17440

11718

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.

Marks

1. a) **Attempt any SIX of the following:** **12**

(i) State the frequency range for audio frequency and voice frequency.

(ii) Define modulation? State the desirable value of modulation index of AM.

(iii) Define pulse modulation and list it's types.

(iv) State the IF frequency and bandwidth of FM receiver.

(v) State the process of FM detection? State it's any two types.

(vi) What is stub? What do you mean by single stub matching.

(vii) Why electromagnetic waves are said to be transverse wave? Explain.

(viii) State the types of electromagnetic polarization? Define any one of it.

Marks

b) **Attempt any <u>TWO</u> of the following:** **8**

(i) Define:

1) Frequency

2) Bandwidth

3) Wavelength

4) Time period

(ii) Draw radiation pattern for the resonant dipoles with following lengths:

1) $l = \lambda/2$

2) $l = \lambda$

3) $l = 3\lambda/2$

4) $l = 3\lambda$

(iii) Compare ground wave propagation, sky wave propagation and space wave propagation.

2. Attempt any <u>FOUR</u> of the following: **16**

a) Draw radiation pattern for following antenna

(i) Yagi-Uda antenna

(ii) Loop antenna

(iii) Dish antenna

(iv) Horn antenna

b) Explain how modulation reduces height of antenna and avoid mixing of signals.

c) Draw and explain block diagram of electronic communication system.

d) Draw block diagram of superheterodyne AM receiver and state the function of RF stage and mixer. What is IF?

e) Define the transmission line? Draw it's general equivalent circuit.

f) Show that AM wave consist of two side bands and carrier. Also prove that bandwidth of AM is double of the modulating frequency.

Marks

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

a) A modulating signal $9\sin(2\pi \times 10^2 t)$ is used to modulate a carrier signal $12\sin(2\pi \times 10^3 t)$. Find modulation index, percentage modulation, frequencies of sidebands components and their amplitudes, bandwidth of modulated signal. Also draw frequency spectrum of AM wave.

b) A superheterodyne AM receiver is tuned to a station operating at 1200 KHz. Find local oscillator frequency and image frequency.

c) Explain ground wave propogation with neat sketch.

d) A telephone cable has the following primary constants per loop kilometer. R = 30Ω, L = 20 mH, C = 0.06 μF, G = 0. If the applied signal has an angular frequency of 5000 rad/sec., determine

(i) Characteristic impedance

(ii) Attenuation constant

e) Explain isotropic radiator with neat sketch.

f) Compare AM and FM on the basis of

(i) Definition

(ii) Bandwidth

(iii) Wave propogation

(iv) Number of sidebands

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

a) Define PAM, PWM, PPM. Draw waveforms.

b) In a FM system, the maximum deviation is 75 KHz. Find bandwidth for modulating frequency

(i) fm = 500 Hz

(ii) fm = 5 KHz

(iii) fm = 10 KHz

Draw conclusion for bandwidth of FM from answer.

Marks

c) For a transmission line, Find SWR and a reflection coefficient R if.

(i) there is no reflected voltage

(ii) reflected voltage and incident voltage is equal.

(iii) if reflected voltage = 20 V and incident voltage = 10 V.

(iv) if reflected voltage = 10 V and incident voltage = 20 V.

d) Explain virtual height with respect to wave propogation with neat sketch.

e) Write one application of following antenna

(i) Rectangular antenna

(ii) Dish antenna

(iii) Yagi-Uda antenna

(iv) Horn antenna

f) Draw waveform for standing waves on an open and shorted line. Prove that impedance is inverted at every quarter wavelength interval.

5. Attempt any <u>FOUR</u> of the following: **16**

a) A frequency modulated signal is represented by the voltage equation CFM = 10 sin $(6 \times 10^8 t + 5 \sin 1250t)$. Find

(i) Carrier frequency

(ii) Modulating frequency

(iii) Maximum deviation

(iv) Power dissipated in 20 Ω resistor.

b) Why should local oscillator frequency be greater than signal frequency in AM receiver? Also explain why IF has constant value?

c) A load of 200 ohm is used to match 300 ohm transmission line to achieve SWR = 1. Find out the required characteristic impedance of a quarter wave transformer connected directly to the load.

d) Draw construction of Yagi-Uda antenna and explain.

Marks

e) Explain working of envelope detector with suitable diagram and waveform.

f) Explain 'BALUN' with neat sketch.

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

a) Compare PAM, PWM and PPM on the basis of

(i) Variable characteristics

(ii) Bandwidth

(iii) Information contained in

(iv) Transmitted power

b) Draw block diagram of FM receiver and explain the use of limiter circuit.

c) Explain operation of balanced slope detector with 's' curve.

d) Explain operation of phase discriminator with suitable phasor diagrams when input frequency and center frequency is unequal.

e) Identify the block diagram label the blocks A, B, C, D, E.

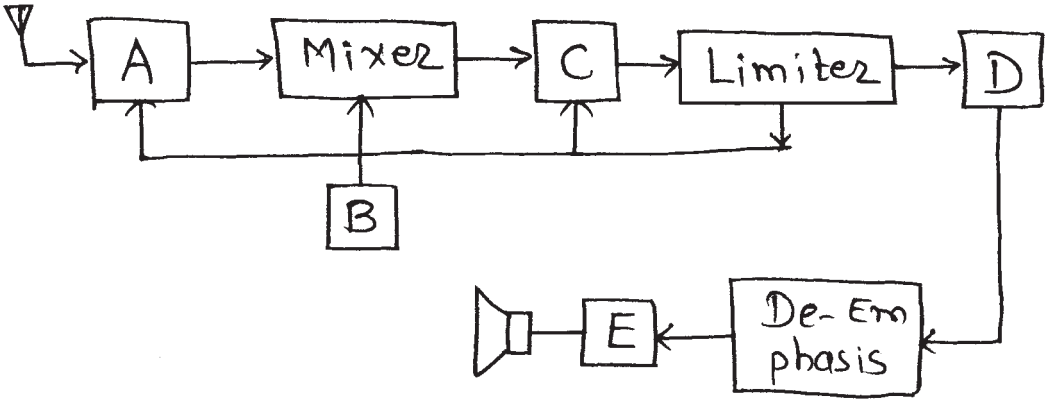

Fig. No. 1

f) Compare loop and ferrite core antenna with respect to following points

(i) working principle

(ii) construction

(iii) radiation pattern

(iv) application