

1260495

No. of Printed Pages : 3

**BIEL-016**

**B. TECH.-VIEP-ELECTRONICS AND  
COMMUNICATION ENGINEERING  
(BTECVI)**

**Term-End Examination**

**June, 2019**

**BIEL-016 : MICROWAVE AND RADAR  
ENGINEERING**

*Time : 3 Hours*

*Maximum Marks : 70*

---

*Note : Attempt any seven questions. All questions carry equal marks. Use of scientific calculator is allowed. Missing data may be suitable assumed.*

---

1. (a) What are waveguides ? How is cut-off wavelength of the waveguides determined ? 5
- (b) Use Maxwell's equations to show that TEM mode cannot exist in the hollow waveguide. 5
2. (a) Derive the field distribution of  $TE_{10}$  mode in rectangular waveguide and draw its field pattern. 5

(A-34) P. T. O.

- (b) What is Microstrip line ? How does its characteristic impedance change with change in width to height ratio ? 5
3. (a) What do you mean by Microwave passive devices ? Describe E-plane tee and magic tee. 5
- (b) What is phase-shifter ? Describe a rotary phase-shifter and explain its working principle. 5
4. (a) What are the limitations of conventional active devices at microwave frequencies ? 5
- (b) What is Travelling Wave Tube ? Explain the principles of operation and construction of T. W. T. 5
5. (a) A two cavity klystron amplifier has the following parameters : 5
- $V_0 = 1000 \text{ V}$        $R_0 = 40 \text{ k}\Omega$
- $I_0 = 25 \text{ mA}$        $f = 3 \text{ GHz}$
- Gap spacing in either cavity :  $d = 1 \text{ mm}$ ,  
 Spacing between the two cavities :  
 $L = 4 \text{ cm}$ . Effective shunt impedance :  $R_{sh} = 30 \text{ k}\Omega$  : 5
- (i) Find the input gap voltage to give maximum voltage  $V_2$ .
- (ii) Find the voltage gain, neglecting the beam loading in the output cavity.

[3]

- (b) What is directional coupler ? Explain the working of 2-hole directional coupler. 5
6. Explain IMPATT and TRAPATT diodes and compare their performance. 10
7. Draw the block diagram of CW Radar operation and tell about its limitations. 10
8. What is Doppler effect and explain the operation of M. T. I. Radar with its block diagram. 10
9. (a) How does the Radar display work ? 5  
(b) Briefly explain the tracking system of Radar. 5
10. Write short notes on any *two* of the following :  
2×5=10
- (a) Circular waveguide
  - (b) GUNN diode
  - (c) VSWR meter
  - (d) Radar clutter