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

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.

(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 V2.
   (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  

(b) An X band pulsed cylindrical magnetron has the following operating parameters:
   Anode voltage $V_0$=26 KV
   Beam current, $I_{o}$=27 A
   Magnetic flux density $B_0$= 0.336Wb/m²
   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 $B_0$
   (iii) The cutoff magnetic flux density for a fixed $V_0$. 

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. 

MODULE III

15. Briefly explain :
   (a) IMPATT diode
   (b) ESAKI DIODE 

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. 

MODULE IV

17. (a) With help of neat diagram explain FM-CW radar. 
(b) Explain MTI radar in detail.

OR

18. (a) Explain various radar displays.
(b) Discuss the Navigation using loop antenna.