Name:	
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2021

Course: Flight Dynamics and Control   **Semester: VI**
Program: B.Tech, ASE+AVE   **Time 03 hrs.**
Course Code: ASEG 3015   **Max. Marks: 100**

SECTION A

S. No.		Marks	CO
Q1.	Differentiate between rotating and non-rotating frame of reference.	5	CO1
Q2.	An acrobatic aircraft flying at 150 m/ s and a 30-deg angle of attack, executes a body axis roll at a rate of 150 deg/s. Determine the accelerations measured by onboard accelerometers.	5	CO1
Q3.	List various levels of Aircraft Flying Qualities.	5	CO2
Q4.	Given the characteristic polynomial $S^4 + 3s^3 + 2s^2 + 4s + 1 = 0$ Examine the stability of the system using Routh's stability criterion.	5	CO3
Q5.	Compare short period and phugoid longitudinal aircraft motions.	5	CO3
Q6.	Why flare maneuver is required during landing?	5	CO4

SECTION B

Q7.	An aircraft weighs 50,000 N and is in a steady level flight at 150 m/s at sea level. The drag polar is given by $C_D = 0.018 + 0.024 C_L$ The lift-curve slope of the wings is 0.095/deg, and the wing mean aerodynamic chord is 2.5 m. The lift-curve slope of the horizontal tail is 0.06/deg. Assuming a tail efficiency of 0.9, estimate the stability derivatives CLq and Cmq.	10	CO1
Q8	Why wing rock motion occurs in aircraft? How can it be prevented ?	10	CO2
Q9	Reduce following given block diagram. 	10	CO3
Q10	Sketch the root-locus for a unity feedback system with $$G(s) = \frac{k(s\ +\ 3)}{s(s\ +\ 2)(s\ +\ 4)}$$	10	CO3
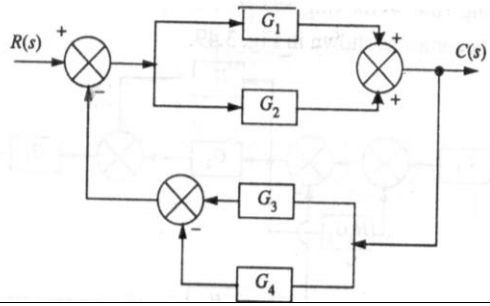
Q11	The single degree of freedom pitching motion of an airplane was shown to be represented by a second order differential equation. If the equation is given as $$\ddot{\theta} + 0.5\dot{\theta} + 2\theta = \delta_e$$ where the θ and δ_e are in radians. Estimate the rise time, peak overshoot and settling time for step input of the elevator angle of 0.10 radians.	10	CO4
	SECTION-C		
Q 12	Explain working principle of ILS system. Hence, find transfer function to design ILS Block diagram. Differentiate between ILS and SAS systems. **OR** What is the significance of small perturbation theory and hence linearize Force equation of motion in Z- direction of body fixed rotating frame. Hence, find transfer function to design altitude hold autopilot.	20	CO4