Prayas JEE (2025)

Physics

Gravitation

DPP: 3

Q1 Two satellite A and B, ratio of masses $3:1$ are in circular orbits of radii r and $4\mathrm{r}$. Then ratio of total mechanical energy of A to B is

(A) $1:3$ (B) $3:1$

(C) $3:4$ (D) $12:1$

Q2 Two satellites A and B go round a planet P in circular orbits having radii $4R$ and R respectively. If the speed of the satellite A is $3\ \mathrm{V}$, the speed of the satellite B will be

(A) $12\ \mathrm{V}$

(B) $6\ \mathrm{V}$

(C) $4/3\ \mathrm{V}$

(D) $3/2\ \mathrm{V}$

Q3 An earth satellite S has an orbit radius which is 4 times that of a communication satellite C. The period of revolution of S is

(A) 4 days (B) 8 days

(C) 16 days (D) 32 days

Q4 An artificial satellite of mass m is revolving around in a circular orbit of radius r . If the mass of earth is M, angular momentum of the satellite with respect to the centre of earth is

(A) $\sqrt{GMm^2r}$

(B) $2m\sqrt{GMr}$

(C) $2M\sqrt{Gmr}$

(D) $\sqrt{\frac{GM}{r}}$

Q5 Two identical satellites are at the heights R and $7R$ from the Earth's surface. Then which of the following statement is incorrect:- ($R =$ radius of the earth)

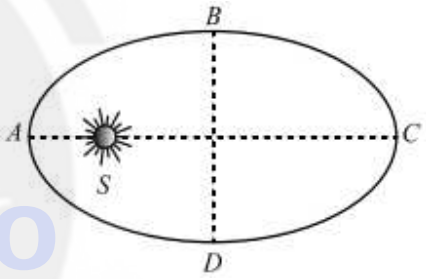
(A) Ratio of total energy of both is 5

(B) Ratio of kinetic energy of both is 4

(C) Ratio of potential energy of both 4

(D) Ratio of total energy of both is 4 and ratio of magnitude of potential to kinetic energy is 2

Q6 A planet is revolving around the sun as shown in elliptical path



The correct option is

(A) The time taken in travelling DAB is less than that for BCD

(B) The time taken in travelling DAB is greater than that for BCD

(C) The time taken in travelling CDA is less than that for ABC

(D) The time taken in travelling CDA is greater than that for ABC

Q7 Two different artificial satellites orbiting with same time period around the earth having angular momenta $2:1$. The ratio of masses of the satellites is

(A) $2:1$ (B) $1:2$

(C) $1:1$ (D) $1:3$

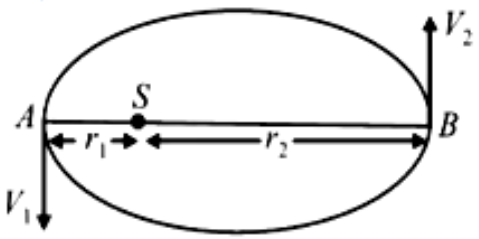
Q8 If the Earth shrinks such that its density becomes 8 times to the present value, then

new duration of the day in hours will be

(A) 24 (B) 12

(C) 6 (D) 3

Q9 Figure shows a planet in elliptical orbit around the sun (S). Ratio of momentum of planet at point A to that at point B is



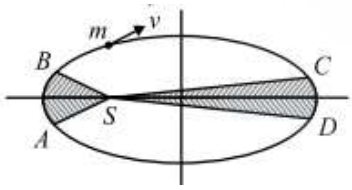
(A) $\frac{r_1}{r_2}$

(B) $\frac{r_1^2}{r_2^2}$

(C) $\frac{r_2}{r_1}$

(D) $\frac{r_2^2}{r_1^2}$

Q10 The figure shows elliptical orbit of a planet m about the sun S. The shaded area SCD is twice the shaded area SAB. If t_1 be the time for the planet to move from C to D and t_2 is the time to move from A to B, then :



(A) $t_1 = t_2$

(B) $t_1 = 8t_2$

(C) $t_1 = 4t_2$

(D) $t_1 = 2t_2$

Answer Key

Q1	D	Q6	A
Q2	B	Q7	A
Q3	B	Q8	C
Q4	A	Q9	C
Q5	A,D	Q10	D

Android App | iOS App | PW Website