

17440

11920

3 Hours / 100 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.

Marks

1. a) **Attempt any SIX of the following:** **12**
- (i) Define analog signal and digital signal with respect to time.
 - (ii) Draw and label AM signal in frequency domain.
 - (iii) Define Frequency Modulation and draw its waveforms.
 - (iv) List different types of AGC and state use of AGC in radio receiver.
 - (v) Draw and label the block diagram of Tuned Radio frequency receiver.
 - (vi) Draw equivalent circuit of transmission line.
 - (vii) Draw and label Transverse Electromagnetic Wave.
 - (viii) Define Polarization and its types for EM wave.

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- b) **Attempt any TWO of the following:** **08**
- (i) Describe different modes of electronic communication with examples.
 - (ii) Classify Resonant antenna and non-resonant antennas (any four points).
 - (iii) Elaborate the concept of actual height and virtual height of an ionized layer.
2. **Attempt any FOUR of the following:** **16**
- a) Interpret the role of wired and wireless channel in communication systems.
 - b) Compare Amplitude Modulation and Frequency Modulation (any four points).
 - c) Explain the concept of Pre-emphasis and De-emphasis with its circuits.
 - d) Describe AM superheterodyne radio receiver with the help of neat diagram.
 - e) Explain different losses in transmission line.
 - f) Draw and describe working of loop antennas.
3. **Attempt any FOUR of the following:** **16**
- a) Construct waveforms of AM signal for different values of modulation index $m < 1$, $m = 1$, $m > 1$.
 - b) A superheterodyne radio receiver with an intermediate frequency of 455 KHz is tuned to a station whose operating frequency is 1120 KHz. Find the image frequency and local oscillator frequency.
 - c) Describe Ground wave propagation with neat diagram.
 - d) Determine the characteristics impedance Z_0 of a co-axial cable having $L = 0.1 \mu\text{H/m}$, $C = 19\text{pF/m}$.
 - e) Elaborate the following terms with respect to antenna.
 - (i) Beam Width
 - (ii) Antenna Gain
 - f) Explain how FM signal is generated using Varactor Diode method.

4. Attempt any FOUR of the following:**16**

- a) Describe Pulse Amplitude Modulation with its block diagram and waveforms.
- b) A frequency modulated signal is represented by the voltage equation $e_{FM} = 10 \sin (6 \times 10^8 t + 5 \sin 1250t)$ Calculate.
 - (i) Carrier Frequency
 - (ii) Modulating Frequency
 - (iii) Carrier Amplitude
 - (iv) Maximum Deviation (δ)
- c) Describe single stub and double stub for impedance matching.
- d) Distinguish Sky wave propagation and Space wave propagation (any four points).
- e) Develop radiation patterns of dipole antenna with respect to their length
 - (i) $\lambda / 2$
 - (ii) $3\lambda / 2$
 - (iii) λ
 - (iv) 3λ
- f) Derive the mathematical relation between SWR and reflection coefficient.

- 5. Attempt any FOUR of the following:** **16**
- a) A 10 KW carrier is amplitude modulated by sinewave to a depth of modulation 0.6, Calculate total power of modulated signal and power in sidebands.
 - b) Explain Sensitivity and Selectivity characteristics of AM radio receiver.
 - c) If R is a Reflection coefficient, Calculate values for the following cases
 - (i) If there is no Reflected voltage.
 - (ii) If reflected voltage and incident voltage is same.
 - (iii) If reflected voltage is 5V and Incident voltage is 15V.
 - (iv) If reflected voltage is 20V and Incident voltage is 10V.
 - d) Predict the name of antenna used to receive TV signals from Satellite. State and explain its operation.
 - e) Describe PLL as a FM demodulator with the help of diagram.
 - f) Explain standing waves with load terminal open circuited and short circuited.
- 6. Attempt any FOUR of the following:** **16**
- a) Describe the generation of PWM using IC 555.
 - b) Draw and explain the working of Diode detector circuit for AM demodulation.
 - c) Describe the working of Balanced Slope detector with neat diagram.
 - d) Illustrate the role of limiter circuit in FM superheterodyne receiver. Draw suitable diagram.
 - e) Elaborate two point and three point Frequency tracking method used in tuned circuits in radio receiver.
 - f) Describe Yagi - Uda antenna with the help of diagram and radiation pattern.
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