T.E. Electronics SEM TE REV EXAM.

Microwave Devices and Circuits

1st-half-AGJ-10 (a) 7

## 29 May 2010

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Con. 3491-10.

## (REVISED COURSE)

AN-4442

(3 Hours)

[ Total Marks : 100

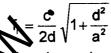
- N.B. (1) Question No. 1 is compulsory.
  - (2) Attempt any four questions from remaining six questions.
  - (3) Figures to the right indicate full marks.
  - 1. Attempt any four :-
    - (a) Explain group velocity and phase velocity in rectangular wavegu
    - (b) What is back heating? How can it be avoided?
    - (c) Explain Gunn effect using two valley theory.
    - (d) What are the advantages of microwave frequencies over her frequency?
    - (e) Explain Rat-Race junction.
  - 2. (a) Compare the multicavity Klystron and TWT from the point of view of basic 10 construction, performance and applications.
    - (b) A pulsed cylindrical magnetron is operated with the following parameters :--10 Anode voltage = 25 kV. Beam current = 25A

Magnetic flux density =  $0.34 \text{ wb/m}^2$ 

 $R_{h} = 10 \text{ cm}.$  $R_{2} = 5 cm,$ 

Calculate - (i) Angular frequency

- (ii) The cut off voltage
- (iii) Cut off magnetic flux consity.
- 3. (a) Derive the wave equation for a TM-wave and obtain all the field components in a 12 rectangular waveguide.
  - (b) A TE11 mode is propagating through a circular waveguide having an air dielectric 8 and a radius of 5 cms. Calculated e cut off frequency, guide wavelength and the wave impedance.
- 4. (a) (i) For TE101 mode free ectangular cavity resonator of width 'a', height 'b' and 5 length 'd'. Show that the frequency of resonance is given by -



- **b** = 1cm, choose d so that cavity will resonate at 10 GHz for (ii) For a = 2cmTE101 mode.
- Tee is referred as magic Tee? Derive the scattering matrix for the 10 (b) Why is hybrid same. 5
- be operation of microwave isolator. (c) Explain
- 5. (a) Describe the operation of IMPATT diode compare it with TRAPATT diode.
  - (b) Explain RF substitution method for measuring attenuation.

6. (a) A symmetric directional coupler with infinite directivity and a forward attenuation of **10** 20 db is used to monitor the power delivered to the load Z<sub>1</sub>. Bolometer 1 introduces VSWR 2.0 on arm 4. Bolometer 2 is matched to arm 3. If Bolometer 1 reads 8 mW and bolometer 2 reads 2 mW. (i) the amount of power dissipated in the load  $Z_{\mu}$ . Find (ii) VSWR on arm 2. (b) Explain the construction and working principle of Reflex Klystron. 10 7. Write short notes on any four :-20 (a) Working of circulator (b) Strapping in Magnetron (c) Double minimum method for measuring VSWR (d) Excitation in Waveguides (e) E-plane Tee. -34 MONDO (69L) CHLIGHT 1 15 COS181 xiole a applicat view of basic ve frequencies over low frequency ? VAILEY UNDER 40004 tional s 1060 化二 医后神经后 赞 CIANGUIST WASVEGUIDE WASHING SHA ON 50 El di (S) 👘 🖉 5 39 H.: 111 J. 6 . Due •unri2a arar (p) 6.8 ے ق 012 E. .... EN T GEA EXUN -1-E