

5E5025

Roll No. _____

Total No of Pages: 4

5E5025

B. Tech. V Sem. (Main / Back) Exam., Dec. 2014
Electronics and Communication Engineering
5EC5A Microwave Engineering - I

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks: 24

Instructions to Candidates:

Attempt any **five** questions, selecting **one** question from **each** unit. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. NIL _____

2. NIL _____

UNIT - I

Q. 1 (a) Derive expressions for the fields in rectangular waveguide in case of Transverse Magnetic (TM) wave. [8]

(b) Draw the field lines for -

(i) TE_{10} mode

(ii) TM_{11} mode

(iii) TE_{20} mode

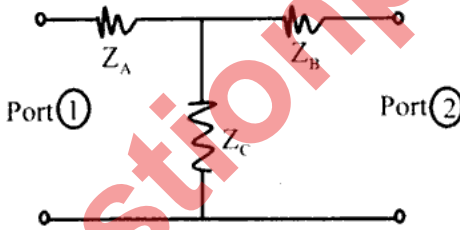
(iv) TM_{21} mode in a rectangular waveguide. [8]

OR

- (a) Explain the following terms with respect to microstrip transmission lines - [8]
- (i) Effective dielectric constant
 - (ii) Characteristic impedance
 - (iii) Losses in microstrip lines.
 - (iv) Electric & magnetic field lines. rtuonline.com
- (b) Find the characteristics impedance of microstrip line that is fabricated on dielectric substrate having $\epsilon_r = 3.2$, $w = 1.78\text{mm}$, $h = 0.762\text{mm}$ and operating frequency is 5 GHz. [8]

UNIT-II

- Q. 2 (a) Find the z-parameter of the two-part T- network shown in figure - [8]



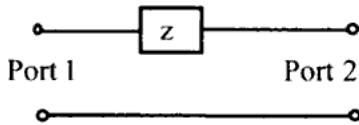
- (b) A certain two-port network is measured and the following scattering matrix is obtained -

$$[S] = \begin{bmatrix} 0.1\angle 0^\circ & 0.8\angle 90^\circ \\ 0.8\angle 90^\circ & 0.2\angle 0^\circ \end{bmatrix}$$

From this data, determine whether the network is reciprocal or lossless. [8]

OR

- (a) Does a nonreciprocal lossless network always have a purely imaginary impedance matrix? [8]
- (b) Find the S- parameter for the series load shown below. Assume a characteristic impedance z_0 [8]



UNIT-III

- Q. 3 (a) Write s- matrix and explain the working of magic tees. [8]
- (b) Draw the directional coupler and explain return loss, directivity, coupling and isolation. [8]

OR

- (a) Design a 3dB branch line coupler. Draw its layout using microstrip line. [8]
- (b) Draw the Wilkinson power divider and its layout using microstrip line. [8]

UNIT-IV

- Q. 4 (a) Describe the microwave power measurement. [8]
- (b) Calculate the VSWR when the distance between half power points is 1mm . Assume the wave is in dominant mode and given that the dimension of the guide are $4 \times 2.5\text{ cm}$ and frequency is 10GHz . [8]

OR

- (a) Explain the measurement using network analyzer. [8]
- (b) What is low VSWR? Describe its measurement. [8]

UNIT-V

- Q. 5 (a) List the basic materials for MMICs. [8]
- (b) Describe the MMIC techniques. [8]

OR

- (a) Describe the discrete, integrated, and monolithic microwave integrality circuits. [8]
- (b) Discuss the capacitor- film development. [8]
