Printed Pages : 4

EIC013

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 132653

Roll No.

B. Tech.

(SEM. VI) THEORY EXAMINATION, 2014-15
MICROWAVE ENGINEERING

Time : **2** Hours]   [Total Marks : **50**

Note :   (1)   All Question Carry Equal Marks.
       (2)   Attempt all questions.

1   Attempt any TWO parts of the following :   **5x2=10**

   (a)   Discuss the importance of Smith Chart in Microwave Measurements. What are the parameters which can be measured by it and How?

   (b)   Calculate the propagation constants and phase velocities for the TE_{10}, TE_{01} and TE_{11} modes for rectangular waveguides with inside dimensions as 5.214×2.404 cm operating at 6.2 GHz.

   (c)   Design a microstrip transmission line for 100 Ω characteristic impedance. The substrate thickness is 0.152 cm, with ε_r = 2.23. What is the guide wavelength on this transmission line if the frequency is 4.2 GHz ?

132653]   **1**   **[Contd...**

2   Attempt any TWO parts of the following: **5x2=10**

(a)   From the unitary properties of the scattering matrix for a lossless nonreciprocal two-port microwave junction, show that it is not possible to have S_{21} zero while S_{12} is finite. Thus a lossless one-way transmission device cannot be built.

(b)   A 20 dB attenuator having an input VSWR of 1.3 is terminated by matched load. Find the reflected power, the absorbed power and the transmitted power.

(c)   Name any two ferrite materials used in designing Non Reciprocal Microwave components. Explain the working of circulator with support of figure.

3   Attempt any TWO parts of the following :   **5x2=10**

(a)   With support of figure explain the working of Reflex klystron. Discuss the importance of Repeller voltage.

(b)   A helix travelling-wave tube is operated with a beam current of 300 mA, beam voltage of 5kV, and characteristic impedance of 20 ohms. What length of the helix will be selected to give an output power 40 dB at 9.4 GHz.

(c)   An X- band pulsed cylindrical magnetron has $V_0 = 33kV$, $I_0 = 80A$, $B_0 = 0.01$ Wb/m^2, a = 4.5 cm, and b=7.2 cm. Calculate the cyclotron angular frequency, cut-off voltage and cut-off magnetic flux angular density.

(c) A rectangular wave guide is terminated by an unknown load. By using slotted line, load VSWR is found to be 2.2 and the distance between two successive minima is 1.5 cm. When the load is replaced by short, the location of the minima shift is 0.32 cm toward generator. Calculate the normalized value of Load.

————