

Code.No: R05412107

R05

SET-1

**IV B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010**  
**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 rotorcraft? What are the different types of rotorcrafts?  
 b) Write the difference between compound helicopter and single rotor helicopter. [8+8]
2. a) What do you understand by the term “NOTAR” ? Describe one such system.  
 b) Explain with sketch, the principle and functioning of ‘Hinge-less rotor’ Helicopter. [8+8]
3. What is the purpose of using “equivalent” solidities in helicopter rotor performance studies? Explain pitfalls using such “equivalent” factors with rotors. [16]
4. Draw and explain the main features of the height-velocity diagram for a single engine/single – rotor helicopter. Explain if and/or how these curve(s) will change for
  - a) A single – rotor / twin – engine helicopter,
  - b) A tandem – rotor helicopter,
  - c) A single – rotor system with a high overall rotational inertia, and
  - d) A higher density altitude. [16]
5. a) Define the term static stability of a helicopter. Is a statically stable helicopter, dynamically stable as well?  
 b) What are the factors affecting the helicopter stability? [8+8]
6. Estimate the figure of merit curves for a rotating wing micro air vehicle in the 0.5kg weight class. Use any sensible assumed values for the induced power factor and profile drag coefficient. Based on the rotor design conditions that will be required for high hovering efficiency, determine the rotor operating conditions that will allow for maximum hovering flight endurance. [16]
7. a) Discuss the aerodynamics of an airplane propeller and a ducted fan/rotor used for forward motion of a Hovercraft.  
 b) Provide the principal details of a Hovercraft in as far as its forward and hovering motion is concerned. [8+8]
8. a) Explain the different types of hovercrafts with suitable diagrams.  
 b) Describe the types of jet machines used in hovercraft, explain briefly with diagrams. [8+8]

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  - d) A higher density altitude. [16]

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