

Name:

Enrolment No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2020

Programme Name: B. Tech ASE+AVE

Semester : VII

Course Name : Digital Avionics

Course Code : AVEG 4001

Max. Marks: 100

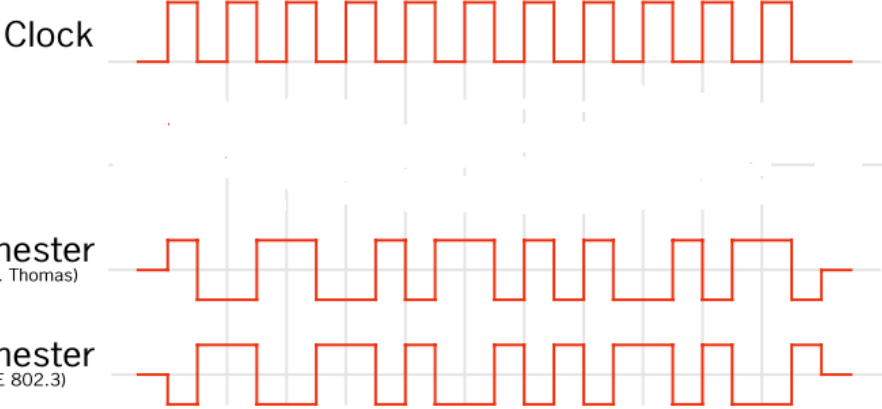
Instructions: The Question paper has three sections such as Section A, B and C Section. Section A (Type the Answer) Section (B & C) – Scan and upload. Make use of sketches/plots (Part B & Part C Section) to elaborate your answer. Brief and to the point, answers are expected.

SECTION A (6*5 =30 Marks)

S. No.	Questions	Marks	CO
Q 1	Differentiate between Fly-By-Wire Vs. Fly-By-Light aircraft systems.	5	CO1
Q 2	Discuss about the Integrated Flight Management Systems (FMS) in civil aircraft.	5	CO1
Q 3	What are factors to consider for designing the Helmet Mounted Display (HMD) in Military aircraft?	5	CO2
Q 4	Write short notes on ARINC 429 and ARINC 629 .	5	CO3
Q 5	Explain the Instrument Landing System (ILS).	5	CO3
Q 6	Explain about the Electro Magnetic Interference (EMI)? Justify how EMI affects the digital avionics system RTCA DO 160 standard.	5	CO4

SECTION B (5*10 =50 Marks)

Q 7	<p>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 a corrections Δt_{sv}, to be added to the satellite clock time. The signal is received by the user at time Δt_u,</p> <p>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.</p>	10	CO1
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Q 8	<p>Assume that the code word is (0011001) is transmitted and that 0010001 is received.</p> <p>The receiver does not "know" what was transmitted and must look for proper parities to determine if the code is correct. Designate any error that has occurred in transmission if even parity is used. Discuss the Hamming codes.</p>	10	CO2
Q 9	<p>As part of an aircraft's functional monitoring system, a circuit is required to indicate the status of the landing gears prior to landing. A green LED display turns on if all three gears are properly extended when the "gear down" switch has been activated in preparation for landing. A red LED display turns on if any of the gears fail to extend properly prior to landing. When a landing gear is extended, its sensor produces a LOW voltage. When a landing gear is retracted, its sensor produces a HIGH voltage. Implement a circuit to meet this requirement. Discuss about the AFCS.</p>	10	CO4
Q 10	<p>For the following clock pulse explain the operation of MIL STD 1553B and find the digital data.</p>  <p>Also, state the command/status/data words.</p>	10	CO2

Q 11	<p>Draw and explain the pitch rate feedback autopilot, for given jet transport aircraft system $\frac{K}{s(s+4)(s^2+4s+20)}$, Find the limiting value of servo gain (K).</p>	10	CO4
SECTION-C (1*20 = 20 Marks)			
Q 12	<p>a) Design the Very High Frequency Omni-directional range (VOR). 10 M</p> <p style="margin-left: 40px;">i) VOR Transmitter (Tx)</p> <p style="margin-left: 40px;">ii) VOR Receiver (Rx)</p> <p style="margin-left: 40px;">iii) Doppler VORs</p> <p>Also, discuss the working operations in details.</p> <p>b) What radio navigation aid determines the distance from an aircraft to a selected ground station by measuring the slant range the radio signal takes to travel to and from the station? Suppose 50 aircraft are interrogating a DME beacon and of these 10 are in search mode. How many response and filter pulses does the beacon transmit per seconds? Justify your Answer. 10 M</p>	20	CO3