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

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**End Semester Examination – Nov/Dec – 2018**

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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. | What should be the pulse repetition frequency of a radar in order to achieve a maximum unambiguous range of 60 nmi? | CO1 | 5 |
| b. | How long does it take for the radar signal to travel out and back when the target is at the maximum unambiguous range? | CO1 | 5 |
| c. | If the radar has a pulse width of 1.5 µs, what is the extent(in meters) of the pulse energy in space in the range coordinate | CO1 | 3 |
| d. | How far apart in range(meters) must two equal-size targets be separated in order to be certain they are completely resolved by a pulse width of 1.5 µs? | CO1 | 4 |
| e. | If the radar has the peak power of 800 kW, what is the average power ? | CO1 | 3 |
| (OR) | | | | |
| 2. | a. | From first principles, derive the fundamental form of radar range equation. State the various parameters that influence the radar range performance. Considering noise as the chief factor limiting the receiver sensitivity, obtain the modified form of radar equation taking the effect of thermal noise | CO1 | 12 |
| b. | How RCS is modeled? What scenarios are address by Swerling Case-I to Case-IV? | CO1 | 8 |
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| 3. | a. | With neat sketch, discuss the principle and operation of FM-CW radar in brief. | CO1 | 12 |
| b. | How FMCW radar overcomes the shortcomings of Doppler CW radar? | CO1 | 4 |
| c. | If the beat frequency measured is 600 Hz, determine the range of the target. The frequency is modulated at the rate of 30kHz over a range of 1.5 kHz. | CO1 | 4 |
| (OR) | | | | |
| 4. | a. | Mention the use of delay line cancellor? Obtain the frequency response of a single delay line cancellor. | CO1 | 4 |
| b. | Explain following terms with respect to MTI radar:   1. Blind speed 2. Staggered PRF 3. Single and Double delay line canceller 4. The plot of the frequency response of 2 pulse and 3 pulse delay line cancellers | CO1 | 12 |
| c. | Distinguish between COHO and STALO. | CO1 | 4 |
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| 5. | a. | With neat sketch, illustrate the principle behind sequential lobing techniques. | CO2 | 14 |
| b. | Distinguish between the sequential lobing and conical scanning. | CO2 | 6 |
| (OR) | | | | |
| 6. | a. | Build a mechanism to detect the elevation and azimuth angle coordinates using amplitude comparison monopulse tracking radar. Brief explain the functional blocks and its significance. | CO2 | 12 |
| b. | List and explain any four losses in the radar propagation. | CO2 | 8 |
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| 7. | a. | With neat sketch, detail the impact of Magnetron oscillator in Radar transmitters. | CO1 | 12 |
| b. | List down any four important performance metrics in Magnetron oscillator. | CO1 | 8 |
| (OR) | | | | |
| 8. | a. | Justify how Cassegrain Feed-parabolic reflector antenna is helpful in radar antennas. | CO2 | 10 |
| b. | With a suitable diagram explain the construction and principle of operation of a Metal plate lens Antenna for radar applications. | CO2 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. |  | Explain in detail the various international standards and types of in Radar navigation techniques. | CO3 | 20 |