

Code No: **R18A0419****MALLA REDDY COLLEGE OF ENGINEERING & TECHNOLOGY****(Autonomous Institution – UGC, Govt. of India)****IV B.Tech I Semester Supplementary Examinations, April 2023****Radar Systems****(ECE)**

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Time: 3 hours**Max. Marks: 70**

Note: This question paper Consists of 5 Sections. Answer **FIVE** Questions, Choosing ONE Question from each SECTION and each Question carries 14 marks.

*********SECTION-I**

- 1 **A** What are the different range frequencies that radar can operate and give their applications? **[7M]**
- B** Compute the maximum detectable range of a radar system specified below: **[7M]**
 Operating wavelength = 3.2 cm, Peak pulse transmitted power = 500 kW,
 Minimum detectable power = 0.1pW, Capture area of the antenna = 5m² and
 a Radar crosssectional area of the target 5m² .G=1000;
- OR
- 2 **A** With the aid of basic block diagram explain working Principle of Radar Systems. **[7M]**
- B** List any five applications in a radar system and discuss the possible causes of each of them. **[7M]**

SECTION-II

- 3 **A** What is Doppler frequency shift? Establish a relation between Doppler frequency shift and radial velocity of a moving target. **[7M]**
- B** Draw the block diagram of FMCW Radar and explain its working. **[7M]**
- OR
- 4 **A** Draw block diagram of FMCW altimeter and explain its working. **[7M]**
- B** Give applications and limitations of CW Radar. **[7M]**

SECTION-III

- 5 **A** What are blind speeds? Suggest a method to reduce the effect of blind speeds for unambiguous detection of a moving target. **[7M]**
- B** Draw the block diagram of MTI Radar with power amplifier and explain its working. **[7M]**
- OR
- 6 **A** Describe the usage of filter banks in an MTI radar that gives range information also. **[7M]**
- B** Why does tracking radar have poor accuracy at low elevation angles? **[7M]**

SECTION-IV

- 7 **A** Explain working Principle of cross-correlation receiver. **[7M]**
- B** Discuss efficiency of non-matched filters? **[7M]**
- OR
- 8 **A** Explain performance of matched filter for non white noise. **[7M]**
- B** Derive the characteristic of matched filter. **[7M]**

SECTION-V

- 9** **A** Explain how a circulator can be utilized for a radar receiver protection **[7M]**
 B Write short notes of beam steering. **[7M]**
- OR
- 10** **A** Describe the operation of branch and balanced type duplexers with necessary diagrams. **[7M]**
 B What is relation between the radiation pattern and current feed pattern in a phased array radar? **[7M]**
