

Please check that this question paper contains 9 questions and 2 printed pages within first ten minutes.

[Total No. of Questions: 09]

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Uni. Roll No. ....

Program: B.Tech. (Batch 2018 onward)

EVENING

Semester: 6

13 JUN 2023

Name of Subject: Microwave and Radar Engineering

Subject Code: PCEC-116

Paper ID: 17178

Scientific calculator is Allowed

Time Allowed: 03 Hours

Max. Marks: 60

**NOTE:**

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

**Part – A**

**[Marks: 02 each]**

**Q1.**

- a) Draw the block diagram for Radar system.
- b) Define PRF in Radar systems.
- c) State the transferred electron effect.
- d) Define GPS orbital parameters.
- e) Discuss the high frequency effects in conventional tubes.
- f) Differentiate between Isolator and Circulator.

**Part – B**

**[Marks: 04 each]**

- Q2. Discuss the working principle of MTI radar with block diagram.
- Q3. Explain the Scanning methods used for radar with relevant sketch.
- Q4. Describe the working principle of TWT and state its two applications.
- Q5. Calculate the Avalanche zone velocity of a TRAPATT diode with doping Concentration  $N_A=2 \times 10^{15} \text{cm}^{-3}$  and current density  $J=20 \text{kA/cm}^2$ .
- Q6. How to measure microwave power using calorimeter?

Q7. Distinguish between Lobe switching and conical scan tracking systems.

Part – C

[Marks: 12 each]

Q8. Describe the principle of Magnetron along with Constructional diagram and Working. Also, discuss the disadvantages and applications of the Magnetron.

OR

Explain the operation of FMCW Radar with the help of a suitable block diagram. Also, Discuss the limitations of CW Radar in brief.

Q9. Calculate the maximum range of guided missile tracking Radar operates at 5GHz with 1M Watt peak power output. If the antenna diameter is 3m and the receiver has a bandwidth of 2MHz with 10dB noise figure. The target cross section is  $2\text{m}^2$ .

OR

Derive the relation for S-matrix of an E-II Tee Junction along with working diagram, characteristics and relevant cases.

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