Enrolment No:	UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Sem Examination, Dec 2019

Course: Helicopter Engineering | **Semester: VII**
Program: B. Tech Aerospace Engineering | **Time: 03 Hrs**
Code: ASEG481 | **Max. Marks: 100**
No. of Pages: 02

SECTION A (4x5-20 Marks)

S. No.		Marks	CO
Q1	Why flapping Hinge is required on Helicopter rotor?	**4**	**CO1**
Q2	What is the significance of term *advance ratio* in Helicopter?	**4**	**CO2**
Q3	What are the stages of rotor aerodynamic during descending flight?	**4**	**CO3**
Q4	What is the effect of *speed disturbances* on Helicopter stability?	**4**	**CO4**
Q5	Explain any one active vibration control method in Helicopter.	**4**	**CO5**
	SECTION B (4x10=40 Marks)		
Q6	Compare flight control methods for different types of Helicopters configurations.	**10**	**CO1**
Q7	Show that Helicopter rotor in vertical climb has *induced velocity* twice of *free stream velocity*.	**10**	**CO2**
Q8	A Helicopter has a gross weight of 25500 kg. The rotor diameter is 10 m. Estimate the power required for the Helicopter to Hover at sea level. Assume Figure of Merit 0.75, Transmission losses=6%. If each of the two turbo-shaft engines delivers 4500kW, estimate the maximum vertical rate of climb at sea level.	**10**	**CO3**
Q9	Compare different types of *Vibration absorbers* used in Helicopter. *or* Compare different types of passive control method for Helicopter Vibration control.	**10**	**CO5**
	SECTION-C (2x20=40 Marks)		
Q 10	A) Explain autorotation phenomenon of Helicooter rotor. Why is it important? B) Derive expressions for required Helicopter *power coefficient* in vertical flight. What is the effect of speed on power required?	**20**	**CO2**
	or		

Q11	Derive trim equation of Helicopter in longitudinal and lateral motions. Hence, derive the expression for trim rotor incidence angle, α_D in longitudinal motion.	**20**	**CO4**
Q12	Describe different types of sources of Helicopter *Vibrations*. What measures are taken to reduce each of these types of Vibrations? Compare their merits and demerits.	**20**	**CO5**