15162

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.

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

Marks

1. **(A) Attempt any SIX :**   **$2 \times 6 = 12$**

(a) Draw a sketch showing tropospheric scatter propogation.

(b) What is transverse electromagnetic wave ?

(c) A load of 300 ohm is used to match 500 ohm transmission line to achieve SWR = 1. Find out the required characteristics impedance of quarter wave transformer connected directly to the load.

(d) List the factors that govern the selection of feed point of dipole array.

(e) Draw Yagi-Uda antenna.

(f) State the value of IF frequency in FM receiver and AM receiver.

(g) Why inter mediate frequency (IF) has constant value ?

(h) Draw the I/P and O/P waveforms of diode detector.

(B) **Attempt any TWO :** 4 × 2 = 8

(a) With respect to sky wave propagation define the following terms.

(i) Virtual height

(ii) Skip distance

(iii) Maximum usable frequency

(iv) Critical frequency

(b) Derive the relation between reflection coefficient (K) and VSWR (S).

(c) Describe balance slope detector with neat circuit diagram.

2. **Attempt any FOUR :** 4 × 4 = 16

(a) Describe ground wave propogation with the help of neat diagram.

(b) What is transmission line ? What are its types ?

(c) Compare resonant and non-resonant antenna (any four points)

(d) With the help of block diagram describe the function of superhetrodyne receiver.

(e) Describe the operation of amplitude limiter with the help of circuit diagram.

(f) Draw the constructional diagram of dipole antenna and draw its radiation pattern.

3. **Attempt any FOUR :** 4 × 4 = 16

(a) Describe effects of image signal on Radio Receiver, Describe the method of rejecting the image signal.

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

(c) Explain the need of AGC and delayed AGC.

(d) Draw the circuit diagram of faster seelay detector and write its working principle.

(e) Draw the equivalent circuit of transmission line at low frequency and radio frequency.

(f) With the help of diagram write working principle of horn type antenna.

4. **Attempt any FOUR :** **4 × 4 = 16**

(a) Derive the equation of characteristics impedance of transmission line at low frequencies and high frequencies.

(b) Define beam width polarization and attenuation in wave propagation.

(c) Write difference between loop antenna and ferrite rod antenna. (4 points)

(d) Describe the role of Padder (capacitor) in three point tracking.

(e) Explain simple AGC circuit for radio receiver.

(f) Draw circuit diagram of Ratio detector and describe its working.

5. **Attempt any FOUR :** **4 × 4 = 16**

(a) Describe the concept of actual height and virtual height with the help of figure.

(b) Define the term standing wave ratio, why is a high value of SWR often undesirable ?

(c) Define the following terms related to Antenna :

   (i) Directivity

   (ii) Isotropic radiator

   (iii) Power gain

   (iv) Antenna gain

(d) Define the frequency tracking in AM Radio Receiver.

(e) Draw block diagram of FM Receiver with AFC and explain it.

(f) How are sensitivity, selectivity, fidelity and S/N ratio test are carried out on radio receiver ?

6. **Attempt any FOUR :** **4 × 4 = 16**

(a) Describe the working of parabolic reflector antenna with casse grain feed.

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

(c) Draw constructional sketch of halfwave dipole antenna and draw its radiation pattern.

(d) What is RF alignment of AM Radio Receiver ? What is necessity of alignment ?

(e) Draw block diagram of tunned radio receiver and describe function of all blocks.

(f) Write difference between tunned radio receiver and superhetrodyne receiver (4 point).

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