

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

Microwave & Radar Engineering

P. Pages : 2

Time : Three Hours



NRJ/KW/17/4698

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 how bunching takes place in case of a two cavity klystron amplifier. **6**
- b) Find expression for velocity modulated beam in reflex klystron and derive bunching equation. **7**

OR

2. a) A helical TWT has diameter of 2mm with 50 turns per cm. (a) calculate axial phase velocity and anode voltage at which the TWT can be operated for useful gain. **6**
- b) Derive expression for cut off magnetic flux density with reference to cylindrical magnetron. **7**
3. a) Discuss the transmission characteristics of E-plane Tee and obtain its scattering matrix. **7**
- b) What is directional coupler? Explain in short its principle of operation, its properties and its types. **6**

OR

4. a) Explain the principle of operation of Faraday's Rotational Isolator in detail. **7**
- b) State and prove Carlin's theorem. **6**
5. a) What is Gunn effect? Draw energy band diagram of GaAs diode and explain its principle of operation. **7**
- b) What is PIN diode? Explain its working and draw its equivalent circuit. **7**

OR

6. a) With the help of diagram state Manley-Row's Relation as applied to parametric amplifier. What are the conditions for parametric up converter and down converter. **7**
- b) Write short notes on **7**
- i) IMPATT Diode
- ii) TRAPATT Diode.

7. a) Describe the Bolometer method of measurement of microwave power. **7**
- b) Draw the diagram of microwave test bench set-up to measure VSWR. How will you measure high values of VSWR. **6**

OR

8. a) Explain any one methods of measuring impedance of a terminating load in a microwave system. **6**
- b) Explain how Attenuation can be measured at microwave frequency. **7**
9. a) Draw basic block diagram of Radar system and explain its operation. **6**
- b) Derive Radar Range equation. **7**

OR

10. a) A RADAR system is used for identification of friend and foe which is operating at frequency of 8GHz and transmitting power 2.5MW with its parabolic reflection of $4.2 \text{ k } \Omega$. With bandwidth equal 2.1 MHz and noise figure of the receiver system is 9.5 dB. If the target is of 2.7 m^2 what is maximum limitation of the range of this Radar system. **7**
- b) Explain the operation of pulsed Radar system with neat block diagram. **6**
11. a) Draw neat circuit diagram of MTI ie moving target Indicator Radar system and explain its operation in detail. **8**
- b) Explain the following parameters of antenna **6**
- i) Radiation intensity
- ii) Antenna Beam width
- iii) Directivity

OR

12. a) Explain the various display methods in Radar. **7**
- b) What are the main drawback of CW Radar and how it overcomes in FMCW Radar? Explain it with neat diagram. **7**
