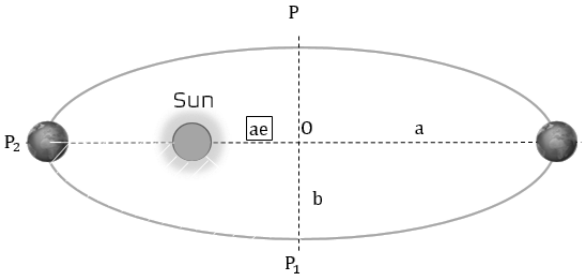
Q.1 The torque of a planet about the centre of Sun is

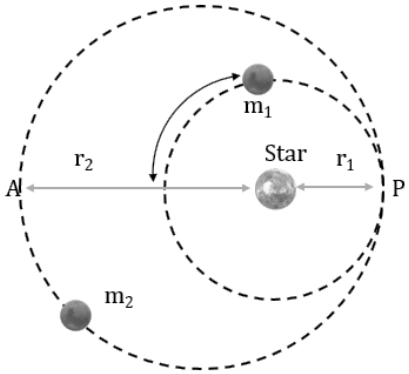
(A) Zero **(B)**Negative **(C)** Positive **(D)**Dependent on mass of planet

Q.2 A planet revolves around the sun in an elliptical orbit of eccentricitye. If T is the time period of the planet then the time spent by the planet while moving from closest point to the sun to the end points of minor axis is [For ellipse eccentricity , $0 < e < 1$]



(A) $T\left(\frac{1}{4}-\frac{e}{2\pi}\right)$ **(B)** $\frac{T_e}{\pi}$ **(C)** $\left(\frac{e}{\pi}-1\right)$ **(D)** $\frac{\pi T}{e}$

Q.3 Two planets of equal masses orbit a massive star. Planet m_1 moves in a circular orbit of radius 110^8 km with a period of 2 years and planet m_2 moves in an elliptical orbit with closest distance $r_1 = 110^8$ km and farthest distance $r_2 = 1.8 \times 10^8$ km, as shown. Using the fact that the mean radius of an elliptical orbit is the length of the semi-major axis, find the period of m_2's orbit.



(A)3.31 years **(B)**2.21 years **(C)** 1.51 years **(D)**6.62 years

Q.4 A planet of small mass m moves around the Sun of mass M along an elliptical orbit such that it's minimum and maximum distances from sun are r and R respectively. Its period of revolution will be:

(A) $2\pi\sqrt{\frac{(r+R)^3}{6GM}}$ **(B)** $2\pi\sqrt{\frac{(r+R)^3}{8GM}}$ **(C)** $2\pi\sqrt{\frac{(r+R)^3}{3GM}}$ **(D)** $2\pi\sqrt{\frac{(r+R)^3}{6GM}}$

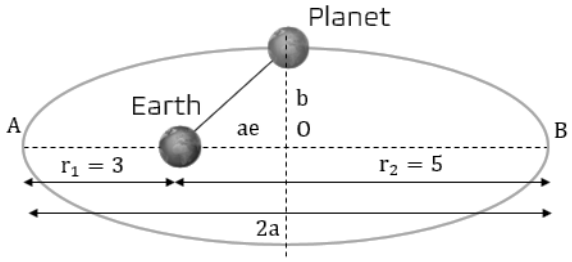
Q.5 A satellite is orbiting around earth in a circular orbit of radiusr. A particle of mass m is projected from satellite in forward direction with velocity $v = \sqrt{2/3}$ time's orbital velocity (this velocity is given with respect to earth). During subsequent motion of the particle, its minimum distance from the centre of earth is

(A) $\frac{r}{2}$ **(B)** $\frac{2r}{3}$ **(C)** $\frac{r}{3}$ **(D)** $\frac{4r}{5}$

Q.6 A satellite is moving with a constant speed 'v' in a circular orbit about the earth. An object of mass 'm' is ejected from the satellite such that it just escapes from the gravitational pull of the earth. At the time of its ejection, the kinetic energy of the object is

(A) $\frac{1}{2}mv^2$ **(B)** mv^2 **(C)** $\frac{3}{2}mv^2$ **(D)** $2mv^2$

Q.7 The satellite is moving in an elliptical orbit about the earth as shown in figure, The minimum and maximum distances of satellite from earth are 3 units and 5 units, respectively. The distance of satellite from the earth when it is at P is equal to



(A) 4 units **(B)** 3 units **(C)** 3.75 units **(D)** None of these

Q.8 A geostationary satellite is orbiting the earth at a height of 5R above the surface of earth, R being the radius of the earth. The time period of another satellite (in hours) at a height of 2R from the surface of the earth will be

(A) $6\sqrt{2}$ **(B)** $\frac{6}{\sqrt{2}}$ **(C)** 5 **(D)** 10

Q.9 In an orbit if the time period of revolution of a satellite is T, then potential energy (PE) is proportional to $\frac{1}{T^x}$

(A) $\frac{1}{3}$ **(B)** $\frac{2}{3}$ **(C)** $\frac{4}{3}$ **(D)** 3

Q.10 A planet is revolving around the sun as shown in elliptical path. Which of the following is the correct statement?

(A) The time taken to travel the path DAB is less than that forBCD.

(B) The time taken to travel the path DAB is greater than that forBCD.

(C) The time taken to travel the path CDA is less than that forABC.

(D) The time taken to travel the path CDA is less than that forABC.

ANSWER KEY

Q.	1	2	3	4	5	6	7	8	9	10
Sol.	(A)	(A)	(A)	(C)	(A)	(B)	(A)	(A)	(B)	(A)