

17440

21718

3 Hours / 100 Marks

Seat No.

--	--	--	--	--	--	--	--	--	--

- 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.
 - (7) Preferably write the answers in sequential order.

Marks

1. a) Attempt any SIX of the following:

12

- (i) State and explain concept of bandwidth.
- (ii) Define pulse modulation. State its types.
- (iii) Give the expression for modulation index for AM and FM.
- (iv) Define selectivity and sensitivity of AM Receiver.
- (v) Define the term baluns and explain where is it used?
- (vi) Define electromagnetic wave and polarization.
- (vii) Define fading? List the causes.

P.T.O.

b) **Attempt any TWO of the following:**

8

- (i) Explain any four different frequency bands and give their two applications of each.
- (ii) Describe microwave antenna with suitable diagram.
- (iii) Explain skip zone and skip distance with neat diagram.

2. **Attempt any FOUR of the following:**

16

- a) Describe with respect to antenna
 - (i) radiation pattern
 - (ii) directive gain
 - (iii) power gain
 - (iv) polarization
- b) Explain reactance modulator for FM generation.
- c) Describe the block diagram of basic communication system.
- d) Explain with neat diagram and waveform, generation of PPM using IC 555.
- e) Describe different types of losses that affect the transmission line signal.
- f) Define modulation index. Derive the expression -

$$m = \frac{V_{\max} - V_{\min}}{V_{\max} + V_{\min}} \text{ using AM waveform.}$$

3. **Attempt any FOUR of the following:**

16

- a) What will be effect of total AM transmitter power if modulation index changes from 0.5 to 1, for 500 watt carrier power? Conclude the result.
- b) State the need of AGC. List the different types of AGC with neat graph.
- c) Describe line of sight propagation in brief.
- d) Calculate characteristic impedance (Z_0) for parallel and co-axial cables.

e) Distinguish between resonant and non-resonant antennas.

f) A FM signal is represented by the voltage equation -

$$U_{\text{FM}} = 10 \sin (6 \times 10^6 \pm 5 \sin 1250 t)$$

Calculate

(i) f_c

(ii) f_m

(iii) δ

(iv) m_f

4. Attempt any FOUR of the following: 16

- Explain effect of 'm' on AM with neat waveforms.
- Derive the expression of total power transmitted P_t in terms of P_c and m_a .
- How quarter wave transformer is used for impedance matching.
- Describe ionosphere with neat sketch.
- Dish antenna is parabolic in shape and has meshy structure. Give reasons.
- Define stub. Explain single and double stub in brief with neat sketch.

5. Attempt any FOUR of the following: 16

- Draw and explain PLL as an FM demodulator.
- With the help of neat diagram, explain the working of phase discriminator.
- The parameters of transmission line are $R = 50 \Omega/\text{km}$,
 $L = 1.6 \text{ mH}/\text{km}$, $C = 0.2 \mu\text{f}/\text{km}$,
 $G = 2.25 \mu\text{S}/\text{km}$. Calculate characteristics impedance and propagation constant.

- d) The operating frequency of pyramidal horn antenna is 10 GHz. The horn antenna is 10 cm high and 12 cm wide. Calculate
- Beam width of antenna
 - Power gain of antenna if $k = 0.6$
- e) Explain with neat block diagram AM superheterodyne receiver.
- f) Derive relation between reflection coefficient (k) and VSWR (s).

6. Attempt any FOUR of the following:

16

- Explain with block diagram of Armstrong method of FM generation.
 - Draw a practical AM diode detector circuit. Sketch i/p and o/p waveforms.
 - Explain with a neat diagram of ratio detector. Why limiter stage is not used before ratio detector.
 - Describe the block diagram of FM superheterodyne receiver.
 - Describe the functions of mixer and local oscillator in radio receiver.
 - Explain loop antenna with neat sketch. Draw radiation pattern. State its advantages and applications.
-