**I M.Tech - II Semester – Regular/Supplementary Examinations
July 2019**

# MICROWAVE NETWORKS
## (MICROWAVE & COMMUNICATION ENGINEERING)

Duration: 3 hours                                  Max. Marks: 60

Answer the following questions.

1. a) Consider a two-port microwave network and formulate ABCD-matrix. Describe its convenience in describing cascaded sections.                                  8 M

   b) Consider a line of length $l$, CI of $Z_o$, phase constant of $\beta$ and determine its ABCD-parameters.                                  7 M

OR

2. a) Consider a two-port microwave network and express its y – parameters in terms of z-parameters.                                  8 M

   b) Describe and explain the primary components and four basic decomposition rules of signal flow graphs.                                  7 M

3. a) Describe the method of single stub matching.  Derive the relation for the length and location of the stub.                                  8 M

b) A loss-less line is to be matched to its load by means of a short circuited stub. Assuming $Z_{os} = 75\Omega$, find the stub position closest to the load, $d_s$ and its shortest length, $l_s$ so that match is achieved when the line's characteristic and load impedances are (i) $Z_o = 100\Omega$, $Z_l = 150\Omega$ and (ii) $Z_o = 150\Omega$, $Z_l = 100\Omega$. 7 M

OR

4. a) Describe the procedures of double stub matching technique using Smith chart. 8 M

b) For each set of the given values, (i) $d_n = 0$, $d_{ss} = 3\lambda/8$ with $z_l = 0.3 + j0.4$, (ii) $d_n = \lambda/8$, $d_{ss} = 3\lambda/8$ with $z_l = 0.5$ and (iii) $d_n = \lambda/4$, $d_{ss} = 5\lambda/8$ with $z_l = 2.5 - j5.0$, determine whether double stub matching technique is feasible or not. Whenever it is infeasible, make necessary so that technique is feasible. 7 M

5. a) Derive the expression for resonant frequency of rectangular cavity resonator. 8 M

b) An air-filled cubical cavity i.e. a=b=d is resonating at a frequency of 8 GHz in $TE_{101}$mode. Determine its dimensions. Also find out its Q factor, when conductivity of the walls is given by $\sigma = 61 \times 10^6$ mhos/m. 7 M

6. a) Derive the expression for resonant frequency of a circular cavity resonator. 8 M

b) An air-filled circular cavity has a length of 2.3cm and a radius of 1.15 cm. Determine its resonance frequencies for modes $TM_{010}$ and $TE_{111}$. 7 M

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

b) What are Kurdo's identities? Describe their significance in filter implementation. 7 M

OR

8. a) Describe insertion loss method for filter design. 8 M

b) Discuss important features of stepped impedance low pass filters. 7 M