R09

Code No: C7614

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH I SEMESTER EXAMINATIONS, APRIL/MAY-2012
ROTORCRAFT AERODYNAMICS
(AEROSPACE ENGINEERING)

Time: 3hours **Max.Marks:60**

Answer any five questions
All questions carry equal marks

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1.a) Derive an expression for the thrust of a rotorcraft in axial climb using Blade Element Analysis.
b) Explain the terms: Rotor Solidity and Blade Loading Coefficient.

2.a) Describe the functioning of the swash plate in a helicopter rotor.
b) Establish the requirement of cyclic pitch of a rotor blade.

3.a) Describe the four working states of the rotor in axial flight.
b) Explain autorotation and vortex ring state.

4.a) Explain, with the help of the relevant equation of dynamics, the requirement of thrust of a tail rotor.
b) Describe Fan-in-fin anti-torque system.

5.a) Describe Conda effect and Circulation controlled airfoils.
b) Describe the advanced designs of airfoils used in helicopter rotor.

6.a) Discuss pure angle of attack and pure plunging oscillations of an airfoil.
b) Describe sinusoidal gust and Sears's function.

7. Define Dynamic stall. Describe effect of airfoil shape on dynamic stall.

8. What are the characteristics of rotor wake in forward flight? Explain in detail.

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