

22392

22232

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) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. Attempt any FIVE of the following :

5 × 2 = 10

- (a) Define half duplex and full duplex communication with example.
- (b) List the application for the frequency range 300 kHz to 30 MHz and 30 MHz to 300 MHz of electromagnetic spectrum.
- (c) Define : (i) Thermal Noise (ii) SNR.
- (d) State the need of modulation.
- (e) State Sampling Theorem.
- (f) List the types of guided Media used for signal propagation.
- (g) Define : (i) Beam width (ii) Bandwidth of an antenna.

2. Attempt any FOUR of the following :

4 × 3 = 12

- (a) Compare serial and parallel communication. (Any three points)
- (b) Draw the neat block diagram of superheterodyne receiver with its waveform at the output of each block.



- (c) Write down the (i) Mathematical representation of FM wave (ii) Equation of modulation index of FM signal.
- (d) State any two advantages and disadvantages of Adaptive Delta Modulation.
- (e) Draw the block diagram of synchronous and asynchronous data transmission.

3. Attempt any FOUR of the following :

4 × 3 = 12

- (a) Draw and explain the block diagram of electronic communication system.
- (b) Compare simple AGC and delayed AGC on the basis of following points :
 - (i) Definition
 - (ii) Effect on gain
 - (iii) Application
- (c) A 20 kW carrier wave is amplitude modulated at 80% depth of modulation by a sinusoidal modulating signal. Calculate the Sideband Power and Total Power.
- (d) Explain Quantization process with neat waveform.
- (e) Draw and explain the block diagram of Differential Pulse Code Modulation (DPCM) transmitter.

4. Attempt any THREE of the following :

3 × 4 = 12

- (a) An AM transmitter uses a carrier wave of 10 MHz with 10V amplitude. It is modulated to a depth of 50% with a signal of 5 kHz. Represent the AM signal in time and frequency domain.
- (b) Explain the generation of FM using varactor diode.
- (c) Compare PCM, DM and ADM on following points :
 - (i) Number of bits
 - (ii) Levels and step size
 - (iii) Transmission Bandwidth
 - (iv) Minimum Bit rate

- (d) Draw and explain, how ratio detector can be used as FM detector.
- (e) Explain the construction of
 - (i) Step Index Optical Fibre
 - (ii) Graded Index Optical Fibre

5. Attempt any THREE of the following :

3 × 4 = 12

- (a) Draw and explain the working of diode detector with the help of input and output waveforms.
- (b) The equation of FM wave is given by $20 \sin (8 \times 10^8 t + 3 \sin 10^4 t)$. Calculate :
 - (i) Carrier Frequency
 - (ii) Modulation frequency
 - (iii) Modulation index
 - (iv) Power dissipated in 10Ω resistor.
- (c) List the types of pulse modulation and draw the block diagram of PPM.
- (d) State aliasing effect. Draw neat diagram showing aliasing effect and explain how it can be overcome.
- (e) Write **one** application of each one of the following :
 - (i) Reflector Antenna
 - (ii) Micro strip Antenna
 - (iii) Array Antenna
 - (iv) Wire Antenna

6. Attempt any TWO of the following :

2 × 6 = 12

- (a) A modulating signal $10 \sin (2\pi \times 10^3 t)$ is used to modulate a carrier signal $20 \sin (2\pi \times 10^4 t)$. Find :
 - (i) Modulation Index
 - (ii) Percentage of modulation
 - (iii) Frequency of sidebands
 - (iv) Amplitude of sidebands
 - (v) Bandwidth of signal
 - (vi) Draw the frequency spectrum of AM signal

P.T.O.

- (b) Compare AM and FM on the basis of :
- (i) Definition
 - (ii) Modulation Index
 - (iii) Bandwidth
 - (iv) Noise Immunity
 - (v) No. of sidebands
 - (vi) Application
- (c) (i) Explain the disadvantages of Delta Modulation with waveforms.
- (ii) How it can be modified ?
- (iii) Draw the block diagram of the same.
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