11920

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) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

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

(a) Draw the block diagram of Tuned Radio Receiver.

(b) Define IF frequency and give IF frequency range for AM & FM radio receiver.

(c) Draw a neat labelled diagram of Hertzian dipole antenna. State its one application.

(d) Draw a neat labelled sketch of loop antenna and state its one application.

(e) Draw RF equivalent circuit of transmission line.

(f) Define Radiation and attenuation.

(g) Draw a neat labelled diagram of EM spectrum.

(h) Define critical frequency and maximum usable frequency.

(B) Attempt any TWO : 8

    (a)   Derive the relation between reflection coefficient (k) & VSWR (s).

    (b)   Define the following terms w.r.t. wave propagation :

        (i)   Actual height

        (ii)   Virtual height

        (iii)   Skip distance

        (iv)   Fading

    (c)   Compare Resonant antenna and Non-resonant antenna (any four points).

2.   Attempt any FOUR : 16

    (a)   Describe the tropospheric scatter propagation with the help of neat diagram.

    (b)   Describe the radiation and dielectric losses in transmission line.

    (c)   Draw and explain horn type antenna with the help of neat diagram.

    (d)   Define the following terms w.r.t. antenna :

        (i)   Antenna gain

        (ii)   ERP

        (iii)   Directivity

        (iv)   Bandwidth

    (e)   Define freq. tracking in AM radio receiver.

    (f)   Draw and explain block diagram of FM radio receiver.

3.   Attempt any FOUR : 16

    (a)   Define beamwidth, polarization & attenuation in wave propagation.

    (b)   Draw and explain the working of Yagi-Uda antenna with neat diagram.

(c) Describe the working of Ground wave propagation with neat diagram. State its one advantage and one disadvantage.

(d) Define the terms w.r.t. transmission line (i) SWR (ii) VSWR.

(e) Explain simple AGC circuit for radio receiver.

(f) Draw and explain PLL based FM demodulator.

4. **Attempt any FOUR :** 16

(a) Draw and explain the ratio detector with neat diagram.

(b) Draw the circuit diagram of amplitude limiter and describe its operation.

(c) Draw and explain the working of practical diode detector circuit with waveforms.

(d) Draw and explain the operation of phased array.

(e) Describe the working principle of transmission line and describe the balanced line with neat diagram.

(f) Describe space wave propagation with neat sketch.

5. **Attempt any FOUR :** 16

(a) Draw and explain duct propagation.

(b) Describe the purpose of short length transmission line for open and short circuit.

(c) Draw and explain the operation of cassegrain feed parabolic reflector.

(d) Explain fidelity and dynamic range of AM radio receiver.

(e) Draw and explain the operation of each block of superheterodyne AM receiver.

(f) Draw and explain foster seelay detector with neat labelled circuit diagram.

P.T.O.

6. **Attempt any FOUR :** **16**

   (a)   Define characteristic impedance of transmission line. A lossless transmission line has a shunt capacitance of 100 PF/m and series inductance of 4 mH/m. Find out its characteristic impedance.

   (b)   Draw the constructional sketch of broadside array antenna and describe its working with radiation pattern.

   (c)   Draw the radiation pattern for the resonant dipole with following lengths :

   (i) $L = \dfrac{\lambda}{2}$

   (ii) $L = \lambda$

   (iii) $L = \dfrac{3\lambda}{2}$

   (iv) $L = 3\lambda$

   (d)   State various factors influencing the choice of IF for radio receivers.

   (e)   Explain the need of AGC & delayed AGC.

   (f)   Explain the role of AFC in radio receiver.

_____