

5E5025

Roll No. \_\_\_\_\_

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5E5025

B. Tech. V Sem. (Main/Back) Exam., Nov.-Dec.-2016  
Electronics And Communication Engineering  
5EC5A Microwave Engineering - I

Time: 3 Hours

Maximum Marks: 80  
Min. Passing Marks Main: 26  
Min. Passing Marks Back: 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) What is the significance of poynting vector and complex poynting vector? [6]
- (b) A rectangular air-filled copper waveguide with a 0.9 inch  $\times$  0.4 inch cross section and 12 inch length is operated at 9.2 GHz with a dominant mode. Find - [10]
- (a) Cut-off frequency,
- (b) Guide wavelength
- (c) Phase velocity
- (d) Characteristics impedance
- (e) The loss

**OR**

- Q.1 (a) How a slot line differs from a microstrip line. [4]
- (b) Draw the structures with field lines of parallel coupled strip lines and explain even and odd mode excitations. [6]
- (c) A coplanar strip line carries an average power of 250 mw and a peak current of 100 mA. Determine the characteristics impedance of the coplanar strip line. [6]

**UNIT – II**

Q.2 The S-parameters of a two – port network are given by -

$$S_{11} = 0.2\angle 0^\circ, \quad S_{22} = 0.1\angle 0^\circ, \quad S_{12} = 0.6\angle 90^\circ, \quad S_{21} = 0.6\angle 90^\circ$$

- (a) Prove that the network is reciprocal but not lossless. [8]
- (b) Find the return loss at port 1 when port 2 is short-circuited. [8]

**OR**

Q.2 A series reactance  $z = j x$  is connected between two lines with different characteristics impedances  $z_1$  and  $z_2$ . Find the S-matrix of the junction. rtuonline.com [16]

**UNIT – III**

- Q.3 (a) Draw the H plane tee and explain with S-parameters matrix. [6]
- (b) A 20 MW signal is fed into one of collinear port 1 of a loss less H plane T- junction. Calculate the power delivered through each port when other ports are terminative in matched load. [10]

**OR**

- Q.3 (a) Draw the low pass and band pass filter using strip line and microstrip lines. [8]
- (b) Draw the microstrip and stripline coupler. Explain their parameters. [8]

**UNIT – IV**

- Q.4 (a) Explain the power (microwave) measurement. [8]
- (b) The signal power at the input of a device is 10 MW. The signal power at the output of the same device is 0.20 MW. Calculate the insertion loss in dB of this component. [8]

**OR**

- Q.4 (a) Explain the measurement of S-parameters. [8]
- (b) A coaxial slotted line is used to measure VSWR of the load at 2 GHz by double minima method. If the distance between the positions of twice minimum power is 0.5 cm, find the value of VSWR on the line and the magnitude of the voltage reflection coefficient. [8]

**UNIT – V**

- Q.5 (a) Explain the properties of substrate and their selection criterion for MIC application. [8]
- (b) Explain the photolithography process. [8]

**OR**

- Q.5 (a) Describe the Microwave Monolithic Integrated Circuit (MMIC) technology and their application. [8]
- (b) Compare the MIC, MMIC, and hybrid integrated circuit technology [8]
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