Code.No: 37160 | R05 | SET-3

**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) What is a rotor craft? What are the different types of rotor crafts?
   b) Explain with sketch and plots the requirement of tail rotor in a conventional helicopter. [8+8]

2. a) Explain the feature, merit and demerit of a fully articulated rotor.
   b) Describe flapping and feathering. [8+8]

3. a) Explain the following with respect to a helicopter.
   i) Hovering flight
   ii) Vertical flight
   iii) Forward flight.
   b) Derive the Thrust coefficient using blade element theory. [6+10]

4. Starting from an expression for the figure of merit of an optimum hovering rotor, Show that the figure of merit is a maximum when the blade section are feathered to the highest value of (lift coefficient) $^{3/2}$ / (drag coefficient) [$Cl3^{/2}/C\alpha$] [16]

5. a) Explain the following terms for a single rotor helicopter
   i) Induced power
   ii) Profile power
   iii) Parasite power.
   iv) Effects of altitude on performance
   b) Compare aero dynamic forces and rotor inclination in hover, vertical flight and forward flight. [8+8]

6. a) Explain the condition for the static stability of a helicopter .
   b) Is a single rotor helicopter stable? Discuss. [8+8]

7. a) Bring out the difference between tilt wing and vectored thrust airplane.
   b) How are the forces generated on helicopter in vertical take off? [8+8]

8. a) Discuss how lift and drag are generated in a hovercraft.
   b) Derive the expression for power required by a hovercraft. [8+8]

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