PVP 17

Code: **17ECMC2T3**

I M.Tech - II Semester – Regular Examinations – AUGUST 2018

MICROWAVE NETWORKS
(MICROWAVE & COMMUNICATION ENGINEERING)

Duration: 3 hours Max. Marks: 60

Answer the following questions.

1. a) Consider an *n*-port microwave network and formulate a *z*-matrix. Describe all the important properties of this matrix. 8 M

   b) Consider a two-port microwave network and express its z- parameters in terms of ABCD-parameters. 7 M

OR

2. a) Consider an n-port microwave network and formulate a y-matrix. Describe all the important properties of this matrix. 8 M

   b) Consider a two-port microwave network and express its z- parameters in terms of y-parameters. 7 M

3. a) What are scattering parameters? Why they are most suitable at microwave frequencies to model a network? 8 M

b) For a 75Ω loss-less line, find the location nearest to the load to insert QWT and the CI of QWT required to achieve matching for each of the following values of RC over the load,

i) Γ_l =1/9, ii) Γ_l = –j0.5 and iii) Γ_l =j/3. 7 M

OR

4. a) Formulate s-parameter matrix for an n-port linear, reciprocal lossless network working at microwave frequencies. Describe how shift in reference plane effects elements of the matrix? 8 M

b) Describe the procedure of load matching with quarter wave transformer for different types of loads. What are the advantages and short comings involved in this method? 7 M

5. a) Derive the expressions for field components in a rectangular cavity resonator. 8 M

b) Find the three lowest resonant frequencies and the corresponding TE modes of oscillations in the air-filled rectangular cavity resonator with dimensions a=4cm, b=3cm and d=4cm. 7 M

OR

6. a) Derive the expressions for field components in a circular cavity resonator. 8 M

b) A rectangular air-filled cavity, with dimensions a×b×d cm, is in resonance with TE_{101} mode. Show that its frequency of resonance, f_r is

$$f_r = \frac{c}{2d}\sqrt{1+\frac{d^2}{a^2}}$$

Also determine, d when f_r=10GHz, a=2cm and b=1cm. 7 M

7. a) Derive the expressions for image impedance of a two port T-network. 8 M

b) Describe the significance of Richard's transformation. 7 M

OR

8. a) Describe image parameter method for filter design. 8 M

b) With suitable examples describe the utility of impedance and frequency scaling in filter design. 7 M