PHYSICS

DPP

DAILY PRACTICE PROBLEMS

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	(3 marks, 3 min.)	[12, 12]
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 m/s^2 (B) 0.8 m/s^2 (C) -0.6 m/s^2 (D) 0.5 m/s^2

4. A particle is moving in a straight line. Its displacement at time t is given by s (in m) = $-4t^2 + 2t$, then 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/s^2

5. A stone thrown upwards from ground level, has its equation of height $h = 490\,t - 4.9\,t^2$ where 'h' is in metres and t is in seconds respectively. What is the maximum height reached by it ?

6. If $\int (x+1)dy$

COMPREHENSION

If a man has a velocity varying with time given as $v = 3t^2$, 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

8. Find out his displacement after 2 seconds of his start :

(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/s^2 (D) 6 m/s^2

Answers Key

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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

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

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

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

$x = 45°$

$y = \sin 45° + \cos 45°$

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

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

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

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

2. (C*) 10 s

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

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

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

4. (A*) -2 m/s, $-8\ m/s^2$

5. $\frac{ds}{dt} = 490 - 9.8\,t = 0 \quad t = \frac{490}{9.8} = 50$ second.

$S_{max} = 490 \times 50 - 4.9 \times 2500 = 12250$ m

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

7. $v = 3t^2$

$v = 3(3)^2 = 27$ m/s

8. $\int_o^s dS = \int_0^2 3t^2 dt$

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

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

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