

BOARD OF TECHNICAL EDUCATION, RAJASTHAN, JODHPUR
RULES AND REGULATION
FOR DIPLOMA COURSES IN ENGINEERING
ANNUAL SCHEME
FOR THE YEAR 2011-2012 AND ONWARDS

1. DEFINITIONS:

- Board** : Means, Board of Technical Education, Rajasthan, Jodhpur constituted by Government of Rajasthan.
- Chairman** : Means, the Chairman of the Board, Ex - officio Director of Technical Education, Rajasthan, Jodhpur.
- Secretary** : Means, Joint Director Cum-Secretary of Board.
- Registrar** : Means, Joint Director (Registrar) of Board.
- Diploma course** : Means, 3 years diploma course in branch of engineering, recognized by the Board.
- Affiliated Institution:** Means, an institution affiliated with Board, running Diploma course, examinations of which are conducted by the Board.
- Principal** : Means, the Principal or the Head of the affiliated Institution.
- Regular Student** : Means, a student who is eligible to pursue a regular course of study i.e. to attend regular classes in a particular year in which he/she wants to appear in the examination in the institution in which he has been enrolled by the Board.
- Ex-Student** : Means, a student who has completed a regular course of study as prescribed by the Board during a year, but fails in the theory and /or practical examination and is eligible to reappear in theory and / or practical examination in one or more subjects.
- Examination** : Means, any examination conducted by the Board.
- Year** : Means, an academic session, for example first year means the first academic session of the prescribed course of study. Similarly second year and third year means second and third academic session of the prescribed course of study respectively.

2. ADMISSION QUALIFICATIONS:

The minimum qualification for admission to a Diploma Course in an affiliated institution shall be as prescribed by the Government of Rajasthan from time to time.

3. DURATION OF COURSE:

The Duration of Diploma Course shall be 3 years. The course of study during a year shall consist of such subjects as are prescribed by the Board in Teaching and Examination Scheme from time to time.

4. ENROLMENT:

No student shall be admitted to any examination of the Board unless he/she has been enrolled with the Board. A student during his enrolment with the Board cannot enroll himself /herself with any other Board/ University. If any such case is reported, the enrolment of the student with the Board will be cancelled and he/she will not be allowed to appear in any of the examination conducted by the Board.

5. EXAMINATION SCHEME:

The valuation of the students shall be done by the Board or by the affiliated institution on behalf of the Board as per the prescribed Teaching and Examination Scheme. Theory and practical Examination will be conducted by the Board at the end of each year in accordance with the prescribed Teaching and Examination Scheme at such centers and on such dates as may be notified by the Board.

5.1 THEORY EXAMINATION (TH): These shall be conducted by the Board at the end of each year in the subjects listed under "TH" in the Teaching and Examination Scheme.

5.2 PRACTICAL EXAMINATION (PR): These shall be conducted by the board at the end of each year in the subjects listed under (PR). The mode of such examination will be as per the Teaching and Examination Scheme.

5.3 SESSIONAL ASSESSMENT: This will be done by the affiliated institution on behalf of the Board on the basis of day to day work consisting of –

(i) Class Test (CT):

Three class tests will be conducted in each year by the institution for each subject during the course of study listed under “CT” in Teaching and Examination Scheme. Marks for best two tests will be counted.

(ii) Tutorials (TU) – Regular Tutorial work done during the course of study listed under “TU” in teaching and Examination Scheme.

(iii) Practical Work [PR(S)] - Regular Practical work done during the course of study listed under "PR (S)" in Teaching and Examination Scheme.

5.4 PRACTICAL TRAINING ASSESSMENT :

On completion of training the assessment will be done by a committee constituted by the institution as per directives of the Board.

5.5. PROJECT ASSESSMENT: Students have to complete a Project as per the Teaching & Examination Scheme. The assessment of project will be done as per directives of the Board.

6. ELIGIBILITY FOR EXAMINATION:

6.1 For eligibility to appear in the Examination a student must have attended at least 75% of the total periods of the lecture (L), tutorial (T), practical (P) (i.e. L + T + P) delivered/conducted in each subject during the year. The deficiency in attendance to

the extent of 5% may be condoned by the Principal and an additional 5% by the Chairman for specific reasons.

- 6.2 A student who does not fulfill the prescribed condition as mentioned in 6.1 shall not be allowed to appear in the examination. The detention orders shall be issued by the Head of the Institution on behalf of the Board.
- 6.3 A student who is not eligible to appear in the examination under regulation 6.1 shall repeat the course of study as a regular student. Such students shall not be permitted to keep term in the next higher class.
- 6.4 **CHECKPOINT:**
A student has to pass Diploma course by the end of eight academic years from the year of enrolment failing which his/her enrolment with the Board will automatically be cancelled.
- 6.5 Time limit to pass all subjects of Diploma course will not be extended for any punishment by the institution and / or for the punishment awarded by the Board for the use of unfair means in the examination.

7. **PASSING STANDARDS:**

- 7.1 Minimum 33% marks in each theory examination in the subjects listed under "TH" in the Teaching and Examination Scheme.
- 7.2 Minimum 45% marks in each practical examination in the subjects listed under "PR" in the Teaching & Examination Scheme.
- 7.3 Minimum 45% marks in consolidated sessionals [PR(S) +TU + CT] of all subjects listed under "PR(S)", "TU" and "CT" in the Teaching and Examination Scheme.
- 7.4 Deficiency to the extent of 5 marks in a subject (TH and PR) and up to 10 marks in a year may be condoned by the chairman. Deficiency will not be condoned in more than two subjects in a year. Deficiency will not be condoned in practical Training and Project assessment. The student whose deficiency in subject/subjects has been condoned will be deemed to have passed the subject/subjects. Condonation marks will be awarded to a student in the eligible subject/ subjects only after he/she has passed all the remaining subjects as well as the consolidated sessionals of the concerned year.
- 7.5 A Diploma student, who fails in consolidated sessional of I year will not be promoted to II Year. Such student will be declared failed and he/she will have to repeat I year as a regular student.
- 7.6 A Diploma student, who fails in consolidated sessional of II year will not be promoted to III Year. Such student will be declared failed and he/she will have to repeat II year as a regular student.
- 7.7 A Diploma student, who fails in consolidated sessional of III year will be declared failed and he/she will have to repeat III year as a regular student.
- 7.8 A Diploma student pass in consolidated sessionals but fail in Board's examination of any subject/subjects of any year shall be allowed to keep terms. Such student will have to reappear in TH/ PR or both as Ex-student in all the subjects in which he/she fails, in the next examination as and when held. He/she will retain full credit of consolidated sessional marks and marks of Theory and/or Practical examination for subject / subjects which he/she had already passed.
- 7.9 The Enrolment of a student who does not fill up the Examination Form for any of the board's examination either regular or ex -student for two consecutive academic years will be cancelled and he/she will not be allowed to appear in any of the examination conducted by the Board.

8. SPECIAL EXAMINATION:

A Diploma student passed in Theory and Practical examination of all the subjects other than III Year as well as in the consolidated sessionals of III year but fails in Theory and/or Practical examination of one or more subject/subjects of III year shall be allowed to appear in the Theory and/or Practical examination of subject/subjects in which he/she is fail, in the special examination for III Year to be conducted after suitable interval.

9. AWARD OF DIPLOMA:

9.1 A student will become eligible for award of a Diploma after passing all the subjects of the prescribed teaching and examination for the Diploma Course.

9.2 FINAL AGGREGATE FOR DIPLOMA COURSE FOR AWARD OF DIVISION:

- (i)** 40% of the aggregate marks of I year.
- (ii)** 60% of the aggregate marks of II Year.
- (iii)** 100% of the aggregate marks of III Year.

9.3 AWARD OF DIVISION:

The division will be awarded to successful Diploma students on the basis of final percentage of marks as given below: -

- (i)** 75% or more : I Division with Honors.
- (ii)** 60% or more but less than 75% : I Division
- (iii)** 45% or more but less than 60% : II Division
- (iv)** Less than 45% but more than the : Pass Class.

Passing standards as stated in Rule 7.

9.4 MERCY GRACE MARK:

- (i)** Only 1 mercy grace mark will be awarded to those students whose Division is changed with the help of this mercy grace mark
- (ii)** Mercy grace mark will be awarded to those students only who have passed all the subjects of Diploma Course.
- (iii)** Mercy grace mark will be added in the grand total of the details of marks to award division and not in the marks of any particular year or subject.

10. MERIT:

Students who pass all subjects of a Diploma course in single attempt without any condonation and within prescribed duration of the course will be considered for the merit as per rules of the Board.

11. IMPROVEMENT:

11.1 A student who passes in all subjects of a Diploma Course may be allowed one chance for improvement of his/her performance as per the directives of the Board.

11.2 Such students will be permitted to reappear only in theory papers of one or more subjects of III year, as ex-student only in the next examination.

- 11.3** The student who avails of chance for improvement of his/her performance will retain full credits of marks except the theory marks of subjects in which he/she re-appears. If the student scores lesser aggregate marks or fails in one or more subjects during his chance for improvement, the aggregate marks and division scored by him/her in the previous examination will stand and no further chance for improvement would be allowed to him/her.
- 11.4** Such improvement of marks will be counted only for the purpose of division and not for merit.
- 12.** Any student debarred or rusticated by the competent authority will not be eligible to appear in any examination from the date of issue of such orders.
- 13.** These Rules and Regulation shall come into force for students under **Annual Scheme-2011** from the session **2011-12** and onwards.
- 14.** Students pursuing a Diploma Course of a recognized State Board of Technical Education or University may be permitted to migrate to this Board in accordance with rules of the Board.
- 15.** A student who completes a course of study in a branch and become eligible for award of a Diploma may be permitted to study and appear in a second Diploma examination in accordance with rules of the Board.
- 16.** If a student is unable to pass regularly the course of study prevailing at the time of admission then he/she is liable to be shifted in the consecutive new scheme, if any, introduced by the Board at any time.
- 17.** The power of addition and alteration of rules shall remain with the Board of Technical Education, Rajasthan Jodhpur.
- 18.** In case of any dispute, the jurisdiction will be courts situated at **JODHPUR** only.

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GOVERNMENT OF RAJASTHAN
BOARD OF TECHNICAL EDUCATION, RAJASTHAN, JODHPUR
 TEACHING AND EXAMINATION SCHEME FOR
Diploma I Year (Common for All Branches of Engineering)
ANNUAL SCHEME SESSION 2017-2018 & ONWARDS

Code No.	Subject	Distribution of Time				Distribution of Max. Marks/ Duration							Total Marks
		Hours per week				Board's Exam.				Sessionals			
		L	T	P	Tot	TH	Hrs.	PR	Hrs.	CT	TU	PR(S)	
101	English & Communication Skills	1	--	2	3	70	3	--	--	30	--	50	150
102	Applied Physics	3	--	2	5	70	3	--	--	30	--	50	150
103	Applied Chemistry	2	--	2	4	70	3	--	--	30	--	50	150
104	Applied Mathematics	3	2/2	--	4	70	3	--	--	30	50	--	150
105	Computer & Information Technology Fundamentals	2	--	2	4	70	3	--	--	30	--	50	150
106	Applied Mechanics	2	2/2	2/2	4	70	3	--	--	30	25	25	150
107	Engineering Drawing	--	--	4	4	--	--	50	3	--	--	100	150
108	Workshop Practice	--	--	3	3	--	--	50	3	--	--	100	150
109	Electrical & Electronics Workshop	--	--	3	3	--	--	50	3	--	--	100	150
	Student Centred Activities *	--	--	2	2	--	--	--	--	--	--	--	--
	Total	13	2	21	36	420	--	150	--	180	75	525	1350
Grand Total :												1350	

* Student Centred Activities include expert lectures/ practice sessions on technical topics of common interest, personality development, human values, yoga, industrial visits, art of living, environmental issues, quiz programmes, interview techniques, greening and cleaning the campus etc. Student Centred Activities will be graded on the basis of attendance, interested learning of the student.

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|--|--|
| 1. L : Lecture | 5. PR : Marks for Board's Examination for Practicals |
| 2. T : Tutorial | 6. CT : Marks for Class Tests |
| 3. P : Practical | 7. TU : Marks for Tutorials |
| 4. TH : Marks for Board Examination for Theory | 8. PR(S) : Marks for Practical and Viva |

ENGLISH & COMMUNICATION SKILLS

CODE 101

L T P
1 - 2

RATIONALE

The students seeking admission to the diploma courses do not have the required proficiency in English. It has, therefore, been decided to introduce English and Communication Techniques to help them attain proficiency in the subject.

CONTENTS

		L
1.	Narration, Voice, Basic Sentence Patterns. (Nine basic sentence patterns)	5
2.	Transformation of Sentences, Determiners, Preposition. (a) Interchange of degree of comparison (b) Interchange of Affirmative and negative sentences (c) Interchange of Interrogative and Assertive sentences (d) Interchange of Exclamatory and Assertive sentences	7
3.	Tenses, Common errors (Noun, Pronoun, Articles, Adverb, Punctuation, Preposition etc.)	7
4.	Modals in Conversational Usage and punctuation: Modals: Can, Could, Should, Will, Would, May, Might, Must, Need not, Dare not, ought to, Used to.	4
	Punctuation: Full stop, Comma, Question mark, Exclamation mark, Inverted Commas, Capital letters	
5.	Composition - 1. Unseen Passage, Précis Writing	2
6.	Letter Writing, and Report Writing	3
7.	Essay Writing - Essays on general topics and topics related to environmental problems.	2

PRACTICALS

We envisage two successive stages for attaining skill in communication ability;

1. Listening
2. Speaking

We can club them together as shown above.

		P
1.	Listening:	6
1.1	For improving listening skills the following steps are recommended,	
1.1.1	Listen to Pre-recorded Tapes	
1.1.2	Reproduce Vocally what has been heard	
1.1.3	Reproduce in Written form	
1.1.4	Summarise the text heard	
1.1.5	Suggest Substitution of Words and Sentences	

- 1.1.6 Answer Questions related to the taped text
1.1.7 Summarise in Writing
- 2. Speaking: 6**
- 2.1 Introducing English consonant-sounds and vowel-sounds.
2.1.1 Remedial exercises where necessary
- 2.2 Knowing Word stress
Shifting word stress in poly-syllabic words
[For pronunciation practice read aloud a para or page regularly while others monitor]
- 3. Vocabulary: 10**
- 3.1 Synonyms. Homonyms. Antonyms and Homophones
3.2 Words often confused, as for example,
[I-me; your-yours; its-it's; comprehensible-comprehensive; complement-compliment]
- 3.3 Context-based meanings of the words, for example,
3.3.1 man[N] man[vb]; step[N] ,step[vb]
3.3.2 conflict _____ Israel Palestinian conflict
Emotional conflict,
Ideas conflict
3.3.3 learn _____ I learn at this school
I learnt from the morning news
- 4. Delivering Short Discourses: 15**
- 4.1. About oneself
4.2 Describing a Place, Person, Object
4.3 Describing a Picture, Photo.
- 5. Group Discussion : 15**
- 5.1 Developing skill to initiate a discussion [How to open]
5.2 Snatching initiative from others [Watch for weak points, etc.]
- 6. Expand a topic-sentence into 4-5 sentence narrative. 8**

Note:

- The Medium of teaching and examination will be English.
- The Question on Essay Writing (Unit-7) will be compulsory.
The student will have to attempt one essay out of two, touching upon given points .
- At least one question will be set from each unit.
- No theory question will be set from syllabus of practicals.

REFERENCE BOOKS:

- | | |
|---|--|
| 1. Intermediate English Grammar | Raymond Murphy,
Pub: Foundation Books,
New Delhi |
| 2. Eng. Grammar, usage & Composition | Tickoo & Subramanian
Pub: S.Chand and Co. |
| 3. A Practical Eng. Grammar
(and its Exercise Books) | Thomson and Martinet.
Pub : ELBS |
| 4. High School English Grammar
and Composition | Wren & Martin. |

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APPLIED PHYSICS

CODE 102

L	T	P
3	--	2

RATIONALE

Physics is an applied science from which all engineering technologies have evolved, therefore, a thorough knowledge of the basic principles & applied aspects will help students understand, apply & evolve technologies more effectively and there by improve the life of the society.

CONTENTS

		L
1.	Units and Dimensions :	5
	1.1 Idea of various systems of units SI units - Basic, Supplementary and Derived Units, Prefixes & Symbols	
	1.2 Dimensions and Dimensional Formulae	
	1.3 Principle of Homogeneity of Dimensions	
	1.4 Dimensional Analysis	
	1.5 Applications	
2.	Elasticity :	4
	2.1 Elasticity	
	2.2 Stress and Strain	
	2.3 Elastic Limit & Hooke's law	
	2.4 Young's Modulus, Bulk Modules & Modulus of Rigidity, Poisson's Ratio	
3.	Properties of Liquids:	7
	3.1 Surface Tension & Surface Energy	
	3.2 Cohesive & Adhesive Forces	
	3.3 Angle of Contact	
	3.4 Capillarity & Expression for Surface Tension	
	3.5 Streamline & Turbulent Flow. Reynold Number.	
	3.6 Viscosity & Coefficient of Viscosity	
	3.7 Stoke's law & Terminal Velocity	
4.	Gravitation & Satellites:	6
	4.1 Newton's law of Gravitation	
	4.2 Acceleration due to Gravity	
	4.3 Kepler's laws of Planetary Motion (statement only)	
	4.4 Artificial Satellite (simple idea), Geo-Stationary Satellites	
	4.5 Escape Velocity	
	4.6 Velocity & Time Period of an Artificial Satellite.	
5.	Simple Harmonic Motion and Sound Waves:	10
	5.1 Periodic motion, Simple Harmonic motion	
	5.2 Displacement, Velocity, K.E., P.E. & Total Energy of a particle executing SHM.	
	5.3 Velocity of Sound Waves - Newton's Formula and Laplace Correction	
	5.4 Propagation of Progressive Wave and Displacement of a particle during propagation of wave	
	5.5 Superposition of Waves	
	5.6 Stationary Waves (without mathematical analysis) & Resonance tube	
6.	Transfer of Heat:	6
	6.1 Modes of Transmission of Heat - Idea of Conduction, Convection & Radiation	
	6.2 Black Body	
	6.3 Kirchoff's Law & Stefan Boltzmann Law (statement only)	
	6.4 Newton's Law of Cooling & its Derivation from Stefan's Law	
7.	Electrostatics:	6
	7.1 Coulomb's Law	
	7.2 Intensity of Electric Field, Intensity due to a Point Charge	
	7.3 Electric Lines of Forces & its properties	
	7.4 Electric Potential, Electric Potential due to a Point Charge	

8.	D.C. Circuits :	8
	8.1 Ohm's Law , Resistance and Resistivity,	
	8.2 Colour code for carbon resistance.	
	8.3 Resistance in Series and Parallel and their Combination	
	8.4 Kirchoff's Laws	
	8.5 Wheatstone Bridge and its application – Meter bridge	
	8.6 Principle of Potentiometer	
	8.7 Application of Potentiometer – Internal resistance of a primary cell & comparison of emf of two primary cells.	
9.	Electromagnetic Induction and A.C. Circuits:	6
	9.1 Faraday's Laws of Electro Magnetic Induction, Lenz's Law	
	9.2 Self and Mutual Inductance	
	9.3 Alternating Current, Phase & Phase Difference	
	9.4 Instantaneous, Average and rms value of AC	
	9.5 Behaviour of Resistance, Capacitance and Inductance in an AC Circuit	
10.	Basic Electronics : An Introduction	8
	10.1 Energy Bands in Conductor, Semi Conductor & Insulator	
	10.2 Intrinsic and Extrinsic Semiconductors	
	10.3 PN-Junction Diode, Working, Biasing and Characteristics Curves	
	10.4 Half Wave & Full Wave Rectifiers (only working, no derivations)	
	10.5 Junction Transistors, Working, Biasing and Characteristic Curves	
11.	Modern Physics:	10
	11.1 Photo Electric Effect	
	11.2 Einstein's Equation	
	11.3 Lasers - Stimulated Emission and Population Inversion	
	11.4 He - Ne gas Laser and Ruby Laser	
	11.5 Brief Introduction to Nano materials and smart materials	
	11.6 Optical Fibers –Principle and classification	
12.	Nuclear Physics:	9
	12.1 Idea of Nuclear Force	
	12.2 Mass - Defect and Binding Energy	
	12.3 Nuclear Reactions,	
	12.4 Natural and Artificial Radioactivity	
	12.5 Law of Radioactive Disintegration	
	12.6 Half Life	
	12.7 Idea of Nuclear Fission and Fusion	
	12.8 Controlled chain reaction and Nuclear Reactor	
13.	Pollution and its control:	5
	13.1 Pollution – An Introduction	
	13.2 Types of Pollution – Noise and Nuclear Pollution	
	13.3 Noise Pollution and its Control	
	13.4 Nuclear Pollution and its Control	

PRACTICALS

Any 15 experiments to be performed from the following list :-

- To measure internal dia, external dia and depth of a calorimeter using venire callipers.
- To measure density of a wire using screw gauge.
- To measure radius of curvature of a lens or mirror using spherometer.
- To determine refractive index of glass using prism.
- To determine the refractive index of glass using travelling microscope

- To determine focal length of a convex lens by displacement method.
- To measure surface tension of water by capillary rise method.
- To determine the velocity of sound at 0°C using resonance tube.
- To determine Young's modulus of elasticity using Searle's apparatus.
- To determine acceleration due to gravity using simple pendulum.
- To verify Newton's law of cooling.
- To establish relation between resistance of a wire and its length using Ohm's law.
- To verify series or parallel law of resistances.
- To determine specific resistance of material using meter bridge.
- To determine internal resistance of a primary cell using potentiometer.
- To compare emf of two primary cells using a potentiometer.
- To draw characteristic curves of PN Diode and determine its static and dynamic resistance.
- To draw characteristic curves of a PNP/NPN transistor in CB/CE configuration.

REFERENCE BOOKS :

- | | |
|-----------------------------------|-------------------------|
| 1. Engineering Physics | Gaur & Gupta |
| 2. Engineering Physics | S.L. Kakani & S. Kakani |
| 3. Applied Physics Vol.-I | Hari Harlal, NITTTR |
| 4. Applied Physics Vol.-II | Hari Harlal, NITTTR |
| 5. A Text Book of Applied Physics | N.S. Kumar |
| 6. Principles of Physics | Brijlal, Subhramanyam |
| 7. Fundamental of Nano science | S.L. Kakani & S. Kakani |

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APPLIED CHEMISTRY

CODE 103

L	T	P
2	--	2

RATIONALE

It is essential that one has to understand the fundamentals of basic sciences before trying to learn their application in various branches. In framing the curriculum of chemistry, emphasis has been laid on the teaching of such topics, which have a bearing on the topics of various branches of engineering. With this object in view, some important fundamental topics of chemistry have been included in this syllabus.

CONTENTS

	L
1. Atomic Structure:	4
1.1 Constituents of the Atom	
1.2 Bohr's Model of the Atom	
1.3 Quantum Number and Electronic Energy Levels	
1.4 Aufbau's Principle, Pauli's Exclusion Principle, Hund's Rule, $n + l$ Rule	
1.5 Electronic Configuration of Elements (s,p,d Block Elements)	
2. Development of Periodic Table:	3
2.1 Modern Periodic Law, Long form of Periodic Table.	
2.2 Study of Periodicity in Physical and Chemical Properties with special reference to : - Atomic and Ionic Radii, Ionisation Potential, Electronegativity, Metallic Character.	
3. Electro Chemistry:	4
3.1 Ionisation, Degree of Ionisation, Factors which Influence Degree of Ionisation .	
3.2 Hydrolysis – Degree of Hydrolysis, Hydrolysis Constant.	
3.3 pH Value	
3.4 Buffer Solution	
4. Kinetic Theory of Gases:	3
4.1 Postulates of kinetic Theory	
4.2 Ideal Gas Equation, Vender Walls Equation	
4.3 Liquefaction of Gases, Critical Pressure and Critical Temperature for Liquefaction.	
4.4 Liquefaction of Gases by Joule – Thomson Effect, Claude's Method and Linde's Method	
5. Carbon Chemistry:	3
5.1 Definition of Organic Chemistry. Difference between Organic and Inorganic Compounds.	
5.2 Classification and Nomenclature - Open Chain and Closed Chain Compounds, IUPAC System of Nomenclature. (up to C5).	
6. Metals and Alloys:	3
6.1 General Principles and Terms listed in Metallurgy	
6.2 Metallurgy of Iron and Steel	
6.3 Different forms of Iron	
6.4 Effect of Impurities on Iron and Steel	
7. Pollution:	6
7.1 Water Pollution	
7.1.1 Causes and Effects	
7.1.2 Treatment of Industrial Water Discharges - Screening, Skimming and Sedimentation Tanks, Coagulation, Reductions, Chlorination, Biological Methods.	
7.2 Air Pollution	
7.2.1 Causes and Effects	
7.2.2 Control Methods – Electrostatic Precipitator, Scrubbers, Gravitational Settling Methods, by Plants.	
7.3 Awareness on Green House Effect, Depletion of Ozone Layer and Acid rain.	
8. Water:	6
8.1 Sources of Water	

	8.2	Hardness of Water.	
	8.3	Degree of Hardness, Estimation of Hardness by EDTA method (only theory)	
	8.4	Disadvantages of Hardness	
	8.5	Softening Methods	
	8.5.1	Lime-Soda Method	
	8.5.2	Permutite Method	
	8.5.3	Ion -Exchange Method	
	8.6	Drinking Water, its Requisites, Purification and Sterilization of Water.	
9.	Fuels:		6
	9.1	Definition, Classification	
	9.2	Calorific Value (HCV and LCV)	
	9.3	Solid Fuels	
	9.4.1	Coal and Coke	
	9.4	Liquid Fuels	
	9.4.1	Petroleum and its Distillation	
	9.4.2	Cracking, Octane and Cetane Values of Liquid Fuels	
	9.4.3	Synthetic Petrol, Power Alcohol	
	9.5	Bio-Gas	
	9.6	Nuclear Fuels – Introduction to Fission and Fusion Reactions.	
10.	Corrosion:		3
	10.1	Definition	
	10.2	Theories of Corrosion	
	10.2.1	Acid Theory (Rusting)	
	10.2.2	Direct Chemical Corrosion or Dry Corrosion	
	10.2.3	Wet Corrosion or Electro-Chemical Corrosion (Galvanic and Concentration Cell Corrosion)	
	10.3	Various Methods for Protection from Corrosion	
11.	Polymers:		6
	11.1	Definition	
	11.2	Plastics	
	11.2.1	Classification, Constituents	
	11.2.2	Preparation, Properties and Uses of Polythene, Bakelite Terylene and Nylon.	
	11.3	Rubber	
	11.3.1	Natural Rubber, Vulcanisation	
	11.3.2	Synthetic Rubbers - Buna - N, Buna-S, Butyl and Neoprene	
	11.4	Biodegradable polymers	
12	Cement and Glass:		3
	12.1	Manufacturing of Portland cement	
	12.2	Chemistry of Setting and Hardening of Cement	
	12.3	Glass: raw materials, Varieties and Uses.	
13.	Lubricants:		3
	13.1	Definition, Classification	
	13.2	Properties of Lubricants: Viscosity, Oiliness, Flash Point, Fire Point, Acid Value, Saponificatin, Emulsification, Cloud and Pour Point.	
	13.3	Artificial Lubricants	
14	Miscellaneous Materials:		3
	14.1	Refractories: Definition, Classification and Properties	
	14.2	Abrasives: Natural and Synthetic Abrasives	
	14.3	Soap and Detergents: Definition, Properties and Uses	
15.	New Engineering Materials: (Brief Idea of Following)		4

- 15.1 Superconductors
- 15.2 Organic Electronic Materials
- 15.3 Carbon Nanotubes
- 15.4 Optical Fibres

PRACTICALS

1. Identification of Acid and Basic Radicals in a Salt (Total Numbers = 10)
2. Characteristic tests of carbohydrates, fats and proteins in pure sample and their detection in given food stuffs.
3. Determination of Percentage Purity of an Acid by Titration With Standard Acid.
4. Determination of Percentage Purity of a Base by Titration with Standard Alkali Solution.
5. Determination of the Strength of Ferrous Sulphate using Standard Ferrous Ammonium Sulphate and Potassium Dichromate as Intermediate Solution
6. Determination of the Strength of Ferrous Sulphate Solution using Standard Solution of Thiosulphate.
7. Determination of the Strength of Copper Sulphate Solution using a Standard Solution of Thiosulphate.
8. Determination of pH Values of Given Samples.
9. Determination of Hardness of Water by EDTA Method.
10. Estimation of Free Chlorine in Water.
11. Determination of Acid Value of Oil.
12. Preparation of Soap.

REFERENCE BOOKS :

- | | |
|---------------------------------------|--|
| 1. अनुप्रयुक्त रसायन | संगीता गोयल, कविता स्वामी एवं प्रभात कुमार |
| 2. Engineering Chemistry II (Hindi) | Mathur and Agarwal |
| 3. Chemistry of Engineering Materials | C.V. Agarwal |
| 4. Engineering Chemistry | P.C. Jain and Monika |
| 5. Engineering Chemistry | M.M. Uppal |
| 6. Engineering Chemistry | V.P.Mehta Jain Bros. Jodhpur |
| 7. Practical Chemistry for Engineers | Virendra Singh |
| 8. Hand book of Technical Analysis | Bannerji Jain Bros.Jodhpur |

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APPLIED MATHEMATICS

CODE 104

L	T	P
3	2/2	--

RATIONALE

Mathematics is the root of engineering. To understand the engineering subjects the knowledge of mathematics is required. This proposed syllabus of mathematics is essential for diploma students of every engineering branch. The maximum number of problems related to engineering should be given to the students in their home assignment. More and more practice of numerical problems is needed for the better understanding of the subject.

CONTENTS

			L	T
1.	1.1	Introduction to Different Types of Expansion:	6	2
	1.1.1	Factorial Notation, Meaning of C (n, r), P(n, r), Binomial, Exponential and Logarithmic Theorem		
	1.2	Complex Number:		
	1.2.1	Definition, algebraic Operations, Conjugate, Modulus, Amplitude and representation in Polar form		
2.		Trigonometry:	7	2
	2.1	Allied Angle ($\sin (180\pm A)$, $\sin (90\pm A)$ etc.,		
	2.2	Sum and Difference Formula (without proof) and their Application		
	2.3	Product Formula and C-D Formula		
	2.4	T-Ratios of Multiple and Sub-Multiple Angles (2A, 3A, A/2)		
	2.5	Solution of Trigonometric Equations : $\sin X = 0$, $\tan X = 0$, $\cos X = 0$, $\sin X=A$, $\cos X =A$ & $\tan x = A$		
3.		Matrices and Determinants:	7	2
	3.1	Definition and Study of different type of Matrices (e.g. Transpose, Symmetric, Skew Symmetric, Orthogonal, Hermitian and Skew Hermitian matrices), Minors, Cofactors, Adjoint and Inverse of a Matrix		
	3.2	Cramer's Rule		
	3.3	Solution of Simultaneous Linear Equations by Inverse Matrix Method.		
4.		Two Dimensional Coordinate Geometry:	10	3
	4.1	General Introduction		
	4.2	Distance Formula and Ratio Formula		
	4.3	Co-ordinate of Centroid, In-Centre, Ortho-Centre and Ex-Centre of a Triangle		
	4.4	Area of Triangle		
	4.5	Straight Line, Slope form, Intercept form, Perpendicular form, One Point Slope form, Two Point form & General form		
	4.6	Angle between Two Lines		
	4.7	Perpendicular Distance of a Line from a Point		
5.		Conic:	10	4
		Definition, Standard Equations, Equation of Tangent and Normal at a Point of Circle, Parabola, Ellipse and Hyperbola.		
6.		Function:	10	3
	6.1	Definition, Range and Domain, Standard Function (e.g. Absolute, Exponential, Identity, Reciprocal, Rational, Irrational, Increasing and decreasing)		
	6.2	Limits of all Standard Functions		
	6.3	Concept of Continuity and Differentiability at a Point (simple Problems)		
7.		Differential Calculus :	7	3
	7.1	Differentiation of Standard Function (e.g. Function of a function, Logarithmic, Implicit, Parametric,		
	7.2	Trigonometric, Transformations : Differentiation of a Function w.r.t. another function and Second Order Derivative		

8.	Applications of Differential Calculus:	7	3
8.1	Geometrical meaning of dy/dx . Tangents and Normals		
8.2	Angle of Intersection between two Curves		
8.3	Derivative as a Rate Measurer		
8.4	Errors and Approximations		
9.	Integral Calculus :	10	3
	Definition, Methods of Integration (e.g. Simplification, Substitution and by parts); Integration of Rational functions and Trigonometric functions, Definite Integral and its properties		
10.	Differential Equations :	10	3
10.1	Definition of differential Equation. Order, Degree and Solution of a differential Equation.		
10.2	Solution of a differential Equation of First Order and First Degree by different methods (e.g. Variable Separable, Homogenous, Reducible to Homogenous Form and substitution); Solution of Linear, Bernoulli's and exact differential Equation		
10.3	Solution of Linear Differential Equation of Higher order with Constant Coefficients		
11.	Vector Algebra:	6	2
11.1	Definition, Addition and Subtraction of Vectors		
11.2	Scalar and Vector Product of two Vectors		
11.3	Scalar Triple Product and Vector Triple Product		
11.4	Applications of Vectors in Engineering Problems		

REFERENCE BOOKS:

1.	Applied Mathematics	Dr. D.KS. Rewar , Dr. S. K. Sharma, O.P. Baheti
2.	Applied Mathematics	Dr. D.C. Gokhroo
3.	Mathematics XI & XII	NCERT, New Delhi
4.	Mathematics XI & XII	Rajasthan Board, Ajmer
5.	Polytechnic Mathematics	H. K. Dass
6.	Text Book on Differential Calculus	Chandrika Prasad
7.	Text Book on Integral Calculus	Chandrika Prasad
8.	Differential Calculus	M. Ray, S. S. Seth, & G. C. Sharma
9.	Integral Calculus	M. Ray, S. S. Seth, & G. C. Sharma

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COMPUTER AND INFORMATION TECHNOLOGY FUNDAMENTALS
CODE 105

L T P
2 -- 2

RATIONALE

Day by day use of computer is increasing for correct, speedy and concise work So it is very essential to educate every technocrat in computer education so that it can be used in regular work.

The contents of this course have been developed with a view to give the students a computer fundamental such as components and operating system. After getting the fundamental knowledge students may go through the advanced field very smoothly.

Information processing and transferring with concise and consistent was is the major goal behind Information Technology. In the present Information Technology scenario a technician should be familiar with basics of Information Computer Communication and Internet.

CONTENTS

	L
1. Introduction:	12
1.1 Computer: An Introduction	
1.2 Generation of Computers & Types: Analog, Digital, Hybrid, Micro, Mini, Main Frame, Super, Lap Top.	
1.3 Data Representation	
1.3.1 Bit, Nibble, Byte, Word	
1.3.2 Number System: Decimal, Binary, Hexadecimal & their Conversions	
1.3.3 Arithmetic Operations (Addition, Subtraction using Binary Number System	
1.3.4 1s, 2s Compliment	
1.3.5 Coding Technique: BCD, EBCDIC, ASCII	
1.4. Idea of:	
1.4.1 Hardware	
1.4.2 Software	
1.4.3 Firmware	
1.4.4 Free ware	
1.4.5 Human ware	
1.5 Computer Languages and Translators:	
1.5.1 Machine	
1.5.2 Assembly	
1.5.3 High Level Language	
1.5.4 Scripting Language	
1.5.5 Object Oriented Language	
1.5.6 Platform Independent Language	
1.5.7 Translators: Assembler, Interpreter, Compiler	
2. Components of Computer:	8
2.1 Block Diagram of Computer	
2.2 Central Processing Unit (CPU)	
2.3 Memory Unit: RAM, ROM, PROM, EPROM, EEPROM, Cache	
2.4 Input/Output Devices: Keyboard, Mouse (Optical), Digitizer, Scanner, Web Camera, Monitor (CRT, TFT, LED), Printers, Plotters, Bar Code Reader, Light pen, Joy stick	
2.5 Secondary Storage Devices: Hard Disk, CD, DVD, Pen Drive	
3. Operating System:	2
3.1 Definition of Operating System (OS)	
3.2 Types of OS	
3.2.1 Single user	
3.2.2 Multi user	
3.2.3 Multi Programming	
3.2.4 Time Sharing	
3.2.5 Multi Processing,	
4. Introduction to Windows OS:	7

4.1	Introduction to Windows Environment	
4.2	Parts of Windows Screen	
4.3	Icon, Menu, Start Menu	
4.4	Minimising, Maximising, Closing Windows, file and folder operations	
4.5	Windows Explorer, Recycle Bin, Clipboard, My Computer, My Network Places	
4.6	Control Panel: Adding New Hardware and Software, Display, Adding new Font, User account management and security.	
4.7	Accessories: Paint, Media Player, System Information, Run, Connecting Network Projector	
4.8	Establishing Network Connection: LAN, WAN, Bluetooth	
5.	Information Concepts and Processing:	3
5.1	Definition of Data, Information	
5.2	Need of Information	
5.3	Quality of Information	
5.4	Concepts of Data Security, Privacy, Protection, Encryption, Decryption	
5.5	Computer Virus and their types	
5.6	Scanning & Removing Virus	
6.	Computer and Communication:	7
6.1	Need of Data Transmission	
6.2	Data Transmission Media: Twisted pair, Coaxial, Fiber Optical, CAT cables	
6.3	Baud rate and Bandwidth, Digital and Analog Transmission, Serial and Parallel Data Transfer, Protocols, MODEM.	
6.4	Types of Networking: LAN, WAN, MAN, Bluetooth, WiFi, WiMax, Hotspot	
6.5	LAN Topologies: Bus, Star, Ring, Hybrid, Mesh	
6.6	Introduction to Ports: RS232, USB, HDMI	
7.	Internet:	6
7.1	Introduction to Internet	
7.2	Bridges, Routers, Switch, Gate way	
7.3	Web Addressing: www, URL, IP address	
7.4	e-mail, e-Commerce	
7.5	Web browsing, Web page, Search engines	
7.6	Introduction to Hyper text & HTML	
7.7	N/W Protocols: http, https, FTP, UDP, TCP/IP, SMTP, IMAP, POP3	
8.	Word Processing:	12
8.1.	Word processor	
8.1.1	Introduction to MS-Word	
8.1.2	Starting MS-Word	
8.1.3	Special Features of MS-Word	
8.1.4	Using Help	
8.1.5	Opening Document, Typing and Editing	
8.1.6	Operation Text and Object: Copying, Inserting, Moving, Deleting	
8.1.7	Copying from One Document to Other	
8.1.8	Undo, Redo, Spell Check, Find and Replace	
8.1.9	Formatting	
8.1.9.1	Characters and Fonts	
8.1.9.2	Spacing	
8.1.9.3	Removing Characters Formatting	
8.1.10	Inserting Symbols	
8.1.11	Paragraphs, format painter, drop cap	
8.1.12	Page Setting	
8.1.13	Header, Footer, foot note and end note	
8.1.14	Page Breaks	
8.1.15	Borders and Shading	
8.1.16	Print Preview and Printing	
8.1.17	Tables and Columns	
8.1.18	Mail Merge	
8.1.19	Auto Text and Auto correct	
8.1.20	Converting Document in PDF and vice-versa	
8.1.21	Inserting mathematical Equation by using Equation editor	

8.2	Electronic Spread Sheet	
8.2.1	Introduction to MS-Excel	
8.2.2	Working with Spread Sheet	
8.2.3	Editing the Worksheet	
8.2.4	Worksheet Formatting	
8.2.5	Formula Entering	
8.2.6	Function Wizard	
8.2.7	Saving and Printing Work Book	
8.2.8	Charts and Graph	
8.2.9	Linking Work Sheets	
8.2.10	Report Wizard	
8.2.11	Sorting and Filtering	
9.	Power Point:	3
9.1	Introduction to Power Point	
9.2	Creating a Presentation/Slide	
9.3	Adding Animation in Slide	
9.4	Running a Slide Show	
9.5	Creating Master Slide	

PRACTICALS		P
1.	Study of Computer Components	2
2.	Practice of Computer Booting Process in Window 7/10	2
3.	Demonstration of Windows Environment	4
4.	Practice of using My Computer, Windows Explorer	2
5.	Practice of using Control Panel	2
6.	Practice of My Network Places	2
7.	Practice of CD and DVD Writing	2
8.	Practice of Paint	4
9.	Installation of Windows 7/10	4
10.	Demonstration of Network	2
11.	Visit to Internet Site	2
12.	Creating e-mail Account , Sending and Receiving e-mails.	4
13.	Sending e-mail with Attachment & Signature	
14.	Searching Web Page/ Site using Search Engine (eg. google.com, yahoo.com, altavista.com etc.)	4
15.	Exercise Based on MS-Word:	8
15.1	Document Preparation	
15.2	Printing Document	
	Mail Merge usage	
	Draw Table	
16.	Exercise Based on Ms- Excel :	8
16.1	Work Book Preparation	
16..2	Printing Workbook	
	Draw Charts	
17.	Exercise Based on Power Point:	4
17.1	Creating Slide	
17.2	Adding, Animations in Slide	
17.3	Running Slide	
18.	Creating Simple Web Page using HTML.	4

REFERENCE BOOKS:

1.	Computer Fundamental	V.K. Jain, Standard Pub.& Distributors
2.	PC Software for Windows made simple	R.K. Taxali, TMH
3.	Mastering Windows 7/10	TMH
4.	BPB Computer Course BPB in Hindi	BPB Editorial Board,
5.	Introduction to Networking	NANCE, PHI

- | | | |
|----|---|---|
| 6. | First Course in Computer Science | Sanjeev Saxena, Vikas
Publishing House |
| 7. | First Look Microsoft Office 2003 | Murray, PHI |
| 8. | Web Based Application Development
using HTML, DHTML, Javascript
Perl/ CGI | Ivan Beyross, TMH |

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APPLIED MECHANICS**CODE 106****L T P**
2 2/2 2/2**RATIONALE**

The Subject deals with the understanding of basic concepts of statics and dynamics and its application to various disciplines of engineering. Knowledge of this subject is essential for all the disciplines of engineering for better understanding of their respective subjects

CONTENTS		L	T
1.	FORCE	2	1
	1.1 Definition		
	1.2 Units		
	1.3 Different Types of Forces.		
2.	COPLANAR FORCES:	6	3
	2.1 Resolution of Forces		
	2.2 Law of Parallelogram of Forces		
	2.3 Resultant of two or more Forces		
	2.4 Basic Conditions of Equilibrium		
	2.5 Lami's Theorem (No Proof)		
	2.6 Jib Crane		
	2.7 Law of Polygon of Forces (Only Statement)		
3.	MOMENT:	6	3
	3.1 Definition, Units & Sign Convention		
	3.2 Principle of Moments		
	3.3 Application of Equilibrium Conditions for non-concurrent Forces		
4.	APPLICATION OF PRINCIPLES OF FORCES & MOMENTS:	4	2
	4.1 Levers & their Types.		
	4.2 Reactions of Simply Supported Beams (Analytical Method)		
	4.3 Steel Yard.		
	4.4 Lever Safety Valve		
	4.5 Foundry Crane		
5.	CENTRE OF GRAVITY:	5	2
	5.1 Concept		
	5.2 Centroid		
	5.3 Calculation of C.G. of Regular Bodies		
	5.4 Calculation of C.G. of Plain Geometrical Figures		
6.	FRICTION:	5	3
	6.1 Types of Friction		
	6.2 Laws of Friction		
	6.3 Angle of Friction		
	6.4 Angle of Repose		
	6.5 Friction on Horizontal and Inclined Planes		
	6.6 Application of Laws of Friction Related to Wedge, Ladder and Screw Jack.		
7.	SIMPLE MACHINES:	7	4
	7.1 Basic Concepts		
	7.2 Loss in Friction		
	7.3 Inclined Plane		
	7.4 Simple & Differential Wheel and Axle (Neglecting Rope thickness)		
	7.5 Screw Jack		
	7.6 Lifting Crabs		
	7.7 Systems of Pulleys		
	7.8 Worm and Worm Wheel		
8.	RECTILINEAR MOTION:	3	1
	8.1 Concept		
	8.2 Motion under Constant Velocity		
	8.3 Motion under Constant Acceleration		
	8.4 Velocity-time graph and its uses		

9.	MOTION UNDER GRAVITY:	3	2
	9.1 Concept		
	9.2 Vertical Motion		
	9.3 Smooth Inclined Plane		
10.	PROJECTILES:	4	2
	10.1 Concept		
	10.2 Range, Maximum Height and Time of Flight		
	10.3 Equation of Trajectory		
	10.4 Calculation of Velocity of Projectile at Certain Height And at Certain instant		
11.	NEWTON'S LAWS OF MOTION:	3	1
	11.1 Definitions		
	11.2 Momentum and it's Unit		
	11.3 Application of Second Law of Motion		
12.	CIRCULAR MOTION:	4	2
	12.1 Concept		
	12.2 Motion under Constant Velocity		
	12.3 Motion under Constant Acceleration		
	12.4 Relationship between Linear Velocity and Angular Velocity		
	12.5 Centrifugal and Centripetal Forces, their Applications		
13.	WORK, POWER AND ENERGY:	8	4
	13.1 Work Done by a Constant Force		
	13.2 Work Done by Uniform Variable Force		
	13.2.1 Power		
	13.2.1.1 Indicated Power.		
	13.2.1.2 Brake Power.		
	13.2.1.3 Efficiency		
	13.2.2 Energy		
	13.2.2.1 Potential Energy		
	13.2.2.2 Kinetic Energy of Rectilinear Motion		
	13.2.2.3 Kinetic Energy of Circular Motion		

PRACTICALS

1. Use of Engineering Calculator.
2. Verification of the Law of Parallelogram and Polygon of Forces
 - 2.1 By using Force Board
 - 2.2 By using Force Table
3. Verification of the Principle of Moments in case of
 - 3.1 Compound Lever
 - 3.2 Bell crank Lever
4. Determination of Reactions in Case of Simply Supported Beams.
5. To Determine Coefficient of Friction between two Surfaces on
 - 5.1 Horizontal Plane
 - 5.2 Inclined Plane.
6. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Simple Wheel and Axle
7. Determination of Mechanical Advantage, Velocity Ratio and Efficiency Of differential Wheel and Axle
8. Determination of Mechanical Advantage, Velocity Ratio and Efficiency Of Single Purchase Crab
9. Determination of Mechanical Advantage, Velocity Ratio and Efficiency Of Double Purchase Crab
10. Determination of Mechanical Advantage, Velocity Ratio and Efficiency Of Worm and Worm Wheel
11. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Screw Jack
12. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of First System of Pulleys
13. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Second System of Pulleys

14. Determination of Mechanical Advantage, Velocity Ratio and Efficiency of Third System of Pulleys.

REFERENCE BOOKS:

- | | |
|------------------------------------|--------------------|
| 1. Engineering Statics (in Hindi) | Gokhru & Soni |
| 2. Applied Mechanics (in Hindi) | A. R. Paage |
| 3. Engineering Mechanics | D. S. Kumar |
| 4. Engineering Mechanics | R.S. Khurmi |
| 5. Engineering Mechanics | A. R. Basu |
| 6. Applied Mechanics Practical | TTC & LRDC Jodhpur |

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ENGINEERING DRAWING

CODE 107

L T P
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RATIONALE

Drawing is the language of engineers. It is the only media of expressing thoughts and imaginations for giving them the practical shape. For developing universal understanding, it is necessary to follow certain universal conventions. This subject is essential for all the discipline of engineering.

CONTENTS

Note: All drawing should be as per IS-SP: 46-2003.

- 1. Introduction of Drawing Instruments.**
- 2. Lines, Lettering and Dimensioning:**
 - 2.1 Types of Line
 - 2.2 Lettering – Single Stroke, Italics
 - 2.3 Various Systems of Placing the Dimensions
- 3. Geometrical Construction and Engineering Curves:**
 - 3.1 Regular Polygons of Given Side
 - 3.2 Conic sections – Construction of Ellipse, Parabola, Hyperbola
 - 3.3 Construction of Cycloid, Epicycloid and Hypocycloid
 - 3.4 Construction of Involute, Archimedean Spiral and Cylindrical Helix
- 4. Theory of Orthographic Projections:**
 - 4.1 Introduction of Projections, Reference Planes and Projectors
 - 4.2 Angle of Projections (First Angle and Third Angle Projections)
 - 4.3 System of Rotations
 - 4.4 Projection of Points in Different Quadrants
- 5. Projection of Lines:**
 - 5.1 Parallel to Both the Planes
 - 5.2 Parallel to One and Perpendicular to Other Planes
 - 5.3 Parallel to One and Inclined to Other Planes
 - 5.4 Inclined to Both the Planes
- 6. Projection of Planes:**
 - 6.1 Projection of Triangular, Square, Rectangular, Pentagonal, Hexagonal and Circular Planes.
 - 6.2 Plane Parallel to One & Perpendicular to Other
 - 6.3 Plane Perpendicular to Both the Planes.
 - 6.4 Plane Perpendicular to One and Inclined to Other Plane.
- 7. Projection of Solids:**
 - 7.1 Projection of Cube, Prism, Pyramid, Cylinder and Cone
 - 7.2 Projection of Solid whose Axis is Perpendicular to One and Parallel to Other plane.
 - 7.3 Projection of Solid Whose Axis is parallel to One and Inclined to Other Plane.
 - 7.4 Projection of Solid Whose Axis is Parallel to both the Planes (excluding inclined to both the planes)
- 8. Conversion of Pictorial Views into Orthographic Views:**
 - 8.1 Orthographic Projections of Simple Solid Object from Pictorial / Isometric view.
- 9. Section of Solids and Development of Surfaces:**
 - 9.1 Introduction of Sectional Planes
 - 9.2 Sectional Plane Perpendicular to one Reference Plane and Parallel to other
 - 9.3 Sectional Plane Perpendicular to one and inclined to other
 - 9.4 Section of all types of Geometrical Solids. viz, Prism, Pyramid, Cone and Cylinder.
 - 9.5 Apparent Section and True Section.
 - 9.6 Development of Surfaces of Regular Solids viz, Prism, Pyramid, Cone and Cylinder.
- 10. Sections and Conventions:**
 - 10.1 Conventional Method of Representing Full, Half, Removed, Revolved, Partial and Offset Section.

- 10.2 Section Lines for Different Material as per ISI Recommendations.
- 11. Rivets and Riveted Joints:**
- 11.1 Different Types of Rivets -Snap Head, Pan Head with Tapered Neck, Rounded Counter Sunk Head, Flat Counter Sunk Head.
- 11.2 Lap Joint - Single Riveted, Double Riveted (Chain Riveting and Zigzag Riveting)
- 11.3 Butt Joint - Single Riveted, Double Riveted Chain Riveting and Zigzag Riveting (using Single and Double Cover Plates)
- 12. Screw Threads and Fasteners:**
- 12.1 Classification of Threads
- 12.2 Profiles and uses of - Metric, BSW, B.A., American National, Square, ACME, Knuckle Threads
- 12.3 Machine Screw – Fillister, Flat Counter Sunk, Rounded Counter Sunk, Cup and Socket.
- 12.4 Set Screws – Oval, Conical, Flat and Cup Pointed
- 12.5 Hexagonal Bolt and Nut, Stud and Collar Stud.
- 13. Foundation Bolt and Locking Devices:**
- 13.1 Drawing and uses of Rag, Lewis and Eye Bolt
- 13.2 Locking by Simple Lock Nut, Split Pin and Spring Washer, Castle Nut, Locking by Plate
- 14. Keys and Pulleys:**
- 14.1 Drawing and uses of Various Types of Keys - Saddle Key - Hollow and Flat, Sunk - Rectangular, Square, Key with Gib Head, Woodruff Key
- 14.2 Straight Arms flat Belt Pulley
- 15. Shaft Couplings:**
- 15.1 Protected Type Flange Coupling.
- 16. Bearings:**
- 16.1 Simple Bush Bearing.
- 17. Building Drawing:**
- 17.1 Section of a Wall Including Foundation
- 17.2 Sectional Plan of One Room and Toilet from Given Sketch

PRACTICALS

- | | |
|---|----------|
| 1. Preparation of following on Imperial Size Drawing Sheet :- | P |
| 1.1 Geometrical Constructions and Engineering Curves. | 12 |
| 1.2 Projection of Lines | 10 |
| 1.3 Projection of Planes | 8 |
| 1.4 Projection of Solids | 10 |
| 1.5 Orthographic Projections of Simple objects | 16 |
| 1.6 Section and Development of Surfaces of Solids
i.e. Cone, Cylinder, Sphere etc. | 8 |
| 1.7 Section and Development of Surfaces of Prism and
Pyramids | 8 |
| 1.8 Riveted Joints. | 8 |
| 1.9 Screw Threads and Fasteners | 12 |
| 1.10 Pulleys | 8 |
| 1.11 Couplings | 6 |
| 1.12 Bearing | 6 |
| 1.13 Building Drawing | 8 |
| 2. Preparation of following Drawings in Sketch Book (Home Assignment) : | |
| 2.1 Type of lines, letters | |
| 2.2 Projection of Points In Different Quadrants | |
| Various Types of Rivet Heads | |
| Section and Conventions | |
| Set Screws | |
| Machine Screws | |
| 2.7 Foundation Bolts, Keys | |

REFERENCE BOOKS:

- | | | |
|----|--|------------------|
| 1. | Engineering Drawing | N D Bhatt |
| 2. | Machine Drawing | N D Bhatt |
| 3. | Engineering Graphics | V. Laxmi Narayan |
| 4. | Machine Drawing | V. Laxmi Narayan |
| 5. | Engineering Drawing | P S Gill |
| 6. | Machine Drawing | M L Mathur |
| 7. | Engineering Drawing (Hindi) | B K Goyal |
| 8. | Mechanical Engineering Drawing (Hindi) | Gupta & Kumar |
| 9. | Engineering Drawing | A C Parkinson |

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WORKSHOP PRACTICE

CODE 108

L T P

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RATIONALE

Every student of diploma course is expected to have the knowledge in basic shops like fitting, plumbing, carpentry, welding, sheet metal. It is expected that students should be able to carry out minor installation work / repair work of domestic appliances independently. The theoretical / practical knowledge thus gained will be helpful in achieving that end. With this view this subject is to be taught in all the branches of diploma.

CONTENTS

Note : A group of student shall be required to do practicals in all the shops during the year. The practical examination will be taken in the shops covered during the year. Theory parts of syllabus should be dealt with the respective practicals in practical classes. Students have to prepare a practical notebook showing the names, specifications and uses of tools and equipment for each shop with figures. This notebook shall be submitted at the time of the Board's practical examinations (PR).

		P		
1.	Carpentry Shop :	30		
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2.	Welding and Sheet Metal Shop:	30		
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Electric arc welding .
Common Welding Defects
and Inspection, various type
of Joints, end Edge
Preparation.

Introduction to Soldering
and Brazing.
Safety Precautions in
Welding shop.

2.2 Sheet Metal Shop:

Theory :

Introduction to sheet metal
shop
Preliminary Idea of Simple
Sheet Metal Operations,
Different Types of Sheet
Metal Edges and Joints.
Development of Surface in
Sheet Metal Work.
Name, Functions and
Specification of Common
Sheet Metal Tools and
equipments.

Exercises :

Preparation of following
utility Jobs involving
various Sheet Metal Joints
(Single and Double Hem
Joints, Lap Joint, Grooved
Seam Joint, Single and
Double Seam Joint)
1. Preparation of a Soap
Tray
2. Preparation of Funnel.

3. Fitting and Plumbing Shop:

30

3.1 Fitting shop:

Theory :

Introduction to fitting shop :
Name, Functions and
Specification of various
tools and equipments used
in Fitting Shop.
Simple Operations in Fitting
shop(Marking, Filing, Hack
Sawing, Drilling and
Tapping).

Safety Precautions in fitting
shop.

3.2 Plumbing shop:

Theory :

Introductions to G.I. and
PVC Pipes and their uses.

Names Functions and
Specifications of Plumbing
Tools and Accessories.
Different Pipe Fittings.

Exercises :

1. Marking Filing &
Hack Sawing Practice.
2. Production of
Utility Job involving
Marking, Filing and Hack
Sawing.
3. Drilling and
Tapping exercise on the
above job.

Exercises :

1. Cutting and
Threading on G.I. Pipe
2. Exercise on PVC
Pipe Fitting.
3. Repair
of Taps and Cocks.

REFERENCE BOOKS:

- | | | |
|----|---------------------|-------------------|
| 1. | Workshop Technology | Gupta & Malani |
| 2. | Workshop Technology | Kumar & Mittal |
| 3. | Workshop Technology | Hajra, Chaudhary |
| 4. | Workshop Technology | B.S. Raghhuwanshi |

- | | | |
|----|---------------------------------|----------------|
| 5. | Workshop Technology (Hindi) | Tahil Maghnani |
| 6. | Workshop Technology (Hindi) | Vinay Kumar |
| 7. | Domestic Devices and Appliances | K.B. Bhatia |

ELECTRICAL & ELECTRONICS WORKSHOP

CODE 109

L T P
-- -- 3**A - ELECTRICAL WORKSHOP**

		P
1.	Study of Symbol, Specification and Approximate Cost of Common Electrical Accessories, Tools and Wires & Cables Required for Domestic Installation.	6
2.	Study of :	3
	2.1 Basic Electricity Rules for a Domestic Consumer	
	2.2 Safety Precautions & use of Fire Fighting Equipments	
3.	Use of series of Phase Tester, Series Test Lamp, Tong Tester and Megger in Testing of Electrical Installation.	3
4.	Measurement	3
	4.1 Prepare a Potential Divider and Measure Resistance of a Filament Lamp Using Voltmeter and Ammeter.	
	4.2 Measurement of Power and Energy Consumption by an Electric Heater using Watt Meter and Energy Meter.	
5.	Preparation of Wiring Diagram, Wiring, Testing, Fault Finding & Costing for :	9
	5.1 Control of one LED Lamp by one Switch (using casing capping & Flush type switch)	
	5.2 Control of Stair Case Wiring (using Casing Capping, CFL and Flush Type Switches)	
	5.3 Control of one Bell Buzzer and Indicator by one Switch (using Conduit and Flush type Switch)	
6.	Prepare one Switch Board as per Institutional Requirement (using Flush type Switches, Sockets, MCB, Etc.)	3
7.	Study, Connecting, Testing and Fault Finding of	6
	7.1 Fluorescent Tube and its Accessories	
	7.2 Ceiling Fan with resistance type and Electronic Regulator	
8.	Study & Functioning, of following Domestic Appliances -	6
	8.1 Automatic Electric Iron	
	8.2 Air Cooler	
	8.3 Electric Water Pump	
9.	Design, Draw and Estimate the Material required for Installation For a small Residential Building / Office / Hall.	6

* **Accessories used in all above Experiments must be According to Latest Technology.**

B - ELECTRONICS WORKSHOP

		P
1.	Identification of following Resistors and finding their Values:	3
	1.1 Fixed Resistor	
	1.2 Variable Resistance .	
	1.3 Semi Variable Preset .	
2.	Identification of following Capacitor and finding their Values:	3
	2.1 Ceramic	
	2.2 Polystyrene	
	2.3 Electrolytic	
	2.4 Tantalum	
3.	Identification of following Switches and Study of their Working Mechanism:	3
	3.1 Toggle switch	
	3.2 Slide switch	
	3.3 Rotary switch	
	3.4 Push to on Push to off	
	3.5 Momentary Switch	
	3.6 Electromagnetic Switch	

3.7 SPST, SPDT, DPST, DPDT

4.	Identification and Testing of following type of Connectors:	3
	4.1 Printed Circuit Edge	
	4.2 Coaxial	
	4.3 Tape & Ribbon	
	4.4 Plug and Socket connector	
	4.5 USB connector	
	4.6 Power connector	
	4.7 Radio Frequency connector	
5	Study of following Tools used in Electronic Workshop:	3
	5.1 Component Lead Cutter	
	5.2 Wire Strippers	
	5.3 Soldering Iron & Soldering Station	
	5.4 De-Solder Pump	
	5.5 Tweezers, Noise Pliers, Screw Driver	
	5.6 LCR meter	
	5.7 Power Supply	
	5.8 Signal Generator	
6.	Measurement of Voltage, Current and Resistance using Analog & Digital Multimeter.	3
7.	Testing of Electronic, Component such as Capacitor, Inductor, Diode and Transistor.	3
8.	Measurement of Amplitude & Frequency of a Signal using CRO.	6
9.	Verification of Ohm's law using Resistive Circuit and Analog/ Digital Meters.	6
10.	Soldering of different passive component combination on general purpose PCB.	6
11.	Sketching of different Electronic Components Symbol on Drawing Sheet.	3

REFERENCE BOOKS:

1.	Electrical Workshop	M.L. Gupta
2.	Domestic Devices & Appliances	K.B. Bhatia
3.	Electrical Workshop	S.L. Uppal
4.	Electrical Component & Shop Practice	K.R. Nahar
5.	Maintenance of Electrical Equipments	K. S. Janwal
6.	Hand Book of Philips Component	

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