

RATIONALE

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

DETAILED CONTENTS

1.	Facets of Literature	(14 hrs)
	1.1 Short stories	
	1.1.1 The Portrait of a Lady - Khushwant Singh	
	1.1.2 The Doll's House – Katherine Mansfield	
	1.1.3 The Refugees – Pearl S. Buck	
	1.2 Prose	
	1.2.1 Walking Tours – R.L. Stevenson	
	1.2.2 A Dialogue on Civilization – C.E.M. Joad	
	1.2.3 The Sign of Red Cross – Horace Shipp	
	1.3 Poems	
	1.3.1 All The World's A Stage – W. Shakespeare	
	1.3.2 Say Not, The Struggle Nought Availeth – A.H. Clough	
	1.3.3 Pipa's Song – Robert Browning	
2.	The Art of Précis Writing	(04 hrs)
3.	Grammar and Usage	(08 hrs)
	3.1 Narration	
	3.2 Voice	
	3.3 Idioms and Phrases	
4.	Correspondence	(04 hrs)
	4.1 Business Letters	
	4.2 Personal letters	
5.	Drafting	(06 hrs)
	5.1 Report Writing	
	5.2 Inspection Notes	
	5.3 Memos, Circulars and Notes	
	5.4 Notices	
	5.5 Press Release	
	5.6 Agenda and Minutes of Meetings	

- 5.7 Applying for a Job: Forwarding letter, Resume/C.V., follow up.
6. Glossary of Technical & Scientific Terms (04 hrs)
7. Communication (08 hrs)
- 7.1 Media and Modes of Communication
- 7.2 Channels of Communication
- 7.3 Barriers to Communication
- 7.4 Listening Skills
- 7.5 Body language
- 7.6 Humour in Communication

LIST OF PRACTICALS

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

Note:

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

RECOMMENDED BOOKS

1. English and Communication Skills, Book-I By Kuldip Jaidka, Alwinder Dhillon and Parmod Kumar Singla, Prescribed by NITTTR, Chandigarh Published By Abhishek Publication, 57-59, Sector-17, Chandigarh
2. Rich Vocabulary Made Easy by Kuldip Jaidka, Mohindra Capital Publishers, Chandigarh
3. Spoken English (2nd Edition) by V Sasikumar & PV Dhamija; Published by Tata MC Graw Hills, New Delhi.
4. Spoken English by MC Sreevalsan; Published by M/S Vikas Publishing House Pvt. Ltd; New Delhi.
5. Spoken English –A foundation course (Part-I & Part-II) By Kamlesh Sdanand & Susheela Punitha; Published by Orient BlackSwan, Hyderabad
6. Practical Course in English Pronunciation by J Sethi, Kamlesh Sadanand & DV Jindal; Published by PHI Learning Pvt. Ltd; New Delhi.
7. A Practical Course in Spoken English by JK Gangal; Published by PHI Learning Pvt. Ltd; New Delhi.

8. English Grammar, Composition and Usage by NK Aggarwal and FT Wood; Published by Macmillan Publishers India Ltd; New Delhi.
9. Business Correspondence & Report writing (4th Edition) by RC Sharma and Krishna Mohan; Published by Tata MC Graw Hills, New Delhi.
10. Business Communication by Urmila Rani & SM Rai; Published by Himalaya Publishing House, Mumbai.
11. Business Communication Skills by Varinder Kumar, Bodh Raj & NP Manocha; Published by Kalyani Publisher, New Delhi.
12. Professional Communication by Kavita Tyagi & Padma Misra; Published by PHI Learning Pvt. Ltd; New Delhi.
13. Business Communication and Personality Development by Bsiwajit Das and Ipseeta Satpathy; Published by Excel Books, Delhi
14. Succeeding Through Communication by Subhash Jagota; Published by Excel Books, Delhi
15. Communication Skills for professionals by Nira Konar; Published by PHI Learning Pvt. Ltd; New Delhi.
16. Developing Communication Skills (2nd Edition) by Krishna Mohan & Meera Banerji; Published by Macmillan Publishers India Ltd; New Delhi.
17. Effective Technical Communication By M .Ashraf Rizwi; Published by Tata MC Graw Hills, New Delhi.
18. Basic Communication Skills for Technology by Andrea J Rutherford; Published by Pearson Education, New Delhi
19. English & Communication Skills for students of Science & Engineering by SP Dhanavel; Published by Orient BlackSwan, Hyderabad.
20. Technical Communication- Principles & Practices by Meenakshi Raman & Sangeetha Sharma; Published by Oxford University Press, New Delhi.
21. Technical English by S. Devaki Reddy & Shreesh Chaudhary; Published by Macmillan Publishers India Ltd; New Delhi.
22. Advanced Technical Communication, by Kavita Tyagi & Padma Misra; Published by PHI Learning Pvt. Ltd; New Delhi.
23. Communication Skills for Engineer & Scientist by Sangeeta Sharma & Binod Mishra; Published by PHI Learning Pvt. Ltd; New Delhi.

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	14	30
2	4	10
3	8	10
4	4	10
5	6	10
6	4	10
7	8	20
Total	48	100

GLOSSARY OF TECHNICAL AND SCIENTIFIC TERMS

1. Absolute	پرم، اچر، پورن، سثئر	مکمل - ساکن
2. Acceleration	تھررر، پھرررر	حرکت
3. Acid	املل	عمل - تیز آب
4. Alkaline	کھاری، کھارا	کھارا
5. Air Compressor	واؤ-سंपीडक	ہوا کے دباؤ - ایرکمپریسر
6. Air Conditioning	واطانुकूलन	ایئرکنڈیشن
7. Alignment	سرررر	ایک لائن میں ایک سیدھ میں
8. Alternating Current	پھررررررررررررررررررر	تعبیدل کرنٹ - لے سی کرنٹ
9. Altimeter	ऊंचाई मापने का यंत्र	اُونچائی ماپنے کا آلہ
10. Alum	فٹکری	پھٹکری
11. Ammeter	अमीटर	بجلی کا کرنٹ ماپنے کا آلہ - ایلمیٹریٹر
12. Ampere	ऐम्पियर	بجلی کی طاقت کو ماپنے کی اکائی - ایمپیر
13. Amplication	प्रवर्धन	پرو و دھن - ایمپلیکیشن
14. Amplitude	आयाम	ایام - ایمپلسٹی چیوڈ
15. Angle	कोण	واؤنر - کون
16. Angular velocity	कोणीय वेग	کوئیے وگ
17. Angular Momentum	कोणीय संवेग	کوئیے سٹوگ
18. Annealing	तापानुशीतन	تاپ ارنشٹن - اٹی لنگ
19. Anode	अनोड	انوڈ
20. Apex	शीर्ष, शिखर, शिखाग्र	اُونچائی - سب سے اُونچا
21. Apparent	स्पष्ट	صاف
22. Applied mechanics	अनुप्रयुक्त यंत्रिकी	اُونرریکت آلہ - اُپلایڈ میکینک
23. Applied Science	अनुप्रयुक्त विज्ञान	اُونرریکت سائنس - اُپلایڈ سائنس
24. Archimedes's Principle	आर्किमिडीज का सिद्धांत	آرک میڈیز کا اصول
25. Architecture	वास्तुकला, स्थापत्यकला	تعمیراتی سائنس - تعمیراتی کلا
26. Armature	आर्मेचर	آرمچر
27. Atom	परमाणु	ایم
28. Automatic	स्वचलित	اپنے آپ چلنے والا
29. Axis	अक्ष	اکش
30. Axle	धुरी	دھرا - ایکسل

31. Balance (Scale)	تुला، ترازو	ترازو
32. Ball Bearing	بال-بیرنگ	بال بیرنگ
33. Bar magnet	छड़-चुम्बक	بمقنا قیس کا ٹکڑا
34. Barometer	वायुदाबमापी	دباؤ کا دباؤ ماپنے کا آلہ۔ بیردمیٹر
35. Base	आधार	بنیادی
36. Base Plate	आधार पट्टिका	بنیادی پلیٹ۔ آویار پٹکا۔ بیس پلیٹ
37. Battery	बैटरी	بیٹری
38. Beaker	बीकर	بی کپ
39. Bending Moment	वंकन आधूर्ण	بندنگ مومنت (بھکنے کی شکتی) طاقت) چپک
40. Blast Furnace	झोंका भट्टी	بلاسٹ فرنس۔ بلاسٹ بھٹی
41. Bleach	विरंजक	بلیچ۔ ڈرنجنگ
42. Boiler	उबालक	بوایلر۔ ابالنے والا۔ آبالک
43. Bridge	पुल	پل
44. Burette	ब्यूरेट	بیوریٹ۔ بیوریٹری میں استعمال ہونے والی شیشے کی نالی
45. Callipers	कैलिपर्स	کیلیپرس
46. Calorie	कैलोरी	کیلو ریٹ۔ حرارت کی طاقت ماپنے کی یونٹ
47. Canal	नहर	نہر
48. Capacitance	धारिता	کے پے سی ٹنس۔ دیار تار
49. Carburettor	कार्बुरेटर	کاربوریٹر
50. Cast Iron	ढलवा लोहा	کچی لوہا۔ کاسٹ آئرن
51. Catalyst	उत्प्रेरक	آنت پریرک
52. Cathode	कैथोड	کے کٹھوڈ
53. Centre of Gravity	गुरुत्वाकर्षण-केन्द्र	دھرتی کی طاقت کا مرکز
54. Centrifugal	उपकेन्द्रीय	مرکزت دور کرنے والا۔ آپ کینڈریہ
55. Centripetal	अभिकेन्द्रीय	مرکز کی طرف لائے والا۔ ابھی کینڈریہ
56. Centroid	केन्द्रीय	مرکز
57. C.G.S. System	सी.जी.एस. पद्धति	سی جی ایس سسٹم
58. Chemical Action	रासायनिक क्रिया	تیزابی نتیجہ
59. Chain	श्रृंखला, माला	سلسلہ۔ مالا
60. Change of State	अवस्था परिवर्तन	تبدیلی حالات
61. Characteristics	लक्षण	آثار۔ خوبیاں
62. Charge (n)	आवेश	آویس۔ چارج بھرن
63. Choke	चोक	چوک۔ بجلی کی ٹوب کو چھٹے کیلے لگا یا جانے والا پرزہ
64. Chord, Major	गुरु स्वर-संघात	کارڈ میجر۔ ٹورڈ سونگھات
65. Chord, Minor	लघु स्वर-संघात	کارڈ مینور۔ چھوٹا سونگھات
66. Circular	वृत्ताकार, वर्तुल	سرکولر۔ درتاکار۔ ڈرزل۔ باہر سے جانے والا

67. Clock-wise	دکھنا ورت	دائے بائیں چلنے والا۔ دکن ورت کلاک وائیز
68. Coagulation	سکندن	کوآولیشن۔ سکند
69. Coefficient of Expansion	پراسار گونا گوں	کو ایفیشنٹ آف ایکشن۔ پراسارنگ۔ نمبر پیلے نمبر کے لگایا گیا نمبر
70. Coil	کونڈلی	کو ایل۔ کٹڈلی۔
71. Combustion	دھن	دھن۔
72. Compass	دیشا سچک	کمپاس۔ اطراف بتانے والا آلہ۔ دشا سوچک۔
73. Compound	یوگیک	کمپاؤنڈ۔ یوگیک۔
74. Concave	اوتل	کن ویا۔ اوتل۔
75. Convex	اوتل	کن ویکس۔ اوتل۔
76. Concentrated (Solution)	(گاڈا، ساڈریت (غول)	گاڈھا مشرب۔ گھول۔ سویوشن
77. Concrete	کونکریٹ	کنکریٹ۔ پتھر کا۔
78. Conduction	چالان	کنڈکشن۔ چالان۔
79. Conductor	چالک	کنڈکٹر۔ چلانے والا۔
80. Cone	شंकو	کون۔ شنگو۔
81. Connection	سمنبند، جوڈ	جوڑ۔ تعلق۔
82. Constant (Adj.)	سٹیر، اوتل، اکتسماں	کھڑا۔ ساکن۔ اچل۔
83. Convection	سمنهون	کنوئشن۔ سزا ہونا۔ زور ہونا۔ وزن نہ ہونا بات میں
84. Coulomb	کولوم (ویدھت شکتی کی ایکاہ)	طاقت کی اکائی۔
85. Couple	بل یوگم	کپل۔ بل یوگم۔ طاقت یوگم
86. Crane	کرن	کرین۔ وزن اٹھانے والی مشین
87. Crystalline	رکھدار	روسے دار کرٹلائن۔
88. Dehydrate	نیرجل کرنا	بنیر پانی کے ہونا۔
89. Distil	آسھن کرنا	عرق نکالنا
90. Effervescence	بودبواہٹ	بڈ بڈاہٹ
91. Element	تتل، مولتتل	ایلی مینٹ۔ بلب میں چلنے والی تار۔ تو
92. Empirical Formula	مول انوپاتی سٹر	بنیادی انوپاتی سٹر۔
93. Equivalent Weight	تولیاں کو۔ ہار	ہم وزن۔ برابر وزن کا۔
94. Flame Test	جواہا۔ پریکشن	فلیم ٹیسٹ۔ آگ کے شعلہ کا ٹیسٹ۔
95. Flash Point	پرجولن۔ تاپ	فلش پوائنٹ۔ آگ کی گرمی
96. Flask	فلاسک	فلاسک۔ پانی کو گرم یا ٹھنڈا رکھنے والی بوتل۔
97. Spring Balance	کمانی تول	سپرنگ ہار ترازو۔
98. Soluble	وکیل یوشیل	وٹے شیل۔ سو ایل۔
99. Viscosity	گاڈاپن	گاڈاپن
100. Volumetric Analysis	آیاتنی ویشلےشن	ایلی میٹریک موآنزہ / مقابہ

RATIONALE

Applied mathematics forms the backbone of engineering students. Basic elements of Differential calculus and integral calculus and statistics have been included in this course. This will develop analytical abilities to apply in engineering field and will provide continuing educational base to the students.

DETAILED CONTENTS

1. Differential Calculus (30 hrs)
 - 1.1 Definition of function; Concept of limits.
 Four standard limits $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$,
 $\lim_{x \rightarrow 0} \frac{\sin x}{x}$, $\lim_{x \rightarrow 0} \frac{a^x - 1}{x}$, $\lim_{x \rightarrow 0} (1+x)^{1/x}$
 - 1.2 Differentiation by definition of x^n , $\sin x$, $\cos x$, $\tan x$, e^x , $\log_a x$ only
 - 1.3 Differentiation of sum, product and quotient of functions. Differentiation of function of a function.
 - 1.4 Differentiation of trigonometric inverse functions . Logarithmic differentiation. Exponential differentiation Successive differentiation (excluding nth order).
 - 1.5 Applications:
 - (a) Maxima and minima
 - (b) Equation of tangent and normal to a curve (for explicit functions only) – Simple problems only

2. Integral Calculus (30 hrs)
 - 2.1 Integration as inverse operation of differentiation
 - 2.2 Simple integration by substitution, by parts and by partial fractions (for linear factors only)
 - 2.3 Evaluation of definite integrals (simple problems)-
 Evaluation of $\int_0^{\pi/2} \sin^n x \cdot dx$, $\int_0^{\pi/2} \cos^n x \cdot dx$, $\int_0^{\pi/2} \sin^m x \cdot \cos^n x \cdot dx$
 using formulae without proof (m and n being positive integers only)

- 3 Ordinary Differential Equations (10 hrs)
 - 3.1. Definition and formation of Differential Equations
 - 3.2. Solution of first order Differential Equations of the type:
 - (i) Variable separable form
 - (ii) Homogeneous Differential Equations
 - (iii) Linear Differential Equations

4. Statistics (10 hrs)
 - 4.1 Measures of Central Tendency: Mean, Median, Mode
 - 4.2 Measures of Dispersion: Mean deviation, Standard deviation

RECOMMENDED BOOKS

1. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi.
2. Applied Mathematics –II by Dr. Sunita Rani Jain, Abhishek Publishers, Chandigarh

3. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
4. Applied Mathematics by Dr. RD Sharma
5. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar
6. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
7. Engineering Mathematics by Dass Gupta
8. Engineering Mathematics by C Dass Chawla, Asian Publishers, New Delhi
9. Comprehensive Mathematics, Vol. I & II by Laxmi Publications
10. Engineering Mathematics, Vol I, II & III by V Sundaram et.al, Vikas Publishing House (P) Ltd., New Delhi
10. Engineering Mathematics by N.Ch.S.N Iyengar et.al, Vikas Publishing House (P) Ltd., New Delhi
11. Engineering Mathematics, Vol I & II by SS Sastry, Prentice Hall of India Pvt. Ltd.,
12. Engineering Mathematics, Vol I & II by AK Gupta, Macmillan India Ltd., New Delhi

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	30	35
2	30	40
3	10	10
4	10	15
Total	80	100

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 (10 hrs)
 - 1.1 Review of basic optics laws: reflection and refraction
 - 1.2 Refraction and refractive index, image formation in lenses, image magnification, lens formulae (thin lens only), power of lens, total internal reflection and their applications
 - 1.3 Simple and compound microscope, astronomical telescope, magnifying power and its calculation (in each case), Terrestrial and Galileo's telescope (Concept only) and their applications
2. Electrostatics (12 hrs)
 - 2.1 Coulombs law, unit of charge, electric potential and electric potential difference
 - 2.2 Electric field, electric field intensity, electric lines of force, electric flux Gauss's Law
 - 2.3 Applications of Gauss law in finding electric field of point charge, straight charged conductor, plane charged sheet and between two plane parallel charged sheets
 - 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 Application of electrostatics in electrostatic precipitator
3. DC Circuits (12 hrs)
 - 3.1 Concept of electricity, current and its units, direct and alternating current, voltage, resistance, potential difference and e.m.f,
 - 3.2 Ohm's law and its applications, concept of resistance, conductance, specific resistance, effect of temperature on resistance, co-efficient of resistance, series and parallel combination of resistors, introduction to super conductivity.
 - 3.3 Kirchoff's laws, Wheatstone bridge principle and its applications (Slide Wire Bridge)
 - 3.4 Heating effect of current and concept of electric power, energy and their units, related numerical problems
 - 3.5 Application of electricity in various equipments, advantages of electrical energy over other forms of energy
4. Electromagnetism (13 hrs)
 - 4.1 Magnetic field and its units, magnetic intensity, magnetic lines of force, magnetic flux and their units, Right hand thumb rule, magnetic lines of force due to straight conductor, circular coil and solenoid
 - 4.2 Force on a charge, moving in a uniform magnetic field (Lorentz force). Force on a current carrying straight conductor. Torque on a current carrying rectangular coil.
 - 4.3 Moving coil galvanometer conductor, its principle, construction and working, conversion of a galvanometer into ammeter and voltmeter.
 - 4.4 Electromagnetic induction, Faradays Laws, Lenz's Law.
 - 4.5 Applications of Electromagnetism
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 Electro magnetic spectrum, photo electric effect and work function, X rays - properties, production and their applications in medicine and industries.
- 6.2 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
- 6.3 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. Conversion of Galvanometer into an Ammeter of given range.
4. Conversion of Galvanometer into Voltmeter of given range.
5. To verify ohm's laws by drawing a graph between voltage and current.
6. To verify laws of resistances in series and in parallel connection.
7. To find resistance of galvanometer by half deflection method
8. To measure very low resistance and very high resistance using Wheat Stone bridge
9. To find the time constant of a capacitor
10. To draw characteristics of a pn junction diode and determine knee and break down voltages
11. To find wave length of He Ne semiconductor laser.

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 Sheetal 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	10	15
2	Electrostatics	12	20
3	DC Circuits	12	20
4	Electromagnetism	13	20
5	Semiconductor Physics	07	10
6	Modern Physics	10	15
	Total	64	100

RATIONALE

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

Note:- Teachers should give examples of engineering/technology applications of various concepts and principles in each topic so that students are able to appreciate learning of these concepts and principles.

DETAILED CONTENTS

- | | | |
|-----|--|----------|
| 1. | Metallurgy | (08 hrs) |
| 1.1 | A brief introduction of the terms: Metallurgy (types), mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), ore, roasting, calcinations, smelting and refining of metal. | |
| 1.2 | Metallurgy of (i) Aluminium (ii) Iron | |
| 1.3 | Definition of an alloy, purposes of alloying, composition, properties and uses of alloys- brass, bronze, monel metal, magnalium, duralumin, alnico, stainless steel and invar. | |
| 2. | Fuels | (10 hrs) |
| 2.1 | Definition of a 'Fuel', characteristics of a good fuel and classification of fuels with suitable examples | |
| 2.2 | Definition of Calorific value of a fuel and determination of calorific value of a solid fuel with the help of Bomb calorimeter. Simple numerical problems based upon Bomb-calorimeter method of finding the Calorific values | |

- 2.3 Brief description of 'Proximate' and 'Ultimate' analysis of a coal. Importance of conducting the proximate and ultimate analysis of a fuel
- 2.4 Merits of gaseous fuels over those of other varieties of fuels
- 2.5 Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas (iii) Biogas
- 2.6 Composition, calorific values and applications of (i) LPG (ii) CNG (iii) Power alcohol
- 2.7 Fuel rating
 - 2.7.1 Octane number for petrol
 - 2.7.2 Cetane number for diesel

3 Corrosion (06 hrs)

- 3.1 Definition of corrosion
- 3.2 Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory
- 3.3 Passivity
- 3.4 Prevention of corrosion by
 - 1. (a) Alloying
 - (b) Providing metallic coatings
 - 2. Cathodic protections:
 - (a) Sacrificial
 - (b) Impressed voltage method
 - 3. Heat treatment (quenching, annealing, tempering & normalizing)

4 Lubricants (06 hrs)

- 4.1 Definition of (i) lubricant (ii) lubrication
- 4.2 Classification of lubricants
- 4.3 Principles of lubrication
 - (i) fluid film lubrication
 - (ii) boundary lubrication
 - (iii) extreme pressure lubrication

- 4.4 Properties of lubricants
- 4.4.1 Physical properties: viscosity, viscosity index, flash-point, fire-point, cloud-pour point, oiliness, volatility, emulsification
- 4.4.2 Chemical properties-Total acidity number (TAN) saponification and iodine value, coke number and aniline point.
- 5 Glass (04 hrs)
- 5.1 Glass: Chemical composition, types of glasses and their applications
- 5.2 Manufacture of ordinary glass and lead glass
6. Classification and Nomenclature of Organic Compounds (06 hrs)
- Classification of Organic Compounds, functional group, Homologous Series, IUPAC-Nomenclature of various homologous series i.e. alcohols, aldehydes, ketones, carboxylic acids, and phenols.
7. Polymers & Plastics (08 hrs)
- 7.1 Definition of polymer, monomer & degree of polymerization
- 7.2 Brief introduction of addition & condensation polymers with suitable examples (PVC, Polyester, Teflon, Nylon 66, Bakelite)
- 7.3 Definition of plastic & type of plastics (thermo & thermo setting plastics) with suitable examples
- 7.4 Applications of polymers & plastics in daily life.
- LIST OF PRACTICALS
1. Gravimetric analysis and study of apparatus used
 2. To determine the percentage composition of a mixture consisting of a volatile and a non-volatile substances
 3. Determine the viscosity of a given oil with the help of “Redwood viscometer”
 4. Determine the flash point of the given oil with the help of Abel’s Flash Point Apparatus
 5. Estimate the amount of moisture in the given sample of coal
 6. Estimate the amount of ash in the given sample of coal
 7. Electroplate the given strip of Cu with Ni
 8. Confirmation test of alcohol, aldehydes, carboxylic acid, amine
 9. To determine the total acidity number of a lubricant
 10. Detection of metal iron in the rust (solution of rust in concentrated HCl may be given)
 11. To prepare Bakelite
 12. To study the effect of metal coupling on corrosion of metals

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

SUGGESTED DISTRIBUTION OF MARKS

Topic No.	Time Allotted (Hrs)	Marks Allotted (%)
1	08	16
2	10	20
3	06	14
4	06	14
5	04	08
6	06	12
7	08	16
Total	48	100

RATIONALE

Drawing is said to be the language of engineers and technicians. Reading and interpreting engineering drawing is their day-to-day responsibility. The course is aimed at developing basic graphic skills so as to enable them to use these skills in preparation of engineering drawings, their reading and interpretation SP 46 – 1988 should be followed

- Note:
1. First angle projection is to be followed
 2. Instructions relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students

DETAILED CONTENTS

1. Detail and Assembly Drawing (2 sheets)
 - 1.1 Principle and utility of detail and assembly drawings
 - 1.2 Wooden joints i.e. corner mortice and tenon joint, Tee halving joint, Mitre faced corner joint, Tee bridle joint, Crossed wooden joint, Cogged joint, Dovetail joint, Through Mortice and Tenon joint
2. Screw threads and threaded fasteners (8 sheets)
 - 2.1 Thread Terms and Nomenclature
 - 2.1.1 Types of threads-External and Internal threads, Right and Left hand threads (Actual and Conventional representation), single and multiple start threads.
 - 2.1.2 Different Forms of screw threads-V threads (B.S.W threads, B.A thread, American National and Metric thread), Square threads (square, Acme, Buttress and Knuckle thread)
 - 2.2 Nuts and Bolts
 - 2.2.1 Different views of hexagonal and square nuts and hexagonal headed bolt
 - 2.2.2 Assembly of Hexagonal headed bolt and Hexagonal nut with washer.
 - 2.2.3 Assembly of square headed bolt with hexagonal and with washer.

- 2.3 Locking Devices
 - 2.3.1 Different types of locking devices-Lock nut, castle nut, split pin nut, locking plate, slotted nut and spring washer.
 - 2.3.2 Foundations bolts-Rag bolt, Lewis bolt, curved bolt and eye bolt.
- 2.4 Drawing of various types of machine screw, set screw, studs and washers
- 3. Keys and Cotters (3 sheets)
 - 3.1 Various types of keys and cotters and their practical application and preparation of drawing of various keys and cotters showing keys and cotters in position
 - 3.2 Various types of joints (3 sheets)
 - Spigot and socket joint
 - Gib and cotter joint
 - Knuckle joint
- 4. Rivets and Riveted Joints (4 sheets)
 - 4.1 Types of general purpose-rivets heads (4 Sheets)
 - 4.2 Caulking and fullering of riveted joints
 - 4.3 Types of riveted joints
 - (i) Lap joint-Single riveted, double riveted (chain and zig-zag type)
 - (ii) Butt Joint-
 - (a) Single cover plate
 - (i) Single riveted joint
 - (ii) Double riveted joint (Chain and zig-zag type)
 - (b) Double cover plate
 - (i) Single riveted joint
 - (ii) Double riveted joint (Chain and zig-zag type)
- 5. Couplings (2 sheets)
 - 5.1 Flange coupling (Protected and non-protected)
- 6. Symbols and Conventions (2 sheets)
 - 6.1 Civil engineering sanitary fitting symbols
 - 6.2 Electrical fitting symbols for domestic interior installations
 - 6.3 Building plan drawing with electrical and civil engineering symbols
- 7. AUTO CAD (for practical and viva-voce only)
 - 7.1 Concept of AutoCAD, Tool bars in AutoCAD, coordinate system, snap, grid, and ortho mode
 - 7.2 Drawing commands – point, line, arc, circle, ellipse
 - 7.3 Editing commands – scale, erase, copy, stretch, lengthen and explode

RECOMMENDED BOOKS

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

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)

Note: The students are supposed to come in proper workshop dress prescribed by the institute. Wearing shoes in the workshop(s) is compulsory. Importance of safety and cleanliness, safety measures and upkeep of tools, equipment and environment in each of the following shops should be explained and practiced. The students should prepare sketches of various tools/jobs in their practical Notebook.

The following shops are included in the syllabus.

1. Carpentry and Painting shop-II
2. Plumbing Shop
3. Welding shop -II
4. Electric shop -II
5. Machine shop or Electronic shop-II
6. Sheet Metal Shop –II

Note:

1. The branches e.g. Civil Engineering, Electrical Engineering, Mechanical Engineering, Automobile Engineering, Wood Technology, Food Technology, Quantity Surveying and Public Health Engineering will do Machine Shop instead of Electronic shop- II
2. The branches e.g. Electronics and Communication Engineering, Instrumentation and Control, Computer Engineering, Information Technology, and Medical Electronics will do Electronic shop-II instead of Machine shop.
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 at least 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 Polishing on wooden items.

2. Plumbing Shop

- 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, taps and reamers 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)
Job III Preparation of a job by filing on non- ferrous metal up to an accuracy of $\pm 0.2\text{mm}$
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 welding techniques. 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.
- 3.3 Demonstration and use of TIG and MIG Welding equipment

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.
- 4.2 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.
- 4.3 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 Testing Single phase/three phase electrical motor by using voltmeters, ammeter, clip on meter, tachometer etc.
Job V Reversing the rotation of a motor.

5. Machine Shop

Introduction to various machines used in machine shop. Demonstration of Lathe, Milling Machine Shaper, Slotter, Radial drilling machine, Surface grinder and CNC machine

Job-1 Exercise on simple turning and facing

Job-II Exercise on taper turning

Job-III Marking and drilling practice on mild steel piece

OR

5. Electronic Shop- II

- 5.1 Demonstrate the jointing methods on general purpose PCB boards mounting and dismantling as well as uses of the items mentioned below:
- Various types of single, multi-cored insulated screened power, audio video, co-axial, general purpose wires/cables
 - Various types of plugs, sockets connectors suitable for general purpose audio and video use, 2 and 3 pin mains plug and sockets, RF Plugs 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.
 - 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.
 - 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.
 - Materials: Conducting, insulating and magnetic materials.
 - Single beam simple CRO, Single Generator and function-Generator, function of energy knob on the front panel.
 - Regulated power supply-fixed and variable voltage, single output as well as dual output.
- 5.2 Identification and familiarization 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, read relays, transformers, Linear and Digital ICs, Thyristors, etc.
- 5.3 Demonstrate the following:
- To make perfect solder joints and soldering on PCBs
 - To remove components/wires by unsoldering.
 - To assemble components on boards, chassis, tape strips.
 - Various laying methods of cables
 - Exposure to modern soldering and de-soldering processes
 - Field visits to relevant work-places
 - Identification of active and passive components
 - Use of Multimeter and testing of active and passive components.

Job I Cut, bend, tin components, leads, inserts and solder components (capacitor, diodes, transistor, IFT, ICs etc) on a PCB.

Job II De-solder, remove and clean all the components, wires from a given equipment, a PCB or a tap strip using the following:

Job III Soldering Iron

Job IV Temperature Control Soldering Iron

Job V De-soldering Pump

Job VI De-soldering Strip

Job VII 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