

313326

25226

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) Write down frequency range for the following :
 - (i) Voice frequency
 - (ii) High frequency
- (b) Define the term external noise. List types of noises.
- (c) State types of AM w.r.t. frequency spectrum.
- (d) Define sensitivity and selectivity of radio receiver.
- (e) List different types of FM detectors.
- (f) Define the following terms w.r.t. wave propagation :
 - (i) Skip distance
 - (ii) Fading
- (g) Draw a neat sketch of half wave dipole antenna & its radiation pattern.



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

- (a) Draw the block diagram of basic electronic communication system & describe function of each block.
- (b) State different transmission modes in communication with suitable diagram and example.
- (c) Compare narrow band FM and wide band FM w.r.t. following parameters :
 - (i) Modulation index
 - (ii) Maximum deviation
 - (iii) Range of modulating frequency
 - (iv) Application
- (d) A 10 K Watt carrier wave is amplitude modulated at 80% depth of modulation by sinusoidal modulating signal. Calculate the total power and the transmission efficiency of AM wave.

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

- (a) Measure the bandwidth required for FM in which maximum deviation is 5 KHz and modulation index is 3.
Assume highest needed sidebands are 8.
- (b) Name the different layers of ionosphere which satisfy the following conditions :
 - (i) Reflect LF, absorbs MF & HF wave to some degree.
 - (ii) Efficiently reflects HF waves, specially at night.
 - (iii) Exists in day time only.
 - (iv) Exists in day time but merges with F_2 layer in night time.
- (c) Define amplitude modulation and explain the effect of modulation index on AM wave with waveforms for
 - (i) $m < 1$
 - (ii) $m = 1$
 - (iii) $m > 1$
- (d) Compare resonant and non-resonant antenna on the basis of :
 - (i) Definition
 - (ii) Reflection
 - (iii) Termination
 - (iv) Radiation Pattern

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

- (a) Describe varactor modulator used for FM generation.
- (b) Describe ground wave propagation along with neat sketch.
- (c) Draw and explain block diagram of low level AM transmitter.
- (d) Draw the diagram of radiation pattern of following resonant dipole antenna :

(i) $L = \frac{\lambda}{2}$ (ii) $L = \lambda$ (iii) $L = \frac{3\lambda}{2}$ (iv) $L = 3\lambda$

where L is length of dipole antenna.

- (e) Compare sky wave propagation & space wave propagation w.r.t. following points :
 - (i) Frequency range (ii) Effect of fading
 - (iii) Polarization (iv) Application

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

- (a) A modulating signal $10 \sin (2 \pi \times 10^2 t)$ is used to modulate carrier signal $12 \sin (2 \pi \times 10^3 t)$.

Find modulation index, percentage modulation, frequency of sidebands and their amplitude, bandwidth of modulated signal. Also draw frequency spectrum of AM waves.

- (b) Write the correct frequency range for the following application :
 - (i) Power transmission (ii) Satellite communication and RADAR
 - (iii) Audio application (iv) TV broadcasting
 - (v) AM broadcasting (vi) Cellular phones

P.T.O.

- (c) Compare AM and FM on the basis of :
- | | |
|--------------------|-----------------------|
| (i) Definition | (ii) Modulation index |
| (iii) Bandwidth | (iv) No. of sidebands |
| (v) Noise immunity | (vi) Application |

6. Attempt any TWO of the following :

12

- (a) Explain working of AM superheterodyne receiver with the help of neat block diagram and waveforms.
- (b) Describe micro-strip patch antenna with neat sketch. Draw radiation pattern of micro-strip patch antenna. List its advantages.
- (c) Write two applications of following antennas :
- | | |
|--------------------------|-------------------------|
| (i) Loop antenna | (ii) Yagi – Uda antenna |
| (iii) Telescopic antenna | (iv) Dish antenna |
| (v) Flexible antenna | (vi) Horn antenna |
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