17440

16172

3 Hours / 100 Marks Seat No. | | | | | | | | |

Instructions – (1) All Questions are *Compulsory*.

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any SIX of the following:** **12**

(i) Compare between simplex and full duplex communication on the basis of :

1) Definition

2) Sketch

(ii) State the significance of modulation index in AM transmission.

(iii) Define modulation index in FM.

(iv) Define sensitivity with graph.

(v) State two disadvantages of TRF receiver over superheterodyne receiver.

(vi) Define VSWR with reference to standing waves.

(vii) Define critical frequency w.r. to wave propagation.

(viii) Define fading w.r. to wave propagation.

P.T.O.

Marks

b) **Attempt any <u>TWO</u> of the following:** **8**

(i) Draw the block diagram of a basic communication system. State the function of each block.

(ii) Compare sky wave propagation and space wave propagation w.r. to following points:

1) Applications

2) Polarization

3) Frequency range

4) Effect of fading

(iii) Draw radiation pattern of yagi-uda antenna. Explain its working principle.

2. Attempt any <u>FOUR</u> of the following: **16**

a) State and explain the concept of transmission bandwidth.

b) Explain pre-emphasis and de-emphasis networks used in FM transmission and reception.

c) Draw and explain the generation of PWM using IC555.

d) Draw the circuit diagram of practical AM diode detector. Sketch its i/p and o/p waveforms.

e) Explain how different types of losses affect the use of transmission line in different applications.

f) Define and explain the term beam width related to antenna with a sketch.

3. Attempt any <u>FOUR</u> of the following: **16**

a) The equation of FM wave is given by

$l_{FM} = 20 \sin (10^8 t + 4 \sin 10^3 t)$

Calculate:

(i) Carrier frequency

(ii) Modulating frequency

(iii) Modulation index

(iv) Power dissipated in $10\ \Omega$ resistor.

Marks

b) Draw circuit diagram of transistor reactance modulator. Explain its working.

c) A superheterodyne radio receiver with an IF of 455 KHz is turned to 1000 KHz. Find:

(i) Image frequency

(ii) Local oscillator frequency

d) A loss less transmission line of 80 Ω characteristics impedance connects a 100 KHz generator to 120 Ω load. Calculate reflection coefficient and VSWR.

e) Explain duct propagation with neat sketch.

f) Draw radiation pattern for following resonant dipoles for following lengths:

(i) $l = \lambda/2$

(ii) $l = \lambda$

(iii) $l = 3\lambda/2$

(iv) $l = 3\lambda$

4. Attempt any <u>FOUR</u> of the following: **16**

a) A 10 kW carrier wave is amplitude modulated of 75% depth of modulation by a modulating signal. Calculate side band power, total power and transmission efficiency of AM wave.

b) With suitable diagram, explain Armstrong method of FM generation. Draw phasor diagram.

c) Explain how quarter wave transformer is used for impedance matching.

d) Draw the equivalent circuit of transmission line and explain the same.

e) Draw the sketch of dish antenna. Explain the same with radiation pattern.

f) Explain ground wave propagation along with sketch.

Marks

5. Attempt any FOUR of the following: **16**

a) Draw block diagram of AM transmitter. State the function of each block.

b) Explain why the local oscillator frequency should be always greater than signal frequency in radio receiver.

c) Explain the working of amplitude limiter in FM receiver with circuit diagram.

d) State the need of stub. Explain single stub and double stub matching.

e) Calculate the characteristic impedance for a transmission line having L = 0.5 mH/km, C = 0.08 μF and negligible R and G.

f) Draw the structure and state applications of :

(i) Ferrite loop (rod) antenna

(ii) Horn antenna

6. Attempt any FOUR of the following: **16**

a) Compare PAM and PWM with reference to:

(i) Definition

(ii) Waveforms

(iii) Advantage and

(iv) Application

b) Compare between simple AGC and delayed AGC (any four points)

c) Draw block diagram of FM radio receiver. Draw waveform at the o/p of each block.

d) Draw and label the circuit diagram of ratio detector.

e) Draw the practical set-up and explain the procedure to measure selectivity of radio receiver.

f) Define following terms related to antennas:

(i) Antenna resistance

(ii) Directivity

(iii) Antenna gain

(iv) Power density