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17AE754

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022 Guidance, Navigation and Control

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Describe the basic principle of working of a radar. (10 Marks)
b. What is range? Explain maximum unambiguous range. (10 Marks)

OR

- 2 a. Calculate the maximum range of a radar for the following specification:
Gain of transmitting Antenna " G " = 4000
Peak power transmitted by the Radar " P_t " = 250kW
Effective aperture of receiving Antenna " A_e " = $4M^2$
Radar cross section of the target " σ " = $25M^2$
Power of minimum detectable signal " S_{min} " = $10^{-12}W$. (10 Marks)
b. Draw the block diagram of a pulse radar and mark the different components, explain their function. (10 Marks)

Module-2

- 3 a. Describe Mono Pulse radar function and explain how is angular measurement carried out. (10 Marks)
b. Explain Conical scanning. (10 Marks)

OR

- 4 a. Draw the neat block diagram of infrared guidance and explain. (10 Marks)
b. Describe Inertial Navigation system. (10 Marks)

Module-3

- 5 a. What is Transfer function of a closed loop system explain with neat sketch. (07 Marks)
b. What are the different altitudes referred in aerodynamics and define each of them? (10 Marks)
c. What are the characteristics of a closed loop system when compared to open loop system? (03 Marks)

OR

- 6 a. Describe roll stabilization of a missile. (08 Marks)
b. Describe with a neat sketch, the aerodynamics of a missile. (07 Marks)
c. With the help of a neat sketch, explain missile autopilot on any one axis. (05 Marks)

Module-4

- 7 a. Describe the proportional navigation guidance system. (10 Marks)
b. Make a table to compare the guidance system. (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. What is Augmented proportional system? (10 Marks)
b. Explain BTT in missile guidance system. (10 Marks)

Module-5

- 9 a. Draw the block diagram for lateral autopilot, explain each component. (10 Marks)
b. What modification can be made to lateral autopilot to keep the weight low? (10 Marks)

OR

- 10 a. Describe fire control system in a fighter aircraft. (10 Marks)
b. What is Autopilot? Explain the functioning of an Autopilot. (10 Marks)
