



CBCS SCHEME

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

Time: 3 hrs.

Max. Marks : 80

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

Module-1

- 1 a. Define rotor solidity, blade loading and figure of merit. (06 Marks)
b. Derive momentum theory analysis during hovering flight. (10 Marks)

OR

- 2 a. Explain Blade flapping, lead-lag and coning of blades. (04 Marks)
b. Derive blade element theory. (12 Marks)

Module-2

- 3 a. What is Ground Effect? (08 Marks)
b. Explain Helicopter turning with and without coning of the rotor blades. (08 Marks)

OR

- 4 a. What is the effect of Gross Weight during forward flight? (08 Marks)
b. What is Auto Rotation? (08 Marks)

Module-3

- 5 a. What are rotor airfoil requirements and how it affects on Reynold's number and Mach number? (06 Marks)
b. With the help of suitable graph, explain the possible dynamic behavior as exhibited by a typical helicopter. (10 Marks)

OR

- 6 a. Explain the development of shockwave on a typical rotor airfoil with suitable diagram. (08 Marks)
b. Write a note on flow characteristics for rotor in forward flight near the ground. (08 Marks)

Module-4

- 7 a. Discuss forward speed disturbance. (08 Marks)
b. Discuss tail rotor control. (08 Marks)

OR

- 8 a. Discuss static stability of Helicopter. (08 Marks)
b. Discuss main rotor control. (08 Marks)

Module-5

- 9 a. Discuss the empenage of helicopter. (08 Marks)
b. What is NOTAR? (08 Marks)

OR

- 10 a. Explain the factors affecting the rotor diameter and tip speed of Main Rotor. (08 Marks)
b. Discuss high speed rotorcraft. (08 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.