Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

MANIPAL

A Constituent Institution of Manipal University

V SEMESTER B.TECH. (AERONAUTICAL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: ORBITAL MECHANICS [AAE 4012]

REVISED CREDIT SYSTEM
(05/01/2017)

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A. What are the contributions of Galileo for the development of Celestial Mechanics? **(2)**

1B. State and prove Kepler's third law **(3)**

1C. Calculate the altitude and speed of a geostationary earth satellite. **(5)**

2A. How a satellite can be shifted from an initial orbit to another orbit of different eccentricity and inclination? **(2)**

2B. Explain Hohmann transfer with necessary diagrams. **(3)**

2C. Find the total delta-v requirement for a bi-elliptic transfer from a geocentric circular orbit of 7000 km radius to one of 105,000 km radius. Let the apogee of the first ellipse be 210,000 km. **(5)**

3A. Explain synodic time. **(2)**

3B. What do you mean by Sphere Of Influence (SOI) of a planet? **(3)**

3C. Calculate the minimum wait time for initiating a return trip from Mars to earth. Radius of earth is 149.6 X 10^6 Km. Radius of Mars is 227.9 X 10^ 6 Km. μ of sun is 132.7 X10^9 units **(5)**

4A. What is orbit determination process? Explain various methods involved. **(2)**

4B.	Explain orbital elements with proper diagram.	**(3)**
4C.	How position and velocity vectors of a satellite is determined using Lagrange co-efficients.	**(5)**
5A.	What are the consequences of orbital perturbations?	**(2)**
5B.	Explain earth centered inertial coordinate system with proper diagram	**(3)**
5C.	Explain various methods employed for space debris removal.	**(5)**