PHYSICS



DPP No. 5

Total Marks: 29

Max. Time: 31 min.

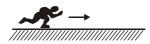
Topic: Mathematical Tools

Type of Questions M.M., Min. Single choice Objective ('-1' negative marking) Q.1 to Q.4 [12, 12] (3 marks, 3 min.) Subjective Questions ('-1' negative marking) Q.5 to Q. 6 (4 marks, 5 min.) [8, 10] Comprehension ('-1' negative marking) Q.7 to Q.9 (3 marks, 3 min.) [9, 9]

- 1. Maximum value of $f(x) = \sin x + \cos x$ is:
 - (A) 1
- (B) 2
- (C) $\frac{1}{\sqrt{2}}$
- (D) $\sqrt{2}$
- 2. The displacement of a body at any time t after starting is given by $s = 15t - 0.4t^2$. The velocity of the body will be 7 ms⁻¹ after time:
 - (A) 20 s
- (B) 15 s
- (C) 10 s
- (D) 5 s
- 3. For the previous question, the acceleration of the particle at any time t is:
 - $(A) -0.8 \text{ m/s}^2$
- (B) 0.8 m/s^2
- $(C) -0.6 \text{ m/s}^2$
- (D) 0.5 m/s^2
- A particle is moving in a straight line. Its displacement at time t is given by s (in m) = $-4t^2 + 2t$, then 4. its velocity and acceleration at time $t = \frac{1}{2}$ second are
 - (A) -2 m/s, -8 m/s^2 (B) 2 m/s, 6 m/s^2
- (C) -2 m/s, 8 m/s^2
- (D) 2 m/s, 8 m/s²
- 5. A stone thrown upwards from ground level, has its equation of height h = 490 t - 4.9 t² where 'h' is in metres and t is in seconds respectively. What is the maximum height reached by it?
- If $\int (x+1)dy$ 6.

COMPREHENSION

If a man has a velocity varying with time given as v = 3t², v is in m/s and t in sec then:



- 7. Find out the velocity of the man after 3 sec.
 - (A) 18 m/s
- (B) 9 m/s
- (C) 27 m/s
- (D) 36 m/s
- Find out his displacement after 2 seconds of his start: 8.
 - (A) 10 m
- (B) 6 m
- (C) 12 m
- (D) 8 m

- 9. Find out his acceleration after 3 seconds:
 - (A) 9 m/s^2
- (B) 18 m/s^2
- (C) 12 m/s²
- (D) 6 m/s^2

Answers Key

DPP NO. - 5

- **1.** (D)
- **2.** (C)
- **3.** (A)
- **4**. (A)

- **5.** 12250 m
- **6.** $4x^3 + 6x^2 + C$
- **7**. (C)
- **8.** (D)
- **9.** (B)

Hint & Solutions

DPP NO. - 5

1.
$$y = f(x) = \sin x + \cos x$$

$$\frac{dy}{dx} = \cos x - \sin x$$

$$\frac{dy}{dx} = 0$$
, $\sin x = \cos x$, $\tan x = 1$

$$x = 45^{\circ}$$

$$y = \sin 45^{\circ} + \cos 45^{\circ}$$

$$= \frac{1}{\sqrt{2}} + \frac{1}{\sqrt{2}}$$

$$=\frac{2}{\sqrt{2}}=\sqrt{2}$$

Alter:
$$fx = \sqrt{2} \sin(x + \frac{\pi}{4})$$

$$f(x)_{max} = \sqrt{2}$$

3.
$$\frac{ds}{dt} = 15 - 0.8 t = 7 = v$$

;
$$8 = 0.8 t$$
; $t = 10 second$.

$$a = \frac{d^2s}{dt^2} = -0.8 \text{ m/s}^2$$

4.
$$(A^*)$$
 -2 m/s, -8 m/s²

5.
$$\frac{ds}{dt} = 490 - 9.8 t = 0$$
 $t = \frac{490}{9.8} = 50$ second.
 $S_{max} = 490 \times 50 - 4.9 \times 2500 = 12250 \text{ m}$

6. dy =
$$12xdx \int (x+1)(12x)dx = 4x^3 + 6x^2 + C$$

7.
$$v = 3t^2$$

 $v = 3(3)^2 = 27 \text{ m/s}$

8.
$$\int_{0}^{s} dS = \int_{0}^{2} 3t^{2} dt$$

$$S = \left[t^3\right]_0^2 = 8$$

9.
$$f = \frac{dv}{dt} = 6t$$

$$f = 6 \times 3 = 18 \text{ m/s}^2$$