Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER 2013

Subject Code: 170105 Date: 03-12-2013

Subject Name: Advance Avionics

Time: 10:30 TO 01:00 Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1 **(a)** What do you understand by Avionics Architecture? Discuss merits and demerits of various types of architecture involving Digital System Design. **07**

(b) Explain why partitioning is done. With the help of a block diagram explain software partitioning of F-16 fighter aircraft. **07**

Q.2 **(a)** Write short notes on (any two) : **06**

(i) Fault detection methodology
(ii) Fault tolerant software
(iii)Life cycle cost

(b) What is RTCA document DO-178? How does it differ from MIL STD 1750? **08**

OR

(b) Mention few important specifications related to environmental condition depicted in DO 160. Discuss their relevance in avionics design. **08**

Q.3 **(a)** How has Enhanced Ground Proximity Warning System superseded the older version Ground Proximity Warning System? Briefly explain its working in different modes. **08**

(b) Write short notes on (any two) : **06**

(i) Night Vision Goggle (NVG).
(ii) Aviator's Night Vision Imaging System (ANVIS).
(iii)Voice recognition

OR

Q.3 **(a)** Explain importance of considering Human Factor Engineering in design of flight deck of a commercial jet liner. **07**

(b) How does aircraft mission drive the avionics system design? Explain with examples from a large civilian passenger aircraft and a military jet fighter. **07**

Q.4 **(a)** Write short notes on (any two) : **08**

(i) Synthetic Vision
(ii) Redundancy
(iii)MTBF and MTTR

(b) With the help of a suitable block diagram explain on board maintenance system of Boeing 717 aircraft. **06**

OR

Q.4 **(a)** Suggest some measures by which even though the cost of aircraft is increasing yet we can reduce its operating cost. **07**

(b) Briefly explain factors of evaluation of System design. **07**

Q.5 **(a)** "Modern war is not won by fire power but by EM compatibility" discuss. **08**

(b) Write short notes on (any two) : **06**

(i) ECCM

(ii) Radar signature

(iii)Synthetic aperture Radar

OR

Q.5 **(a)** What is Fault Tree Analysis? Briefly mention its salient features with line diagram. **07**

(b) You are to design avionics system of a medium size Military Helicopter. Discuss possible systems you would select. Also mention steps involved in the process up to certification and validation. **07**

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KYE POINTS

1. (a) Basis and doctrine of structural aspects of Aviation System Design.
Salient features of possible architecture.
(b) Compartmentalization in respect of safe failure mode so that no other system gets affected.
Block Diagram and brief explanation.

2. (a)
(i) In process (on line) procedures for automatic fault detection and identification.
(ii) Aspects of redundancy and automatic changing over from unserviceable to serviceable sub system
(iii) Total cost for operating a facility for entire useful life.

(b) Specifications listed in document for certification
OR
(b) Limits of Voltage, Freq, Harmonics, Temperature, pressure, Humidity, vibration etc.

3. (a) Improvements made towards overcoming drawbacks of old system.
(b)
(i) Sketch of equipment and brief description of operation.
(ii) same as above
(iii) same as above
OR
(a) Pattern of human behavior under fatigue conditions etc and tendency of short cuts.
(b) Different phases of mission sketch, avionics support needed.

4. (a)
(i) Sketch and working principle.
(ii) Brief explanation of how associated in design aspect.
(iii) Aspects of reliability analysis in maintenance activities.
(b) Block diagram and explanation of each block.
OR
(a) Procedures involving reduction in operation and maintenance cost.
(b) Matters in reliability, maintainability, certificatibility etc

5. (a) Importance of Electromagnetic capability of a nation in deception to penetrate in to enemy territory to cause damage.
(b)
(i) Explanation of electronics counter counter measures. Waveform diagrams.
(ii) Effective size of the target as viewed by Radar.
(iv) Keeping the antenna stationary, beam movement to cover entire target in 3D space.
OR
(a) Proven methods of Boolean algebra terms and functions in fault analysis
(b) Name of various nav, comm., Radar systems with justification.
Sequence of action in certification.