# PREFACE

*This book contains the Daily Practice Problems (DPPs) designed for the aspirants JEE(Main+Advanced). It is a collection of problems (Physics, Chemistry & Mathematics in separate booklets) from multiple topics to understand the application of concepts learned in theory. Each DPP is kind of a timed test with marking scheme and prescribed time to be spent on each problem. It is according to the latest pattern of JEE(Advanced) and serves as a great tool for the students to simulate examination conditions at home. It enables a student to practice time management while solving a problem which helps him/her to better prepare for the target exam.*

*Every effort has been taken to keep this book error free, however any suggestions to improve are welcome at smdd@resonance.ac.in.*

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# DPP
DAILY PRACTICE PROBLEMS

## PHYSICS

**TARGET: JEE (Main + Advanced)**

**COURSE : VIKAAS (00JA)** **DPPs - A1 to A21**

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**NOTE : Marked questions are recommended for Revision.**

# DPP No. : A1 (JEE-ADVANCED)

| | |
|---|---|
| **Total Marks : 34** | **Max. Time : 23 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.6** | **(3 marks 2 min.) [18, 12]** |
| **One or more than one options correct type ('–1' negative marking) Q.7 to Q.9** | **(4 marks 2 min.) [12, 06]** |
| **Subjective Questions ('–1' negative marking) Q.10** | **(4 marks 5 min.) [04, 05]** |

**1.** Value of sin (37°) cos (53°) is -

(A) $\frac{9}{25}$ (B) $\frac{12}{25}$ (C) $\frac{16}{25}$ (D) $\frac{\sqrt{3}}{2}$

**2.** If $\sin\theta = \frac{1}{3}$ , then $\cos\theta$ will be -

(A) $\pm\frac{8}{9}$ (B) $\pm\frac{4}{3}$ (C) $\pm\frac{2\sqrt{2}}{3}$ (D) $\pm\frac{3}{4}$

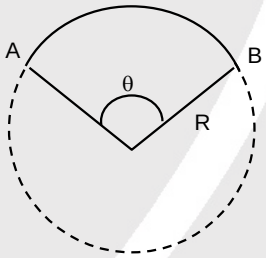
**3.** If $\sin\theta = \frac{3}{5}$ and $\cos\theta < 0$, then find $\tan\theta$ :

(A) $\frac{3}{5}$ (B) $-\frac{3}{4}$ (C) $\frac{4}{3}$ (D) $-\frac{4}{3}$

**4.** $\sin 2\theta$ =

(A) $2\sin\theta\cos\theta$ (B) $2\sin\theta$ (C) $2\cos\theta$ (D) $\frac{\sin\theta\cos\theta}{2}$

**5.** The length of the arc AB, shown in the figure (R =7cm, $\theta = 90°$, $\pi = 22/7$)




(A) 630 cm (B) 22 cm (C) 11 cm (D) None of these

**6.** Value of $\sin 15^o . \cos 15^o$ is :

(A) 1 (B) 1/2 (C) 1/4 (D) $\frac{\sqrt{3}}{2}$

**7.** Which of the following is/are correct trigonometric identity:

(A) $\sin^2\theta + \cos^2\theta = 1$ (B) $1 + \tan^2\theta = \sec^2\theta$ (C) $1 - \cot^2\theta = \text{cosec}^2\,\theta$ (D) $\sin\theta\sec\theta = \tan\theta$

**8.** Which of the following has value 1:

(A) tan 45° (B) sin 90° (C) cos 90° (D) cos 0°

**9.** Which of the following has value zero?

(A) Sin 0° (B) tan 0° (C) cos 0° (D) sec 0°

**10.** Convert the following angles into radian:–

(i) 30° (ii) 45° (iii) 60° (iv) 90° (v) 120° (vi) 135° (vii) 150° (viii) 180° (ix) 270°

# DPP No. : A2 (JEE-MAIN)

**Total Marks : 60** **Max. Time : 40 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.20** **(3 marks 2 min.)** **[60, 40]**

**1.** cos(A+B) =
(A) cosAcosB – sinAsinB (B) cosAcosB + sinAsinB
(C) sinAsinB –cosAcosB (D) None of these

**2.** cos (A–B) =
(A) cosAcosB – sinAsinB (B) cosAcosB + sinAsinB
(C) sinAsinB –cosAcosB (D) None of these

**3.** sin(A+B) =
(A) sinAcosB + cosA sinB (B) sinAcosB – cosA sinB
(C) cosAsinB – sinAcosB (D) None of these

**4.** sin(A–B) =
(A) sinAcosB + cosA sinB (B) sinAcosB – cosA sinB
(C) cosAsinB – sinA cosB (D) None of these

**5.** sinA + sinB =
(A) $2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$ (B) $2\sin\left(\frac{A-B}{2}\right)\cos\left(\frac{A+B}{2}\right)$
(C) $-2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$ (D) $2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A+B}{2}\right)$

**6.** sinA – sinB =
(A) $2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$ (B) $2\sin\left(\frac{A-B}{2}\right)\cos\left(\frac{A+B}{2}\right)$
(C) $-2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$ (D) $2\sin\left(\frac{A+B}{2}\right)\cos\left(\frac{A+B}{2}\right)$

**7.** cosA + cosB =
(A) $2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$ (B) $2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$
(C) $-2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$ (D) $-2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$

**8.** cosA – cosB =
(A) $2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$ (B) $2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$
(C) $-2\sin\left(\frac{A+B}{2}\right)\sin\left(\frac{A-B}{2}\right)$ (D) $-2\cos\left(\frac{A+B}{2}\right)\cos\left(\frac{A-B}{2}\right)$

**9.** The value of sin(15°) is
(A) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (B) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (C) $\frac{\sqrt{3}}{2\sqrt{2}}$ (D) $\frac{1}{2\sqrt{2}}$

**10.** The value of sin(75°) is
(A) $\frac{\sqrt{3}+1}{2\sqrt{2}}$ (B) $\frac{\sqrt{3}-1}{2\sqrt{2}}$ (C) $\frac{\sqrt{3}}{2\sqrt{2}}$ (D) $\frac{1}{2\sqrt{2}}$

**11.** sin 300º is equal to –

(A) 1/2 (B) –1/2 (C) $-\frac{\sqrt{3}}{2}$ (D) $\frac{\sqrt{3}}{2}$

**12.** sin (90º + θ) is -

(A) sin θ (B) cos θ (C) – cos θ (D) – sin θ

**13.** sec $(\pi + \theta)$ =

(A) cosθ (B) tanθ (C) sec θ (D) – sec θ

**14.** If θ = 120º , then :

(A) $\sin\theta = \frac{\sqrt{3}}{2}$ (B) $\cos\theta = \frac{1}{2}$ (C) cot $\theta = \frac{1}{2}$ (D) $\tan\theta = \sqrt{3}$

**15.** sin (750°) =

(A) $\frac{1}{2}$ (B) $-\frac{1}{4}$ (C) 0 (D) $\frac{\sqrt{3}}{2}$

**16.** $\cos\left(\frac{11\pi}{6}\right)$ =

(A) $\frac{1}{2}$ (B) $-\frac{\sqrt{3}}{2}$ (C) 0 (D) $\frac{\sqrt{3}}{2}$

**17.** Value of tan225º is :

(A) $\sqrt{3}$ (B) $\frac{1}{\sqrt{3}}$ (C) 1 (D) –1

**18.** If $f(x) = 3x + 4x^2 - 2$, then value of f(–1) is

(A) 1 (B) –1 (C) 2 (D) 5

**19.** If $f(x) = \sin^3 x - \cos(2x)$, then the value of $f\left(\frac{\pi}{2}\right)$ is :

(A) 0 (B) 2 (C) 1 (D) –2

**20.** If $f(x) = \sin^2 x - \cos^2 x$

Then find f (π/12)

(A) $\frac{\sqrt{3}}{2}$ (B) $-\frac{\sqrt{3}}{2}$ (C) $\frac{1}{2}$ (D) $-\frac{1}{2}$

# DPP No. : A3 (JEE-ADVANCED)

| | |
|---|---|
| **Total Marks : 40** | **Max. Time : 30 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.4** | **(3 marks 2 min.) [12, 08]** |
| **One or more than one options correct type ('–1' negative marking) Q.5 to Q.7** | **(4 marks 2 min.) [12, 06]** |
| **Subjective Questions ('–1' negative marking) Q.8 to 9** | **(4 marks 5 min.) [08, 10]** |
| **Match the Following (no negative marking) Q.10** | **(8 marks 6 min.) [08, 06]** |

**1.** If f(x) = tanx :

then the value of f $\left(\frac{\pi}{4}\right)$

(A) 2 (B) 3 (C) 1 (D) None of these

**2.** If $g(x) = e^{2x} + e^x - 1$ and $h(x) = 3x^2 - 1$, the value of g(h(0)) is :

(A) $\frac{1}{e^2} + e - 1$ (B) $\frac{1}{e^2} + \frac{1}{e} - 1$ (C) $e^2 + e - 1$ (D) $\frac{1}{e^2} + \frac{1}{e}$

**3.** If f(x) = $\frac{\frac{1}{x}+1}{\frac{1}{x}-1}$;

The value of f(x) + f(–x) is

(A) $2(1 + x^2)$ (B) $2\frac{(1-x^2)}{1+x^2}$ (C) $2\frac{(1+x^2)}{(1-x^2)}$ (D) $\frac{1+x^2}{1-x^2}$

**4.** If $f(x) = x^2$ and g(x) = sin(2x) ; the value of $g(f(\sqrt{y}))$ =

(A) siny (B) sin (2y) (C) sin $\left(2\sqrt{y}\right)$ (D) $\sin^2(2y)$

**5.** $\sin^2\theta$ =

(A) $\frac{1+\cos 2\theta}{2}$ (B) $\frac{1-\cos 2\theta}{2}$ (C) $1 - \cos^2\theta$ (D) $\sin(2\theta)$

**6.** $\cos 2\theta$ =

(A) $2\cos^2\theta - 1$ (B) $1 - 2\sin^2\theta$ (C) $\cos^2\theta - \sin^2\theta$ (D) $\cos^2\theta + \sin^2\theta$

**7.** $\cos^2\theta$ =

(A) $\frac{1+\cos 2\theta}{2}$ (B) $\frac{1-\cos 2\theta}{2}$ (C) $1 - \sin^2\theta$ (D) $\cos(2\theta)$

**8.** If $f(x) = \frac{x-1}{x+1}$, Find the value of :

(i) f(1)
(ii) f(0)
(iii) f(f(1))
(iv) f(2)

**9.** The following angle lie in which quadrant: –

(i) $\frac{\pi}{3}$ (ii) $\frac{5\pi}{3}$ (iii) $\frac{2\pi}{7}$ (iv) $\frac{5\pi}{6}$ (v) $\frac{7\pi}{5}$

**10. Match the following columns :**

| | |
|---|---|
| (a) sin 37º | (P) $-\frac{3}{5}$ |
| (b) cos 127º | (Q) $\frac{3}{5}$ |
| (c) tan 307º | (R) $-\frac{4}{5}$ |
| (d) cos 307º | (S) $-\frac{4}{3}$ |
| (e) cos (–53º) | |

## DPP No. : A4 (JEE-MAIN)

**Total Marks : 60** **Max. Time : 40 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.20** **(3 marks 2 min.)** **[60, 40]**

**1.** If $f(x) = x^3$; $g(y) = y - 1$ ; $h(z) = z + 1$
The value of $f(g(h(x)))$ is :
(A) $x^3 - 1$ (B) $x^3 + 1$ (C) $x + 1$ (D) $x^3$

**2.** If $y = x^3 + 2x^2 + 7x + 8$ then $\frac{dy}{dx}$ will be -
(A) $3x^2 + 2x + 15$ (B) $3x^2 + 4x + 7$ (C) $x^3 + 2x^2 + 15$ (D) $x^3 + 4x + 7$

**3.** If $y = \frac{1}{x^4}$ then, $\frac{dy}{dx}$ will be :
(A) $\frac{4}{x^3}$ (B) $4x$ (C) $-\frac{4}{x^5}$ (D) $\frac{4}{x^5}$

**4.** If $y = x^2 \sin x$ , then $\frac{dy}{dx}$ will be -
(A) $x^2 \cos x + 2x \sin x$ (B) $2x \sin x$ (C) $x^2 \cos x$ (D) $2 x \cos x$

**5.** If $y = e^x \cdot \cot x$ then $\frac{dy}{dx}$ will be–
(A) $e^x \cot x - \text{cosec}^2 x$ (B) $e^x \text{cosec}^2 x$
(C) $e^x[\cot x - \text{cosec}^2 x]$ (D) $e^x \cot x$

**6.** If $y = x \ \ell nx$ then $\frac{dy}{dx}$ will be–
(A) $\ell nx + x$ (B) $1 + \ell n\, x$ (C) $\ell nx$ (D) 1

**7.** $y = 4 + 5x + 7x^3$. Find $\frac{dy}{dx}$ :
(A) $5 - 21x^2$ (B) $5 + 21x^2$ (C) $9 + 7x^2$ (D) $5 + 21x$

**8.** $y = x + x^2 + \frac{1}{x} + \frac{1}{x^3}$ Find $\frac{dy}{dx}$
(A) $1 + 2x - \frac{1}{x^2} - \frac{3}{x^4}$ (B) $1 + 2x - \frac{1}{x^2} + \frac{2}{x^4}$
(C) $1 - 2x - \frac{1}{x^2} + \frac{3}{x^4}$ (D) $1 + 2x - \frac{1}{x^2} - \frac{3}{x^3}$

**9.** If $f(x) = x^3 \ell n (x)$
Then f '(x) is :
(A) $x^2 + 3x^2 \ell nx$ (B) $x^2 (1 + \ell nx)$ (C) $4x^2$ (D) None of these

**10.** If $f(x) = \frac{x+2}{x-2}$
The value f (–1) is
(A) $\frac{1}{3}$ (B) $-\frac{1}{3}$ (C) 3 (D) –3

**11.** $y = x^2 + \frac{1}{x^2}$ .Find $\frac{dy}{dx}$
(A) $2x - \frac{2}{x^3}$ (B) $2x - \frac{2}{x^4}$ (C) $2x + \frac{2}{x^3}$ (D) None of these

**12.** $f(x) = \sin^2 x - \cos^2 x$
then the value of f' $\left(\frac{\pi}{4}\right)$
(A) 2 (B) 0 (C) 1 (D) None of these

**13.** Double differentiation of displacement w.r.t. time is :
(A) acceleration (B) velocity (C) force (D) none of these

**14.** If $y = x^3$ then $\frac{d^2y}{dx^2}$ is -
(A) $6x^2$ (B) 6x (C) $3x^2$ (D) 3x

**15.** If $y = 2 \sin^2 \theta + \tan \theta$ then $\frac{dy}{d\theta}$ will be -
(A) $4\sin \theta \cos \theta + \sec \theta \tan \theta$ (B) $2 \sin 2 \theta + \sec^2 \theta$
(C) $4 \sin \theta + \sec^2 \theta$ (D) $2 \cos^2 \theta + \sec^2 \theta$

**16.** If $y = \sin x$, then $\frac{d^2y}{dx^2}$ will be :
(A) cos x (B) sin x (C) – sin x (D) sin x + C

**17.** The value of f''(x) at x = 1 for the function $f(x) = x \ell n x$ is
(A) $\ell n 2$ (B) 2 (C) 1 (D) 0

**18.** Find value of $\sin^2 15^\circ + \sin^2 645^\circ$ :
(A) $\frac{1}{2}$ (B) 1 (C) $\frac{1}{\sqrt{3}}$ (D) None of these

**19.** Slope of graph y = tanx drawn between y and x, at $x = \frac{\pi}{4}$ is :
(A) 0 (B) 1 (C) 2 (D) $\frac{1}{\sqrt{2}}$

**20.** $y = \frac{1}{x+1}$. Find $\frac{dy}{dx}$
(A) $-\frac{2}{(x+1)^2}$ (B) $-\frac{1}{(x-1)^2}$ (C) $-\frac{1}{(x+1)^2}$ (D) $\frac{1}{(x+1)^2}$

# DPP No. : A5 (JEE-ADVANCED)

**Total Marks : 34** **Max. Time : 26 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.6** **(3 marks 2 min.) [18, 12]**
**One or more than one options correct type ('–1' negative marking) Q.7 to Q.8** **(4 marks 2 min.) [08, 04]**
**Subjective Questions ('–1' negative marking) Q.9 to 10** **(4 marks 5 min.) [08, 10]**

**1.** If $f(x) = 5x - 5$, $g(x) = \sin^3 x + 2\cos^3 x$ ; The value of $f(g(f(1)))$ is
(A) 5 (B) 0 (C) 10 (D) – 5

**2.** If $f(x) = x + 1$ ; $g(z) = z^2$ ; $h(y) = 3y$, The value of $f(h(g(a)))$ is :
(A) $(3a + 1)^2$ (B) $3a^2 + 1$ (C) $3(a^2 + 1)$ (D) $3a^2$

**3.** Equation of straight line is $2x + 3y = 5$. Slope of the straight line is :
(A) 3/2 (B) 2/3 (C) –2/3 (D) –3/2

**4.** If $f(x) = \sin x + \cos x$
Then $\frac{f(x)+f(-x)}{f(x)-f(-x)} =$
(A) $\frac{\sin x+\cos x}{\sin x-\cos x}$ (B) $\cot x$ (C) $\tan x$ (D) $\frac{\sin x-\cos x}{\sin x+\cos x}$

**5.** If $f(x) = \frac{x^3-1}{x^2+1}$, then the value of $f(f(1))$ is
(A) 2 (B) –2 (C) 1 (D) –1

**6.** If $f(x) = \frac{x}{(x^2+a^2)^{3/2}}$, where a is a constant. the value of $f\left(\frac{a}{\sqrt{2}}\right)$ is :
(A) $\frac{2^{3/2}}{3a^2}$ (B) $\frac{2a^2}{3\sqrt{3}}$ (C) $\frac{2}{3\sqrt{3}a^2}$ (D) $\frac{3\sqrt{3}}{2}a^2$

**7.** Which of the following have value equal to 1 ?
(A) $\tan 225^\circ$ (B) $-\cos \pi$ (C) $\sin\left(\frac{5\pi}{2}\right)$ (D) $\tan(405^\circ)$

**8.** If $f(x) = x^6$; $h(y) = -y^2 + 1$ ; $g(z) = z - 1$
Then the correct general relation(s) is/are
(A) $f(x) - h(x^3) = 1$ (B) $f(x) + h(x^3) = 1$
(C) $g(y) + h(\sqrt{y}) = 0$ (D) $g(y^6) - f(y) = -1$

**9.** If $f(x) = \left(\frac{\sin x}{1-\cos^2 x}\right)$ (cosec x + cotx) (cosecx – cotx)

Then the value of function f(x) at $x = \frac{\pi}{2}$ is

**10.** If $f(x) = x^2 - 1$ and $g(x) = \frac{1}{x} + 1$ ; the value of $f\left(\frac{1}{g(x)}\right)$ is

# DPP No. : A6 (JEE-ADVANCED)

| | |
|---|---|
| **Total Marks : 41** | **Max. Time : 27 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.3** | **(3 marks 2 min.) [09, 06]** |
| **One or more than one options correct type ('–1' negative marking) Q.4 to Q.8** | **(4 marks 2 min.) [20, 10]** |
| **Subjective Questions ('–1' negative marking) Q.9** | **(4 marks 5 min.) [04, 05]** |
| **Match the Following (no negative marking) Q.10** | **(8 marks 6 min.) [08, 06]** |

**1.** If $y = f(x) = 3x^2 + 2x + 4$, then value of y at x = f(2) will be :

(A) 20 (B) 1244 (C) 100 (D) 80

**2.** If $y = e^{kt}$ then $\frac{dy}{dt}$ will be

(A) $e^{kt}$ (B) $e^{kt} / k$ (C) $te^{kt}$ (D) $ke^{kt}$

**3.** Differentiation of $\sin(x^2)$ w.r.t. x is -

(A) $\cos(x^2)$ (B) $2x\cos(x^2)$ (C) $x^2\cos(x^2)$ (D) $-\cos(2x)$

**4.** If $y = \sin^3 x$

$\frac{dy}{dx}$ will be :

(A) $3\sin^2 x\cos x$ (B) $3\sin x\cos x$ (C) $1.5\sin x\sin 2x$ (D) $\cos^3 x$

**5.** If $y = \sin x$ & $x = 3t$ then $\frac{dy}{dt}$ will be -

(A) $3\cos(x)$ (B) $\cos x$ (C) $3\cos(3t)$ (D) $-\cos x$

**6.** If $\alpha = \sec(3\beta)$ then $\frac{d\alpha}{d\beta}$ will be -

(A) $3\sec(3\beta)\tan(3\beta)$ (B) $3\alpha^2\sin(3\beta)$ (C) $\sec(3\beta)\tan(3\beta)$ (D) $3\sec^2(3\beta)$

**COMPREHENSION**

If $S = ut + \frac{1}{2}at^2$

Where ; S is displacement, u - initial velocity (constant) ,v - final velocity, a - acceleration (constant) & t - time taken then -

**7.** Differentiation of 'S' w.r.t. 't' will be -

(A) $u + \frac{at}{2}$ (B) $u + at$ (C) $u + 2at$ (D) $\frac{ut^2}{2} + \frac{at^3}{6}$

**8.** Differentiation of above result w.r.t. 't' will be -

(A) a (B) u + a (C) u (D) none of these

**9.** $y = (2x+3)^4 - (7x-1)^2 + \frac{2}{(3x-1)^3} + \frac{4}{(3x-2)^3}$ Find $\frac{dy}{dx}$

**10.** Match the following functions in column -I with their derivatives with respect to x, in column-II

| | **Column-I** | | **Column-II** |
|---|---|---|---|
| (A) | Sinx | (P) | sec x tanx |
| (B) | –cosx | (Q) | cosecxcotx |
| (C) | secx | (R) | cosx |
| (D) | –cosecx | (S) | sinx |

# DPP No. : A7 (JEE-ADVANCED)

**Total Marks : 37** **Max. Time : 29 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.3** **(3 marks 2 min.) [09, 06]**
**One or more than one options correct type ('–1' negative marking) Q.4 to Q.7** **(4 marks 2 min.) [16, 08]**
**Subjective Questions ('–1' negative marking) Q.8 to Q.10** **(4 marks 5 min.) [12, 15]**

**1.** If $Q = 4v^3 + 3v^2$ , then the value of 'v' such that, there exist maxima of 'Q' -

(A) 0 (B) $-\frac{1}{2}$ (C) $\frac{1}{2}$ (D) none of these

**2.** If velocity of particle is given by $v = 2t^4$ then its acceleration (dv/dt) at any time t will be given by :

(A) $8t^3$ (B) 8t (C) $-8t^3$ (D) $t^2$

**3.** If $y = 3t^2 - 4t$ ; then minima of y will be at :

(A) 3/2 (B) 3/4 (C) 2/3 (D) 4/3

**4.** If $f(x) = \sqrt{\sin\sqrt{x}}$ , then find f'(x)

(A) $\frac{1}{4}\frac{\cos\sqrt{x}}{\sqrt{\sin x}}$ (B) $\frac{1}{4}\frac{\cos\sqrt{x}}{\sqrt{x}\sqrt{\sin\sqrt{x}}}$

(C) $\frac{1}{4}\frac{\cot\sqrt{x}}{\sqrt{x}\sqrt{\sin\sqrt{x}}}$ (D) $\frac{1}{4}\frac{\sqrt{\cot\sqrt{x}}\sqrt{\cos\sqrt{x}}}{\sqrt{x}}$

**5.** if $f(x) = \cos^3(x^2)$ then find f '(x)

(A) $-6x\cos^2(x^2)\sin(x^2)$ (B) $6x\cos^2(x^2)\sin(x^2)$
(C) $-3x\cos(x^2)\sin(2x^2)$ (D) $-3\cos(x^4)\sin(2x^2)$

**Comprehension**

If a function is written as :
$y_1 = \sin(4x^2)$ & another function is $y_2 = \ln(x^3)$ then :

**6.** $\frac{dy_1}{dx}$ will be :

(A) $8x\cos(4x^2)$ (B) $\cos(4x^2)$ (C) $-\cos(4x^2)$ (D) $-8x\cos(4x^2)$

**7.** $\frac{dy_2}{dx}$ will be –

(A) $\frac{1}{x^3}$ (B) $\frac{3}{x}$ (C) $-\frac{1}{x^3}$ (D) $\frac{3}{x^2}$

**8.** $y = x(c - x)$ where c is a constant. Find maximum value of y.

**9.** The height h (in meters) of an object varies with time 't' in seconds as
$h = 10t - 5t^2$
Then maximum height (in m) attained by the object is :

**10.** Find $\frac{dy}{dx}$ of the following :
$y = \sin x^3$

# DPP No. : A8 (JEE-MAIN)

**Total Marks : 60** **Max. Time : 40 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.20** **(3 marks 2 min.)** **[60, 40]**

**1.** $\int x^2$ is equal to :

(A) $\frac{x^3}{3}+C$ (B) 2x (C) $\frac{2x^3}{3}$ (D) Meaningless

**2.** $\int\left[(x)^{1/3}-\frac{1}{(x)^{1/3}}\right]$ dx is equal to :

(A) $x^{4/3} - x^{2/3} + c$ (B) $\frac{4}{3}\ x^{2/3} - x^{2/3} + c$

(C) $\frac{3}{4}\ x^{4/3} - \frac{2}{3}\ x^{1/3} + c$ (D) $\frac{3}{4}\ (x)^{4/3} - \frac{3}{2}\ (x)^{2/3} + c$

**3.** $\int x^3 dx$ can be equal to :

(A) $3x^2$ (B) $\frac{x^4}{4} + C$ (C) $\frac{x^3}{4} - 3$ (D) $4x^3$

**4.** The maximum value of xy subject to x + y = 8, is :
(A) 8 (B) 16 (C) 20 (D) 24

**5.** $\int 2\sin(x)dx$ is equal to :
(A) –2sin x + C (B) 2 cosx + C (C) –2 cos x + C (D) 2 cosx

**6.** If $y = x^2\sin(x^3)$ then $\int y\ dx$ will be :

(A) $-\cos(x^3) + C$ (B) $-\left(\frac{\cos x^3}{3}\right)+C$ (C) $\cos(x^3) + C$ (D) $\frac{\cos x^3}{3}+C$

**7.** If $f(x) = \frac{x+1}{x-1}$ then the value of f(f(f(x))) is :

(A) $\frac{x-1}{x+1}$ (B) 1 (C) $\frac{x+1}{x-1}$ (D) x

**8.** The function $x^5 - 5x^4 + 5x^3 - 10$ has a maxima, when x =
(A) 3 (B) 2 (C) 1 (D) 0

**9.** The derivative of
$f(x) = x^3 + 3x\,\ell nx + 5$ with respect to x is :

(A) $3x^2 + 3x$ (B) $3x^2 + 3\ell nx + 3$ (C) $3x^2 + 3\ell nx + 5$ (D) $3x^2\ 3\ell nx + 8$

**10.** 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

**11.** 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 $m/s^2$

**12.** $\int (x+1)dy$ If $y = 6x^2$

(A) $2x^3 + 6x^2 + C$ (B) $4x^3 + 6x^2 + C$ (C) $4x^3 + 4x^2 + C$ (D) $4x^3 - 6x^2 + C$

**13.** If $\int_0^1 (t^2 + 9t + c)dt = \frac{9}{2}$ then find the value of 'c'

(A) $-\frac{1}{3}$ (B) Zero (C) 3 (D) 2

**14.** **Integrate :** –

$\int \frac{3}{2}\sqrt{x}dx$

(A) $\sqrt{x^3} + C$ (B) $\sqrt{x} + C$ (C) $x + C$ (D) $\frac{1}{\sqrt{x}} + C$

**15.** Evaluate $\int_{-1}^{1} x^5 dx$

(A) 0 (B) $\frac{1}{3}$ (C) $\frac{1}{6}$ (D) 2

**16.** Value of $\int_0^{\pi/2} \cos 3t\, dt$ is

(A) $\frac{2}{3}$ (B) $-\frac{1}{3}$ (C) $-\frac{2}{3}$ (D) $\frac{1}{3}$

**17.** The value of $\int_0^{\pi/2} \sin^2 x\, dx$ will be :

(A) 1 (B) 0 (C) $\frac{\pi}{4}$ (D) $\frac{\pi}{2}$

**18.** If $y = 4\cos 4x$ find $\int y\, dx$

(A) $\sin 4x + C$ (B) $\cos 4x + C$
(C) $4\sin 4x + C$ (D) $-\sin 4x + C$

**19.** Integrate the following :

$\int (2t - 4)^{-4}\, dt =$

(A) $-\frac{(2t-4)^{-3}}{6} + C$ (B) $\frac{(2t-4)^3}{6} + C$

(C) $\frac{(2t-4)^3}{2} + C$ (D) $\frac{(2t-4)^{-3}}{2} + C$

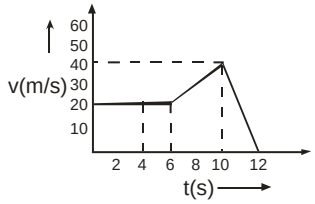
**20.** $y = 5\sin(3\omega t + \phi)$
where $\omega$ and $\phi$ are constant
Find $\frac{dy}{dt}$

(A) $15\,\omega \cos(3\omega t + \phi)$ (B) $15\,\omega \cos(3\omega t)$
(C) $15 \cos(3\omega t + \phi)$ (D) $5\,\omega \cos(3\omega t + \phi)$

# DPP No. : A9 (JEE-ADVANCED)

| | |
|---|---|
| **Total Marks : 38** | **Max. Time : 26 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.2** | **(3 marks 2 min.) [06, 04]** |
| **One or more than one options correct type ('–1' negative marking) Q.3 to Q.8** | **(4 marks 2 min.) [24, 12]** |
| **Subjective Questions ('–1' negative marking) Q.9 to Q.10** | **(4 marks 5 min.) [08, 10]** |

**1.** For the graph shown in the fig., find area under the velocity time graph from t = 0 to t = 12 second.




(A) 360 m (B) 240 m (C) 280 m (D) none of these

**2.** The area of region between y = sinx and x–axis in the interval $\left[0, \frac{\pi}{2}\right]$ will be :

(A) 1 (B) 0 (C) 2 (D) 4

**3.** $\int_0^1 \frac{x-1}{x^2-1} dx$

(A) $\ell$n(2) (B) $\ell$n(6) – $\ell$n(3) (C) $\ell$n(3) – $\ell$n(6) (D) – $\ell$n(2)

**4.** Solve the following Integrals.

$\int \frac{\cos^3\theta}{1-\sin\theta} d\theta$

(A) $\sin\theta + \frac{\sin^2\theta}{2} + C$ (B) $\sin\theta + \frac{\cos^2\theta}{2} + C$

(C) $\cos\theta + \frac{\cos^2\theta}{2} + C$ (D) $\sin\theta - \frac{\cos^2\theta}{2} + C$

**5.** Integrate :

$\int \frac{3}{2\sqrt{x}} dx$ may be equal to

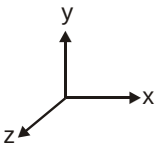
(A) $3\sqrt{x}$ (B) $\sqrt{x}$ (C) $\sqrt{x} + 1$ (D) $3\sqrt{x} + 2$

## COMPREHENSION

Position vector $\vec{A}$ is $2\hat{i}$

Position vector $\vec{B}$ is $3\hat{j}$

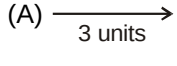
$\hat{i}, \hat{j}, \hat{k}$ are along the shown x,y and z axes :

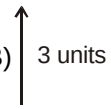


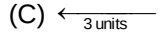

**6.** Geometrical representation of $\vec{A}$ is

(A) $\xrightarrow[2\text{ units}]{}$ (B) 2 units ↑ (C) $\xleftarrow[2\text{ units}]{}$ (D) 2 units

**7.** Geometrical representation of $\vec{B}$ is :

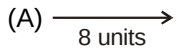
(A) 

(B) 

(C) 

(D) 


**8.** $-4\vec{A}$ can be represented as

(A) 

(B) 

(C) $\overleftarrow{A}$ (D) $\vec{A}$

**9.** Manufacturing cost of a product is $9x^2$ while the company sells it at a rate of $18x + 6$. Find
(a) Profit as a function of x by the company.
(b) Maximum profit that can be made by company on the product.

**10.** Find a unit vector in the direction from point P (1, –1, 2) to point Q(–1, 1, 1).

## DPP No. : A10 (JEE-MAIN)

**Total Marks : 57** **Max. Time : 38 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.19** **(3 marks 2 min.)** **[57, 38]**

**1.** The unit vector along $\vec{A} = 2\hat{i} + 3\hat{j}$ is :

(A) $2\hat{i} + 3\hat{j}$ (B) $\frac{2i+3j}{2}$ (C) $\frac{2i+3j}{13}$ (D) $\frac{2i+3j}{\sqrt{13}}$

**2.** If $\vec{A} = \hat{i} + \vec{j}$, and $\vec{B} = \hat{i} - \hat{j}$
The value of $\left(\vec{A}+\vec{B}\right).\left(\vec{A}-\vec{B}\right)$ is :

(A) $\sqrt{2}$ (B) 0 (C) $\frac{1}{2}$ (D) 2

**3.** If $\hat{i}$ are $\hat{j}$ unit vectors along mutually perpendicular directions then the magnitude of $\hat{i} - \hat{j}$ is

(A) 0 (B) $\sqrt{2}$ (C) 1 (D) 2

**4.** $f(x) = e^{\sin x}$ ; find the value of $f'\left(\frac{\pi}{2}\right)$

(A) e (B) 0 (C) 1 (D) –e

**5.** Vectors $\vec{A} = \hat{i} + \hat{j} - 2\hat{k}$ and $\vec{B} = 3\hat{i} + 3\hat{j} - 6\hat{k}$ are :

(A) Parallel (B) Antiparallel
(C) Perpendicular (D) at acute angle with each other

**6.** If $\vec{A}, \vec{B}$ & $\vec{A}+\vec{B}$ are three non–zero vector. Such that $\vec{A}+\vec{B}$ is perpendicular to $\vec{B}$ then which of one is correct :

(A) $A \geq B$ (B) $A \geq \frac{B}{\sqrt{2}}$ (C) $A > B$ (D) $A > \frac{B}{\sqrt{2}}$

**7.** A body goes 30 km south and then 40 km east. What will be the displacement from initial point ?

(A) 50 km, 37º South of East (B) 30 km, 37º South of East
(C) 40 km, 53º South of East (D) 70 km, 53º South of East

**8.** The displacement of particle varies with time as :
$S = 3t^2 + 2t$
Find the velocity of the particle at t = 1 sec.
(A) 5m/s (B) 2m/s (C) 8m/s (D) 6m/s

**9.** $\int (x^2 + \sin x)dx =$

(A) 3x + cosx + C (B) $\frac{x^3}{3}$ –cosx + C (C) $\frac{x^3}{3}$ + cosx + C (D) 3x – cosx + C

**10.** If $\vec{A} = \hat{i} + \hat{j} + \hat{k}$ and $\vec{B} = 2\hat{i} + \hat{k}$ , then $\vec{A} + 2\vec{B}$ is

(A) $5\hat{i} - \hat{k} + \hat{j}$ (B) $3\hat{i} + \hat{k}$ (C) $3\hat{i} + 2\hat{k}$ (D) $5\hat{i} + \hat{j} + 3\hat{k}$

**11.** If $\vec{A} = 3\hat{i} + 4\hat{j} + 5\hat{k}$ , then the component of $\vec{A}$ along z-axis is :

(A) 3 (B) 4 (C) 5 (D) $5\sqrt{2}$

**12.** A unit vector $\hat{j}$ is defined along vertically upward direction, the rain is falling vertically downward with a speed of 7m/s. Then the velocity vector of rainfall is :

(A) $\hat{j}$ m/s (B) $7\hat{j}$ m/s (C) $-7\hat{j}$ m/s (D) None of these

**13.** The velocity of a particle is given as $v(t) = t^3 + 2t + 1$
Find the acceleration of the particle at time t = 1sec.
(A) 4 (B) 5 (C) 2 (D) 3

**14.** The vector $\vec{A}$ is given as
$\vec{A} = 3\hat{i} + 3\hat{j}$
Find the angle which the vector makes with the positive y-axis :

(A) $\frac{\pi}{4}$ (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{6}$

**15.** For the function
$f(x) = \cos(3x)$
Find $f''\left(\frac{\pi}{3}\right)$

(A) 0 (B) 9 (C) –9 (D) 3

**16.** For the function $f(x) = x^3 + 5x + 2$;
The slope of the graph of function f(x) at point x = 3 is :
(A) 44 (B) 32 (C) 27 (D) 0

**17.** The displacement vector of the particle if it moves from A (3, 4, 5) to B(4, 5, 6) is

(A) $3\hat{i} + 4\hat{j} + 5\hat{k}$ (B) $4\hat{i} + 5\hat{j} + 6\hat{k}$ (C) $\hat{i} + \hat{j} + \hat{k}$ (D) $3\hat{i} + 5\hat{j} + \hat{k}$

**18.** If $\vec{A}$ is $2\hat{i} + 9\hat{j} + 4\hat{k}$, then $4\vec{A}$ will be :

(A) $8\hat{i} + 16\hat{j} + 36\hat{k}$ (B) $8\hat{i} + 36\hat{k} + 16\hat{j}$ (C) $8\hat{i} + 9\hat{j} + 16\hat{k}$ (D) $8\hat{i} + 36\hat{j} + 16\hat{k}$

**19.** If $\vec{A} = 2\hat{i} + 8\hat{j} + 7\hat{k}$ and $\vec{B} = 3\hat{i} + 2\hat{k}$ then the component of $\left(\vec{A} + \vec{B}\right)$ along x-axis is :

(A) 5 (B) 9 (C) 8 (D) 10

# DPP No. : A11 (JEE-ADVANCED)

| | |
|---|---|
| **Total Marks : 37** | **Max. Time : 26 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.3** | **(3 marks 2 min.) [09, 06]** |
| **One or more than one options correct type ('–1' negative marking) Q.4 to Q.8** | **(4 marks 2 min.) [20, 10]** |
| **Subjective Questions ('–1' negative marking) Q.9 to Q.10** | **(4 marks 5 min.) [08, 10]** |

**1.** If $x = (6y + 4)(3y^2 + 4y + 3)$ then $\int x\,dy$ will be :

(A) $\frac{1}{3y^2+4y+3}$ (B) $\frac{(3y^2+4y+3)^2}{2} + C$

(C) $(3y^2 + 4y + 3)$ (D) $\frac{(6y+4)}{(3y^2+4y+3)}$

**2.** $\int_0^{\pi/2} (e^{\sin x})\cos x\,dx$

(A) 1 (B) e + 1 (C) e – 1 (D) None of these

**3.** Find the maximum value of xy :
if x + 3y = 12

(A) 24 (B) 2 (C) 12 (D) 6

**4.** If $y = x^2 \sin x + \frac{3x}{\tan x}$, then $\frac{dy}{dx}$ will be :

(A) $2x \sin x + x^2 \cos x + \frac{3\tan x - 3x\sec^2 x}{\tan^2 x}$ (B) $2x \sin x + x^2 \cos x + \frac{1.5\sin(2x) - 3x}{\sin^2 x}$

(C) $x^2 \cos x + (3\tan x - 3x\sec^2 x)/\tan^2 x$ (D) $x^2\cos x - 2x\sin x - (3\tan x - 3x\sec^2 x)/\tan^2 x$

**5.** A ball is thrown vertically up with a certain velocity. It attains a height of 40 m and comes back to the thrower. Then choose the **incorrect** options :($g = 10 m/s^2$)

(A) The average speed of the ball for the round trip is zero.
(B) total displacement is 80 m
(C) total displacement is zero
(D) the average velocity for round trip is non zero

**COMPREHENSION :**

For the given vectors

$\vec{A} = 2\hat{i} + \hat{j} - \hat{k}$

$\vec{B} = \hat{i} - \hat{j} - \hat{k}$

$\vec{C} = 2\hat{i} + \hat{j} + \hat{k}$

Answer the following

**6.** The magnitude of $\vec{A} + \vec{B} - \vec{C}$ is :

(A) $\sqrt{10}$ (B) $2\sqrt{3}$ (C) $\sqrt{11}$ (D) 3

**7.** The angle between $\vec{B}$ and $\vec{C}$ is :

(A) $\frac{\pi}{6}$ (B) $\frac{\pi}{2}$ (C) $\frac{\pi}{3}$ (D) $\frac{\pi}{4}$

**8.** The vector $\vec{C}\times\vec{B}$ has a magnitude :

(A) $\sqrt{5}$ (B) $\sqrt{18}$ (C) 4 (D) $2\sqrt{5}$

**9.** The angle $\sqrt{3}\hat{i}-\hat{j}$ vector makes with the positive x-axis is _____

**10.** A sail boat sails 2 km due East, 5 km 37° South of East and finally an unknown displacement. If the final displacement of the boat from the starting point is 6 km due East, the third displacement is _____.

## DPP No. : A12 (JEE-MAIN)

**Total Marks : 60** **Max. Time : 40 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.20** **(3 marks 2 min.)** **[60, 40]**

**1.** If $y = x^2$ , then area of curve y v/s x from x = 0 to 2 will be :

(A) 1/3 (B) 8/3 (C) 4/3 (D) 2/3

**2.** If $\vec{P} = \hat{i}+\hat{j}-\hat{k}$ and $\vec{Q} = \hat{i}-\hat{j}+\hat{k}$ , then unit vector along $(\vec{P}-\vec{Q})$ is :

(A) $\frac{1}{\sqrt{2}}\hat{i}-\frac{1}{2}\hat{k}$ (B) $\frac{\sqrt{2}\hat{j}-\sqrt{2}\hat{k}}{2}$ (C) $\frac{\hat{j}-\hat{k}}{2\sqrt{2}}$ (D) $\frac{2\hat{j}-2\hat{k}}{4}$

**3.** If $\vec{A}=\hat{i}+\hat{j}$ and $\vec{B}=\hat{i}-\hat{j}$

The value of $(\vec{A}+\vec{B})\times(\vec{A}-\vec{B})$ is :

(A) $4\hat{k}$ (B) $\vec{A}=\hat{i}+\hat{j}$ (C) $2\hat{k}$ (D) 4

**4.** A particle moving rectilinearly with a uniform acceleration $2m/s^2$, crosses a point A with a velocity of 5m/s in the same direction as that of acceleration. Find the velocity of the particle after one second :

(A) 5 m/s (B) 7m/s (C) 3m/s (D) 2m/s

**5.** $\int \sin^5 x\cos x\,dx$ =

(A) $\frac{\sin^6 x}{6}+C$ (B) $\frac{\cos^6 x}{6}+C$ (C) $5\sin^4 x + C$ (D) $-\frac{\cos^6 x}{6}+C$

**6.** $\bar{A}=2\hat{i}-3\hat{j}+\hat{k}$ and $\bar{B}=-\hat{i}-\hat{j}-\hat{k}$

The value of $\bar{A}.\bar{B}$ is

(A) 4 (B) 6 (C) 0 (D) 2

**7.** The component of vector $A=3\hat{i}+4\hat{j}$ along the vector $\hat{i}+\hat{j}$ is :

(A) $\frac{7}{\sqrt{2}}$ (B) $\frac{6}{\sqrt{2}}$ (C) $\frac{5}{\sqrt{2}}$ (D) $\frac{3}{\sqrt{2}}$

**8.** The displacement of a body is given by $r = \sqrt{a^2 - t^2} + t \cos t^2$, where t is the time and a is constant. Its velocity is:

(A) $\frac{-t}{\sqrt{a^2 - t^2}} + \cos t^2 - t \sin 2t$ (B) $\frac{-t}{\sqrt{a^2 - t^2}} + \cos t^2 - 2t^2 \sin t^2$

(C) $\frac{-a}{\left(a^2 - t^2\right)} + 2t \cos t^2 \sin t + \sin t$ (D) $a - t^2 - t \sin t^2$

**9.** The velocity of a particle increases linearly with time i.e. $v = k t$, where $k = 2$ m/s$^2$. The distance covered in first three seconds will be:

(A) 12 m (B) 6 m (C) 9 m (D) 18 m

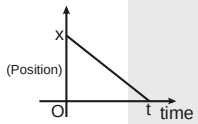
**10.** A ball is thrown vertically upwards in air. If the air resistance cannot be neglected (assume it to be directly proportional to velocity), then the acceleration of the ball at the highest point will be:

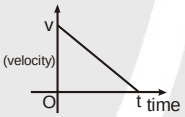
(A) 0 (B) g (C) > g (D) < g

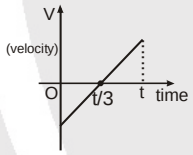
**11.** A body goes 10 km north and 20 km east. What will be the displacement from initial point ?

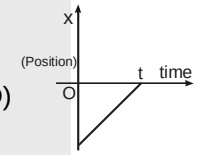
(A) 22.36 km (B) 2 km (C) 5 km (D) 30 km

**12.** For which of the following graphs the average velocity of a particle moving along a straight line for time interval (0, t) must be negative -

(A) 


(B) 


(C) 


(D) 


**13.** A person travelling on a straight line moves with a uniform velocity $v_1$ for some distance and with uniform velocity $v_2$ for the next equal distance. The average velocity v is given by

(A) $v = \frac{v_1 + v_2}{2}$ (B) $v = \sqrt{v_1 v_2}$ (C) $\frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$ (D) $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2}$

**14.** Mark the correct statement(s).

(A) if speed of a body is varying, its velocity must be varying and it must have zero acceleration

(B) if velocity of a body is varying, its speed must be varying

(C) a body moving with varying velocity may have constant speed

(D) a body moving with varying speed may have constant velocity if its direction of motion remains constant.

**15.** A particle moving along a straight line with a constant acceleration of – 4 m/s$^2$ passes through a point A on the line with a velocity of + 8 m/s at some moment. Find the distance travelled by the particle in 5 seconds after that moment.

(A) 26 m (B) 8 m (C) 18 m (D) 10 m

**16.** Find the maximum height reached by a particle which is thrown vertically upwards with the velocity of 20m/s. (Take g = 10 m/s$^2$)

(A) 40 m (B) 10 m (C) 20m (D) zero

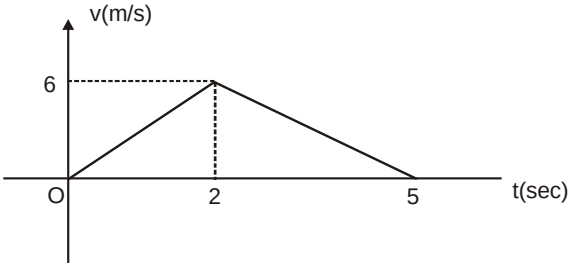
**17.** The acceleration of particle varies with time as :

$a(t) = 3t^2 + 4$

If the initial velocity of particle is 2m/s, find the velocity of particle at t = 3 sec.

(A) 41 m/s (B) 4m/s (C) 39 m/s (D) 27 m/s

**18.**




From the above velocity-time graph of a particle determine the acceleration of particle at t = 1 sec :
(A) $3m/s^2$ (B) $6m/s^2$ (C) $2m/s^2$ (D) 5m/s

**19.** A particle is moving with speed 6 m/s along the direction of $\vec{A} = 2\hat{i} + 2\hat{j} - \hat{k}$, then its velocity is :

(A) $(4\hat{i} + 2\hat{j} - 4\hat{k})$ m/s (B) $(4\hat{i} + 4\hat{j} - 2\hat{k})$ m/s

(C) $(4\hat{i} + 4\hat{j} - 4\hat{k})$ m/s (D) $(2\hat{i} + 4\hat{j} - 2\hat{k})$ m/s

**20.** The distance travelled by a freely falling body, dropped from rest at t = 0, is proportional to:
(A) the mass of the body (B) the square of the acceleration due to gravity
(C) the square of the time of fall (D) the time of fall

## DPP No. : A13 (JEE-ADVANCED)

| | | |
|---|---|---|
| **Total Marks : 42** | | **Max. Time : 27 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.2** | **(3 marks 2 min.)** | **[06, 04]** |
| **One or more than one options correct type ('–1' negative marking) Q.3 to Q.8** | **(4 marks 2 min.)** | **[24, 12]** |
| **Subjective Questions ('–1' negative marking) Q.9** | **(4 marks 5 min.)** | **[04, 05]** |
| **Match the Following (no negative marking) Q.10** | **(8 marks 6 min.)** | **[08, 06]** |

**1.** Find area under the curve $y = 5e^x$ and the x-axis, between x = 0 and x = 2 :

(A) $5e^2$ (B) $e^2 - 1$ (C) $5(e^2 - 1)$ (D) $\frac{e^2 - 1}{5}$

**2.** A car starts from rest and moves with constant acceleration. The ratio of the distance covered in the $n^{th}$ second to distance covered in n seconds is :

(A) $\frac{2}{n^2} - \frac{1}{n}$ (B) $\frac{2}{n^2} + \frac{1}{n}$ (C) $\frac{2}{n} - \frac{1}{n^2}$ (D) $\frac{1}{n} + \frac{1}{n^2}$

**3.** A particle is moving in a straight line. Its displacement at time t is given by $s = -4t^2 + 2t$, then its velocity and acceleration at time $t = \frac{1}{2}$ second are

(A) velocity of the particle is $-2$ m/s (B) velocity of the particle is 4 m/s
(C) acceleration of the particle is $-8$ m/s$^2$ (D) acceleration of the particle is 6 m/s$^2$

**4.** From the top of a tower of height 200 m, a ball A is projected up with 10 m $s^{-1}$ and two seconds later another ball B is projected vertically down with the same speed. Then choose the correct option(s) : (Take g = 10 m/s$^2$)
(A) both A and B will reach the ground simultaneously
(B) the ball A will hit the ground 2 seconds later than B hitting the ground
(C) both the balls will hit the ground with the same velocity
(D) none of these

**5.** The magnitude of the displacement is equal to the distance covered in a given interval of time if the particle. Then choose the correct option(s)
(A) moves with constant acceleration along any path
(B) moves with constant speed
(C) moves in same direction with constant velocity or with variable velocity
(D) have acceleration and velocity in same direction.

**Comprehension : (6 to 8)**

If a man has a velocity varying with time given as $v = 3t^2$ , v is in m/s and t in sec then :

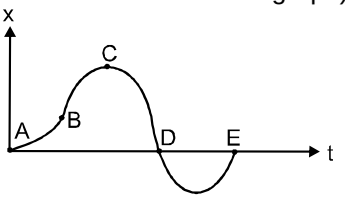
**6.** Regarding the velocity of man choose the correct option(s) :
(A) velocity of man after t = 3 sec is 27 m/s
(B) velocity of man after t = 3 sec is 9 m/s
(C) average velocity of man during t = 0 to t = 3 sec is 9 m/s
(D) average velocity of man during t = 0 to t = 3 sec is 27 m/s

**7.** Based on above comprehension choose the correct option(s) regarding displacement of particle :
(A) displacement of particle after 2 seconds of his start is 8m
(B) displacement of particle after 2 seconds of his start is 12m
(C) ratio of displacement of particle during first 2 seconds and next 2 seconds is 1 : 7
(D) ratio of displacement of particle during first 2 seconds and next 2 seconds is 7 : 1

**8.** Regarding acceleration of man choose the correct option(s)
(A) acceleration of man after t = 3 second is 18 $m/s^2$
(B) average acceleration of man during t = 0 to t = 3 seconds is 18 $m/s^2$
(C) average acceleration of man during t = 0 to t = 3 seconds is 9 $m/s^2$
(D) acceleration of man after t = 3 second is 12 $m/s^2$

**9.** If $\vec{A}$ and $\vec{B}$ are two non–zero vectors such that $|\vec{A}+\vec{B}| = \frac{|\vec{A}-\vec{B}|}{2}$ and $|\vec{A}| = 2|\vec{B}|$ then the angle between $\vec{A}$ and $\vec{B}$ is $\theta$ such that $\cos\theta = -\frac{m}{n}$ **(**where m and n are positive integers and $\frac{m}{n}$ is in lowest form) then find m + n

**10.** A particle is moving along x-axis. Its position (x) varies with time (t) is shown in the graph. Points A,B,C,D and E are also given in the graph. Here positive values of velocity and acceleration means they are towards +x direction and their negative values means that they are towards –x direction. Match the column–I, according the correct results given in column–II. (Centre of curvature of BD is below the graph but centre of curvature of AB and DE is above the graph)




| **Coulmn–I** | **Column–II** |
|---|---|
| (A) From point A to B | (p) acceleration of the particle is positive |
| (B) From point B to C | (q) acceleration of the particle is negative |
| (C) From point C to D | (r) velocity of the particle is positive or zero |
| (D) From point D to E | (s) speed is increasing |

# DPP No. : A14 (JEE-MAIN)

**Total Marks : 60** **Max. Time : 40 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.20** **(3 marks 2 min.)** **[60, 40]**

**1.** $\int_{\pi/6}^{\pi/3} \sin(3x)dx =$

(A) $\frac{1}{3}$ (B) $-\frac{1}{3}$ (C) 1 (D) 3

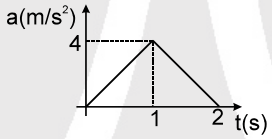
**2 .** If $y = \sin x \ \ell n(3x)$

then $\frac{dy}{dx}$ will be :

(A) $\frac{3\cos x}{x}$ (B) $\frac{\sin x}{x} + (\cos x)\ \ell n(3x)$

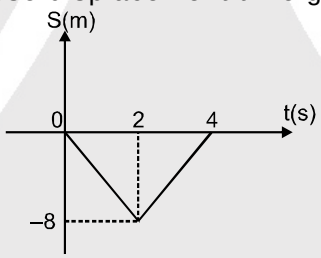
(C) $\sin(x^2) + \cos x\ \ell n(3x)$ (D) $3x\sin x + 3\cos x\ \ell n(x)$

**3.** The acceleration–time graph of a particle moving on a straight line is as shown in figure. The velocity of the particle at time t = 0 is 2m/s. The velocity after 2 seconds will be



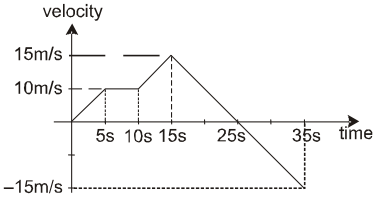

(A) 6 m/s (B) 4 m/s (C) 2 m/s (D) 8 m/s

**4.** The velocity of particle (whose displacement time graph is shown) at t = 3s, is:




(A) 4m/s (B) 6 m/s (C) 8m/s (D) 2m/s

**5.** A person starts from origin and for his linear motion velocity is given as shown in figure. Find displacement of the person from t = 15 sec to t = 35 sec.

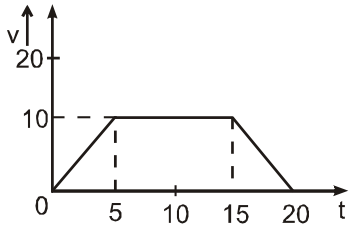



(A) 75 m (B) 0 (C) –75 m (D) 150 m

**6.** The velocity of a car moving on a straight road increases linearly according to equation, v = a + b x, where a & b are positive constants. The acceleration in the course of such motion: (x is the displacement)

(A) increases (B) decreases (C) stay constant (D) becomes zero

**7.** Figure shows the velocity time graph of a particle moving along straight line (v is m/s and t is in seconds). Its average velocity in 20 seconds will be:




(A) 10 m/s (B) zero (C) 3.75 m/s (D) 7.5 m/s

**8.** A particle is projected with speed 10 m/s at angle 60° with the horizontal. Then the time after which its speed becomes half of initial ($g = 10 m/s^2$) -

(A) $\frac{1}{2}$ sec. (B) 1 sec. (C) $\sqrt{3/2}$ sec. (D) $\sqrt{3}/2$ sec.

**9.** $\int \frac{x^3}{(x^4+7)^8} dx =$

(A) $-\frac{1}{28}\left(\frac{1}{(x^4+7)^7}\right) + C$ (B) $-\frac{1}{7}\left(\frac{1}{(x^4+7)^7}\right) + C$

(C) $-\frac{1}{4}\left(\frac{1}{(x^4+7)^7}\right) + C$ (D) $-\frac{1}{(x^4+7)^7} + C$

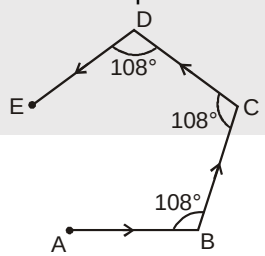
**10.** A particle has initial velocity, $\vec{v} = 3\hat{i}+4\hat{j}$ and a constant force $\vec{F} = 4\hat{i}-3\hat{j}$ acts on the particle. The path of the particle is :

(A) straight line (B) parabolic (C) circular (D) elliptical

**11.** A particle travels according to the equation $x = at^3$, $y = bt^3$. The equation of the trajectory is

(A) $y = \frac{ax^2}{b}$ (B) $y = \frac{bx^2}{a}$ (C) $y = \frac{bx}{a}$ (D) $y = \frac{bx^3}{a}$

**12.** A particle moves in a plane from A to E along the shown path. It is given that AB=BC=CD =DE=10 metre. Then the magnitude of net displacement of particle is :

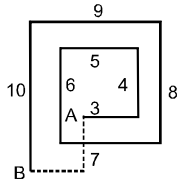



(A) 10 m (B) 15 m (C) 5 m (D) 20 m

**13.** The magnitude of the displacement is equal to the distance covered in a given interval of time if the particle.

(A) moves with constant acceleration along any path
(B) moves with constant speed
(C) moves with variable velocity
(D) have acceleration and velocity in same direction.

**14.** A particle travels from A to B path shown in figure, then the displacement of particle is :




(A) $2\sqrt{2}$ m (B) $4\sqrt{2}$ m (C) 52 m (D) None of these

**15.** A stone is projected with speed 20 m/s at angle 37° with the horizontal and it hits the ground with speed 12 m/s due to air resistance. Assume the effect of air resistance is to reduce only horizontal component of velocity. Then the time of flight will be ($g = 10\ m/s^2$) -

(A) greater than 2.4 sec (B) less than 2.4 sec.
(C) 2.4 sec. (D) depends on other data

**16.** A particle is projected under gravity at an angle of projection 45° with horizontal. Its horizontal range is 36 m. Find maximum Height attained by particle.

(A) 8 meter (B) 9 meter (C) 10 meter (D) 20 meter

**17.** A ball is projected horizontally with a velocity of 5 m $s^{-1}$ from the top of a building 19.6 m high. How long will the ball take to hit the ground ? ($g = 9.8\ m/s^2$)

(A) 1s (B) 2 s (C) 4s (D) 3 s

**18.** A bomb is dropped from an aeroplane when it is at a height h directly above the target. If the aeroplane is moving horizontally with a speed v, the distance by which the bomb will miss the target is given by

(A) $2v\sqrt{\frac{h}{g}}$ (B) $v\sqrt{\frac{h}{g}}$ (C) $v\sqrt{\frac{2h}{g}}$ (D) $v\frac{\sqrt{h}}{2g}$

**19.** A train starts from station A at 1 pm and reaches station B at 3 pm, after tarvelling 108 km. It halts at station B for one hour and then starts for station C which is 42 km from station B. It reaches station C at 7pm on the same day. The average speed of the train for the whole journey from A to C is

(A) 68 km/hr (B) 25 km/hr (C) 30 km/hr (D) 35 km/hr

**20.** The projection of $\vec{A} = 2\hat{i} + 2\hat{j} + 5\hat{k}$ on to $\vec{B} = \hat{i} - \hat{j}$ is :

(A) Zero (B) $\frac{4}{\sqrt{2}}$ (C) $-\frac{4}{\sqrt{2}}$ (D) 4

## DPP No. : A15 (JEE-ADVANCED)

| | |
|---|---|
| **Total Marks : 42** | **Max. Time : 27 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.2** | **(3 marks 2 min.) [06, 04]** |
| **One or more than one options correct type ('–1' negative marking) Q.3 to Q.8** | **(4 marks 2 min.) [24, 12]** |
| **Subjective Questions ('–1' negative marking) Q.9** | **(4 marks 5 min.) [04, 05]** |
| **Match the Following (no negative marking) Q.10** | **(8 marks 6 min.) [08, 06]** |

**1.** A body is projected horizontally with speed 30 m/s from a very high tower. What will be its speed after 4 sec.-

(A) 20 m/s (B) 50 m/s (C) 54 m/s (D) 70 m/s

**2.** For a particle undergoing rectilinear motion with uniform acceleration, the magnitude of displacement is one third the distance covered in some time interval. The magnitude of final velocity is less than magnitude of initial velocity for this time interval. Then the ratio of initial speed to the final speed for this time interval is :

(A) $\sqrt{2}$ (B) 2 (C) $\sqrt{3}$ (D) 3

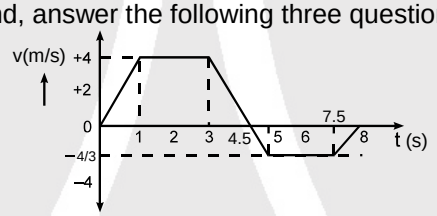
**3.** A particle is projected with a velocity $10\sqrt{2}$ m/s making an angle 45º with the horizontal. Neglect the effect of air friction. Then after 1 seconds of projection. Take g=10 m/s$^2$
(A) the height of the particle above the point of projection is 5 m.
(B) the height of the particle above the point of projection is 10 m.
(C) the horizontal distance of the particle from the point of projection is 10 m.
(D) the horizontal distance of the particle from the point of projection is 15 m.

**4.** A particle is moving with initial velocity $\vec{u} = \hat{i} - \hat{j} + \hat{k}$. What may be its acceleration so that it can remain moving in the same straight line ?
(A) $\vec{a} = 2\hat{i} - 2\hat{j} + 2\hat{k}$ (B) $\vec{a} = -2\hat{i} + 2\hat{j} - 2\hat{k}$
(C) $\vec{a} = 3\hat{i} + 3\hat{j} + -3\hat{k}$ (D) $\vec{a} = 1\,\hat{i} - 1\,\hat{j}$

**5.** The function f(x) = $\frac{x}{(x^2+4)^{3/2}}$ has a maxima and /or minima at x equal to
(A) $\sqrt{2}$ (B) $-\sqrt{2}$ (C) $\frac{1}{\sqrt{2}}$ (D) $-\frac{1}{\sqrt{2}}$

## Comprehension

The velocity time graph of a particle moving along a straight line is shown in the figure. In the time interval from t = 0 to t = 8 second, answer the following three questions.




**6.** According to above v-t curve. Choose the correct option(s)
(A) Distance travelled by the particle up to t = 8 sec. is 6 m
(B) Distance travelled by the particle up to t = 8 sec. is 17 m
(C) Displacement of particle up to t = 8 sec. is 9 m
(D) Displacement of particle up to t = 8 sec. is 18 m

**7.** According to above v-t curve. Choose the correct option(s)
(A) magnitude of maximum speed during the course of motion is 4 m/s
(B) magnitude of average speed from t = 0 to t = 8 sec. is $\frac{17}{8}$ m/s
(C) magnitude of average velocity from t = 0 to t = 8 sec. is $\frac{9}{8}$ m/s
(D) magnitude of average velocity from t = 0 to t = 8 sec. is 4 m/s

**8.** Choose the correct option(s) regarding acceleration of the particle :
(A) acceleration of particle at t = 1.5 sec. is 4 m/s$^2$
(B) acceleration of particle at t = 4 sec. is –8/3 m/s$^2$
(C) acceleration of particle from t = 1 sec to t = 3 sec is constant but non-zero
(D) acceleration of particle from t = 1 sec to t = 3 sec is constant

**9.** A particle moves in a straight line with an acceleration a ms$^{-2}$ at time 't' seconds where a = $-\frac{1}{t^2}$. At time t = 1s the particle has a velocity of 3ms$^{-1}$ then the velocity at t = 4s is m × 10$^{-2}$ m/s (where m is an positive integer). Find $\frac{|m|}{5}$

**10.** If the position (x) of the particle is given as $x = 3t^2 - 8t + 5$. Here positive value of velocity and acceleration means they are towards x direction. Match the column-I with correct result of column-II. Here x is in meters and t is in seconds.

| **Column-I** | | **Column-II** | |
|---|---|---|---|
| (A) | Acceleration of particle is 6 m/s$^2$ | (P) | t = 1 seconds |
| (B) | Velocity of particle is zero | (Q) | t = 3/4 seconds |
| (C) | Velocity of particle is negative | (R) | t = 5/3 seconds |
| (D) | Particle is at origin (x = 0) | (S) | t = 0 seconds |
| | | (t) | t = 4/3 seconds |

## DPP No. : A16 (JEE-MAIN)

**Total Marks : 60** **Max. Time : 40 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.20** **(3 marks 2 min.)** **[60, 40]**

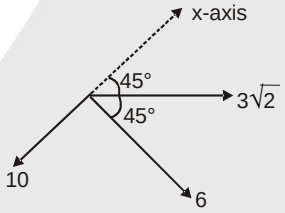
**1.** A particle A is projected with speed $V_A$ from a point making an angle 60º with the horizontal. At the same instant, second particle B (lie in the same horizontal plane) is thrown vertically upwards from a point directly below the maximum height point of parabolic path of A , with velocity $V_B$. If the two particles collide then the ratio of $V_A/V_B$ should be ;

(A) 1 (B) $2/\sqrt{3}$ (C) $\sqrt{3}/2$ (D) $\sqrt{3}$

**2.** A particle is projected at an angle of projection $\alpha$ and after t seconds it appears to have an angle of $\beta$ with the horizontal. The initial velocity is:

(A) $\frac{gt}{2\sin(\alpha-\beta)}$ (B) $\frac{gt\cos\beta}{\sin(\alpha-\beta)}$ (C) $\frac{\sin(\alpha-\beta)}{2gt}$ (D) $\frac{2\sin(\alpha-\beta)}{gt\cos\beta}$

**3.** Three co-planar vectors (x-y plane) having magnitude $3\sqrt{2}$, 6, 10 are shown in the figure. Find the component of resultant of three vectors along the x-axis as shown :




(A) 7 (B) –10 (C) 9 (D) –7

**4.** A ball is released from the top of a tower of height h. It takes time T to reach the ground. What is the position of the ball (from ground) after time T/3 ?

(A) h/9 (B) 7h/9 (C) 8h / 9 (D) 17h/18

**5.** A vector perpendicular to $\hat{i}+\hat{j}+\hat{k}$ is

(A) $\hat{i}-\hat{j}+\hat{k}$ (B) $\hat{i}-\hat{j}-\hat{k}$ (C) $-\hat{i}-\hat{j}-\hat{k}$ (D) $3\hat{i}+2\hat{j}-5\hat{k}$

**6.** A partical moves in the x-y plane according to the scheme $x = -8\sin\pi t$ and $y = -2\cos^2\pi t$,where t is time. Find the equation of path of the particle.

(A) $y = -2 + \frac{x^2}{32}$ (B) $y^2 = -2 + \frac{x^2}{32}$ (C) $x^2 = -2 + \frac{y^2}{32}$ (D) $x = -2 + \frac{y^2}{32}$

**7.** A stone is dropped from a certain height which can reach the ground in 5s. It is stopped momentarily after 3s of its fall and then it is again released. The total time taken by the stone to reach the ground will be :
(A) 6s (B) 6.5 s (C) 7s (D) 7.5 s

**8.** The equation of motion of a projectile is $y = 12x - 3/4\,x^2$. Given that $g = 10\ ms^{-2}$. What is the range of the projectile? (the origin is the point of projection, x-axis is horizontal and y-axis is vertical)
(A) 36m (B) 30.6 m (C) 16 m (D) 12.4 m

**9.** A man in a balloon, throws a stone downwards with a speed of 5 m/s with respect to balloon . The balloon is moving upwards with a constant acceleration of 5 $m/s^2$. Then velocity of the stone relative to the man after 2 second is ($g = 10 m/s^2$):

(A) 10 m/s (B) 30 m/s (C) 15 m/s (D) 35 m/s

**10.** A ball is dropped from a height of 20 m and rebounds with a velocity which is $\frac{3}{4}$ of the velocity with which it hits the ground. What is the time interval between the first and second bounces- ($g = 10\ m/s^2$)
(A) 3 sec. (B) 4 sec. (C) 5 sec. (D) 6 sec.

**11.** A body travelling with uniform acceleration crosses two points A and B with velocities 20 m $s^{-1}$ and 30 m $s^{-1}$ respectively. The speed of the body at the mid-point of A and B is
(A) 24 m $s^{-1}$ (B) 25 m $s^{-1}$ (C) $\sqrt{650}$ m $s^{-1}$ (D) $10\sqrt{6}$ m $s^{-1}$

**12.** A particle P is moving with a constant speed of 6m/s in a direction $2\hat{i} - \hat{j} - 2\hat{k}$. When t = 0, P is at a point whose position vector is $3\hat{i} + 4\hat{j} - 7\hat{k}$. Find the position vector of the particle P after 4 seconds.
(A) $18\hat{i} - 4\hat{j} - 23\hat{k}$ (B) $19\hat{i} - 4\hat{j} - 23\hat{k}$ (C) $19\hat{i} + 4\hat{j} - 23\hat{k}$ (D) $19\hat{i} - 4\hat{j} + 23\hat{k}$

**13.** At a particular instant velocity and acceleration of a particle are $(-\hat{i} + \hat{j} + 2\hat{k})$m/s and $(3\hat{i} - \hat{j} + \hat{k})m/s^2$ respectively at the given instant particle's speed is :
(A) increasing (B) decreasing (C) constant (D) can't be say

**14.** A particle whose speed is $5\sqrt{6}$ m/s moves along the line from A (1, 0, 3) to B (3, 2, –1) . Find its velocity vector in the form of $a\hat{i} + b\hat{j} + c\hat{k}$
(A) $5\hat{i} + 5\hat{j} - 10\hat{k}$ (B) $5\hat{i} + 10\hat{j} - 10\hat{k}$ (C) $5\hat{i} + 5\hat{j} + 10\hat{k}$ (D) None of these

**15.** From the top of a tower a stone is dropped. If it covers 25 m in the last second of its motion, find the height of the tower. ($g = 10\ m/s^2$)
(A) 45m (B) 15 m (C) 50 m (D) None of these

**16.** An astronaut is on the surface of a planet whose air resistance is negligible. To measure the acceleration due to gravity (g), he throws a stone upwards. He observes that the stone reaches to a maximum height of h = 10m (which is negligible is compare radius of planet) and reaches the surface 4 second after it was thrown. Find the acceleration due to gravity (g) on the surface of that planet :
(A) 5 $m/s^2$ (B) 10 $m/s^2$ (C) 7.5 $m/s^2$ (D) 2.5 $m/s^2$

**17.** The projectile is projected from origin in x-y plane. The y-coordinate of the projectile at time t is given by $y = 4t - t^2$ and the x-coordinate of the particle is given by $x = 3t$. What is the angle of projection with the x-axis?

(A) $\tan^{-1} 3/5$ (B) $\tan^{-1} 4/5$ (C) $\tan^{-1} 4/3$ (D) $\tan^{-1} 3/4$

**18.** The distance covered by a moving particle is directly proportional to $t^{1/2}$ where t is time elapsed. What type of motion the object is performing :

(A) always retarded (B) always accelerated

(C) first retarded and then accelerated (D) first accelerated and then retardation

**19.** A bullet is fired with speed 50 m/s at 45° angle with horizontal. Find the height of the bullet when its direction of motion makes angle 30° with the horizontal.

(A) $\frac{125}{3}$ m (B) $\frac{125}{4}$ m (C) $\frac{125}{5}$ m (D) None of these

**20.** Integrate:

$$I = \int_{\infty}^{R} \frac{GMm}{x^2} dx$$

where G,M, m, R are constants

(A) $-\frac{GMm}{R^2}$ (B) $-\frac{GMm}{R}$ (C) $-\frac{GMR}{m}$ (D) None of these

## DPP No. : A17 (JEE-ADVANCED)

| | |
|---|---|
| **Total Marks : 42** | **Max. Time : 27 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.2** | **(3 marks 2 min.) [06, 04]** |
| **One or more than one options correct type ('–1' negative marking) Q.3 to Q.8** | **(4 marks 2 min.) [24, 12]** |
| **Subjective Questions ('–1' negative marking) Q.9** | **(4 marks 5 min.) [04, 05]** |
| **Match the Following (no negative marking) Q.10** | **(8 marks 6 min.) [08, 06]** |

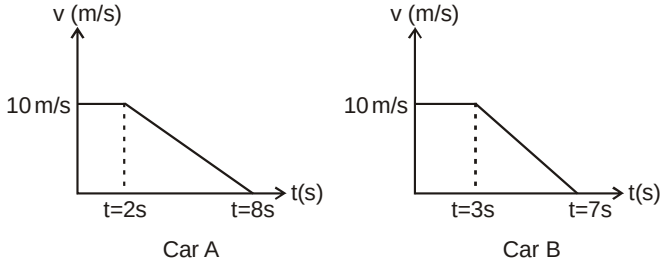
**1.** Ratio of the ranges of the bullets fired from a gun (of constant muzzle speed) at angle $\theta$, $2\theta$ & $4\theta$ is found in the ratio x : 2 : 2, then the value of x will be (Assume same muzzle speed of bullets)

(A) 1 (B) 2 (C) $\sqrt{3}$ (D) $\frac{2}{\sqrt{3}}$

**2.** A particle is projected from a point P (2, 0, 0)m with a velocity 10 m/s making an angle 45º with the horizontal. The plane of projectile motion passes through a horizontal line PQ which makes an angle of 37º with positive x-axis, xy plane is horizontal. The coordinates of the point where the particle will strike the line PQ is: (Take $g = 10$ m/s$^2$)

(A) (10, 6, 0)m (B) (8, 6, 0)m (C) (10, 8, 0)m (D) (6, 10, 0)m

**3.** Car A and car B move on a straight road and their velocity versus time graphs are as shown in figure. Comparing the motion of car A in between t = 0 to t = 8 sec. and motion of car B in between t = 0 to t = 7 sec., pick up the correct statement.



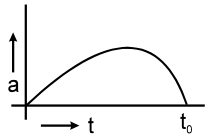

(A) Distance travelled by car A is less than distance travelled by car B.

(B) Distance travelled by car A is greater than distance travelled by car B.

(C) Distance travelled by car A is equal to distance travelled by car B.

(D) Average speed of car A is less than average speed of car B.

**4.** A particle is moving in a straight line whose acceleration versus time graph is given. Assume that initial velocity is in the direction of acceleration. Then which of the statement is correct between time t = 0 to $t = t_0$.




(A) Velocity first increases then decreases.
(B) Velocity always increases from time zero to $t_0$
(C) Displacement first increases then decreases.
(D) Displacement always increases from time zero to $t_0$

**5.** A particle is thrown with velocity 10 m/sec at an angle of 37º with vertical, then at the time of projection : ($g = 10 m/s^2$) (tan 37º = 3/4)
(A) Component of acceleration of particle in line of velocity is $8 m/s^2$
(B) Component of acceleration of particle perpendicular to line of velocity is $6 m/s^2$
(C) Component of velocity of particle in line of acceleration is 8m/sec
(D) Component of velocity of particle perpendicular to line of acceleration is 6m/sec.

## COMPREHENSION

A particle moves in xy-plane according to the equations $x = \alpha t$ and $y = \alpha t(1 - \beta t)$ where $\alpha$ and $\beta$ are positive constants and t is time.

**6.** choose the correct option(s) in regards to trajectory (path) of the particle :

(A) Equation of the trajectory (path) of the particle is $y = x\left(1-\frac{\beta}{\alpha}x\right)$

(B) Equation of the trajectory (path) of the particle is $y = x\left(1-\frac{\alpha}{\beta}x\right)$

(C) trajectory of particle is symmetric about $x = 2\alpha/\beta$
(D) trajectory of particle is symmetric about $x = \alpha/2\beta$

**7.** choose the correct option(s) according to above comprehension:

(A) Speed of the particle at time $t = \frac{1}{4\beta}$ is $\frac{\sqrt{5}}{2}\alpha$ m/s

(B) Speed of the particle at time $t = \frac{1}{4\beta}$ is $\frac{\sqrt{5}}{2}\beta$ m/s

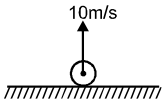
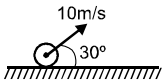
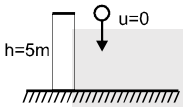
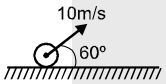
(C) acceleration of particle at any instant is $-2\alpha\beta\hat{j}$

(D) acceleration of particle at any instant is $-2\alpha\beta\hat{i}$

**8.** Choose the correct option(s)
(A) The time t after start at t = 0 when the angle between the direction of velocity and acceleration of particle becomes 30º is $\frac{\sqrt{3}+1}{2\beta}$
(B) initial angle (t = 0) of velocity vector with x-axis is 45°
(C) The time t after start at t = 0 when the angle between the direction of velocity and acceleration of particle becomes 30º is $\frac{\sqrt{3}+1}{2\alpha}$
(D) angle of velocity vector with x-axis, at the instant when acceleration vector is perpendicular to velocity vector is 0°.

**9.** A particle which is initially at rest has time–dependent acceleration given as $a = 3t^2$. If velocity (in m/s) of the particle at t = 2 sec. is n, then find $\frac{n}{2}$:

**10.** In column–I four situations are given match the column–I with column–II. Consider the motion upto the time when ball hits the ground first time. ($g = 10\ m/s^2$)

| | **Column–I** | **Column–II** |
|---|---|---|
| (A) |   | (p) maximum height attained by the ball from ground is 5m |
| (B) |   | (q) speed of ball is 10 m/s when it touches the ground again |
| (C) |   | (r) minimum speed of the ball is zero during flight. |
| (D) |   | (s) horizontal range of the ball is $5\sqrt{3}$ m. |
| | | (t) time of flight is 1 sec. |

## DPP No. : A18 (JEE-MAIN)

**Total Marks : 60** **Max. Time : 40 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.20** **(3 marks 2 min.)** **[60, 40]**

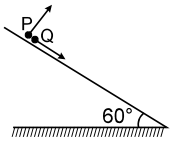
**1.** A particle is projected up the incline such that its component of velocity along the incline is 10 m/s. Time of flight is 2 sec and maximum height above the incline is 5 m. Then velocity of projection will be:
(A) 10 m/s (B) $10\sqrt{2}$ m/s (C) $5\sqrt{5}$ m/s (D) none of these

**2.** A pebble is thrown horizontally from the top of a 20 m high tower with an initial velocity of 10 m/s. The air drag is negligible. The speed of the pebble when it is at the same distance from top as well as base of the tower ($g = 10\ m/s^2$)
(A) $10\sqrt{2}$ m/s (B) $10\sqrt{3}$ m/s (C) 20 m/s (D) 25 m/s

**3.** A ball is projected with velocity u at right angle to the slope which is inclined at an angle $\alpha$ with the horizontal. The distance 'x' along the inclined plane that it will travel before striking the slope is -
(A) $\frac{2u^2}{g}\cos\alpha$ (B) $\frac{2u^2}{g}\tan\alpha$ (C) $\frac{2u^2}{g}\frac{\tan\alpha}{\cos\alpha}$ (D) $\frac{2u^2}{g}\frac{\tan\alpha}{\sin\alpha}$

**4.** A stone projected at angle '$\theta$' with horizontal from the roof of a tall building falls on the ground after three second. Two second after the projection it was again at the level of projection. Then the height of the building, is ($g = 10 m/s^2$)–
(A) 5 m (B) 25 m (C) 20 m (D) 15 m

**5.** A particle P is projected from a point on the surface of long smooth inclined plane (see figure). Simultaneously another particle Q is released on the smooth inclined plane from the same position. P and Q collide after t = 4 second. The speed of projection of P is :




(A) 5 m/s (B) 10 m/s (C) 15 m/s (D) 20 m/s

**6.** A ball is thrown from bottom of an incline plane at an angle $\alpha$ from the inclined surface up the plane. Another ball is thrown from a point on the inclined plane with same speed and at same angle $\alpha$ from the inclined surface down the plane. If in the two cases, maximum height attained by the balls with respect to the inclined surface during projectile motion are $h_1$ and $h_2$ then :

(A) $h_1 > h_2$ (B) $h_1 < h_2$

(C) $h_1 = h_2$ (D) All the three can be possible

**7.** Three particles, A, B and C are projected from ground from the same point with same initial speeds making angles 30°, 45° and 60° respectively with the horizontal. Which of the following statement is correct-

(A) A, B and C have unequal ranges

(B) Ranges of A and C are equal and less than that of B

(C) Ranges of A and C are equal and greater than that of B

(D) A, B and C have equal ranges

**8.** A particle is projected from a point on ground with initial speed of 10 m/sec at an angle of 37º with the horizontal. At the same instant a fly starts flying on the same path of particle with constant speed of 10 m/s Then :

(A) time taken by fly to complete whole path is less then time taken by particle

(B) acceleration of fly is zero

(C) average velocity of both are same for whole journey

(D) None of these

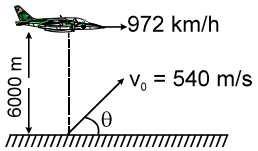
**9.** A ball is thrown upward at an angle 30º to the horizontal and lands on the top edge of a building that is 20 m away and 5m high. How fast was the ball thrown ($g = 10 m/s^2$).

(A) 10 m/s (B) 20 m/s (C) 40 m/s (D) 80 m/s

**10.** A particle starts from the origin at t = 0 and moves in the x-y plane with constant acceleration a in the y direction. Its equation of motion is $y = bx^2$. The x component of its velocity is :

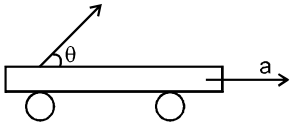
(A) variable (B) $\sqrt{\frac{2a}{b}}$ (C) $\frac{a}{2b}$ (D) $\sqrt{\frac{a}{2b}}$

**11.** An aircraft moving with a speed of 972 km/h is at a height of 6000 m, just overhead of an anti-aircraft gun. If the muzzle velocity of the gun is 540 m/s, the firing angle $\theta$ for the bullet to hit the aircraft should be :




(A) $73^0$ (B) $30^0$ (C) $60^0$ (D) $45^0$

**12.** A platform is pulled with a constant acceleration a. A particle is projected from the platform at angle $\theta$ with the horizontal with respect to the platform as shown in the figure. The value of $\tan\theta$ such that particle again come to the starting point on the platform is ($a = 5\ m/s^2$): use $g = 10\ m/s^2$

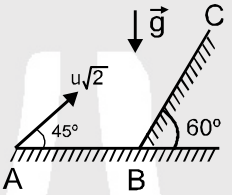



(A) 4 (B) 6 (C) 2 (D) 3

**13.** The vertical height of the projectile at time t is given by $y = 4t - 5t^2$ and the horizontal distance covered is given by $x = 3t$. What is the angle of projection with the horizontal?

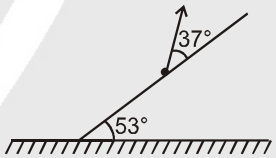
(A) $\tan^{-1} 3/5$ (B) $\tan^{-1} 4/5$ (C) $\tan^{-1} 4/3$ (D) $\tan^{-1} 3/4$

**14.** A particle is projected from point 'A' with velocity $u\sqrt{2}$ at an angle of 45º with the horizontal as shown in the figure. It strikes the inclined plane BC at right angle. The velocity of the particle just before the collision with the inclined is :



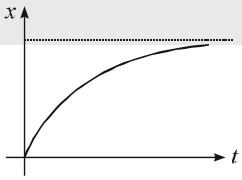

(A) $\frac{\sqrt{3}u}{2}$ (B) $\frac{u}{2}$ (C) $\frac{2u}{\sqrt{3}}$ (D) u

**15.** A particle is projected from the inclined plane at angle 37° with the inclined plane in upward direction with speed 10 m/s. The angle of inclined plane with horizontal is 53°. Then the maximum height attained by the particle from the incline plane will be-




(A) 3m (B) 4 m (C) 5 m (D) zero

**16.** Variation of displacement *x* of a particle moving on a straight line with time *t* is shown in following figure**. The figure indicates :**

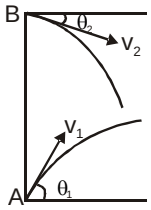



(A) the particle starts with a certain speed but the motion is retarded
(B) the velocity of particle is constant throughout motion
(C) the acceleration of the particle is constant throughout motion
(D) the particle starts with certain speed and moves with increasing speed .

**17.** A body dropped from the top of a tower covers 7/16 of the total height in the last second of its fall. The time of fall is

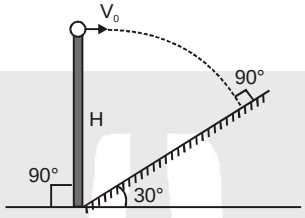
(A) 2 sec (B) 4 sec (C) 1 sec (D) $\left(\frac{50}{7}\right)$sec

**18.** Two balls are projected from points A and B in vertical plane as shown in Fig. AB is a straight vertical line. The balls can collide in mid air if $v_1/v_2$ is equal to :




(A) $\frac{\sin\theta_1}{\sin\theta_2}$ (B) $\frac{\sin\theta_2}{\sin\theta_1}$ (C) $\frac{\cos\theta_1}{\cos\theta_2}$ (D) $\frac{\cos\theta_2}{\cos\theta_1}$

**19.** In fig. the angle of inclination of the inclined plane is 30°. Find the horizontal velocity $V_0$ so that the particle hits the inclined plane perpendicularly.




(A) $V_0 = \sqrt{\frac{2gH}{5}}$ (B) $V_0 = \sqrt{\frac{2gH}{7}}$ (C) $V_0 = \sqrt{\frac{gH}{5}}$ (D) $V_0 = \sqrt{\frac{gH}{7}}$

**20.** A train is standing on a platform , a man inside a compartment of a train drops a stone . At the same instant train starts to move with constant acceleration. The path of the particle as seen by the person who drops the stone is :

(A) parabola

(B) straight line for sometime & parabola for the remaining time

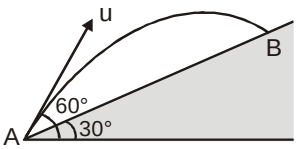
(C) straight line

(D) variable path that cannot be defined

## DPP No. : A19 (JEE-ADVANCED)

| | |
|---|---|
| **Total Marks : 42** | **Max. Time : 31 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.2** | **(3 marks 2 min.) [06, 04]** |
| **One or more than one options correct type ('–1' negative marking) Q.3 to Q.8** | **(4 marks 2 min.) [24, 12]** |
| **Subjective Questions ('–1' negative marking) Q.9** | **(4 marks 5 min.) [04, 05]** |
| **Match the Following (no negative marking) Q.10** | **(8 marks 6 min.) [08, 06]** |

**1.** A stone is projected from point A with speed u making an angle 60° with horizontal as shown. The fixed inclined surface makes an angle 30° with horizontal. The stone lands at B after time t. Then the distance AB is equal to




(A) $\frac{ut}{\sqrt{3}}$ (B) $\frac{\sqrt{3}ut}{2}$ (C) $\sqrt{3}ut$ (D) 2 ut

**2.** A ball is thrown from the roof of a building of height 44m with speed $v_0$ at an angle $\theta$ below the horizontal. It lands 2 seconds later at a point 30m from the base of the building, then the value of $\tan\theta$ is : ($g = 10\ m/s^2$)

(A) $\frac{4}{5}$ (B) $\frac{3}{5}$ (C) $\frac{5}{4}$ (D) $\frac{5}{3}$

**3.** Equation of trajectory of a projectile is given by $y = -x^2 + 10x$ where x and y are in meters and x is along horizontal and y is vertically upward and particle is projected from origin. Then which of the following options is/are **correct** : ($g = 10\ m/s^2$)

(A) initial velocity of particle is $\sqrt{505}$ m/s (B) horizontal range is 10 m

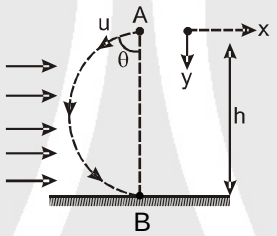
(C) maximum height is 25 m (D) angle of projection with horizontal is $\tan^{-1}(5)$

**4.** A particle is projected in such a way that it follows a curved path with constant acceleration $\vec{a}$. For finite interval of motion. Which of the following option(s) may be correct :

$\vec{u}$ = initial velocity $\vec{a}$ = acceleration of particle $\vec{v}$ = instant velocity for t > 0

(A) $|\vec{a}\times\vec{u}| \neq 0$ (B) $|\vec{a}\times\vec{v}| \neq 0$ (C) $|\vec{u}\times\vec{v}| \neq 0$ (D) $\vec{u}.\vec{v} = 0$

**5.** A particle is projected at point 'A' with initial velocity 5 m/s at an angle $\theta = 37°$ with the vertical y axis. A strong horizontal wind gives the particle a constant horizontal acceleration 6 m/s$^2$ in the x direction. If the particle strikes the ground at a ground directly under its released position, The downward y acceleration is taken as the constant g = 10 m/s$^2$ , take $\left(\sin 37° = \frac{3}{5},\ \cos 37° = \frac{4}{5}\right)$. **choose the correct option(s):**




(A) Hight h of point A is 9m

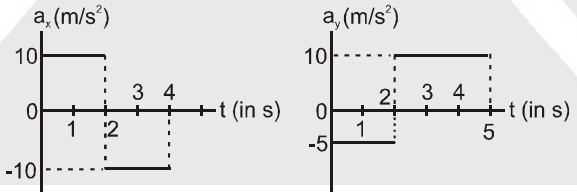
(B) time taken by particle to reach point B is 1 second

(C) time taken by particle to reach point B is 2 second

(D) Hight h of point A is 28m

**COMPREHENSION (Q.6 to Q.8)**

A particle which is initially at rest at the origin, is subjected to an acceleration with *x*- and *y*-components as shown. After time *t* = 5 sec. , the particle has no acceleration.




**6.** According to above a-t curve choose the correct option(s) :

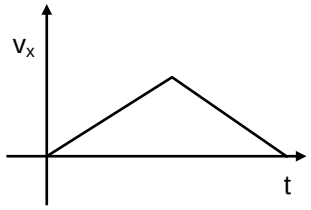
(A) magnitude of velocity of the particle at t = 2 seconds is $10\sqrt{5}$ m/s

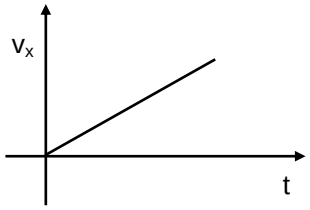
(B) magnitude of average velocity of the particle between t = 0 and t = 4 seconds is $\frac{5}{2}\sqrt{17}$ m/s

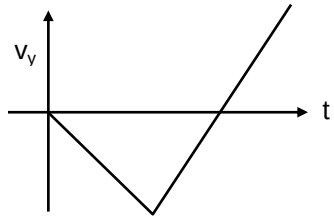
(C) particle is at its farthest distance from the y-axis at t = 4 sec.

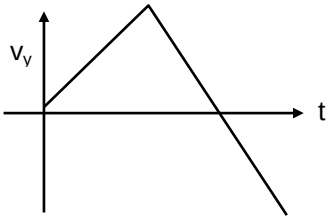
(D) None of these

**7.** Choose the correct v-t curve based on above a-t curve :

(A) 


(B) 


(C) 


(D) 


**8.** Choose the correct option(s)

(A) displacement of particle in X direction is non-zero.

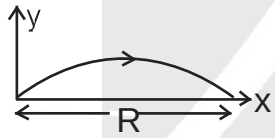
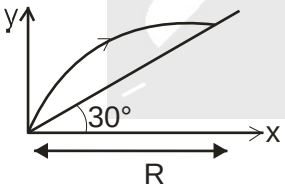
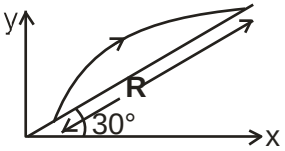
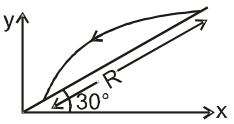
(B) displacement of particle in X direction upto t = 4sec will be zero.

(C) displacement of particle in Y direction will be zero at t = $\left(3+\sqrt{3}\right)$ sec.

(D) Trajectory (path) of particle after t = 4sec. must be straight line.

**9.** Distance between a frog and an insect on a horizontal plane is 9 m. Frog can jump with a maximum speed of $\sqrt{10}$ m/s. If minimum number of jumps required by the frog to catch the insect is n, then find n. (Take g =10 m/s$^2$):

**10.** In the column-I, the path of a projectile (initial velocity 10 m/s and angle of projection with horizontal 60° in all cases) is shown in different cases. Rangle 'R' is to be matched in each case from column-II. Take g = 10 m/s$^2$. Arrow on the trajectory indicates the direction of motion of projectile.

| **Column-I** | **Column-II** |
|---|---|
| (A)   | (p) R = $\frac{10}{\sqrt{3}}$ m |
| (B)   | (q) R = $\frac{40}{3}$ m |
| (C)   | (r) R = $5\sqrt{3}$ m |
| (D)   | (s) R = $\frac{20}{3}$ m |

# DPP No. : A20 (JEE-MAIN)

**Total Marks : 60** **Max. Time : 40 min.**
**Single choice Objective ('–1' negative marking) Q.1 to Q.20** **(3 marks 2 min.)** **[60, 40]**

**1.** A particle is thrown up inside a stationary lift of sufficient height. The time of flight is T. Now it is thrown again with same initial speed $v_0$ with respect to lift. At the time of second throw, lift is moving up with speed $v_0$ and uniform acceleration g upward (the acceleration due to gravity). The new time of flight is–

(A) $\frac{T}{4}$ (B) $\frac{T}{2}$ (C) T (D) 2T

**2.** A particle is moving rectilinearly so that its acceleration is given as $a = 3t^2 + 1$ m/s$^2$.Its initial velocity is zero.
(A) The velocity of the particle at t=1 sec will be 3m/s.
(B) The displacement of the particle in 1 sec will be 2m.
(C) The particle will continue to move in positive direction.
(D) The particle will come back to its starting point after some time.

**3.** A coin is released inside a lift at a height of 2 m from the floor of the lift. The height of the lift is 10 m. The lift is moving with an acceleration of 9 m/s$^2$ downwards. The time after which the coin will strike with the lift is : ($g = 10$ m/s$^2$)

(A) 4 s (B) 2 s (C) $\frac{4}{\sqrt{21}}$ s (D) $\frac{2}{\sqrt{11}}$ s

**4.** Three forces P, Q and R are acting on a particle in the plane, the angle between P and Q & Q and R are 150$^o$ and 120$^o$ respectively. Then for equilibrium, forces P, Q and R are in the ratio

(A) 1 : 2 : 3 (B) 1 : 2 : $\sqrt{3}$ (C) 3 : 2 : 1 (D) $\sqrt{3}$ : 2 : 1

**5.** A projectile is launched with an initial velocity $\vec{V}_0 = (2m/s)\hat{i} + (3m/s)\hat{j}$ . At the top of the trajectory, the speed of the particle is (x horizontal direction, y-vertical direction)-

(A) $\sqrt{2^2 + 3^2}$ m/s (B) 2 m/s (C) 3 m/s (D) 5 m/s

**6.** An arrow is shot in air, its time of flight is 5 sec and horizontal range is 200m. The inclination of the arrow with the horizontal is-

(A) $\tan^{-1}\frac{5}{8}$ (B) $\tan^{-1}\frac{8}{5}$ (C) $\tan^{-1}\frac{1}{8}$ (D) 45°

**7.** If angles of projection are $\left(\frac{\pi}{4}+\theta\right)$ and $\left(\frac{\pi}{4}-\theta\right)$ where $\theta < \frac{\pi}{4}$, then the ratio of horizontal ranges described by the projectile is (speed is same)-

(A) 2 : 1 (B) 1 : 2 (C) 1 : 1 (D) 2 : 3

**8.** The speed of a projectile at its maximum height is $\frac{\sqrt{3}}{2}$ times its initial speed. If the range of the projectile is 'P' times the maximum height attained by it, P =

(A) $\frac{4}{3}$ (B) $2\sqrt{3}$ (C) $4\sqrt{3}$ (D) $\frac{3}{4}$

**9.** For a projectile on the horizontal plane, the ratio of maximum height reached to the square of flight time is- ($g = 10$ ms$^{-2}$)

(A) 5 : 4 (B) 5 : 2 (C) 5 : 1 (D) 10 : 1

**10.** A rider on horse falls back when horse starts running, all of a sudden because-
(A) rider is taken back
(B) rider is suddenly afraid of falling
(C) inertia of rest keeps the upper part of body at rest while lower part of the body moves forward with the horse
(D) none of the above

**11.** A particle moves in the x-y plane according to the rule $x = t^2$, $y = t - t^3/3$, where t is time. Find the magnitude of displacement of the particle from t = 0 to t = 3s.
(A) $\sqrt{81}$ (B) $\sqrt{36}$ (C) $\sqrt{117}$ (D) $\sqrt{90}$

**12.** Two forces whose magnitudes are in the ratio 3 : 5 give a resultant of 28 N if the angle between them is 60°, then the magnitude of the two forces are :
(A) 18 N and 30 N (B) 12 N and 20 N (C) 3N and 5N (D) 9N and 15N

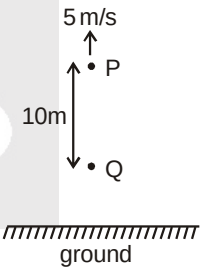
**13.** A body falls freely from rest under gravity. it coveres as much distance in the last second of its motion as covered in the first three seconds. The body has fallen for a time of :
(A) 3s (B) 5s (C) 7s (D) 9 s

**14.** An object accelerates from rest to a velocity 27.5 $ms^{-1}$ in 10 s. Find the distance covered by the object during the next 10s :
(A) 412.5 (B) 137.5 m (C) 550 m (D) 275 m

**15.** When the speed of a car is u, the minimum distance over which it can be stopped is s. If the speed becomes nu, what will be the minimum distance in which can be stopped ?
(A) s/n (B) ns (C) $s/n^2$ (D) $n^2s$

**16.** A train moving with some initial velocity, on applying breaks (constant retardation) stops after covering 50 m. If the initial velocity of train is just doubled and applied the same retarding force then the distance covered by the train to stop is :
(A) 50 m (B) 100 m (C) 150 m (D) 200 m

**17.** A ball is thrown vertically upwards with an initial velocity of 5 m/sec from point P as shown. Q is a point 10 m vertically below the point P. Then the speed of the ball at point Q will be :
(take g = 10 $m/s^2$ and neglect air resistance)
(A) 7.5 m/sec (B) 10 m/sec
(C) 15 m/sec (D) 17.5 m/sec




**18.** 50 m long trains are crossing each other in opposite direction with velocity of 10 m/s and 15 m/s respectively. Then time-taken by trains to cross each other will be
(A) 2 sec (B) 4 sec (C) 6 sec (D) 8 sec

**19.** A body starts from rest, and moves with constant acceleration. What is the ratio of the distance travelled by the body during the $4^{th}$ and $3^{rd}$ second-
(A) $\frac{7}{5}$ (B) $\frac{5}{7}$ (C) $\frac{7}{3}$ (D) $\frac{3}{7}$

**20.** A stone is thrown with an initial speed of 4.9 m/s from a bridge in vertically upward direction. It falls down in water after 2 sec. The height of the bridge is (g = 9.8 $m/s^2$)-
(A) 4.9 m (B) 9.8 m (C) 19.8 m (D) 24.7 m

# DPP No. : A21 (JEE-ADVANCED)

| | |
|---|---|
| **Total Marks : 38** | **Max. Time : 25 min.** |
| **Single choice Objective ('–1' negative marking) Q.1 to Q.2** | **(3 marks 2 min.) [06, 04]** |
| **One or more than one options correct type ('–1' negative marking) Q.3 to Q.7** | **(4 marks 2 min.) [20, 10]** |
| **Subjective Questions ('–1' negative marking) Q.8** | **(4 marks 5 min.) [04, 05]** |
| **Match the Following (no negative marking) Q.9** | **(8 marks 6 min.) [08, 06]** |

**1.** Man A is sitting in a car moving with a speed of 54 km/hr observes a man B in front of the car crossing perpendicularly a road of width 15 m in three seconds. Then the velocity of man B (in m/s) will be:

(A) $5\sqrt{10}$ towards the car at some angle (B) $5\sqrt{10}$ away from the car at some angle

(C) 5 perpendicular to the road (D) 15 along the road

**2.** Hail stones falling vertically with a speed of $12\sqrt{3}$ m/s hits the wind screen which makes an angle 30º with the horizontal. If car is running at velocity v(in m/s) so that the driver find the hailstones striking perpendicular to the wind screen. Find the value of $\frac{v}{2}$ ?

(A) 6 m/s (B) 8 m/s (C) 5 m/s (D) 9 m/s

**3.** Two projectiles A and B are projected with same speed at an angle 30° and 60° to the horizontal, then which of the following is valid. where T is total time of flight, H is max. height and R is horizontal range.

(A) $H_A = 3H_B$ (B) $T_B = \sqrt{3}\, T_A$ (C) $R_A = R_B$ (D) $H_B = 3H_A$

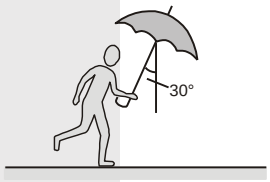
**4.** A man is holding an umbrella at angle 30° with vertical with lower end towards himself, which is appropriate angle to protect him from rain for his horizontal velocity 10 m/s. Then which of the following will be true-

(A) rain is falling at angle 30° with vertical, towards the man

(B) rain may be falling at angle 30° with vertical, away from the man

(C) rain may be falling vertically

(D) none of these




**5.** A man holding a flag is running in North-East direction with speed 10 m/s. Choose the correct option(s).

(A) If wind is blowing in east is direction with the speed $5\sqrt{2}$ m/s. then flag will flutter in south direction

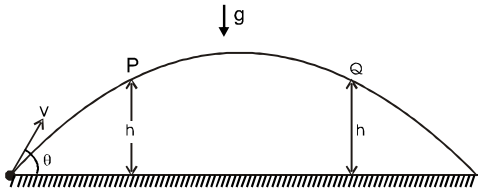
(B) If wind is blowing in east is direction with the speed $5\sqrt{2}$ m/s. then flag will flutter in north direction.

(C) If wind is blowing in north is direction with the speed $5\sqrt{2}$ m/s. then flag will flutter in east direction.

(D) If wind is blowing in north is direction with the speed $5\sqrt{2}$ m/s. then flag will flutter in west direction.

## COMPREHENSION

A projectile is thrown with a velocity v making angle $\theta$, with horizontal as shown in figure. It just crosses the topes of two poles, each of the height h, after 1s and 3s, respectively :




**6.** Choose the correct option(s)

(A) The time of flight of the projectile is 4s (B) The time of flight of the projectile is 3s

(C) Maximum height is numerically equal to 2g (D) The height h is numerically equal to $\frac{3g}{2}$

**7.** For $\theta = 45°$ choose the correct option(s) based on above comprehension.
(A) The value of range is 80 m (B) The value of range is 60 m
(C) The ratio of maximum height to h is 4 : 3 (D) The value of range is 40 m

**8.** Two boats are moving along perpendicular paths on a still lake at night. One boat moves with a speed of $3ms^{-1}$ and the other boat moves with a speed of $4ms^{-1}$ in the directions such that they collide after some time. At t = 0, the boats are 300m apart. Two boats will collide after time_____.

**9.** **Match the following :**
A ball is projected from the ground with speed u, at angle such that its range on the horizontal plane is maximum.

| | |
|---|---|
| (A) speed at half the maximum height | (P) $\frac{\sqrt{3}u}{2}$ |
| (B) speed at maximum height | (Q) $\frac{u}{\sqrt{2}}$ |
| (C) Change in velocity when it returns to the ground | (R) $u\sqrt{2}$ |
| (D) magnitude of average velocity when it reaches maximum height | (S) $\frac{u}{2}\sqrt{\frac{5}{2}}$ |

# ANSWERS

## DPP No. : A1

**10.** (i) $\frac{\pi}{6}$; (ii) $\frac{\pi}{4}$; (iii) $\frac{\pi}{3}$; (iv) $\frac{\pi}{2}$; (v) $\frac{2\pi}{3}$; (vi) $\frac{3\pi}{4}$
(vii) $\frac{5\pi}{6}$; (viii) $\pi$; (ix) $\frac{3\pi}{2}$

## DPP No. : A3

**8.** (i) 0 (ii) –1 (iii) –1 (iv) $\frac{1}{3}$

**9.** (i) I (ii) IV (iii) I (iv) II (v) III

## DPP No. : A5

**9.** **1** **10.** $\frac{-2x-1}{(x+1)^2}$

## DPP No. : A6

**9.** $8(2x+3)^3 - 14(7x-1) - \frac{18}{(3x-1)^4} - \frac{36}{(3x-2)^4}$

## DPP No. : A7

**8.** $\frac{c^2}{4}$ **9.** R = 5 meter

**10.** $3x^2 \cos x^3$

## DPP No. : A9

**9.** (a) $18x+6-9x^2$ (b) 15 **10.** $\frac{-2i+2j-k}{3}$

## DPP No. : A11

**9.** 30° **10.** 3 km north.

## DPP No. : A13

**9.** 7

## DPP No. : A15

**9.** 45

## DPP No. : A17

**9.** 4

## DPP No. : A19

**9.** 9

## DPP No. : A21

**8.** 60 sec.