

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)**

**CLASS: B.TECH.
BRANCH: ECE**

**SEMESTER: VII
SESSION: MO/2022**

SUBJECT: EC423 RADAR ENGINEERING

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 25.
 2. Candidates attempt for all 25 marks.
 3. Before attempting the question paper, be sure that you have got the correct question paper.
 4. The missing data, if any, may be assumed suitably.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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|--------|--|---------|----|
| Q1 (a) | Draw the block diagram of a simple monostatic radar system | [2] CO1 | 2 |
| Q1 (b) | Explain the functionality of each pivotal components of a radar system. | [3] CO1 | 3 |
| Q2 (a) | Using radar range equation, determine the required transmit power for a radar: given $P_{rmin} = 10^{-12}$ Watts, $G=27$ dB, $\lambda=0.23$ m, $PRF=262$, $\sigma=5.0$ m ² . | [2] CO1 | 4 |
| Q2 (b) | Derive various forms of radar's equations with different powers of λ . | [3] CO1 | 3 |
| Q3 (a) | How minimum detectable signal is decided in a radar system? | [2] CO1 | 5 |
| Q3 (b) | Explain how critical the Signal to noise ratio of a receiver system. Write short notes on receiver noise. | [3] CO5 | 4 |
| Q4 (a) | " T_{fa} is more meaningful than P_{fa} " - Analyze in relation to the requirement of integration of pulses for effective radar signal detection. | [2] CO1 | 5 |
| Q4 (b) | Explain how pulse repetition frequency is related with the range ambiguities. | [3] CO1 | 4 |
| Q5 (a) | How central limit theorem defines the random process like noise voltage. What is the probability of detection of presence of target signal along with other interfering / noise signals | [2] CO1 | 5 |
| Q5 (b) | Define Radar cross section. How radar cross section can be decided for an irregular target with the help of a generic radar cross section diagram. | [3] CO1 | 3 |

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