

22334

12425

3 Hours / 70 Marks

Seat No.

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- Instructions :**
- (1) All Questions are *compulsory*.
 - (2) Answer each next main Question on a new page.
 - (3) Illustrate your answers with neat sketches wherever necessary.
 - (4) Figures to the right indicate full marks.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.
 - (8) Use of steam tables, logarithmic, Mollier's chart is permitted.

Marks

1. Attempt any FIVE of the following :

10

- (a) Define half duplex and full duplex type of communication.
- (b) State the need of modulation.
- (c) Draw the basic block diagram of communication system.
- (d) State the IF frequency and bandwidth of FM receiver.
- (e) State the need of de-emphasis circuit used with FM receiver.
- (f) What is fading ? Write two reasons of fading.
- (g) Draw radiation pattern of yagi-uda antenna.



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

- (a) State and explain the types of noise in communication system.
- (b) Draw block diagram of AM super-heterodyne receiver and explain its working principle.
- (c) Compare AM and FM on the basis of
 - (i) Definition
 - (ii) Modulation index
 - (iii) Noise immunity
 - (iv) No. of sidebands.
- (d) A 800 W carrier is amplitude modulated to a depth of 80%. Calculate
 - (i) Total power in modulated wave
 - (ii) Power in sidebands.

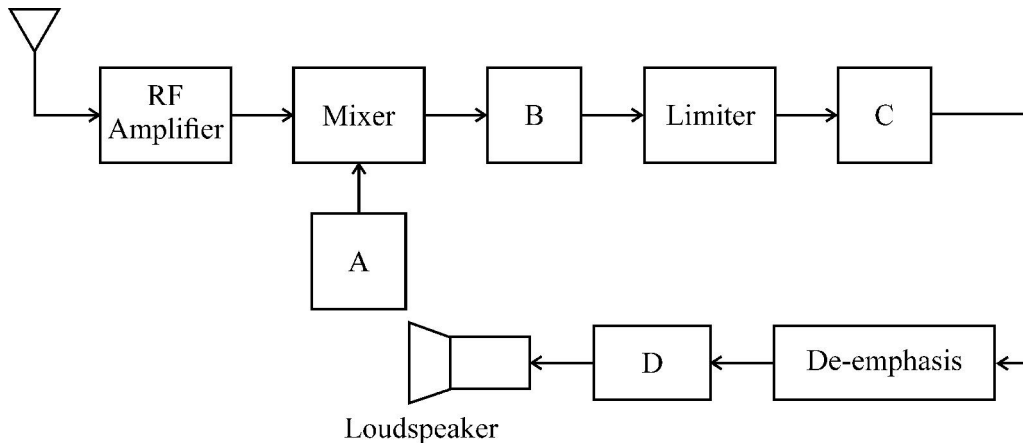
3. Attempt any THREE of the following :**12**

- (a) Draw FM signal in (i) Time Domain (ii) Frequency Domain.
- (b) Draw labelled sketch of ionosphere. What changes takes place in ionosphere at night ?
- (c) Compare between asynchronous and synchronous transmission mode (any four modes).
- (d) Draw practical AM diode detector circuit. Sketch its input and output waveforms.

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

- (a) Describe the term virtual height with the help of diagram showing ionized layer and path of wave.

- (b) A single tone FM is represented by the voltage equation as $V(t) = 12 \cos(6 \times 10^8 t + 5 \sin 1250 t)$. Determine the following :
- Carrier frequency
 - Modulating frequency
 - Modulation index
 - Maximum deviation
- (c) Redraw the block diagram by identifying the blank blocks. (Fig. 1)



(Fig. 1)

- (d) Explain the following terms :
- Critical frequency
 - Skip Distance
- (e) Compare resonant and non-resonant antenna for the given parameter :
- Definition
 - Direction or radiation
 - Formation of standing waves
 - Radiation pattern

5. Attempt any TWO of the following :

12

- (a) Compare ground wave propagation, sky wave propagation and space wave propagation on the following parameter :
- Frequency of operation
 - Path followed
 - Distance covered
 - Effect of fading
 - Application
 - Disadvantage

- (b) (i) Derive the expression of total power transmitted P_t in terms of P_C and m_a .
- (ii) Draw the AM wave for the given modulation index (m_a) (i) $m_a = 1$
(ii) $m_a < 1$ (iii) $m_a > 1$.
- (c) Explain the following terms related to antenna :
 - (i) Polarization
 - (ii) Beam width
 - (iii) Antenna gain.

6. Attempt any TWO of the following :

12

- (a) (i) Explain labelled structure of folded dipole antenna and its radiation pattern.
 - (ii) List any two applications of folded dipole antenna.
 - (b) For the given frequency band in electromagnetic spectrum, state frequency and application :
 - (i) Radiowave
 - (ii) Microwave
 - (iii) X-ray
 - (c) (i) An audio frequency signal $10 \sin (2\pi \times 10^3 t)$ is used to modulate amplitude of a carrier $20 \sin (2\pi \times 10^4 t)$. Calculate :
 - (1) modulation index
 - (2) sideband frequencies
 - (ii) In FM maximum deviation is 75 kHz and the maximum modulating frequency is 10 kHz, calculate the deviation ratio and bandwidth of FM.
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