17440

14115

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) Preferably, write the answers in sequential order.

Marks

1. (A) Attempt any SIX from the following : **12**

(a) Define simplex and Half duplex system with sketch.

(b) Define deviation ratio in FM. What is maximum value of deviation ratio and modulating frequency ?

(c) List the types of Analog pulse modulation. Also state the need of pulse modulation.

(d) What is the tuning range and IF value of (i) MW band AM and (ii) FM radio receiver ?

(e) What is tracking ? List its types.

(f) Draw general equivalent circuit of transmission line.

(g) What is Fading ? Write two reasons of Fading.

(h) What is electromagnetic polarization ? List the types of polarization.

(B) Attempt any TWO from the following : **08**

(a) Draw the block diagram of communication system and state the function of each block.

(b) Draw the construction of Yagi-Uda antenna. Draw its radiation pattern and write two application.

(c) A lossless transmission line for 100 Ω characteristic impedance connects to 100 kHz generator and 140 Ω load. Calculate reflection coefficient and VSWR.

2. Attempt any FOUR from the following : **4 × 4 = 16**

(a) Compare Resonant and Non-resonant antenna on the basis of (i) Definition (ii) Circuit (iii) Reflection co-efficient (iv) Radiation pattern.

(b) Draw the transistorized circuit for generation of PWM and explain its working.

(c) State and explain the types of noise in communication system.

(d) Draw the block diagram of AM superhetrodyene radio receiver and state the function of each block.

(e) What is stub ? Draw and explain single stub matching.

(f) Differentiate between AM and FM on the basis of (i) Definition (ii) Bandwidth (iii) Modulation Index (iv) Application.

3. Attempt any FOUR from the following : **4 × 4 = 16**

(a) A frequency modulated signal is represented by voltage equation as $e_{FM} = 10 \sin (6 \times 10^8 t + 5 \sin 1250 t)$. Find out (i) Carrier frequency (ii) Modulating frequency (iii) Modulation index (iv) Maximum deviation.

(b) Define intermediate frequency (IF). Why local oscillator frequency (fo) is made greater than signal frequency (Fs) in radio receiver ?

(c) Explain with sketch properties of transmission lines for various lengths.

(d) How quarter wave transformer is used for impedance matching ? Explain.

(e) A half-wave dipole antenna is capable of radiating 1 kW and has a 2.15 dB gain over an isotropic antenna. How much power must be delivered to the isotropic antenna to match the field strength of directional antenna.

(f) Represent the FM in time domain and frequency domain with neat labelling.

4. Attempt any FOUR from the following : 4 × 4 = 16

(a) What is pre-emphasis and de-emphasis ? Draw the circuit of pre-emphasis. State where both the circuits are used.

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

(c) For a transmission line, if R is the reflection co-efficient what will be its value

(i) If there is no reflected voltage ?

(ii) If reflected and incident voltages are same ?

(iii) If reflected voltage = 10 V and incident voltage = 20 V ?

(iv) If reflected voltage = 2V and incident voltage = 2 V ?

(d) Draw voltage and current standing waves of a transmission line terminated in an open circuit. State four characteristics of transmission line.

(e) Explain with neat sketch microstrip patch antenna (any one).

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

5. Attempt any FOUR from the following : 4 × 4 = 16

(a) In FM, if maximum deviation is 75 kHz and the maximum modulating frequency is 10 kHz, calculate the deviation ratio and Bandwidth of FM.

(b) State the functions of RF section used in AM radio receiver. State any four advantages of RF amplifier.

(c) The parameters of transmission line are R = 65 Ω/km, L = 1.6 mH/km, C = 0.1 μF/km, G = 2.25 μΩ/km. Calculate characteristic impedance.

(d) Describe with sketch working principle of Dish antenna. List its two advantages.

(e) Define sensitivity and selectivity. Draw the graph of sensitivity and selectivity for radio receiver.

(f) Derive the relation between reflection co-efficient (K) and VSWR(S).

6. Attempt any FOUR from the following : 4 × 4 = 16

(a) Draw block diagram for generation of PAM with waveform at each block. State two disadvantages and one application.

(b) Draw practical AM diode detector circuit. Sketch its input and output waveforms.

(c) Draw circuit of Ratio detector. Why limiter stage is not used before Ratio detector ?

(d) Draw the transistorized circuit of amplitude limiter used in FM receiver.

(e) Draw the delayed AGC circuit. State its two advantages and applications.

(f) Explain Loop antenna with sketch. Draw its radiation pattern. State its advantages and applications.

———————