

22334

23242

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) State formula to calculate bandwidth of AM signal.
- (b) Define simplex and half duplex system with neat sketch.
- (c) Define electromagnetic polarization and list its types.
- (d) State the frequency range for Ground wave propagation and Space wave propagation.
- (e) Define signal to Noise Ratio. State the ideal value of signal to Noise Ratio.
- (f) Draw pre-emphasis and de-emphasis circuits used in FM transmission and reception.
- (g) Define Radiation Pattern for antenna.



2. Attempt any THREE of the following : 12

- (a) State the frequency range for the following :
- (i) Voice Frequency
 - (ii) High Frequency
 - (iii) IR Frequency
 - (iv) Visible Frequency
- (b) Explain power relation in AM wave.
- (c) A 10 kW carrier is amplitude modulated by two sine to a depth of 0.5 & 0.6 respectively. Calculate total power of modulated carrier.
- (d) Compare sky wave propagation and space wave propagation (Any four points).

3. Attempt any THREE of the following : 12

- (a) Compare AM and FM with the help of following parameters :
- (i) Mathematical Expression
 - (ii) Frequency Spectrum
 - (iii) Number of Sidebands
 - (iv) Effect of Noise
- (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 20Ω resistor ?
- (c) Define the terms with respect to Sky wave propagation :
- (i) Critical Frequency
 - (ii) Maximum Utilize Frequency (MUF)
 - (iii) Actual Height
 - (iv) Virtual Height
- (d) Define Antenna and list its types. Draw the diagram of Horn Antenna.

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

- (a) Draw the block diagram of basic electronic communication system.
- (b) Describe the term virtual height with the help of diagram showing ionized layer and path of wave.
- (c) In FM if max. deviation is 75 kHz and the max. modulating frequency is 10 kHz, Calculate the deviation ratio and bandwidth of FM.
- (d) Develop radiation patterns of dipole antenna with respect to their length :
 - (i) $\lambda/2$
 - (ii) $3\lambda/2$
 - (iii) λ
 - (iv) 3λ
- (e) Illustrate in detail PLL as a FM demodulator.

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

- (a)
 - (i) Explain electromagnetic spectrum with neat diagram.
 - (ii) Explain atmospheric noise with example.
- (b) Derive a mathematical expression for AM wave.
- (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, especially in night.

P.T.O.

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) State need of AGC. List types of AGC. Draw and explain AGC characteristics for delayed, ideal and simple AGC.
- (c) Describe Yagi-Uda antenna with a neat sketch. State any two advantages of Yagi-Uda antenna.
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