

Code No: M2124/R07

**Set No. 1**

**IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011  
AVIONICS  
(Aeronautical Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions  
All Questions carry equal marks**

\*\*\*\*\*

1. How radar originated? Explain the developments in radar technology. Explain its importance in the field of aviation. [4+6+6]
2. (a) What factors must be considered while designing a 'Helmet mounted display'?  
(b) Compare and contrast HUD and HMD. [6+10]
3. Explain the ground and line-of-sight waves. How the propagation and noise characteristics of ground waves differ from line-of-sight waves? [4+4+8]
4. (a) What is Radio- Range? How VOR operates?  
(b) Explain the functioning of Automatic Direction Finder(ADF). [8+8]
5. (a) Explain how the "Exact Position Fix" can be obtained by "Triangulation".  
(b) Elucidate this methodology of Hyperbolic Navigation using three GPS receivers. [8+8]
6. Explain briefly "Inertial Navigation System" used by military aircraft and how it can be integrated with "Weapon - Aiming System". [16]
7. (a) What are the specialities of SSR used for civil airliner?  
(b) How the system can be utilized on TCAS - I, TCAS - II & TCAS - III. [8+8]
8. Draw the block-diagram of Digital Version Air-Data Computer and explain its function for Auto-Flight Control. [16]

\*\*\*\*\*

Code No: M2124/R07

**Set No. 2**

**IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011  
AVIONICS  
(Aeronautical Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions  
All Questions carry equal marks**

\*\*\*\*\*

1. Draw a block diagram to explain the “Integration” of AVIONIC SUITE in a military (typical fighter) aircraft. [16]
2. What is an HSI and what are its functions? Draw a typical HSI in operating mode showing the various indications and neatly label it. Explain the operation briefly. [4+6+6]
3. What is TCAS? Describe the principle and working/operation of TCAS. [6+10]
4. List the various navigational aids used to completely describe the navigation system of an aircraft? Describe the principle and working of any one of them. [6+10]
5. (a) A method to obtain “Position fix ” is called Triangulation. Explain.  
(b) Using a block-diagram explain how GPS Receiver can display  $\rho, v, t$  (position, Velocity and Time). [8+8]
6. (a) What is “Four -axis Stable Platform of INS”?  
(b) On the control pannel of CDU in the Cock-pit, there are 4 modes namely
  - i. Stand-By
  - ii. Align
  - iii. Navigate
  - iv. Update. Explain these modes. [8+8]
7. (a) Draw a block diagram to explain primary & secondary Surveillance Radar System.  
(b) Explain various modes of operation including Mode ‘C’ and ‘S’ as per ICAO specifications. [8+8]
8. Draw a simplified block diagram of Integrated Flight Management System of a modern aeroplane and explain the basic functioning of the system. [16]

\*\*\*\*\*

Code No: M2124/R07

**Set No. 3**

**IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011  
AVIONICS  
(Aeronautical Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions  
All Questions carry equal marks**

\*\*\*\*\*

1. (a) List out any 8 performance requirements of Avionic Systems of a State-of-Art Aircraft.  
(b) Differentiate Analogue Vs Digital Avionic Systems. [8+8]
2. “Head Up Display (HUD)” or “Head Down Display (HDD)” or “Multi Function Display MFD)” or “Head Level Display (HLD)” or “Helmet Mounted Display (HMD)” are the state-of-art display methodology in a military aircraft cock-pit display. Explain in detail. [16]
3. How antenna affects the performance of radio systems? What factors affect the selection of antennas for low and medium frequencies? [6+10]
4. (a) What is Radio- Range? How VOR operates?  
(b) Explain the functioning of Automatic Direction Finder(ADF). [8+8]
5. (a) Explain the principle of position fix using Hyperbolic Navigation.  
(b) Briefly explain the methodology of satellite navigation in general. [8+8]
6. (a) What is the difference between “Rate Gyro” and “Ring Laser Gyro (RLG)”?  
And its applications?  
(b) Draw a brief diagram of RLG and explain its advantages to enhance the accuracy of INS. [8+8]
7. A Secondary Surveillance Radar (for civil airliner) or Identification Friend or Foe (IFF for military aircraft) are very important for the safety of the craft. Using the “Basic Interrogation Reply Format” explain its detailed functioning and the facilities it can provide. [16]
8. (a) Draw a simple schematic of Take-off/STALL warning system for an Airliner.  
(b) “Auto-pilot” can be coupled to “NAVO-MATIC” of a civilairliner to obtain Integrated Auto-Flight control system. Explain the methodology. [8+8]

\*\*\*\*\*

Code No: M2124/R07

**Set No. 4**

**IV B.Tech I Semester Supplementary Examinations, Feb/Mar 2011  
AVIONICS  
(Aeronautical Engineering)**

**Time: 3 hours**

**Max Marks: 80**

**Answer any FIVE Questions  
All Questions carry equal marks**

\*\*\*\*\*

1. Explain and discuss the importance of avionics in the era of communication. [4+12]
2. Explain in detail with suitable block-diagram the Flight Deck Display Methodology using "Head-Up-Display & Multi Function Display (HUD & MFD)". [16]
3. (a) Explain the frequency band designation of Electro - Magnetic Spectrum.  
(b) What is the VHF and UHF frequency band and why Aeroplane's communication sets use generally V/UHF spectrum? Discuss its advantages and limitations? [8+8]
4. What are the various navigational aids used in a modern aircraft? Explain the principle and working of 'Automatic Direction Finder'? [6+10]
5. (a) Explain basic principles of operation of the three segments GPS system.  
(b) What is the signal structure of "NAVSTAR" Satellite Broadcasts and velocity? [8+8]
6. (a) List out basic differences (functional) between "Strapped Down" and "Stable Platform" INS.  
(b) Why "Strapped Down INS" is generally not used for Aircraft Navigation? [8+8]
7. TTCAS (Terrain and Traffic Collision Avoidance System) is the on-board Radar System for the "ultimate safety in the Air". Explain with full details its functions. [16]
8. (a) Draw a schematic lay-out of a modern civil transport airplane Avionics architecture using triplex redundant ARINC-429 DATA Bus.  
(b) Using the above schematic layout explain Boeing-777 Airplane Control and Management System. [8+8]

\*\*\*\*\*