

TELECOMMUNICATION TECHNOLOGY
SCHEME OF STUDIES

FIRST YEAR				T	P	C	Page
Gen	111	Islamiat & pakistan Studies		1	0	1	1
Eng	112	English		2	0	2	10
Math	113	Mathematics		3	0	3	13
Phy	122	Applied Physics		1	3	2	19
Comp	111	Computer Applications		0	3	1	26
TC	114	Telecom Essentials & Networks		3	3	4	28
TC	127(a)	Telecom Drawing General Engineering		0	6	2	41
TC	127(b,c,d)	(I)	Fitting Shop	0	3	1	
		(II)	Woodwork Shop	0	3	1	
		(III)	Electrical Wiring	0	3	1	
TC	127(e,f)	Electronics Components, Applications & Assembly		0	6	2	45
T o t a l				10	27	19	
SECOND YEAR							
Gen	211	Islamiat & Pak Studies		1	0	1	46
Math	212	Applied Mathematics		2	0	2	53
Ch	222	Applied Chemistry		1	3	2	59
Mgm	211	Business Communication		1	0	1	66
Mgm	221	Industrial Economics		1	0	1	70
TC	214	Telecom Electronics Devices & Circuits.		3	3	4	75
TC	222	Digital Circuits & Micro-processor		2	3	3	78
TC	233	Measuring Instruments		2	3	3	97
TC	243	Radio Communication System-I		2	3	3	109
TC	253	Telephone & Exchanges		2	3	3	115
TC	262	Power Plant		1	3	2	119
T o t a l				18	21	24	
THIRD YEAR							
Gen	311	Islamiat & Pak Studies		1	0	1	123
Mgm	311	Industrial Management & Human Relations		1	0	1	130
TC	312	Radio Communication System-II		2	3	3	136
TC	325	TV Circuits & Systems		3	6	5	142
TC	332	Antenna & Wave Propagation		1	3	2	155
TC	342	Microprocessor Application & Interfaces		2	3	3	162
TC	352	Telecom Equipment Servicing		0	6	2	169
TC	363	Digital Communication		2	3	3	170
TC	372	Project		0	3	2	176
TC	382	Fiber Optics & Satellite Communication		1	3	2	177
T o t a l				13	30	24	

Eng-112ENGLISH

Total contact hours

Theory	64	T	P	C
Practical	0	2	0	2

AIMS At the end of the course, the students will be equipped with cognitive skill to enable them to present facts in a systematic and logical manner to meet the language demands of dynamic field of commerce and industry for functional day-to-day use and will inculcate skills of reading, writing and comprehension.

COURSE CONTENTS

ENGLISH PAPER "A"

1 PROSE/TEXT **16 hours**

1.1 First eight essays of Intermediate English Book-II

2 CLOZE TEST **4 hours**

2.1 A passage comprising 50-100 words will be selected from the text. Every 11th word or any word for that matter will be omitted. The number of missing word will range between 5-10. The chosen word may or may not be the one used in the text, but it should be an appropriate word.

ENGLISH PAPER "B"

3 GRAMMAR **26 hours**

3.1 Sentence Structure.

3.2 Tenses.

3.3 Parts of speech.

3.4 Punctuation.

3.5 Change of Narration.

3.6 One word for several

3.7 Words often confused

4. COMPOSITION **8 hours**

4.1 Letters/Messages

4.2 Job application letter

4.3 For character certificate/for grant of scholarship

4.4 Telegrams, Cablegrams and Radiograms, Telexes, Facsimiles

4.5 Essay writing

4.6 Technical Education, Science and Our life, Computers, Environmental Pollution, Duties of a Student.

5. TRANSLATION

5.1 Translation from Urdu into English.

For Foreign Students: A paragraph or a dialogue.

4 hours
6 hours

RECOMMENDED BOOKS

1. Intermediate English Book-II.

2. An English Grammar and Composition of Intermediate Level.

3. A Hand Book of English Students By Gatherer.

Eng-112ENGLISH

INSTRUCTIONAL OBJECTIVES

PAPER-A

1. DEMONSTRATE BETTER READING, COMPREHENSION AND VOCABULARY

- 1.1 Manipulate, skimming and scanning of the text.
- 1.2 Identify new ideas.
- 1.3 Reproduce facts, characters in own words
- 1.4 Write summary of stories

2. UNDERSTAND FACTS OF THE TEXT

- 2.1 Rewrite words to fill in the blanks recalling the text.
- 2.2 Use own words to fill in the blanks.

PAPER-B

3. APPLY THE RULES OF GRAMMAR IN WRITING AND SPEAKING

- 3.1 Use rules of grammar to construct meaningful sentences containing a subject and a predicate.
- 3.2 State classification of time, i.e present, past and future and use verb tense correctly in different forms to denote relevant time.
- 3.3 Identify function words and content words.
- 3.4 Use marks of punctuation to make sense clear.
- 3.5 Relate what a person says in direct and indirect forms.
- 3.6 Compose his writings.
- 3.7 Distinguish between confusing words.

4. APPLY THE CONCEPTS OF COMPOSITION WRITING TO PRACTICAL SITUATIONS

- 4.1 Use concept to construct applications for employment, for character certificate, for grant of scholarship.
- 4.2 Define and write telegrams, cablegrams and radiograms, telexes, facsimiles
- 4.3 Describe steps of a good composition writing.
- 4.4 Describe features of a good composition.
- 4.5 Describe methods of composition writing
- 4.6 Use these concepts to organize facts and describe them systematically in practical situation.

5. APPLIES RULES OF TRANSLATION

- 5.1 Describe confusion.
- 5.2 Describe rules of translation.

5.3 Use rules of translation from Urdu to English in simple paragraph and sentences.

Math-113 APPLIED MATHEMATICS-I

T	P	C
3	0	3

Total Contact Hours

Theory 96 Hours.

Pre-requisite: Must have completed a course of Elective Mathematics at Matric level.

AIMS: After completing the course the students will be able to

1. Solve problems of Algebra, Trigonometry, vectors, Mensuration, Matrices and Determinants.
2. Develop skill, mathematical attitudes and logical perception in the use of mathematical instruments as required in the technological fields.
3. Acquire mathematical clarity and insight in the solution of technical problems.

COURSE CONTENTS

- | | |
|--|----------------|
| 1. QUADRATIC EQUATIONS | 6 Hours |
| 1.1 Standard Form | |
| 1.2 Solution | |
| 1.3 Nature of roots | |
| 1.4 Sum & Product of roots | |
| 1.5 Formation | |
| 1.6 Problems | |
| 2. ARITHMETIC PROGRESSION AND SERIES. | 3 Hours |
| 2.1 Sequence | |
| 2.2 Series | |
| 2.3 nth term | |
| 2.4 Sum of the first n terms | |
| 2.5 Means | |
| 2.6 Problems | |
| 3. GEOMETRIC PROGRESSION AND SERIES. | 3 Hours |
| 3.1 nth term | |
| 3.2 Sum of the first n terms | |
| 3.3 Means | |
| 3.4 Infinite Geometric progression | |
| 3.5 Problems | |
| 4. BINOMIAL THEOREM | 6 Hours |
| 4.1 Factorials | |

- 4.2 Binomial Expression
 - 4.3 Binomial Co-efficient
 - 4.4 Statement
 - 4.5 The General Term
 - 4.6 The Binomial Series
 - 4.7 Problems.
- 5. PARTIAL FRACTIONS 6 Hours**
- 5.1 Introduction
 - 5.2 Linear Distinct Factors Case I
 - 5.3 Linear Repeated Factors Case II
 - 5.4 Quadratic Distinct Factors Case III
 - 5.5 Quadratic Repeated Factors Case IV
 - 5.6 Problems
- 6. FUNDAMENTALS OF TRIGONOMETRY 6 Hours**
- 6.1 Angles
 - 6.2 Quadrants
 - 6.3 Measurements of Angles
 - 6.4 Relation between sexagesimal & circular system
 - 6.5 Relation between Length of a Circular Arc & the Radian Measure of its central Angle
 - 6.6 Problems
- 7. TRIGONOMETRIC FUNCTIONS AND RATIOS 6 Hours**
- 7.1 Trigonometric functions of any angle
 - 7.2 Signs of trigonometric Functions
 - 7.3 Trigonometric Ratios of particular Angles
 - 7.4 Fundamental Identities
 - 7.5 Problems
- 8. GENERAL IDENTITIES 6 Hours**
- 8.1 The Fundamental Law
 - 8.2 Deductions
 - 8.3 Sum & Difference Formulae
 - 8.4 Double Angle Identities
 - 8.5 Half Angle Identities
 - 8.6 Conversion of sum or difference to products
 - 8.7 Problems
- 9. SOLUTION OF TRIANGLES 6 Hours**
- 9.1 The law of Sines
 - 9.2 The law of Cosines
 - 9.3 Measurement of Heights & Distances

9.4 Problems

10. MENSURATION OF SOLIDS

30 Hours

10.1 Review of regular plane figures and Simpson's Rule

10.2 Prisms

10.3 Cylinders

10.4 Pyramids

10.5 Cones

10.6 Fruste

10.7 Spheres

11. VECTORS

9 Hours

11.1 Scalars & Vectors

11.2 Addition & Subtraction

11.3 The unit Vectors i, j, k

11.4 Direction Cosines

11.5 Scaler or Dot Product

11.6 Deductions

11.7 Dot product in terms of orthogonal components

11.8 Vector or cross Product

11.9 Deductions

11.10 Analytic Expression for $a \times b$.

11.11 Problems

12. MATRICES AND DETERMINANTS

9 Hours

12.1 Definition of Matrix

12.2 Rows & Columns

12.3 Order of a Matrix

12.4 Algebra of Matrices

12.5 Determinants

12.6 Properties of Determinants

12.7 Solution of Linear Equations

12.8 Problems

REFERENCE BOOKS

1. Ghulam Yasin Minhas - Technical Mathematics Vol-I, Ilmi Kitab Khana, Lahore.
2. Prof. Riaz Ali Khan - Polytechnic Mathematic Series Vol I & II, Majeed Sons, Faisalabad
3. Prof. Sana Ullah Bhatti - A Text Book of Algebra and Trigonometry, Punjab Text Book Board, Lahore.

INSTRUCTIONAL OBJECTIVES

1.USE DIFFERENT METHODS FOR THE SOLUTION OF QUADRATIC EQUATIONS.

- 1.1 Define a standard quadratic equation.
- 1.2 Use methods of factorization and method of completing the square for solving the equations.
- 1.3 Derive quadratic formula.
- 1.4 Write expression for the discriminant.
- 1.5 Explain nature of the roots of a quadratic equation.
- 1.6 Calculate sum and product of the roots.
- 1.7 Form a quadratic equation from the given roots.
- 1.8 Solve problems involving quadratic equations.

2.UNDERSTAND APPLY CONCEPT OF ARITHMETIC PROGRESSION AND SERIES.

- 2.1 Define an Arithmetic sequence and a series.
- 2.2 Derive formula for the nth term of an A.P.
- 2.3 Explain Arithmetic Mean between two given numbers.
- 2.4 Insert n Arithmetic means between two numbers.
- 2.5 Derive formulas for summation of an Arithmetic series.
- 2.6 Solve problems on Arithmetic Progression and Series..

3. UNDERSTAND GEOMETRIC PROGRESSION AND SERIES.

- 3.1 Define a geometric sequence and a series.
- 3.2 Derive formula for nth term of a G.P.
- 3.3 Explain geometric mean between two numbers.
- 3.4 Insert n geometric means between two numbers.
- 3.5 Derive a formula for the summation of geometric Series.
- 3.6 Deduce a formula for the summation of an infinite G.P.
- 3.7 Solve problems using these formulas.

4. EXPAND AND EXTRACT ROOTS OF A BINOMIAL.

- 4.1 State binomial theorem for positive integral index.
- 4.2 Explain binomial coefficients: $(n,0), (n,1), \dots, (n,r), \dots, (n,n)$
- 4.3 Derive expression for the general term.
- 4.4 Calculate the specified terms.
- 4.5 Expand a binomial of a given index.
- 4.6 Extract the specified roots.
- 4.7 Compute the approximate value to a given decimal place.
- 4.8 Solve problems involving binomials.

5.RESOLVE A SINGLE FRACTION INTO PARTIAL FRACTIONS USING DIFFERENT METHODS.

- 5.1 Define a partial fraction, a proper and an improper fraction.
- 5.2 Explain all the four types of partial fractions.
- 5.3 Set up equivalent partial fractions for each type.
- 5.4 Explain the methods for finding constants involved.
- 5.5 Resolve a single fraction into partial fractions.
- 5.6 Solve problems involving all the four types.

6. UNDERSTAND SYSTEMS OF MEASUREMENT OF ANGLES.

- 6.1 Define angles and the related terms.
- 6.2 Illustrate the generation of an angle.
- 6.3 Explain sexagesimal and circular systems for the measurement of angles.
- 6.4 Derive the relationship between radian and degree.
- 6.5 Convert radians to degrees and vice versa.
- 6.6 Derive a formula for the circular measure of a central angle.
- 6.7 Use this formula for solving problems.

7.APPLY BASIC CONCEPTS AND PRINCIPLES OF TRIGONOMETRIC FUNCTIONS.

- 7.1 Define the basic trigonometric functions/ratios of an angle as ratios of the sides of a right triangle.
- 7.2 Derive fundamental identities.
- 7.3 Find trigonometric ratios of particular angles.
- 7.4 Draw the graph of trigonometric functions.
- 7.5 Solve problems involving trigonometric functions.

8.USE TRIGONOMETRIC IDENTITIES IN SOLVING TECHNOLOGICAL PROBLEMS.

- 8.1 List fundamental identities.
- 8.2 Prove the fundamental law.
- 8.3 Deduce important results.
- 8.4 Derive sum and difference formulas.
- 8.5 Establish half angle, double angle & triple angle formulas.
- 8.6 Convert sum or difference into product & vice versa.
- 8.7 Solve problems.

9.USE CONCEPTS, PROPERTIES AND LAWS OF TRIGONOMETRIC FUNCTIONS FOR SOLVING TRIANGLES.

- 9.1 Define angle of elevation and angle of depression.
- 9.2 Prove the law of sines and the law of cosines.
- 9.3 Explain elements of a triangle.
- 9.4 Solve triangles and the problems involving heights and distances.

10.USE PRINCIPLES OF MENSURATION IN FINDING SURFACES, VOLUMES AND WEIGHTS OF SOLIDS.

- 10.1 Define mensuration of plane and solid figures.
- 10.2 List formulas for perimeters & areas of plane figure.
- 10.3 Define pyramid and cone.
- 10.4 Define frusta of pyramid and cone.
- 10.5 Define a sphere and a shell.
- 10.6 Calculate the total surface and volume of each type of solid.
- 10.7 Compute weight of solids.
- 10.8 Solve problems of these solids.

11.USE THE CONCEPT AND PRINCIPLES OF VECTORS IN SOLVING TECHNOLOGICAL PROBLEMS.

- 11.1 Define vector quantity.
- 11.2 Explain addition and subtraction of vector.
- 11.3 Illustrate unit vectors i, j, k .
- 11.4 Express a vector in the component form.
- 11.5 Explain magnitude, unit vector, direction cosines of a vector.
- 11.6 Derive analytic expression for dot product and cross product of two vector.
- 11.7 Deduce conditions of perpendicularity and parallelism of two vectors.
- 11.8 Solve problems

12.USE THE CONCEPT OF MATRICES & DETERMINANTS IN SOLVING TECHNOLOGICAL PROBLEMS.

- 12.1 Define a matrix and a determinant.
- 12.2 List types of matrices.
- 12.3 Define transpose, adjoint and inverse of a matrix.
- 12.4 State properties of determinants.
- 12.5 Explain basic concepts.
- 12.6 Explain algebra of matrices.
- 12.7 Solve linear equation by matrices.
- 12.8 Explain the solution of a determinant.
- 12.9 Use Crammers Rule for solving linear equations.

Phy-122APPLIED PHYSICS

Total Contact Hours

Theory	32	T	P	C
Practicals	96	1	3	2

AIMS:The students will be able to understand the fundamental principles and concept of physics, use these to solve problems in practical situations/technological courses and understand concepts to learn advance physics/technical courses.

COURSE CONTENTS

1MEASUREMENTS. 2 Hours.

- 1.1Fundamental units and derived units
- 1.2Systems of measurement and S.I. units
- 1.3Concept of dimensions, dimensional formula
- 1.4Conversion from one system to another
- 1.5Significant figures

2SCALARS AND VECTORS. 4 Hours.

- 2.1Revision of head to tail rule
- 2.2Laws of parallelogram, triangle and polygon of forces
- 2.3Resolution of a vector
- 2.4Addition of vectors by rectangular components
- 2.5Multiplication of two vectors, dot product and cross product

3MOTION 4 Hours.

- 3.1Review of laws and equations of motion
- 3.2Law of conservation of momentum
- 3.3Angular motion
- 3.4Relation between linear and angular motion
- 3.5Centripetal acceleration and force
- 3.6Equations of angular motion

4TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA. 4 Hours.

- 4.1Torque
- 4.2Centre of gravity and centre of mass
- 4.3Equilibrium and its conditions
- 4.4Torque and angular acceleration
- 4.5Rotational inertia

5WAVE MOTION. 5 Hours

- 5.1Review Hooke's law of elasticity

- 5.2 Motion under an elastic restoring force
- 5.3 Characteristics of simple harmonic motion
- 5.4 S.H.M. and circular motion
- 5.5 Simple pendulum
- 5.6 Wave form of S.H.M.
- 5.7 Resonance
- 5.8 Transverse vibration of a stretched string

6 SOUND.

5 Hrs

- 6.1 Longitudinal waves
- 6.2 Intensity, loudness, pitch and quality of sound
- 6.3 Units of Intensity of level and frequency response of ear
- 6.4 Interference of sound waves silence zones, beats
- 6.5 Acoustics
- 6.6 Doppler effect.

7 LIGHT.

5 Hours

- 7.1 Review laws of reflection and refraction
- 7.2 Image formation by mirrors and lenses
- 7.3 Optical instruments
- 7.4 Wave theory of light
- 7.5 Interference, diffraction, polarization of light waves
- 7.6 Applications of polarization in sunglasses, optical activity and stress analysis

8 OPTICAL FIBER.

2 Hours

- 8.1 Optical communication and problems
- 8.2 Review total internal reflection and critical angle
- 8.3 Structure of optical fiber
- 8.4 Fiber material and manufacture
- 8.5 Optical fiber - uses.

9 LASERS.

3 Hours

- 9.1 Corpuscular theory of light
- 9.2 Emission and absorption of light
- 9.3 Stimulated absorption and emission of light
- 9.4 Laser principle
- 9.5 Structure and working of lasers
- 9.6 Types of lasers with brief description.
- 9.7 Applications (basic concepts)
- 9.8 Material processing
- 9.9 Laser welding
- 9.10 Laser assisted machining
- 9.11 Micro machining

- 9.12Drilling, scribing and marking
- 9.13Printing
- 9.14Lasers in medicine

RECOMMENDED BOOKS

- 1Tahir Hussain, Fundamentals of Physics Vol-I and II
- 2Farid Khawaja, Fundamentals of Physics Vol-I and II
- 3Wells and Slusher, Schaum's Series Physics .
- 4Nelkon and Oyborn, Advanced Level Practical Physics
- 5Mehboob Ilahi Malik and Inam-ul-Haq, Practical Physics
- 6Wilson, Lasers - Principles and Applications
- 7M. Aslam Khan and M. Akram Sandhu, Experimental Physics Note Book

Phy-122APPLIED PHYSICS

INSTRUCTIONAL OBJECTIVES

1 USE CONCEPTS OF MEASUREMENT TO PRACTICAL SITUATIONS AND TECHNOLOGICAL PROBLEMS.

- 1.1 Write dimensional formulae for physical quantities
- 1.2 Derive units using dimensional equations
- 1.3 Convert a measurement from one system to another
- 1.4 Use concepts of measurement and Significant figures in problem solving.

2 USE CONCEPTS OF SCALARS AND VECTORS IN SOLVING PROBLEMS INVOLVING THESE CONCEPTS.

- 2.1 Explain laws of parallelogram, triangle and polygon of forces
- 2.2 Describe method of resolution of a vector into components
- 2.3 Describe method of addition of vectors by rectangular components
- 2.4 Differentiate between dot product and cross product of vectors
- 2.5 Use the concepts in solving problems involving addition resolution and multiplication of vectors.

3 USE THE LAW OF CONSERVATION OF MOMENTUM AND CONCEPTS OF ANGULAR MOTION TO PRACTICAL SITUATIONS.

- 3.1 Use law of conservation of momentum to practical/technological problems.
- 3.2 Explain relation between linear and angular motion
- 3.3 Use concepts and equations of angular motion to solve relevant technological problems.

4 USE CONCEPTS OF TORQUE, EQUILIBRIUM AND ROTATIONAL INERTIA TO PRACTICAL SITUATION/PROBLEMS.

- 4.1 Explain Torque
- 4.2 Distinguish between Centre of gravity and centre of mass
- 4.3 Explain rotational Equilibrium and its conditions
- 4.4 Explain Rotational Inertia giving examples
- 4.5 Use the above concepts in solving technological problems.

5 USE CONCEPTS OF WAVE MOTION IN SOLVING RELEVANT PROBLEMS.

- 5.1 Explain Hooke's Law of Elasticity
- 5.2 Derive formula for Motion under an elastic restoring force
- 5.3 Derive formulae for simple harmonic motion and simple pendulum
- 5.4 Explain wave form with reference to S.H.M. and circular motion
- 5.5 Explain Resonance
- 5.6 Explain Transverse vibration of a stretched string
- 5.7 Use the above concepts and formulae of S.H.M. to solve relevant problems.

6UNDERSTAND CONCEPTS OF SOUND.

- 6.1Describe longitudinal wave and its propagation
- 6.2Explain the concepts: Intensity, loudness, pitch and quality of sound
- 6.3Explain units of Intensity of level and frequency response of ear
- 6.4Explain phenomena of silence zones, beats
- 6.5Explain Acoustics of buildings
- 6.6Explain Doppler effect giving mathematical expressions.

7USE THE CONCEPTS OF GEOMETRICAL OPTICS TO MIRRORS and LENSES.

- 7.1Explain laws of reflection and refraction
- 7.2Use mirror formula to solve problems
- 7.3Use the concepts of image formation by mirrors and lenses to describe working of optical instruments, e.g. microscopes, telescopes, camera and sextant.

8UNDERSTAND WAVE THEORY OF LIGHT

- 8.1Explain wave theory of light
- 8.2Explain phenomena of interference, diffraction, polarization of light waves
- 8.3Describe uses of polarization given in the course contents.

9UNDERSTAND THE STRUCTURE, WORKING AND USES OF OPTICAL FIBER.

- 9.1Explain the structure of the Optical Fiber
- 9.2Explain its principle of working
- 9.3Describe use of optical fiber in industry and medicine.

LIST OF PRACTICALS.

- 1 Draw graphs representing the functions:
 - a) $y=mx$ for $m=0, 0.5, 1, 2$
 - b) $y=x^2$
 - c) $y=1/x$
- 2 Find the volume of a given solid cylinder using vernier callipers.
- 3 Find the area of cross-section of the given wire using micrometer screw gauge.
- 4 Prove that force is directly proportional to (a) mass, (b) acceleration, using fletchers' trolley.
- 5 Verify law of parallelogram of forces using Grave-sands apparatus.
- 6 Verify law of triangle of forces and Lami's theorem
- 7 Determine the weight of a given body using
 - a) Law of parallelogram of forces
 - b) Law of triangle of forces
 - c) Lami's theorem
- 8 Verify law of polygon of forces using Grave-sands apparatus.
- 9 Locate the position and magnitude of resultant of like parallel forces.
- 10 Determine the resultant of two unlike parallel forces.
- 11 Find the weight of a given body using principle of moments.
- 12 Locate the centre of gravity of regular and irregular shaped bodies.
- 13 Find Young's Modules of Elasticity of a metallic wire.
- 14 Verify Hooke's Law using helical spring.
- 15 Study of frequency of stretched string with length.
- 16 Study of variation of frequency of stretched string with tension.
- 17 Study resonance of air column in resonance tube and find velocity of sound.
- 18 Find the frequency of the given tuning fork using resonance tube.
- 19 Find velocity of sound in rod by Kundt's tube.
- 20 Verify rectilinear propagation of light and study shadow formation.
- 21 Study effect of rotation of plane mirror on reflection.
- 22 Compare the refractive indices of given glass slabs.
- 23 Find focal length of concave mirror by locating centre of curvature.
- 24 Find focal length of concave mirror by object and image method
- 25 Find focal length of concave mirror with converging lens.
- 26 Find refractive index of glass by apparent depth.
- 27 Find refractive index of glass by spectrometer.
- 28 Find focal length of converging lens by plane mirror.
- 29 Find focal length of converging lens by displacement method.
- 30 Find focal length of diverging lense using converging lens.
- 31 Find focal length of diverging lens using concave mirror.
- 32 Find angular magnification of an astronomical telescope.
- 33 Find angular magnification of a simple microscope (magnifying glass)

- 34 Find angular magnification of a compound microscope.
- 35 Study working and structure of camera.
- 36 Study working and structure of sextant.
- 37 Compare the different scales of temperature and verify the conversion formula.
- 38 Determine the specific heat of lead shots.
- 39 Find the coefficient of linear expansion of a metallic rod.
- 40 Find the heat of fusion of ice.
- 41 Find the heat of vaporization.
- 42 Determine relative humidity using hygrometer.

Comp-111 COMPUTER APPLICATION

T	P	C
0	3	1

Total contact hours:

Practical: 96 Hours.

AIMS After completion of this course the students will be able to

1. Describe micro-, mini-, mainframe- and super-computer.
2. Explain the function of CPU, input and output devices of a computer system
3. Enlist, appropriate specification of a computer for a certain specific purpose.
4. Apply Disk operating system for a specific operation.
5. Design small program in Basic language.
6. Use Word Perfect 5.1 Package.
7. Use LOTUS 123 package.
8. Use CAD package.

COURSE CONTENTS

1. ELECTRONIC DATA PROCESSING (EDP).

- 1.1. Data Concept
- 1.2. Block diagram of a microcomputer (PC) system.
- 1.3. Input and output devices and CPU
- 1.4. Specification of CPU, input output devices.
- 1.5. Processor types.
- 1.6. Computer concept.
- 1.7. Secondary storage devices.
- 1.8. Printers and plotters.
- 1.9. Using computer for application soft ware.

2. DISK OPERATING SYSTEM (DOS).

- 2.1. Internal Commands.
- 2.2. External Commands.
- 2.3. Batch files.

3. BASIC LANGUAGE.

- 3.1. History of BASIC.
- 3.2. List of high level language.
- 3.3. REM statements.
- 3.4. INPUT statement
- 3.5. Assignment statement.
- 3.6. READ DATA statement.

- 3.7 END STOP statement.
- 3.8 IF THEN ELSE statement.
- 3.9 a) DIM statement (Array)
- b) L Print statement.
- 3.10 Logic of BASIC programmer
- 3.11 Running BASIC program.
- 3.12 Saving and Retrieving BASIC program.

4. BASIC PROGRAM RELATED TO ELECTRONICS.

- 4.1 Calculate the value of XL, Xc & power factor
- 4.2 Ripple factor in Power supply.
- 4.3 BJT amplifier, current and voltage calculation.
- 4.4 BJT amplifier biasing.
- 4.5. FET amplifier biasing.
- 4.6 Design of basic amplifier.

5. WORD PROCESSING.

- 5.1 Running Word Processor.
- 5.2 Opening a document
- 5.3 Saving a document.
- 5.4 Ending a session.
- 5.5. Retrieving document.
- 5.6 Spell check.
- 5.7 Aligning paragraph.
- 5.8 Printing document.
- 5.9 Advance features.

6. LOTUS 123 AND CAD PACKAGES.

- 6.1 Introduction to LOTUS 123.
- 6.2 Spread sheets.
- 6.3 Tables and graphs.
- 6.4 Introduction to CAD
- 6.5 Making simple drawings.
- 6.6 Making layout for PCBs.

TEXT/REFERENCE BOOKS.

- 1. George Culp Instructional computing Fundamentals for IBM Microprocessors.
- 2. Harper & Stevart computer Education
- 3. Nashelskey Boylestar Basic applied circuit analysis
- 4. BASIC for Biginner (Indian print)
- 5. Basics of BASIC (Indian print)

TC-114 TELECOM ESSENTIALS AND NETWORKS

Total Contact Hours:

	T	P	C	
Theory: 96 Hours		3	3	4
Practical: 96 Hours				

Prerequisite: Applied Mathematics & Physics

AIMSThis course is designed so that the student will be able to learn basic knowledge of electricity and electronics.

Understand the operation and application of electrical and electronic principles, devices and circuits.

1. Identify the different electrical/electronics component, devices and types of circuits.
2. Explain the principles of operations and applications of electrical and electronic components, devices and circuits.
3. Use different electrical/electronic components and devices in different circuits configuration.
4. Describe the ratings, tolerances, coding and troubles in different electrical and electronics components and circuits.
5. Calculate current, voltage, power and power factor using circuit laws and network theorems.
6. Use filters and coupling in electronics circuits.

COURSE CONTENTS.

- 1. BASIC PRINCIPLE OF ELECTRICITY** **5 Hours**
 - 1.1 Electron Theory
 - 1.1.1 Structure of atom, K, L and M shell, energy levels and valence electrons.
 - 1.1.2 Energy bands with reference to conductors, insulators and semiconductor.
 - 1.2 Electrical Quantities
 - 1.2.1 Potential, current and resistance.
 - 1.2.2 Units of potential, current and resistance.
 - 1.2.3 Conventional and electron current
- 2. DC FUNDAMENTALS.** **(12 Hours)**
 - 2.1 Ohm's Law
 - 2.1.1 Definition of Ohm's law.
 - 2.1.2 Problems on Ohm's Law.
 - 2.2. Laws of Resistance
 - 2.2.1 Specific Resistance, conductance and conductivity.
 - 2.2.2 Effect of temperature on resistance and temp. Coefficient of resistance.
 - 2.2.3 Problems on $R = \rho \cdot L/A$ and $R_t = R_o (1 + \alpha t)$
 - 2.2.4 Resistance in series, parallel and series-parallel

- 2.2.5 Calculations on combination of resistance and cells in series, parallel and series-parallel combinations.
- 2.2.6 Power and Energy their units and calculations.
- 2.2.7 Power dissipation in resistors.
- 2.3 Kirchhoff's Laws
 - 2.3.1 Introduction of Kirchhoff's Laws.
 - 2.3.2 Calculation using KVL and KCL by loop and node methods.
- 2.4 Resistors
 - 2.4.1 Resistor construction and types.
 - 2.4.2 Application of resistors.
 - 2.4.3 Resistors, colour coding
 - 2.4.4 Resistors, Power rating.
 - 2.4.5 Resistor, troubles.
- 2.5 Batteries
 - 2.5.1 Types of DC sources.
 - 2.5.2 Types of cells , Primary and secondary cells(Mercury, silver oxide, Nickel-cadmium, etc.)
 - 2.5.3 Lead acid batteries.
 - 2.5.4. Solar cell.
 - 2.5.5 Internal resistance of a cell.
 - 2.5.6 Application of cell as constant voltage and constant current source.

3. MAGNETISM AND ELECTROMAGNETISM. (12 Hours)

- 3.1 Magnetism.
 - 3.1.1 Introduction to magnetism, magnetic line of force, flux, flux-density, permeability, Reluctance and their units.
 - 3.1.2 Properties of magnetic lines of force.
 - 3.1.3 Types of magnets.
 - 3.1.4 Magnetic properties of materials (ferro-, para- and dia-magnetic) magnetic induction.
- 3.2 Electromagnetism.
 - 3.2.1 Electromagnetism, M.M.F. (AT) field intensity ($H = AT/L$) ampere turns/meter.
 - 3.2.2 B-H curve and magnetic Hysteresis.
 - 3.2.3 Electromagnetic induction.
 - 3.2.4 Magnetic field around a current carrying conductor and solenoids cork screw and left hand rules.
 - 3.2.5 Force between two magnetic fields and motor action.
 - 3.2.6 Faraday's Law of Electromagnetic induction ($R = Nd/dt$.)
 - 3.2.7 Lenz's Law.

4. ELECTROSTATICS. (12 Hours)

- 4.1 Principle of electrostatic, positive and negative charges.

- 4.2 Laws of electrostatic.
- 4.3 Electrostatic induction and field strength.
- 4.4 Properties of electric lines of force and comparison with magnetic lines.
- 4.5 Dielectric, dielectric strength and its importance permittivity and break down voltage.
- 4.6 Capacitance and capacitors. Capacitance of parallel plate capacitor.
- 4.7 Types and uses of capacitors.
- 4.8 Equivalent capacitance for series, parallel and series parallel combination of capacitors.
- 4.9 Energy stored in capacitors.
- 4.10 Colour code, tolerance and rating of capacitors.
- 4.11 Troubles in capacitors.

5. AC FUNDAMENTALS. (12 Hours)

- 5.1 The simple AC generator.
 - 5.1.1 Sine wave, cycle, wavelength, period, frequency and units.
 - 5.1.2 AC sine wave form and its characteristics. (Instantaneous, peak, average, rms or effective values and their inter relation).
 - 5.1.3 Audio and Radio frequencies, wavelengths and periods frequency spectrum.
 - 5.1.4 Types of alternating wave forms (sinusoidal and non-sinusoidal waves). Fundamental wave and harmonics.
- 5.2 AC Circuits
 - 5.2.1 AC through pure resistance, Phasor quantities.
 - 5.2.2 Phase angle, in-phase, out of phase waves and phase lag & lead and power factor.
 - 5.2.3 Calculation of V, I and W for resistive circuits through inductance.
 - 5.2.4 Self inductance, and self induced voltage.
 - 5.2.5 Inductive reactance ($X_L = 2\pi fL$) Phase relation between V & I.
 - 5.2.6 Phasor diagram and power for pure inductor.
 - 5.2.7 AC through R-L series circuit.
 - 5.2.8 Phasor diagram and power in a R-L series circuit.
 - 5.2.9 Time constant, $\tau = L/R$, and its effect.
 - 5.2.10 Impedance, Impedance triangle.
 - 5.2.11 AC through R-L parallel circuit.
 - 5.2.12 Inductive reactance in series, parallel and series-parallel combination.
 - 5.2.13 Q of coil and its effects on selectivity.
 - 5.2.14 Skin effect, AF and RF chokes.
 - 5.2.15 Troubles in chokes.
 - 5.2.16 AC through pure capacitor. Phase relation between V & I and power.
 - 5.2.17 Capacitive reactance
 - 5.2.18 AC through R-C series circuit.
 - 5.2.19 Time constant RC and its effect.
 - 5.2.20 Impedance, Impedance triangle.
 - 5.2.21 AC through R-C parallel circuit.

- 5.2.22 Capacitive reactance in series, parallel, and series parallel combination.
- 5.2.23 AC through RLC series circuit, phase relation and power calculation.
- 5.2.24 AC through RLC parallel circuit phase relation and power calculation.
- 5.2.25 Simple calculations for RLC circuits.
- 5.2.26 Concepts of real $VI \cos Q$ and apparent power (VA), power factor. simple calculations.

6. TRANSFORMER (6 Hours)

- 6.1 Principle of transformer, mutual inductance, coefficient of mutual inductance.
- 6.2 Turn ratio and e.m.f. equation
- 6.3 Construction, types of transformers, core materials.
- 6.4 Application of transformers in electronics.
- 6.5 Auto-transformers, principle, advantages, disadvantages and applications.
- 6.6 Poly phase transformers, star and delta connection.
- 6.7 Phase and line voltage and current their, inter-relation.
- 6.8 Transformer losses.
 - 6.8.1 Core loss.
 - 6.8.2 Hysteresis loss.

7. PHOTO-AND THERMO-ELECTRICITY. (9 Hours)

- 7.1 Photoelectric effects, Photo- emissive, conductive, and photovoltaic phenomena.
- 7.2 Application of photoelectric effects.
- 7.3 Thermoelectricity - Thompson and Seebeck effects.
- 7.4 Thermocouple, construction, materials and applications
- 7.5 Incandescent lamp, construction, rating and application
- 7.6 Fluorescent tube light, construction, working, rating and applications.

8. NETWORK THEOREMS. (5 Hours)

- 8.1 Superposition theorem for complex circuits.
- 8.2 Calculation based on the superposition theorem.
- 8.3 Thevenin's Theorem circuits simplification.
- 8.4 Calculation based on the Thevenin's theorem.
- 8.5 Norton theorem and current source concept.
- 8.6 Calculation based on the Norton's Theorem.
- 8.7 Star and Delta transformation.
- 8.8 Calculation based on Star and Delta transformation.

9. RESONANCE. (6 Hours)

- 9.1 Condition of resonance and resonant circuit.
- 9.2 Relation between f , L and C at resonance.
- 9.3 Series resonant circuit. Impedance of series resonant circuit.
- 9.4 Current, voltage and impedance characteristic of series resonant circuit.
- 9.5 Parallel resonant circuit and its impedance

- 9.6 Characteristics of impedance, current and voltage of a parallel resonant circuit
- 9.7 Series and parallel resonance curve comparison and Bandwidth.
- 9.8 Q of circuit, Effect of Q on the slope and width of the resonance curves.
- 9.9 Relation between the slope of the resonance curve on selectivity.
- 9.10 Effect of the L.C. ratio on selectivity.
- 9.11 Use of resonance circuit in radio and TV receivers.

10. FILTER & COUPLING CIRCUITS (9 Hours)

- 10.1 Purpose and action of a filter circuit.
- 10.2 Principle of filter action.
- 10.3 Types of filter circuit LPF, HPF, K filter and m drive filter.
- 10.4 Band Pass filter (BPF) Band Stop filter (BSF)
- 10.5 Power supply filter.
- 10.6 Purpose and action of coupling circuit.
- 10.7 Coefficient of coupling and coupled impedance.
- 10.8 Type of coupling, RC, Impedance transformer coupling.
- 10.9 Delay action circuits, R-L and R-C circuits.
- 10.10 Time constant of R-L & R-C circuits and its importance in rise and fall of circuit current and voltage.

11. SEMICONDUCTORS. (8 Hours)

- 11.1 Semiconductor theory
 - 11.1.1 Doping, doping level and methods.
 - 11.1.2 PN Junction diode, Depletion region and junction potential.
 - 11.1.3 Diode as rectifier.
 - 11.1.4 Transistor, types (PNP and NPN)
 - 11.1.5 Transistor as amplifier.
 - 11.1.6 Integrated circuits types, analog and digital.

TEXT/REFERENCE BOOKS.

1. Grob, Bernard, Basic Electronics, Sixth Edition.
2. Slurzberg, Orested, Essentials of Electricity for Radio and TV.
3. Therja, B.L. Electrical Technology.
4. Slurzberg, Essentials of Radio.

TC-114 TELECOM ESSENTIALS AND NETWORKS

INSTRUCTIONAL OBJECTIVES

1. **BASIC PRINCIPLE OF ELECTRICITY.**
 - 1.1 Understand electron theory.
 - 1.1.1 Describe the structure of atom.
 - 1.1.2 Describe the K, L, and M shells.
 - 1.1.3 Describe energy level.
 - 1.1.4 Describe valence electron.
 - 1.1.5 Explain energy bands with reference to conductors, insulators & semiconductors.
 - 1.2 Understand Electrical Quantities
 - 1.2.1 Describe potential, current & resistance
 - 1.2.2 Describe units of potential, current & resistance
 - 1.2.3 Differentiate between conventional current and electron current.
2. **DC FUNDAMENTALS.**
 - 2.1 Understand Ohm's Law.
 - 2.1.1 Define ohm's law
 - 2.2.2 Solve problems on Ohm's law
 - 2.2 Understand Laws of Resistance
 - 2.2.1 Define specific resistance
 - 2.2.2 Define conductor
 - 2.2.3 Define conductivity
 - 2.2.4 Explain the effect of temperature on resistance
 - 2.2.5 Explain coefficient of resistance
 - 2.2.6 Solve problems on $R = PL/A$ and $R_t = R_o(1 + \alpha t)$.
 - 2.2.7 Describe the resistance in series
 - 2.2.8 Describe the resistance in parallel
 - 2.2.9 Describe the resistance in series-parallel
 - 2.2.10 Calculate the combination of resistances and cells, R_t , I & V.
 - 2.2.11 Define power and energy
 - 2.2.12 Describe units of power and energy
 - 2.2.13 Explain the power dissipation in resistors
 - 2.3 Understand Kirchhoffs' Laws
 - 2.3.1 Define Kirchhoff's laws
 - 2.3.2 Solve problems using Kirchhoff voltage law
 - 2.3.3 Solve problems using kirchhoff current law

- 2.4 Understand Resistors
 - 2.4.1 Define resistance and resistor
 - 2.4.2 List types of resistors
 - 2.4.3 Enlist use of resistors
 - 2.4.4 Describe resistor colour codes
 - 2.4.5 Describe power rating of resistor
- 2.5 Understand Batteries
 - 2.5.1 Name types of D.C source
 - 2.5.2 Describe types of cells (Mercury, Silver oxide, Nickel cadmium)
 - 2.5.3 Describe lead acid battery
 - 2.5.4 Describe solar cells
 - 2.5.5 Explain the internal resistance of cell
 - 2.5.6 Use cells in series and parallel of voltage and constant source of current

3. **MAGNETISM & ELECTROMAGNETISM**

- 3.1 Understand magnetism
 - 3.1.1 Describe lines of force, flux, flux density, permeability, reactance & their units
 - 3.1.2 Explain properties of magnetic lines of force
 - 3.1.3 Describe types of magnets
 - 3.1.4 Explain magnetic properties of materials
 - 3.1.5 Define and list ferromagnetic, paramagnetic and diamagnetic materials.
 - 3.1.6 Describe magnetic induction.
- 3.2 To understand electromagnetism
 - 3.2.1 Describe electromagnetism
 - 3.2.2 Describe magneto-motive force
 - 3.2.3 Describe field intensity (HAT/L)
 - 3.2.4 Draw B-H Curve
 - 3.2.5 Explain B-H curve
 - 3.2.6 Describe magnetic hysteresis
 - 3.2.7 Explain electromagnetic induction
 - 3.2.8 Explain magnetic field around a current carrying conductor
 - 3.2.9 Define inductor
 - 3.2.10 Write formula for inductance base on physical parameters of an inductor

$$[L = \mu_r \times (N)^2 \times A / L]$$
 - 3.2.11 Solve problem using the above formula for inductor
 - 3.2.12 Describe solenoids
 - 3.2.13 Describe cork screw rule and left hand rule
 - 3.2.14 Explain force between two magnetic fields and motor action
 - 3.2.15 Define Faraday's law of electromagnetic induction ($e = N d\phi/dt$)

3.2.16 Define Lenz's Law

4. ELECTROSTATICS.

- 4.1 Understand electrostatics
 - 4.1.1 Describe principle of electrostatic charges
 - 4.1.2 Explain the effect of negative & positive charges
 - 4.1.3 Describe the laws of electrostatics
 - 4.1.4 Describe electrostatic induction & field strength
 - 4.1.5 Explain properties of electric lines of force
 - 4.1.6 Compare between electric lines of force and magnetic lines of force
 - 4.1.7 Describe dielectric & dielectric strength/dielectric constant
 - 4.1.8 Describe the importance of dielectric & dielectric strength
 - 4.1.9 Describe capacitor and capacitance
 - 4.1.10 Describe breakdown voltage
 - 4.1.11 Describe the capacitance of parallel plate capacitor
 - 4.1.12 Describe types of capacitors
 - 4.1.13 Describe the use of capacitors
 - 4.1.14 Calculate the total capacitance in series in parallel and series-parallel combination
 - 4.1.15 Explain the energy stored in capacitor
 - 4.1.16 Describe the colour coding, tolerance and voltage rating of capacitors
 - 4.1.17 Describe the troubles in capacitors

5. AC FUNDAMENTALS.

- 5.1 Understand A.C Waveform
 - 5.1.1 Describe sine wave (cycle, wave length, period, frequency and their units)
 - 5.1.2 Draw AC sine waveform (sinusoidal, square, sawtooth)
 - 5.1.3 Describe Instantaneous value, peak value, average value, r.m.s. value, effective value and their inter-relation
 - 5.1.4 Describe Audio & Radio frequencies and their wavelengths
 - 5.1.5 Draw the electromagnetic wave spectrum
 - 5.1.6 Define harmonic and fundamental wave.
- 5.2 Understand AC circuits
 - 5.2.1 Describe AC through resistors
 - 5.2.2 Describe phase angle, in phase & out of phase waves
 - 5.2.3 Describe phase lag, lead & power factor
 - 5.2.4 Calculate voltage, current & power (v,i,w) for resistive circuit
 - 5.2.5 Describe AC through inductance using waveforms and phaser diagram
 - 5.2.6 Define self inductance & self induced voltage
 - 5.2.7 Explain inductive reactance ($X_L = 2\pi fL$), phase relation between voltage & current
 - 5.2.8 Draw its phaser diagram

- 5.2.9 Calculate power for pure inductor
- 5.2.10 Explain AC through R-L series circuit
- 5.2.11 Draw phaser diagram for R-L series circuit
- 5.2.12 Calculate power factor for R-L series circuit
- 5.2.13 Calculate time constant for L/R
- 5.2.14 Define impedance
- 5.2.15 Draw impedance triangle
- 5.2.16 Explain AC through R-L parallel circuit
- 5.2.17 Calculate inductive reactance for series, parallel and series-parallel inductor
- 5.2.18 Describe skin effect
- 5.2.19 Describe audio frequency chokes
- 5.2.20 Describe radio frequency chokes
- 5.2.21 Explain ac through pure capacitor
- 5.2.22 Explain phase relation between voltage, current & power for AC through capacitors
- 5.2.23 Calculate capacitive reactance ($\frac{1}{2} \pi f c$)
- 5.2.24 Explain AC through R-C series circuit
- 5.2.25 Explain time constant for R-C series circuit
- 5.2.26 Explain AC through R-C parallel circuit
- 5.2.27 Calculate capacitive reactance for capacitor in series, in parallel and series parallel combination
- 5.2.28 Explain AC through RLC series circuit
- 5.2.29 Explain phase relation
- 5.2.30 Calculate power for RLC series circuit
- 5.2.31 Explain real power ($VI \cos \phi$), apparent power (VI)
- 5.2.32 Calculate power factor

6. TRANSFORMER.

- 6.1 Understand the transformers
 - 6.1.1 Explain the principle of transformer
 - 6.1.2 Define mutual induction
 - 6.1.3 Define coefficient of mutual induction
 - 6.1.4 Describe turn ratio of transformer
 - 6.1.5 Describe construction of transformer
 - 6.1.6 Enlist the types of transformer
 - 6.1.7 Enlist core material of transformer
 - 6.1.8 Describe auto transformer
 - 6.1.9 Explain star, delta connections of three phase transformer
 - 6.1.10 Explain phase & line voltage for star and delta connection
 - 6.1.11 Explain phase & line current for star and delta connection of three phase system
 - 6.1.12 List the applications of transformer in electronics:
 - i) step down transformer,

- ii) impedance matching
- iii) coupling

6.1.13 Explain transformer losses.

6.1.14 Explain hysteresis loss and core loss.

7. PHOTO AND THERMO-ELECTRICITY.

7.1 Understand photo and thermo-electricity

7.1.1 Describe photo-electric effects (photo emissive, photo conductive and photo voltaic effects)

7.1.2 Name the applications of photo electric effect

7.1.3 Explain thermoelectric effect (Thompson & See-beck effects)

7.1.4 Explain thermocouple

7.1.5 Draw the diagram of incandescent lamp

7.1.6 Explain the working of incandescent lamp

7.1.7 Draw the diagram of fluorescent tube light

7.1.8 Explain the working of fluorescent tube light

8. NETWORK THEOREMS.

8.1 Understand Superposition, Thevenin & Norton theorems

8.1.1 Explain Superposition theorem

8.1.2 Solve problems based on superposition theorem

8.1.3 Explain Thevenin's theorem

8.1.4 Solve problems based on Thevenin's theorem

8.1.5 Explain Norton's theorem

8.1.6 Solve problems based on Norton's theorem

8.1.7 Explain transformation of star to delta and delta to star networks

8.1.8 Solve problems based on star, delta transformation

9. UNDERSTAND RESONANCE

9.1 Explain resonance

9.2 Explain the relation between frequency, inductance & capacitance at resonant

9.3 Draw the series resonant circuit

9.4 Explain series resonant circuit

9.5 Draw the characteristics of series resonant circuit

9.6 Calculate current, voltage and impedance of series resonant circuit

9.7 Draw the diagram of parallel resonant circuit

9.8 Explain the parallel resonant circuit

9.9 Draw the characteristics of parallel resonant circuit

9.10 Compare series and parallel resonant circuit

9.11 Describe the band width of a resonant circuit

9.12 Describe Q of a circuit

9.13 Explain the effect of the L.C ratio on selectivity

9.14 Enlist the use of resonant circuit in radio and TV receivers

10. UNDERSTAND FILTERS & COUPLING CIRCUITS

- 10.1 Explain purpose & action of a filter circuit
- 10.2 Enlist the types of filter circuits
- 10.3 Explain low pass filter high pass filter, K-filter & m-derived filters
- 10.4 Explain band pass filter & band stop filter
- 10.5 Explain action & purpose of a coupling circuit
- 10.6 Define coefficient of coupling
- 10.7 Enlist types of coupling
- 10.8 Explain RC, impedance, and transformer coupling
- 10.9 Define time constant of R-L & R-C Circuits
- 10.10 Explain importance of rise and fall of circuit current and voltage in reactive circuit.

11. SEMICONDUCTORS.

- 10.1 Understand semiconductor
 - 10.1.1 Describe semiconductor theory
 - 10.1.2 Describe doping, doping level
 - 10.1.3 Explain PN junction diode
 - 10.1.4 Describe depletion region, junction potential, reverse bias & forward bias junction
 - 10.1.5 Explain the application of diode as rectifier
 - 10.1.6 Explain PN junctions as PNP transistor
 - 10.1.7 Explain NP junctions as NPN transistor
 - 10.1.8 Explain the application of transistor as amplifier
 - 10.1.9 Describe Integrated circuit(IC)
 - 10.1.10 Enlist the types of Integrated circuit (Analog, digital).
 - 10.1.11 Enlist the application of Integrated circuit

TEXT/REFERENCE BOOKS:

- 1. Grob Bernard "Basic Electronics 6th Edition"
- 2. Slurzberg, Orested "Essentials of Electricity for radio & TV"
- 3. Therja B.L. "Electrical Technology"
- 4. Slurzberg "Essentials of radio"
- 5. R.B. Faber "Applied Electricity & Electronics for technicians"

LIST OF PRACTICAL.

1. Study of Ammeter, Voltmeter and Multimeter.
2. a) Measurement of current, voltage and resistance.
b) Verification of Ohm's Law by:
 Keeping the voltage constant.
 Keeping the resistance constant.
3. a) Verify the laws of series and parallel combination of resistances by
 i) Ohmmeter method.
 ii) Voltmeter-Ammeter method.
4. Determine temperature coefficient of resistance.
5. Verify Kirchhoffs' laws.
6. a) Measurement of power by:
 i) Voltmeter/Ammeter method.
 ii) Wattmeter.
b) Measurement of Energy by:
 i) Wattmeter and clock method.
 ii) Energy meter.
7. a) Practice of resistor colour coding.
b) Use of potentiometer and Rheostat as voltage divider and current limiter.
8. Combine cells in series and parallel and verify the net voltage.
9. a) Study of lead acid battery, practice and use of hydrometer and electrolyte preparation.
b) Practice charging of a lead acid battery.
10. a) Determine the internal resistance of a cell.
b) Study of E.M.F. of cell and measurement of their voltages.
11. Plot magnetic line of forces of bar magnets in different positions.
12. a) Study of the magnetic effect of a current carrying:
 i) Conductor.
 ii) coil.
b) Study the change in the Magnetic power of an Electromagnet by the introduction of various cores in the coil.
13. Study of the effect on a current carrying conductor when placed in
a) magnetic field.
14. Verify Faraday's Laws of Electromagnetic induction.
15. a) Study of various types of capacitors and their colour coding.
b) verify laws of combination of capacitors.
16. Observe capacitor charging and discharging.
17. Practice plotting sine wave for a given equation $e = E_m \sin Q$.
18. Study of sine wave on an oscilloscope and determine its peak, peak to peak, r.m.s. and average values of current and voltage.

19. Determine wave length, time period and frequency of a given AC signal by oscilloscope.
20. Determine the power factor of a given AC circuit using a power factor meter.
21. Study the principles of self and mutual induction in coils.
22.
 - a) Determine the inductance of a choke coil.
 - b) Determine the capacitance of a capacitor by using digital LCR meter.
23. Determine phase relationship between voltage and current in inductive circuit by showing phase difference between V_R and V_L using an oscilloscope.
24. Study the behavior of inductance and capacitance with AC and DC supplies.
25.
 - a) Determine active and reactive power in an AC circuit.
 - b) Calculate power factor for the above circuit.
26.
 - a) Study of the frequency response of R.L.C. series circuit and resonance effect.
 - b) Study of the frequency response of R.L.C. parallel circuit and resonance effect.
27.
 - a) Study of various type of transformers used in electronics field.
 - b) Study of single-phase transformer and determine its transformation ratio.
28. Practice of core assembly and winding of the core type transformers.
29. Study of photo-electric and photo-conductive effects using LDR Photo-Diode, solar Cell, LED.
30.
 - a) Study of various type of incandescent and vapour lamps.
 - b) Connect a fluorescent tube light.
31. Verify the line and phase values of current and voltage in star and delta connections.
32.
 - a) Demonstration of diode as rectifier.
 - b) Demonstration of transistor as amplifier.

TC-127(a) TELECOM DRAWING GENERAL ENGINEERING

T	P	C
0	6	2

Total contact Hours

Practical: 192 Hours.

Description: Lettering, Numbering, Conventional lines and dimensioning. Drawing symbols, simple circuits (Electrical and Electronics).

Objectives: To help the students in understanding the basic methods of drawing.

COURSE CONTENTS.

1. Use and care of drawing instruments.
2. Use of various grades of pencils.
3. Single stroke and inclined Gothic letters.
4. Practice in lettering, vertical and inclined.
5. Practice in numbering, vertical and inclined.
6. Alphabets of line.
7. Line values.
8. Tangency exercises.
9. One view drawing.
10. Dimensioning techniques.
11. System of dimensioning.
12. Kinds of dimensioning.
13. Preparation of multi-view drawing from the given models showing conventional placement of dimensions there upon.
14. Drawing tracing.
15. Simple pictorial drawings:
 - a) Isometric
 - b) Oblique.
 - c) One point perspective.
16. Comparison of orthographic first angle and third angle methods of projection.
17. Production and use of simple standard working drawing.
18. Practice in the use of symbols.
19. Schematic drawing of simple circuits (resonant/filter circuits)
20. Practice in single line diagram schematic drawing.
21. Practice in line and curve tracing.
22. Drawing light, fan and plug circuit.
23. Drawing signal circuits, Hotel, Hospital call bell system.
24. Draw the circuit diagram of a fluorescent tube.
25. Circuit diagram of half wave rectifier.

26. Circuit diagram of full wave rectifier.
27. Circuit diagram of common emitter amplifier.
28. Circuit diagram of common collector amplifier
29. Circuit diagram of common base amplifier.
30. Circuit diagram Audio frequency amplifier.
31. Circuit diagram of Radio frequency amplifier.
32. Circuit diagram of push pull power amplifier.
33. Circuit diagram of intercom apparatus.
33. Circuit diagram of thyristor, working as rectifier.
34. Block diagram of Oscilloscope.
35. Block diagram of TV receiver.
36. Block diagram of a radio transmitter.
37. Flow chart symbol.
38. Flow chart for a program in Basic language.

**TC-127 (b,c,d): TELECOM DRAWING GENERAL ENGINEERING
(Fitting, Woodwork Shop & Electric Wiring)**

T	P	C
0	6	2

Total contact Hours.

Practical: 288 Hours

(b) Fitting Shop Practice

List of Practical:

1. Study of metal work tools like files, hammers, screw driver, hacksaw, hacksaw blade, chisels, punches, wrenches, scrapers, scales, drills, reamers, bench vice, hand vice, etc.
2. Draw layout on sheet metal for making chassis and clamps,
3. Practice cutting, shearing sheet metals.
4. Practice bending sheet metal.
5. Marking layout for punching and drilling
6. Practice punching and drilling holes in sheet metal
7. Practice reaming holes.
8. Practice rissetting sheet metal.
9. Practice bending sheet metal.
10. Install electronic components on sheet metal chassis

(c) Wood Workshop

List of jobs:

1. Study of wood work tools such as saws, marking tool, chisels, plane cutters etc.
2. Sawing practice
3. Planning practice
4. Practice wooden joints such as CROSSLAP, MORTISE, TENON and DOVE -TAIL joints.
5. Practice sharpening woodwork tools, such as :
 - i) Hand saw
 - ii) Chisels
 - iii) Plane cutters

(d) Basic Wiring

List of Practical:

1. Study of wiring tools, accessories and cables (types and sizes)
2. Making straight, Tee and Duplex joints
3. Practice of loose wiring on the following circuits
 - a) Single lamp circuit
 - b) Staircase wiring

- c) Two lamp in parallel controlled by two individual switches
- 4 Study of the parts of tube light its connections
- 5 Practice of batten wiring on the following circuits:
 - a) Single lamp circuit controlled by SPST switch.
 - b) Single lamp controlled by two way switches
 - c) Single lamp with 5A socket each controlled by individual SPST switches.
 - d) Wiring bell circuit controlled by single and three push buttons.

TC-127 (e,f) ELECTRONICS COMPONENTS, APPLICATION & ASSEMBLY

		T	P	C
Total Contact hours:		0	6	2
Practical	192 Hours			

(e) Printed Circuit Making

Practice Printed Circuit Board Making

1. Draw circuit lay out on copper coated sheet.
2. Practice etching
3. Silk screen-printing
4. Use of CAD in drawing PCB layout with PC.
5. Practice soldering on PCB.

(f) Radio Components, Application & Assembly

Practice in Radio Components and their Assembly.

6. Identify Aerial, Inductor, capacitors, transformers, vacuum tubes and transistors and draw their symbols.
7. Construct AF and RF chokes
9. Check a junction diode and construct a bridge rectifier
10. Identify transistors (BJT & FET) and their electrodes
11. Study number system of diodes and transistors using data books.
12. Construct a voltage doubler & tripler and check their outputs
13. Check radio components
14. Construct of A.C and AC/DC power supply
15. Construct of superhetrodyne receiver sections:
 - a) Construct a simple voltage and power amplifiers
 - b) Use diodes and Transistor as detector
 - c) Construct local oscillator
 - d) Construct converter stage and check its performance
 - e) Construct the I.F and R.F amplifier
16. Align I.F and R.F stages
17. Practice troubleshooting a superheterodyne radio receiver.