

# Shrinivas Academy

A small sample of the Screening Test for 2 Year, IIT-JEE 2016 Training Program.

Duration: 60 Minutes

Marks: 50

Student's Full Name:- \_\_\_\_\_

Student's Contact No's:- \_\_\_\_\_

Given Quantities :-  $g$  (gravitational acceleration) =  $10\text{m/s}^2$

===== **Physics & Mathematics** =====

Part A - Objective Questions with Single Option Correct. **Marking Scheme (+4, -1)**

- Q1. A ball thrown upwards vertically takes 8 seconds to reach back to the throwers hands. The maximum height reached by the ball is  
(a) 125 m                      (b) 150 m                      (c) 100 m                      (d) 80 m
- Q2. The surface area of the six faces of a rectangular solid are 4, 4, 8, 8, 18 & 18 sq.cm then the volume of the solid in cubic centimeter is  
(a) 324                              (b) 60                              (c) 48                              (d) 24

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Part B - Comprehension based Questions. **Marking Scheme (+5, -2)**

**Passage I**

Let  $\alpha, \beta$  be the roots of the quadratic equation  $ax^2 + bx + c = 0, a \neq 0$ . Then  $\alpha + \beta =$  sum of the roots =  $-\frac{b}{a}$  and  $\alpha\beta =$  product of the roots =  $\frac{c}{a}$  hence  $x^2 - x(\alpha + \beta) + \alpha\beta = 0$  represents a quadratic equation whose roots are  $\alpha, \beta$ .

- Q3. If A, B are the roots of the equation  $x^2 + 2x - 15 = 0$  then  $AB^2 + A^2B + AB$  is equal to  
(a) 30                              (b) 15                              (c) 5                              (d) 0
- Q4. The value of 'a' so that the sum of the roots of the equation  $ax^2 + 2x + 3a = 0$  may be equal to their product is  
(a)  $3/2$                               (b)  $2/3$                               (c)  $-3/2$                               (d)  $-2/3$

**Passage II**

The average speed of any particle is defined as the ratio of total distance travelled to the total time taken for the travel. The average velocity of a particle is defined as the ratio of total displacement covered to the total time taken for the displacement to happen. The average acceleration is defined as the ratio of difference in the final and initial velocity to the time interval taken for the velocity change.

Consider ABCD to be a square of side  $l$ . A particle which always moves with constant speed travels along the sides of this square.

- Q5. If the particle travels from A to B to C to D in time  $t$ , its average acceleration is  
(a)  $\frac{6l}{t^2}$                               (b)  $\frac{3l}{t^2}$                               (c)  $\frac{l}{t^2}$                               (d)  $\frac{2l}{t^2}$
- Q6. If the particle travels from A to B to C in time  $t$  then its average velocity is  
(a)  $\frac{2l}{t}$                               (b)  $\frac{3l}{t}$                               (c)  $\frac{\sqrt{2}l}{t}$                               (d) 0

**Part C - Subjective questions.**

Final answer to be written in the space provided on the answer sheet. Please provide clear workings of your solution on the rough sheets provided. **Marking Scheme (+7, -2)**

- Q7. Equal masses of two miscible liquids of density  $\rho$  &  $2\rho$  are mixed thoroughly in a big container. A solid cube of material density  $\rho$  is held completely submerged in this liquid mixture. What is the value of the upward acceleration of the block immediately after it is released?

===== **Logical & Analytical Ability** =====

*Objective Questions with Single Option Correct. Marking Scheme (+5, -4)*

- Q8. How many times in a complete day the minute hand & the hour hand of a 12 hr wall clock are pointing exactly opposite to each other.  
(a) 23                      (b) 24                      (c) 22
- Q9. What is the minimum number of cuts in which a cake can be cut to be distributed equally among 8 students?  
(a) 2                      (b) 3                      (c) 4
- Q10. What is the minimum number of trials required to detect a slightly heavier marble out of 9 marbles which appear the same? You are given a simple grocer's balance to carry out the trials.  
(a) 3                      (b) 2                      (c) 1