UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, December 2019

Course: Flight Mechanics 1	**Semester: Vth**
Program: B.Tech ASE/ASE+AVE	**Time 03 hrs.**
Course Code: ASEG3001	**Max. Marks: 100**

No.of pages:02

Instructions: Assume the necessary data if not given. Use suitable plots wherever required.

SECTION A 4*5 =20

S. No.		Marks	CO
Q 1	State the need of using "Standard Atmosphere" in flight mechanics	**4**	**CO1**
Q 2	Calculate pressure, temperature, density of the air at an altitude of 19 kms. Assume sea level conditions at 0 km.	**4**	**CO 1**
Q 3	Derive relation between geometric altitude and geopotential altitude.	**4**	**CO 1**
Q 4	Derive the expression of C_L and C_D for minimum drag condition assuming that flight is steady and level.	**4**	**CO 2**
Q 5	What is level coordinated turn? Explain in brief using suitable diagram.	**4**	**CO5**

SECTION B 4*10=40

Q 6	Explain about delta wing aerodynamics in subsonic and supersonic speeds respectively. OR Discuss the effect of aspect ratio, wing twist, wing planform and taper ratio on aerodynamic characteristics of a subsonic aircraft.	**10**	**CO2**
Q 7	Show that instantaneous turn radius in pull down maneuver is given by , $$R = \frac{V\infty^2}{g(n+1)}$$	**10**	**CO5**
Q 8	An aircraft is to be fitted with a NACA 23018 airfoil section, and flaps, which increase the maximum lift coefficient, by 60 per cent. If the landing speed must not be more than 85 knots, what is the highest possible value of the wing loading?	**10**	**CO3**
Q 9	Derive the expression to determine lift, drag and moment about L.E. of an airfoil using pressure distribution.	**10**	**CO2**

SECTION-C 2*20=40

Q 10	Derive the Breguet's equation of range and endurance for propeller driven and jet powered aircraft respectively.	20	CO4
Q 11	Derive the expression for distance covered and time taken for ground run during landing. OR An aircraft weighs 1500kg and having S=20m^2, takes 18 sec for one full horizontal coordinated turn at straight and level altitude. If C_L during turn is 1.1 and C_D =0.0175+0.06C_L^2 Find 1) aircraft bank angle 2) Engine thrust required during turn.	20	CO5