

# Biyani Girls college ,Jaipur

Model Paper-B(B.Sc. I)

Subject:Mathematics

Paper : Third (Dynamics and Prog in C)

Max Marks: 32

Max Time: 2:30 hrs

Attempt any five questions in all selecting atleast one question from each unit.

## UNIT-I

**1.a.** A point moves in a curve so that its tangential and normal accelerations are equal and the angular velocity of the tangent is constant .Find the path.

**b.** An insect crawls at a constant rate  $u$  along the spoke of a cart moving with velocity  $v$ , Find the acceleration along the perpendicular to the spoke of the insect at time  $t$ .

**2a.** Show that the time of descent to the centre of force ,the force varying inversely as the square of distance from the centre through the first half of its initial distance is to that through the last half as

$$\pi + 2 : \pi - 2.$$

**b.** from the middle point of its path at three consecutive seconds are observed to be  $x_1, x_2, x_3$ . Prove that the

time of a complete oscillation is  $\frac{2\pi}{\cos^{-1}\left(\frac{x_1 + x_3}{2x_2}\right)}$ .

## UNIT-II

**3a.** A particle is passes from such a medium under gravity in rest ,whose resistance is proportional to velocity ,then describe its motion.

**b.** Prove that the kinetic energy of any particle of mass  $m$  under any constant force in any time interval will be  $\frac{1}{6}m(u_1^2 + u_2^2 + u_1u_2)$ , if initial velocity will be  $u_1$  and  $u_2$ . And also prove that this K.E. will be more then the K.E. during that time interval and less then from K.E. of half path.

**4a.** A heavy particle of weight  $W$ , attached to a fixed point by light inextensible string ,describe a circle in a vertical plane . The tension in the string has values  $mW$  and  $nW$  respectively when the particle at highest and lowest points of the path .Show that  $n=m+6$ .

**b.** A heavy particle slides down the arc of a smooth vertical circle of radius  $a$  being slightly displaced from rest at the highest point. Find where it will leave the circle. Also that it will be there after describe a parabola of latus rectum  $\frac{16}{27}a$ .

### UNIT-III

**5a.** A particle moves with a central acceleration  $\mu(r^5 - c^{4r})$  being projected from an apse at distance  $c$  with a velocity  $\sqrt{\frac{2\mu}{3}}c^3$  show that its path is the curve  $x^4 + y^4 = c^4$ .

**b.** Find the force to the pole when a particle describes the curve  $r = a \sin n\theta$ .

**6a.** Find the M.I. of hollow sphere w.r.t. diameter, where 'a' and 'b' are external and internal radii.

**b.** Find the M.I. of rectangular lamina about its sides.

### UNIT-IV

7a. Draw the flow chart for adding the even numbers between 1 to 100.

b. Write the C-program to obtain the greatest no. in given three numbers.

8.a. Write the algorithm to find the value of  $\cos x$ .

b. Define (i) Array in C-programming (ii) Multidimensional array