Reg. No. \_\_\_\_\_\_\_\_\_\_\_\_\_



**End Semester Examination – Nov / Dec – 2019**

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| **Code :** | **14EC2049** | **Duration :** | **3hrs** |
| **Sub. Name :** | **RADAR COMMUNICATION** | **Max. Marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | Derive the radar range equation as governed by minimum detectable sign to noise ratio. Explain the system losses that might occur in a long range surveillance radar and indicate the typical vaue of the losses due to each factor. | CO1 | 12 |
| b. | Explain the methods of integration of radar pulses to improve detection. Define the term integration improvement factor. How does this factor affect the radar range equation? | CO1 | 8 |
| **(OR)** | | | | |
| 2. | a. | A radar operating at 1.5 GHz uses a peak power of 2.5MW and has a range of 100nmi for objects, whose radar cross section is 1m2. If the minimum detectable receivable power of the receiver is 2x10-13 watts, what is the smallest diameter of the antenna reflector, assuming it to be a full paraboloid with an aperture efficiency of 0.65? | CO1 | 8 |
| b. | List down any four probabilistic models to characterize noise in echo waveforms. Explain with relevant examples. | CO1 | 12 |
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| 3. | a. | Draw the block diagram of CW radar using IF stage in the receiver and explain its operation. What is the ncessessity of IF stage and doppler filters bank? | CO1 | 12 |
| b. | Derive an expression for doppler frequency shift in terms of radial velocity. | CO1 | 8 |
| **(OR)** | | | | |
| 4. | a. | Explain the operation of moving target indicator radar, with the help of block diagram. | CO1 | 10 |
| b. | Write brief notes on   1. Blind speed 2. Delay Line Canceller. | CO1 | 10 |
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| 5. | a. | Explain the operation of a two-coordinate Amplitude comparison mono pulse tracking radar. | CO2 | 10 |
| b. | Discuss the effect of surface quality and reflection characteristics of a target on the angular tracking accuracy of a tracking radar. | CO2 | 10 |
| **(OR)** | | | | |
| 6. | a. | Compare and contrast conical scan with sequential lobing tracking techniques. | CO2 | 8 |
| b. | With the help of a suitable block diagram, expain the sequential lobing type of tracking technique in a tracking radar system. | CO2 | 12 |
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| 7. | a. | Describe the operation of coaxial magnetron oscillator in radar transmitter. | CO2 | 12 |
| b. | Write briefly the tuning mechanism in coaxial magnetron oscillator. | CO2 | 8 |
| **(OR)** | | | | |
| 8. | a. | Describe the types of reflector antenna and explain the working of parabolic reflector antenna. | CO2 | 12 |
| b. | List down the significance of Cassegrain and Gregorian feed techniques for parbolic antennas. | CO2 | 8 |
|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss various types of radar navigation techniques. | CO3 | 10 |
| b. | Briefly explain microwave radiation hazards due to radio wave propagation. | CO3 | 10 |