B.E. Eighth Semester (Electronics & Telecommunication / Electronics & Communication Engineering) (C.B.S.)

Microwave & Radar Engineering

P. Pages : 2 **NKT/KS/17/7560**

Time : Three Hours * 0 3 2 7 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Explain two cavity Klystron with Applegate diagram. **6**

b) Derive the expression for Hull cut off magnetic field equation for Magnetron. **7**

OR

2. a) A reflex Klystron operates at peak of n = 1 mode. The DC input power in 40 mw. **6**
$V_1 / V_0 = 0.278$. Find
i) Efficiency of RK
ii) O/P power in MW.
iii) If 20% of power delivered by electron beam is dissipated in cavity walls. Find power delivered to load.

b) Write short note on slow wave structure. **7**

3. a) What is scattering matrix ? Explain & prove unity property. **6**

b) A susceptance jβ is connected across the transmission line having characteristic impedance Zc. Find it's scattering matrix. **7**

OR

4. a) Derive the scattering matrix for Magic Tee & give it's applications. **6**

b) Obtain scattering matrix for directional coupler. Explain the term coupling factor & directivity of it. **7**

5. a) With two valley model theory, explain phenomenon of negative resistance in n-GaAs. **7**

b) What is parametric amplifier ? Discuss it's amplification mechanism with circuit diagram. **7**

OR

6. a) What is PIN Diode ? Explain the use of PIN diode as a switch & limiter. **7**

b) Explain the construction & working principle of IMPATT Diode. **7**

7. a) Describe the method of measurement for impedance by using Magic Tee. **6**

b) Explain the method of microwave power measurement using calorimeter. **7**

OR

8. a) Draw & explain setup for VSWR measurement & explain double minima method. **7**

b) What is phase shifter ? Explain Rotary phase shifter. **6**

9. a) Explain with the help of block diagram of pulsed Radar system. **7**

b) Derive the expression for Radar Range equation. **6**

OR

10. a) Which factors affects the radar performance ? Explain in details. **7**

b) What is the basic principles of Radar ? Explain modified Radar system. **6**

11. a) What is Doppler effect ? What are the drawback of CW Doppler Radar ? Explain FMCW Radar system. **7**

b) Find maximum active tracking range of deep space radar operating at 2.5 GHz & using peak pulse power of 0.5 mw with antenna diameter 64 m. Noise figure 1.1. & 5 kHz bandwidth. It radar beacon antenna diameter is 1 M & It's noise figure is 13 dB & transmitted pulse power is 50 W. **7**

OR

12. Write short notes on **any three.** **14**

i) Display methods.

ii) Radar Scanning Methods.

iii) Moving Target Indicator Radar.

iv) Applications of Radar.

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