CBCS SCHEME

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18AS34

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Introduction to Aerospace Engineering

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. An earth satellite is in an orbit with Perigee altitude of 400km and an eccentricity of e = 0.6. Find the Perigee radius, Apogee Radius, Semi major axis, a true anomaly averaged radius. The apogee velocity, the orbit of the velocity, the true anomaly, satellite speed, flight path angle. **(10 Marks)**

b. Derive the hydrostatic equation and the relation between Geopotential and Geometric altitude. **(10 Marks)**

OR

2 a. Explain about Kepler's law of planetary motion, Newton's law and the orbital elements with neat sketch. **(10 Marks)**

b. Define about sun-synchronous orbit, Hoffman's transfer orbit, geo synchronous orbit. **(10 Marks)**

Module-2

3 a. Derive the derivation for speed of sound "a" with example. **(10 Marks)**

b. Explain center of pressure and its significance and also explain airfoil nomenclature. **(10 Marks)**

OR

4 a. Derive the Bernoulli's theorem for generation of lift and the pressure distribution over a wing. **(10 Marks)**

b. Explain about Aerodynamic lift, lift co-efficient, and lift curves and also discuss about the significance of supersonic flight effects. **(10 Marks)**

Module-3

5 a. List and summarize the working principle of Gas Turbine Engine with its classification. **(10 Marks)**

b. Distinguish the difference between the convergent exhaust nozzle and Convergent-Divergent Exhaust Nozzle with neat sketch. **(10 Marks)**

OR

6 a. Explain the classification of Rocket propulsion with neat sketch. **(10 Marks)**

b. Summarize about space exploration. **(05 Marks)**

c. Determine the mass of propellant to send a 2500kg spacecraft from LEO to Mars (0.7 yr mission) and specific impulse of 310- sec. And also explain about rocket performance calculation. **(05 Marks)**

Module-4

7 a. What is a structure, explain the types of aircraft structural members and also explain the different types of loads and stresses acting on aircraft structure. **(10 Marks)**

b. Explain the difference between Mono-coque, semi-monocoque and geodesic structure and also the typical wing and fuselage structure with neat sketch. **(10 Marks)**

OR

8 a. Distinguish the difference between aluminium alloy, titanium alloy, magnesium alloy, and stainless steel. **(10 Marks)**

b. Explain composite materials for aerospace applications. **(10 Marks)**

Module-5

9 a. Explain briefly about, instruments displays, navigation instruments and basic air data systems and probes with neat sketch. **(10 Marks)**

b. Explain about Mach meter, Air speed Indicator, Vertical speed Indicator, Altimeter, and Gyro based Instruments with neat sketch. **(10 Marks)**

OR

10 a. Explain about aircraft air conditioning and cockpit pressurization system with neat sketch. **(10 Marks)**

b. Explain about aircraft fuel system, fire protection system, Ice and Rain projection system. **(10 Marks)**

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