

22334

**21819**

**3 Hours / 70 Marks**

Seat No.

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- 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. Attempt any FIVE of the following :**

**10**

- (a) Define simplex and half duplex system with neat sketch.
- (b) Define the term signal to noise ratio.
- (c) Represent FM wave in time domain & frequency domain.
- (d) State the types of AM with respect to frequency spectrum.
- (e) Draw pre-emphasis and de-emphasis circuits used in FM transmission and reception.
- (f) Define fading with respect to wave propagation.
- (g) Draw sketch of Loop antenna along with its radiation pattern.

2. Attempt any THREE of the following : 12

- (a) Explain the sources of noise in communication system.
- (b) Explain power relation in AM wave.
- (c) Explain duct propagation with neat sketch.
- (d) Explain the term beam width related to antenna with a sketch.

3. Attempt any THREE of the following : 12

- (a) A 500 watts carrier is modulated to depth of 80%.

Calculate :

- (i) Total power in AM
- (ii) Power in sidebands

- (b) A frequency modulated signal is represented by the voltage equation

$$e_{fm} = 10 \sin (6 \times 10^8 t + 5 \sin 1250 t)$$

Calculate :

- (i) Carrier frequency  $f_c$
- (ii) Modulating frequency  $f_m$
- (iii) Maximum deviation
- (iv) What power will this FM wave dissipates in  $20 \Omega$  resistor ?

- (c) Compare between simple AGC and delayed AGC.
- (d) Compare resonant & non-resonant antenna on the basis of
  - (i) Definition
  - (ii) Circuit
  - (iii) Reflection co-efficient
  - (iv) Radiation Pattern
- (e) Differentiate between ground wave and sky wave propagation.

**4. Attempt any THREE of the following :****12**

- (a) Draw the block diagram of basic electronic communication system.
- (b) Differentiate between AM & FM on the basis of
  - (i) Definition
  - (ii) Bandwidth
  - (iii) Modulation index
  - (iv) Application
- (c) Draw the circuit diagram of practical AM diode detector. Sketch its input and output waveforms.
- (d) Describe the term virtual height with the help of diagram showing ionized layer and path of wave.
- (e) Draw the construction of Yagi-Uda antenna. Draw its Radiation Pattern and write two applications.

**5. Attempt any TWO of the following :****12**

- (a) Write down range of different frequencies in electromagnetic spectrum for following :
  - (i) Voice frequency
  - (ii) High frequency
  - (iii) Infrared frequency
  - (iv) Visible spectrum (light)
  - (v) Radio frequency
  - (vi) UV frequencyAlso, write one application area of each frequency.
- (b) Explain why the local oscillator frequency should be always greater than signal frequency in radio receiver. A superheterodyne radio receiver with an IF of 455 kHz is turned to 1000 kHz. Find its Image frequency and local oscillator frequency.

**P.T.O.**

- (c) Name the different layers of atmosphere which satisfy following conditions :
- (i) Reflects LF, absorbs MF and HF waves to some degree.
  - (ii) Helps surface waves and reflect HF waves.
  - (iii) Partially absorbs HF waves yet allowing them to reach its upper layer.
  - (iv) Efficiently reflects HF waves, specially in night.
  - (v) Exists in Day time only.
  - (vi) Exists in day time but merges with F2 layer in night time.

**6. Attempt any TWO of the following :**

**12**

- (a) Explain the effect of modulation index on AM wave with waveforms for
- (i)  $m < 1$
  - (ii)  $m = 1$
  - (iii)  $m > 1$
- (b) Explain working of AM super heterodyne receiver with the help of neat block diagram and waveforms.
- (c) Explain following terms in short related to antennas
- (i) Antenna resistance
  - (ii) Directivity
  - (iii) Antenna gain
  - (iv) Power density
  - (v) Radiation pattern
  - (vi) Polarization
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