

Roll No:



UNIVERSITY OF PETROLEUM AND ENERGY STUDIES

End Semester Examination, December 2017

Course Name: B. Tech ASE+AVE

Semester – VII

Course Name: Digital Avionics

Max. Marks : 100

Course Code : AVEG 431

Duration : 3 Hrs

No. of page/s: 03

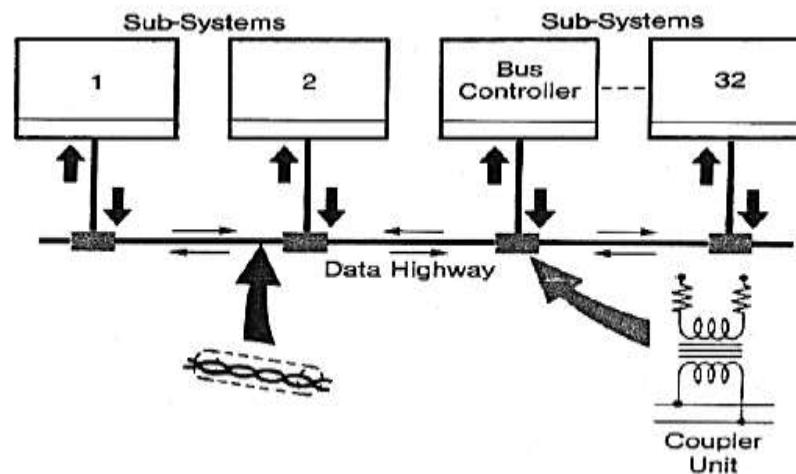
Note: Internal choice is given for Question No 10 & 11.

Section – A (5x4=20)

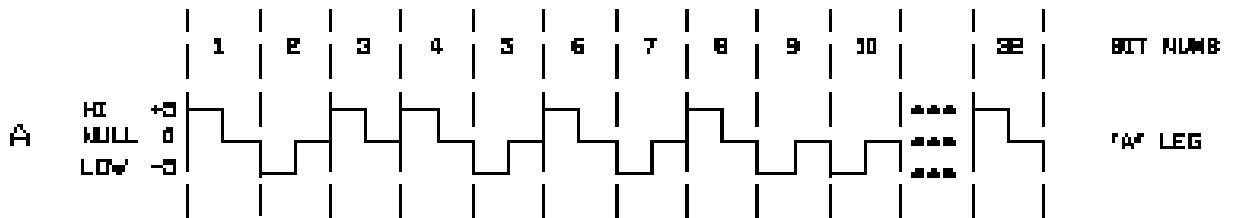
1. Explain the RTCA-DO 160 tests required for Digital avionics system
2. Find the required effective focal length F , Head up display (HUD) for civil aircraft TFOV of 20° and a CRT diameter of 50 mm.
3. What is Dear Reckoning Navigation system?
4. Explain the major factor to be considered to design the Helmet Mounted Display for fighter Aircraft?
5. Explain about the DOD-STD 1733 Fiber optic system

Section – B (4x 10 = 40 Marks)

6. For the given diagram explain the Interconnections of avionic sub-systems by multiplexed data bus From fig (1)



7. Explain the types of navigation system and compare the DR Navigation vs. Radio Navigation with examples.
8. a) Draw and explain the Bipolar Return to Zero (BRZ) encoding technique. **(06+04)**
For the given voltage level for 32-bits, Find the Binary Data using BRZ Encoding



- b) Explain about ARINC 629 civil transport aircraft data bus in details.
9. Explain the following Avionics System Architecture
- Federated Architecture (F-16 A/B)
 - Distributed Architecture (DAIS)

Section – C (20 x 2 = 40 Marks)

10. Explain the following military aircraft data buses
- Specifications & Protocol (MIL-STD 1553B)
 - Hardware elements (BC, RT, BM)
 - Word Formats (MIL-STD 1553B)
 - Message Formats (BC to RT, RT to BC, RT to RT)
 - Coupling Methods

(Or)

11. a) Explain the following segment in Global position System GPS **(12+08)**
- Space Segment
 - Control Segment
 - User Segment
- b) What are the components of feedback control system and what types of feedback (FB) is employed in control systems also Explain the Effects of FB in Control Systems.

12. Briefly explain the Distance Measuring Equipment (DME) with suitable diagram

- a) Interrogator
- b) Transponder
- c) Intermediate frequency
- d) Echo Signal
- e) Ranging circuit for DME

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Section – A (5x4=20)

1. Explain the DOD-STD-1773 fiber optic system
2. What are the components of feedback control system and what types of feedback (FB) is employed in control systems also Explain the Effects of FB in Control Systems.
3. Write short note on Chronometer and ALMANACS
4. Explain the various segment of Global Position System
5. Find the required effective focal length F , Head up display (HUD) for civil aircraft TFOV of 20° and a CRT diameter of 50 mm.

Section – B (4x 10 = 40 Marks)

6. Explain the **Manchester Bi-Phase coding**? For the clock pulse shown in Fig (1) explain the **coding** and find the digital Data.

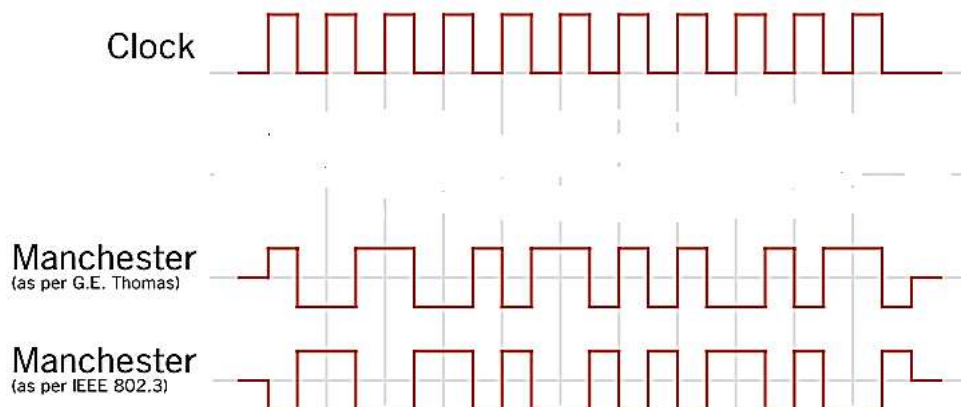


Fig (1)

7. Draw and explain the Instrumentation parts of the VOR Receiver in details.
 - a) Low pass Filter
 - b) Discriminator
 - c) Phase Shifting and adding Network
 - d) Resolver
 - e) Bridge phase Detector

8. Briefly explain about the Head up Display (HUD) of civil transport aircraft single element combiner and three element combiner. And compare HUD Vs. HMD

9. Explain the following Avionics System Architecture
 - a) Hierarchical Architecture (F-16 C/D, EAP)
 - b) Pave Pillar Architecture (F-22)

Section – C (20 x 2 = 40 Marks)

10. Briefly explain about the civil aircraft data bus ARINC 429 protocol
 - a) Specification & standard
 - b) BRZ Encoding
 - c) Word formats
 - d) SDI & SSM Matrix
 - e) What is the need for using two different speeds in ARINC 429

(Or)

11. a) Briefly explain about the types of Navigation system (12+08)
 - i) Visual navigation (or) pilotage navigation
 - ii) Celestial navigation (or) Astronomical navigation
 - iii) DR navigation
 - iv) Radio navigation
- b) Explain the Inertial Navigation System (INS)
 - i) Stepdown platform
 - ii) Gimballed platform

12. a) Differentiate between Fly By Wire Vs. Fly By Light (06+06+08)

b) Briefly explain about the Electromagnetic Interference (EMI) and how its affect the avionics system? Discuss about the various operating frequency Vs. avionics system

c) For the given diagram explain the Interconnections of avionic sub-systems by multiplexed data bus From Fig (2)

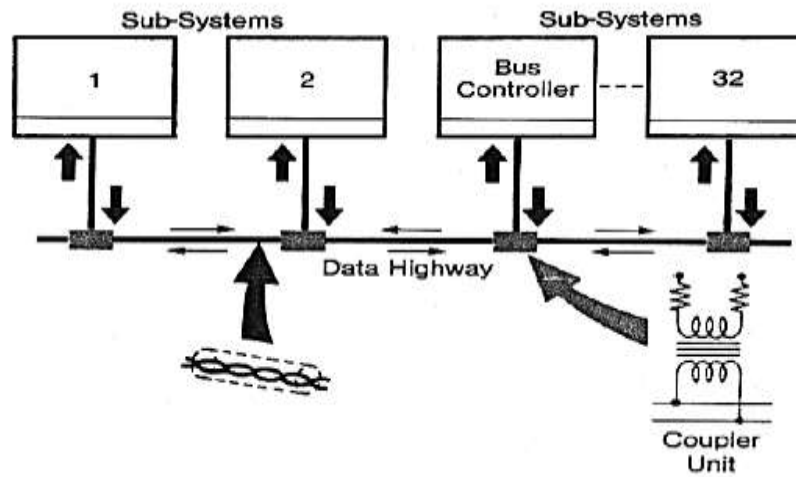


Fig (2)