Code.No: 37160 | R05 | SET-1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
IV.B.TECH - I SEMESTER REGULAR EXAMINATIONS NOV/DEC, 2009
HELICOPTER ENGINEERING
(AERONAUTICAL ENGINEERING)

Time: 3hours **Max.Marks:80**

Answer any FIVE questions
All questions carry equal marks

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1. a) Describe with sketch and plot the difference between conventional airplane and the helicopter.
   b) Discuss the advantages and disadvantages of a compound helicopter over a conventional helicopter [8+8]

2. Explain collective pitch and cyclic pitch in a helicopter. Describe their action in vertical and forward flights. [16]

3. a) Explain ' Vortex system' of rotor blades of a helicopter.
   b) Based in 'Blade element theory' derive the thrust coefficient and torque coefficient of a helicopter in lowering flight. [8+8]

4. a) Discuss rotor speeds and tip speeds.
   b) Define figure of merit in the contact of a helicopter.
   c) What are the limitations on the rotor speeds? [6+6+4]

5. A helicopter weights 5 tones and has s single rotor of 20m diameter. Estimate the power required to fly forward at a speed of 15m\s at sea level, if C_D= 0.008 .Assume if any additional data required , but give justification of reasonableness. [16]

6. a) Define the terms: state stability and dynamic stability of helicopter. Draw neat diagram.
   b) What are the factors effecting the stability of a helicopter? [8+8]

7. a) Describe the thrust vectoring in VTOL airplane. Make use of neat sketches.
   b) Bring the difference between VTOL and STOL aircraft. [8+8]

8. a) Explain the different types of hovercraft. Draw neat sketches.
   b) Describe the drag on a hovercraft on land, with expression (formulae) when ever possible.
   c) Describe qualitatively the difference between hovercraft flying over land and water. [4+6+6]

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