Name: **Enrolment No:**	UPES UNIVERSITY WITH A PURPOSE

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

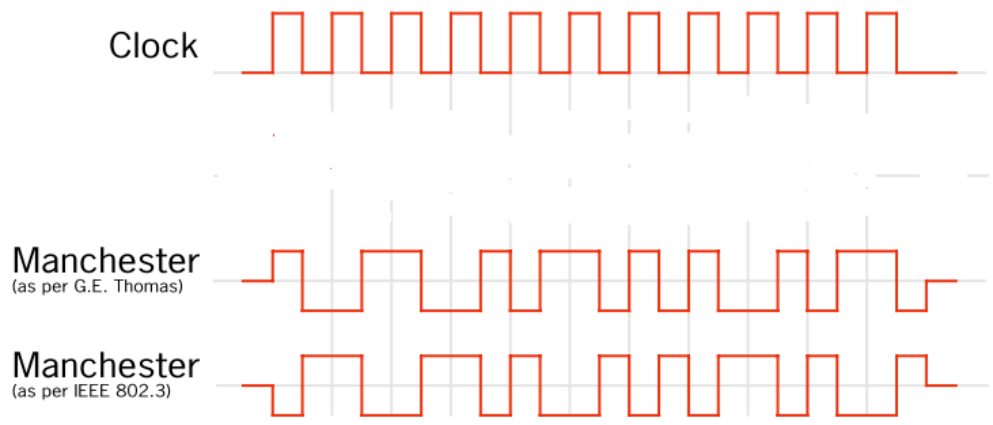
Course: Digital Avionics **Semester: VII**
Program: B. Tech ASE+AVE **Time 03 hrs.**
Course Code: AVEG 433 **Max. Marks: 100**

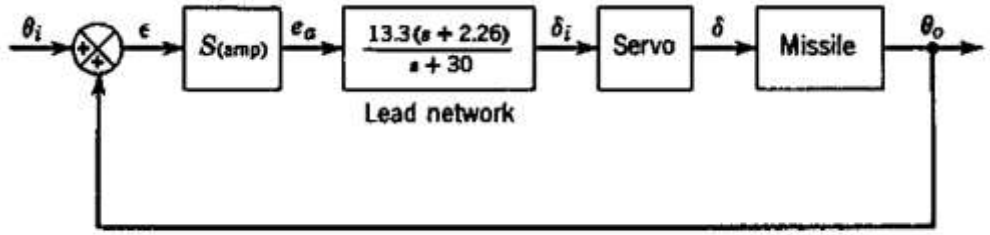
Instructions: Make use of *sketches/plots* to elaborate your answer. Brief and to the point, answers are expected.
The Question paper has three sections: Section A, B and C, Section B and C having internal choices.

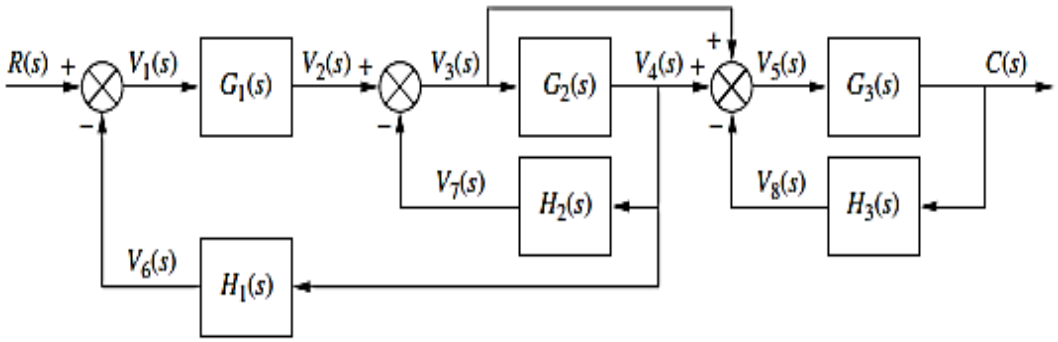
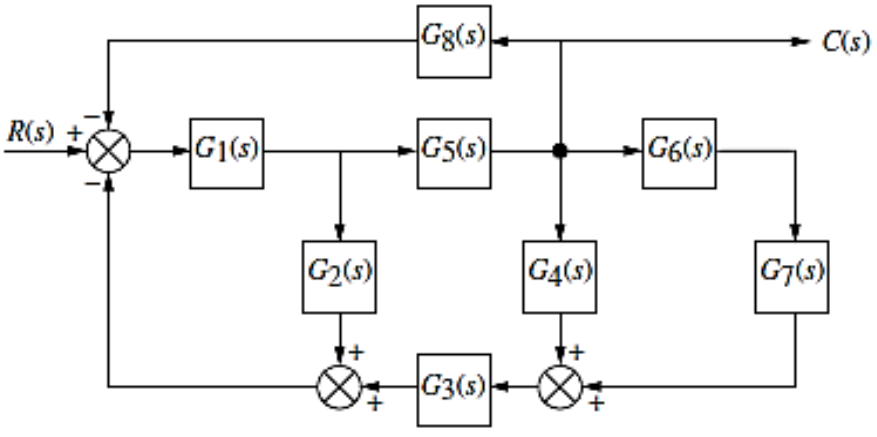
SECTION A

S. No.	Questions	Marks	CO
Q 1	Write shorts note on fiber optic Data buses **DOD-STD 1773**	**4**	**CO3**
Q 2	What are the components of feedback control system and types of feedback (FB) is employed in control systems. Explain the Effects of FB in Automatic Flight Control Systems (**AFCS**).	**4**	**CO2**
Q 3	What are the major factors consider designing the Helmet Mounted Display (**HMD**) of Fighter Aircraft.	**4**	**CO4**
Q 4	Explain the various role in civil and military aircraft.	**4**	**CO1**
Q 5	Discuss the Dead-Reckoning (**DR**) Navigation system with suitable examples	**4**	**CO5**

SECTION B

Q 6	For the following clock pulse explain the **Manchester Bi-Phase coding** and find the Data.  Also, state the Data buses of MIL-STD 1533B Military Aircraft protocols.	**10**	**CO3**

Q 7	Write the MATLAB programming for vanguard missile control system, amplifier gain $S_{(amp)}$ =10  *Vanguard control system (rigid missile)* **TF (servo) =$\frac{2750}{(S^2+84S+2750)}$;** **TF (Missile) = $\frac{-7.21}{(S+1.6)(s-1.48)}$**	**10**	**CO1**
Q 8	Find the following conversion: a) **$(132)_{10}$** to Binary b) **$(73.75)_{10}$** to Octal c) **$(137.21)_8$** to Decimal d) **$(C3A6)_{16}$** to Binary e) **$(82.25)_{10}$** to Hex equivalent	**10**	**CO3**
Q 9	a) A transmitter uses a single error-correcting code for the message using even parity. The message received at the receiving end is **1110101**. Check and correct the error. b) Find the required effective focal length *F*, Head up display (**HUD**) for civil aircraft TFOV of 20^0 and a CRT diameter of 50 mm. **(Or)** a) The response of a servomechanism is **$c(t) = 1+ 0.2\ e^{-60t} – 1.2\ e^{-10t}$** when subject to a unit step input. Obtain an expression for the system b) The following equation **$S^4 +0.811S^3 + 1.32S^2 +0.0102S +0.00695 = 0$**. Find the damping Ratio and undamped natural frequency for i) Phugoid oscillation ii) Short-Period oscillation	**10**	**CO4**

SECTION C			
Q 10	How GPS system works? A satellite transmit a signal at the nominal GPS time (by its clock) of $t_{sv,}$ However, the clock corrections broadcast in the data stream indicates corrections $\underline{\Delta} t_{sv,}$ to be added to the satellite clock time. The signal is received by the user at time $\underline{\Delta} t_{u,}$ By the user clock, which has got an error indicated by $t_{bias,}$ Write the range equations for the satellite which takes these into consideration. Show by a sketch how these factors affect the measured delay.	**20**	**CO5**
Q 11	Convert the block diagram to signal flow graph and determine the transfer function using mason's Gain formula  **(Or)** Reduce the block diagram shown in figure to a single block $\frac{C(s)}{R(s)}$  	**20** **20**	**CO2**