

Code: EC6T3

**III B.Tech - II Semester – Regular Examinations - May 2015**

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

Duration: 3 hours

Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

- 1 a) Explain about the RADAR system which will help in finding the range and velocity of moving target. 7 M
- b) Name four important properties of microwaves that make them suitable for a particular application. 7 M
- 2 a) What are transit time effects? How do these impair working of low frequency tubes and transistors at microwave frequencies? 7 M
- b) How does a reflex klystron differ from a two cavity klystron? Explain the working of reflex klystron and obtain the condition for oscillations. 7 M
- 3 a) Explain the role of a slow wave structure in a traveling wave tube and discuss the different types of slow wave structures used, explain the amplification process in a helix type TWT. 7 M

- b) What are cross field devices? How does a magnetron sustain oscillations using cross field? Derive the expression for cut off voltage and magnetic flux density. 7 M
- 4 a) Why is Phase shifter needed in a microwave network? Outline the basic principle behind the design of microwave phase shifters. 7 M
- b) Illustrate the uses of directional coupler in reflectometer and power divider. 7 M
- 5 a) 1 W of power is fed to symmetrical E-plane tee at its coplanar arm 1. When other ports are matched terminated, this results in  $VSWR=1.64$  in arm 1. Find the power delivered to ports 2 and 3. 7 M
- b) A signal of 0.25 W is fed at input port 1 of a symmetrical directional coupler of Directivity 24 dB and coupling factor 33 dB. Find the power outputs at coupled and isolated ports. 7 M
- 6 a) Explain Gunn effect using two valley theory. Describe domain formation in Gunn diode. 7 M
- b) Explain the construction and operation of varactor diode. Mention its applications. 7 M

7 a) Explain the principle of operation of TRAPATT diode with suitable diagram. 7 M

b) Briefly explain 7 M

i) degenerate parametric amplifier

ii) non-degenerate parametric amplifier.

8 a) Explain the double minima method of measuring VSWR. 7 M

b) An unknown load terminates a 50 ohm microwave line. The VSWR measured is 2.4 and the first minima are located at a distance  $0.313 \lambda_g$  from load. Find the unknown load and reflection coefficient. 7 M