SEM VI ELEX MDC 13/5/14

QP Code : **MV-18074**

(3 Hours) **[Total Marks : 100**

N. B. : (1) Question No. **1** is **compulsory**.
(2) Solve any **four** questions of remaining **six** questions.
(3) **Assume** suitable **data** if **necessary**.

1. Answer any **four** :- **20**
   (a) Why S parameters are used at microwave frequencies ?
   (b) TEM waves do not propagate through hollow waveguide. Justify.
   (c) An IMPATT diode has following parameters :-
   Carrier drift velocity $\upsilon d = 2 \times 10^7$ cm/s
   Drift region length L = 6μm
   Maximum operating voltage $V0_{max} = 100V$
   Maximum operating current $T0_{max} = 200$ mA
   Efficiency $\eta = 15\%$
   Breakdown voltage Vbd = 90V.
   Find :-
   (i) The maximum power in watts.
   (ii) The resonant frequency.
   (d) What is back heating in microwave oscillator ?
   (e) Differentiate between TE_{mn} and TM_{mn} modes in rectangular waveguides.

2. (a) Derive wave equation for TE wave and obtain all field components in rectangular wave guide. **12**
   (b) Define group velocity and phase velocity for wave propagating in rectangular waveguide. **8**
   A wave guide has cutt off frequency of 3.75 GHz. Find the group velocity for this rectangular waveguide at 5 GHz.

3. (a) With neat schematic diagram, explain the bunching of electrons in Reflex Klystron. Hence derive the expression for bunching parameter. **10**
   (b) A pulsed cylindrical magnetron is operated with following parameters :- **10**
   Anode voltage = 25 kV
   Beam current = 25 A
   Magnetic flux density = 0.34 wb/m^2
   Radius of cathode cylinder, a = 5 cm
   Radius of vane edge to center, b = 10 cm
   Calculate :-
   (a) The cyclotron angular frequency
   (b) The cutt off voltage
   (c) The cutt off magnetic flux density.

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4. (a) What are ferrite devices ? Explain with neat schematic circulator and mention its uses. **10**
   (b) Explain a method to measure VSWR at microwave frequencies when VSWR is greater than 10. **10**

5. (a) Explain the different operating modes of Gunn diode. **10**
   (b) With neat diagram explain the operation of Travelling Wave Tube. **10**

6. (a) Explain the operation of two hole directional coupler. Derive its S-matrix. **10**
   (b) Explain power frequency limitation in microwave transistors. **10**

7. Write short notes on (any **four**) :- **20**
   (a) Measurement of power
   (b) Microwave resonator
   (c) Magic TEE
   (d) Striplines
   (e) Applications of microwaves
