JEE ANSWER BOOKLET

SUBJECTIVE ASSESSMENT - I

Ac. Yr. 2018-2019
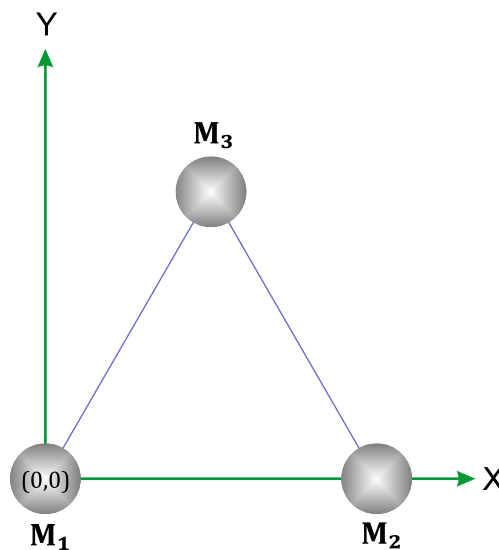
Learn At Quest

NAME OF STUDENT :

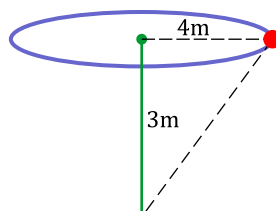**Q.1. (a)** Locate the centre of mass of a system of particles of masses m_1 = 1 kg, m_2 = 2 kg and m_3 = 3 kg, situated at the corners of an equilateral triangle of side 1 metre.

Q.1. (b) A particle of mass 10 kg is moving in a circle of 4 m radius with a constant speed of 5 m/sec. What is the angular momentum about:
(i) the centre of the circle?
(ii) and 3 m distant from its centre?
(iii) Which one of these will always be in the same direction?

Questions To Be Solved On This Page: Q.1.

Rough Work

QUESTIONS TO BE SOLVED ON THIS PAGE: Q.2.

Q.2. Two masses m_1 = 15 kg and m_2 = 10 kg are attached to the ends of a cord which passes over the pulley of an Atwood's machine. The mass of the pulley is M = 10 kg and its radius is R = 0.1 metre. Calculate:
(i) the tension in the cord
(ii) the acceleration a of the system
(iii) the number of revolutions made by the pulley at the end of 2 seconds from the start

M

m₁

m₂

ROUGH WORK

Questions To Be Solved On This Page: Q.3.

Q.3. On the flat surface of a disc of radius a, a small circular hole of radius b is made with its centre at a distance c from the centre of the disc.

If mass of the whole uncut disc is M,

Calculate :

(i) the new position of the centre of mass if centre of mass of uncut disc is the origin.

(ii) the moment of inertia of the holed disc about the axis of the circular hole.

Rough Work

Questions To Be Solved On This Page: Q.4.

Q.4. If the tangent at a point (1, 2) on the curve $y = ax^2 + bx + 7/2$ be parallel to the normal at point (-2, 2) on the curve $y = x^2 + 6x + 10$,, then find the value of a and b.

Rough Work

Questions To Be Solved On This Page: Q.5.

Q.5. For a given curved surface of a right circular cone, show that the volume is maximum when the semi-vertical angle of the cone is sin $^{-1}$(1/√3)

ROUGH WORK

Questions To Be Solved On This Page: Q.6.

Q.6. Find the greatest and least values of the following functions on the indicated intervals:
(i) $f(x) = 2x^3 - 3x^2 - 12x + 1$ on $[-2, 5/2]$
(ii) $f(x) = x^2 \log x$ on $[1, e]$

Rough Work

QUESTIONS TO BE SOLVED ON THIS PAGE: Q.7.

Q.7. The degree of ionization of a 0.1M bromoacetic acid solution is 0.132. Calculate the pH of the solution and the pK$_a$ of bromoacetic acid.

ROUGH WORK

QUESTIONS TO BE SOLVED ON THIS PAGE: Q.8.

Q.8. The concentration of sulphide ion in 0.1M HCl solution saturated with hydrogen sulphide is 1.0×10^{-19} M. If 10 mL of this is added to 5 mL of 0.04 M solution of the following: $FeSO_4$, $MnCl_2$, $ZnCl_2$ and $CdCl_2$. in which of these solutions precipitation will take place?

ROUGH WORK

QUESTIONS TO BE SOLVED ON THIS PAGE: Q.9.

Q.9. The ionization constant of nitrous acid is 4.5×10^{-4}. Calculate the pH of 0.04 M sodium nitrite solution and also its degree of hydrolysis.

ROUGH WORK

ROUGH WORK

ROUGH WORK