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BAS-025

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

December, 2015

BAS-025 : SPACE DYNAMICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. Explain the launch site and launch azimuth velocity penalty by making use of a plot. *10*

2. What are the phases of a ballistic missile ? Explain with the help of a neat diagram. *10*

3. Prove that optimum inter-planetary trajectory is a heliocentric ellipse, tangential to both the Earth's orbit and to the target planet's orbit. *10*

4. Explain the following in brief : *5+5*

   (a) Axis of the ecliptic

   (b) Vernal equinox and Autumnal equinox

5. (a) Explain the reference frame, where the sun is taken as origin and compare it with the reference frames usually considered for satellite orbits. *4*

(b) Briefly describe the following : *6*

(i) Time of flight

(ii) Re-entry phase

(iii) Trajectory geometry

6. Describe Cowell's method and Encke's method in detail. *10*

7. Sketch the velocity hodographs for elliptic, parabolic and hyperbolic motion. Also, explain them in detail. *10*

8. State Kepler's laws. An Earth bound satellite is so positioned that it appears stationary to an observer on the Earth and serves the purpose of a fixed relay station for intercontinental transmission and other communications. What would be the height at which the satellite should be positioned and the direction of its motion ? *10*

9. (a) Derive the equation of orbit for a spacecraft moving in the gravitational field of the Earth. *5*

(b) Explain the various approximate models of motion that are used to study the motion of a spacecraft. *5*