Total No. of Questions : 8]

SEAT No. :

P3830

[Total No. of Pages : 2

[5561]-251
B.E. (E&TC)
MICROWAVE ENGINEERING
(2012 Pattern) (404183)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) The TE10 mode is propagated in a rectangular waveguide of dimensions a = 6cm and b = 4cm. By means of a travelling detector, the distance between a maxima and minima is found to be 4.55cm. Find the frequency of the wave. **[8]**

b) What is a directional coupler? Draw and explain the operation two hole directional coupler. **[6]**

c) An isolator has insertion loss 0.5dB and isolation of 30dB. Determine scattering matrix of an isolator if the isolated ports are perfectly matched to the junction. **[6]**

OR

Q2) a) Explain the following parameters of a waveguide. **[8]**

i) Cut off frequency

ii) Phase Velocity

iii) Guide wavelength

iv) Wave impedance

b) Explain the properties of H plane Tee with the help of a neat diagram. Also state Scattering matrix of H plane tee and Magic tee. **[6]**

c) Compare strip line and microstrip line. **[6]**

Q3) a) A two cavity klystron is operated at a frequency 10GHz with Beam voltage (V_0) = 1200V, Beam current (I_0) = 30 mA, Gap spacing in either cavity (d) = 1mm, Gap spacing between centers of cavity (L) = 4 cm, Effective shunt impedance (Rsh) = 40kΩ. Neglecting beam. Calculate

P.T.O.

i) Input RF voltage,Vl for a maximum output voltage coupling coefficient

ii) Voltage Gain

iii) Efficiency **[9]**

b) Write Hull Cut off voltage equation, Performance characteristics and Applications of Magnetron. **[9]**

OR

Q4) a) With the help of applegate diagram explain the operation of two cavity Klystron in detail. **[9]**

b) Explain the construction and working of Travelling Wave Tube with its slow wave structure. **[9]**

Q5) a) With help of two valley model along with emphasis on drift velocity, explain the negative resistance property of a Gunn diode. **[8]**

b) Write a short note on: **[8]**

i) Shottky Barrier Diode

ii) PIN Diode

OR

Q6) a) Explain the construction and working of IMPATT diode in detail. **[8]**

b) Write short notes on: **[8]**

i) Varactor diode

ii) TRAPATT diode.

Q7) a) How are microwave measurements different from low frequency measurements? **[8]**

b) Explain following Microwave Measurement devices in detail. **[8]**

i) Slotted Line

ii) Tunable Detector

OR

Q8) a) Explain phase shift measurement using double minima method at microwave frequency. **[8]**

b) Explain different techniques for measuring unknown frequency of a microwave generator. **[8]**

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