

[Time:3 Hours]

[Marks:80]

Please check whether you have got the right question paper.

- N.B:
1. Each question carries 20 marks.
 2. Question no.1 is compulsory.
 3. Solve any 3 out of remaining
 4. Assume suitable data wherever required.

- Q.1 Solve any four 20
- a) Load impedance $Z_L = 50 + j150\Omega$ and characteristics impedance $Z_0 = 50\Omega$, calculate reflection coefficient and VSWR
 - b) List microwave frequency bands with frequency range and state applications of any two bands
 - c) Explain working principal of TUNNEL diode.
 - d) Show that for a TE_{10} mode a frequency of 6 GHz will pass through the waveguide if a dielectric with relative permittivity of 4 is inserted into the waveguide. The dimensions are $a = 1.5\text{cm}$ and $b = 1\text{cm}$
 - e) Explain Applegate diagram of Reflex Klystron.
- Q.2 A Explain Two cavities Klystron with schematic diagram. Explain bunching process with the help of Applegate diagram. 10
- B Explain physical structure and principal of operation of IMPATT diode 10
- Q.3 A A rectangular waveguide has width $a = 22.86\text{mm}$ and height $b = 10.16\text{mm}$. Calculate the cut-off frequency and cut-off wavelength of the first four mode. 10
- B A travelling wave tube (TWT) has the following characteristics: 10
- Beam Voltage $V_0 = 2\text{KV}$, Beam current $I_0 = 4\text{mA}$, frequency $f = 8\text{GHz}$,
Circuit length $N = 50$, Characteristics impedance $Z_0 = 20\Omega$.
Determine
- a) Gain parameter 2
 - b) The power gain in decibels 2
 - c) All four propagation constants 6
- Q.4 A 50Ω transmission line is connected to a cellular phone antenna with load Impedance $Z_L = 25 - j50\Omega$. Find the position and the length of a shunt short circuit stub required to match the 50Ω line. 10
- B Describe working principle of phase shifter with neat diagram. 10
- Q.5 A Explain E-plane Tee and H-plane Tee with their properties. 10
- B Explain methods of microwave frequency measurement 10
- Q.6 A Explain any two methods of measuring impedance of a terminating load in Microwave system. 10
- B a) Explain Two Valley Model Theory in Gunn diode. 5
- b) Describe Varactor diode working principle. 5
