17440

16117

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) Define half duplex and full duplex type of communication.

(ii) Draw the time domain and frequency domain representation of AM.

(iii) Define modulation index in AM with equation.

(iv) List the different methods of demodulation of FM.

(v) Draw the circuit diagram of phase discriminator.

(vi) Draw the general equivalent circuit of transmission line.

(vii) Define:

(1) Critical frequency

(2) MUF

(viii) List the application of space wave propagation.

Marks

b) **Attempt any __TWO__ of the following:** 8

    (i)   Describe the block diagram of basic communication system.

    (ii)   Describe folded dipole antenna with help of diagram. List any two advantages.

    (iii) Distinguish between ground wave and sky wave propagation.

2. **Attempt any __FOUR__ of the following:** 16

    a) Describe the loop antenna in brief.

    b) State the need of modulation.

    c) Describe electromagnetic spectrum with diagram.

    d) Describe the working of PLL as FM demodulator.

    e) Describe single stub and double stub matching.

    f) Describe varactor modulator used for FM generation.

3. **Attempt any __FOUR__ of the following:** 16

    a) A frequency modulated signal is represented by voltage equation as $e_{FM} = 10 \sin (6 \times 10^8 t + 5\sin 1250t)$.
Find out:

        (i)   Carrier frequency

        (ii)   Modulating frequency

        (iii) Modulation index

        (iv) Max. deviation

    b) The desired signal frequency is 93 MHz and the intermediate frequency is 10.7 MHz calculate the local oscillator frequency and image frequency.

    c) Describe various layers of ionosphere with neat diagram.

    d) If R is Reflection co-efficient what will be its value.

        (i)   If there is no reflected voltage

        (ii)   If reflected voltage is same as incident voltage

        (iii) If reflected voltage = 15V and incident voltage = 25 V.

        (iv) If reflected voltage = 20 V and incident voltage = 10 V.

e) Calculate the directivity for the antennas having following specifications:

(i) Power gain, efficiency 90%

(ii) Power gain 45 dB, efficiency 90%

f) Describe the generation of PPM with waveforms.

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

a) Describe the Pre-emphasis with graph.

b) A 10 kW carrier is amplitude modulated by two sine waves to a depth of 0.5 and 0.6 respectively. Calculate total power content of modulated carrier.

c) Derive the relation between reflection co-efficient (K) an VSWR.

d) Describe duct propagation with neat diagram.

e) Why dish antenna is having parabolic shape and meshy surface?

f) Describe resonant and non-resonant type of transmission line.

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

a) AM transmitter transmits signals at 50 kW with modulation depth as 85%. Calculate carrier power and total side band power in transmitted signal.

b) Describe operation of AM superheterodyne receiver with block diagram.

c) Derive the equation for characteristic impedance of transmission line at low frequency and high frequency.

d) An antenna has a radiation resistance of 72Ω, a loss resistance of 8Ω and power gain of 16. What is its efficiency and directivity?

e) State and explain types of AGC with its characteristic

f) Describe different types of losses in transmission line.

Marks

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

   a) Describe with diagram FM signal generation using IC 566.

   b) Describe with neat circuit diagram and waveforms of envelope detetctor.

   c) Describe with diagram balanced slope detector.

   d) Describe the block diagram of FM superheterodyne receiver.

   e) Describe the function of mixer and local oscillator in radio receiver.

   f) Explain Yagi Uda antenna with its radiation pattern.

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