



**Eighth Semester B.E. Degree Examination, Dec.2024/Jan.2025**  
**Radar Engineering**

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

**Module-1**

- 1 a. With neat block diagram, explain the basic Radar system. (10 Marks)  
b. Define the following terms with respect to RADAR  
i) Unambiguous range ii) PRT iii) PRF iv) P.W v) Clutter. (10 Marks)

**OR**

- 2 a. Calculate the maximum range of radar which operates at a frequency of 10 GHz. Peak pulse power of 600 kW, if the antenna effective area is 5 sq.mts and the area of the target is 20m<sup>2</sup> minimum receivable power is 10<sup>-13</sup> watts. (10 Marks)  
b. Describe in detail the various application of Radar. (10 Marks)

**Module-2**

- 3 a. Derive the fundamental form of Radar Range equation. (10 Marks)  
b. A RADAR system operator at 6 GHz, 3 mW power output. If the antenna diameter is 5 m and the receiver bandwidth is 1.5 MHz, and has a 12dB noise sigma, what is the maximum detection range for 1m<sup>2</sup> target? (10 Marks)

**OR**

- 4 a. Clearly explain the concept of False Alarm Time and probability in Radar. (10 Marks)  
b. Briefly explain the following system losses in RADAR  
i) Plumbing loss ii) Beam shape loss iii) Limiting loss. (10 Marks)

**Module-3**

- 5 a. State and explain Doppler effect. (10 Marks)  
b. Find the Doppler shift caused by a vehicle moving towards a RADAR at 96 KMPH, if the RADAR operates at 10 GHz. (10 Marks)

**OR**

- 6 a. With a neat block diagram, explain the operation of MTI RADAR using relevant waveform. (10 Marks)  
b. Explain the operation of Digital MTI Doppler signal processor with neat block diagram. (10 Marks)

**Module-4**

- 7 a. With neat diagram, explain amplitude comparison monopulse tracking radar in one and two coordinate. (10 Marks)  
b. Explain with neat sigma phase comparison monopulse. (10 Marks)

**OR**

- 8 a. Explain with relevant figure, techniques involved in conical scan tracking radar. (10 Marks)  
b. Explain in detail the types of Radar that can provide the tracks of targets. (10 Marks)

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Module 6  
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- 9 a. Mention the various function of Radar Antenna (10 Marks)  
b. What is duplexer? Explain the operation of balanced duplexer. (10 Marks)

**OR**

- 10 a. Explain the effect receiver noise sigma on the radar receiver. (10 Marks)  
b. Elaborate in detail the various types of radar displays. (10 Marks)

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