ਤਕੜੀ
98.	Soluble	विलयशील	ਘੁਲਣਸ਼ੀਲ
99.	Viscosity	गाढापन	ਗਾੜ੍ਹਾਪਨ
100.	Volumetric Analysis	आयतनी विश्लेषण	ਆਇਤਨੀ ਵਿਸ਼ਲੇਸ਼ਣ

2.2   APPLIED MATHEMATICS - II

L T P
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.   Algebra   (10 hrs)

1.1   Determinants: Elementary properties of determinants up to 3rd order, consistency of equations, Crammer'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 $\lim_{x \to a} \dfrac{x^n - a^n}{x - a}$,

$\lim_{x \to 0} \dfrac{\sin x}{x}$, $\lim_{x \to 0} \dfrac{a^x - 1}{x}$, $\lim_{x \to 0} (1+x)^{1/x}$

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)-

   Evaluation of $\int_{0}^{\pi/2} \sin^n x \, dx$, $\int_{0}^{\pi/2} \cos^n x \, dx$, $\int_{0}^{\pi/2} \sin^m x \, \cos^n x \, dx$

   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. Patparganl, New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

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

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   Simlpe 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 Conducter's

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

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 Sheeetal Kumar, Cengage   Learning India Pvt. Ltd. Patparganj, Delhi (year 2008)

Suggested Distribution of Marks for Facilitating Paper Setter

Sr No	Topic	Time Allotted (Hrs)	Marks Allotted (%)
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
	Total	**64**	**100**

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(ΔG) 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, germen 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), soapanification 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, Balkelite, 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 spectrophotometerically.
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 $FeCl_3$ 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

2.5 BASICS OF INFORMATION TECHNOLOGY

L T P
- - 4

RATIONALE

Information technology has great influence on all aspects of life. Primary purpose of using computer is to make the life easier. Almost all work places and living environment are being computerized. The subject introduces the fundamentals of computer system for using various hardware and software components. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concept of information technology and its scope; operating a computer; use of various tools of MS office; using internet etc. form the broad competency profile of diploma holders. This exposure will enable the students to enter their professions with confidence, live in a harmonious way and contribute to the productivity.

Note:

Explanation of Introductory part should be dovetailed with practical work. Following topics may be explained in the laboratory along with the practical exercises. There will not be any theory examination.

TOPICS TO BE EXPLAINED THROUGH DEMONSTRATION

1.   Information Technology – its concept and scope, applications of IT, impact of computer and IT in society.

2.   Computers for information storage, information seeking, information processing and information transmission

3.   Computer Application in office, book publishing, data analysis, accounting, investment, inventory control, graphics, Air and Railway Ticket reservation, robotics, Military, banks, Insurance financial transactions and many more

4.   Elements of computer system, computer hardware and software; data types – numeric data, alpha numeric data; contents of a program, processing

5.   Computer organization, block diagram of a computer, CPU, memory

6.   Input devices; keyboard, Scanner, mouse etc; output devices; VDU and Printer, Plotter

7.   Electrical requirements, inter-connections between units, connectors and cables

8.   Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD), primary and secondary memory: RAM, ROM, PROM etc., Capacity; device controllers, serial port, parallel port, system bus

9.   Installation concept and precautions to be observed while installing the system and software

10.   Introduction about Operating Systems such as MS DOS, Windows, Windows NT etc. as an interface to Computer System

11.   Special features, various commands of MS word and MS-Excel, MS PowerPoint

12.   About the internet – server types, connectivity (TCP/IP, shell); applications of internet like: e-mail and browsing

13.   Various Browsers like Internet explorer, Mozilla Fire fox, WWW (World wide web); hyperlinks; HTTP (Hyper Text Transfer Protocol); FTP (File Transfer Protocol)

14. Basics of Networking – LAN, WAN, Topologies
15. Ethics and information Technology
16. Future with information Technology

LIST OF PRACTICALS

1. *Given a PC, name its various components and peripherals. List their functions*
2. Practice in installing a computer system by giving connection and loading the system software and application software
3. Exercises on entering text and data (Typing Practice)
4. Installation of operating System viz. Windows XP, Windows 2007 etc..

   Features of Windows as an operating system

   - Start
   - Shutdown and restore
   - Creating and operating on the icons
   - Opening closing and sizing the windows
   - Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file
   - Creating and operating on a folder
   - Changing setting like, date, time, colour (back ground and fore ground)
   - Using short cuts
   - Using on line help

5. MS-Word
   - File Management:
   - Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file
   - Page Set up:
   - Setting margins, tab setting, ruler, indenting
   - Editing a document:
   - Entering text, Cut, copy, paste using tool- bars
   - Formatting a document:
   - Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
   - Aligning of text in a document, justification of document ,Inserting bullets and numbering
   - Formatting paragraph, inserting page breaks and column breaks, line spacing
   - Use of headers, footers: Inserting footnote, end note, use of comments
   - Inserting date, time, special symbols, importing graphic images, drawing tools
   - Tables and Borders:

- Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
- Print preview, zoom, page set up, printing options
- Using Find, Replace options
- Using Tools like:
- Spell checker, help, use of macros, mail merge, thesaurus word content and statistics, printing envelops and lables
- Using shapes and drawing toolbar,
- Working with more than one window in MS Word,
- How to change the version of the document from one window OS to another
- Conversion between different text editors, software and MS word

6.   MS-Excel

- Starting excel, open worksheet, enter, edit, data, formulae to calculate values, format data, create chart, printing chart, save worksheet, switching between different spread sheets
- Menu commands:
    - Create, format charts, organise, manage data, solving problem by analyzing data, exchange with other applications. Programming with MS-Excel, getting information while working
- Work books:
    - Managing workbooks (create, open, close, save), working in work books, selecting the cells, choosing commands, data entry techniques, formula creation and links, controlling calculations, working with arrays
- Editing a worksheet, copying, moving cells, pasting, inserting, deletion cells, rows, columns, find and replace text, numbers of cells, formatting worksheet
- Creating a chart:
    - Working with chart types, changing data in chart, formatting a chart, use chart to analyze data
- Using a list to organize data, sorting and filtering data in list
- Retrieve data with query: Create a pivot table, customising a pivot table. Statistical analysis of data
- Exchange data with other application: embedding objects, linking to other applications, import, export document.

7.   MS PowerPoint

a)   Introduction to PowerPoint

- How to start PowerPoint
- Working environment: concept of toolbars, slide layout, templates etc.
- Opening a new/existing presentation
- Different views for viewing slides in a presentation: normal, slide sorter etc.

b)   Addition, deletion and saving of slides

c)   Insertion of multimedia elements

- Adding text boxes
- Adding/importing pictures
- Adding movies and sound
- Adding tables and charts etc.
- Adding organizational chart

d) Formatting slides
- Using slide master
- Text formatting
- Changing slide layout
- Changing slide colour scheme
- Changing background
- Applying design template

e) How to view the slide show?
- Viewing the presentation using slide navigator
- Slide transition
- Animation effects etc.

8. Working with MS Access
a) Understanding different data types
b) Creation of table
c) Entering data in a table and modify it.
d) Creating simple Queries

9. Internet and its Applications
a) Log-in to internet
b) Navigation for information seeking on internet
c) Browsing and down loading of information from internet
d) Sending and receiving e-mail
- Creating a message
- Creating an address book
- Attaching a file with e-mail message
- Receiving a message
- Deleting a message

INSTRUCTIONAL STRATEGY

Since this subject is practice oriented, the teacher should demonstrate the capabilities of computers to students while doing practical exercises. The students should be made familiar with computer parts, peripherals, connections and proficient in making use of MS office, MS Excel, MS Power Point and MS Access in addition to working on internet. The student should be made capable of working on computers independently

RECOMMENDED BOOKS

1. Fundamentals of Computer by V Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi

2. Information Technology for Management by Henery Lucas, 7th edition, Tata Mc Graw Hills, New Delhi

3. Computers Fundamentals Architecture and Organisation by B Ram, revised Edition, New Age International Publishers, New Delhi

4. Computers Today by SK Basandara, Galgotia publication Pvt ltd. Daryaganj, New Delhi.

5. MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi

6. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

7. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

8. Mastering Windows 95, BPB Publication, New Delhi

9. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi

10. Fundamentals of Information Technology by Leon and Leon;Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi

11. On Your Marks - Net…Set…Go… Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi

12. Learning MS Office XP by Ramesh Bangia, Khanna Book Publishing Co. (P) Ltd., New Delhi.

13. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

2.6   ENGINEERING DRAWING - II

L T P
- - 5

RATIONALE

Drawing is the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The subject is aimed at developing basic graphic skills in the students so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation. The emphasis, while imparting instructions, should be to develop conceptual skills in the students following BIS SP 46 – 1988.

Note:

1)   First angle projection is to be followed
2)   Minimum 15 sheets to be prepared
3)   BIS Code 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
5)   20 percent of drawing sheets to be prepared on the third angle projection
6)   Punjab State Board of Technical Education, may recommend any of the CAD software viz. Solid Works, Pro Engineer, CATIA, NX, Inventor-AutoCAD etc.
7)   The State Directorate of Technical Education may allocate funds for the purchase of computer systems and CAD software for drawing classes.
8)   Continuous evaluation be done by the teachers for exercises/work done on CAD software. For this proper record may be maintained for its inclusion in the internal assessment**.**

DETAILED CONTENTS

1.   Detail and Assembly Drawing   (01 sheets)

   1.1.   Principle and utility of detail and assembly drawings
   1.2.   Introduction to CAD Software
   1.3.   Practical exercise on drawing from detail to assembly or vice versa using wooden joints as example with CAD Software

2.   Threads   (Min.02 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, Acme, Knuckle, Metric, Seller and Buttress thread
   2.3   Simplified conventions of left hand and right hand threads, both external and internal threads
   2.4   Draw at least one sheet using CAD Software

3.   Nuts and Bolts   (Min.02 sheets)

   3.1   Different views of hexagonal and square headed bolts and nuts
   3.2   Assembly of nuts and bolts with washers
   3.3   Draw at least one sheet using CAD Software

4. Locking Devices   (01 sheet)

    4.1   Lock nuts, Castle nuts, Sawn nuts, Split pin lock nut
    4.2   Spring washers, Locking plates.
    4.3   Draw different locking devices using CAD Software

5.   Screws, Studs and Washers   (01 sheet)

    5.1   Drawing various types of machine screws
    5.2   Drawing various types of studs
    5.3   Drawing various types of washers
    5.4   Redraw the above sheet using CAD Software

6.   Keys and Cotters   (Min.03 sheets)

    6.1   Various types of keys and their application. Preparation of drawings of various keys   and cotters
    6.2   Various types of joints (a) Sleeve and Cotter joint (b) Kunckle joint (c) Spigot and Socket joint
    6.3   Draw any one joint using CAD Software

7.   Rivets and Rivetted Joints   (02 sheets)

    7.1   Types of general purpose rivet heads
    7.2   Types of rivetted joints - lap, butt (single cover plate and double cover plate), chain and zig-zag riveting.
    7.3   Caulking and fullering of rivetted joints.
    7.4   Draw any one type of rivetted joint using CAD Software

Instructional Strategy

The teachers teaching Engineering Drawing should first demonstrate then assist the students to prepare drawing sheets. The student should also be encouraged and motivated to learn CAD software at the earliest and do the given exercises.

RECOMMENDED BOOKS

1. A Text Book of Engineering Drawing by Surjit Singh, Dhanpat Rai & Co., New Delhi

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

3. Elementary Engineering Drawing in First Angle Projection by ND Bhatt, Charotar Publishing House

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

5. AutoCAD 2010: For Engineers & Designers by Prof. Sham Tickoo & D. Sarvanan, Wiley India Pvt. Ltd., Delhi

6. CATIA for Beginners by Prof. Sham Tickoo, Wiley India Pvt. Ltd., Delhi

7. CATIA for Engineers and Designers by Prof. Sham Tickoo, Wiley India Pvt. Ltd., Delhi

8. Pro/Engineer Wildfire 5.0 for Engineers and Designers by Prof. Sham Tickoo, Wiley India Pvt. Ltd.,Delhi.
9. NX 6: For Engineers and Designers by Prof. Sham Tickoo, Wiley India Pvt. Ltd., Delhi.
10. Solidworks 2009: The Basics by David C. Planchard, Schroof Development Corporation, Post Box 1334, Mission KS 66222, USA.
11. Solidworks 2010 for Engineers and Designers, Prof. Sham Tickoo, Wiley India Pvt. Ltd, Delhi

2.7   GENERAL WORKSHOP PRACTICE - II

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RATIONALE

As we know that, the psychomotor skills are mastered through practice, an opportunity therefore, has been extended to students through this course to refine their skills in different trades. The basic skills developed during first semester will be refined during this course by doing higher order skills jobs. In addition to developing general manual and machining skills in the students, the objective of development of sense of dignity of labour, precision, safety at work places, team working and right attitude among the students will also be met.

DETAILED CONTENTS (PRACTICALS)

The following shops are included in the syllabus. Student can opt relevant shops depending upon the need of his/her branch of diploma programme :

1.   Carpentry and painting shop-II
2.   Fitting shop -II
3.   Welding shop -II
4.   Electric shop -II
5.   Smithy shop –II or Electronic shop-II
6.   Sheet Metal Shop –II

Note:
1.   The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Mechanical (RAC), Production and Industrial Engineering will do **Smithy Shop -II** instead of Electronic shop- II

and

2.   The branches e.g. Electronics and Communication Engineering, Electronics (with Specialization in Microprocessor), will do **Electronic shop- II** instead of Smithy Shop-II

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

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 Tenon saw, method of sharpening various saws.
1.3   Demonstration of job on Band Saw and Circular Saw, Chain and Chisel, Universal wood working machine, Saw re-sharpening machine, Saw Brazing unit.
1.4   Importance and need of polishing wooden items, Introduction to polishing materials.
Job V   Preparation of surface before polishing including prime coat.
Job VI Polishing on wooden items.

2   Fitting Shop – II

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

2.2   Description and demonstration of various types of drills, taps and dies Selection of dyes for threading, selection of drills and taps for tapping operations.
Job I   Making internal and external threads on a job by tapping and dieing operations (manually)

2.3   Precautions while drilling soft metals, e.g. Copper, Brass, Aluminium etc.
Job II   Drilling practice on soft metals (Aluminum, Brass and Copper)

2.4   Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count.
Job III Peparation of a job by filing on non- ferrous metal up to an accuracy of $\pm$ 0.1mm
Job IV Preparation of job involving thread on GI pipe/ PVC pipe and   fixing of different types of elbow, tee, union, socket, stopcock, taps, etc

3.   Welding Shop – II

3.1   Introduction to gas welding, spot welding and seam welding and machinery and equipment used.   Adjustments of different types of flames in gas welding, demonstration and precautions about handling welding equipment.

Job I   Practice in handling gas welding equipment (Low pressure and High pressure) and welding practice on simple jobs.

3.2   Common welding joints generally made by gas welding.

Job II   Preparation Butt joint by gas welding.

Job III Preparation of small cot frame from conduit pipe by electric arc welding/gas welding.

Job IV   Preparation of square pyramid from MS rods by welding (type of welding to be decided by students themselves).

Job V   Exercise of preparing a job on spot/seam welding machine.

4   Electric Shop – II

4.1   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.

Estimating and costing of power connection.

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 series lamp) location of faults with a multimeter) and their rectification in simple machines and/or other electric circuits fitted with earthing.

Demonstration of dismantling, servicing and reassembling a table fan/ceiling fan/air cooler/mixer/electric iron, Electric heater, geyser, electric oven, air conditioner etc.

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

Job V Testing Single phase/three phase electrical motor by using voltmeters, ammeter, clip on meter, tachometer etc.

Job VI Reversing the rotation of a motor.

5. Smithy Shop – II

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

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

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

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

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

Job IV To forge a single/double ended spanner.

Job V To prepare a job involving drawing down process

OR

6. Electronic Shop- II

6.1 Demonstrate the jointing methods. mounting and dismantling as well as uses of the items mentioned below:

a) Various types of single, multi-cored insulated screened power, audio video, co-axial, general purpose wires/cables

b) Various types of plugs, sockets connectors suitable for general purpose audio and video use, 2 and 3 pin mains plug and sockets.

Banana-plugs, and sockets, BNG, RCA, DIN, UHF, Ear phone speaker connector, telephone jacks and similar male and female connectors and terminal strips.

c) Various types of switches such as: normal/ miniature toggle, slide, push button, piano key, rotary, micro switches, SPST, SPDT, DPST, DPDT, band selector, multi way Master Mains Switch.

d) Various types of protective devices such as : Wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, thermal fuse, single/multiple circuit breakers, over and under current relays.

6.2 Identification and familiarisation with active and passive components; colour code and types of resistor, capacitors and potentiometers (including VDR, LDR, and thermistor). Identification of components including LED, LCD, UJT, FET, Coils, relays, switches (SPDT, DPDT, etc.) connectors, micro switches, read relays, transformers (mains, audio and RF, etc) Linear and Digital ICs, Thyristors, etc.

6.3 Demonstrate the following:

1) To make perfect solder joints and soldering on PCBs
2) To remove components/wires by unsoldering.
3) To assemble components on boards, chassis, tape strips.
4) Various laying methods of cables
5) Exposure to modern soldering and de-soldering processes
6) Field visits to relevant work-places

Job I	De-solder, remove and clean all the components, wires from a given equipment, a PCB or a tap strip using the following:
Job II	Soldering Iron
Job III	Temperature Control Soldering Iron
Job IV	De-soldering Pump
Job V	De-soldering Strip
Job VI	Wiring of a small circuit on a PCB/tag strip involving lacking, sleeving and use of identifier tags

6. Sheet Metal Shop-II

6.1 Introduction to various metal forming processes e.g. Spinning, Punching, Blanking, cup drawing

6.2 Introduction to soldering and brazing.

6.3 Introduction to metal spinning process.

Job I Preparation of job involving shearing, circular shearing, rolling, folding, beading and soldering process e.g. Funnel or any other job involving above operations.

Job II Exercise on job involving brazing process

Job III Spinning a bowl/cup/saucer

Job IV Visit to a sheet metal industry e.g. coach builders etc.

RECOMMENDED BOOKS

1. Workshop Technology I,II,III, by S K Hajra, Choudhary and A K Choudhary. 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; 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

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