SEVENTH SEMESTER B.TECH DEGREE EXAMINATION NOVEMBER 2016

(2013 SCHEME)

MODEL QUESTION PAPER

Course Code and Name: 13.703 MICROWAVE AND RADAR ENGINEERING (T)

Time: 3 hours   Maximum Marks: 100

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PART A (Answer *all* questions. *Each* carries **2** marks**)**

(1) List out the advantages of microwaves.

(2) Obtain the resonance frequency of rectangular cavity.

(3) Describe the working of a two hole directional coupler

(4) Mention the properties of S matrix

(5) Draw and explain a magic Tee.

6) Describe the structure of a microwave BJT.

(7) Discuss two valley theory of Gunn diode.

(8) Explain microwave frequency measurement by electronic means.

(9) Briefly explain Doppler frequency.

(10) Differentiate CW and Pulse radar.

*(10*2=20 Marks)*

PART B (Answer any one full question from each module.**)**

MODULE I

11.(a) With the help of neat diagram explain the working of a two cavity Klystron.
(10 Marks)

(b) A two cavity Klystron has the following parameters:
     Vo= 1000V , Ro= 40KΩ , Io= 25mA, f= 3 GHz
     Gap spacing in either cavity, d=1 mm
     Spacing between the two cavities, L= 4 cm
     Effective shunt impedance, excluding beam loading, Rsh= 30 KΩ.
   (i)   Find the input gap voltage to give maximum voltage V_2.
   (ii)   Find the voltage gain, neglecting the beam loading in the output cavity.
   (iii)   Find the efficiency of the amplifier, neglecting beam loading.
   (iv)   Calculate the beam loading conductance and show that neglecting it was
              justified in preceding calculations.   *(10 Marks)*

OR

12.Explain Reflex klystron oscillator. Obtain the output power and efficiency of the
same.   *(20 Marks)*

MODULE II

13. (a)   Briefly explain:
        (i) Hybrid rings
        (ii)H plane Tee   (*5*2=10 Marks*)

(b) An X band pulsed cylindrical magnetron has the following operating parameters:
    Anode voltage Vo=26 KV
    Beam current,Io=27 A
    Magnetic flux density Bo= 0.336Wb/m^2
    Radius of cathode cylinder, a=5cm
    Radius of vane edge to center, b=10cm
    Compute:
    (i)   The cyclotron angular frequency
    (ii)   The cutoff voltage for a fixed Bo
    (iii)   The cutoff magnetic flux density for a fixed Vo.   (*10 Marks*)

OR

14. (a) Draw and explain the working of directional coupler. Obtain the S matrix of
    directional coupler.
(b) Describe the working of circulators and isolators.   (*10*2=20Marks*)

MODULE III

15. Briefly explain :
    (a) IMPATT diode
    (b) ESAKI DIODE   (*10*2=20Marks*)
OR
16. (a) With help of neat diagram explain how the following parameters of
microwaves   are measured.
      i. Power   ii. wavelength
(b) Discuss the power frequency limitations of a transistor.   (*10*2=20Marks*)

MODULE IV

17. (a) With help of neat diagram explain FM-CW radar.   *8 Marks)*
 (b) Explain MTI radar in detail.   *(12 Marks)*
OR
18. (a) Explain various radar displays.   *(8Marks)*
(b) Discuss the Navigation using loop antenna.   *(12Marks)*