(b) Explain the principle of negative resistance in IMPATT cliode.   **7**

7. Discuss the following :

(i) Microwave FETs

(ii) TRAPATT oscillators

(iii) Gunn oscillators.   **3×5=15**

Section D

8. Explain the following limitations of M.T.I. radar : **15**

(i) Equipment instabilities

(ii) Scanning modulation

(iii) Internal fluctuation of clutter.

9. (a) Discuss about the multiple frequency CW radar.

(b) Derive the expression for Radars-equation to detect the target.   **7.5×2=15**

J-21-0149

B. Tech. EXAMINATION, 2021

Semester VII (CBCS)

MICROWAVE AND RADAR ENGINEERING

EC-702

Time : 2 Hours   *Maximum Marks : 60*

The candidates shall limit their answers precisely within 20 pages only (A4 size sheets/assignment sheets), no extra sheet allowed. The candidates should write only on one side of the page and the back side of the page should remain blank. Only blue ball pen is admissible.

Note : Attempt *Four* questions in all, selecting *one* question from any of the Sections A, B, C and D. Q. No. **1** is compulsory.

(Compulsory Question)

1. (a) What are the secondary constants of a line ? Why are the line parameters called distributed elements ?

(b) How to avoid the frequency distortion that occurs in the line ?

(c) What is Faraday's rotation law ?

(d) Give the drawbacks of klystron amplifiers.

(e) What is meant by strapping ?

(f) What are the principal limitations of conventional negative grid electron tubes ?

(g) What are the applications of Tunnel diode ?

(h) What are the various modes of transferred electron oscillators ?

(i) List the limitations of CW radar.

(j) How M.T.I. delay line canceller can be treated as a traversal filter ? $1.5 \times 10 = 15$

Section A

2. Explain the method of single stub impedance matching and double stub impedance matching using Smith chart.   **15**

3. (a) Explain the constants for the line of zero dissipation.   **7.5**

   (b) Derive the expression for TM modes in rectangular waveguides.   **7.5**

Section B

4. A reflex klystron operates under the following conditions :

$V_0 = 500$ V, Rsh $= 20$ kΩ and $f_r = 8$ GHz

L = 1 mm is the spacing between repeller and cavity. The tube is oscillating at f_r at the peak on $n = 2$ mode or $1\frac{3}{4}$ mode. Assume that the transit time through the gap and through the beam handling effect can be neglected :

(a) Find the value of repeller voltage V_R

(b) Find the dc necessary to give microwave gap of voltage of 200 V

(c) Calculate the electronic efficiency.   **15**

5. (a) Derive the expression for the cut-off magnetic flux density with reference to a cylindrical cavity magnetron.   **8**

   (b) Explain, how velocity modulation is utilized in Klystron Amplifier.   **7**

Section C

6. (a) Explain the physical structure and application of Bipolar Microwave transistor along with characteristics.   **8**