

# CBCS SCHEME

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18AE/AS743

Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024

## Guidance, Navigation and Control

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.  
2. Missing data, if any, may be suitably assumed.

### Module-1

- 1 a. Define :  
i) Navigation  
ii) Guidance  
iii) Control.  
Explain different types of navigation in brief. (10 Marks)  
b. Illustrate the basic principle of RADAR with a neat sketch. Also mention the applications of RADAR. (10 Marks)

OR

- 2 a. Explain the MTI RADAR and Pulsed Doppler RADAR with a neat block diagram. Mention the differences between both. (12 Marks)  
b. List out the limitations of MTI performance. (08 Marks)

### Module-2

- 3 a. Briefly explain Sequential lobbing and Conical scanning method of tracking in RADARS. (10 Marks)  
b. Explain the principle of monopulse tracking for single angle co-ordinate system. (10 Marks)

OR

- 4 a. Explain the following :  
i) Inertial guidance  
ii) Components of INS  
iii) Gynoscope and its properties. (12 Marks)  
b. Write short notes on Global Positioning System. (08 Marks)

### Module-3

- 5 a. Define transfer function. Obtain the transfer function of closed loop and open control system. (10 Marks)  
b. Mention the differences between open loop and closed loop system. (10 Marks)

OR

- 6 a. Explain the principle of Roll stabilization system used in missile with a neat diagram. (10 Marks)  
b. Explain the operation of missile autopilot with a neat schematic diagram. (10 Marks)

### Module-4

- 7 a. Explain the various guidance phases of Surface to Air Missile (SAM) and Air to Air Missile (AAM) with a neat sketch. (10 Marks)  
b. Explain the principle of command guidance law with a neat schematic. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

OR

- 8 a. Define and explain terms with respect to missile guidance :
- i) LOS rate
  - ii) Lateral acceleration
  - iii) Closing velocity
  - iv) Miss distance
  - v) Blind zone
  - vi) Time – to – go
- b. Explain PN guidance law with a neat sketch.

(12 Marks)

(08 Marks)

**Module-5**

- 9 a. Describe the Integrated Flight/Fire Control System (IFFC) and various components associated with it.
- b. Explain the working of Pitch Orientational at Control System (POCS) with a neat diagram.

(10 Marks)

(10 Marks)

OR

- 10 a. Explain director fire control system with a neat diagram.
- b. Explain the following :
- i) Tracking Control Laws (TCL)
  - ii) Lateral Autopilot.

(10 Marks)

(10 Marks)

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