




**MAHARAJA AGRASEN
HIMALAYAN GARHWAL UNIVERSITY
UTTARAKHAND**

**POLYTECHNIC
(DIPLOMA IN ELECTRONICS ENGINEERING)**

REVISED SYLLABUS PREPARED BY

1. DR. SHAILESH KUMAR SINGH 

2. DR. ALOK BHARDWAJ 

3. MR. ISHANT DOBRIYAL 


Registrar
Maharaja Agrasen Himalayan Garhwal University

**RECOMMENDED BY BOARD OF STUDIES DEPARTMENT OF
ENGINEERING AND TECHNOLOGY**

S.N.	NAME	DESIGNATION
1.	DR. ALOK BHARDWAJ	HEAD 
2.	MR. ANOOP SINGH	ASSOCIATE PROFESSOR
3.	MR. UMESH CHANDRA	ASSISTANT PROFESSOR
4.	DR. SADANAND SINGH	EXTERNAL EXPERT*
5.	DR. NARESH KUMAR TRIVEDI	EXTERNAL EXPERT*

(*NOMINATED BY VICE CHANCELLOR)

**APPROVED BY
ACADEMIC COUNCIL, MAHARAJA AGRASEN HIMALAYAN GARHWAL
UNIVERSITY**

W.E.F. - ACADEMIC SESSION 2022-23

Diploma 1st Sem.

Subject Code	Subject	L	T	P	T O T	EVALUATION SCHEME						Total Marks	Credit Point
						Internal		External					
						Theory	Practical	Theory		Practical			
						Max Marks	Max Marks	Max Marks	Hrs. : Min	Max Marks	Hrs. : Min		
DA101	English & Communication Skills -1st	3	0	2	5	20	30	50	2:15	50	3:00	150	4
DA102	Applied Mathematics 1st	3	0	0	3	50	0	100	2:15	0	0	150	3
DA103	Applied Physics 1st	3	0	2	5	20	30	50	2:15	50	3:00	150	4
DA104	Applied Chemistry 1st	3	0	2	5	20	30	50	2:15	50	3:00	150	4
DA105	Basics of Information Technology	3	0	2	5	10	10	50	2:15	30	3:00	100	4
DA106	Engineering Drawing-1st	0	0	6	6	0	50	100	0:00	0	9:00	150	3
DAP107	General Workshop Practice 1st	0	0	6	6	0	50	0	0	50	9:00	100	3
Disc/Game/Sca/Ncc/NSS		0	0	4	4	0	0	0	0	25	6:00	25	2
Industrial Exposure(Assestment at Inst. Level)		0	0	0	0	0	0	0	0	25	0	25	0
Total		15		24	39	120	200	400	11:15	280	36:00:00	1000	27

General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS, cultural activities and discipline etc.

+ Industrial visit compulsory at minimum 2 industry or department

Note: 1- Each period will be 45 minutes. 2- Each session will be of 16weeks. 3- Effective teaching will be at least 15 week + Industrial Visit

Theory 1 Credit = 10 Hrs

Practical 1 Credit = 10 Hrs


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Diploma 2nd Sem.

Subject Code	Subject	L	T	P	T O T	EVALUATION SCHEME						Total Marks	Credit Point
						Internal		External					
						Theory	Practical	Theory		Practical			
						Max Marks	Max Marks	Max Marks	Hrs. : Min	Max Marks	Hrs. : Min		
DA201	English & Communication Skills - 2nd	3	0	2	5	20	30	50	2:15	50	3:00	150	4
DA202	Applied Mathematics 2nd	3	0	0	3	50	0	100	2:15	0	0:00	150	3
DA203	Applied Physics 2nd	3	0	2	5	20	30	50	2:15	50	3:00	150	4
DA204	Applied Chemistry 2nd	3	0	2	5	20	30	50	2:15	50	3:00	150	4
DA205	Environmental Science	3	0	0	3	30	0	70	2:15	0	0:00	100	3
DA206	Engineering Drawing-2nd	0	0	6	6	0	50	100	0:00	0	9:00	150	3
DAP207	General Workshop Practice 2nd	0	0	6	6	0	50	0	0	50	9:00	100	3
	Disc/Game/Sca/Ncc/NSS	0	0	6	6	0	0	0	0	25	9:00	25	3
	Industrial Exposure(Assesment at Inst. Level)	0	0	0	0	0	0	0	0	25	0	25	0
	Total	15	0	24	39	140	190	420	11:15	250	36:00:00	1000	27

General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS, cultural activities and discipline etc.

+ Industrial visit compulsory at minimum 2 industry or department

Note: 1- Each period will be 45 minutes. 2- Each session will be of 16weeks. 3- Effective teaching will be at least 15 week + Industrial Visit

Theory 1 Credit = 10 Hrs

Practical 1 Credit = 10 Hrs

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**STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN
ELECTRONICS ENGINEERING**

THIRD SEMESTER

Course Code	Subject	L	T	P	T O T	EVALUATION SCHEME						Total Marks	Credit
						Internal Assessment		External Assessment (Examination)					
						Theory	Practical	Theory		Practical			
						Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs		
ECE301	Electrical Engineering and Machines	3	1	2	6	30	20	70	3.0	30	3.0	150	5
ECE302	Analog Electronics	3	1	2	6	30	20	70	3.0	30	3.0	150	5
ECE303	Digital Electronics	3	1	2	6	30	20	70	3.0	30	3.0	150	5
ECE304	Communication Engineering	3	1	2	6	30	20	70	3.0	30	3.0	150	5
ECE P305	Electronics Workshop and Minor Project (Practical)	0	0	2	2	-	50	-	-	150	3.0	200	2
ECE306	Computer Programming Using C	2	0	2	4	30	20	70	1.30	30	3.0	150	3
General Proficiency		-	-	4	4	-	25	-	-	25	6	50	2
Total		14	4	16	34	150	175	350	13.30	325	24:00	1000	27

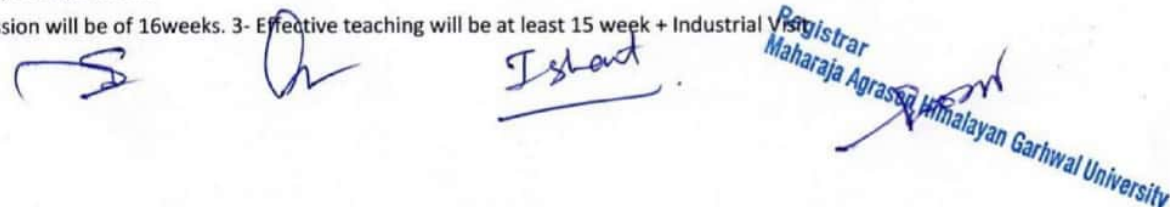
General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS, cultural activities and discipline etc.

+ Industrial visit compulsory at minimum 2 industry or department

Note: 1- Each period will be 45 minutes. 2- Each session will be of 16 weeks. 3- Effective teaching will be at least 15 week + Industrial Visit

Theory 1 Credit = 10 Hrs

Practical 1 Credit = 20 Hrs



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**STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN
ELECTRONICS ENGINEERING
FOURTH SEMESTER**

Course Code	Subject	Periods/Week				Evaluation Scheme						Total Marks	Credit
						Internal Assessment		External Assessment					
		L	T	P	Tot	Theory	Practical	Theory		Practical			
						Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs		
ECE401	Electronics Circuits	3	0	2	5	30	20	70	2.15	30	3.0	150	4
ECE402	Microprocessor and its Applications	3	0	2	5	30	20	70	2.15	30	3.0	150	4
ECE403	Electronic Measuring Instruments	3	0	2	5	30	20	70	2.15	30	3.0	150	4
ECE404	Network Filters and Transmission Lines	3	1	2	6	30	20	70	3.0	30	3.0	150	5
ECE405	Signal Sensing and Conditioning	4	0	2	6	30	20	70	3.0	30	3.0	150	5
ECE406	Entrepreneurship development and Management	4	0	0	4	50	-	150	3.0	-	-	200	4
Industrial Training		Industrial training of 30 days after 4 th semester											
General Proficiency		-	-	4	4	-	25	-	-	25	6	50	2
Total		20	1	14	35	200	125	500	15.45	175	21:00	1000	28

General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS, cultural activities and discipline etc.

+ Industrial visit compulsory at minimum 2 industry or department

Note: 1- Each period will be 45 minutes. 2- Each session will be of 16 weeks. 3- Effective teaching will be at least 15 week + Industrial Visit

Theory 1 Credit = 10 Hrs

Practical 1 Credit = 20 Hrs

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**STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN
ELECTRONICS ENGINEERING
FIFTH SEMESTER**

Course Code	Subject	L	T	P	T 0 T	EVALUATION SCHEME						Total Marks	Credit
						Internal Assessment			External Assessment (Examination)				
						Theory		Practical	Theory		Practical		
						Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs		
ECEP501	Industrial Training (Practical)	4 Weeks				-	20	-	-	30	3	50	
ECE502	Consumer Electronics and Troubleshooting	3	0	2	5	30	20	70	2.15	30	3	150	4
ECE503	Microwave Communication	3	-	2	5	30	20	70	2.15	30	3	150	4
ECE504	Advanced Microprocessor	3	-	2	6	30	20	70	2.15	30	3	150	4
ECE505	Electronics in Industry	3	-	2	5	30	20	70	2.15	30	3	150	4
ECE506	Digital Switching and Circuits	3	-	2	6	30	20	70	2.15	30	3	150	4
ECE507	Process Control and Instrumentation	3	-	2	5	30	20	70	2.15	30	3	150	4
General Proficiency		-	-	4	4	-	25	-	-	25	6	50	4
Total		18	0	16	36	180	165	420	13:30	235	27:00	1000	28

General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS, cultural activities and discipline etc.

+ Industrial visit compulsory at minimum 2 industry or department

Note: 1- Each period will be 45 minutes. 2- Each session will be of 16weeks. 3- Effective teaching will be at least 15 week + Industrial Visit

Theory 1 Credit = 10 Hrs

Practical 1 Credit = 20 Hrs

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**STUDY AND EVALUATION SCHEME FOR DIPLOMA PROGRAMME IN
ELECTRONICS ENGINEERING
SIXTH SEMESTER**

Course Code	Subject	L	T	P	T 0 T	EVALUATION SCHEME						Total Marks	Credit
						Internal Assessment		External Assessment (Examination)					
						Theory	Practical	Theory		Practical			
						Max. Marks	Max. Marks	Max. Marks	Hrs	Max. Marks	Hrs		
ECE601	Optical Fiber Communication	3	0	2	5	30	20	70	2.15	30	3	150	4
ECE602	Mobile Communication	3	0	2	5	30	20	70	2.15	30	3	150	4
ECE603	Microcontroller and Embedded System	3	0	2	5	30	20	70	2.15	30	3	150	4
ECE604	Computer Networks	3	0	2	5	30	20	70	2.15	30	3	150	4
ECE605	Programmable Logic Controller	3	0	2	5	30	20	70	2.15	30	3	150	4
ECEP606	Employable Skills (Practical)	-	-	2	2	-	30	-	-	70	3	100	2
ECEPR607	Major Project	-	-	2	2	-	30	-	-	70	3	100	2
General Proficiency		-	-	4	4	-	25	-	-	25	6	50	4
Total		15	0	18	33	150	185	350	11:15	315	27	1000	28

General Proficiency will comprise of various co-curricular activities like games, hobby clubs, seminars, declamation contests, extension lectures, NCC, NSS, cultural activities and discipline etc.

+ Industrial visit compulsory at minimum 2 industry or department

Note: 1- Each period will be 45 minutes. 2- Each session will be of 16 weeks. 3- Effective teaching will be at least 15 week + Industrial Visit

Theory 1 Credit = 10 Hrs

Practical 1 Credit = 20 Hrs

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FIRST SEMESTER

DA101 ENGLISH AND COMMUNICATION SKILLS – I

Periods/Week L T P
 3 - 2

RATIONALE

Interpersonal communication is a natural and necessary part of organizational life. Yet, communicating effectively can be challenging because of our inherent nature to assume, overreact to and misperceive what actually is happening. Poor communication or lack of communication is often cited as the cause of conflict and poor teamwork. In today's team-oriented workplace, managing communication and developing strategies for creating shared meaning are crucial to achieve results and create successful organizations. The goal of the Communicating Skills course is to produce civic-minded, competent communicators. To that end, students must demonstrate oral as well as written communication proficiency. These include organizational and interpersonal communication, public address and performance. The objectives of this subject are understanding how communication works, gaining active listening and responding skills, understanding the importance of body language, acquiring different strategies of reading texts and increasing confidence by providing opportunities for oral and written expressions

DETAILED CONTENTS

1. COMMUNICATION SKILLS (12 Periods)
 - 1.1 Introduction and Process of Communication
 - 1.2 Objectives of Communication
 - 1.3 Verbal and Non-verbal Communication
 - 1.4 Process of Communication
 - 1.5 Barriers to Communication; Overcoming Strategies
 - 1.6 Listening and Speaking Skills and Sub-Skills
(All topics should be in detail)

2. GRAMMAR AND USAGE (08 Periods)
 - 2.1 Syntax (Parts of speech)

3. WRITING SKILLS (10 Periods)
 - 3.1 Writing Paragraphs
 - 3.2 Picture Composition
 - 3.3 Developing writing skills based on some audio-visual stimulus

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4. READING COM PREHENSION SKILLS (10 Periods)
Unseen comprehension passages (at least 3 passages of literary, scientific, data interpretation).
5. FACETS OF LITERATURE (24 Periods)
- 5.1 Fiction
- 5.1.1 Homecoming – R.N. Tagore
5.1.2 The Selfish Giant - Oscar Wilde
5.1.3 The Missing Mail – R K Laxman
- 5.2 Prose
- 5.2.1 Of Studies – Francis Bacon
5.2.2 Art of Conversation – Richard Steel
5.2.3 Democracy – Dr. Radhakrishnan
- 5.3 Poems
- 5.3.1 Ozymandias – P.B. Shelley
5.3.2 Daffodils – William Wordsworth
5.3.3 Stopping by Woods on a Snowy Evening – Robert Frost

LIST OF PRACTICALS

(Note: The following contents are only for practice. They should not be included in the final theory examination)

DEVELOPING ORAL COMMUNICATION SKILLS

- Greeting, Starting a Conversation
- Introducing Oneself
- Introducing Others
- Leave Taking
- Thanking, Wishing Well
- Talking about Oneself
- Talking about Likes and Dislikes
- Mock Interview

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LIST OF REFERENCE BOOKS

1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. High School English Grammar and Composition by Wren and Martin; S. Chand & Company Ltd., Delhi.
3. Communication Techniques and Skills by R. K. Chadha; Dhan pat Rai Publications, New Delhi.


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DA102 APPLIED MATHEMATICS - I

	L	T	P
Periods/Week	3	-	-

RATIONALE

Applied Mathematics forms the backbone of engineering students. The curriculum of mathematics has undergone changes from time to time in accordance with growth of subject. Diploma in Engineering is a launching stage where the students learn the basics of engineering. The revised syllabus has been designed keeping in view the emerging needs of all categories of students. Great emphasis has been laid on application of various contents like algebra, complex numbers, trigonometry and coordinate geometry. This course will develop analytical abilities to make exact calculations and provide continuing educational base to the 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. Algebra (30 Periods)

- 1.1 Series: A.P. and G.P., n th term of AP and GP, sum to n th term, Value of ${}^n P_r$ and ${}^n C_r$.
- 1.2 Binomial theorem (without proof) for positive integral index (expansion and general form); binomial theorem for any index (expansion without proof)
- 1.3 Partial fractions (linear factors, repeated linear factors, non-reducible quadratic factors only)
- 1.4 Determinants and Matrices – expansion of determinants (up to third order), properties of determinants, solution of equations (up to 3 unknowns) by Cramer's rule. Definition of matrix, addition, subtraction, multiplication of matrices (up to third order), minors and co-factors, inverse of a matrix by adjoint method (up to second order)
- 1.5 Scalar and vector product of two /three vectors

2. Trigonometry (20 Periods)

Review of ratios of some standard angles (0,30,45,60,90 degrees), T-Ratios of Allied angles (without proof), Sum, difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa). T-Ratios of multiple angles, sub-multiple angles (2A, 3A, A/2).

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3. Complex numbers (10 Periods)

Definition of complex numbers, real and imaginary parts of a complex number, polar and Cartesian form and their inter-conversion, conjugate of a complex number, modulus and argument of a complex number, addition, subtraction, multiplication and division of a complex number. De-Moiver's Theorem (simple problems)

4. Co-ordinate Geometry (20 Periods)

4.1 Equation of straight line in various standard forms (without proof), inter section of two straight lines, angle between two lines, perpendicular distance formula (without proof)

4.2 General equation of a circle and its characteristics. To find the equation of a circle, given:

- * Centre and radius
- * Three points lying on it
- * Coordinates of end points of a diameter

4.3 Equations of conics (ellipse, parabola and hyperbola), simple problems related to engineering (standards forms only)

RECOMMENDED BOOKS

1. Applied Mathematics by Dr. RD Sharma, Dhan pat Rai Publications, Delhi
2. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
3. Applied Mathematics-I (Hindi) by Dr. Kailash Sinha, Nav Bharat Publication, Meerut.
4. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
5. Applied Mathematics, Vol. I & II by SS Sabharwal and Sunita Jain, Eagle Parkashan, Jalandhar

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DA103 APPLIED PHYSICS – I

	L	T	P
Periods/Week	3	-	2

RATIONALE

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

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. Units and Dimensions (8 Periods)

- 1.1 Physical quantities
- 1.2 Units - fundamental and derived units, systems of units (FPS, CGS, MKS and SI units)
- 1.3 Dimensions and dimensional formulae of physical quantities
- 1.4 Dimensional equations and principle of homogeneity, applications to conversion from one system of units to another, checking the correctness of physical relations and derivation of simple physical relations, limitations of dimensional analysis
- 1.5 Error in measurement, random and systematic errors, types of errors, propagation of errors, significant figures

2. Force and Motion (12 Periods)

- 2.1 Concept of Scalar and Vector quantities – examples, types of vectors.
- 2.2 Resolution and Composition of vectors, Vector multiplication (scalar product and vector product of vectors), addition of vectors (Parallelogram law)
- 2.3 Force: Newton's laws of motion, linear momentum and conservation of linear momentum, impulse and its application, simple numerical problem in brake system of vehicles and trains etc.
- 2.4 Friction: Types of friction and its application.

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- 2.5 Circular motion: Angular displacement, angular velocity and angular acceleration
- 2.6 Relation between linear and angular variables (velocity and acceleration)
- 2.7 Centripetal force (derivation) and centrifugal force with application such as banking of roads and bending of cyclists
- 2.8 Application of various forces in lifts
- 3 Rotational Motion (6 Periods)
- 3.1 Concept of translatory and rotating motion with examples
- 3.2 Definitions of torque, angular momentum and their relationship
- 3.3 Conservation of angular momentum (qualitative) and its examples
- 3.4 Moment of inertia and its physical significance, radius of gyration, Theorems of parallel and perpendicular axes (statements), Moment of inertia of rod, disc, ring and sphere (Formulae only).
- 3.5 Application of rotational motions in transport vehicles, trains and aero plane turbine/engine.
- 4 Work, Power and Energy (8 Periods)
- 4.1 Work: definition and its SI units
- 4.2 Work done in moving an object on horizontal and inclined plane (incorporating frictional forces) with its application
- 4.3 Power: definition and its SI units, calculation of power with numerical problems
- 4.4 Energy: Definition and its SI units: Kinetic energy and Potential energy with examples and their derivation
- 4.5 Principle of conservation of mechanical energy (for freely falling bodies), transformation of energy from one form to another with its application
- 5 Properties of Matter (10 Periods)
- 5.1 Elasticity: definition of stress and strain, different types of modulus of elasticity, stress – strain diagram, Hooke's law with its applications
- 5.2 Pressure: definition, its units, atmospheric pressure, gauge pressure, absolute pressure, Fortin's Barometer and its applications
- 5.3 Surface tension: concept, its units, angle of contact, measurement of surface tension by capillary tube method, applications of surface tension, effect of temperature and impurity on surface tension
- 5.4 Viscosity and coefficient of viscosity: Stoke's Law and derivation of terminal velocity, effect of temperature on viscosity.

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6 Thermometry (10 Periods)

- 6.1 Difference between heat and temperature
- 6.2 Principles of measurement of temperature and different scales of temperature and their relationship
- 6.3 Types of thermometers (Concept only)
- 6.4 Expansion of solids, liquids and gases, coefficient of linear, surface and cubical expansions and relation amongst them
- 6.5 Modes of transfer of heat (Conduction, convection and radiation with examples)
- 6.6 Co-efficient of thermal conductivity
- 6.7 Engineering Application of conduction, convection and radiations

7. Waves and Vibrations (10 Periods)

- 7.1 Simple Harmonic Motion(SHM): definition, expression for displacement, velocity, acceleration, time period, frequency in S.H.M. Equation of simple harmonic progressive wave
- 7.2 Wave motion: transverse and longitudinal wave motion with examples, sound and light waves, velocity, frequency and wave length of a wave (relationship $v = n\lambda$) and their applications
- 7.3 Free, forced and resonant vibrations with examples
- 7.4 Acoustics of buildings – reverberation, reverberation time, echo, noise, coefficient of absorption of sound, methods to control reverberation time and their applications
- 7.5 Ultrasonics – production (magnetostriction and piezoelectric methods) and their engineering and medical applications

LIST OF PRACTICALS (to perform minimum ten experiments)

- 1. To find the diameter of wire using a screw gauge
- 2. To find volume of solid cylinder and hollow cylinder using a vernier calipers
- 3. To determine the thickness of glass strip and radius of curvature using a spherometer
- 4. To verify parallelogram law of forces
- 5. To find the time period of a simple pendulum and determine the length of second's pendulum.
- 6. To find the velocity of sound by using resonance apparatus at room temperature.
- 7. To determine the viscosity of glycerin by Stoke's method
- 8. To determine the coefficient of friction on horizontal plane.

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9. To determine the Young's Modulus by Searles apparatus
10. To determine force Constant of spring using Hooke's Law

INSTRUCTIONAL STATREGY

Teacher may use various teaching aids like models, charts, graphs and experimental kits etc. for imparting effective instructions in the subject. The teacher should explain about field applications before teaching the basics of mechanics, work power and energy, rotational motion, properties of matter 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. Text Book of Physics for Class XII (Part-I, Part-II) N.C.E.R.T
3. Applied Physics Vol. I and Vol. II, TTTI Publications, Tata McGraw Hill, New Delhi
4. Concepts in Physics by HC Verma, Vol. I & II, Bharti Bhawan Ltd. New Delhi
5. Berkeley Physics Course, Vol. I, II & III, Tata McGraw Hill, Delhi
6. Comprehensive Practical Physics, Vol. I & II, JN Jaiswal, Laxmi Publishers
7. Engineering Physics by PV Naik, Pearson Education Pvt. Ltd, New Delhi
8. Applied Physics I & II by RA Banwait & R Dogra, Eagle Parkashan, Jalandhar
9. Applied Physics by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar
10. Engineering Physics by Vanchna Singh and Sheetal Kumar, Cengage Learning India Pvt. Ltd. Patparganj, Delhi




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DA104 APPLIED CHEMISTRY - I

	L	T	P
Periods/Week	3	-	2

RATIONALE

The role of Chemistry and chemical products in every branch of engineering is expanding greatly. Now a days various products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive year. The strength of materials, the chemical composition of substances, their behavior 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 demonstration and with the active involvement of students.

DETAILED CONTENTS

1. Basics Concepts (08 Periods)
 - 1.1 Definition of chemistry and its importance
 - 1.2 Definition of matter, element, compound and mixtures, atom, molecule, ion, symbol, formula, valency and chemical equation.
 - 1.3 Writing of the chemical formula of a simple chemical compound. Calculation of percentage composition of a chemical compound and form the empirical and molecular formula of the compound
 - 1.4 Essentials of a chemical equation, balancing of a chemical equation by hit and trial method

2. Atomic Structure and Chemical Bonding (08 Periods)
 - 2.1 Fundamental particles i.e. electron, proton and neutron, their characteristics (discovery is not included)
 - 2.2 Electronic concept of valency
 - 2.3 Elementary account of electrovalent, covalent and coordinate bond formation on the basis of the electronic concept of valency giving suitable examples to each
 - 2.4 Hydrogen bonding and its effect on physical properties of the compounds
 - 2.5 Electronic configuration of elements (up to $Z = 30$) with special reference to Aufbau principle

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3. Water (16 Periods)
- 3.1 Hard and soft water, types of hardness and its causes, disadvantages of hardness of water (i) in industrial use (ii) in boilers for steam generation with special reference to sludge and scale formation; foaming and priming in boilers
- 3.2 Methods to remove hardness of water (i) Clark's Process (ii) Permutit Process (iii) Soda Lime process (iv) Ion-Exchange resin process. Simple numerical problems related to soda lime process.
- 3.3 Definition of degree of hardness of water and the systems to express the degree of hardness of water. Simple numerical problems related to finding the degree of hardness on different scales. Estimation of hardness of water sample by O'Hehner's Method and E.D.T.A. Method
- 3.4 Qualities of water used for drinking purposes, treatment of river water to make it fit for town supply
- 3.5 Disinfection of water by chlorination process
4. Solutions (12 Periods)
- 4.1 Concept of homogenous solution, brief introduction of the terms (i) Ionization (ii) Acidity (iii) Basicity (iv) equivalent weight and gram equivalent weight with suitable examples
- 4.2 Strength of a solution (i) Normality (ii) Molarity (iii) Molality as applied in relation to a solution with simple numerical problems related to these terms
- 4.3 Definition of pH, and different industrial applications of pH, determination of pH of a solution with the help of pH meter including simple numerical problems.
- 5 Electrolysis (12 Periods)
- 5.1 Definition of the terms: Electrolytes, Non-electrolytes conductors and non-conductors with suitable examples
- 5.2 Faraday's Laws of Electrolysis with simple numerical problems
- 5.3 Different industrial applications of 'Electrolysis' with special reference to electroplating and electrorefining of metals
- 5.4 Basic concept of Buffer solutions, indicators and solubility product.

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6 Environmental Chemistry

(08 Periods)

- 6.1 General concept of pollution and pollutants
- 6.2 Types and control of pollution like air, water, noise and soil pollution
- 6.3 General idea of ozone depletion, global warming

LIST OF PRACTICALS

1. Volumetric analysis and study of apparatus used therein. Simple problems on volumetric analysis equation
2. Preparation of standard solution of oxalic acid or potassium dichromate
3. To analyse the inorganic mixture for two acidic and two basic radicals from the following radicals
 - a) Acidic Radicals CO_3^{--} , SO_4^{--} , NO_3^- , CH_3COO^- , Cl^- , Br^- , I^-
 - b) Basic Radicals NH_4^{++} , Pb^+ , Cu^{++} , Cd^{++} , As^{+++} , Sb^{+++} , Sn^{++} , Al^{+++} , Fe^{+++} , Cr^{+++} , Mn^{++} , Ni^{++} , Co^{++} , Zn^{++} , Ba^{++} , Sn^{++} , Ca^{++} and Mg^{++} ,
4. Determine the degree of temporary hardness of water by O'Heher's method
5. Estimation of total alkalinity of water volumetrically
6. Determine pH of a given sample by using pH meter
7. Determination of solubility of a solid at room temperature
8. Demonstration – Application of FeCl_3 in etching process for designing circuits on PCB (Printed Circuit Board)

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. A Text Book of Applied Chemistry-I by Sharma and Others; Technical Bureau of India, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M,
6. Chemistry of Engineering by Aggarwal CV,
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar

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DA105 BASICS OF INFORMATION TECHNOLOGY

Periods/Weeks L T P
3 - 2

RATIONALE

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

DETAILED CONTENTS

1. Information Technology – its concept and scope (2 Periods)
2. Elements of a computer system, its usefulness and applications, block diagram of a computer, CPU, memory, data – numeric data, alpha numeric data; contents of a program, processing of data (4 Periods)
3. Computer organization, computer hardware and software; primary and secondary memory: RAM, ROM, PROM etc. (4 Periods)
4. Input devices; keyboard, scanner, mouse etc.; output devices; VDU and Printer, Plotter (4 Periods)
5. Primary and Secondary Storage (Auxiliary Storage), Secondary storage; magnetic disks – tracks and sectors, optical disk (CD, CD-RW and DVD Memory) (4 Periods)
6. Introduction to Operating Systems such as MS-DOS and Windows (4 Periods)
7. Introduction to internet, browsing using search engine (like google etc.) (5 Periods)
8. Basics of Networking – LAN, WAN, Topologies (5 Periods)

LIST OF PRACTICALS

1. Given a PC, name its various components and list their functions
2. Identification of various parts of a computer and peripherals
3. Practice in installing a computer system by giving connection

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4. DOS Commands (internal / external) e.g. TYPE, REN, DEL, CD, MD, COPY, TREE, BACKUP
5. Exercises on entering text and data (Typing Practice using any tutor)
6. Features of Windows as an operating system
 - Start
 - Shutdown and restore
 - Creating and operating on the icons
 - Opening closing and sizing the windows
 - Using elementary job commands like – creating, saving, modifying, renaming, finding and deleting a file
 - Creating and operating on a folder
 - Changing setting like, date, time color (back ground and fore ground)
 - Using short cuts
 - Using on line help
7. MS-Word
 - File Management:
Opening, creating and saving a document, locating files, copying contents in some different file(s), protecting files, Giving password protection for a file
 - Page Set up:
Setting margins, tab setting, ruler, indenting
 - Editing a document:
Entering text, Cut, copy, paste using tool- bars
 - Formatting a document:
Using different fonts, changing font size and colour, changing the appearance through bold/ italic/ underlined, highlighting a text, changing case, using subscript and superscript, using different underline methods
 - Aligning of text in a document, justification of document, Inserting bullets and numbering
 - Formatting paragraph, inserting page breaks and column breaks, line spacing
 - Use of headers, footers: Inserting footnote, end note, use of comments
 - Inserting date, time, special symbols, importing graphic images, drawing tools
 - Tables and Borders:
Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table
 - Print preview, zoom, page set up, printing options
 - Using Find, Replace options
 - Using Tools like:
Spell checker, help, use of macros, mail merge, thesaurus word content and

- statistics, printing envelopes and labels
- Using shapes and drawing toolbar,
- Working with more than one window in MS Word,
- How to change the version of the document from one window OS to another
- Conversion between different text editors, software and MS word

8. MS-Excel

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

9. MS PowerPoint

- a) Introduction to PowerPoint
 - How to start PowerPoint
 - Working environment: concept of toolbars, slide layout, templates etc.
 - Opening a new/existing presentation
 - Different views for viewing slides in a presentation: normal, slide sorter etc.
- b) Addition, deletion and saving of slides
- c) How to view the slide show?
 - Viewing the presentation using slide navigator
 - Slide transition
 - Animation effects etc.

10. Internet and its Applications

- a) Log-in to internet
- b) Navigation for information seeking on internet
- c) Browsing and down loading of information from internet

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d) Sending and receiving e-mail

- Creating a message
- Creating an address book
- Attaching a file with e-mail message
- Receiving a message
- Deleting a message

INSTRUCTIONAL STRATEGY

Since this is an introductory computer related subject, the teacher should demonstrate and explain computer and its peripherals in the laboratory. The theory may be dovetailed with practical exercises for better understanding. The students may be encouraged to work independently on computer to gain confidence.

RECOMMENDED BOOKS

1. Fundamentals of Computer by V. Rajaraman; Prentice Hall of India Pvt. Ltd., New Delhi
2. Computers Today by SK Basandara, Galgotia Publication Pvt Ltd. Darya Ganj, New Delhi.
3. MS-Office 2000 for Everyone by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., New Delhi
4. Internet for Every One by Alexis Leon and Mathews Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
5. A First Course in Computer by Sanjay Saxena; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
6. Mastering Windows 95, BPB Publication, New Delhi
7. Computer Fundamentals by PK Sinha; BPB Publication, New Delhi
8. Fundamentals of Information Technology by Leon and Leon; Vikas Publishing House Pvt. Ltd., Jungpura, New Delhi
9. On Your Marks - Net...Set...Go... Surviving in an e-world by Anushka Wirasinha, Prentice Hall of India Pvt. Ltd., New Delhi
10. Learning MS Office XP by Ramesh Bangia, Khanna Book Publishing Co. (P) Ltd., New Delhi.
11. Fundamentals of Information Technology by Vipin Arora, Eagle Parkashan, Jalandhar

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DA106 ENGINEERING DRAWING – I

L T P

Periods/Weeks - - 6

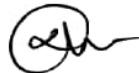
RATIONALE

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. The emphasis while imparting instructions should be to develop conceptual skills in the students.

- Note:
1. First angle projection is to be followed
 2. Instruction relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students
 3. S.P. 46.1988 should be followed
 4. Minimum of 15 sheets to be prepared by each student

DETAILED CONTENTS

1. Drawing Office Practice, Lines & Lettering (2 Sheets)
 - 1.1 Drawing instruments
 - 1.2 Sizes and layout of standard drawing sheets and drawing boards
 - 1.3 Different types of lines in engineering drawing as per BIS specifications
 - 1.4 Free hand lettering (alphabet and numerals) lower case and upper case, single stroke vertical and inclined at 75 degree in different standard series of 2.5, 3, 5, 7, 10, and 15 mm heights in the ratio of 7:4
2. Dimensioning (2 Sheets)
 - 2.1 Necessity of dimensioning, Types of dimensioning (chain, parallel and progressive dimensioning, size and location dimensioning)
Methods of placing dimensioning (Aligned and unidirectional system), use of leader lines. General principles of dimensioning.
 - 2.2 Dimensioning of overall sizes, circles, thread holes, chamfered surfaces, angles, tapered surface holes equally spaced on PCD, counter sunk hole counter bored holes, cylindrical parts, narrow space and gaps, radii, curves and arches.
3. Simple Geometrical Constructions used in Engineering Practice (2 Sheets)
 - 3.1 Construction of regular polygons (triangle, square, pentagon, hexagon) and circles
 - 3.2 Ellipses (concentric circle method and Intersecting Arcs method)
 - 3.3 Parabola (rectangle and tangent method), cycloid




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4. Scale (2 sheets)
 - 4.1 Scale – their need and importance, Definition of representative fraction (R.F), find RF of given scale
 - 4.2 Construction of plain and diagonal scales
5. Principle of Projections (7 sheets)
 - 5.1 Principle of orthographic projection and introduction to first angle projection and third angle projection
 - 5.2 Projection of points situated in different quadrants (1 Sheet)
 - 5.3 Projection of lines, Lines inclined to one plane and parallel to the other and vice versa (1st & 3rd quadrants); Line inclined to both reference planes (HP and VP) (1 Sheet)
 - 5.4 Projection of Planes: Planes perpendicular and parallel to either of the planes; planes perpendicular to one plane and inclined to the other or vice versa (1st & 3rd quadrants) (1 Sheet)
 - 5.5 Projection of solids, such as Prism, Cube, Cylinder and Cones with axis perpendicular to horizontal plane or parallel to horizontal plane/vertical plane or both
 - 5.6 Drawing 3 orthographic views of given objects (3 sheets, at least one sheet in 3rd Angle Projection)
 - 5.7 Identification of surfaces on drawn orthographic views from isometric object drawn (1 Sheet)
6. Sectional Views (1 sheet)
 - 6.1 Need for sectional views –Drawing of different conventions for materials in sections, conventional breaks for shafts, pipes, rectangular, square, angle, channel and rolled sections
7. Isometric Views (2 sheets)
 - 7.1 Fundamentals of isometric projections (theoretical instructions) and isometric scales
 - 7.2 Isometric views of combination of regular solids like cylinder, cone, cube, prism and pyramid
8. Symbols and Conventions (2 sheets)
 - 8.1 Civil engineering sanitary fitting symbols
 - 8.2 Electrical fitting symbols for domestic interior installations and electronics symbols
 - 8.3 Building plan drawing with electrical and civil engineering symbols

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RECOMMENDED BOOKS

1. Engineering Drawing by C M Verma, Takniki Parkashak, Roorkee.
2. Elementary Engineering Drawing (in First Angle Projection) by ND Bhatt, Charotar Publishing House
3. A Text Book of Engineering Drawing by Surjit Singh ; Dhanpat Rai and Co., Delhi
4. Engineering Drawing by PS Gill ; SK Kataria and sons, Delhi
5. Engineering Drawing by RB Gupta ; Satya Prakashan, New Delhi



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DAP107 GENERAL WORKSHOP PRACTICE – I

L T P
Periods/Week - - 6

RATIONALE

In order to have a balanced overall development of diploma engineers, it is necessary to integrate theory with practice. General workshop practices are included in the curriculum in order to provide hand on experience about use of different tools and basic manufacturing practices. This course aims at developing general manual and machining skills in the students. Besides above, the development of dignity of labour, precision, safety at work place, team working and development of right attitude are the other objectives.

DETAILED CONTENTS (PRACTICALS)

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-1
2. Fitting Shop
3. Welding Shop-I
4. Electric Shop -I
5. Smithy Shop or Electronic Shop-I
6. Sheet Metal Shop

Note:

1. The branches e.g. Civil Engineering, Electrical Engineering and Automobile Engineering, will do **Smithy Shop** instead of Electronic Shop- I
2. The branches e.g. Electronics and Communication Engineering, Computer Engineering and Information Technology will do **Electronic Shop-I** instead of Smithy Shop.


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1. Carpentry and Painting Shop -I

- 1.1 Introduction to various types of wood such as Deodar, Kail, Partal, Teak, Mango, Sheesham, etc. (Demonstration and their identification).
- 1.2 Demonstration, function and use of commonly used hand tools. Care, maintenance of tools and safety measures to be observed.
Job I Marking, sawing, planning and chiseling & their practice (size should be mentioned)
- 1.3 Introduction to various types of wooden joints, their relative advantages and uses.
Job II Preparation of half lap joint
Job III Preparation of Mortise and Tenon Joint
- 1.4 Demonstration of various methods of painting wooden items.
Job IV Preparation of wooden surface before painting including primer coating
Job V Painting Practice by brush/spray
Job VI Preparation of surface, before Painting such as cleaning, sanding, putty. Procedure and application of primer code and painting steel items.
- 1.5 Safety precautions in carpentry shop

2. Fitting Shop

- 2.1 Introduction to fitting shop tools, common materials used in fitting shop, Identification of materials. Such as Steel, Brass, Copper, Aluminum etc. Identification of various sections of steel such as Flat, Angle, Tee, Channel, Bar Girder, Square, Z-Section, etc.
- 2.2 Description and demonstration of various types of work benches, holding devices and files. Precautions while filing.
- 2.3 Description and demonstration of simple operation of hack-sawing, demonstration and description of various types of blades and their specifications, uses and method of fitting the blade.

Job I Marking of job, use of marking tools and measuring instruments.
Job II Filing a dimensioned rectangular or square piece of an accuracy of $\pm 0.5\text{mm}$
Job III Filing practice (production of flat surfaces). Checking by straight edge.

Job IV Making a cutout from a square piece of MS Flat using hand hacksaw.
- 2.4 Care and maintenance of measuring tools like calipers, steel rule, try square, vernier calipers, micrometer, height gauge, combination set. Handling of measuring instruments, checking of zero error, finding of least count (all gauges including dial gauge).

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3. Welding Shop – I

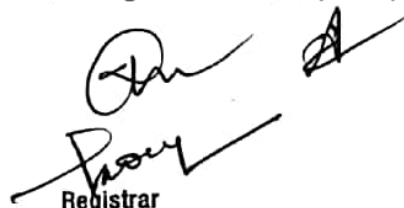
- 3.1 (a) Introduction to welding and its importance in engineering practice; types of welding; common materials that can be welded, introduction to welding equipment e.g. a.c. welding set, d.c. rectifier, electrode holder, electrodes and their specifications, welding screens and other welding related equipment, accessories and gloves.
- (b) Safety precautions during welding
- (c) Hazards of welding and its remedies
- 3.2 Electric arc welding, (a.c. and d.c.) precautions while using electric arc welding, Practice in setting current and voltage for striking proper arc. Earthing of welding machine.
- Job I Practice of striking arc bending and tacking while using electric arc welding set.
- Job II Welding practice on electric arc welding for making uniform and straight weld beads
- 3.3 Various types of joints and end preparation.
- Job III Preparation of butt joint by electric arc welding.
- Job IV Preparation of lap joint by electric arc welding.
- Job V Preparation of corner joint by using electric arc welding.
- Job VI Preparation of Tee joint by electric arc welding.

4. Electric Shop – I

- 4.1 Study, demonstration and identification of common electrical materials such as wires, cables, switches, fuses, ceiling roses, PVC Conduits, PVC Channels and allied items, tools along with electrical instruments such as voltmeter, ammeter and multimeter.
- 4.2 Study of electrical safety measures and demonstration about use of protective devices such as fuses, MCBs, ELCBs and relays including earthing.
- Job I Identification of phase, neutral and earth of domestic appliances and their connection to two pin/three pin plugs.
- Job II Preparation of a house wiring circuit on wooden board using fuse, switches, socket, holder, ceiling rose etc. in PVC conduit and PVC casing and capping wiring system.
- 4.3 Study of common electrical appliances such as electric iron, electric kettle, ceiling fan, table fan, electric mixer, electric Geyser, gas geyser, desert cooler, refrigerator, water purifier
- 4.4 Introduction to lead-acid battery, identification of parts and its working.
- Job III Installation of inverter with battery and to connect two or more batteries in series and in parallel (knowledge of a.c. and d.c.)
- Job IV Charging of a battery and testing it with the help of hydrometer and cell tester

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5. Smithy Shop

- 5.1 Demonstration and detailed explanation of tools and equipment used. Forging operations in smithy shop. Safety measures to be observed in the smithy shop.
- 5.2 Demonstration and description of bending operation, upsetting operation, description and specification of anvils, swage blocks, hammers etc.
- 5.3 Demonstration and description of tongs, fullers, swages etc.
 - Job I To forge a L-hook.
 - Job II To prepare a job involving upsetting process
 - Job III To forge a chisel
 - Job IV To prepare a cube from a M.S. round by forging method.

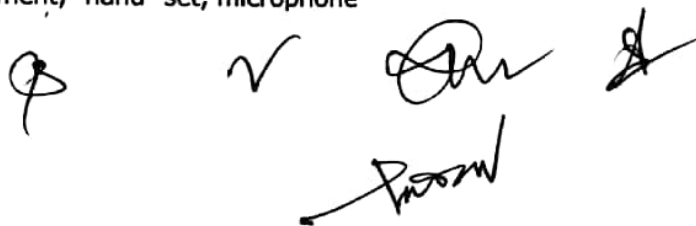
OR

5. Electronic Shop – I

- 5.1 Identification and familiarization with the following tools used in electronic shop: Such as Tweezers, Screw drivers (different sizes), Insulated Pliers, Cutter, Sniper, Philips Screw Driver (Star Screw Driver), L- Keys, Soldering Iron, soldering wire, flux. Their demonstration and uses.
- 5.2 Identification and familiarization with Multimeter (analog and digital)
 - Job I Practice in the use of above mentioned tools and instruments. For this a small experimental set up may be done
- 5.3 Various types of protective devices such as : wire fuse, cartridge fuse etc. ,
- 5.4 Identification and familiarization with ear phone speaker connector, telephone jacks and similar male and female connectors (audio, video)
- 5.5 Safety precautions to be observed in the electronic shop
- 5.6 Identification and familiarization with soldering and desoldering practice
- 5.7 Introduction to thimbles and crimping tools

NOTE: Demonstration boards for the electronics components such as resistor, capacitor, diodes, transistors, FETs, IFT Coils, ICs should be made.

- Job II Cut, strip, join an insulated wire with the help of soldering iron (repeat with different types of wires)
- Job III Cut, strip, connect/solder/crimp different kinds of wires/ cables (including co-axial and shielded cable) to different types of power/general purpose/audio video/telephone plugs, sockets, jacks, terminals, binding posts, terminal strips, connectors. The tasks should include making complete recording/playback/ antenna/ speaker leads for common electronic products such as Radio, TV, CD players, VCD/DVD players, cassette recorder and players, Hi-Fi equipment, hand- set, microphone

The image shows several handwritten signatures and initials in black ink. There are four distinct signatures at the top, and a larger, more stylized signature below them that appears to be 'Prasanna'.

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6. Sheet Metal Shop

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

- 6.1 Introduction and demonstration of hand tools used in sheet metal shop.
- 6.2 Introduction and demonstration of various machines and equipment used in sheet metal shop e.g. shearing machine, bar folder, burring machine, power press, sheet bending machine.
- 6.3 Introduction and demonstration of various raw materials used in sheet metal shop e.g., M.S. sheet, galvanized-iron plain sheet, galvanized corrugated sheet, aluminum sheets etc.
- 6.4 Study of various types of rivets, steel screw etc.

Job I Shearing practice on a sheet using hand shears.

- a) Practice on making single riveted lap joint/double riveted lap Joint.
- b) Practice on making single cover plate chain type, seam joint and riveted butt joint

RECOMMENDED BOOKS

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

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SECOND SEMESTER

DA201: ENGLISH AND COMMUNICATION SKILLS – II

Periods/Week L T P
 3 - 2

RATIONALE

Interpersonal communication is a natural and necessary part of organizational life. Yet, communicating effectively can be challenging because of our inherent nature to assume, overreact to and misperceive what actually is happening. Poor communication or lack of communication is often cited as the cause of conflict and poor teamwork. In today's team-oriented workplace, managing communication and developing strategies for creating shared meaning are crucial to achieve results and create successful organizations. The goal of the Communicating Skills course is to produce civic-minded, competent communicators. To that end, students must demonstrate oral as well as written communication proficiency. These include organizational and interpersonal communication, public address and performance. The objectives of this subject are understanding how communication works, gaining active listening and responding skills, understanding the importance of body language, acquiring different strategies of reading texts and increasing confidence by providing opportunities for oral and written expressions

DETAILED CONTENTS

Section A

1. FACETS OF LITERATURE

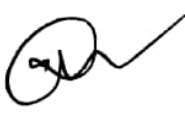
(22 Periods)

- 1.1 Fiction
 - 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 Of Truth – Francis Bacon
 - 1.2.2 Praises of Solitude – Samuel Johnson
 - 1.2.3 A Gentleman – John Henry Newman
- 1.3 Poems
 - 1.3.1 All The World's A Stage – W. Shakespeare
 - 1.3.2 A Solitary Reaper – William Wordsworth

2. READING SKILLS

Unseen comprehension passages (at least 3 passages).

(08 Periods)

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Section B

3. WRITING SKILLS (16 Periods)

Writing Notice Page 31 of 21

- Writing Circular
- Writing a Memo
- Agenda for a Meeting
- Minutes of the Meeting
- Press release
- Telephonic Messages
- Paragraph writing:
Simple and Current Topics should be covered.

4. Correspondence (06 Periods)

- Business Letters
- Personal Letters

5. Communication (12 Periods)

- Media and Modes of Communication
- Channels of Communication
- Barriers to Communication
- Listening Skills
- Body language
- Humour in Communication

LIST OF PRACTICALS

(Note: The following contents are only for practice. They should not be included in the final theory examination)

1. LISTENING COMPREHENSION
 - a. Locating Main Ideas in a Listening Excerpt, Note-taking
2. DEVELOPING ORAL COMMUNICATION SKILLS
 - a. Offering-Responding to Offers, Requesting-Responding to Requests, Congratulating, Expressing Sympathy and Condolences, Expressing Disappointments, Asking Questions-Polite Responses, Apologizing, Forgiving

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Complaining, Persuading, Warning, asking for and Giving Information, Giving Instructions, Getting and Giving Permission, asking for and Giving Opinions, Group Discussion

TEXTBOOK:

1. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi

LIST OF REFERENCE BOOKS

1. Communicating Effectively in English, Book-I by Revathi Srinivas; Abhishek Publications, Chandigarh.
2. High School English Grammar and Composition by Wren & Martin; S. Chand & Company Ltd., Delhi.
3. Communication Techniques and Skills by R. K. Chadha; Dhanpat Rai Publications, New Delhi.

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DA202: APPLIED MATHEMATICS - II

L T P
Periods/Week 3 - -

RATIONALE

Applied Mathematics forms the backbone of engineering students. The curriculum of mathematics has undergone changes from time to time in accordance with growth of subject. Diploma in Engineering is a launching stage where the students learn the basics of engineering. The revised syllabus has been designed keeping in view the emerging needs of all categories of students. Great emphasis has been laid on application of various contents like differential calculus, integral calculus, differential equations and statistics. This course will develop analytical abilities to make exact calculations and provide continuing educational base to the 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. Differential Calculus

(30 Periods)

Definition of function; Concept of limits.

Four standard limits $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a}$

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

Differentiation by definition of x^n , $\sin x$, $\cos x$, $\tan x$, e^x , $\log_a x$ only

Differentiation of sum, product and quotient of functions. Differentiation of function of a function.

Differentiation of inverse trigonometrical functions, Logarithmic differentiation, Exponential differentiation, Successive differentiation (up to third order only).

Applications:

(a) Maxima and minima

(b) Equation of tangent and normal to a curve (for explicit functions only) – Simple problems only

2. Integral Calculus

(25 Periods)

Integration as inverse operation of differentiation

Simple standard integrals and related problems

Simple integration by substitution, by parts and by partial fractions (for

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linear factors only)

Properties of definite integrals

Evaluation of definite integrals (simple problems)-

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

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

Numerical integration by Simpson's Rule and Trapezoidal Rule (simple problems only)

3 Ordinary Differential Equations (10 Periods)

- 3.1 Definition, order, degree, linear and non-linear differential equations
- 3.2 Formation of differential equations (up to second order)
- 3.3. Solution of first order differential equations (a) Variable Separable (b) Homogeneous (c) Linear and (d) Exact.

4. Statistics (15Periods)

Measures of Central Tendency: Mean, Median, Mode
Measures of Dispersion: Mean deviation, Standard deviation
Co-efficient of rank correlation

TEXTBOOK:

- 1. Applied Mathematics by Dr. RD Sharma, Dhanpat Rai Publications, Delhi

RECOMMENDED BOOKS

- 1. Applied Mathematics by Dr. RD Sharma, Dhanpat Rai Publications, Delhi
- 2. Elementary Engineering Mathematics by BS Grewal, Khanna Publishers, New Delhi
- 3. Applied Mathematics-I (Hindi) by Dr. Kailash Sinha, Nav Bharat Publication, Meerut.
- 4. Engineering Mathematics by Vol. I & II by S Kohli, IPH, Jalandhar
- 5. Applied Mathematics, Vol. I & II by SS Sabharwal & Sunita Jain, Eagle Parkashan, Jalandhar

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DA203: APPLIED PHYSICS – II

	L	T	P
Periods/Week	3	-	2

RATIONALE

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

DETAILED CONTENTS

- Optics** (10 Periods)
Review of basic optics laws: reflection and refraction

Refraction and refractive index, image formation in lenses, image magnification, lens formulae (thin lens only), power of lens, total internal reflection and their applications

Simple and compound microscope, astronomical telescope, magnifying power and its calculation (in each case), Terrestrial and Galileo's telescope (Concept only) and their applications
- Electrostatics** (12 Periods)
Coulombs law, unit of charge, electric potential and electric potential difference

Electric field, electric field intensity, electric lines of force, electric flux Gauss's Law

Applications of Gauss law in finding electric field of point charge, straight charged conductor, plane charged sheet and between two plane parallel charged sheets

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

Application of electrostatics in electrostatic precipitator

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3. DC Circuits

(12 Periods)

Concept of electricity, current and its units, direct and alternating current, voltage, resistance and resistivity, potential difference and e.m.f., Concept and applications of potentiometer.

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.

Kirchhoff's laws, Wheatstone bridge principle and its applications (Slide Wire Bridge)

Heating effect of current and concept of electric power, energy and their units, related numerical problems

Application of electricity in various equipment, advantages of electrical energy over other forms of energy

4. Electromagnetism

(13 Periods)

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

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.

Moving coil galvanometer conductor, its principle, construction and working, conversion of a galvanometer into ammeter and voltmeter.

Electromagnetic induction, Faradays Laws, Lenz's Law.

Applications of Electromagnetism

5. Semiconductor physics

(07 Periods)

Energy bands, intrinsic and extrinsic semiconductors, p-n junction diode and its characteristics

Diode as rectifier – half wave and full wave rectifier, semiconductor transistor pnp and npn (concept only)



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6. Modern Physics

(10 Periods)

Electromagnetic spectrum, photo electric effect and work function, X rays -properties, production and their applications in medicine and industries.

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

Fiber optics: introduction to optical fiber materials, types, light propagation and applications in communication.

LIST OF PRACTICALS (To perform minimum eight experiments)

1. Conversion of Galvanometer into an Ammeter of given range.
2. Conversion of Galvanometer into Voltmeter of given range.
3. To verify ohm's laws by drawing a graph between voltage and current.
4. To verify laws of resistances in series and in parallel connection.
5. To draw characteristics of a pn junction diode and determine knee and break down voltages
6. Verification of Kirchhoff's Laws
7. Determination of resistivity by Wheatstone bridge
8. To determine the resistance of electronic components by multimeter
9. Determination of internal resistance of primary cell by using ammeter and voltmeter
10. To determine emf of primary cell using potentiometer and standard voltage source.

INSTRUCTIONAL STRATEGY

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

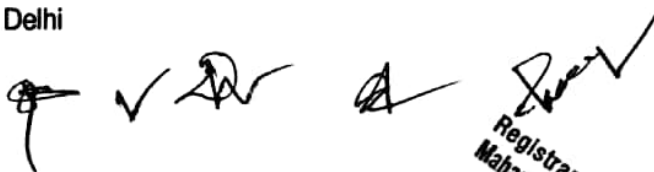
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TEXTBOOK:

1. Applied Physics Vol II by Jasmer Kaur and Bhupinder Singh, Lords Publications, Jalandhar

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



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DA204: APPLIED CHEMISTRY-II

L T P
Periods/Week 3 - 2

RATIONALE

The role of Chemistry and chemical products in every branch of engineering is expanding greatly. Now a days various products of chemical industries are playing important role in the field of engineering with increasing number of such products each successive year. The strength of materials, the chemical composition of substances, their behavior 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 demonstration and with the active involvement of students.

DETAILED CONTENTS

1. Metallurgy (12 Periods)

A brief introduction of the terms: Metallurgy, mineral, ore, gangue or matrix, flux, slag, concentration (methods of concentrating the ores), roasting calcination and refining as applied in relation to various metallurgical operations

Metallurgy of (i) Aluminum (ii) Iron

Definition of an alloy, purposes of alloying, composition and uses of alloys like magnalium, duralumin, alnico, invar and stainless steel

2. Fuels (16 Periods)

Definition of a 'Fuel', characteristics of a good fuel and classification of fuels with suitable examples

Definition of Calorific value of a fuel and its determination for a solid fuel with the help of Bomb calorimeter with simple numerical problems.

Merits of gaseous fuels over those of other varieties of fuels

Manufacture, composition, properties and uses of (i) Water gas (ii) Oil gas

(iii) Biogas (iv) Compressed Natural gas (CNG) Octane Number and Cetane

Number

3 Corrosion (08 Periods)

Meaning of the term 'corrosion' and its definition



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Theories of corrosion i.e. (i) direct chemical action theory and (ii) electro chemical theory

Prevention of corrosion by

- (a) Alloying
- (b) Providing metallic coatings
- (c) Sacrificial cathodic protections:

4 Lubricants (08 Periods)

Definition of (i) lubricant (ii) lubrication
Classification of lubricants
Principles of lubrication
(i) fluid film lubrication
(ii) boundary lubrication

Characteristics of a lubricant such as viscosity, viscosity index, volatility, oxidation, oiliness, acidity, emulsification, flash point, fire point and pour point.

Importance of additives in lubricants

Dewaxing and solvent refining of liquid lubricants

5 Cement and Glass (04 Periods)

General introduction to cement and glass

Manufacture of Cement

Manufacture of ordinary glass and lead glass

6. Classification and Nomenclature of Organic Compounds (16 Periods)

Classification of Organic Compounds, functional group, Homologous Series

Physical and Chemical properties, and industrial use of Organic Compound

IUPAC system of nomenclature of Carboxylic acid, Alcohols, Phenols, Aldehydes, Ketones and Amines (first six members of each series only).

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LIST OF PRACTICALS

1. Gravimetric analysis and study of apparatus used there in
2. To determine the percentage composition of a mixture consisting of a volatile and a non-volatile substance
3. Estimate the amount of moisture in the given sample of coal
4. Esterification and ceric ammonium tests of alcohol
5. Sodium carbonate and Ester test of carboxylic acids
6. To determination the amount of copper in the given sample of copper sulphate with the help of N/20 sodium thiosulphate solution.
7. Detection of metal iron in the rust (solution of rust in concentrated HCL may be given)
8. Demonstration to determine calorific value of a solid fuel with the help of Bomb Calorimeter

TEXTBOOK:

1. Applied Chemistry-II by Dr. J K Sharma, Abhishek Publications, Sector 17-C, Chandigarh

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-II by SS Kumar; Tata McGraw Hill, Delhi
4. A Text Book of Applied Chemistry-II by Sharma and Others; Technical Bureau of India, Jalandhar
5. Engineering Chemistry by Jain PC and Jain M,
6. Chemistry of Engineering by Aggarwal CV,
7. Chemistry for Environmental Engineers by Swayer and McCarty, McGraw Hill, Delhi
8. Progressive Applied Chemistry –I and II by Dr. G.H. Hugar; Eagle Prakashan, Jalandhar
9. Applied Chemistry-II by Dr. J K Sharma, Abhishek Publications, Sector 17-C, Chandigarh.

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DA205: ENVIRONMENTAL SCIENCE

L T P
Periods/Week 3 - -

RATIONALE

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

DETAILED CONTENTS

1. Basics of ecology, eco system and sustainable development (03 Periods)
2. Conservation of land reforms, preservation of species, prevention of advancement of deserts and lowering of water table (04 Periods)
3. Sources of pollution - natural and man-made, their effects on living and non-living organisms, Pollution of water - causes, effects of domestic wastes and industrial effluent on living and non-living organisms, Pollution of air-causes and effects of man, animal, vegetation and non-living organisms, Sources of noise pollution and its effects
4. Solid waste management; classification of refuse material, types, sources and properties of solid wastes, abatement methods (06 Periods)
5. Mining, blasting, deforestation and their effects (03 Periods)
6. Legislation to control environment (04 Periods)
7. Environmental Impact Assessment (EIA), Elements for preparing EIA statements (04 Periods)
8. Current issues in environmental pollution and its control, role of non-conventional sources of energy in environmental protection (06 Periods)

TEXTBOOK:

1. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.

RECOMMENDED BOOKS

1. Environmental and Pollution Awareness by Sharma BR; Satya Prakashan, New Delhi.
2. Environmental Protection Law and Policy in India by Thakur Kailash; Deep and Deep Publications, New Delhi.
3. Environmental Engineering and Management by Suresh K Dhamija; SK Kataria and Sons, New Delhi.
4. Environmental Science by Deswal and Deswal; Dhanpat Rai and Co. (P) Ltd. Delhi.

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DA206: ENGINEERING DRAWING – II

Periods/Week L T P
 - - 6

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

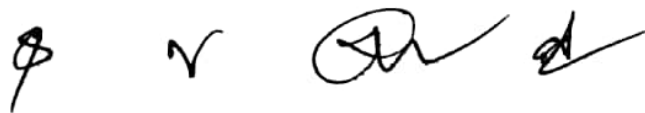
- Note:**
1. First angle projection is to be followed
 2. Minimum of 15 sheets to be prepared by each student
 3. SP 46 – 1988 should be followed
 4. Instructions relevant to various drawings may be given along with appropriate demonstration, before assigning drawing practice to the students

DETAILED CONTENTS

1. Section of Solids by Different Cutting Planes
2. Development of Surfaces (2 sheets)

Development of surfaces – cubes, prisms, (square, pentagonal and hexagonal), cylinders, pyramids (square, pentagonal, hexagonal) and cones
3. Detail and Assembly Drawing (2 sheets)
Principle and utility of detail and assembly drawings
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 Mortise and Tenon joint
4. Threads (2 sheets)
Nomenclature of threads, types of threads (metric), single and multiple start threads
Forms of various external thread sections such as V, square and acme threads, BA, BSW and Knuckle, Metric, Seller Thread, Buttress Threads
Simplified conventions of left hand and right-hand threads, both external and internal threads
5. Locking Devices (1 sheet)

Lock nut, castle nut, split pin nut, sawn nut, slotted nut



A handwritten signature or set of initials, possibly 'J. S.', written in black ink.

6. Nuts and Bolts (3 sheets)
Different views of hexagonal and square nuts; Assembly of hexagonal headed, square headed, square headed with square neck, bolts with hexagonal and square nuts and washers. Foundations bolts – Rag bolt and Lewis's bolt
7. Screws, Studs and Washers (1 sheet)
Drawing various types of machine screws
Drawing various types of studs and set screws
8. Keys and Cotters (2 sheets)
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
Cotter joints (i) gib and cotter joint (ii) knuckle joint
9. Rivets and Riveted Joints (2 sheets)
Types of structural and general purposes rivet heads
Caulking and fullering of riveted joints
Types of riveted joints – lap, butt (single riveted, double riveted lap joint, single cover plate and double cover plate), chain and zig – zag riveting
10. Welded Joints (1 sheet)
Various conventions and symbols of welded joints (IS 696)
Practical applications of welded joints say joints on steel frames, windows, doors and furniture
11. Couplings (2 sheets)
Muff or Box coupling, half lap muff coupling
Flange coupling (Protected and non-protected)
Flexible coupling
12. AutoCAD (for practical and viva only)

Practice on drawing commands, editing commands
Practice on sectioning and hatching
Practice on preparing simple drawings

TEXTBOOK:

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

RECOMMENDED BOOKS

1. Engineering Drawing by C M Verma, Takniki Parkashak, Roorkee.
2. Elementary Engineering Drawing by ND Bhatt, Charotar Publishing House
3. A Text Book of Engineering Drawing by Surjit Singh, Dhanpat Rai and Co. Delhi
4. Engineering Drawing by PS Gill, SK Kataria and Sons, New Delhi
5. Machine Drawing by RB Gupta, Satya Prakashan, New Delhi.

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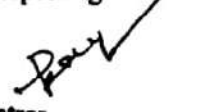
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Note:

1. A minimum of 15 sheets should be prepared by each student
2. No table is suggested for distribution of marks, instead it is emphasized that the examination paper should contain exercises for evaluation of all necessary skills envisaged in the curriculum.
3. It is also suggested that a comprehensive viva of each student should be conducted by an external examiner during or just after the examinations to ascertain understanding of the subject e.g., reading and interpreting drawings and development of necessary skills etc.

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DAP207: GENERAL WORKSHOP PRACTICE - II

Periods/Weeks L T P
 - - 6

RATIONALE

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. Fitting and Plumbing Shop
3. Welding shop -II
4. Electric shop -II
5. Electronic shop-II or Machine Shop

Note:

1. The branches e.g., Civil Engineering, Mechanical Engineering, Mechanical (Automobile), Chemical Engineering, Chemical (R&P), Agriculture Engineering, Electrical Engineering and Automobile Engineering will do **Machine Shop** instead of electronic shop- II
2. The branches e.g., Electronics and Communication Engineering, Computer Engineering and Information Technology 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

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.

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Demonstration of job showing use of rip saw, bow saw and tenon saw, method of sharpening various saws.

Demonstration of job on band saw and circular saw, chain and chisel, universal wood working machine, saw re-sharpening machine, saw brazing unit.

Importance and need of polishing wooden items. Introduction to polishing materials.

Job V Polishing on wooden items.

2. Fitting and Plumbing Shop

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

Description and demonstration of various types of drills, taps and dies Selection of dies for threading, selection of drills, taps and reamers for tapping operations.

Job, I Making internal and external threads on a job by tapping and dyeing operations (manually)

Precautions while drilling soft metals, e.g., copper, brass, aluminum etc.

Job II Drilling practice on soft metals such as 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 elbows, tee, union, socket, stopcock, taps etc.

3. Welding Shop – II

3. 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 Highpressure) and welding and tacking practice on simple jobs.

Common welding joints generally made by gas welding.

Job II Preparation of butt joint by gas welding.

Job III Preparation of small cot frame from conduit pipe by 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.

Demonstration and use of TIG and MIG welding equipment

4. Electric Shop = II

Importance and demonstration of three-phase wiring on three-phase panel with the help of a demonstrating panel.

Job, I Laying out 3-phase wiring for an electric motor or any other 3-phase machine.

Job II Connecting single-phase energy meter and testing it. Reading and working out the power consumption and the cost of energy.

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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.

Job IV Finding fault in simple electric machine and its rectification
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 V Testing single phase/three phase electrical motor by using voltmeters, ammeter, clip-on meter, tachometer etc.

Job VI Reversing the rotation of a motor.

5. Electronic Shop- II

Uses of the items mentioned below:

- a) Various types of single, multi-cored insulated screened wire and cables - power, audio video, co-axial, general purpose wires/cables
- b) Various types of plugs, sockets, connectors suitable for general purpose audio and video use, 2 and 3 pin mains plug and sockets, 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.
- c) Various types of switches such as normal/miniature toggle, slide, push button, piano key, rotary, micro switches, SPST, SPDT, DPST, DPDT, band selector, multi way master mains switch.
- d) Various types of protective devices such as: wire fuse, cartridge fuse, slow acting/fast acting fuse, HRC fuse, thermal fuse, single/multiple circuit breakers, over and under current relays.
- e) Materials: Conducting, insulating and magnetic materials.
- f) Demonstration and uses of single beam simple crop, signal generator and function-generator
- g) Regulated power supply-fixed and variable voltage, single output as well as dual output.

Identification and familiarization with active and passive components; types and color code of resistor, capacitors and potentiometers (including VDR, LDR, and thermistor). Identification of components including diode, LED, transistor, LCD, UJT, FET, coils, relays, reed relays, transformers, linear and digital ICs, thyristors.

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








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- 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 Soldering practices

Job III Temperature controlled soldering station

Job IV De-soldering pump

Job V De-soldering strip/wik

Job VI De-solder, remove and clean all the components, wires from a given equipment, a PCB or a tag strip.

Job VII Wiring of a small circuit on a PCB/tag strip involving lacking, sleeving and use of identifier tags

OR

5 Machine Shop

Introduction to various machines used in machine shop

Job I: Exercise on simple turning

Job II: Exercise on taper turning

Job III: Marking and drilling practice on mild steel piece

Job IV: Marking and drilling practice on aluminum piece

Job V. Demonstration of various functions of CNC Machine

TEXTBOOK:

1. Workshop Technology by B.S. Raghuvanshi, Dhan pat Rai and Co., New Delhi

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 Technology by B.S. Raghuvanshi, Dhan pat Rai and Co., New Delhi
6. Workshop Technology by HS Bawa, Tata McGraw Hill Publishers, New Delhi



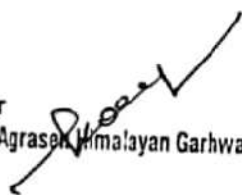





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THIRD SEMESTER

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ECE301 ELECTRICAL ENGINEERING AND MACHINES

L T P

Periods/week: 3 1 2

RATIONALE:

For a diploma holder, it becomes imperative to know the fundamentals of the electrical engineering in order to grasp the knowledge of the field. This subject will provide acquaintance with various terms, knowledge of fundamental concepts of electricity, and various motors and machines.

DETAILED CONTENTS

(08 eriods)

1. Over view of DC Circuits

- Basic concept of AC & DC
- Applications of Kirchoff's Laws in solving electrical network problems.
- Network theorems such as superposition, Thevenin theorem, Norton theorem and maximum power transfer theorem.
- Star-delta transformation

2. AC fundamentals

(10 Periods)

- Concept of alternating current, and voltage, equation of instantaneous values.
- Representation of alternating sinusoidal quantities by phasors
- Power in pure resistance, inductance, capacitance. RL, RC, RLC circuits Active and reactive components of current and their significance
- Power factor and its practical significance
- Resonance in series and parallel circuits Active
- Active power reactive power, apparent power

3. Three phase supply

(10 Periods)

- Advantage of three phase system over single phase system
- Star-delta connection
- Relation between phase voltage and line voltage, also between phase current and line current in a 3 phase system
- Power and power factor in 3 phase system

4. Transformer

(10 Periods)

Working principle of a Transformer, constructional features, voltage and current transformation. Methods of connection 3 phase transformers, current and voltage relationship, auto transformer and its uses, instruments transformer, voltage regulation and its significance, need for isolation. Losses in a transformer, cooling of transformer

5. Electrical Machines

Principles of electromechanical energy conversion,

(16 Periods)

DC Machines: Types, e.m.f. equation of generator and torque equation of motor, construction characteristics and applications of dc motors, speed control of DC motor. Single Phase Induction Motor: Principle of operation and construction brief of single phase motor introduction to methods of starting, applications.

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Three Phase Induction Motor: Types, constructional brief & Principle of operation, Slip-torque characteristics, speed control and starting methods
Three Phase Synchronous Machines: Constructional brief & Principle of operation of alternator and synchronous motor and their applications.

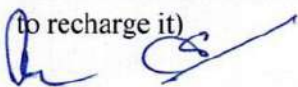
6. Batteries

(10 Periods)

- Basic idea about primary and secondary cells,
- Construction, working and applications of Lead-Acid, Nickel-Cadmium and Silveroxide batteries,
- Capacity and efficiency of lead acid battery
- Charging methods used for lead-acid battery(accumulator),
- Care and maintenance of lead-acid battery,
- Series and parallel connections of batteries,
- Testing of lead acid battery for fully charged condition and their specification
- Application of lead acid battery
- Introduction to maintenance free batteries.

LIST OF PRACTICALS

1. Familiarization of measuring instruments viz. voltmeter, ammeter, wattmeter and other accessories
2. To measure (very low) resistance of an ammeter and (very high) resistance of a voltmeter
3. To verify in d.c. circuits
 - Thevenin's theorem
 - Norton's theorem
 - Super Position Theorem
 - Maximum Power Transfer Theorem
4. To find a voltage current relationship in a single phase R-L and R-C Series circuits, draw their impedance triangles and determination of the power factor in each case.
5. To determine effect of a single phase transformer from the data obtained through open circuit and short circuit test.
6. To connect the primary and secondary winding of a three phase transformer and to verify line and phase current and voltage relationship respectively.
7. To connect a dc shunt motor with supply through a 3 point starter and to run the motor at different speeds with the help of a field regulator.
8. To run a 3 phase induction motor with the help of a star- delta starter. To change the direction of rotation of the motor.
9. To run a synchronous motor with a.c. supply and to measure speed to verify the relation $N = 120f/p$.
10. To test a lead – acid storage battery for charged & discharged condition (with hydrometer & to recharge it)



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INSTRUCTIONAL STRATEGY

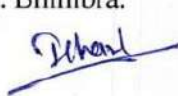
The teacher should give emphasis on understanding of concept and various terms used in the subject. Practical exercises will reinforce various concepts.

TEXTBOOKS

1. Basics of Electrical and Electronics by SN Ali; Vayu Publications

RECOMMENDED BOOKS:

1. Basic Electrical and Electronics Engineering by SK Sahdev , DhanpatRai and CO, New Delhi.
2. Electrical Science by Choudhury S; Narosa Publishing House Pvt. Ltd. Daryaganj New Delhi.
3. Basic Electrical and Electronics Engineering by Kumar KM , Vikas Publishing House Pvt Ltd. Jangpura, New Delhi.
4. Basic Electrical Engineering by MoolSingh ,Galgotia Publication Pvt. Ltd. New Delhi.
5. Electrical Technology by BL Theraja, S Chand and Co, New Delhi.
6. Principles of Electrical Engineering by BR Gupta, S Chand and Co, New delhi.
7. Basic Electrical Engineering by PS Dhogal , Tata McGraw Hill , New Delhi.
8. Basic Electrical Engineering by JB Gupta; SK Kataria and Sons , New Delhi.
9. Electrical Machine by SK Bhattacharya, Tata McGraw Hill, New Delhi.
10. Electrical Machine by SK Sahdev, Unique International Publications, Jalandhar.
11. Electrical Machine by Nagrathand Kothari, Tata McGraw Hill, New Delhi.
12. Electrical Engineering by JB Gupta, SK Kataria & Sons , New Delhi.
13. Electrical Machines by P. S. Bhimbra.



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RATIONALE

This subject will enable the student to have conceptual understanding of conductors, semiconductors and insulators, extrinsic and intrinsic semi-conductors, p-n junction, need of rectifiers in electronics, understanding of filters in rectifiers, tunnel diodes, LEDs, varactor diodes, LCD, understanding the working of transistors in various configuration; understanding of FETs and MOSFET etc. For effective functioning in the field of electronics service industry. The teacher should give emphasis on understanding of concepts and explanation of various terms used in the subject. Practical exercises will reinforce various concepts. Industrial/field exposures must be given by organizing visit to local electronic industries.

DETAILED CONTENTS

1. Semi conductor Physics (12 Periods)
 - Review of basic atomic structure and energy level, concept of insulator, conductors and semi conductors, atomic structure of Ge and Si, covalent bonds
 - Concept of intrinsic and extrinsic semiconductor, P and N impurities, doping of impurity
 - P and N type semiconductors and their conductivity. Effect of temperature on conductivity of intrinsic semi conductor
 - Energy level diagram of conductors, insulators and semi conductors, minority and majority carriers
 - Basic idea of Hall Effect and its uses

2. Semi Conductor Diode (12 Periods)
 - PN junction diode, mechanism of current flow in PN junction, Drift and diffusion current, depletion layer, forward and reverse biased PN junction, potential barrier, concept of junction capacitance in forward and reverse bias condition
 - V-I characteristics, static and dynamic resistance and their calculation from diode characteristics
 - Diode as half wave, full wave and bridge rectifier. PIV, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC filter and n filter
 - Type of diodes, characteristics and applications of Zener diode. Zener and avalanche breakdown, use of Zener diode as a voltage regulator

3. Introduction to Bipolar Transistor (12 Periods)

Concept of bipolar transistor, structure, PNP and NPN transistor, their symbols and mechanism of current flow; current relations in transistor; concept of leakage current; CB, CE, CC configuration of the transistor, input and output characteristics in CB and CE configurations; input and output dynamic resistance in CB and CE configurations; current

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amplification factors. Comparison of CB, CE and CC Configurations, Power rating of Transistor

4. Transistor Biasing Circuits

(06 Periods)

Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits, Load line Analysis, Concept of AC load Line, Stability Factor

5. Single Stage Transistor Amplifier

(10 Periods)

Classification of Amplifier

Single stage transistor amplifier circuits, a.c load line and its use in calculation of currents and voltage gain of a single stage amplifier circuit. Explanation of phase reversal of output voltage with respect to input voltage. H-parameters and their significance. Calculation of current gain, voltage gain, input impedance and output impedance using h-parameter

6. FET, MOSFET & UJT

(12 Periods)

Construction, operation and characteristics of FET and its application

- Construction, operation and characteristics of MOSFET in depletion and enhancement modes and its applications
- C-MOS advantages and applications
- Comparison of JFET, MOSFET and BJT
- FET amplifier circuit and its working principle. (No analysis)
- Construction, operations and application of UJT.

LIST OF PRACTICALS

1. Familiarization, identification and testing of active and passive components.
2. Familiarization with operations of different Electronics instruments like analog & digital Multi-meter, CRO, Signal generator, Regulated Power Supply
3. To plot V-I characteristics of PN junction diode
4. To plot V-I characteristics of a zener diode & observe its use as voltage regulator
5. To observe the wave shape of following rectifier circuit
 - Half wave rectifier
 - Full wave rectifier
 - Bridge rectifier
6. To plot the wave shape of full wave rectifier with
 - Shunt capacitor filter
 - Series capacitor filter
 - π filter
7. To plot input and output characteristics and calculate parameter of transistor in CE configuration
8. To plot input and output characteristics and calculate parameter of transistor in CB configuration

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9. To plot V-I characteristics of FET Transistor
10. To measure the Q-point and note the variation of Q- point
 - By increasing the base resistance in fixed biased circuit
 - By changing out of bias resistance in potential driver circuit
11. To measure voltage gain, input, output impedance in single stage CE amplifier circuits
12. To Plot the V-I Characteristics of UJT & use of UJT as relaxation oscillator.

INSTRUCTIONAL STRATEGY

The aim of this subject is to provide the knowledge of the fundamental concepts related to basic electronics. The teacher should give more emphasis on understanding of concepts and the measuring of various terms used in the subject. Practical exercises should be included to reinforce the various concepts. Practical applications of semiconductor diodes, transistors, field effect transistors etc must be elucidated to the students.

TEXTBOOK:

1. Analog Electronics by Varun Goyal; Vayu Publications

RECOMMENDED BOOKS:

1. Basic Electronics and Linear circuit by NN Bhargava and Kulshreshtha, Tata McGraw Hill, New Delhi.
2. Electronics Devices and circuits by D.C. Kulshreshtha; New Age Publishers, New Delhi.
3. Principle of Electrical and Electronics Engineering by VK Mehta; S Chand and Co. New Delhi.
4. Electronics Components and Materials by SM Dhi, Tata McGraw Hill, New Delhi.
5. Electronics Device and circuits by Millman and Halkias; McGraw Hill.
6. Principle of Electronics by Albert Paul Malvino; Tata McGraw Hill.
7. Electronics Devices and circuits-I by Naresh Gupta, Jyotesh Malhotra and Harish CSaini, Eagle Prakashan, Jalandhar.
8. Electronics Devices and circuits by Rama Reddy, Narosa Publishing House Pvt.Ltd. New Delhi.

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ECE303 DIGITAL ELECTRONICS

Periods/week L T P
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RATIONALE

This syllabus has been designed to make the students know about the fundamental principles of digital electronics and gain familiarity with the available IC chips. This subject aims to give a background in the broad field of digital systems design and microprocessors.

DETAILED CONTENTS

1. Introduction (02 Periods)
 - Comparison between analog and digital signal
 - Applications and advantages of digital signals
2. Number System (04 Periods)
+ (01 T)
 - Binary, octal and hexadecimal number system: conversion from decimal and hexadecimal to binary and vice-versa
 - Binary addition, subtraction, multiplication and division including binary points. 1's and 2's complement method of addition/subtraction, sign magnitude method of representation, floating point representation
3. Codes and Parity (05 Periods)
+ (01 T)
 - Concept of code, weighted and non-weighted codes, examples of 8421, BCD, excess-3 and Gray code
 - Concept of parity, single and double parity and error detection code.
4. Logic Gates and Families (06 Periods)
+ (02 T)
 - a) Concept of negative and positive logic
 - b) Definition, symbols and truth tables of NOT, AND, OR, NAND, NOR, EXOR Gates, NAND and NOR as universal gates
 - c) Logic family classification
 - Definition of SSI, MSI, LSI, VLSI
 - TTL and C MOS families
 - Characteristics of TTL and C MOS digital gates. Delay, speed, noise margin, logic levels, power dissipation, fan-in, fan-out, power supply requirement and comparison between TTL and C MOS families, ECL & IIL
 - Open collector and totem pole output circuits
 - Introduction to tri-state devices, tri state buffer and Inverter circuits

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5. Logic Simplification (04 Periods)
+ (02 T) Various identities.
- Postulates of Boolean algebra, De Morgan's Theorems. Formulation of truth table and Boolean equation for simple problem. Implementation of Boolean (logic) equation with gates
 - Karnaugh map (upto 4 variables) and simple applications in developing combinational logic circuits
 - Concept of POS & SOP.
6. Arithmetic circuits (04 Periods)
+ (01 T)
- Half adder and Full adder circuit, design and implementation.
 - Half and Full subtractor circuit, design and implementation.
 - 4bit binary Adder and Subtractor IC (7483)
7. Decoders, Multiplexer and De Multiplexer (07 Periods)
+ (01 T)
- Four bit decoder circuits for 7 segment display and decoder/driver ICs.
 - Multiplexers and De-Multiplexers
 - Basic functions and block diagram of MUX and DEMUX. Different ICs
8. Latches and flip flops (06 Periods)
+ (01 T)
- Concept and types of latch with their working and applications
 - Operation using waveforms and truth tables of RS, T, D, Master/Slave JK flip flops.
 - Difference between a latch and a flip flop
 - Flip flop ICs
9. Counters (06 Periods)
+ (02 T)
- Introduction to Asynchronous and Synchronous counters
 - Binary counters
 - Divide by N ripple counters, Decade counter.
 - Up/down counter
 - Ring counter with timing diagram
 - Counter ICs
10. Shift Register (05 Periods)
+ (01 T)
- Introduction and basic concepts including shift left and shift right.
 - Serial in parallel out, serial in serial out, parallel in serial out, parallel in parallel out. Universal shift register
 - Buffer register, Tristate Buffer
 - register IC 7495

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11. A/D and D/A Converters (06 Periods)
+ (02 T)
- a) Working principle of A/D and D/A converters
b) Brief idea about different techniques A/D conversion and study of

- Stair step Ramp A/D converter
- Dual Slope A/D converter
- Successive Approximation A/D Converter

- c) Detail study of
- Binary Weighted D/A converter
 - R/2R ladder D/A converter
- d) Applications of A/D and D/A converter
e) Sample and Hold Circuit

12. Memories (05 Periods)
+ (01 T)

Memory organization, Classification of semi conductor memories. ROM, PROM, DROM, EPROM, EEPROM, RAM, CCD memories, Programmable logic devices, programmable logic array, programmable array logic

- 13 Arithmetic & Logic Unit (05 Periods)
+ (01 T)

Basic idea about arithmetic logic unit w.r.t IC 74181 and applications, implementation of binary multiplication, division, subtraction and addition.

LIST OF PRACTICALS

- 1) Verification and interpretation of truth tables for AND, OR, NOT NAND, NOR and Exclusive OR (EXOR) and Exclusive NOR (EXNOR) gates
- 2) Realisation of logic functions with the help of NAND or NOR gates
- 3) To design a half adder & full adder using XOR and NAND gates and verification of its operation
- 4) Realisation of 4 bit adder/subtractor using IC
- 5) Verification of truth table for positive edge triggered, negative edge triggered, level triggered IC flip-flops (At least one IC each of D latch, D flip-flop, JK flip-flops)
- 6) Verification of truth table for encoder and decoder ICs, Mux and DeMux
- 7) To design a 4 bit SISO, SIPO, PISO, PIPO shift registers using JK/D flip flops and verification of their operation
- 8) Asynchronous Counter ICs

Verification of truth table for any one universal shift register IC

Use of IC 7490 or equivalent TTL (a) divide by 2 (b) divide by 10 Counter
OR

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

9. To design A/D and D/A convertor and verify their operations.

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10. Familiarity use of EPROM programmes
11. Verify the writing and reading operation of RAM IC
12. Verify the logic operation, arithmetic operation of ALU IC

Note: Above experiments may preferably be done on Bread Boards.

INSTRUCTIONAL STRATEGY

The digital systems in microprocessors have significant importance in the area of electronics. Adequate competency needs to be developed by giving sufficient practical knowledge in microprocessors (programming as well as interfacing), A/D, D/A Converters and other topics. Help may be taken in the form of charts, simulation packages to develop clear concepts of the subject. Programming exercises other than the tested in circulation may be given to the students.

TEXTBOOKS

1. Digital Electronics by Dr. KP Mishra; Vayu Publications

RECOMMENDED BOOKS:

1. Digital Electronics and Applications by Malvino Leach, Tata McGraw Hill Education Pvt Ltd, New Delhi.
2. Digital Logic Designs by Morris Mano, Prentice Hall of India, New Delhi.
3. Digital Electronics by Soumitra Kumar Mandal, Tata McGraw Hill Education Pvt Ltd.
4. Digital Electronics by V K Sangar , Raj Publishers, Jalandhar.
5. Digital Electronics by Tokheim, Tata McGraw Hill Education Pvt Ltd.
6. Digital Fundamentals by Thomas Floyds, Universal Book Stall.
7. Digital Electronics by RP Jain, Tata McGraw Hill Education Pvt Ltd, New Delhi.
8. Digital Electronics by KS Jamwal, DhanpatRai and Co., New Delhi.
9. Digital Electronics by Rajiv Sapra, Ishan Publication, Ambala.
10. Digital Electronics by BR Gupta, DhanpatRai& Co., New Delhi.
11. Digital Systems, Principles and Applications by RJ Tocci, Prentice Hall of India, New Delhi.
12. Digital Electronics by Rajaraman V., Prentice Hall of India, New Delhi.
13. Fundamentals of Digital Electronics by Naresh Gupta, Jain Brothers, New Delhi.

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RATIONALE

The study of principles of communication systems leads to further specialized study of audio and video systems, line communications and microwave communication systems. Thus the diploma-holder in Electronics and Communication Engineering shall find employment in areas of R and D, production, servicing and maintenance of various communication systems. The students should understand the advantage and limitations of various analog and digital modulation systems, transmitters, receivers and antennas relate to them while studying practical communication systems.

DETAILED CONTENTS

1. Introduction (04 Periods)
 - Need for modulation, frequency translation and demodulation in communication systems
 - Basic scheme of a modern communication system

2. Amplitude modulation (05 Periods)
+ (02 T)
 - Derivation of expression for an amplitude modulated wave. Carrier and side band components. Modulation index. Spectrum and BW of AM Wave. Relative power distribution in carrier and side bands
 - Elementary idea of DSB-SC, SSB-SC, ISB and VSB modulations, their comparison, and areas of applications

3. Frequency & Phase Modulation (07 Periods)
+ (02 T)
 - Expression for frequency modulated wave and its frequency spectrum (without Proof and analysis of Bessel function), Modulation index, maximum frequency deviation and deviation ratio, BW of signals
 - Effect of noise on FM carrier. Noise triangle, Role of limiter, Need for pre-emphasis and de-emphasis
Expression for phase modulated wave, modulation index
 - Comparison of Phase, FM and AM in communication systems

4. Modulators (07 Periods)
+ (02 T)
 - a. AM Modulators
Circuit Diagram and working operation of
 - i. Collector and Base Modulator
 - ii. Square Law Modulator
 - Switching Modulator
 - Balanced Modulator
 - Ring Modulator
 - b. FM Modulators

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Circuit Diagram and working of reactance modulator, varactor diode modulator, VCO and Armstrong phase modulator. Stabilization of carrier for using AFC (Block diagram approach)

5- Demodulators (07 Periods)
+ (02 T)

a. AM Demodulators

- Principles of demodulation of AM wave using diode detector circuit; concept of Clipping and formula for RC time constant for minimum distortion (no derivation)
- Principle of demodulation of AM Wave using synchronous detection.

b. FM Demodulators

- Basic principles of FM detection using slope detector
- Principle of working of the following FM demodulators
 - Foster-Seeley discriminator
 - Ratio detector
 - Quadrature detector
 - Phase locked Loop (PLL) FM demodulators

6- Pulse Modulation (08 Periods)
+ (02 T)

Statement of sampling theorem and elementary idea of sampling frequency for pulse modulation

Basic concepts of time division multiplexing (TDM) and frequency division multiplexing (FDM)

Types of pulse modulation-PAM, PPM, PWM (Generation & Detection) and their comparison

Pulse code Modulation (PCM) Basic scheme of PCM system. Quantization, quantization error, companding Advantages of PCM systems.

7. AM/FM Transmitters (04 Periods)
+ (02 T)

Classification of transmitters

Block diagram and working principles of AM transmitters Reactance transmitter & Armstrong FM Transmitters.

8. AM/FM Radio Receivers (12 Periods)
+ (02 T)

Block Diagram and working principle of super heterodyne AM receiver, function of each block and typical wave at I/P and O/P of each block, Advantages of super heterodyne reception.

Performance characteristics of a radio receiver-sensitivity, selectivity, fidelity, S/N ratio, image rejection ratio and their measurement procedure.

Selection criteria of intermediate frequency (IF), Concepts of Simple and delayed AGC.

- Block diagram of an FM receiver, function of each block and wave forms at input and output different blocks.
- Block diagram of communication receivers, differences with respect to broadcast receivers.



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9. Antennas

(10 Periods)

+ (02 T)

Physical concept of radiation of electromagnetic energy from a dipole, type of propagation
Brief idea of EM wave propagation & type of propagation, Concept of polarization of EM waves, electromagnetic spectrum and its various ranges. Tropospheric scattering in brief.

- a) Definition and physical concepts of the terms with antennas like point source, gain, directivity, aperture, effective area, radiation pattern, beam angle, beam width & radiation resistance.
- b) Types of antennas : brief description, characteristics and typical applications of
 - Half wave dipole.
 - Medium wave (mast) antenna
 - Yagi & ferrite rod antenna
- c) Brief description of broadside and end fire arrays, their radiation pattern and applications (without analysis); basic concept Tropospheric scattering brief idea about rhombic antenna and disc antenna.

LIST OF PRACTICALS

1. To observe an AM wave on CRO produced by a standard signal generator using internal and external modulation & to measure the modulation index of the wave obtained
2. To obtain an AM wave from a square law modulator circuit and observe waveforms and to measure the modulation index of the obtained wave form
3. To obtain an FM wave and measure the frequency deviation for different modulating signal
4. To obtain modulating signal from an AM detector circuit and observe the pattern for different RC time constants and obtain its optimum value for least distortion
5. To obtain modulating signal from a FM detector
6. To observe PAM, PPM and PWM signal and compare it with the analog input signal
7. To feed an analog signal to a PCM modulator and compare the demodulated signal with the analog input. Also note the effect of low pass filter at the demodulated output
8. To plot the sensitivity & selectivity characteristics of a radio receiver and determine the frequency of maximum sensitivity.
9. To align AM broadcast radio receiver and study different faults and radio receiver & major the Voltage at the different points of a radio receiver
10. Installation of directional antenna for best reception.
11. Installation of dish antenna for best reception.

INSTRUCTIONAL STRATEGY

The subject requires both theory and practical emphasis simultaneously, so that the student can understand the practical significance of the various areas. Visits to instrumentation and communications industries must be carried out, so as to make the students can understand where and how the various instruments are used in the industry.

TEXTBOOKS

1. Electronics Communication System by Kennedy, Tata McGraw Hill Education pvt ltd, New Delhi
2. Communication Engineering by Manoj Kumar; Satya Prakashan



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RECOMMENDED BOOKS

1. Electronics Communication System by Kennedy, Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Fundamentals of Communication System by Fitz, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Principles of Communication Engineering by Taub, Tata McGraw Hill Education Pvt Ltd,
4. Electronics Communication by KS Jamwal, Dhanpat Rai and Co, New Delhi
5. Radio Engineering by GK Mittal, Khanna Publishers, New Delhi
6. Principles of Communication Engineering by DR Arora, Ishan Publications, Ambala
7. Communication Engineering by A Kumar
8. Principles of Communication Engineering by Manoj Kumar, SatyaPrakashan, New Delhi
9. Principles of Communication Engineering by Anokh Singh, S.Chand and Co., New Delhi
10. Principles of Communication Engineering by Roody , Coolin

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ECE P305 ELECTRONIC WORKSHOP AND MINOR PROJECT (PRACTICAL)

L T P

Periods/week -- 2

RATIONALE

In electronics, with theoretical knowledge the practice is also very important. Starting from identification of components to testing of different circuit the practice must be there. To identify components, To use data book, To identify leads, Use of test equipment such as multi-meter to oscilloscope, To learn the technique of soldering and de-soldering are the areas where practice is required and it makes perfect electronics engineer. Minor project work aims at exposing the students to various developments taking place in the field of electronics and related areas in addition to developing interest in the students about working and fabrication of electronics devices. The project may be selected from utility items pertain to their laboratories or homes. It would enable first hand experience of components, their purchase, assembly, testing and trouble shooting. It would also boost up confidence of the students in repairing and maintenance of electronics gadgets. There should not be more than 2-3 students for each project. A report must be prepared with a hard and soft copy. The purpose of this subject is also to give practice to the students in elementary design and fabrication of simple electronic circuits. The topics of assembly, soldering, testing, and documentation have been included to give overall picture of the process of manufacturing of electronic devices. The teacher may guide/ help students to identify their minor project work and chalk out their plan of action well in advance preferably at the beginning of 3rd semester For this purpose, the concerned teachers must identify curriculum related industrial problems which should be expository in nature and ask students (individual/group) to carry out their investigation/activity such that enough industrial exposure is gained by them during this process.

DETAILED CONTENTS

1. Laboratory Experiences (06 Periods)
 - Identification of components
 - Practice for color coding of resistance
 - Practice for identification of various components such as diode, capacitors, transistors, SCR, Triac and different ICs
 - Understand the use of data book for transistors, Diodes, SCR and triac
 - Understand the use of data book for TTL and CMOS ICs
 - Testing of different components using multi-meter
2. Use of electronic instruments (08 Periods)
 - Practice for the use of multi-meter
 - Practice for the use of signal generator
 - Practice for the use of power supply
 - Practice for the use of oscilloscope
3. Designing the PCB layout using computer software (12 Periods)
 - Understanding the use of printed circuit board in electronics.
 - Designing practice of PCB layout for a simple electronics circuit such as rectifier, transistor, amplifier etc.
 - Use of software -- Work bench and PSPICE

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4. Soldering the PCB (05 Periods)
- Soldering practice for PCB
 - Soldering the PCB design in layout topic.
 - Desoldering practice
5. Testing of PCB (05 Periods)
- After soldering the component on given PCB testing the continuity and input / output result of given circuit
6. Fault finding of electronic circuit (06 Periods)
- Basic idea of fault finding procedure
7. Minor Project Work (24 Periods)
- Minimum 04 Project to be fabricated by each student** Students can also select any other project with the advice of teacher
1. Regulated power supply
 2. Timers using 555 and other oscillators
 3. Touch plate switches – transistorized or 555 based
 4. Door bell/cordless bell
 5. Clapping switch and IR switch
 6. Blinkers
 7. Sirens and hooters
 8. FM Transmitter and Receiver
 9. Electronic toy gun, walker, blinkers
 10. Electronic dice
 11. Cell charger, battery charger, mobile charger
 12. Fire/smoke/intruder alarm
 13. Liquid level controller
 14. Counters
 15. Combination locks
 16. Electronics musical instruments
 17. Telephone handset
 18. Audio amplifiers
 19. Tape recorders
 20. Automatic stabilizer/CVT
 21. Emergency light
 22. Design and manufacture of transformer
 23. Fan regulator
 24. Triac using Fan Regulator
 25. 555 using lighting delay Circuits
 26. Temperature sensor based fabrication
 27. Design and fabricate transistor switch to operate an LED.
 28. Design and Fabricate a single stage Amplifier for 1 KHz

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TEXTBOOKS:

1. Data books for TTL and CMOS

RECOMMENDED BOOKS:

1. Data books for transistors Diodes & SCR
2. Data book for TTL and CMOS ICs
3. PCB designing Books



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ECE306 COMPUTER PROGRAMMING USING C

L T P
Periods/week 2 - 2

RATIONALE

Computer plays a very vital role in present day life, more so, in the professional life of Diploma engineers. In order to enable the students use the computers effectively in problem solving, this course offers the modern programming language C along with exposure to various engineering applications of computers. The knowledge of C language will be reinforced by the practical exercises and demonstration of application software in the field of Electrical Engineering during the course of study. Introduction to data base management system is also a very significant field with vast employment potential.

DETAILED CONTENTS

1. Algorithm and Program Development (04 Periods)

- Steps in development of a program Flow-charts, algorithm development Introduction to various computer languages
- Concept of interpreter, compiler, high level language(HLL), machine language (ML) and Assembly Language

2. Program Structure (C Programming) (20 Periods)

- History of 'C', data types, input output statements, arithmetic and logical operations, data assignments, precedence and associativity
- I/O statements - Assignment, Variables, arithmetic operation- their precedence, data types standard I/O function, formulated I/O
- Control Statements - Logical and relational operators; if-else, while, do- while, for loops, breaks, switch statements
- Functions - Function declaration, parameter passing- by value, storage classes (Local, Global and Static variables), standard library functions
- Arrays - Single and multi dimensional arrays, character arrays
- Pointers - To various data types, pointers in parameters passing, pointers to function
- Structures - Definition of a structure, pointer to structure, union and array of structure
- Strings - String processing, functions and standard library function
- Data files - File handling and manipulation, file reading and writing, Binary and ASCII files, file records using standard function type mouse

3. Software Applications in Electronics Engineering (08 Periods)

Computer application overview through various applications software related to Electronics Engineering branch viz: ORCAD & MATLAB




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LIST OF PRACTICALS

1. Programming exercise on executing a C Programs
2. Programming exercise on editing a C program
3. Programming exercise on defining variables and assigning values to variables
4. Programming exercise on arithmetic and relation operators
5. Programming exercise on arithmetic expressions and their evaluation
6. Programming exercise on reading a character
7. Programming exercise on writing a character
8. Programming exercise on formatting input using print
9. Programming exercise on formatting output using scan
10. Programming exercise on simple IF statement
11. Programming exercise on IF... ELSE statement
12. Programming exercise on SWITCH statement
13. Programming exercise on GOTO statement
14. Programming exercise on DO-WHILE statement
15. Programming exercise on FOR statement
16. Programming exercise on one dimensional arrays
17. Programming exercise on two dimensional arrays
18. Basic programming and Application of the software: MATLAB & ORCAD.

INSTRUCTIONAL STRATEGY

This course is a highly practical and self- study oriented courses. The teachers are expected to explain the theoretical part and ensure that the students to execute and debug different programs. The PC needs to have Turbo C.

TEXTBOOKS:

1. Programming in C by Balagurusamy, Tata McGraw Hill Education Pvt Ltd
2. Programming in C – Let us C by Yashwant Kanetkar; BPB Publications

RECOMMENDED BOOKS:

1. Programming in C by Balagurusamy, Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Programming in C by Gottfried, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Programming in C by Kerning Lan and Richie; Prentice Hall of India, New Delhi
4. Let us C- Yashwant Kanetkar, BPB Publications, New Delhi
5. Vijay Mukhi Series for C and C++
6. Programming in C by R Subburaj, Vikas Publishhing House Pvt. Ltd., Jangpura, New Delhi
7. Programming in C by Kris A Jansa, Galgotia Publications Pvt. Ltd., Daryaganj, New Delhi
8. Programming in C by BP Mahapatra, Khanna Publishers, New Delhi
9. Elements of C by MH Lewin, Khanna Publishers, New Delhi
10. The Complete Reference to Visual Basic 6, by Noel Jerke, Tata McGraw Hill Education Pvt Ltd, New Delhi
11. Web site www.Beyondlogic.org
12. Pointers in C by Yashwant Kanetkar, BPB Publishers New Delhi
13. Programming in Applications by Chandershekhra, Unique International Publications, Jalandhar
14. The essentials of Computer Organizing and Architecture by Linda Null and Julia Labur, Narosa Publishing House Pvt. Ltd., New Delhi

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FOURTH SEMESTER

8 ✓

2 ✓

ECE401 ELECTRONICS CIRCUITS

L T P

Periods per week: 3 – 2

RATIONALE

Having attained basic knowledge of electronic devices like diodes, transistors, and elementary circuits, in second semester, this course will enable the students to learn about the use of transistors in analog circuits like power amplifier, multistage amplifier, oscillators, wave shaping circuits and in multivibrators etc. It also gives information about timer, operational amplifier, voltage regulator, ICs and their applications for effective functioning in the field of electronic service industry.

DETAILED CONTENTS

1. Multistage Amplifiers (10 Periods)

Need for multistage amplifier

Gain of multistage amplifier

- Different types of multistage amplifier, Coupling, Comparison between different types of coupling, RC coupled, transformer coupled, direct coupled, and their frequency response and bandwidth

2. Large Signal Amplifier (08 Periods)

- Difference between voltage and power amplifiers
- Importance of impedance matching in amplifiers
- Class A, Class B, Class AB, and Class C amplifiers, collector efficiency and Distortion in class A, B, C
- Single ended power amplifiers, Graphical method of calculation (without derivation) of output power; heat dissipation curve and importance of heat sinks. Push-pull amplifier, and complementary symmetry push-pull amplifier
- Concept of Thermal Runaway & its protection

3. Feedback in Amplifiers (10 Periods)

- Basic principles and types of feedback
- Derivation of expression for gain of an amplifier employing feedback
- Effect of feedback (negative) on gain, stability, distortion and bandwidth of an amplifier
- RC coupled amplifier with emitter bypass capacitor Emitter follower amplifier and its application Darlington Amplifier.

4. Sinusoidal Oscillators (08 Periods)

- Barkhausen criterion for oscillations
- Tank Circuits
- Use of positive feedback
- Classification of oscillators

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- Tuned collector, Hartley, Colpitts, phase shift, Wien's bridge, and crystal oscillator. Their working principles (no mathematical derivation but only simple numerical problems)
5. Tuned Voltage Amplifiers (06 Periods)
 - Series and parallel resonant circuits and bandwidth of resonant circuits
 - Single and double tuned voltage amplifiers and their frequency response characteristics
 6. Wave Shaping Circuits (06 Periods)
 - General idea about different wave shapers
 - RC and RL integrating and differentiating circuits with their applications
 - Diode clipping and clamping circuits and simple numerical problems on these circuits
 7. Multivibrator Circuits (08 Periods)
 - Working principle of transistor as switch
 - Concept of multi-vibrator: Astable, Monostable, and Bistable and their applications
 - Block diagram of IC555 and its working and applications
 - IC555 as Monostable and Astable multi-vibrator
 8. Operational Amplifiers (08 Periods)
 - Characteristics of an ideal operational amplifier and its block diagram
 - Definition of differential voltage gain, CMRR, PSRR, slew rate and input offset current
 - Operational amplifier as an inverter, scale changer, adder, subtractor, differentiator, and integrator
 - Concept of Schmitt trigger circuit and sample/hold circuit using operational amplifier and their application

LIST OF PRACTICALS

1. Plot the frequency response of two stage RC coupled amplifier and calculate the bandwidth and compare it with single stage amplifier
2. To measure the gain of push-pull amplifier at 1KHz
3. To measure the voltage gain of emitter follower circuit and plot its frequency response
4. Plot the frequency response curve of Hartley and Colpitts Oscillator
5. Plot the frequency response curve of phase shift and Wein bridge Oscillator
6. To observe the output waveforms of series and shunt clipping circuits
7. To observe the output for clamping circuits
8. Use of IC 555 as monostablemultivibrator and observe the output for different values of RC
9. Use of IC 555 as astablemultivibrator and observe the output at different duty cycles
10. To use IC 741 (op-amplifier) as

i) 

Inverter,

ii) Adder,

iii) Subtractor

iv) Integrator






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11. To realize positive and negative fixed voltage AC power supply using three terminal voltage regulator IC (7805, 7812, 7905)

INSTRUCTIONAL STRATEGY

This subject being of fundamental importance for diploma holders in electronics engineering and related fields, emphasis on conceptual understanding may be given by taking the help of charts, simulation packages etc. Sufficient exercises given to the students in single stage and multi-stage amplifier circuits in addition to simple exercises in fabricating and testing of various simple d.c circuits. The students may be encouraged to perform some additional practical exercises apart from the list provided.

TEXTBOOK:

1. Electronics Devices and Circuit by Rama Reddy ; Narosa Publishing.

RECOMMENDED BOOKS:

1. Basic Electronics and Linear Circuits by NN Bhargava, Tata McGraw Hill, New Delhi
2. Electronic Principles by Sahdev, Dhanpat Rai and Sons, New Delhi.
3. Electronics Principles by Malvino, Tata McGraw Hill, New Delhi
4. Electronic Devices and Circuits by Millman and Halkias, McGraw Hill, New Delhi
5. Electronics Devices and Circuits by Bhupinderjit Kaur, modern Publishers, Jalandhar
6. Basic Electronics by Grob, Tata McGraw Hill, New Delhi
7. Art of Electronics by Horowitz
8. Electronic Circuit Theory by Boylstead
9. Electronic Devices and Circuits by BL Theraja, S Chand and Co Ltd. New Delhi
10. Operational Amplifiers and Linear Integrated Circuits by Ramakant A. Gaykwad
11. Electronics Devices and Circuits by Rama Reddy, Narosa Publishing House Pvt. Ltd., New Delhi
12. Electronics Devices and Circuits-II by Rajesh Kumar, Eagle Prakashan, Jalandhar



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ECE402 MICROPROCESSOR AND ITS APPLICATIONS

L T P

Periods per week 3 0 2

RATIONALE

The study of microprocessors in terms of architecture, software and interfacing techniques leads to the understanding of working of CPU in a microcomputer. The development in microprocessors of 32 bit architecture brings them face-to-face with mainframe finding employment in R&D, assembly, repair and maintenance of hardware of microprocessors and computers. Microprocessors find application in process control industry. They also form a part of the electronic switching system between source and destination in long distance telecommunications. Thus the microprocessor is an area of specialization. Students of electronics and related engineering branches often use microprocessors to introduce programmable control in their projects, in industrial training.

DETAILED CONTENTS

1. Evolution and Architecture of a Microprocessor (With reference to 8085 microprocessor) (12 Periods)
Typical organization of a microcomputer system and functions of its various blocks. Concept of Bus, bus organization of 8085, Functional block diagram of 8085 and function of each block, Pin details of 8085 and related signals, Demultiplexing of address/data bus generation of read/write control signals, Steps to execute a stored programme
2. Programming (with respect to 8085 microprocessor) (16 Periods)
Brief idea of machine and assembly languages, Machines and Mnemonic codes, Instruction format and Addressing mode. Identification of instructions as to which addressing mode they belong. Concept of Instruction set. Explanation of the instructions of the following groups of instruction set. Data transfer group, Arithmetic Group, Logic Group, Stack, I/O and Machine Control Group. Programming exercises in assembly language. (Examples can be taken from the list of experiments).
3. Memories and I/O interfacing (10 Periods)
Memory organization, Concept of memory mapping, partitioning of total memory space. Address decoding, concept of I/O mapped I/O and memory mapped I/O. Interfacing of memory mapped I/O devices. Concept of stack and its function. Basic RAM Cell, N X M bit RAM, Expansion of word length and capacity, static and dynamic RAM.
4. Instruction Timing and Cycles (08 Periods)
Instruction cycle, machine cycle and T-states, Fetch and execute cycle
5. Interrupts (06 Periods)
Concept of interrupt, Maskable and non-maskable, Edge triggered and level triggered interrupts, Software interrupt, Restart interrupts and its use. Various hardware interrupts of 8085, Servicing interrupts, extending interrupt system

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6. Data transfer techniques (06 Periods)
 Concept of programmed I/O operations, sync data transfer, async data transfer (hand shaking), Interrupt driven data transfer, DMA, Serial output data, Serial input data
7. Peripheral devices (06 Periods)
 8255 PPI and 8253 PIT, 8257 DMA controller, 8279 Programmable KB/Display Interface, 8251 Communication Interface Adapter, 8155/8156

LIST OF PRACTICALS

1. Familiarization of different keys of 8085 microprocessor kit and its memory map
2. Steps to enter, modify data/program and to execute a programme on 8085 kit
3. Writing and execution of ALP for addition and subtraction of two 8 bit numbers
4. Writing and execution of ALP for multiplication and division of two 8 bit numbers
5. Writing and execution of ALP for arranging 10 numbers in ascending/descending order
6. Writing and execution of ALP for 0 to 9 BCD counters (up/down counter according to choice stored in memory)
7. Interfacing exercise on 8255 like LED display control
8. Interfacing exercise on 8253 programmable interval timer
9. Interfacing exercise on 8279 programmable KB/display interface like to display the hex code of key pressed on display
10. Study and use of interfacing 8 bit A/D card and D/A card in sampling, wave generation, multiplexer, de-multiplexer and counter

INSTRUCTIONAL STRATEGY

The digital systems in microprocessors have significant importance in the area of electronics. Adequate competency needs to be developed by giving sufficient practical knowledge in microprocessors (programming as well as interfacing). Help may be taken in the form of charts, simulation packages to develop clear concepts of the subject. Programming exercises other than the given in the list may be given to the students.

TEXTBOOK:

1. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd, New Delhi

RECOMMENDED BOOKS:

1. Microprocessor Architecture, Programming and Applications with 8080/8085 by Ramesh S Gaonker, Willey Eastern Ltd. New Delhi
2. Introduction to Microprocessor by Mathur, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Microprocessor and Microcontrollers by Dr B P Singh, Galgotia Publications, New Delhi
4. Microprocessor and Applications by Badri Ram: Tata McGraw Hill Education Pvt Ltd, New Delhi
5. Microprocessor and Microcomputers by Refiquzzaman, Prentice Hall of India, New Delhi

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6. Digital Logic and Computer Design by Mano, M Morris; Prentice Hall of India, New Delhi
7. Digital Electronics and Applications by Malvino Leach; Publishers McGraw Hill, New Delhi
8. Digital Integrated Electronics by Herbert Taub and Donald Sachilling; Prentice Hall of India Ltd., New Delhi
9. Digital Electronics by Rajaraman; Prentice Hall of India Ltd., New Delhi
10. Digital Electronics and Microprocessor by Rajiv Sapra, Ishan Publication, Gurgaon

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RATIONALE

In the real world of work the technician is required to handle wide variety of instruments while testing, trouble shooting, calibration etc. the study of this subject will help students to gain the knowledge of working principles and operation of different instruments. During practical sessions, he will acquire the requisite skills.

DETAILED CONTENTS

1. Basics of Measurements (06 Periods)

Measurement, method of measurement, types of instruments

Specifications of instruments: Accuracy, precision, sensitivity, resolution, range, errors in measurement, sources of errors, limiting errors, loading effect, importance and applications of standards and calibration

2. Voltage, Current and Resistance Measurement (12 Periods)

- Principles of operation and construction of permanent magnet moving coil (PMMC) instruments
- Moving iron type instruments, measurement of d.c voltage and current, measurement of d.c voltage and current, milli-volt measurement
- Measurement of voltage, current and resistance using multimeter
- Specifications of multimeter and its applications Limitations
- with regard to frequency and input impedance

3. Cathode Ray Oscilloscope (10 Periods)

- Construction and working of Cathode Ray Tube (CRT)
- Time base operation and need for blanking during fly back, synchronization
- Block diagram, description of a basic CRO and triggered sweep oscilloscope, front panel controls.
- Specifications of CRO and their explanation.
- Measurement of voltage, current, frequency, time period and phase using CRO.
- CRO probes, special features of dual beam, dual trace, delay sweep.
- Digital storage oscilloscope (DSO) : block diagram and working principle.

4. Signal Generators and Analytical Instruments (08 Periods)

- Explanation of block diagram specifications of low frequency and RF generators, pulse generator, function generator
- Wave analyzer, distortion measurement and spectrum analyser

5. Impedance Bridges and Q Meters (14 Periods)

Wheat stone bridge

- AC bridges: Maxwell's induction bridge, Hay's bridge, De-Sauty's bridge, Schering Bridge and Anderson bridge

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- Block diagram description of laboratory type RLC bridge, specifications of RLC Bridge
- Block diagram and working principle of Q meter

6. Digital Instruments

(14 Periods)

- Comparison of analog and digital instruments
- Working principle of ramp, dual slope and integration type digital voltmeter
- Block diagram and working of a digital multimeter
- Measurement of time interval, time period and frequency using universal counter/frequency counter
- Working principle of logic probe, logic pulser, logic analyzer, logic comparator, signature analyzer

LIST OF PRACTICALS

1. To observe the loading effect of a multimeter while measuring voltage across a low resistance and high resistance
2. To observe the limitations of a multimeter for measuring high frequency voltage
3. Measurement of voltage, frequency, time period and phase using CRO
4. Measurement of rise time and fall time using CRO
5. Measurement of Q of a coil and its dependence on frequency
6. Measurement of voltage, frequency, time and phase using DSO
7. Measurement of resistance and inductance of coil using RLC Bridge
8. Use of logic pulser and logic probe
9. Measurement of time period, frequency, average period using universal counter/frequency counter

INSTRUCTIONAL STRATEGY

The subject requires both theory and practical emphasis simultaneously, so that the student can understand the practical significance of the various areas. Visits to instrumentation and communications industries must be carried out, so as to make the students can understand where and how the various instruments are used in the industry.

TEXTBOOKS:

1. Electronics Measurement and Instrumentation by Oliver, Tata McGraw Hill Education Pvt Ltd, New Delhi

RECOMMENDED BOOKS:

1. Electronics Measurement and Instrumentation by AK Sawhney, Dhanpat Rai and Sons, New Delhi
2. Electronics Measurement and Instrumentation by Oliver, Tata McGraw Hill Education Pvt Ltd, New Delhi
3. Electronics Instrumentation by Cooper, Prentice Hall of India, New Delhi
4. Electronics Test and Instrumentation by Rajiv Sapra, Ishan Publications, Ambala
5. Electronics Instrumentation by JB Gupta, SatyaPrakashan, New Delhi

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RATIONALE

The study of networks, filters and transmission lines leads to understanding of line communication, audio and video communication, and microwave communication. Particularly the study of networks takes off from principles of a.c. theory and introduces the student to parameters and characteristics of various networks, including filters. Also the study of transmission lines becomes important as its analogy is used in study of transmission of plane electromagnetic waves in bounded media.

DETAILED CONTENTS

1. Circuit Theory & Networks (20 Periods)
 - a) Elements of Networks and its type, Current Sources, Voltage Source and their conversion, Dependent and Independent Sources, Nodal and Mesh analysis.
 - b) Two port (four terminals) network: Basic concepts of the following terms
 - Symmetrical and asymmetrical networks: Balanced and unbalanced network, T-network, \bar{E} network, Ladder network; Lattice network; L-network and Bridge T-network
 - c) Symmetrical Network:
 - Concept and significance of the terms characteristic impedance, propagation constant, attenuation constant, phase shift constant and insertion loss.
 - T-network and \bar{E} Network
 - d) Asymmetrical Network
 - Concept and significance of iterative impedance, image impedance, image transfer constant and insertion loss
 - The half section (L-section); symmetrical T and \bar{E} sections into half sections

2. Attenuators (08 Periods)
 - Units of attenuation (Decibels and Nepers): General characteristics of attenuators
 - Analysis and design of simple attenuator of following types; Symmetrical T and \bar{E} type, L type

3. Filters (16 Periods)
 - a) Brief idea of the use of filter networks in different communication systems, concept of low pass, high pass, band pass and band stop filters
 - b) Prototype Filter Section
 - Impedance characteristics vs frequency characteristics of a low and high pass filter and their significance
 - Attenuation Vs frequency; Phase shift Vs frequency, characteristics impedance vs frequency of T and \bar{E} filters and their significance vs
 - Simple design problems of prototype low pass section.
 - c) M-Derived Filter Sections - Limitation of prototype filters, need of m-derived filter

- d) Crystal Filters - Crystal and its equivalent circuits, special properties of piezoelectric filters and their use
 - e) Active Filters - Basic concept of active filters and their comparison with passive filters
4. Transmission Lines (20 Periods) • Transmission Lines, their types and applications.
- Distributed constants, T and \bar{E} representation of transmission line section.
 - Definition of characteristic impedance, propagation constant, attenuation constant and phase shift constant.
 - Concept of infinite line
 - Condition for minimum distortion and minimum attenuation of signal on-the-line and introduction to loading methods.
 - Concept of reflection and standing waves, definition of reflection coefficient, SWR & VSWR and their relation (no derivation).
 - Transmission line equation, expression for voltage, current and impedance at a point on the line.
 - Concept of transmission lines at high frequencies.
 - Introduction to stubs. (single, open and short stubs).

LIST OF PRACTICALS

1. To measure the characteristic impedance of symmetrical T and \bar{E} networks
2. To measure the image impedance of a given asymmetrical T and \bar{E} networks
3. For a prototype low pass filter:
 - Determine the characteristics impedance experimentally.
 - Plot the attenuation characteristics
4. To design and measure the attenuation of a symmetrical T/ \bar{E} type attenuator
5. For a prototype high pass filter:
 6. a) To plot the Impedance characteristic of a prototype band-pass filter
 - b) To plot the attenuation characteristic of a prototype band pass filter
7. a) To plot the impedance characteristic of m- derived low pass filter
- b) To plot the attenuation characteristics of m-derived high pass filter
8. To observe the information of standing waves on a transmission line and measurement of SWR and characteristic impedance of the line
9. Draw the attenuation characteristics of a crystal filter

INSTRUCTIONAL STRATEGY

Stress should be laid on problems in networks/ filter and transmission lines. Practical must be carried out after completion of topic to gain a good know how on the subject students should be given home assignments on various topics, stress on making own circuit models to calculate input/output impedance, characteristic impedance, losses etc. should be carried out by the students.

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TEXTBOOK:

1. Network Filters and Transmission Lines by AK Chakarvorty; DhanpatRai and Co. Publication, New Delhi

RECOMMENDED BOOKS:

1. Network Lines and Fields by John D Ryder; Prentice Hall of India, New Delhi
2. Network Filters and Transmission Lines by AK Chakarvorty; DhanpatRai and Co. Publication, New Delhi
3. Network Analysis by Van Valkenburg; Prentice Hall of India, New Delhi
4. Network Analysis by Soni and Gupta; DhanpatRai and Co. Publication, New Delhi
5. Network Theory and Filter Design by Vasudev K. Aatre
6. Network Filters and Transmission line by UmeshSinha
7. Electrical and Electronics Measuring instrumentation , A.K Sawhney, DhanpatRai and Co. Publication, New Delhi
8. Network Analysis by G.K. Mithal
9. Network Filters and Transmission line by NardeepGoyal, Rajneesh Kumari Tech. Max Publication, Pune.



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ECE405 SIGNAL SENSING AND CONDITIONING

L T P

Periods per week 4 0 2

RATIONALE

This subject provides knowledge about signals, sensing of signals, signal transmission, conditioning and recording.

DETAILED CONTENTS

(04 periods)

1. Introduction

- Signal
- Types of Signals
- Functional Elements of System
- Importance of Sensing of Signals

2. Sensing Elements

(24 Periods)

- Resistive sensing elements: potentiometers, resistance thermometers, strain gauges, Load cell/Pressure cell
- Capacitive sensing elements: variable separation, area and dielectric
- Inductive sensing elements: variable reluctance and LVDT displacement sensors
Electromagnetic sensing elements: velocity sensors
- Thermoelectric sensing elements: laws, thermocouple characteristics, installation problems
- Elastic sensing elements: sensing elements for force, torque, acceleration, pressure
- Piezoelectric sensing elements: static and dynamic characteristics
- Electrochemical sensing elements: ion selective electrodes, solid state gas sensors
- Photo sensing elements : Basic principle and characteristics of photo sources and photo detector, photo resistors, photo diodes, photo transistors, photo electric cells, LCDs, LEDs and photocouplers, LDR
- Photo Detectors : Optical detection Principles, Electro-optic effect, Integrated Optical Devices, Magneto optic effect, Acousto-optic effect
- Digital Transducer element, Micro sensor, smart sensors

3. Signal Transmission

(12 Periods)

Introduction

Methods of Data Transmission

General Telemetry System

Types of Telemetry System

Land Line Telemetering System

Voltage Telemetering System

Current Telemetering System

Position Telemetering System

Land Line Telemetering System

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- Feed Back System
Radio Frequency (R.F.) Telemetry
4. Signal Conditioning (07 Periods)
- Basic Instrumentation Amplifier
 - Applications of Instrumentation Amplifiers (Specific Bridge)
 - Chopped and Modulated DC Amplifier
5. Signal Recording and Display (10 Periods)
- Recording Requirements
 - Analog Recorders
 - Graphics Recorders
 - Strip Chart Recorders
 - Types of Strip Chart Recorders
 - Galvanometer Type Recorders
 - Null Type Recorders
 - Potentiometric Recorders
 - X-Y Recorders
 - Direct Recording
 - Digital Display Methods
 - Digital Display Units
 - Segmental Displays
 - Dot Matrices
 - Rear Projection Display
6. Data Acquisition System (07 Periods)
- Introduction
 - Objective of DAS
 - Single Channel Acquisition System
 - Multi-Channel DAS
 - Computer Based DAS
 - Data Loggers
 - Sensors Based Computer Data Systems

LIST OF PRACTICALS

1. Measurement of Displacement using LVDT
2. Measurement of Temperature using Thermocouple & Thermister
3. Measurement of Strain using strain gauge
4. Application of Load Cell/Pressure Cell
5. Application of capacitive transducer
6. Application of Potentiometer
7. Application and use of LDR, Photocell
8. Application of Potentiometer recording
9. Application and use of graphic and strip chart recorder
10. Use of Telemetry System

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INSTRUCTIONAL STRATEGY

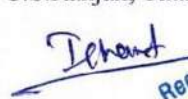
The teaching should be supplemented by using audio visual aids.

TEXTBOOKS:

1. Instrumentation Devices and Systems by C.S.Ranjan; Tata McGraw Hill

RECOMMENDED BOOKS:

1. Electronic Instrumentation; by H.S.Kalsi; McGraw-Hill Education India Pvt.Ltd.
2. Principles of Measurement Systems by John P.Bently (Pearson)
3. Electrical and Electronic Measurements and Instrumentation by A.K.Sawhney; DhanpatRai& Co.
4. Instrumentation measurement and Analysis by B.C. Nakra, K.K.Chaudhary
5. Optoelectronics An Introduction to Materials and Devices by Singh Jasprit; McGraw Hill
6. Instrumentation Devices and Systems by C.S.Ranjan; Tata McGraw Hill



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RATIONALE

In the present day scenario, it has become imperative to impart entrepreneurship and management concepts to students so that a significant percentage of them can be directed towards setting up and managing their own small enterprises. This subject focuses on imparting the necessary competencies and skills of enterprise set up and its management.

DETAILED CONTENTS**SECTION – A****ENTREPRENEURSHIP**

(23 Periods)

1. Introduction

- Concept /Meaning and its need
- Qualities and functions of entrepreneur and barriers in entrepreneurship
- Sole proprietorship and partnership forms of business organisations
- Schemes of assistance by entrepreneurial support agencies at National, State, District level: NSIC, NRDC, DC: MSME, SIDBI, NABARD, Commercial Banks, SFC's TCO, KVIB, DIC, Technology Business Incubator (TBI) and Science and Technology Entrepreneur Parks (STEP)

2. Market Survey and Opportunity Identification

(17 Periods)

● Scanning of business environment

- Salient features of National and State industrial policies and resultant business opportunities
- Types and conduct of market survey
- Assessment of demand and supply in potential areas of growth
- Identifying business opportunity
- Considerations in product selection

3. Project report Preparation

(14 Periods)

- Preliminary project report
- Detailed project report including technical, economic and market feasibility
- Common errors in project report preparations
- Exercises on preparation of project report

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SECTION –B MANAGEMENT

4. Introduction to Management (06 Periods)

Definitions and importance of management

Functions of management: Importance and Process of planning, organising, staffing, directing and controlling

Principles of Management (Henri Fayol, FW Taylor)

Concept and Structure of an Organisation

Types of industrial organisations

- a) Line organisation
- b) Line and staff organisation
- c) Functional Organisation

5. Leadership and Motivation (05 Periods)

a) Leadership

- Definition and Need
- Qualities and functions of a leader
- Manager vs leader
- Types of leadership

b) Motivation

- Definitions and characteristics
- Factors affecting motivation
- Theories of motivation (Maslow, Herzberg, McGregor)

6. Management Scope in Different Areas (10 Periods)

a) Human Resource Management

- Introduction and objective
- Introduction to Man power planning, recruitment and selection
- Introduction to performance appraisal methods

b) Material and Store Management

Introduction functions, and objectives

- ABC Analysis and EOQ

c) Marketing and sales

- Introduction, importance, and its functions
- Physical distribution
- Introduction to promotion mix
- Sales promotion

d) Financial Management

- Introductions, importance and its functions

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- Elementary knowledge of income tax, sales tax, excise duty, custom duty and VAT

7. Miscellaneous Topics (05 Periods)

a) Customer Relation Management (CRM)

Definition and need

Types of CRM

b) Total Quality Management (TQM)

- Statistical process control
- Total employees Involvement
- Just in time (JIT)

c) Intellectual Property Right (IPR)

Introductions, definition and its importance

Infringement related to patents, copy right, trade mark

Note: In addition, different activities like conduct of entrepreneurship awareness camp extension lecturers by outside experts, interactions sessions with entrepreneurs and industrial visits may also be organised.

INSTRUCTIONAL STRATEGY

Some of the topics may be taught using question/answer, assignment or seminar method. The teacher will discuss stories and case studies with students, which in turn will develop appropriate managerial and entrepreneurial qualities in the students. In addition, expert lecturers may also be arranged from outside experts and students may be taken to nearby industrial organisations on visit. Approach extracted reading and handouts may be provided.

TEXTBOOK:

1. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi

RECOMMENDED BOOKS:

1. A Handbook of Entrepreneurship, Edited by BS Rathore and Dr JS Saini; Aapga Publications, Panchkula (Haryana)
2. Entrepreneurship Development published by Tata McGraw Hill Publishing Company Ltd., New Delhi
3. Entrepreneurship Development in India by CB Gupta and P Srinivasan; Sultan Chand and Sons, New Delhi
4. Entrepreneurship Development - Small Business Enterprises by Poornima M Charantimath; Pearson Education, New Delhi
5. Entrepreneurship : New Venture Creation by David H Holt; Prentice Hall of India Pvt. Ltd., New Delhi
6. Handbook of Small Scale Industry by PM Bhandari
7. Principles and Practice of Management by L M Prasad; Sultan Chand & Sons, New Delhi.

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INDUSTRIAL TRAINING

Industrial training provides an opportunity to students to experience the environment and culture of industrial production units and commercial activities undertaken in field organizations. It prepares student for their future role as diploma engineers in the world of work and enables them to integrate theory with practice.

For this purpose, students at the end of fourth semester need to be sent for industrial training for a minimum of 4 weeks duration to be organised during the semester break starting after IV Semester examinations. The concerned HODs along with other teachers will guide and help students in arranging appropriate training places relevant to their specific branch. It is suggested that a training schedule may be drawn for each student before starting of the training in consultation with the training providers. Students should also be briefed in advance about the organizational setup, product range, manufacturing process, important machines and materials used in the training organization.

Equally important with the guidance is supervision of students training in the industry/organization by the teachers. A teacher may guide a group of 4-5 students. A minimum of one visit by the teacher is recommended. Students should be encouraged to write daily report in their diary to enable them to write final report and its presentation later on.

Internal assessment and external assessment have been provided in the study and evaluation scheme of V Semester. Evaluation of professional industrial training report through viva-voce/presentation aims at assessing students understanding of materials, industrial process, practices in industry/field organization and their ability to engage in activities related to problem solving in industrial setup as well as understanding of application of knowledge and skills learnt in real life situations. The formative and summative evaluation may comprise of weightage to performance in testing, general behaviour, quality of report and presentation during viva-voce examination. It is recommended that such evaluations may be carried out by a team comprising of concerned HOD, teachers and representative from industry, if any. The components of evaluation will include the following.

- | | |
|--------------------------------------|-----|
| a) Punctuality and regularity | 15% |
| b) Initiative in learning new things | 15% |
| c) Relationship with workers | 15% |
| d) Industrial training report | 55% |



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FIFTH SEMESTER


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ECE502 CONSUMER ELECTRONICS AND TROUBLESHOOTING




L T P
Periods/week 3 0 2

RATIONALE

The objective of teaching this subject is to give students an in depth knowledge of various electronic audio and video devices and systems. Further this subject will introduce the students with working principles, block diagram, main features of consumer electronics gadgets/goods/devices like audio-systems, CD systems. TV and other items like microwave ovens, Photostat machines etc. which, in-turn will develop in them capabilities of assembling, fault diagnosis and rectification in a systematic way.

DETAILED CONTENTS

1. Audio Systems: (08 Periods)
 - 1.1. Microphones and Loudspeakers
 - a) Carbon, moving coil, cordless microphone
 - b) Direct radiating and horn loudspeaker
 - c) Multi-speaker system
 - 1.2. Sound Recording
 - a) Magnetic Recording
 - b) Digital Recording
 - c) Optical Recording (CD system and DVD)
 - 1.3 Study of VCD and DVD Player systems.
2. Television
 - 2.1. Monochrome TV (14 Periods)
 - a) Scanning and its need
 - b) Need of synchronizing and blanking pulses, VSB
 - c) Composite Video Signal
 - d) Picture Tube
 - e) Camera Tube : Vidicon and Plumbicon
 - f) TV Receiver: Block diagram, function of each block, waveform at input and output of each block.
 - 2.2. Colour Television: (12 periods)
 - a) Primary, secondary colours
 - b) Concept of Colour Mixing, Colour Triangle
 - c) Camera tube
 - d) PAL TV Receiver
 - e) Concept of Compatibility with Monochrome Receiver
 - f) NTSC, PAL, SECAM system (brief comparison)
3. LCD and LED Television: Basic principle and working of LCD & LED TV (06 Periods)
4. Cable Television: Concept and Working of Cable TV, DTH, HDTV (06 Periods)




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5. Consumer Appliances- Principle, Working and troubleshooting with special emphasis on control panel (10 Periods)
- a) Microwave Oven
 - b) Washing Machine
 - c) Photostat Machine
 - d) DTH System
 - e) Digital Camera

6. a) Repair, Servicing and Maintenance Concepts (08 Periods)

Mean time between failures (MTBF), Mean time to repair (MTR), Maintenance policy, potential problems, preventive maintenance and corrective maintenance.

- b) Fundamental Trouble Shooting Procedures





- i) Fault location
- ii) Fault finding aids
 - Service manuals
 - Test and measuring instruments
 - Special tools
- iii) Trouble Shooting Techniques
 - Functional Areas Approach
 - Split half method
 - Divergent, convergent and feedback path circuit

LIST OF PRACTICALS

1. To plot the directivity pattern and frequency response of a microphone.
2. To plot the directivity pattern and frequency response of a loudspeaker.
3. Demonstration of VCD/DVD player and study of its transport mechanism.
4. Familiarization with the different sections of B/W TV Receiver.
5. To observe the wave forms and voltage of B/W and colour TV Receiver.
6. Fault finding of colour T.V Receiver.
7. Familiarization with different section of LCD & LED TV
8. Study of cable TV network system.
9. Demonstration and Operation of Control Panel
 - (a) Microwave Oven
 - (b) DTH System
 - (c) Photostat Machine
 - (d) Washing Machine

INSTRUCTIONAL STRATEGY

This subject gives the knowledge of the various day-to-day life electronic products. So, the teacher is required to show and demonstrate the gadgets and impart practical knowledge to the students. For that one should give home assignment and frequent industrial visit should be there. Visit to TV studio and TV transmitter station should be arranged to give a practical exposure to the students.





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TEXTBOOKS:

1. Consumer Electronics & Troubleshooting by Jyotesh Malhotra; Satya Prakashan
2. Modern Electronic Equipments and Trouble Shooting, REpai4r and Maintenance by RS Khandpur, Tata McGraw Hill Education Pvt Ltd, New Delhi

RECOMMENDED BOOKS:

1. Audio and Video Systems by RG Gupta, Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Colour Television-Principles & Practice by R.R Gulati , Wiley Eastern Limited, New Delhi
3. Complete Satellite & cable Television R.R Gulati New age International Publisher, New Delhi
4. Colour Television Servicing by RC Vijay BPB Publication, New Delhi
5. Colour Television & Video Technology by A.K. Maini CSB Publishers
6. Colour TV by A. Dhake
7. Service Manuals, BPB Publication, New Delhi
8. Modern Electronic Equipment Trouble shooting, Repair and Maintenance by RS Khandpur, Tata McGraw Hill Education Pvt Ltd, New Delhi

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ECE503 MICROWAVE COMMUNICATION

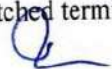


L T P
Periods/ Weeks 3 - 2

RATIONALE

This subject includes an exposure to microwaves engineering, radar systems, fibre optics and satellite communication. In microwaves industry, job opportunities are available in of assembly, production, installation, repair and maintenance of microwave transmitters and receivers. The knowledge of radar systems allows opportunities with civil and defence organizations dealing with aircraft and shipping. Fibre optics is the latest thrust area in communication with vast opportunities in the private sector.

DETAILED CONTENTS

1. Introduction to Microwaves (04 Periods)
Introduction to microwaves and its applications, Classification on the basis of its frequency bands (HF, VHF, UHF, L, S, C, X, KU, KA, mm, SUB, mm)
2. Microwave Devices (12 Periods)
Basic concepts of thermionic emission and vacuum tubes, Effects of interelectrode capacitance, Lead Inductance and Transit time on the high frequency performance of conventional vacuum tubes, and steps to extend their high frequency operations.
Construction, characteristics, operating principles and typical applications of the following devices (No mathematical treatment)
 - Multi cavity klystron
 - Reflex klystron
 - Multi-cavity magnetron
 - Traveling wave tube
 - Gunn diode
 - Impatt diode
3. Wave guides (08 Periods)
Rectangular and circular wave guides and their applications. Mode of wave guide, Propagation constant of a rectangular wave guide, cut off wavelength, guide wavelength and their relationship with free space wavelength (no mathematical derivation). Impossibility of TEM mode in a wave guide.
4. Microwave Components (10 Periods)
Constructional features, characteristics and application of tees, bends, matched termination, twists, detector, mount, slotted section, directional

  
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coupler, fixed and variable attenuator, isolator, circulator and duplex, coaxial to wave guide adapter.

5. Microwave antennas (06 Periods)

Structure characteristics and typical applications of Horn and Dish antennas

6. Microwave Communication systems (10 Periods)

- Basic idea of different modes of radio wave propagation, ground wave propagation space wave communication and sky wave propagation
- Explanation of terms – critical frequency, maximum usable frequency, skip distance, Noise in radio communication, signal fading
- Block diagram and working principles of microwave communication link.
- Troposcatter Communication: Troposphere and its properties, Tropospheric duct formation and propagation, troposcatter propagation.

7. Radar Systems (08 Periods)

- Introduction to radar, radar range equation (no derivation), its various applications,.
- Block diagram and operating principles of basic pulse radar. Concepts of ambiguous range, radar area of cross-section and its dependence on frequency.
- Block diagram and operating principles of CW (Doppler) and FMCW radars.
- Block diagram and operating principles of MTI radar.

8. Satellite Communication (06 Periods)

- Basic Idea of passive and active satellite. Meaning of the term orbit, apogee, perigee.
- Geo Stationary satellite. Block diagram and explanation of a satellite communication link. Link losses.
- Transponders, , VSAT and its features.

LIST OF PRACTICALS

1. To measure electronics and mechanical tuning range of a reflex klystron
2. To measure VSWR of a given load.
3. To measure the Klystron frequency by slotted section method
4. To measure the directivity and coupling of a directional coupler.
5. To plot radiation pattern of a horn antenna in horizontal and vertical planes.

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6. To verify the properties of tee.
7. To carry out installation of a dish antenna.
8. Study of satellite communication system

NOTE:

Visit to the appropriate sites of microwave industries, radar installations and communication stations should be made to understand their working. A comprehensive report must be prepared by all the students on these visits, especially indicating the dates and locations of their visits.

INSTRUCTIONAL STRATEGY

Microwave and radar is a very important subject and requires both theoretical as well as practical exposure. The teaching should be supplemented by visits to the microwave stations and using suitable audio visual aids.

TEXTBOOKS:

1. Microwave Communication by Sharma & Sharma; Satya Prakashan

RECOMMENDED BOOKS:

1. Microwave Devices and Components by Samuel Y. Liao, Prentice Hall of India, New Delhi
2. Electronics Communication by Roddy and Coolen
3. Electronics Communication System by KS Jamwal, Dhanpat Rai and Sons, Delhi
4. Microwave Engineering by Das, Tata McGraw Hill Education Pvt Ltd, New Delhi

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Gurgaon, Haryana

ECE504 ADVANCED MICROPROCESSORS

L T P
Periods/ Weeks 3 - 2

RATIONALE

The complex systems require high through put that at times is not met with 8- bit microprocessor system. So, 16 bit up based system become suitable. They provide better facilities to personal computers and other automatic process control systems.

DETAILED CONTENTS

1. The 8086 Microprocessor (08 Periods)
 - Internal Architecture of 8086.
 - Memory organisation: Memory segmentation & physical address generation.
 - 8086 Flags
2. 8086 Signal (12 Periods)
 - Pins and Signals description.
 - CLK circuitry.
 - 8086 Address and Data bus Concept
 - Maximum & Minimum mode.
 - Memory and I/O Interface block diagram
 - Types of interrupts and interrupt priority. (Brief Idea)
3. 8086 Instruction set (12 Periods)
 - Instruction Format : Example on Mov instruction only.
 - Instruction : Data transfer, Arithmetic, Bit & Logical manipulation, String, Program transfer and processor control instructions.
 - Addressing mode & its types.
 - Macros , Procedure.
4. Directives and Programming. (12 Periods)
 - Editor, Assembler, Emulators, Directives.
 - Programs: Addition, Subtraction, Multiplication, Division, Shifting of data right / Left, Increment, Decrement, Complement, Block movement of data.
5. Interrupts (12 Periods)
 - 8086 Interrupt.
 - Interrupt Vector table, Vector & Non Vector Interrupt.
 - Predefined Interrupts (0 - 4)
 - User defined Software/Hardware Interrupts.
6. Latest Microprocessor (08 Periods) Introduction to 32 bit Microprocessor, Features and advantages of Pentium processor/ Dual core processor and RISC processor

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LIST OF PRACTICALS

1. To Study the Architecture of 8086 microprocessor.
2. Familiarization of different keys of 8086-microprocessor kit and its memory map.
3. Steps to enter, check /modify data or program and to execute a program on 8086 Microprocessor kit.
4. Addition of two 8 bit numbers.
5. Addition of two 16 bit numbers
6. Subtraction of two 8 bit numbers.
7. Subtraction of two 16 bit numbers
8. Multiplication of two 8 bit numbers
9. Division of two 8 bit numbers
10. Program for And, OR, X-OR & its complement.
11. Determine the Hex code of Mov instruction for various addressing mode.
12. Determine the Physical address for different segments.

INSTRUCTIONAL STRATEGY

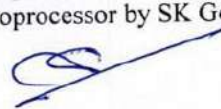
Advanced Microprocessor gives the knowledge of 8086 and latest microprocessors. So, the teaching process require the theoretical study of microprocessors and also practical implementation using the microprocessor kits.

TEXTBOOK:

1. Advance Microprocessor by Arora & Chabra; Satya Prakashan

RECOMMENDED BOOKS:

1. Microprocessor and Application by D.V. Hall.
2. Microprocessor 8086/88 by B.B. Brey
3. Microprocessors & Micro controllers by Dr. B.P. Singh
4. Microprocessor by Rajiv Sapra, Ishan Publications, Ambala
5. Microprocessor by Naresh Grover
6. Microprocessors and Microcomputers and their Applications by AK Mukhopadhyay
7. Microprocessors and Applications by Uffenback
8. Introduction to Microprocessor by Adithya Mathur, Tata McGraw Hill Publishing Co, New Delhi
9. Microprocessor Architecture, Programming and Applications with 8085 by RS Gaonkar, Wiley Eastern Ltd, New Delhi
10. Microprocessor and Applications by B Ram
11. Microprocessor by SK Goel ,



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ECE505 ELECTRONICS IN INDUSTRY

L T P
Periods/ Weeks: 3 - 2

RATIONALE

This course deals with electronic devices and circuits used in industry. It involves the study of thyristors, rectifier circuits, communication circuits and also the application of electronics in industry.

DETAILED CONTENTS

1. Thyristors and Other Power Electronics Devices (30 Periods)
 - 1.1 Introduction
 - 1.2 Applications
 - 1.3 Symbolic Representations
 - 1.4 Specifications
 - 1.5 Principle of Operating of an SCR
 - 1.6 Two-Transistor Analogy of SCR
 - 1.7 DIAC
 - 1.8 TRIAC
 - 1.9 Basic Triggering circuits for Thyristors
 - 1.10 Rectifier Circuits using SCR
 - 1.11 Construction and working of Gate Turn Off (GTO) thyristor
 - 1.12 Characteristics of Programmable Uni-junction Transistor (PUT), ASCR, LASCR, RCT, SCS
 - 1.13 Construction and Working of IGBT

2. Power Electronics Circuits (18 Periods)
 - 2.1 Commutation Circuits
 - 2.2 Inverters series and parallel
 - 2.3 Choppers: Step up, Morgan's, Jones's
 - 2.4 Single phase and Three Phase Converters.

3. Module 03- Application of Electronics in Industry/ Sector (2 weeks)

(Not to include in theory)

 - a. Process Industry- i) Chemical Industry ii) Sugar iii) Paper iv) Paint v) Steel vi) Fertilizer vii) Glass viii) Textile ix) Rubber
 - b. Medical and Pharmaceutical Industry
 - c. Computer Manufacturing Industry
 - d. Consumer Goods Industry
 - e. Service Sector
 - f. Power Generation and Transmission Industry
 - g. Communication Service providing Organisation as BSNL, Reliance, Airtel, Idea, Government Telecommunication Department etc
 - h. Defence Sector
 - i. Space Organisation
Petroleum Industry

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Student will get the exposure of equipments, flow diagram of organisation setup maintenance and service of any of 4 above industry/ sector. And will submit the report and the evaluation will be based on viva-voice.

LIST OF PRACTICALS

1. Testing of components- SCR, DIAC, TRIAC
2. To plot and verify Characteristic of an SCR
3. To plot and verify Characteristic of an TRIAC
4. To plot V-I characteristics of UJT
5. To plot V-I characteristics of DIAC
6. Assembly and testing of Half-wave Gate-controlled Rectifier using One SCR
7. Assembly and testing of Single-phase Half-controlled Full-wave Rectifier using two SCRs and two Diodes
8. Assembly and testing of Illumination/ Fan Control circuit using SCR
9. Assembly and testing of Illumination Control circuit using Triac
10. Assembly and testing of SCR Controlled Emergency light
11. Study of Integrator and Differentiator circuit using OPAMP 741
12. Study of Adder and comparator circuit using OPAMP 741
13. To visit at least four industries mentioned at module 03 and write the report.

INSTRUCTIONAL STRATEGY



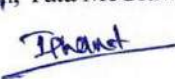

Electronics in Industry is the subject related to practical implementation and exposure of electronic devices and circuits in today's industries. Thus, it requires both theoretical as well as practical exposure.

TEXTBOOKS:

1. Power Electronics by PS Bhimbra; Khanna Publications
2. Industrial Electronics by SK Bhattacharya/ S Chatterjee, Tata McGraw Hill Publishing Company Limited

RECOMMENDED BOOKS:

1. Industrial Electronics: S.K. Bhattacharya / S Chatterjee, Tata McGraw-Hill Publishing Company Limited
2. Industrial Electronics: James Humphries, Leslie Sheets, 4e - Delmar Publications
3. Industrial Electronics: Biswanath Paul PHI
4. Industrial Electronics for Technicians: J.A.Sam Wilson Joseph Rissi, Prompt Publications
5. Thyristors and its Application by Ramamurthy, East West New Delhi
6. Modern Digital Electronics by R.P. Jain, McGraw Hill Publication
7. Op-amp and linear integrated circuits by Gaikwad, Eastern co. Edition PHI
8. Electrical and Electronic Measurements by A. K. Sawhney, Dhanpat rai & Sons New Delhi
9. Power Electronics by P.C. Sen, Tata McGraw-Hill Publishing, New Delhi
10. Digital Electronics by Malvino Leach, Tata McGraw-Hill Publishing, New Delhi





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ECE506 DIGITAL SWITCHING AND CIRCUITS




L T P
Periods/week: 3 - 2

RATIONALE

This course deals with the advanced digital and data communication techniques beyond the conventional communication. It involves the use of modems in synchronous and asynchronous data transmission. It encompasses the modern communication network and integrated services like FAX, electronic exchanges etc. so vital for present day communication.

DETAILED CONTENTS

1. Introduction: (06 Periods)
Basic block diagram of digital and data communication systems. Their comparison with analog communication systems. Basic information theory.
2. Coding (10 Periods)
 - a) Introduction to various common codes 5 bit Baudot code, 7 bit ASCII, EBCDIC
 - b) Code error detection and correction techniques - Redundancy, parity, block check character (BCC), Vertical Redundancy check (VRC), Cyclic Redundancy check (CRC), Hamming code
3. Digital Modulation Techniques: (14 Periods)
 - Basic block diagram and principle of working of the following:
 - Amplitude shift keying (ASK): Interrupted continuous wave (ICW), two tone modulation
 - Frequency Shift keying (FSK)
 - Phase shift keying (PSK),
 - Quadrature Amplitude modulation (QAM)
4. Characteristics/working of data transmission circuits; bandwidth requirements, data transmission speeds, noise, cross talk, echo suppressors, distortion, equalizers (06 Periods)
5. UART, USART: (06 Periods)
Their need and function in communication systems
6. Modems: (08 Periods)
Need and function of modems, Mode of modems operation (low speed, medium speed and high speed modems) . Modem interconnection, Modem data transmission speed, Modem modulation method, Modem interfacing (RS 232 Interface, other interfaces).




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7. Electronic Exchange and FACSIMILE (FAX) (14 Periods)

- Typical telephone network. Various switching offices (Regional Centre, District Centre, Toll Centre, Local Office) and their hierarchy.
- Principles of space division switches. Basic block diagram of a digital exchange and its working.
- Introduction to EPABX.
- Basic idea of FAX system and its applications. Basic Principle of operation and block diagram of modern FAX system. Important features of modern FAX machines.

LIST OF PRACTICALS

1. Observe wave forms at input and output of ASK and FSK modulators
2. To transmit parallel data on a serial link using USART
3. Transmission of data using MODEM.
4. Observe wave forms at input and output of a PSK and QAM circuit
5. To study the working principle of a telephone handset
6. To study the working principle of a FAX machine.
7. To study the working principle of an EPABX.

NOTE:

Visits to the sites of all types of telephone exchanges (including mobile and WLL), FAX should be made with a view to understand their working. A comprehensive report must be prepared by all the students on these visits, especially indicating the dates and locations of their visits.

INSTRUCTIONAL STRATEGY

This subject provides information to the students regarding the various techniques used in Digitals and Data Communication. Emphasize be made in the laboratory during the conduct of experiments. For the better awareness taking around the world, visit must be arranged to the industries. Like telephone exchange, various cellular industries etc.

TEXTBOOKS:

1. Electronic Communication Systems By George Kennedy Tata McGraw Hill Education Pvt Ltd, New Delhi

RECOMMENDED BOOKS:

1. Electronic Communication Systems By George Kennedy Tata McGraw Hill Education Pvt Ltd, New Delhi
2. Communication system By A.K. Gautam S.K. Kataria Sons, Delhi
3. Electronics communication by K.S. Jamwal, Dhanpat Rai and Sons, Delhi

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ECE507 PROCESS CONTROL AND INSTRUMENTATION

L T P
Periods/ Weeks 3 - 2

RATIONALE

The technician has the responsibility of using and maintaining electronic test equipments, for measurement, design, testing and trouble shooting, with the introduction of new techniques of process control in modern industries, the use of transducing elements in agriculture and other non-engineering areas, the task of the technician has become varied and different from the previous task of measurement only.

The Course aims to develop appreciation and understanding of the use of measurement of a variety of physical quantities and their control.

(A) Process Instrumentation

1. Introduction (04 Periods)
 - Functional block diagram of instrumentation system.
 - Description of each block
 - Process
 - Process Characteristics
 - Process Variables
2. Pressure Measurement (05 periods)
 - Types of Pressure
 - Measurement of Pressure by Manometers
 - Diaphragms
 - Bourdon Tube
 - Bellows
 - Vacuum Measurement
3. Temperature Measurement (05 Periods)
 - Temperature Measuring Devices like Thermocouples.
 - Pyrometer
 - Resistance Thermometer.
 - Thermister
 - Bimetallic Thermometer
4. Strain Measurement (05 Periods)
 - Requirements for strain measurement
 - Strain Gauges
 - General Strain Measurement
 - Load cell



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5. Vibration and Angular Velocity Measurement (05 Periods)

- Vibration Measurement Systems
- Measurement of Angular Velocity
- DC & AC Tachometer Generators
- Digital Methods

6. Flow Measurement (06 Periods)

- General
- Types of Flow
- Flow Coefficient
- Renolds No
- Flow Meters
- Venturi Meter
- Orifice Plate
- Pitot Tube
- Rotameter

7. Humidity, Moisture and Level Measurement (04 Periods)

- Hygrometer method for humidity measurement
- Moisture meter
- Electrical contact type liquid level indicators

8. Chemical, Analytical, Medical & Nuclear Instruments (07 Periods)

- Spectrophotometer, Filters
- Electrochemical Sensors
- PH Meter
- General idea and working and application of Medical Instruments as X-Ray Machine, Electronic method for BP measurement, Blood Sugar measurement, EEG and ECG machine
- Brief description of Nuclear Instrumentation

(B) Process Control


9. Introduction (02 Periods)

- Block diagram of a general open and closed loop process
- Automatic Control

10. Control System Components (06 Periods)

- Brief description and working of a potentiometer
- Differential transformer, servo motors
- Tacho Generator
- Eddy Current clutches, relay contractors, timing relay

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11. Types of Control Techniques

(05 Periods)

- Brief Idea and Introduction of following control techniques
- ON-OFF Control
- Proportional
- Integral
- Derivative
- PI
- PD
- PID

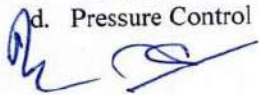
12. Controller

(10 Periods)

- Block Diagram & Circuits of pneumatic PI, PD & PID controller, ON-OFF Controller
- Electronic Controller/Automatic Controller
- Simple Example Of
- Heating Control using SCR
- Illumination Control
- Level Control
- Pressure Control

LIST OF PRACTICALS

1. Experiment of Pressure Measurement
2. Experiment of Temperature Measurement
3. Experiment of Flow Measurement
4. Experiment of Moisture/Humidity Measurement
5. Experiment of Strain Measurement/ load cell
6. Experiment on spectrophotometer and PH meter.
7. Measurement of Level
8. Measurement of angular velocity
9. ON /OFF Controller
10. Experiment of Elex Controller
 - a. Heating Control Using SCR
 - b. level Control
 - c. Illumination Control
 - d. Pressure Control



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TEXTBOOKS:

1. Process Control & Instrumentation by OP Arora/ S Arora; NAV Publications
2. Instrumentation Devices and Systems by S Ranjan; Tata McGraw Hill Publishing

RECOMMENDED BOOKS:

1. Instrumentation Devices & Systems by By S. Ranjan; Tata McGraw-Hill Publishing
2. Electrical & Elex Measurement by A. K. Sawhney; Danpat Rai & Co.
3. Industrial Instrumentation by Tyson
4. Process Instrumentation by Donald P. Echman
5. Process Control by Donald P. Echman
6. Instrumentation by Cirk & Rimboi
7. Instrumentation Measurement and Analysis by B. C. Nakra and K K Chaudhary; MC Graw Hill Publication
8. Electronics Instrumentation by H.S. Kalsi; McGraw Hill Publication
9. Medical Instruments by S. Ananthi; New Age International (P) Limited Publisher

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SIXTH SEMESTER

8-2

ECE601 OPTICAL FIBRE COMMUNICATION

L T P

Periods/ Weeks

3 0 2

RATIONALE

Progressing from communication over copper wire to today's fibre optic communication, we have increased our ability to transmit more information, more quickly and over longer distances. This has expanded our boundaries and is finding a good slot in communication system. Optical fibers has replaced existing transmission media due to its advantages. As a result the technicians are supposed to have knowledge of optical communication. This subject will provide basic concepts and requisite knowledge and skill required.

DETAILED CONTENTS

1. Introduction (10 Periods)

Historical perspective, basic communication systems, optical frequency range, advantages of optical fibre communication, application of fibre optic communication
Electromagnetic spectrum used, Advantages and disadvantages of optical communication.
Principle of light penetration, reflection, critical angle.

2. Optical Fibers and Cables (10 Periods)

Constructional details of various optical fibers, multimode and mono-mode fibers, step index and graded index fibers, acceptance angle, Types of optical fiber cables.
Optical Fibers cable connectors and splicing techniques

3. Losses in Optical Fiber Cable (08 Periods)

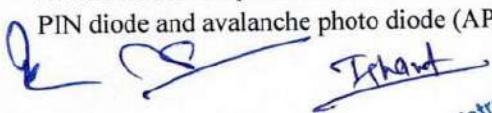
- Absorption Losses: Scattering Losses, Radiation losses, Connector losses, Bending losses.
- Dispersion: Types and its effect on data rate.

4. Optical Sources (10 Periods)

Characteristics of light used in optical communication, principle of operation of LED, different types of LED structures used and their brief description, Injection laser diode, principle of operation, different injection laser diodes, comparison of LED and ILD.

5. Optical Detectors (08 Periods)

Characteristics of photo detectors used in optical communication: PIN diode and avalanche photo diode (APD), Noise in detectors


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6. Optical Amplifiers (10 Periods)

Types of optical amplifiers, semiconductor & fiber optical amplifiers
Functional types, principal of operation of SOA, types of SOA. FPA,
TWA, SOA applications, advantages, Drawbacks, EDFAS, Raman
amplifiers.

7. Optical Fiber System (08 Periods)

Optical transmitter circuit, optical receiver circuit, optical power
budgeting, Multiplexing: WDM (Wavelength Division Multiplexing),
Modulation in fibre optics

LIST OF PRACTICALS

1. Introduction to various components and tools used in optical fiber communication
2. Setting up of fiber analog link
3. Setting up to optic digital link
4. Measurement of bending losses in optical fibers
5. To observe and measure the splice or connector loss
6. To measure and calculate numerical aperture of optical fiber
7. To observe characteristics of optical source
8. To observe characteristics of optical detector
9. To connect a fiber with connector at both ends

INSTRUCTIONAL STRATEGY

This subject gives the complete knowledge of optical fibre communication techniques. The teacher should make the students aware about the historical development, optical sources and optical fibre system in addition to applications of optical fibre in communication system. Since this subject deals with theory and practical, the theory should be re-enforced by visit to sites and industries like HFCL having optical fiber installations in addition to practical work in the laboratory.

TEXTBOOK:

1. Optical fiber Communication by Gerd Keiser, McGraw Hill International Editions

RECOMMENDED BOOKS:

1. Optical fiber Communication by John M Senior, Prentice Hall of India, New Delhi
2. Optical fiber Communication by J. Gower, Prentice Hall of India, New Delhi
3. Optical fiber Communication by Gerd Keiser, McGraw Hill International Editions
4. Optical Communications – Components and Systems by JH Franz and VK Jain, Narosa Publishing House, New Delhi
5. Optical Fiber Communication by Sangar and Sahdev, Uneek Publications, Jalandhar

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RATIONALE

The wireless/mobile communication technology though complex but is spreading at a very fast rate. People use more mobile phones in comparison to land line phones. It is expected that with in very short period almost everybody will be using mobile communication. Technology is also changing very fast. Therefore, the students should know the functioning of wireless/mobile system/equipment to keep themselves abreast of this latest application of communication.

DETAILED CONTENTS

1. Wireless Communication (10 Periods)
 - 1.1 Basics
 - 1.2 Advantages of wireless communication
 - 1.3 Electromagnetic waves.
 - 1.4 Frequency Spectrum used.
 - 1.5 Paging system.
 - 1.6 Cordless Telephone System.
 - 1.7 Cellular Telephone System
 - 1.8 Comparison of above wireless communication systems.
 - 1.9 Propagation considerations
 - a) Range
 - b) Atmospheric Effect
 - c) Geographic Effect
 - d) Signal Fading
 - e) Doppler Effect
2. Cellular Concept (12 Periods)
 - 2.1 Cell area
 - 2.2 Capacity of cell
 - 2.3 Frequency Reuse
 - 2.4 Co-channel Interference
 - 2.5 Adjacent channel Interference
 - 2.6 Power Control for reducing Interference
 - 2.7 Improving coverage and capacity in cellular system
 - a) Cell Splitting.
 - b) Sectoring
 - c) Repeater for Range Extension.
3. Multiple Access Techniques for Wireless Communication (18 Periods)
 - 3.1 Introduction to Multiple Access.
 - 3.2 Frequency Division Multiple Access (FDMA)
 - 3.3 Time Division Multiple Access (TDMA)

- 3.4 Code Division Multiple Access (CDMA)
- 3.5 Spread Spectrum Multiple Access (SSMA)
- 3.6 Frequency Hopping spread Spectrum (FHSS).
- 3.7 Comparison of FDMA/TDMA/CDMA
- 3.8 Introduction to Wireless local loop (WLL) technologies.
 - (a) Satellite- Based System
 - (b) Cellular-- Based System
 - (c) Micro Cellular-- Based System
 - (d) Fixed Wireless Access Systems

4. Mobile Communication Systems (16 Periods)

- 4.1 Advanced Mobile Phone System (AMPS)
 - a) Operation of AMPS
 - b) Working of AMPS Phone System
- 4.2 Introduction of Global Systems for Mobile Communication (GSM) and its architecture, Introduction of CDMA System, comparison of CDMA and GSM Systems
- 4.3 Introduction of GPRS and GPS System.

5. Mobile computing (08 Periods)

- 5.1 Introduction to Blue tooth and Infrared Data Association(IRDA)
- 5.2 Introduction to Wi-Fi ,Radio Frequency identification (RFID) .

LIST OF PRACTICALS

1. Study the features, specification and working of cellular mobile
2. Signal strength measurement of various points from a transmitting antenna/cordless phone
3. Visit of a Mobile Switching Centre (MSC) in the nearest M.S. facility provider
4. Demonstration of Base Trans Receiver (BTS) with nearby cellular tower
5. Observing call processing of GSM trainer Kit.
6. Observing call processing of CDMA trainer Kit.
7. Practical study of setting of Wi-Fi
8. Fault finding of a basic (GSM) and a (CDMA) mobile phones Demonstration
9. Study and practice of data transfer using blue tooth

INSTRUCTIONAL STRATEGY

Wireless and Mobile Communication is heaving significant impact in Electronics Market. For the proper awareness of this subject it is must to provide the students the detail functioning of wireless/mobile system/equipment. For this visits must be arranged to BTS/MSC (Mobile Switching Centre) providers. The theory classes need to be application based in addition to industrial visits in the BSNL, Vodafone, Airtel, SPICE, TATA Indicom etc

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TEXTBOOKS:

1. Mobile and Personal Communication Systems and Services, by Raj Pandya, Prentice Hall of India, New Delhi

RECOMMENDED BOOKS:

1. Wireless Communications, Principles and Practice, by Theodore S.Rappaport.
2. Wireless Communications by Singal, Tata McGraw Hill Education Pvt Ltd , New Delhi
3. Wireless Communications by Misra, Tata McGraw Hill Education Pvt Ltd , New Delhi
4. Introduction to Wireless and Mobile Systems, by Dharma Prakash Agarwal, Qing-An zeng.
5. Wireless Communications and Networking, by William Stallings.
6. Mobile and Personal Communication Systems and Services, by Raj Pandya, Prentice Hall of India, New Delhi
7. Mobile Communication by John Schiller, Prentice Hall of India, New Delhi
8. Wireless Communications by Pahalwan, Pearson Publishers
9. Wireless and Mobile Communication VK Sangar, Ishan Publications.



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RATIONALE

In industry, many manufacturing processes demand a sequence of operation, which are to be performed repetitively. Early automation systems were mechanical in design, timing and sequencing being effected by gears and cams. Slowly these design concepts were replaced by electrical drives which were controlled by relays and now by programmable logic controllers (PLCs).

DETAILED CONTENTS

- | | | |
|----|---|--------------|
| 1. | Microcontroller series (MCS) – 51 Overview | (16 Periods) |
| | <ul style="list-style-type: none"> • Pin details • I/O Port structure • Memory Organization • Special Function Registers (SFRS) • External Memory | |
| 2. | Instruction Set; Addressing Modes, Instruction types | (12 Periods) |
| | <ul style="list-style-type: none"> • Timer operation • Serial Port operation • Interrupts | |
| 3. | Assembly language programming | (10 Periods) |
| | <ul style="list-style-type: none"> • Assembler directives • Assembler operation | |
| 4. | Design and Interface | (10 Periods) |
| | <ul style="list-style-type: none"> • keypad interface, 7- segment interface, Switches etc | |
| 5. | Embedded Systems | (16 Periods) |
| | Introduction, Embedded design concept, Brief description and architecture of AVR and PIC, Application of embedded system, case study of embedded system. General Idea of Robotics, Different types of Robots, Their working principles and elements used in robotics. | |

LIST OF PRACTICALS

1. Familiarization of Micro Controllers (8051) kit
2. Assembly Language Programming
3. Testing of general input/output on Micro controller board




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4. Development of Electrical , Instrumentation applications using 8051 micro-controller
5. Study of interfacing ADC, Infrared Sensor, RS 232, DAC with 8051.
6. Case study of embedded system

TEXTBOOKS:

1. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education.

RECOMMENDED BOOKS:

1. B. B. Brey: The Intel Microprocessors, Architecture, Programming and Interfacing, Pearson Education.
2. Liu Gibson: Microcomputer Systems: The 8086/8088 Family- Architecture, Programming And Design , PHI
3. D. V. Hall: Microprocessors and Interfacing, TMH.
4. Mazidi and Mazidi: The 8051 Microcontroller and Embedded Systems, Pearson Education.
5. Ayala Kenneth:- The 8051 microcontroller, Third Edition, Cengage Learning
6. A. V. Deshmukh: Microcontroller (Theory and Application), TMH.
7. Raj Kamal: Embedded Systems- Architecture, Programming and Design, TMH, New Delhi.
8. V. Udayashankara and M. S. Mallikarjunaswamy: 8051 Microcontroller, TMH, New Delhi.
9. Digital Electronics by Malvino Leach, Tata McGraw-Hill Publishing, New Delhi

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ECE604 COMPUTER NETWORKS

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RATIONALE

The future of computer technology is in computer networks. Global connectivity can be achieved through computer networks. A diploma holder in computer engineering should therefore understand the function of networks. Knowledge about hardware and software requirements of networks is essential.

DETAILED CONTENTS

1. Networks Basics (08 Periods)
 - Concept of network
 - Models of network computing
 - Networking models
 - Peer-to-peer Network
 - Server Client Network
 - LAN, MAN and WAN
 - Network Services
 - Topologies
 - Switching Techniques

2. OSI Model (10 Periods)
 - Standards
 - OSI Reference Model
 - OSI Physical layer concepts
 - OSI Data-link layer concepts
 - OSI Networks layer concepts
 - OSI Transport layer concepts
 - OSI Session layer concepts
 - OSI presentation layer concepts
 - OSI Application layer concepts

3. Introduction to TCP/IP (12 Periods)
 - Concept of physical and logical addressing
 - Different classes of IP addressing, special IP address
 - Sub netting and super netting
 - Loop back concept
 - IPV4 and IPV6 packet Format
 - Configuring IPV4 and IPV

4. Network Architecture (10 Periods)
 - ARC net specifications
 - Ethernet Specification and Standardization:

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Gurgaon, Haryana

10 Mbps (Traditional Ethernet), 10 Mbps (Fast Ethernet) and 1000 Mbps (Gigabit Ethernet), Introduction to Media Connectivity (Leased lines, ISDN, PSTN, RF, VSAT, Optical and IPLC)

5. Network Connectivity (08 Periods)
- Network connectivity Devices
 - NICs
 - Hubs
 - Repeaters
 - Multiplexers
 - Modems
 - Routers and Protocols,
 - Firewall
 - ATM
 - VOIP and Net-to-Phone Telephony,
 - Laws and Protocols
6. Network Trouble Shooting Techniques (10 Periods)
- Trouble Shooting process
 - Trouble Shooting Tools: PING, IPCONFIG, IFCONFIG, NETSTAT, TRACEROUT, Wireshark/ Dsniffer/ Pcop
 - Hauffman codes
 - Cryptography
7. Wireless Networking (06 Periods)
- Basics of Wireless: Wireless MAN, Networking, Wireless LAN, Wi-Fi, Wi-Max (Broad-band Wireless) and Blue-Tooth technology.

LIST OF PRACTICALS

1. Recognize the physical topology and cabling (coaxial, OFC, UTP, STP) of a network.
2. Recognition and use of various types of connectors RJ-45, RJ-11, BNC and SCST
3. Recognition of network devices (Switches, Hub, Routers of access points for Wi-Fi)
4. Making of cross cable and straight cable
5. Install and configure a network interface card in a workstation.
6. Identify the IP address of a workstation and the class of the address and configure the IP Address on a workstation
7. Managing user accounts in windows or LINUX
8. Study and Demonstration of sub netting of IP address
9. Connectivity troubleshooting using PING, IPCONFIG, IFCONFIG
10. Installation of Network Operating System(NOS)
11. Visit to nearby industry for latest networking techniques

Required Software

Windows Server/Linux Server



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Required Tools and Supplies

- 1) Crimping tool, crone Tool, Cable tester,
- 2) RJ 45 connectors, RJ-11, BNC, SCST
- 3) Coaxial Cable, UTP, STP, OFC cable
- 4) Screwdriver Kit
- 5) Switch/Hub
- 6) Manageable Switch

INSTRUCTIONAL STRATEGY

This subject deals with both theory and practicals. The students should be made to practically establish LAN with various hardware and software and their integration.

TEXTBOOK:

1. Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi

RECOMMENDED BOOKS:

1. Computer Networks by Tanenbaum, Prentice Hall of India, New Delhi
2. Data and Computer Communication by William Stallings, Pearson Education, New Delhi
3. Local Area Networks by Peter Hudson
4. Understanding Local Area Network by Neil Jenkins
5. Area Networks by Stan Schatt, Prentice Hall of India, New Delhi
6. Network+ Lab manual,- BPB Publications -by Tami Evanson
7. Networking Essentials – BPB Publications New Delhi
8. Computer Network and Communications By V.K. Jain and Narija Bajaj, Cyber Tech Publications, New Delhi.
9. Linux – Install and Configuration Black Book by Dee Annleblanc and Issac Yates, IDG Books India Private Limited, Delhi.
10. Unleashed Linux by TechMedia Publishers, New Delhi
11. Computer Network by J.S. Katre, Tech-Max Publication, Pune

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4. Ladder diagram programming (15 Periods)

Programming based on Basic instructions, timer counter, sequencer to comparison instruction using ladder diagrams.

5. Applications of PLCs (15 Periods)

- Car parking
- Doorbell operation
- Traffic light control
- Microwave Oven
- Washing machine

LIST OF PRACTICALS

1. Familiarization with the working of PLC
2. Components/sub-components of a PLC, learning functions of different modules of a PLC system
3. Introduction to programming language, ladder diagram concepts, instruction list for module 5.
4. Basic logic operations, AND, OR, NOT, functions
5. Logic control systems with time response as applied to clamping operation
6. Sequence control system e.g in lifting a device for packaging and counting
7. Writing, entering and testing programs using a hand-held programmer and computer for the following operations
 - Ladder Logic
 - Timers
 - Counters
 - Sequencers

INSTRUCTIONAL STRATEGY

The teacher should explain the scope of various measuring devices and their practical application in the field. The transducers and measuring devices must be shown to the students and they should be trained in the selection, operation, maintenance and calibrations. Frequent visits to nearby process industries will be of immense help to the students. The inputs shall start with theoretical inputs to architecture, instruction set, assembly language programming, Small projects may be identified, be designed and implemented. PLC ladder diagram and programming should be supplemented with visits to industry. More emphasis may be given to practical work.

TEXTBOOK:

1. Introduction to PLCs by Gary Dunning. McGraw Hill

RECOMMENDED BOOKS:

1. Programmable Logic Controller by Job Dan Otter; P.H. International, Inc, USA
2. Introduction to PLCs by Gary Dunning. McGraw Hill
3. Module on PLCs and their Applications by Rajesh Kumar, NITTTR Chandigarh
4. Module on "Allen Bradlag PIC (SLC 500), Institution set-1, by Rajesh Kumar, NITTTR, Chandigarh
5. Module on "PLC Applications based on SLC 5/03" By Rajesh Kumar, NITTTR Chandigarh

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ECE606 EMPLOYABLE SKILLS

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Periods per week - - 2

RATIONALE

Diploma holders are required to not only possess subject related knowledge but also soft skills to get good jobs and to rise steadily at their workplace. This subject is included to develop employability skills amongst the students.

DETAILED CONTENTS

1. Industrial Scenario Engineering Education and expectations of competences from an engineer by employer (04 Periods)
2. Personality types, characteristic and features for a successful engineer (04 Periods)
3. Professional Engineer desirable values and ethics and their development. Relation between engineering profession, society and environment (04 Periods)
4. Managing project (16 periods)
 - Leadership
 - Motivation
 - Time management
 - Resource management
 - Computer Software
 - Interpersonal relationship
 - Engineer economics and fundamentals
5. Effective Communication (08 Periods)
 - Listening
 - Speaking
 - Writing
 - Presentation Technique/Seminar
 - Group discussion
6. Preparing for Employment (08 Periods)
 - Searching for job/job hunting
 - Resume Writing
 - Interview technique in personal interview telephonic interview, panel interview, group interview, video conference

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7. Managing Self (06 Periods)
- Managers body, mind, emotion and spirit
 - Stress Management
 - Conflict resolution
8. Continuing professional development (04 Periods)
- Organising learning and knowledge
 - Use of computer for organising knowledge resource
9. Creativity, Innovation and Intellectual property right (06 Periods)
- Concept and need in present time for an engineer
10. Basic rules, laws and norms to be adhered by engineers during their working (04 Peeriods)

TEXTBOOK:

1. SOURCE: Internet Source



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ECEPR607 MAJOR PROJECT WORK

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RATIONALE

Major Project Work aims at developing innovative skills in the students whereby they apply in totality the knowledge and skills gained through the course work in the solution of particular problem or by undertaking a project. In addition, the project work is intended to place students for project oriented practical training in actual work situation for the stipulated period with a view to:

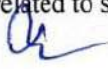


- i) Develop understanding regarding the size and scale of operations and nature of field-work in which students are going to play their role after completing the courses of study.
- ii) Develop understanding of subject based knowledge given in the classroom in the context of its application at work places.
- iii) Develop first hand experience and confidence amongst the students to enable them to use and apply polytechnic/institute based knowledge and skills to solve practical problems related to the world of work.
- iv) Develop abilities like interpersonal skills, communication skills, positive attitudes and values etc.

The individual students have different aptitudes and strengths. Project work, therefore, should match the strengths of students. For this purpose, students should be asked to identify the type of project work, they would like to execute. The activity of problem identification should begin well in advance (say at the end of second year). Students should be allotted a problem of interest to him/her as a major project work. It is also essential that the faculty of the respective department may have a brainstorming session to identify suitable project assignments for their students. The project assignment can be individual assignment or a group assignment. There should not be more than 3 students if the project work is given to a group. The project work identified in collaboration with industry should be preferred.

This practical training cum project work **should not** be considered as merely conventional industrial training in which students are sent at work places with either minimal or no supervision. This experience is required to be planned in advance and supervised on regular basis by the polytechnic faculty. For the fulfillment of above objectives, polytechnics may establish close linkage with 8-10 relevant organization for providing such an experience to students. It is necessary that each organization is visited well in advance and activities to be performed by students are well defined. The chosen activities should be such that it matches with the curricular interest to students and of professional value to industrial/ field organizations. Each teacher is expected to supervise and guide 5-6 students.

Some of the project activities are given below:

- a) Projects related to designing small electronic equipment / instruments.
- b) Projects related to increasing productivity in electronic manufacturing areas.
- c) Projects related to quality assurance.
- d) Projects connected with repair and maintenance of plant and equipment.
- e) Projects related to design of PCBs.
- f) Projects related to suggesting substitutes of electronics components being used.




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- g) Projects related to design of small oscillators and amplifier circuits.
- h) Projects related to design, fabrication, testing and application of simple digital circuits and components.
- i) Projects related to microprocessor/microcontroller based circuits/ instruments.

A. SOME OF THE PROJECTS BASED ON ABOVE AREAS ARE LISTED BELOW FOR THE BENEFIT OF STUDENTS

1. Microprocessor/Microcontroller based rolling display/bell and calendar
2. Microprocessor based stepper motor control.
3. Speed control of DC Machines by Microprocessor/Microcontrollers
4. Temperature monitoring using Microprocessor/Microcontroller based systems.
5. Microprocessor/Microcontroller based liquid level indicator and control
6. Fabrication and assembling of digital clock.
7. Fabrication of PCB circuits using ORCAD/ EAGLE Software.
8. Fabrication of ON line/OFF line UPS of different ratings and inverters
9. Design, fabrication and testing of different types of experimental boards
10. Repair of oscilloscope, function generator
11. Design and developing web sites of organizations
12. Installation of computer network (LANS).
13. Microprocessor/Microcontroller based solar tracking system
14. GSM based car or home security system
15. Bank token display using microcontroller
16. Printer sharing unit
17. Microprocessor/Microcontroller Based A/D converter
18. Microprocessor/Microcontroller Based D/A converter
19. Simulation of half wave and full wave rectifiers using Simulation Software
20. Simulation of class A, Class B, Class AB and Class C amplifiers
21. Simulation of different wave forms like sine, square, triangular waves etc.
22. GPS based vehicle tracking system
23. Calculate Bit Error Rate (BER) of various modulation techniques
24. Design ALU using CPLD/FPGA
25. Design Display System using CPLD/FPGA
26. Electronic Weighing Machines

B. FABRICATION AND TESTING (AT LEAST TWO OF THE FOLLOWING):

- 1 Voltage Stabilizer for Refrigerator, Air-Conditioner
- 2 Emergency Light using SCR
- 3 Power amplifier
- 4 Low cost intercom for home
- 5 Analog computer
- 6 Regulated power supply (+ 12V and + 6V) using 7812, 7912 and 7806, 7906
- 7 Automatic battery charger using SCR
- 8 Burglar Alarm
- 9 Automatic street light/dressing table light
- 10 Inverter circuit 500 watt.
- 11 Microprocessor/Microcontroller Based A/D converter
- 12 Microprocessor/Microcontroller Based D/A converter
- 13 Simulation of half wave and full wave rectifiers using Simulation Software

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- 14 Simulation of class A, Class B, Class AB and Class C amplifiers
- 15 Inverter/Emergency light circuit using power transistors
- 16 SCR based automatic battery charger
- 17 SCR operated illumination controller
- 18 SCR operated automatic water level controller
- 19 SCR based speed controller for DC shunt motor
- 20 Three phase full wave rectifier using power diodes
- 21 Timer circuit using 555-IC
- 22 SCR controlled rectifier circuit
- 23 Speed control circuit of DC shunt motor using SCR
- 24 Inverting and non-inverting amplifiers using OP AMP(741)
- 25 Comparator circuits using OP AMP (741)

NOTE:

The list is only the guideline for selecting a project; however a student is at liberty to select any other related project of his choice independently under guidance of his teacher

A suggestive criterion for assessing student performance by the external (person from industry) and internal (teacher) examiner is given in table below:

Sr. No.	Performance Criteria	Max.** Marks	Rating Scale				
			Excel lent	Very Good	Good	Fair	Poor
1.	Selection of project assignment	10%	10	8	6	4	2
2.	Planning and execution of 2 considerations	10%	10	8	6	4	
3.	Quality of performance	20%	20	16	12	8	4
4.	Providing solution of the problems or production of final product	20%	20	16	12	8	4
5.	Sense of responsibility	10%	10	8	6	4	2
6.	Self expression/ communication skills	5%	5	4	3	2	1
7.	Interpersonal skills/human relations	5%	5	4	3	2	1
8.	Report writing skills	10%	10	8	6	4	2
9	Viva voce	10%	10	8	6	4	2
Total marks		100	100	80	60	40	20

The overall grading of the practical training shall be made as per following table.

In order to qualify for the diploma, students must get "Overall Good grade" failing which the students may be given one more chance to improve and re-evaluate before being disqualified and declared "not eligible to receive diploma". It is also important to note that the students must get more than six "goods" or above "good" grade in different performance criteria items in order to get "Overall Good" grade.

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"Overall Good"

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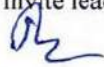
	Range of maximum marks	Overall grade
i)	More than 80	Excellent
ii)	79 > 65	Very good
iii)	64 > 50	Good
iv)	49 > 40	Fair
v)	Less than 40	Poor

Important Notes

1. This criteria must be followed by the internal and external examiner and they should see the daily, weekly and monthly reports while awarding marks as per the above criteria.
2. The criteria for evaluation of the students have been worked out for 200 maximum marks. The internal and external examiners will evaluate students separately and give marks as per the study and evaluation scheme of examination.
3. The external examiner, preferably, a person from industry/organization, who has been associated with the project-oriented professional training of the students, should evaluate the students performance as per the above criteria.
4. It is also proposed that two students or two projects which are rated best be given merit certificate at the time of annual day of the institute. It would be better if specific nearby industries are approached for instituting such awards.

The teachers are free to evolve other criteria of assessment, depending upon the type of project work.

It is proposed that the institute may organize an annual exhibition of the project work done by the students and invite leading Industrial organisations in such an exhibition.




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