**B.A./B.Sc. 6th Semester Mathematics Core (Major) Syllabus**

**Course Code: CT-4-MTH-604**

**Course Title : Space dynamics and Relativity**

**Total Marks : 80**

**Objective :** Students will be introduced to the application of Mathematical principles to the problems of Space Dynamics and Relativity.

**A. Space Dynamics Lecture Hours: 40**

**Unit I:** Spherical Trigonometry: Spherical triangles and its properties, the sine-cosine formulae, four parts formula. **(Lecture Hours: 12)**

**Unit II:** Coordinate systems: Position on the earth surface, horizontal system, equatorial system, ecliptic system, elements of the orbit in space, rectangular coordinate system, orbital plane coordinate system, transformation of systems. **(Lecture Hours: 16)**

**B. Relativity Lecture Hours: 40**

**Unit I:** Classical theory of relativity: Inertial frame, Galilean transformation, Michelson and Morley experiments. **(Lecture Hours: 9)**

**Unit II**: Lorentz transformation, equations, composition of velocities in terms of rapidity. Lorentz transformation as rotation, consequences of Lorentz transformation equation viz. Lorentz-Fitzgerald contraction, Time dilation, the clock paradox, space like and time like integrals. **(Lecture Hours: 16)**

**Unit II:** Relativistic mechanics : The relativistic conception of mass increasing with velocity, transformation laws of mass, velocity, acceleration, density, momentum, energy and force. The mass energy relation and simple examples. **(Lecture Hours: 15)**

**Text Books :**

[1] Text book of Astronomy; Smart, Oxford University Press.

[2] The foundations of Astro-dynamics; A. E. Roy, Mcmillan Co., New York.

[3] An Introduction to Celestial Mechanics; T. E. Sterne, Inter-Science Pub.

[4] Introduction to Special Relativity; Robert Resnick, Wiley Intl.

[5] The Theory of Relativity; P.M. Ray.

[6] The Mathematical Theory of Relativity, A.S. Edington