

SW-429

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**B.Sc. (Part - I) (Semester - I) (CBCS) Examination, November -2019**  
**PHYSICS**

**DSC. 1A : Mechanics - I (Paper - I)**

**Sub. Code : 71604**

**Day and Date : Thursday, 14 - 11 - 2019**

**Total Marks : 50**

**Time : 12.00 noon to 02.00 p.m.**

- Instructions :**
- 1) All questions are compulsory.
  - 2) Figures to the right indicate full marks.
  - 3) Draw neat labeled diagrams wherever necessary.
  - 4) Use of Scientific calculator is allowed.

**Q1) Select the correct alternative from the following: [10]**

a) The triangle law of vector addition can be used to find the resultant of

- ~~i) two vectors~~  
ii) unit vectors

- iii) parallel vectors  
~~iv) more than two vectors~~

b) The order and degree of the equation  $\frac{d^2y}{dx^2} = \sqrt{1 + \left(\frac{dy}{dx}\right)^3}$  are \_\_\_\_\_.

- i) 1, 1  
ii) 2, 3

- ~~iii) 2, 2~~  
iv) 1, 3

c) The magnitude of the resultant of two unit vectors  $\vec{i}$  and  $\vec{j}$  is \_\_\_\_\_.

- i) 0  
ii) 2

- ~~iii)  $\sqrt{2}$~~   
iv)  $\sqrt{3}$

d) Ordinary differential equation involves \_\_\_\_\_.

- i) Only dependent variables  
~~ii) Total derivatives~~

- iii) Only independent variables  
iv) Partial derivatives

e) The state of rest is also a state of uniform motion with zero \_\_\_\_\_.

- i) mass  
~~ii) velocity~~

- iii) acceleration  
iv) momentum

**P.T.O.**

- f) The time rate of change of angular momentum is \_\_\_\_\_.
- i) Linear acceleration                      ii) Angular acceleration  
~~iii) Force~~                                      ~~iv) Torque~~
- g) If the frame of reference is changed then \_\_\_\_\_
- i) the value of physical quantity is not changed  
 ii) the physical laws are changed  
 iii) the conservation laws are not obeyed  
~~iv) the conservation laws are obeyed~~
- h) According to Newton's third law of motion, action and reaction act along \_\_\_\_\_ directions.
- i) the same                                      ~~ii) opposite~~  
 iii) the perpendicular                      iv) any random
- i) Moment of inertia in rotational motion is analogous to the \_\_\_\_\_ in translational motion.
- i) momentum                                      ~~ii) mass~~  
 iii) force    iv) torque
- j) Acceleration of body rolling down an inclined plane is independent on \_\_\_\_\_ of the body.
- ~~ii) radius~~                                      ii) radius of gyration  
~~iii) mass~~                                      iv) inclination

Q2) Attempt any two of the following : [20]

- 36 a) Define second order homogeneous differential equation with constant coefficients. Discuss a method to obtain its solution with an example.
- 76 b) State and prove the law of conservation of energy of a system of particles.
- 92-94 c) Explain moment of inertia with its physical significance. Derive an expression for moment of inertia of solid cylinder about its own axis of symmetry.

Q3) Attempt any four of the following: [20]

- a) Determine the angle between the vectors  $\vec{A} = 7\vec{i} - 3\vec{j} - 2\vec{k}$  and  $\vec{B} = 2\vec{i} + 2\vec{j} + 4\vec{k}$ .
- b) Define vector product with its any three characteristics. 12-13
- c) Explain a non-inertial frame of reference with two examples. 50
- d) State and explain Newton's third law of motion with examples. 57-58
- e) Explain the physical significance of centre of mass. 70
- f) Obtain the relation between torque and angular momentum. 90

