CBCS SCHEME

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17AE743

Seventh Semester B.E. Degree Examination, July/August 2022
Helicopter Dynamics

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Express the momentum theory analysis in hovering flight with its flow model. **(10 Marks)**
b. Derive and explain equilibrium about lead lag hinge. **(10 Marks)**

OR

2 a. Explain with expression –Disk loading, figure of merit, rotor solidity. **(10 Marks)**
b. Develop the expressions for blade element analysis in hover. **(10 Marks)**

Module-2

3 a. Draw and explain the different forces acting on helicopters. **(10 Marks)**
b. Summarise with expression, the speed for minimum power. **(10 Marks)**

OR

4 a. Derive and explain speed for maximum range. **(10 Marks)**
b. Write a brief note on :
i) Total power required in forward flight
ii) Factors affecting forward speed. **(10 Marks)**

Module-3

5 a. Explain along with expressions the effect of Reynold's number and mach number due to rotor airfoil aerodynamics. **(10 Marks)**
b. Write brief note on :
i) Rotor airfoil requirements
ii) Airfoil shape definition. **(10 Marks)**

OR

6 a. What are the different flow visualization techniques? Explain. **(10 Marks)**
b. Write a note on characteristics of rotor wakes in hover and forward flight. **(10 Marks)**

Module-4

7 a. Explain forward speed disturbance and yawing disturbance. **(10 Marks)**
b. Explain the dynamic stability aspects of helicopter. **(10 Marks)**

OR

8 a. Explain the vertical speed disturbance and side-slip disturbance. **(10 Marks)**
b. Demonstrate the different levels of handling qualities. **(10 Marks)**

Module-5

9 a. Explain the military derivatives of civil rotor craft. **(10 Marks)**
b. Summarise the different aspects empennage design of helicopters. **(10 Marks)**

OR

10 a. Write a note on general and operational requirements for a rotor craft. **(10 Marks)**
b. Explain the classifications of rotorcraft vibrations. **(10 Marks)**

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