UPES

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, May 2018

Program: M.Tech ASE (UAV)   Semester – II
Subject (Course): Actuators and Sensors for UAV   Max. Marks   : 100
Course Code   : AVEG 7006   Duration   : 3 Hrs
No. of page/s: 02

	Section A (Attempt ALL questions) (5X4M =20 Marks)	Marks	Course Objective
1	What are the types of flows encountered in the flow measurement?	**4**	**CO4**
2	Compute the following a. Add 110111010 and 101101111 b. 2's complement of 11001001	**4**	**CO1**
3	Why is stalling an electric motor is likely to cause damage? What can be done to prevent it?	**4**	**CO5**
4	What values can be extracted from NMEA data?	**4**	**CO3**
5	List out the types of errors that occur in instruments.	**4**	**CO2**
	Section B (Attempt ALL questions) (4X10M =40 Marks)		
6	Elucidate the following terminologies with respect to signal conditioning: a. Amplification b. Attenuation c. Isolation d. Filtering e. Linearization	**10**	**CO2**
7	The treatment of instrument and measurement characteristics are divided into two categories namely static characteristics and dynamic characteristics. Discuss in detail all the static characteristics.	**10**	**CO2**

8	A sample of metal, temperature versus resistance has following measured values	**10**	**CO3**
	$T(^oF)$ $R(\Omega)$ 60 106.0 65 107.6 70 109.1 75 110.2 80 111.1 85 111.7 90 112.2		
	Calculate the linear approximation of resistance versus temperature between 60ºF and 90ºF. OR With reference to the data provided in question no.3, Calculate the quadratic approximation of resistance versus temperature between 60ºF and 90ºF for given data in table given below.		
9	Consider two types of variable speed drives. In the first one an electric motor with a power electronic servo drive is directly coupled to the load through a mechanism. In the second one an electric motor with a constant speed drive drives the pump in a hydraulic system which provides the variable speed drive to the load. Which one of these two is more energy efficient?	**10**	**CO5**
Section B (Attempt ALL questions) **(2X20M =40 Marks)**		
10	Explain the working of laser Doppler anemometer; discuss all the significant advantages and disadvantages OR Write a program to interface a BLDC motor and a potentiometer with ATMEGA 32 Microcontroller. Assume that the ESC used works on 50 Hz cycle. Draw the circuit diagram for the same. What should be the changes in the circuit if one wants to control the speed of DC motor?	**20**	**CO4**
11	Explain the working of LVDT with a neat sketch and With a neat sketch explain the operating principle of Ultrasonic Flow Meters.	**20**	**CO3**