

Code: EC6T3

**III B.Tech-II Semester–Regular/Supplementary Examinations–March 2018**

**MICROWAVE ENGINEERING  
(ELECTRONICS & COMMUNICATION ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

**PART – A**

Answer *all* the questions. All questions carry equal marks

11x 2 = 22 M

1. a) How is bunching achieved in a cavity magnetron?
- b) Classify the microwave tubes.
- c) Differentiate between klystrons and TWT.
- d) Explain briefly the operation of magic Tee junction.
- e) Write different Microwave T-Junctions.
- f) Define coupling factor and directivity of directional coupler.
- g) Write applications of directional coupler.
- h) Explain the operation of TRAPATT.
- i) A gunn diode has a drift length of 5  $\mu\text{m}$ . What minimum voltage would be needed to initiate Gunn effect?
- j) What is bolometer? and explain different types.
- k) Define attenuation and explain different methods for measuring attenuation.

## PART – B

Answer any *THREE* questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) Explain the classification of microwave tubes. 8 M
- b) Draw different slow wave structures and explain why slow wave structures are used in travelling wave tubes. 8 M
3. a) What is a Magic Tee? Calculate its S-matrix. 8 M
- b) With a neat sketch explain the construction and operation of H plane Tee junction. 8 M
4. a) A 3-port circulator has an insertion loss of 1 dB, isolation 30 dB and VSWR is 1. Find the S-matrix. 6 M
- b) A directional coupler has 10 dB coupling coefficient and 40 dB directivity, insertion loss of 1dB. For an input power of 10mW at the input port of the main arm, determine the power at different ports. Other ports except the one at which the measurement is made are match terminated. 4 M
- c) Explain about waveguide cavity resonators. 6 M

5. a) An IMPATT diode has a  $C_j$  of 0.05 pF and  $L_p$  of 0.5nH,  $C_p$  is negligible. If the breakdown voltage is 100V and the bias current is 100mA. Determine the resonant frequency and efficiency. Assume the RF peak current as 0.8A and  $R_L$  as  $2\Omega$ . 8 M
- b) Explain different modes of operation of Gunn diode. 8 M
6. a) Explain the measurement of Q of a cavity resonator. 8 M
- b) Calculate the SWR of a transmission system operating at 8 GHz. The distance between two minimum power points is 0.9mm on a slotted line whose velocity factor is unity. 8 M