## Mgm-311    INDUSTRIAL MANAGEMENT AND HUMAN RELATIONS.

**Total Contact Hours**

|           |    |   | T | P | C |
|-----------|----|---|---|---|---|
| Theory    | 32 |   |   |   |   |
| Practical | 0  |   | 1 | 0 | 1 |

**AIMS** The study of this subject will enable the student to develop the management skill, acquaint him with the principles of management and human relations and develop psychological approach to solve the labour problems.

## COURSE CONTENTS

1.   **INDUSTRIAL PSYCHOLOGY.**                                    2 Hours
     1.1    History and definition.
     1.2    Nature and scope.

2.   **LEADERSHIP**                                                1 Hour
     2.1    Definition and types.
     2.3    Qualities of a good leader.

3.   **MOTIVATION**                                                2 Hours
     3.1    Definition.
     3.2    Types (Financial and non financial motives).
     3.3    Conflict of motives.

4.   **MORALE**                                                    1 Hour
     4.1    Importance.
     4.2    Development.
     4.3    Measurement.

5.   **HUMAN ENGINEERING.**                                        1 Hour
     5.1    Importance of human factor in industry.
     5.2    Man-machine system.
     5.3    Strategy for making allocation decisions.

6.   **INDUSTRIAL FATIGUE AND BOREDOM.**                           2 Hours
     6.1    Definition and distinction.
     6.2    Psychological causes.
     6.3    Objective causes.
     6.4    Prevention

7.   **INDUSTRIAL ACCIDENTS**                                      2 Hours
     7.1    Psychological causes.
     7.2    Objective causes.

7.3     Prevention

8.      **INDUSTRIAL PREJUDICE**                                    2 Hours
        8.1     Causes
        8.2     Remedies

9.      **PUBLIC RELATIONS.**                                       2 Hours
        9.1     Importance
        9.2     Functions

10.     **GUIDANCE AND COUNSELLING**                                2 Hours
        10.1    Importance
        10.2    Choice of job.
        10.3    During service.

11.     **JOB EVALUATION**                                          2 Hours
        11.1    Importance
        11.2    Methods
        11.3    Job satisfaction
        11.4    Work simplification.

12.     **INDUSTRIAL MANAGEMENT**                                   2 Hours
        12.1    Introduction
        12.2    Functions of management.
        12.3    Subdivisions of management
        12.4    Objectives of industrial management.

13.     **PERSONNEL SELECTION.**                                    2 Hours
        13.1    Recruitment of employees.
        13.2    Training.
        13.3    Effects of training on production and product cost.

14.     **WORKING CONDITIONS.**                                     2 Hours
        14.1    Importance and consideration.
        14.2    Effects on efficiency and per unit cost.

15.     **TIME AND MOTION STUDY.**                                  3 Hours
        15.1    Concept and importance.
        15.2    Sequence of motion study.
        15.3    Principles of motion study.
        15.4    Steps to time study.
        15.5    Determination of operations time.

16.    **QUALITY CONTROL.**                                        2 Hours
    16.1    Concept and advantages
    16.2    Methods.

17.    **ROLE OF FOREMAN IN MANAGEMENT.**                          2 Hours
    17.1    Foreman's abilities.
    17.2    Duties and functions.

**BOOKS RECOMMENDED:**
1C.S. Meyers, Industrial Psychology, Oxford University Press, London.
2.    Smith Wakley, Psychology of Industrial Behaviors, Mc-Graw Hill, New York.
3.    Ghulam Hussain, Nizamat-e-Sanaat Aur Insani Rawabat, Ilmi Kitab
      Khana, Urdu Bazar, Lahore.
4.    Andrew R. Megill, The Process of Management   William M New Man.
5.    Richard N Omen, Management of Industrial Enterprises.

**Mgm-311     INDUSTRIAL MANAGEMENT AND HUMAN RELATIONS.**

**INSTRUCTIONAL OBJECTIVES**

At the completion of this course, the students will be able to:

1.     **KNOW INDUSTRIAL PSYCHOLOGY.**
       1.1     Describe brief history if industrial psychology.
       1.2     Describe in detail definition of industrial psychology.
       1.3     State nature and scope of industrial psychology.

2.     **KNOW LEADERSHIP.**
       2.1     Define leadership.
       2.2     Describe types of leadership.
       2.3     State qualities of a good leader.

3.     **UNDERSTAND MOTIVATION.**
       3.1     Define motivation.
       3.2     Describe financial and non financial motives.
       3.3     Explain conflict of motives.

4.     **KNOW MORALE.**
       4.1     State importance of morale.
       4.2     Describe development of morale.
       4.3     State the method of measurement of morale.

5.     **UNDERSTAND HUMAN ENGINEERING.**
       5.1     Explain importance of human engineering in the industry.
       5.2     Explain man-machine system.
       5.3     Explain strategy for making allocation decisions.

6.     **UNDERSTAND INDUSTRIAL FATIGUE AND BOREDOM.**
6.1 Define fatigue and boredom.
       6.2     Describe psychological causes of fatigue and boredom.
       6.3     Describe objective causes of fatigue and boredom.
       6.4     Explain measures to prevent fatigue and boredom.

7.     **UNDERSTAND INDUSTRIAL ACCIDENTS.**
       7.1     Explain psychological causes of industrial accidents.
       7.2     Explain objective causes of industrial accidents.
       7.3     Explain measures to prevent industrial accidents.

8.     **UNDERSTAND INDUSTRIAL PREJUDICE.**
8.1 Define prejudice

8.2     Explain causes of industrial prejudice.
8.3     Explain remedies of industrial prejudice.

## 9.     UNDERSTAND THE SIGNIFICANCE OF PUBLIC RELATIONS.
9.1     Explain importance of public relations.
9.2     Explain functions of public relations.

## 10.    UNDERSTAND THE NEED FOR GUIDANCE AND COUNSELLING.
10.1    State importance of guidance and counselling.
10.2    Explain the role of guidance and counselling in choosing the job.
10.3Describe help of guidance and counselling during service.

## 11.    UNDERSTAND JOB EVALUATION.
11.1    Explain importance of job evaluation.
11.2    Explain methods of job evaluation.
11.3    Explain job satisfaction.
11.4    Explain work simplification.

## 12.    UNDERSTAND INDUSTRIAL MANAGEMENT.
12.1    Define management.
12.2    State functions of management.
12.3    Enlist subdivision of management.
12.4    Explain objectives of industrial management.

## 13.    UNDERSTAND TRAINING AND ITS EFFECTS.
13.1    Describe the recruitment procedure of employees in an industrial concern.
13.2    Explain training.
13.3    Identify the kinds of training.
13.4    Explain the effects of training on production and product cost.

## 14.    UNDERSTAND THE EFFECT OF WORKING CONDITION ON EFFICIENCY.
15.1    Explain importance of working condition.
15.2    Describe air-conditioning, ventilation, lighting and noise.
15.3    State the effects of good working conditions on efficiency
        and per unit cost.

## 15.    UNDERSTAND TIME AND MOTION STUDY.
15.1    Explain the concept.
15.2    Describe the importance of work study.
15.3    Explain the sequence of motion study.
15.4    State the principles of motion study.
15.5    Describe the steps for carrying out time study.
15.6    Explain the method of determination of operations time.

## 16.     UNDERSTAND THE METHODS OF QUALITY CONTROL.
16.1     Define quality control
16.2State the advantages of quality control.
16.2Explain methods of quality control.

## 17.UNDERSTAND THE ROLE OF FOREMAN IN AN INDUSTRIAL UNDERTAKING.
17.1     Explain ability of the foreman.
17.2     Enlist duties of foreman.
17.3     Describe functions of foreman as middle management.

**TC-312        RADIO COMMUNICATION SYSTEM-II**

|   | T | P | C |
|---|---|---|---|
|   | 2 | 3 | 3 |

**Total contact hours:**
     Theory:     32  Hours.
     Practical:    96  Hours

**Pre-requisites:**RADIO Communication   System-I (TC-243), Electronics Devices & Circuits

**AIM**After studying the course the student will be able to understand   the principle, function and
     applications of:
     1.     A.M. Transmitters.
     2.     FM Transmitters.
     3.     TV transmitters.
     4.     Aviation and Marine Radio communication.

**1.     A.M. TRANSMISSION.**                         **(12   Hour)**
     1.1     Principle of A.M. transmission.
     1.2     Analysis of A.M. modulated wave.
     1.3     Modulation index and band width.
     1.4Single side Band, Double Side band transmission techniques with the help of block
          diagram.
     1.5     Repeater.
     1.6     Types of noises.
     1.7     Modulators
     1.8     Modulated class c amplifier.
     1.9     Multiplier power supply.

**2.     F.M. TRANSMITTERS.**                        **(20   Hours)**
     2.1     Principle of frequency modulator.
     2.2.Concept of index of modulation, frequency deviation, frequency swing effect on side
          band and band width, Basal functions graph and application.
     2.3     System of F.M. modulation, block diagram.
          a)     Reactance modulator.
          b)     Phase shift.
          c)     Phasitron.
     2.4     Merits and demerits of F.M.
     2.5Block diagram of   F.M. transmission with automatic arrangements of controlled
          modulation. Stereo broadcast   transmission.
     2.6     Significance of Pre-emphasis and de-emphasis and their circuit explanation.
     2.7     Block diagram of TV transmitter.
     2.8     Principle of operation of TV transmitter.
     2.9     Care and maintenance of transmitter.
     2.10    F. M. transmitter for microwave frequency.

2.11    Aviation, marine radio communication.


**TEXT & REFERENCE BOOKS**

1       Electronics communication systems by George Kennedy
2       Colour Television by R.R.Gulati
3       Radio Electronics Engineering by Terman
4       "Communication Electronics" by   Deshpanda & Rangole.

TC-312              COMMUNICATION SYSTEM -II

INSTRUCTIONAL OBJECTIVES.

1.      UNDERSTAND THE PRINCIPLE OF A.M. TRANSMISSION.
        1.1     Define the term "transmission" of an electromagnetic wave.
                1.1.4    Explain the working principle of each block.
        1.2     Enlist types of transmission. (Ground wave, Sky wave, Space wave)
        1.3     Draw the basic block diagram of A.M. transmission system.

2.      UNDERSTAND A.M. MODULATED WAVE.
        2.1     Define modulation.
        2.2     Describe need for modulation.
        2.3     Enlist types of modulation.
        2.4     Explain amplitude modulation.
        2.5     Draw amplitude modulated wave.
        2.6     Compute percentage of modulation.
        2.7     Enlist merits and demerits.
        2.8     Describe relationship between carrier power and power in side bands.

3.      UNDERSTAND MODULATION INDEX AND BAND WIDTH.
        3.1     Define modulation index.
        3.2     Explain formula for modulation index.
        3.3     Use formula to calculate modulation index.
        3.4     Explain side band and Band width of A.M. wave.

4.UNDERSTAND TRANSMISSION TECHNIQUE WITH THE HELP OF BLOCK
        DIAGRAM FOR SSB, DSB, DSB-SC INDEPENDENT SIDE BAND.
        4.1     Enlist different types of transmission techniques.
        4.3     Draw the block diagram of SSB transmission.
        4.4     Explain the working principle of   SSB.
        4.5     Draw the block diagram of DSB transmission.
        4.6     Explain the working principle of DSB.
        4.7     Enlist advantages and disadvantages of SSB.
        4.8     Draw the block diagram of DSB-SC
        4.9     Explain the working of DSB-SC.
        4.10    Draw the block diagram of independent side band transmission techniques.
        4.11    Explain the working of independent side band.

5.UNDERSTAND THE PRINCIPLE, CONSTRUCTION, WORKING AND ADVANTAGES
        OF A REPEATER.
        5.1     Describe the need of a repeater.
        5.2     Draws the block diagram of repeater.
        5.3     Explain the working principle of a repeater.

        5.4       Enlist advantages of a repeater.

**6.      UNDERSTAND "NOISE" AND TYPES OF NOISES.**
        6.1       Define Noise.
        6.2       Enlist types of noise.
        6.3       Explain types of noises.

**7.UNDERSTAND THE PRINCIPLE, CONSTRUCTION AND WORKING OF MODULATORS.**
        7.1       Describe the A.M. modulator.
        7.2       Enlist types of A.M. modulators.
        7.3       Draw   the circuit diagram of plate modulator.
        7.4       Explain the working of plate modulator circuit.
        7.5       Draw the circuit diagram of grid modulator.
        7.6       Explain the working of grid modulator.
        7.7Compare the operating characteristics of plate modulation with grid modulation.
        7.8       Draw the circuit diagram of transistorized modulator (collector modulator).
        7.9       Explain the working of collector modulator.
        7.10     Draw the circuit diagram of base modulator.
        7.11     Explain the working of base modulator.

**8.UNDERSTAND THE PRINCIPLE OF WORKING OF MODULATED CLASS-C AMPLIFIER.**
        8.1       Explain class-C operation of an amplifier
        8.2       Draw the circuit diagram of modulated class-C amplifier.
        8.3       Explain the working principle of modulated class-C amplifier.

**9.UNDERSTAND THE CONSTRUCTION AND THE WORKING PRINCIPLE OF MULTI-VOLTAGE POWER SUPPLY.**
        9.1       Describe the construction of multi voltage transformer.
        9.2       Use multi voltage transformer in supply circuit..
        9.3       Draw multi voltage power supply circuit.
        9.4       Explain the principle of working of supply.
        9.5       Describe its uses.

**10.    UNDERSTAND THE CONCEPT OF FREQUENCY MODULATION.**
        10.1     Describe the principle of F.M.
        10.2     Draw the wave form of F.M.
        10.3     Describe FM band   (broadcast band, VHF & UHF communication band)

11. UNDERSTAND THE TERMS:   MODULATION INDEX, FREQUENCY DEVIATION, FREQUENCY SWING, EFFECTIVE SIDE BAND BANDWIDTH, BASAL FUNCTION GRAPH AND ITS APPLICATION.
    11.1    Explain the terms given above
    11.2    Explain the parameters formula for frequency deviation, modulation index.
    11.3    Use Basal function graph to find side bands and bandwidth.

12. UNDERSTAND THE PRINCIPLE OF WORKING OF F.M. MODULATION SYSTEMS WITH THE HELP OF BLOCK DIAGRAM.
    12.1    Enlist systems of F.M. modulation.
    12.2 Draw the block diagram of FM transmitter using reactance modulator direct method.
    12.3    Explain the working principle of reactance modulator   FM transmitter.
    12.4    Explain frequency multiplier.
    12.5    Explain reactance modulator.
    12.6 Draw block diagram of F.M. transmitter using indirect, method (Phase shift) of modulation (Armstrong F.M. transmitter).
    12.7    Explain the working principle of Armstrong F.M. transmitter.
    12.8    Explain phase shift modulation   (P.M.).
    12.9    Draw F.M. modulation system using phasitron.
    12.10    Explain   the working   principle of phasitron.

13.    UNDERSTAND   THE MERITS AND DEMERITS OF   F.M.
    13.1    List merits of F.M.
    13.2    List   demerits of F.M.
    13.3    Compare F.M. with P.M.

14. UNDERSTAND THE F.M. TRANSMITTER WITH AUTOMATIC ARRANGEMENT OF   CONTROLLING MODULATION AND STEREO F.M.   TRANSMISSION.
    14.1    Draw   the block diagram of   F.M. transmitter with   AFC.
    14.2    Explain the working   principle of   the transmitter.
    14.3 Identify the difference between the   F.M. transmitter with AFC and Armstrong transmitter.
    14.4    Introduction to stereo broadcast transmission.

15.    UNDERSTAND PRE-EMPHASIS AND DE-EMPHASIS.
    15.1    Define pre-emphasis and de-emphasis.
    15.2    Draw the schematic diagram of pre-emphasis and de-emphasis circuit.
    15.3    Explain the working of pre-emphasis and de-emphasis circuit.
    15.4    Identify the need of   the above circuit.

16.    UNDERSTAND   THE FUNCTION OF MODULATOR AND EQUALIZER.
    16.1 Draw circuit of reactance modulator (Transistorized and varactor diode modulator).

16.2    Explain the working   principle of   the above modulator.

16.3    Explain phase frequency network.

17.    **UNDERSTAND   THE WORKING OF   TV   TRANSMITTER.**

17.1    Draw the block   diagram   of   TV   transmitter.

17.2    Explain   the working principle of   TV   transmitter.

18.    **UNDERSTAND   THE CARE AND MAINTENANCE OF   TRANSMITTER.**

18.1    Enlist all possible points for care and maintenance of transmitter.

18.2    Apply   the concept in the maintenance of transmitter.

19.**UNDERSTAND   THE   WORKING OF   F.M.   TRANSMITTER   FOR MICROWAVE FREQUENCY.**

19.1    Draw the block diagram of F.M. transmitter for microwave frequency.

19.2    Explain the working of   each block of microwave transmitter

19.3    Identify the difference of   F.M. transmitter at U.H.F. and microwave.

20.**UNDERSTAND   THE WORKING OF AVIATION AND MARINE RADIO COMMUNICATION.**

20.1    Describe aviation and marine communication.

20.2    Explain aviation communication using block diagram.

20.3    Explain marine communication using block diagram.

20.4    Compare aviation and marine communication.

## TC-325    TV CIRCUITS & SYSTEMS

| T | P | C |
|---|---|---|
| 3 | 9 | 5 |

**Total contact hours:**
    Theory:        96 Hours.
    Practical:     278 Hours.

**Pre-requisites:** Communication System-I & II.

**AIMS** Having gone through this subject the student will be able to understand the principle, operation,   and application of Black & White TV, Colour TV Receivers and TV Studio.

1.      Identify the stages of back & white and colour TV receiver.
2.      Explain the operation of stages in Black & White and Colour TV receivers.
3.      Explain the operation of equipment used in TV studio.
4. Use the equipment and apparatus for servicing the Black & White and Colour TV receivers.
5.      Troubleshooting   of Black & White and Colour TV receivers        .
6. Replace the faulty components used in Black & White and Colour TV receivers.

## 1.    PICTURE  SCANNING  &  TV STANDARDS.                                    (01 Hour)
1.1     Picture Elements
1.2     Scanning.
1.3     Field  and  frame  frequency , persistence of vision.
1.4     Introduction  of  CCIR  and  FCC  standards.

## 2.    VIDEO  SIGNAL.                                                         (03 Hours)
2.1     Picture information and video signal amplitude.
2.2 Video signal frequencies and DC components of video signal, study of resolution and high resolution system.
2.3     **Scanning and   Blanking Pulses**
        2.3.1    Sawtooth wave from for linear scanning.
        2.3.2    Principle of interlaced scanning, non-interlaced scanning.
        2.3.3    Aspect ratio, frame and field frequency.
        2.3.4    Vertical  blanking  pulses.
        2.3.5    Horizontal  blanking  pulses.

## 3.    CAMERA TUBES.                                                          (04 Hours)
3.1 Photosensitive, photo-conductive, photo-voltaic and photo-emissive materials, principle and uses.
3.2 Introduction of various kinds of camera tube, Iconoscope, Image orthicon, plumbicon, saticon, their construction and working principles,   merits and   demerits.
3.3 Construction and working principle of silicon target plate and CCD camera and their uses.

**4.      TV RECEIVER CIRCUIT.**                                              (01 Hour)
   4.1      Block diagram of monochrome TV Receiver.
   4.2      Path of   signal flow.

**5.      CHANNEL SELECTION   (VHF & UHF).**                                   (04 Hours)
   5.1      RF amplifier, mixer and local oscillator circuit and function.
   5.2      Band width of channel according to CCIR and FCC systems
   5.3      Channel frequency in VHF and UHF ranges.
   5.4      UHF channel, circuit and function.
   5.5 Different types of   tuners. Rotary, Preset variable resistor and   varactor   diode tuning.
   5.6 Study of   the operational controls and adjustments of monochrome TV receiver..

**6.      AUTOMATIC GAIN   CONTROL   (AGC).**                                  (03 Hours)
   6.1      Automatic Gain Control circuit
   6.2      Keyed and delayed AGC circuit and function.
   6.3      Picture intermediate frequency amplifier
   6.4 I, II, and III picture intermediate frequency amplifier circuit, & their functions.
   6.5 Picture I.F.   alignment procedure, study of saw filter used as IFT,   AFT circuit, study of
            response curve of IF amplifier.

**7.      COMPOSITE VIDEO SIGNAL.**                                           (04 Hours)
   7.1 Study of composite Video signal at the output of video detector. Blanking, sync,
            equalizing pulses.
   7.2 Video amplifier circuit and operation, high & low video frequency compensation circuit.
   7.3      Signal polarity in input and output of video amplifier.
   7.4      Brightness and contrast control.
   7.5      Video detector (AM) circuit and operation

**8.      SYNC   SEPARATOR   SECTION.**                                        (04 Hours)
   8.1 Sync take-off point and separation of sync pulses from the video signal. Horizontal and
            vertical synchronization.
   8.2      Sync clipping and sync separator circuit.
   8.3      High and low pass filters circuits and operation.
   8.4      Differentiating circuit and its operation.
   8.5      Integrating circuit and its operation.

**9.      HORIZONTAL   SECTION.**                                             (04 Hours)
   9.1      Sweep circuit   function and   waveform requirements.
   9.2      Review of different types of sweep generator circuits.
   9.3      Automatic frequency control for horizontal oscillator.
   9.4      Horizontal oscillator, Horizontal driver, their function and circuit.
   9.5 Horizontal output, horizontal output transformer. Damper and damper circuit, High
            voltage rectifier, their function and circuit.

9.6     Electromagnetic deflection. Yoke coil, Horizontal linearity and width control.
9.7     High tension power supply.

10.     **VERTICAL SECTION.**                                                  (04 Hours)
10.1    Vertical oscillator circuit and its function.
10.2    Vertical driver circuit and its function.
10.3    Vertical output circuit and its function.
10.4    Study of vertical linearity, hold and height control.

11.     **SOUND SECTION.**                                                     (04 Hours)
11.1    Sound take off   from video detector. Sound sub-carrier frequency.
11.2    Sound I.F. amplifier, circuit, operation and alignment.
11.3    F.M. detector, ratio detector, discriminator circuit and operation.
11.4    Sound output circuit and operation.

12.     **POWER SUPPLIES.**                                                    (04 Hours)
12.1Transformer and transformerless power supplies, circuit,   operation, merit and
        demerits.
12.2    AC/DC stabilized power supply circuit operation, merit and demerits
12.3    Switched mode power supply (SMPS), circuit, operations, merits and demerits.
12.4    Primary and secondary power supply, circuit & operation.

13.     **OPTICS OF  COLOUR  TELEVISION.**                                     (05 Hours)
13.1    Study of visible light spectrum.
13.2    Perception of colours.
13.3    Primary and secondary colours and colour circle.
13.4Mixing of colours, Colour addition and subtraction, complementary colours, colour
        circle diagram with phase angle.
13.5    Studio white and   receiver white.
13.6    Hue, Saturation, Luminance, Chrominance & Compatibility.
13.7    Introduction of colour TV camera and its working principle.

14.     **COLOUR TELEVISION SYSTEMS.**                                         (08 Hours)
14.1NTSC system, Introduction, brief discussion merits and demerits of NTSC system with
        block diagram.
14.2    SECAM system, Introduction ,merits and demerits with block diagram
14.3    PAL system, Merits and demerits.
14.4    Block diagram of PAL colour TV Receiver and Transmitter.

15.     **PAL CODER OR PAL ENCODER.**                                          (12 hours)
15.1    Introduction of PAL colour signal, waveform. Frequency Interlacing.
15.2Choice of sub-carrier frequency. PAL sub-carrier frequency.   Calculation of   exact
        value of   PAL sub-carrier frequency.
15.3Basic PAL coder, basic block diagram and phasor diagram. UV weighing factor.

15.4   Modulation products and chrominance signal.
15.5   Colour swing burst   and colour burst getting.
15.6   Band width of colour difference signals and colour signal sync pulses.

## 16.   PAL DECODER.                                                      (12 Hours)
16.1   Method of Tuning
16.2   Frequency synthesis method of tuning and Automatic fine tuning (AFT).
16.3   I.F. Section.
16.4   I.F section circuit and operation. Saw filter in I.F. section.
16.5   Video detector, distribution of detected signal and video signal path.
16.6   The Luminance channel, luminance amplifier.
16.7   Pedestal clamp, contrast control. Retrace blanking. The Comb filter.
16.8   PAL Colour Decoder, block diagram, function of each block with waveform.
16.9   Automatic Colour control (ACC) amplifier.
16.10  U & V signal demodulator, the reference oscillator, and study of delay lines.
16.11  Burst phase identification (Indent) signal   amplifier and colour killer.
16.12  The PAL switch & 90 degree phase shifting. 180 degree PAL switch
16.13  RGB Matrix
16.14  Colour burst and phase discriminator circuit

## 17.   CONVERGENCE.                                                      (02 Hours)
17.1   Dynamic. Static and   blue lateral convergence.
17.2   Pincushion distortion corrections.
17.3   East-West modulation, E-W pincushion correction and   spark gap protection.

## 18.   COLOUR PICTURE TUBES.                                             (02 Hours)
18.1   Types of colour picture tubes, delta   gun tube. In line precision picture tube.
18.2   Trinitron picture tube.
18.3   LCD screen.
18.4 Study different control in colour TV receiver control on front   panel and on PC Board
       of colour TV.

## 19.   TELETEX RECEIVER.                                                 (02 Hour)
19.1   Introduction of   Teletex TV receiver using block diagram.
19.2 Introduction of   Teletex display, picture , data line ,access time, and coding signal.
19.3   Generation of Teletex character, its control and storage.
19.4   Formation of   Teletex data line assembly, view data and prestel system.

## 20.   REMOTE CONTROL                                                    (01 Hour)
20.1  Remote control transmitters..
20.2   Remote control receiver circuit and its operation.

## 21.   TV   ANTENNAS.                                                    (02 Hour)

21.1 Fundamentals of receiving aerial, dipole and   folded dipole, impedance of feeder cable.

21.2     Antenna booster and TV signal distribution system.


## MODULE-III TV   STUDIO   PRACTICE.

**22.     CAMERA MOUNTINGS.**                                          (02 Hours)
22.1     Various type of TV Camera mounting equipment.
22.2     Camera movement panning, dolling. titling, rolling.

**23.     CAMERA LENSES.**                                             (03 Hours)
23.3     Camera optical systems, types of lens, turret, fixed, tele-lens, and zoom lens.
23.4     Aperture control in TV Camera.
23.5 Production of optical image techniques for taking up close up views limitations of light beams.

**24.     STUDIO LIGHTING SYSTEM.**                                    (02 Hours)
24.1     Various light sources, flood, spot, stripe and special effect lights.
24.2     Light board, Patch board and   light dimmers.

**25.     STUDIO   CONTROL ROOM.**                                     (05 Hours)
25.1     Audio video control console (Block Diagram)
25.2     Video switching system. Three bus and five bus switching system.
25.3 Explanation the terms, dissolve, fade in, fade out, superimposition, switching and mixing.
25.4     Picture monitor, intercommunication system.
25.6     Block diagrams of VHS VCR PAL system and multi-system
25.7     Video recording systems. VHS tape transport system.
25.8     Necessity of projection equipment in TV studio

**26.     OUTDOOR TV BROADCASTING.**                                   (02 Hours)
26.1     Necessity of remote pick up arrangement in TV broadcasting
26.2     Field equipment used for remote pick up, Outdoor Broadcast Van.


## TEXT AND REFERENCE BOOKS:

1.     Monochrome and Colour TV by R.R. Gulati
2.     Colour Television by Cole.
3.     Colour TV Principle and Practice by R.R. Gulati
4.     Television   Production by Alan Wurtzel
5.     Techniques of Television Production by   Rudy Bretz
6..    Television Broadcasting by   Chinn

TC-325    T.V. CIRCUITS & SYSTEMS

INSTRUCTIONAL OBJECTIVES.

BLACK & WHITE TELEVISION

1.Understand the picture elements, scanning   and   standards for Black and White TV
transmission.
1.1    Describe the picture element.
1.2    Describe scanning   (interlaced and non-interlaced scanning).
1.3    Describe saw tooth wave shape for linear scanning.
1.4    Describe sync pulses and equalizing pulses.
1.5    Describe CCIR and FCC standards.
1.6Describe line & field frequency, aspect ratio, raster, frame frequency according to CCIR
and FCC standards.
1.7    Describe a blanking pulse.
1.8    Identify the function   of   horizontal and vertical blanking pulses.

2.    Understand the composite video signal.
2.1    Draw the formation of composite video signal.
2.2    Explain the composite video signal.

3.    Understand the working principle and operation of   B& W camera tubes.
3.1Name photo sensitive, photo-conductive, photo-voltaic and photo-emissive material
with their   uses.
3.2    Explain the construction, working principles and use of iconoscope.
3.3    List the merits & demerits of iconoscope.
3.4    Explain the construction & working principle of image orthicon.
3.5    List the merits the demerits of image orthicon.
3.6    Explain the construction & working principle of plumbicon.
3.7    List the merits and demerits of plumlicon.
3.8    Explain the construction & working principles of saticon.
3.9    List the merits & demerits of saticon.
3.10   Explain construction & working principle of silicon target plate.
3.11   List the merit & demerits of silicon target plate.
3.12   Describe CCD camera and   its applications.

4.    UNDERSTAND   THE   BLOCK DIAGRAM OF B & W   TV RECEIVER.
4.1Draw the block diagram of black & white T.V receiver according to CCIR standard.
4.2    Label each stage of black and white T.V receiver.
4.3    Draw the path of signal   flow with waveform at each stage.


5.    UNDERSTAND THE WORKING OF TUNER AND CHANNEL SELECTOR.

5.1     Describe band width of channels according to CCIR & FCC standard
5.2     Describe channels frequencies for VHF & UHF range.
5.3     Enlist types of tuners.
5.4     Draw the schematic diagram of R.F amplifier.
5.5     Explain the function of R.F. amplifier circuit.
5.6     Draw the schematic diagram of mixer stage.
5.7     Explain the function of mixer stage circuit.
5.8     Draw the schematic diagram of local oscillator stage.
5.9     Explain the function of local oscillator circuit.
5.10    Draw the schematic diagram of tuning circuit using varactor diode.
5.11    Explain the function of varactor diode tuning circuit.
5.12    Explain the manual and synthesized phase locked loop controlled tuning.
5.13    Draw the schematic diagram of   a channel selector.
5.14    Explain the working of channel selector.

6.      UNDERSTAND THE WORKING OF   AGC & PICTURE I.F. AMPLIFIER.
6.1     Define automatic gain control (AGC) and list its types.
6.2     Draw the schematic diagram of delayed AGC & Keyed AGC.
6.3     Explain the operation of delayed AGC & Keyed AGC circuits
6.4     Draw the schematic diagram of Picture I.F. amplifier
6.5     Explain the function of picture I.F amplifier.
6.6     Describe frequencies at Picture I.F input & I.F frequencies.
6.7     Describe the working Picture I.F Amplifier (function of I,   II   and III   IFA).
6.8     Draw the response curve of Picture I.F. Amplifier.
6.9     Explain the function of SAW filter used in a I.F.T.

7.      UNDERSTAND THE WORKING OF   VIDEO SECTION.
7.1     Draw the schematic diagram of video amplifier stage.
7.2     Explain the operation of video output circuit.
7.3     Draw the wave form of signal at the input &   output of video output stage.
7.4Explain the method of frequency compensation of video stage by using peaking coil.
7.5     Draw the schematic diagram of video detector (AM) stage.
7.6     Explain the function of video detector circuit.
7.7     Describe the function of   buffer stage.
7.8     Explain the function of brightness & contrast controls.

8.      TO UNDERSTAND   THE FUNCTION OF SYNC SEPARATOR   SECTION.
8.1     Draw the schematic diagram of sync take off   point from the video section.
8.2     Draw the schematic diagram of sync separator section.
8.3     Explain the function of sync separator.
8.4     Explain the operation & uses of differentiating & integrating circuits.

9.UNDERSTAND THE WORKING AND OPERATION OF HORIZONTAL STAGE.
9.1     Draw the schematic diagram of Horizontal oscillator circuit.

9.2     Explain the function of horizontal oscillator.
9.3Draw the schematic diagram of horizontal Automatic Frequency Control (AFC).
9.4     Explain the function of AFC.
9.5     Draw the schematic diagram of horizontal driver stage.
9.6     Explain the function of horizontal driver stage.
9.7     Draw the schematic diagram of horizontal output stage.
9.8     Explain the function of horizontal output stage.
9.9     Draw the schematic diagram of damper and line output (flyback) transformer.
9.10    Explain the function of damper & line output   (flyback) transformer.
9.11    Draw the wave shapes of signals at the above circuits of horizontal section.
9.12    Describe electromagnetic deflection.

10.     UNDERSTAND THE  WORKING OF  VERTICAL  SECTION.
10.1    Draw the block diagram of vertical oscillator.
10.2    Explain the function of vertical oscillator circuit.
10.3    Draw the schematic diagram of vertical driver stage.
10.4    Explain the function of vertical driver stage.
10.5    Draw the schematic diagram of vertical output section.
10.6    Explain the function of vertical output stage.

11.     TO UNDERSTAND THE OPERATION OF SOUND SECTION.
11.1    List the methods of sound take off (detector and   buffer take off).
11.2    Draw the block diagram of sound take off circuit from video section.
11.3    Draw the schematic diagram of sound I.F.   amplifier.
11.4    Explain the operation of sound I.F. amplifier circuit.
11.5    Explain the operation of FM detector circuit.
11.6    Draw the schematic diagram of sound output section.
11.7    Explain the function of sound output section.
11.8    Describe the function of sound control (volume and tone).

12.UNDERSTAND THE CONSTRUCTION, TYPES AND APPLICATIONS OF POWER
     SUPPLIES.
12.1    Describe the need of power supply in a TV receiver.
12.2    Draw the block diagram of transformer type power supply.
12.3    Explain the function of transformer type power supply.
12.4    Draw the schematic diagram of transformer-less power supply.
12.5    Explain the function of transformer-less power supply.
12.6    Compare transformer type & transformer less power supply.
12.7    Draw the schematic diagram of AC/DC stabilized power supply.
12.8    Explain the function of AC/DC stabilized power supply.
12.9    Describe merits & demerits of AC/DC stabilized power supply.
12.10   Draw the schematic diagram of switched mode power supply.
12.11   List the function of switched mode power supply.
12.12   Describe merits & demerits of switched mode power supply.

12.13   Explain the operation of primary power supply circuit.
12.14   Draw the schematic diagram of secondary power supply.
12.15   Explain the operation of secondary power supply circuit.


## COLOUR TELEVISION RECEIVERS.

**13.    UNDERSTAND OPTICS OF COLOUR TELEVISION.**
13.1    Review of nature of   light.
13.2    Describe visible light spectrum.
13.3    Describe perception of colours.
13.4    List primary colours.
13.5    Describe additive mixing of colours.
13.6    Describe subtractive mixing of colours.
13.7    Describe hue, saturation, luminance, chrominance & compatibility.
13.8    Describe primary & secondary and complementary colours.
13.9    Draw colour circle diagram   w.r.t   phase angle.
13.10   Explain colour theory with luminance values of colours.
13.11   Explain colour circle diagram w.r.t. phase angle.
13.12   Draw the block diagram of colour   TV camera.
13.13   Identify the function   of   each block of colour T.V camera.
13.12   Describe the working   principle of colour T.V camera.

**14.    UNDERSTAND COLOUR TELEVISION SYSTEMS.**
14.1    Describe the NTSC colour TV system.
14.2    List the merits & demerits of   NTSC colour TV system.
14.3    Describe   the SECAM colour   TV system.
14.4    List   the merits & demerits of   SECAM   colour   TV system..
14.5    Describe PAL colour TV system.
14.6    Name the types of   PAL   colour   TV   systems.
14.7    List the   merits & demerits of   PAL colour TV system.
14.8   Draw the block diagram of PAL colour TV transmitter.
14.9    Describe each stage of PAL colour TV transmitter.
14.10   Draw the block diagram of PAL colour TV receiver.
14.11   Describe each stage of PAL colour TV receive.

**15.    UNDERSTAND THE WORKING OF   PAL CODER OR ENCODER.**
15.1    Draw the block diagram of basic encoder.
15.2    Draw the block diagram of   PAL   CODER.
15.3    Describe frequency interlacing.
15.4    Describe choice of colour sub-carrier frequency.
15.5    Describe exact value of colour sub carrier frequency.
15.6    Draw the phasor   diagram of   PAL encoder.
15.7    Describe U & V signals.

15.8    Describe U & V weighing factor.
15.9    Describe band width of colour difference signals.
15.10   Describe modulation products.
15.11   Describe chrominance signal.
15.12   Describe colour burst and swinging burst.
15.13   Describe colour burst getting.
15.14   Draw the diagram of colourplexed   video signal with sync pulses.

## 16.    UNDERSTAND THE WORKING OF PAL DECODER.

16.1    Draw the block diagram of PAL-D decoder.
16.2    Explain the working of PAL decoder stage by stage.
16.3    Elaborate the difference between   PAL-B, PAL-D, NTSC, & SECAM.
16.4    Identify the function of Comb filter.
16.5    Describe the function of chrome amplifier stages.
16.6    Describe the function burst gate (gaited burst) and burst blanking.
16.7    Identify the function of ACC and colour killer.
16.8    Explain the need and function of sub-carrier generator (4.43 MHz oscillator).
16.9    Describe phase discriminator circuit.
16.10   Identify the burst phase identification (indent) signal.
16.11   Identify the function of indent amplifier.
16.12   Explain the function of   180 degree PAL switch.
16.13   Explain the working of   U and V demodulator circuit.
16.14   Explain the working   of   matrix circuit to generate   G - Y signal.
16.15   Identify the function of colour difference amplifiers.
16.16   Explain the function of RGB matrix circuit.
16.17   Compute the values of   RGB drive circuit resistors.
16.18   Explain the working of RGB amplifiers.

## 17. UNDERSTAND THE NEED OF PURITY ADJUSTMENTS AND CONVERGENCE.

17.1    Describe convergence.
17.2    Describe colour purity.
17.3    Explain dynamic, static & lateral convergence.
17.4    Describe pincushion distortion corrections.
17.5    Draw the schemata diagram of pincushion distortion correction.
17.6    Explain pincushion distortion correction circuit.
17.7    Describe East-West modulation.
17.8    Explain gray scale tracking.
17.9    Describe East-West percussion correction.
17.11   Explain spark gap protection.

## 18. UNDERSTAND THE TYPES AND CHARACTERISTICS OF COLOUR PICTURE TUBES AND TV RECEIVER CONTROLS.

18.1Draw   and label the cross sectional view of   precision in line (PIL) picture   tube.
18.2    Draw and label the cross sectional view of trinitron picture tube.

18.3     Compare PIL & trinitron picture tubes.

## 19. UNDERSTAND THE ESSENTIAL FEATURES OF TELEVISION EQUIPMENT   TO RECEIVE AND DISPLAY TELETEXT INFORMATION.
19.1     Draw the block diagram of teletext receiver.
19.2     Describe the function of each block   of   teletext   receiver.
19.3     Describe the teletext coding signals
19.4     describe the terms: data lines, access time and teletext character.

## 20. TO UNDERSTAND   THE WORKING   REMOTE CONTROL.
20.1     Describe remote control transmitter & receiver.
20.2     Draw the schematic diagram of remote control transmitter.
20.3     Explain remote control transmitter circuit.
20.4     Draw the schematic diagram of remote control receiver.
20.5     Explain remote control receiver circuit.
20.6     Explain antenna booster.

## 21. UNDERSTAND THE FUNCTION AND TYPES OF BASIC TV   ANTENNAS AND ANTENNA BOOSTERS.
21.1     Describe the properties of   V.H.F. and U.H. F.   signals.
21.2     List the   fundamental   characteristics of   half-wave dipole and folded dipole aerials.
21.3     Enlist the   main features of   coaxial   type and   parallel two-wire line   aerials feeder cables.
21.4     Describe the factors effecting the choice of the type of receiving antennas.

## 22. UNDERSTAND THE FUNCTION, TYPES, CONTROLS AND HANDLING OF STUDIO CAMERA   MOUNTING.
22.1     Describe camera mounting equipment used in   TV studio.
22.2     Describe camera movements, panning, dolling & tilting.

## 23. UNDERSTAND THE OPTICAL SYSTEM AND USE OF   LENSES.
23.3     Describe the optical system of   a TV studio camera.
23.4     Enumerate kinds of lens with their applications.
23.5     Describe the   aperture control in TV camera.
23.6     Describe optical image techniques for taking   a close up view.

## 24. UNDERSTAND   THE   NEED, TYPES AND APPLICATION OF   STUDIO LIGHTING.
24.1     Describe the objective of TV   studio lighting.
24.2     Identify the steps   for lighting   a new show.

24.3    Enlist the types of lights with their application in a TV studio.
24.4    List the types light sources with their uses.
24.5   Enlist the limitations of light beam.
24.6    Describe the term: flood light, spot light, stripe & special effect lights.
24.7    Describe light board, patch board & light dimmers.

## 25.    UNDERSTAND THE FUNCTION OF AUDIO-VIDEO CONTROL CONSOLE.

25.1    Draw the block diagram of audio-video control console.
25.2    Identify the function of each block of audio video control console.
25.3    Explain the terms: dissolve, fade-in, fade-out, superimposition, switching and mixing.
25.3    Explain three bus bar & five bus bar switching system.
25.4    Describe the picture monitor & intercommunication system.
25.5    Describe the necessity of projection equipment TV studio.

## 26.    UNDERSTAND THE WORKING OF FIELD EQUIPMENT AND VIDEO FOR OUTDOOR TV BROADCAST.

26.1    Describe the necessity of remote pick up arrangement in TV broadcasting.
26.2    Enlist the field equipment used for remote pick up.
26.3    Draw and label the plan of outdoor broadcast van.

TC-332:          ANTENNA & TRANSMISSION LINES.

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|  | 1 | 3 | 2 |

**Total Contact Hours:**
   Theory:          32 Hours.
   Practical:       96 Hours.

**Pre-requisites:** Communication-I

**AIMS** Having gone through this subject, the student will be able to understand:

1.      Characteristics of transmission lines.
2.      Reflection in transmission lines.
3.      Impedance   matching of transmission lines.
4.      Use of   Smith chart.
5.      Characteristics of antennas.
6.      Type of   antennas.
7.      Broadcasting antennas.
8.      Receiving antennas.

## MODULE-I

1.     **TRANSMISSION LINES.**                                             (20 Hours)
   1.1     Introduction to various types
   1.2     Characteristics of transmission lines.
   1.3 Transmission lines parameter and characteristic   impedance (Zo) of parallel wire & coaxial cable.
   1.4     Current and voltage wave through a transmission lines.
   1.5     Stand wave ratio.
   1.6     Current and voltage Power reflection coefficient.
   1.7 Propagation of a wave through a line   attenuation and propagation   coefficient and phase shift.
   1.8     Quarter wave and half wave transmission Line characteristics.
   1.9     Transmission line matched in different loads.
   1.10    Use of smith chart for the calculation of:
       i)       Zin
       ii)      ZL
       iii)     YL
       iv)      Line   length
       v)       Distance to the first voltage minimum
       vi)      Maximum and minimum impedance on the line
       vii)     Magnitude and phase angle of reflection coefficient.
       viii)    VSWR
       xi)      Quarter wave transformer (Location and Zo)

x)      Single stub matching (Position and length of stub).

## 2.      ANTENNAS.                                                    (12 Hours)
2.1      Principle of radiation from antenna.
2.2.     Sketching of current and voltage wave form.
2.3      Antenna conduction induction and radiation field.
2.4      Intensity of radiation field and unit of measurement.
2.5Antenna gain resistance, beam width effective aperture, effective length and polarization.
2.6      Effect of ground on radiation of energy of an antenna.
2.7      Characteristics of ½ wave dipole antenna
2.8      Radiation Pattern of Array.
2.9      Gain of an Array.
2.10     Construction function and characteristics of Yagi antenna.
2.11     Construction and working of Rhombic antenna.
2.12     Different types of broadcast, horn and parabolic antenna.

## TEXT AND REFERENCE BOOKS:

1.  Fields Waves and Transmission Line by   F.A. Benson and   T.M. Bension.
2.  Satellite Communication System Design Principle by   M. Richaria.
3.  Electronics Communication, Modulation and Transmission by R. J. Schoenbeck.
4.  Antenna and Radio Waves, Propagation   by Collin.
5.  Electronics Communication System by   George Kennedy.

TC-332:        ANTENNAS & TRANSMISSION LINES

1.      UNDERSTAND VARIOUS TYPES OF TRANSMISSION LINES.
        1.1     Define   a transmission line.
        1.2     List the types of transmission lines: two wire line, axial cable and microstrip.
        1.3     Explain the construction of each type transmission line.
        1.4     List modes of signal propagation through a transmission line.
        1.5     List types of   dielectric used in transmission line.
        1.6     Derive the factors that determine the power handling ability of a transmission line.

2.UNDERSTAND SCHEMATIC REPRESENTATION (EQUIVALENT CIRCUIT) OF A
        TRANSMISSION LINE.
        2.1     Describe "primary or distributed" line constants (R, L , C  & G).
        2.2     Define the characteristic impedance (surge Impedance) of a transmission line.
        2.3     Explain formulae for calculating characteristic impedance in terms of:
                i)      Primary line constants
                ii)     At high frequencies
                iii)    With physical parameters of two-wire line & coaxial cable.
        2.4     Solve problems on   above.

3.UNDERSTAND THE FACTORS INVOLVED IN PROPAGATION OF A SIGNAL
        THROUGH A   TRANSMISSION LINE.
        3.1Define secondary line constants i.e. propagation   coefficient,   attenuation coefficient &
                phase shift coefficient
        3.2     Explain phase velocity, velocity factor & line wavelength.
        3.3     Solve the problems on above (3.1 & 3.2).

4.UNDERSTAND THE NEED FOR MATCHING "LOAD IMPEDANCE" WITH THE
        CHARACTERISTIC IMPEDANCE OF A TRANSMISSION LINE.
        4.1Explain the need for making "ZI" equal to "Z₀" of a transmission line.
        4.2     Define Incident wave.
        4.3     Define Reflected wave.
        4.4     Define Standing waves.
        4.5     Define Voltage standing wave ratio (VSWR).
        4.6     Define Voltage reflection coefficient (magnitude & phase angle).
        4.7     Define Current reflection coefficient.
        4.8     Solve problems on (4.2).

5.UNDERSTAND THE CHARACTERISTICS OF SHORT-CIRCUITED,
        OPEN-CIRCUITED AND FLAT LINES.
        5.1Explain the behavior   i.e. voltage & current   distribution for a short-circuited line.
        5.2     Write down formula for input impedance of a short circuited line.
        5.3Explain the behavior i.e. voltage & current distribution of an open-circuited line.
        5.4     Write down the formula for input impedance of an open-circuited line.

5.5    Explain the behavior & characteristics of a half wavelength line.
5.6    Explain the behavior of quarter wave transmission line.
5.7    Solve the   problems on above (5.1 & 5.3).

6.    **UNDERSTAND THE APEDANCE MATCHING & SMITH CHART.**
6.1    Explain the behavior of a quarter wave transformer as a matching device.
6.2 Write formula for calculation of characteristic impedance of the quarter   wave
       transformer.
6.3    Use `SMITH CHART' to determine:
    i)    Normalized Impedance.
    ii)    Input Impedance.
    iii)    Load Impedance.
    iv)    Load Admittance.
    v)    Voltage standing wave ratio (VSWR).
    vi)    Magnitude & phase angle of   reflection coefficient.
    vii)    Maximum & minimum impedance on the line.
    viii)    Distance to the first voltage minima.
    ix)    Quarter wave transformer ( location and characteristic Impedance).
    x)    Single stub-matching (location and length of the stub).

7. **UNDERSTAND THE CONSTRUCTION AND THE CHARACTERISTICS OF
       SLOTTED LINE & DIRECTIONAL COUPLER.**
7.1    Explain the working & characteristics of slotted line.
7.2    Explain   the working & characteristics of directional coupler.

8.    **UNDERSTAND VARIOUS TYPES OF LOSSES THAT OCCUR IN A
TRANSMISSION LINE.**
8.1    Explain   the radiation loss.
8.2    Explain loss due to conductor heating (I,R).
8.3    Explain loss due to dielectric heating.

9. **UNDERSTAND THE PRINCIPLES OF ELECTROMAGNETIC ENERGY RADIATION.**
9.1    Describe the fundamentals of Electromagnetic waves.
9.2    Explain Electric field, magnetic field & direction of propagation.
9.3 Explain waves in free space, velocity of propagation, inverse square law, power density &
       characteristic Impedance of free space.
9.4    Describe reflection, refraction and interference of electromagnetic waves.
9.5    Draw   the electromagnetic spectrum.
9.6    Describe ground (surface) waves   propagation.
9.7    Describe sky wave propagation.
9.8    Describe space wave propagation.
9.9    Explain the terms:   maximum useable frequency,
       critical frequency, and skip distance.

10. UNDERSTAND THREE CHARACTERISTICS, AND CLASSIFICATION OF HIGH-FREQUENCY ANTENNAS.
    10.1    Describe the electromagnetic radiation mechanism.
    10.2 Explain the construction and behavior of a half wave dipole by using its radiation pattern.
    10.3    Sketch the current and voltage distribution pattern for a half wave dipole.
    10.4    Draw the radiation pattern for resonant & non resonant antennas.
    10.5    Write the formula to find length of an antenna for a given frequency.
    10.6    Calculate the length for the resonant antenna for given frequency.
    10.7    Define the terms
    10.7    Describe briefly the isotropic radiator.

11. UNDERSTAND VARIOUS TERMS RELATED TO ANTENNAS
    11.1    Define the following terms
        i)       Radiation Resistance
        ii)     Polarization
               a)     Linear polarization
               b)     Vertical Polarization
               c)     Horizontal Polarization
               d)     Elliptical polarization
               e)     Circular polarization
    11.2 Define directivity, power-gain, beam width, front to back ratio, physical and electrical length, major & minor lobes.

12. LOOP AND FERRITE ROD ANTENNA.
    12.1    Understand construction & behavior of receiving antennas.
        12.1.1 Describe square loop antenna along with its radiation pattern
        12.1.2 Describe ferrite rod antenna & give an expression for calculation of its effective length.
    12.2    Understand various types of non-resonant antennas.
        12.2.1 Describe the construction, radiation pattern and characteristics of long wire antenna.
        12.1.2 List the uses of long wire antenna.
        12.1.3 Explain construction, radiation pattern & characteristics of a R Rhombic antenna.
        12.1.4 List the applications of Rhombic antenna.
    12.3    Understand arrangement of antenna elements.
        12.3.1 Define the term parasitic elements.
        12.3.2 Describe the function of parasitic directors.
        12.3.3 Identify the function of parasitic reflectors.
        12.3.4 Describe the construction & characteristics of dipole and folded dipole.
        12.3.5 Explain construction and characteristics of Yagi antenna.
        12.3.6 List the applications of Yagi antenna.

13. **UNDERSTAND THE BEHAVIOR OF VARIOUS WIDE BAND ANTENNAS.**
    13.1    Describe the construction & characteristics of dipole omnidirectional antenna.
    13.2    Describe   the construction & characteristics of helical antenna.

14. **UNDERSTAND THE FUNDAMENTAL FEATURES OF ANTENNAS USED AT MICROWAVE   FREQUENCIES.**
    14.1    Describe the construction and characteristics of parabolic reflector antenna.
    14.2 Write down   formulae for   calculation of its beam width between half power points, beam   width between Nulls, gain,   directivity,   effective area, and Illumination Efficiency.
    14.3    Solve problems on above (14.2).
    14.4    Describe the construction & characteristics of a slot antenna.

## TC-332:        ANTENNA & TRANSMISSION LINE

**LIST OF PRACTICAL.**                                                           **96 Hours**

**TRANSMISSION LINES.**

1.       To study the characteristics of E.M. wave. Measurements on transmission lines:
2.       Measure VSWR.
3.       measure frequency.
4.       Measure characteristic impedance.
5.       Measure reflection coefficient.
6.       To study the characteristics of   two-wire parallel   and coaxial lines.
7.       Determinate   impedance   mismatching.
8.       Match impedance by single stub matching using Smith chart technique.
9.       Match impedance by double stub matching using Smith chart technique.
10.      Use of smith chart for the calculation of:
         i)        Zin,
         ii)       ZL,
         iii)      YL,
         iv)       Line Length,
         v) Distance to the first voltage minima.
         vi)Maximum and minimum impedance on the line.
         vii) Magnitude and Phase angle of reflection efficient
         viii)VSWR for different loads.
         ix)       Quarter wave transformer (Location + $Z_o$)
11.      Characteristics of isotropic antenna.
12.      Plot the radiation pattern of   a basic isotropic antenna.
13.      Plot the directional pattern of   half wave dipole.
14.      Plot the polar directivity pattern   for folded dipole antenna.
15.      Plot the polar   directivity pattern of   Yagi antenna.
16.      Measure gain efficiency, radiation resistance for the following antennas:
         a)        Dipole,
         b)        Folded dipole,
         c)        Rhombic
         d)        Fire end
         e)        Vertical
         f)        Yagi antenna
         g)        Adcock
         h)        Parabolic
17.Design the antennas given under experiment 15 above.
18.      To study the characteristics of dish antenna.
19.      Plot the polar directivity pattern of dish antenna.
20.      Select an antenna for given conditions.
21.      Install various type of antennas.

## TC-342 MICROPROCESSOR APPLICATION & INTERFACES

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| 2 | 3 | 3 |

**Total contact hours:**
Theory: 64 Hrs.
Practical: 96 Hrs.

## TOPICS

1 Microprocessors                                             6 Hrs.

2 Instruction Sets                                            6 Hrs.

3 Assembly Language Programme                                 6 Hrs.

4 Interfacing Memory                                          8 Hrs.

5 Peripheral Subsystems                                       15 Hrs.

6 Advanced Microprocessors                                    6 Hrs.

7 8086/88 Processors                                          6 Hrs.

8 System Bus Structure                                        5 Hrs.

9 I/O Interface                                               6 Hrs.


## REFERENCE BOOKS:

1.    Microprocessors Architecture and Applications - Goankar.
2.    Introduction to Microprocessors - Mathur.
3.    Microprocessor - Dougles V Hall.
4.    Asborne Series Vol.I - Morries Mano.
5.    Computer Organization - Tanenbaun.

## TC-342    MICROPROCESSOR APPLICATION & INTERFACES

## OBJECTIVES

1 Understand the architecture of 8085 microprocessors.
  1.1 Draw the block diagram of a micro-computer.
  1.2 List the functions of microprocessor in a micro-computer.
  1.3 Explain about the purpose of address bus, data bus and the control bus.
  1.4 Give the functional block diagram of 8085 microprocessor.
  1.5 List the register and explain their functions.
  1.6 Distinguish the functions of various registers.
  1.7 Give the pin diagram of 8085 microprocessor and give the purpose of all the pins.
  1.8 Explain how to demultiplex the AD-Airbus using latch.
  1.9 Draw a logic schematic to generator, using control signals.

$$Using\ 8085\quad IO/\overline{M}\quad \overline{RD}\quad \overline{VR}\ Signals$$

$$1.\ \overline{MEMR}\quad 2.\ \overline{MEMW}\quad 3.\ \overline{IOR}\ 4.\ \overline{IOW}$$

2 Know the instruction set of 8085 microprocessor.
  2.1 Define the terms such as machine language, assembly level language, mnemonics as
       applied to microprocessor.
  2.2 Give the difference between machine level and assembly level programming with
       examples.
  2.3 State the need for an instruction set.
  2.4 List the five major groups in the instruction set along with examples.
  2.5 Explain the terms operation code and operand and illustrate these terms by writing an
       instruction.
  2.6 Explain the four data manipulation functions-data transfer, arithmetic, logic and
       branching.
  2.7 Classify the 8085 instructions into one byte, two byte and three bye instructions.
  2.8 Classify the 8085 instructions into different groups based on different addressing modes.

3 Apply instruction set of 8085 to write assembly level programmes.
  3.1 Write programs in mnemonics to illustrate the application of data copy instructions and
       translate these mnemonics into hexa-codes.
  3.2 Write programmes in the proper formate showing memory addresses, Hex machine
       codes, mnemonics and comments.
  3.3 Explain the arithmetic instructions and recognize the flags that are set or reset for given
       data conditions.

3.4 Write programme of instructions to perform single bye, double bye and multi byte addition and substraction.

3.5 Explain the logic instructions and recognize the flags that are set or reset for given data conditions.

3.6 Illustrate the logic operations and explain their use in making, setting and resetting of individual bits.

3.7 Explain unconditional and conditional jump and how flags are used to change the sequence of programme.

3.8 Illustrate the application of jump instruction.

3.9 Draw flow charts for simple programmes.

3.10 Draw flow charts for conditional loop illustrating indexing and counting.

3.11 Use the unconditional and conditional jump instruction with flags or writing programmes.

3.12 Write a programme using counter techniques.

3.13 Define the stack, stack pointer, programmes counter.

3.14 Describe the use of above.

3.15 Define a subroutine and explain its uses.

3.16 Explain the sequence of program when a subroutine is called and executed.

3.17 Explain how information is exchanged between the programme counter and the stack and identify the stack pointer register when a subroutine is called.

3.18 List and explain unconditional and conditional call and return instructions.

3.19 Use PUSH, POP instructions in programme.

3.20 Illustrate the concept of nesting, multiple ending and common ending in subroutines.

3.21 Use input/output, machine related statements in writing assembly language programmes.

3.22 Explain the term debugging a programme.

3.23 List the important steps in writing and trouble shooting a simple programme.

3.24 Explain the principles of single loop and break point bebugging techniques.

3.25 Explain fetch cycle, execute cycle and instruction cycle.

3.26 Distinguish between machine cycle and state.

3.27 Write instructions to set up time delay.

3.28 Know the timing diagram for memory write, memory read and instruction fetch operations.

3.29 Explain the necessity of interrupts.

3.30 Give the priorities of various interrupts.

4 Know the working of different interfacing circuits and interfacing chips.

4.1 Explain what is interfacing

4.2 List different interfacing devices

4.3 Distinguish between memory mapped I/O and I/O mapped I/O.

4.4 Analyse a memory interfacing circuit and specify the memory map of a given memory devices.

4.5 Define the port address of a given I/O devices.

4.6 Use the peripheral chips such as 8155, 8255 and 8279 in simple and handshaking modes.

4.7 Explain DMA and its advantages.

4.8 State the functions of various elements of programmable DMA controller 8257.

4.9 Explain basic features of 8259 or equivalent programmable interface control.

5 Comprehend the working of Communication interfaces.

5.1 Give the necessity of communication interface.

5.2 Explain that the data transfer occurs in the serial I/O mode and how it differs from parallel I/O mode.

5.3 Explain the term synchronous a synchronous transmission, simple, half and full duplex transmission, baud rate and parity check.

5.4 Explain how data bits are transmitted for received in the synchronous format.

5.5 Explain basics of two standards transmission current loop and RS 232.

5.6 Comprehend the modes of application of USART - 8251.

5.7 Explain the constructional details and organisation of typical multi bus and VME bus.

6 Appreciate the applications of Microprocessors.

6.1 State the advantages of Microprocessor control over discrete logic control. List its applications.

6.2 Explain any two microprocessor applications such as traffic control, lift control, temperatures monitoring, stepper motor control - through flow charts and block diagrams.

7 Know about other 8 bit microprocessor.

7.1 List the features of Z80 microprocessor and compare them with those of 8085.

7.2 give details of commonly used single chip microprocomputers (8048 and 8051 family)

7.3 Compare the capabilities of various 8 bit microprocessor.

8 Investigate the processor architecture.

8.1 Draw the block diagram of a simple accumulator based CPU.

8.2 Explain the function of each unit.

8.3 Define the terms micro-operation, macro-operation, instruction cycle, fetch cycle and execution cycle.

8.4 Explain the basic instructions READ, WRITE, ADD, COMPLEMENT, JUMP, LOAD, STORE AND SHIFT RIGHT.

8.5 Draw the flow-chart showing the sequence of micro-operations in processing a typical instruction.

8.6 Explain the relation between word length and memory.

8.7 Calculate the bit lengths of each register of the accumulator based CPU from the word length.

8.8 Define stored programme concept.

8.9 Describe the sequential execution of a programme stored in memory by the CPU.

9 Comprehend the process of information representation.

9.1 Explain the basic types of information representation in a computer.

9.2Define floating-point representation and fixed-point representation of numbers.
9.3Illustrate the same with suitable examples.
9.4Distinguish between the above two representation.
9.5Define operand, opcode and address.
9.6Explain instruction formats.
9.7Classify the instruction types.
9.8Explain the terms zero-address, one-address, two-address and three-instructions.
9.9Explain the above with simple examples.
9.10Discuss different addressing modes.

10Comprehend the architecture of 8086/88 Microprocessors.
10.1Draw the register structure diagram of 8086 processor.
10.2State the need for data group registers.
10.3State the need for index registers.
10.4State the need for segment registers
10.5Give the steps involved in compating the physical address.
10.6State the internal operations of CPU.
10.7Illustrate the different addressing modes in 8086.
10.8Illustrate the different instruction formats (1 to 6 bytes).
10.9Complete the execution time for simple instructions.
10.10Give architecture of 8088 processors.
10.11State the compatibility of 8088 and 8086.

11Write the assembly level programme on 8086/88.
11.1Know the assembly instruction format.
11.2State different data transfer instructions.
11.3State different arithmetic instructions.
11.4State different loop instructions.
11.5Know flag instructions.
11.6Know shift and rotate instructions.
11.7State Assembler directives and operatives.
11.8Write simple assembler progress using above instructions.

12Comprehend the system bus structure of 8086/88.
12.1Draw the Pin diagram of 8086.
12.2State the purpose of each pin.
12.3Draw the block diagram of a typical system bus architecture.
12.4Distinguish maximum and minimum mode of operation of 8086.
12.5Give the system bus timing.
12.6State the interrupt structure of 8086.
12.7Explain the interrupt management using single 8259.

13Comprehend the I/O interface of 8086/88.

13.1 State the requirements of I/O interface.
13.2 State the issue involved in serial communication.
13.3 Explain asynchronous serial interface using 8251.
13.4 State the issues involved in parallel communication.
13.5 Explain parallel interface using 8255.
13.6 Explain programmable timer and event counter using 8254.
13.7 Explain the key board and display controller using 8279.
13.8 Explain the DMA controller using 8237.
13.9 Explain the diskette controller using 8272.

14 Understand the 80286/287 processor architecture.
14.1 Give the architectural differences between 8086 and 80286.
14.2 Explain the computation of physical address and the issue involved in single level tasks.
14.3 State the issues involved in multi level tasks.
14.4 State the issues involved in multiple tasks.
14.5 Explain the 80286 interrupt system.
14.6 Explain the system initialization for multiple task with a flow chart.
14.7 Explain memory interface to 80286.
14.8 Explain the interconnection of 80286 to 80287.
14.9 Give the improved features in 80386.

15 Understand the 68000 processor architecture.
15.1 Give the simplified CPU structure of 68000.
15.2 Give the register diagram of 68000.
15.3 State the need for status register
15.4 Distinguish between user mode and supervisory mode of operation.
15.5 State the issues in memory accessing in 68000.
15.6 Give the instruction set of 68000.
15.7 Illustrate the addressing odes used in 68000.
15.8 State the assembler directives used in 68000 assembly level programming.
15.9 Give the programme format used in 68000.
15.10 Write single assembly level programmes using 68000.
15.11 Give the Pin configuration of 68000.
15.12 State the need for each pin.
15.13 Explain the address bus.
15.14 Explain the data bus.
15.15 Give the improved features in 68020 and 68030.

## TC-352          TELECOM EQUIPMENT SERVICING

|  | T | P | C |
|---|---|---|---|
|  | 0 | 6 | 2 |

**Total contact hours:**
  Practical:  192 Hours.

## LIST OF PRACTICAL

1.Introduction to servicing, Methods of servicing, demonstration on telephone set, manipulation of controls, external adjustment and connections
2.Review of various tests (general tests) and their application   to test electronic equipment available in the laboratory.
3.  General test, checking, adjustment of a multimeter
4.  Service voltage stabilizers and   write a report.
5-6  Service & repair a stabilized power supply, and writing a report.
7-9  Service an oscilloscope and write a report.
10-12 Service of recording equipment
13.  Service a signal tracer and write a report.
14.  To   study   vacuum tube voltmeter.
15.  Service a T.V.M.
16-17 Service an A.F. signal generator with special attention to dial tone.
18-19 Service a R.F. signal generator with special attention to carrier generator.
20-21 Service a function signal generator and write a report.
22-24 Servicing telephone switching equipment.
25.Service a wave meter and write a report
26-28 Servicing of Electronics Exchanges.
29-30 Servicing of line equipment.
31-33Servicing, alignment and calibration of standard instruments used for the servicing of telephone exchanges and telephone set.
34.Servicing of remote control.

TC-363        DIGITAL COMMUNICATION

|   | T | P | C |
|---|---|---|---|
|   | 2 | 3 | 3 |

**Total Contact Hours:**
> Theory64 Hours
> Practical        96 Hours

**Pre-requisites:**

**AIMS**Students will be able to

> This course has been designed to enable the students:
> 1.To gain understanding of the techniques for transmission of Analog and Digital messages.
> 2.        To Gain an understanding of the Networking concept and LAN.

**COURSE CONTENTS**

1.        **INTRODUCTION TO COMMUNICATION SYSTEM.**
>        1.1        The essentials of a communication system.
>        1.2        Description and need for modulation.
>        1.3        Analog and Digital messages.
>        1.4        Bandwidth.
>        1.5        Noise.
>        1.6        Signal to Noise Ratio and Noise figure.
>        1.7        Sampling theorem.

2.        **CARRIER COMMUNICATION.**
>        2.1        Carrier signal, modulating and modulated signals.
>        2.2        Base band and Broad band communication.
>        2.3        Amplitude Modulation.
>        2.4        Frequency modulation.
>        2.5        Advantages of FM over AM.

3.        **PULSE COMMUNICATION.**
>        3.1        Coding.
>        3.2        Pulse Modulation.
>        3.3        PAM, PPM, and PWM.
>        3.4        Pulse code Modulation.
>        3.5        Time division multiplexing.
>        3.6        Quantization.
>        3.7        Generation of PCM.
>        3.8        Advantages and application of PCM.
>        3.9        Delta Modulation.
>        3.10        Comparison of Delta Modulation, PCM and differential PCM.

## 4. DATA COMMUNICATION.

4.1 Digital Multiplexing.

4.2 Microprocessor.

4.3 Data transmission circuits.

4.4 Characteristics of Data transmission circuits such as Bandwidth requirements, Data transmission speeds, Noise, Cross talk, Distortion, equalizers.

4.5 Digital codes (Baudot, ASCII Codes).

4.6 Parity check codes for error detection.

4.7 Data sets i.e Modems.

4.8 Modes of Modem operation (simplex, Duplex).

4.9 Modem data transmission speeds.

4.10 Modem modulation method (ASK, FSK, PSK).

4.11 RS. 232 interface.

4.12 Introduction of data sets to telephone loops.

4.13 Facsimile machines.

## 5. COMPUTER NETWORKS.

5.1 Network concepts.

5.2 Types of networks according to geographical limitations.

5.3 Local area network.

5.4 Elements of LAN (Gate ways, file server, work stations, hard ware, network operating system).

5.5 Packets.

5.6 The OSI reference model.

5.7 Layers of the OSI model.

5.8 Protocols.

5.9 Some important protocols.

5.10 LAN topologies such as:
Token ring, Token bus, star networking.

5.11 Inter Net.

5.12 IEEE 802 standards for LANs such as 802.1, 802.2, 802.3

5.13 Introduction to NOVELL NETWARE.

## 6. ADVANCED COMMUNICATION SYSTEM.

6.1 Fax and facsimile transmission.

6.2 Data Communication computer.

6.3 Satellite communication.

6.4 Fibre optic communication.

6.5 Applications of computer Networks such as E-mail, Internet, World (WWW).

TC-363        DIGITAL COMMUNICATION

INSTRUCTIONAL OBJECTIVES

1.UNDERSTAND COMMUNICATION SYSTEM AND ASSOCIATED TERMINOLOGIES.
      1.1     List the essential requirements of a communication.
      1.2Explain the functioning of a transmitter, receiver, channel in a communication system.
      1.3     Discuss the difference between analog and Digital Messages.
      1.4     Define distortion, signal to noise ratio.
      1.5     Define frequency spectrum of a signal, channel Bandwidth and Noise figure.
      1.6Define modulation, baseboard modulating signal, carrier and modulated signal.
      1.7     Explain the need for modulation in communication systems.
      1.8     Differentiate between baseboard and broadband signals.
      1.9     Define the purpose and concept of frequency division multiplexing.
      1.10    Ex[lain the sampling theorem.

2.UNDERSTAND CARRIER COMMUNICATION AND ALLIED TERMINOLOGY.
      2.1     Name different modulation system.
      2.2     Define amplitude, frequency and phase modulation.
      2.3     Sketch the waveforms for AM, FM, PM signals.
      2.4     Define Bandwidth and signal to Noise ration far A.M signals and F.M signals.
      2.5Compare A.M and F.M in respect of sideband generation, signal to noise ratio, noise,
              bandwidth and field of application.
      2.6     Draw simple block diagrams of A.M and F.M transmitters.
      2.7     State the function of each block in 2.6
      2.8     Draw the block diagram of F.M receiver.
      2.9     State the function of each block in 2.8

3.     UNDERSTAND PULSE COMMUNICATION SYSTEM.
      3.1     Define digital communication system.
      3.2     Define the concept of Information and its measurement.
      3.3     Define coding and its importance.
      3.4     Explain Baudot code.
      3.5     Explain time division multiplexing.
      3.6     Describe effects of noise, redundancy in an information carrying channel.
      3.7     Explain pulse modulation for the transmission of analog signals.
      3.8Explain the analog pulse modulation system i.e PAM, and pulse time modulation.
      3.9     Explain PWM and PPM.
      3.10    List the Digital Pulse modulation system.
      3.11    Explain in detail pulse code application.
      3.12    Discuss the advantages and application of PCM.
      3.13    Discuss the effects of noise on PCM.
      3.14    Explain delta modulation.
      3.15    Define differential pulse code modulation.

3.16 Draw a comparison between delta modulation, differential pulse code modulation and PCM.

**4      UNDERSTAND DATA COMMUNICATION.**
4.1      Explain digital multiplexing    .
4.2      Discuss shift registers for parallel to serial conversion of data.
4.3      Discuss the microprocessor as a data oriented device.
4.4 Discuss the characteristics of data transmission circuits (Bandwidth, requirements, data transmission, speeds, Noise, cross talk).
4.5      Explain Echo suppressors distortion, equalizers.
4.6 Discuss the digital codes, the error detection and correction codes (Parity check codes).
4.7      Define moderns/Data sets.
4.8      Discuss the modes of operation of modems.
4.9      List the typical data transmission speeds of modems.
4.10    List the modem modulation methods.
4.11    Explain FSK, ASK, PSK.
4.12    Discuss the RS-232 Interface.
4.13    Explain the Inter connection of data circuits to telephone loops.

**5      UNDERSTAND COMPUTER NETWORKING.**
5.1      Define computer networks.
5.2      State and define the types of Networks according to geographical limits.
5.3      State the network topologies.
5.4      Sketch and explain 5.3
5.5      Explain LAN.
5.6 Explain the elements of LAN such as gate ways, file server, work stations, Hardwares network operating systems.
5.7      Discuss the concept of packets, and packet switching.
5.8      Draw the block diagram of OSI model.
5.9      State the function of each layer of OSI model.
5.10    Define protocol.
5.11    State the functioning of some Important protocols.
5.12    Explain LAN with OSI model.
5.13    Explain the principle of protocols for each layer.
5.14    State the function of JEEE 802 standards for LAN such as 802.1, 802.2, 802.3
5.15    Explain data communication software.
5.16    Describe system Network Architecture.
5.17    Discuss the functioning of Network operating system such as NOVELL.
5.18    State the need for Network security.

**6      UNDERSTAND ADVANCED COMMUNICATION SYSTEM.**
6.1      Explain the principle of fax machine with block diagram.
6.2      Explain facsimile transmission.
6.3      Explain data transmission with computers using block diagram.

6.4     Explain the principle of working of satellite communication.

6.5     Discuss the working of fibre optic communication.

6.6     Explain the data transmission through fibre optics.

6.7Illustrate the working of transmitter in fibre optic communications using a block diagram.

6.8Illustrate the working receiver used in fibre optic communications using a block diagram.

6.9Discuss the applications of computer Networks such as Electronic Mail, Inter Net, World Wide Web (WWB).

6.10    Define Interservices digital network (ISDN).

6.11    Discuss the basic principle and applications of ISDN.

## TC-363      DIGITAL COMMUNICATION

**LIST OF PRACTICALS**                                                          **96 Hours**

1. Demonstrate the characteristics of PCM

2. Demonstrate the difference in the characteristics of PAM, PPM and PWM.

3. Demonstrate the characteristics of Delta Modulation.

4. Demonstrate the characteristics of digital multiplexer.

5. Measure characteristics of data transmission.

6. Demonstrate the operation of a modem.

7. Measure the characteristics of equalizers.

8. Install interface circuit.

9. Connect data sets to telephone loops.

10. Demonstrate the characteristics of Facsimile machine.

11. Demonstrate the working of a local area network.

12. Install the local area network.

13. Demonstrate the working of Token Bus, or Star Networking.

14. Demonstration of the working of Inter Net.

15. Demonstration of FAX.

**TC-372          PROJECT**

|   | T | P | C |
|---|---|---|---|
|   | 0 | 3 | 2 |

**Total contact hours**
      Practical:     96 Hours

Project will be based on installation of telephone exchanges; Assembling exchange equipment; installation of telephone lines; remote control design and assembly; repair or redesign or upgradation of an exchange.   The project will be allotted to a group of students under a supervisor.

**TC-382       FIBER OPTICS & SATELLITE COMMUNICATION**

|   | T | P | C |
|---|---|---|---|
|   | 1 | 3 | 2 |

**Total contact hours**
        Theory:        32 Hours.
        Practical:     96 Hours

1.      Introduction of Opto Electronics.                    2 Hrs.
        1.1     Basic Theory of light .
        1.2     Introduction of Opto Electronics
        1.3     Application of Opto Electronics

2.      Photo Resistor (Photo conductor)                   2 Hrs.
        2.1     Photo resister construction, characteristic and application.

3.      Photo Cell.                                 2 Hrs.
3.1Theory of operation, construction and applications.
        3.2Infrared detector, Ultraviolet detector.

4.      Photo diode and Photo transistor.                   2 Hrs.
        4.1     Photo diode construction, characteristics and applications.
        4.2Photo transistor, comparison with photo diode.
        4.3Applications

5.      Photo SCR and Photo Triac                       2 Hrs.
        5.1SCR construction, working principle and applications.
        5.2Triac comparison with SCR application.

6.      Opto Isolator,                              2 Hrs.
        6.1Opto isolator and other isolator devices.
        6.2Types of opto isolator
        6.3Application.

7.      Opto Electronic in Digital Communication.           2 Hrs.
        7.1Introduction of Digital communication.
        7.2Opto electronics based digital communication.
        7.3Transition of optical based digital communication.
        7.4Optical based receiver.
        7.5Advantages of optical based digital communication.

8.      Mid Term

9.      Fiber Optic.                                2 Hrs.
        9.1Introduction of Fiber optic advantages & disadvantages.

9.2Block diagram of Fiber optic system.

| | | |
|---|---|---|
| 10. | Characteristics of Light. | 2 Hrs. |
| | 10.1General terms and characteristics of Fiber optics. | |
| | | |
| 11. | Construction of Fiber Cable | 2 Hrs. |
| | 11.1Fiber optic, construction, working principle and types. | |
| | | |
| 12. | Connection of coupling in Fiber Optic. | 2 Hrs. |
| | 12.1    Different types of connectors used in Fiber optic. | |
| | 12.2Coupling types and losses in Fiber optic. | |
| | | |
| 13. | Fiber Optics Communication. | 2 Hrs. |
| | 13.1Fiber optics theory of Transmission and reception. | |
| | 13.2Methods of communication. | |
| | | |
| 14. | Basic Concept of Laser. | 2 Hrs. |
| | 14.1Laser, Introduction, Types and advantages and disadvantages. | |
| | | |
| 15. | Application of Laser. | 2 Hrs. |
| | 15.1Laser theory of operation | |
| | 15.2Construction and working principle & application of laser driver. | |

## TC-382        FIBER OPTICS & SATELLITE COMMUNICATION

OPTO ELECTRONICS:

1.        Understand the   basic concept of the subject.
        1.1        Explain basic theory of light.
        1.2        Describe the importance of the topic.
        1.3        State the applications of the topic.

2.        Understand the construction & working of Photo Resistor (photo conductor)
        2.1        Draw the schematic diagram of photo conductor.
        2.2        Describe the construction of photo resistor
        2.3        Explain the working principle of photo resistor.
        2.4        Define the characteristic of photo resistor
        2.5Describe the application of photo resistor. (i.e photo resister as voltage divider, controller of
                power light sensitive resister)

3.        Understand the working & uses of Photo cell.
        3.1        Describe the theory of operation of photo cell.
        3.2        Draw the schematic diagram of photo cell.
        3.3        Explain the working principle of photo cell.
        3.4        State the application of photo cell.
        3.5        Describe infrared detector
        3.6        Describe ultra violet detector.

4a.        Understand the working & uses of Photo diode
        4a.1        Differentiate between ordinary diode and photo diode.
        4a.2        Name the material used in photo diode.
        4a.3        Draw the schematic diagram of photo diode.
        4a.4        Explain the operation of photo diode.
        4a.5        Explain the characteristic curve of photo           diode.
        4a.6        State dark current.
        4a.7        State application of photo diode as a sensor.

4b.        Understand the working & uses of photo transistor.
        4b.1        Describe the theory of operation of photo transistor.
        4b.2        Compare the characteristic of   photo transistor with those of the photo diode.
        4b.3        State the of applications photo transistor.

5a.        Understand the working & uses of photo S C R.
        5a.1        Describe the operation of photo darlington sensor.
        5a.2        Describe the theory of operation.
        5a.3        Draw the equivalent circuit of photo SCR.

5a.4    Explain the working principle of photo SCR.

5a.5Explain the use of photo SCR circuit to control power devices by means of light activation.

5a.6    State application of SCR.

5b.    Understand the working & uses of photo triac.

    5b.1    Describe the theory of operation of photo TRIAC.

    5b.2    Compare the characteristics of photo SCR with those of photo TRIAC.

    5b.3    State application of photo TRIAC.

6.    Understand the working & uses of opto Isolator.

    6.1    Distinguish opto Isolator with that of transformer as a isolator

    6.2    State advantages of opto isolator over (i.e transformer and RF isolator)

    6.3    Describe the theory of operation of optical isolator.

    6.4    Compare current transfer rates (CTR)

    6.5    State the different type of optical isolator.

    6.6    Determine the performance of opto isolator with both pulses and analog   signals.

    6.7    State the power application of opto isolator using different types.

7.    Understand the application of opto      electronic in digital communication.

    7.1    Describe the general term of digital communication.

    7.2    Describe the working principle of optical based digital communication

    7.4    Describe the operation of optical based digital transmitter.

    7.5    Describe the operation of optical board digital receiver.

    7.6    State advantage of optical based digital communication.

8.    MID TERM

## FIBER OPTICS

9.    Understand the basic concepts   of fiber optic.

    9.1    Describe the historical back ground of fiber optic.

    9.2    State advantage of fiber optic communication over conventional communication.

    9.3    Draw the block diagram of a fiber optic system.

    9.4    Explain briefly each block .

10.    Understand general term and characteristics of light.

    10.1    Explain   propagation of light.

    10.2    Define propagation parameters.

    10.3    Define reflection and refraction of light .

    10.4    Define Refractive index.

    10.5    Define numeric aperture.

    10.6    Define dispersion.

    10.7    Define material dispersion.

10.8    Define model dispersion.
10.9    Define band width of fiber optic
10.10   Describe attenuation.

11.     Understand the construction of fiber cable.
11.1    Name the material used in fiber optic cable.
11.2    Describe   construction of fiber optic cable.
11.3    Explain the principle of transfer of light in fiber cable.
11.4    Explain in briefly different types of fiber optic cables.
11.5    Comparison of fiber cable with ordinary cable.

12.     Understand the connection and coupling in fiber optic.
12.1    Explain the   theory of connecting fiber optic cable.
12.2    Define different types of connector.
12.3    Distinguish b/w fusion sluing type and ferrule type connector.
12.4    Explain the theory of coupling.
12.5    State different type of coupling.
12.6    Identify the losses of coupling.

13.     Understand the fiber optics communication.
13.1    Describe the theory of transmission in fiber optic
13.2    Draw the block diagram of optical fiber transmitter.
13.3    Explain   the working principle of each block.
13.4    Describe the theory of reception
13.5    Describe the block diagram of fiber optic receiver.
13.6    Describe the communication of analog signal over a fiber optic link.
13.7    Describe DC transmitter over a fiber optic system.
13.8Define time division multiplexing (T D M) and frequency division multiplexing (FDM).

14.     Understand basic concept of laser.
14.1    State the history of laser.
14.2    Define laser.
14.3    Describe different types of lasers.
14.4    State advantages and disadvantages of laser.

15.     Understand application of laser.
15.1    Describe the theory of operation of laser.
15.2    Draw the schematic diagram of laser driver
15.3    Explain the working principle of laser driver.
15.4    State application of laser.

## TC-382        FIBER OPTICS & SATELLITE COMMUNICATION

## PRACTICAL

1.Demonstrate the function of Photo diode as voltage divider and light sensor resistor.

2.        Determine the characteristics of Photo cell.

3.        Demonstrate the application of photo diode as a sensor.

4.        Demonstrate the operation of photo darlington.

5.Demonstrate the operation of photo SCR to control a power device by means of light activation.

6.        Determine the function of photo SCR as by directional switch.

7.        Determine the characteristic of opto-isolator.

8.        Familiarization of Fiber optic cable.

9.        Demonstrate coupling losses between Fiber optics Cable connectors.

10.        Measure of attenuation of a fiber optic cable.

11.Determine min   power required to drive optical receiver for logic 1 to logic 0 effects of cable length on logic state.

12.        Check a fiber optic cable for attenuation specification.

13.        Demonstrate fiber optic communication.

14.        Demonstrate the operation of laser driver.