THE TWENTY EXAM QUESTIONS

1 Discuss methods of measuring distances to Moon, Sun and planets.

2 Derive Kepler's law for circular motion.

3 Derive the escape velocity formula.

4 Calculate the gravitational energy of the Sun and show that it cannot be the source for solar luminosity.

5 Argue that the nuclear energy is sufficient to support solar luminosity.

6 Discuss methods of measuring distances to stars.

7 Discuss masses of stars.

8 Discuss types of astrophysical black holes.

9 Estimate the size of a black hole.

10 Discuss orbits of bodies in the Solar System using the effective potential method.

11 What is the observational evidence of the Dark Matter in our Galaxy?

12 In a particular galaxy the velocity curve is constant over a large range of radii, and equal 300km/sec at a particular radius of 10kpc in this range. Estimate the mass inside this radius.

13 Calculate the velocity curve (how velocity depends on radius) in a galaxy with constant density of mass.

14 Why a collision of with a 10^{15} [g] black hole is not dangerous for the life on Earth? Support your arguments by some calculations.

15 Discuss difficulties in finding Dark Matter in our Galaxy.

16 Explain the moving cluster method for measuring distances.

17 Explain terms: intensity, flux, luminosity, frequency (for light).

18 Explain how do we measure radial velocities of distant objects.

19 What is the evidence for the Dark Energy in the Universe?

20 Discuss different cosmological models, with zero, positive, and negative curvature.