Roll No. 2204608 Total No. of Pages : 2

BT-7/D06 9404

Microwave Engineering

Paper : ECE-407-E

Time : Three Hours] [Maximum Marks : 100

Note :– The question paper consists of **FOUR** units. Attempt **FIVE** questions in all, selecting at least **ONE** question from each unit.

UNIT-I

1. (a) Draw the schematic diagram of cylindrical cavity resonator showing proper coordinates. With the help of separation equations for TE and TM modes, write expressions for resonant frequencies for these modes. 10

   (b) Define Q factor of a cavity resonator. How will you couple cavity to a generator ? Explain with appropriate circuits. 10

2. (a) Draw the block diagram of the procedural set up for insertion loss measurement and discuss its working. Also mention main errors in this measurement. 10

   (b) How will you measure load impedance using slotted section ? Describe the measurement procedure. 10

UNIT-II

3. (a) Draw the schematic diagram of two-cavity Klystron amplifier. Discuss its operation in detail. 10

   (b) Resonator - repeller spacing in a reflex Klystron is 5 mm. Beam velocity, while entering the resonant cavity corresponds to an acceleration through a potential of 3000 volts. Calculate the repeller voltage for which the reflex Klystron can oscillate at 3 GHz in n=3 mode. 10

4. (a) Explain the amplification process in a helix type travelling wave tube. 10

(b) An X-band pulsed cylindrical magnetron has V_0 = 30KV, I_0 = 80 A, B_0 = 0.01 Wb/sq.m, a = 4 cm, and b = 8 cm. Calculate the cyclotron angular frequency, cut - off voltage and cut-off magnetic flux density. Symbols used carry usual meanings. 10

UNIT-III

5. (a) What are scattering parameters ? How will you define those ? Discuss with the help of a two - port network. 8

(b) With the help of S-matrix, show that it is not possible to construct a perfectly matched, lossless, reciprocal 3-port junction. 12

6. Describe the operating principle of the following :—

(a) E - Plane Tee

(b) Tuning Screws. 20

UNIT-IV

7. (a) Give the Gunn diode structure. Also discuss its performance. How will you use Gunn diode as an oscillator ? 12

(b) What is IMPATT diode ? How does it exhibit differential negative resistance ? 8

8. (a) What are Manley-Rowe relations ? Discuss those. 12

(b) Describe advantages and limitations of parametric amplifiers. 8