14115

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 :   **12**

(a) Draw well labelled Electromagnetic spectrum.

(b) State frequency range and application of ground wave propagation.

(c) Calculate the characteristic impedance of a transmission line having $L = 0.5$ mH/km, $C = 0.08$ μF and negligible R and G.

(d) Define beam-width and polarization of an antenna.

(e) What is a folded dipole antenna ? Draw its radiation pattern.

(f) Define sensitivity of AM receiver.

(g) Draw input and output waveforms of practical diode detector.

(h) Why FM reception is noise free ? Justify.

(B) Attempt any TWO :   **8**

   (a)   Define ship distance. How it can be kept constant ?

   (b)   Derive the relation between reflection co-efficient (e) and VSWR.

   (c)   Explain how PLL can be used as FM demodulator.

2.   Attempt any FOUR :   **16**

   (a)   Explain tropospheric scatter propagation with relevant diagram.

   (b)   Draw generalized equivalent circuit and RF equivalent circuit of a transmission line.

   (c)   List characteristics of non-resonant antenna. Draw its radiation pattern.

   (d)   Draw well labelled sketch of Yagi antenna and give the function of its elements.

   (e)   With the help of block diagram, describe the function of TRF radio receiver.

   (f)   Explain the operation of FM radio receiver with the help of block diagram.

3.   Attempt any FOUR :   **16**

   (a)   Define the following terms with respect to wave propagation :

      (i)   Reception

      (ii)   Attenuation

      (iii) Absorption

      (iv)   Polarization

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

   (c)   State the concept of Hertzian dipole and draw its radiation pattern.

   (d)   Describe the working of parabolic reflector antenna with Cassegrain feed. Support the description with neat diagram.

(e) State the concept of AGC. Explain simple AGC circuit for radio receiver.

(f) Draw circuit of ratio detector and state the advantages of ratio detector over other types of FM Demodulators.

4. Attempt any FOUR : 16

(a) Define two different types of radiowave propagation. State three characteristics of each.

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

(c) Draw the constructional sketch of a broad side array antenna and describe its working with radiation pattern.

(d) Draw the block diagram of super-heterodyne receiver with output waves after each block.

(e) State any four factors influencing the choice of intermediate frequency for radio receiver.

(f) Draw the block diagram of foster-seely FM detector and explain its working.

5. Attempt any FOUR : 16

(a) Define virtual and actual height in shy wave propagation. Draw neat sketch depicting both the heights.

(b) State any four properties of quarter wave transmission line.

(c) Draw neat sketch of loop antenna with its radiation pattern. Explain how they are used for direction feeding.

(d) Describe the frequency tracking in AM radio receiver.

(e) If AM radio receiver is not RF aligned, what are the effects on radio receiver's output ?

(f) Compare Balance slope detector and Ratio detector on the basis of working principle and circuit diagram.

6. **Attempt any FOUR :** 16

   (a) Explain the basic principle of transmission line. Also give classification of transmission lines on the basis of construction.

   (b) Define directivity and power gain of an antenna. Also give the relation between directivity and power gain.

   (c) Draw the constructional sketch of phased array and describe its working with radiation pattern.

   (d) Why intermediate frequency has a constant value ?

   (e) Define the term fidelity and dynamic range of radio receiver.

   (f) With the help of characteristic curve, explain the working of slope detector.

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