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UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Program: B. Tech ASE **Semester – VII**
Subject (Course): Helicopter Engg. **Max. Marks : 100**
Course Code : ASEG-481 **Duration : 3 Hrs**
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Section A (4x5= 20) marks

1. Explain various helicopter rotor configurations with help of sketch.
2. What are aerodynamic limits of Helicopter rotor blades?
3. Describe helicopter control mechanism used for helicopter motion control.
4. Find the actual power required for a helicopter at sea level. It has Weight: 18000N and Rotor Radius=4 m (Figure of Merit=0.75).

Section B (5x8=40) marks

5. What is the effect of forward flight on Helicopter rotor aerodynamics?
6. What are various speed limits during climbing performance of Helicopter?
7. Derive linearized longitudinal equation of Motion of Helicopter.
8. Explain various Helicopter Stability problems due to various disturbances.
9. Derive the relation for power consumption of helicopter in vertical flight using momentum theory.
   or
10. Derive thrust approximation for helicopter in Hovering flight using blade element theory

Section C (2x20=40 Marks; ANY TWO)

11. A) Define the non-dimensional form of following terms used in Helicopter: thrust, power, torque, lift, drag, advance ratio, induced flow factor and figure of merit.
    B) Drive the *Range* and *Endurance* relation for Helicopter in level flight.
12. Compare *flapping*, *feathering* and *lagging* blade motions in Helicopter. What are the rotor blade mechanisms for these motions.
13. What are various sources of Vibrations in Helicopters? How Vibration Absorbers help in reducing various Helicopter Vibrations?