[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+j150Ω and characteristics impedance Z_o=50Ω, 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 TUINNEL 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=1.5cm and b=1 cm

e) Explain Applegate diagram of Reflex Klystron.

Q.2 A Explain Two cavities Klystron with schematic diagram. Explain bunching process with the heip 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 mm and height b =10.16mm. 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_o = 2KV, Beam current Io = 4 mA, frequency f = 8 GHz,
Circuit length N = 50, Characteristics impedance Zo = 20 Ω.
Determine

a)Gain parameter 2

b) The power gain in decibels 2

c) All four propagation constants 6

Q.4 A 50 Ω transmission line is connected to a cellular phone antenna with load Impedance Z_L=25-j50 Ω. Find the position and the length of a shunt short circuit stub required to match the 50Q 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

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