

[Time: 3 Hours]

[Marks:80]

Please check whether you have got the right question paper.

- N.B:
1. **Q 1 is compulsory**
 2. **Solve any 3 from remaining**
 3. **Assume suitable data if required**

- Q.1 Solve any four 20
- a) What is mode jumping and how is it avoided in magnetron
 - b) List microwave frequency bands with frequency range
 - c) Calculate coupling factor of directional coupler when the incident power is 600 mW and power in auxiliary waveguide is 350 mW.
 - d) Explain working of Tunnel diode and its application in microwave engineering.
 - e) Explain microstrip line working with geometry
- Q.2 a) Explain schematic of Reflex klystron & working with applegate diagram. 10
- b) Explain physical structure and principle of working of TRAPATT diode. 10
- Q.3 a) An air filled 5 x 2 cm waveguide has $E_2 = 20 \sin(40\pi x) \sin(50\pi y) e^{-j\beta z}$ V/m 15GHz 10
1. What is mode of propagation. Justify
 2. Determine wave impedance E_y/H_x
- b) A magnetron has following parameters 10
- Inner radius : 0.15 m
- Outer radius : 0.45m
- Flux density of magnetic field B_0 : 1.2 Wb/m²
1. Determine Hull cut off voltage
 2. Cut off magnetic field density when beano voltage $V_0 = 6000V$
 3. Cyclotron frequency in GHz if $B = 0.3 \text{ Wb/ m}^2$
- Q.4 a) A 50Ω transmission line is terminated on a load of $73 - j80\Omega$. Design single stub matching impedance matching using short circuited shunt stub 10
- b) Explain any two methods of power measurement. 10
- Q.5 a) Construct a four port circulator using two magic Tees & a gyrator. Explain working of same at all four parts. 10
- b) Discuss working of Faraday Rotation isolator from port 1 to port 2 & port 2 to port 1 with relevant diagrams. 10
- Q.6 a) List various modes of oscillation of Gunn diode. Give criteria of classification of these modes and explain working of any one mode. 10
- b) Derive field equations for TE modes in rectangular waveguides. What are degenerate modes? 10