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# MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

*(A constituent unit of MAHE, Manipal)*

## VII SEMESTER B.TECH. (AERONAUTICAL ENGINEERING)

## END SEMESTER EXAMINATIONS, NOV 2019

SUBJECT: AVIONICS AND NAVIGATION SYSTEMS [AAE 4103]

**REVISED CREDIT SYSTEM**
**(23/11/2019)**

Time: 3 Hours MAX. MARKS: 50

**Instructions to Candidates:**

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

**1A.** Explain the A-380 aircraft electrical system-power generation, conversion and distribution with neat diagram. Why essential equipments are always connected with global electrical busbar? **[03]**

**1B.** Describe the challenges associated with aircraft autopilot systems during turbulence. What are the corrective action taken by the pilot? **[03]**

**1C.** How FMS supports for efficient engine performance and trajectory optimization during flight? Sketch the modern Airbus or Boeing aircraft FMS and briefly explain its functions. **[04]**

**2A.** Fly-by-Wire is current trend in aircrafts. Justify with its advantages, digital implementation challenges, and need of redundancy and failure survival with neat diagram. **[04]**

**2B.** What do you mean by all electric aircraft? What are the types of electrical power system (voltage, frequency etc) available in the Aircraft? Justify with any four aircraft (as example). **[03]**

**2C.** Why technological advancement in aircraft data bus became compulsory to implement modern or future avionics systems? Justify with one example. **[03]**

**3A.** What do you mean by ADS-B and why modern and future aircrafts should be compliant with ADS-B receiver? **[02]**

**3B.** Describe the basic components of microwave landing systems for full capacity operation? What are the advantages to transmit signal at operational frequency of MLS? **[04]**

**3C.** Why VOR-DME is advisable to be used simultaneously? Explain the conventional VHF Omni-Directional Range operating principle and block diagram with neat sketch. **[04]**

**4A.** Justify the working principle of a weather radar with example. Explain the weather radar system components, its function and placement in the modern aircraft. **[04]**

**4B.** List 5 types of antenna currently available and their placement on the aircraft with challenges involved. **[03]**

**4C.** Compare the modern A-380 and B-777/787 Glass cockpit layout with neat diagram and their place in the generation of avionics architecture. List the critical instrument's informations displayed on various screens available. **[03]**

**5A.** With neat sketch explain the HUD head motion box concepts, its importance and challenges. How to improve the total field of view? **[03]**

**5B.** Justify the importance and technical advancement of INS, AHRS and GNSS-INS. What is the of working theory of GNSS-INS system? **[03]**

**5C.** List the databuses used in the A-380 aircraft or B-787. Also explain the ARINC-629 protocols, topology, electrical characteristics and signal transfer with neat diagram. **[04]**