B.Sc. 5th Semester (Honours) Examination, 2019
ELECTRONICS

Course ID : 51717   **Course Code : SH/ELC/504/DSE-2(T)**

Course Title : Transmission lines, Antenna and wave propagation etc.

Time 1 Hour 15 Minutes   **Full Marks: 25**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words
as far as practicable.

1. Answer *any three* of the following questions: 1×3=3

   (a) What are the primary line constants in relation to the transmission line?

   (b) What is skin depth?

   (c) Define the terms TE. wave and TM-wave in relation to propagation of e.m. wave through wave guides.

   (d) What is 'plasma frequency' in connection with the propagation of radio wave through ionosphere?

   (e) What is ionosphere? Why is it formed at a certain height in the earth atmosphere?

   (f) Mention two application of RADAR.

2. Answer *any two* of the following questions: 3×2=6

   (a) What is Maximum Usable Frequency (MUF)?

   (b) What is "duct propagation"? Where does it happen?

   (c) What is 'Critical Frequency" in short wave propagation?

   (d) Define "skip distance' in connection with ionosphere wave propagation.

   (e) What is the function of 'Duplexer' circuit in RADAR system?

   (f) The amount of radiated power in a RADAR system is increased by a factor of 4 (four). What will be the new range of the RADAR system then?

3. Answer *any two* of the following questions: 5×2=10

   (a) Derive an expression for the "input impedance" of any high frequency transmission line in terms of secondary line constants.

   (b) Show that the "phase velocity" of a plane e.m. wave propagation in an ionized medium is greater than the velocity of light in free space.

(c) Discuss briefly the mechanism of reflection of e.m. wave in ionosphere.

(d) Define VSWR (Voltage Standing Wave Ratio) in connection with the propagation of electrical energy through transmission line. How is it related with the voltage reflection co-efficient?

4. Answer *any one* of the following questions: 6×1=6

(a) What are primary line constants of a transmission line? Derive the expression of characteristic impedance (Z_0) and propagation co-efficient (P) in terms of primary line constant.

(b) Derive an expression for RADAR range equation for a pulse RADAR system.

(c) Derive the necessary working formula to show how refractive index (μ) of any ionosphere layer is related with the concentration of the free electron (electron density) of that layer.

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