**[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 E2 = 20 sin (40 $\pi$ x) sin (50 $\pi$ y) $e^{-j\beta z}$ z v/m 15GHz **10**

1. What is mode of propagation. Justify
2. Determine wave impedance Ey/Hx

b) A magnetron has following parameters **10**

Gnner radius : 0.15 m
Outer radius : 0.45m
Flux density of magnetic field Bo : 1.2 Wb/$m^2$

1. Determine Hull cut off voltage
2. Cut off magnetic field density when beano voltage Vo = 6000V
3. Cyclotron frequency in GHz if B = 0.3 Wb/ $m^2$

Q.4 a) A 50 $\Omega$ transmission line is terminated on a load of 73 – j80 $\Omega$ . Design single stub matching impedance matching using shart 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 relavant 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**

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