Prachand NEET 2025

Physics

Basic Maths

DPP 01

Q1 Find the values of:

(i) tan (– 30°)

(ii) cos 150°

(iii) sin 210°

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

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

Q2 Convert the following angles from radian to degree

(a) $\frac{3\pi}{4}\text{rad}$

(b) $\frac{7\pi}{6}\text{rad}$

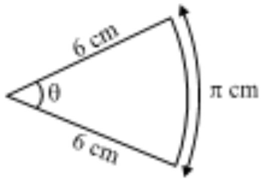
(A) 135°, 210°

(B) 210°, 135°

(C) 225°, 240°

(D) 135°, 225°

Q3 A circular arc is of length π cm. Find angle subtended by it at the centre.



(A) 60° (B) 30°

(C) 90° (D) 15°

Q4 Find the slope of straight line $2y = 3x + 5$.

(A) 3 (B) 1

(C) 3/2 (D) 5/2

Q5 If $y = \log_e x + \sin x + e^x$, then $\frac{dy}{dx}$ is:

(A) $\frac{1}{x} + \sin x + e^x$

(B) $\frac{1}{x} - \cos x + e^x$

(C) $\frac{1}{x} + \cos x + e^x$

(D) $\frac{1}{x} - \sin x$

Q6 Find derivative of $y = x^3 + \frac{4}{3}x^2 - 5x + 1$

(A) $\frac{x^4}{4} + \frac{4x^3}{9} - \frac{5x^2}{2} + x$

(B) $3x^2 + \frac{8}{3}x - 5$

(C) $x^2 + x - 5$

(D) $3x^2 + x - 5$

Q7 Calculate $\frac{9/8}{6/5}$

(A) $\frac{16}{15}$ (B) $\frac{15}{16}$

(C) $\frac{5}{16}$ (D) $\frac{27}{20}$

Q8 $\frac{d}{dx}\left(e^{100}\right) = \ldots..$

(A) e^{100}

(B) 0

(C) $100e^{999}$

(D) 1

Q9 If acceleration due to gravity g at height $h \ll R$ (where R is radius of earth) is $g_n = g_0\left(1 + \frac{h}{R}\right)^{-2}$, then using binomial theorem which is correct ?

(A) $g_n = g_0$

(B) $g_n = g_0\left(1 - \frac{2h}{R}\right)$

(C) $g_n = g_0\left(1 + \frac{2h}{R}\right)$

(D) $g_n = g_0\left(1 - \frac{h}{2R}\right)$

Q10 If radius of a spherical bubble starts to increase with time t as $r = 0.5t$. What is the time rate of change of volume of the bubble at $t = 4$s?

(A) 8π units/s (B) 4π units/s

(C) 2π units/s (D) π units/s

Q11 If x+y = 8, then what will be the maximum value of xy ?

(A) 8 (B) 16

(C) 20 (D) 24

Q12 Find value of $\frac{10^{-4}}{8}$

(A) 1.25×10^{-5}

(B) 1.25×10^{-4}
(C) 1.25×10^{-3}
(D) 1.25×10^{-6}

Q13 Evaluate $\int \left(x^2 - \cos x + \frac{1}{x}\right) dx$
(A) $x^3 - \sin\ x + \ln(x) + c$
(B) $2x - \sin\ x + \ln(x) + c$
(C) $\frac{x^3}{3} + \sin x + \ln(x) + c$
(D) $\frac{x^3}{3} - \sin x + \ln(x) + c$

Q14 Find the value of integral $\int_0^{\pi/2} \cos\ x\ dx$
(A) 0 (B) 1
(C) -1 (D) 2

Q15 Find the value of $\int_2^3 \left(x^3 - 4x^2 + 5x - 10\right) dx$
(A) 74/12 (B) 464
(C) –464 (D) –79/12

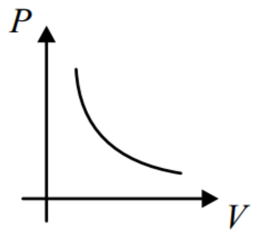
Q16 Find the value of $\log_{10} 1000 - \log_{10} 100$ = ____?
(A) 3 (B) 2
(C) 1 (D) 10

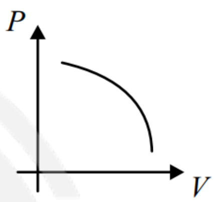
Q17 Find $1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \frac{1}{16} - \frac{1}{32} + ...\infty$
(A) 2 (B) 1
(C) 2/3 (D) ∞

Q18 Find sum of first ten terms of given Arithmetic progression: 1+3+5+7…… upto 10 terms.
(A) 100 (B) 80
(C) 95 (D) 200

Q19 A container having 2 moles of a gas at a temperature(T) of 300 K expands isothermally from volume $V_1 = 2\ m^3$ to $V_2 = 8\ m^3$.
Calculate work done by the gas.
[Here take formula of work done as,
$W = nRT \int_{V_1}^{V_2} \frac{1}{V} dV$, n is number of moles, R is gas constant]
(A) $600\ R\ \ln(4)$
(B) $600\ R\ \ln(8)$
(C) $300\ R\ \ln(4)$
(D) $600\ R\ \ln(2)$

Q20 Calculate $\frac{1}{2} + \frac{1}{4} + \frac{1}{12} + \frac{1}{3}$
(A) $\frac{7}{6}$ (B) $\frac{6}{7}$
(C) $\frac{7}{12}$ (D) 12

Q21 P-V graph for ideal gas at constant temperature(T) is [Given ideal gas equation PV =nRT]
(A)


(B)


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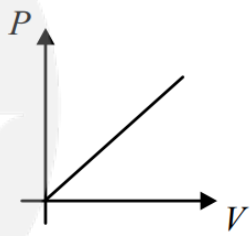
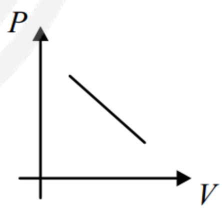
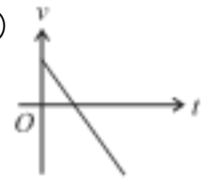
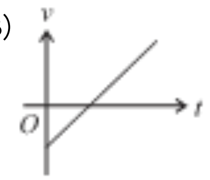
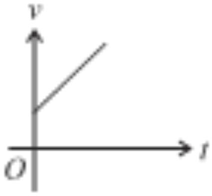


(D)


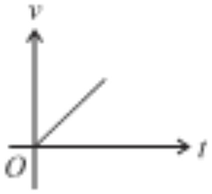
Q22 If velocity v varies with time (t) as $v = 2t - 3$, then the plot between v and t is best represented by:
(A)


(B)


(C)



(D)



Q23 If $y^2 - 2y - 3 = 0$, then find the value of y.

(A) 3, 1

(B) –3, –1

(C) 3, –1

(D) –3, 1

Q24 If $y = t^4 + 8t^2 + 3$ then find $\frac{d^2y}{dt^2}$

(A) $12t^2 + 16$

(B) $12t^2$

(C) $4t^2 + 16$

(D) $\frac{4t^3}{3} + 12$

Q25 **Statement I**- As θ increases, the value of $\cos\ \theta$ also increases $(0^\circ \leq \theta \leq 90^\circ)$

Statement II - For a very small angle θ, $\sin\theta \simeq \theta$

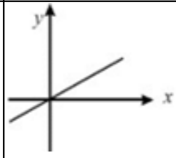
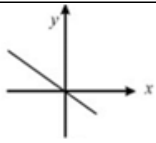
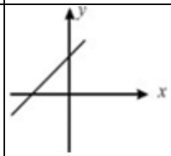
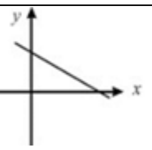
(A) Statement I is correct but Statement II is incorrect.

(B) Statement I is incorrect but Statement II is correct.

(C) Both Statement I and Statement II are correct.

(D) Both Statement I and Statement II are incorrect.

Q26 Match the graph in List-II corresponding to the equations given in List I

	List I		**List II**
(i).	$y = 4x$	(a)	
(ii).	$y = -6x$	(b)	
(iii).	$y = x + 4$	(c)	
(iv).	$y = -2x + 4$	(d)	

Choose the correct option from the codes given below

(A) i-(b), ii-(c), iii-(d), iv-(a)

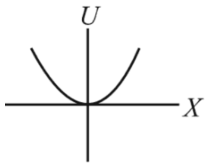
(B) i-(a), ii-(d), iii-(b), iv-(c)

(C) i-(b), ii-(c), iii-(a), iv-(d)

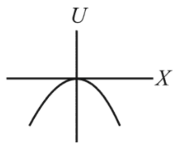
(D) i-(a), ii-(b), iii-(c), iv-(d)

Q27 A body is attached to a spring whose other end is fixed. If the spring is elongated by x, its potential energy is $U = 5x^2$, where x is in metre and U is in joule. $U - x$ graph is

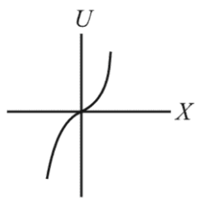
(A)



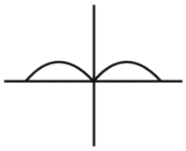
(B)



(C)



(D)



Q28 Match the List I with List II to find out the correct option

	List I		List II
(i).	$\log_e 125 + \log_e 4 - 2\log_e 5$	(a)	1
(ii).	$\log_e 16$	(b)	$\log_e 20$
(iii).	$\log_{10} 10$	(c)	$4 \log_e 2$
(iv).	$\log_2 16$	(d)	4

Choose the correct option from the codes given below

(A) i-(b), ii-(a), iii-(c), iv-(d)

(B) i-(a), ii-(b), iii-(c), iv-(d)

(C) i-(b), ii-(c), iii-(a), iv-(d)

(D) i-(d), ii-(a), iii-(b), iv-(c)

Q29 Choose the correct statement(s) among the following.

(I) The integral $\int_1^5 x^2\, dx$ is equal to $\frac{124}{3}$

(II) The value of $(\sin\ 180^\circ\ +\ \cos\ 90^\circ)^2$ is 1

(III) Slope of straight line $\frac{x}{2} - \frac{y}{4} = 1$ is 2.

(A) Only I

(B) I and II

(C) I, II and III

(D) I and III

Q30 **Assertion :** Distance between two points (1, 2, 3) and (1,6,6) is 5 units.

Reason : The distance between two points (x_1, y_1, z_1) and (x_2, y_2, z_2) is given by the formula : $r = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$

(A) Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.

(B) Both Assertion and Reason are correct, but Reason is not the correct explanation of Assertion.

(C) Assertion is correct, but Reason is incorrect.

(D) Assertion is incorrect, but Reason is correct.

Answer Key

Q1	(B)
Q2	(A)
Q3	(B)
Q4	(C)
Q5	(C)
Q6	(B)
Q7	(B)
Q8	(B)
Q9	(B)
Q10	(A)
Q11	(B)
Q12	(A)
Q13	(D)
Q14	(B)
Q15	(D)
Q16	(C)
Q17	(C)
Q18	(A)
Q19	(A)
Q20	(A)
Q21	(A)
Q22	(B)
Q23	(C)
Q24	(A)
Q25	(B)
Q26	(D)
Q27	(A)
Q28	(C)
Q29	(D)
Q30	(A)

Hints & Solutions

Q1 Text Solution:

(B)

(i) tan(–30°) = –tan30°

$= -\frac{1}{\sqrt{3}} [\because \quad \tan(-\theta) = -\tan\theta]$

(ii)cos 150° = cos(180° – 30°)

$[\because \cos(180 - \theta) = -\cos\theta]$

= – cos 30°

$= -\frac{\sqrt{3}}{2}$

(iii)sin 210° = sin (180° + 30°)

$[\because \sin(180 + \theta) = -\sin\theta]$

= –sin 30°

$= -\frac{1}{2}$

Q2 Text Solution:

(A)

(a) We know that π radian = 180°

1 rad = $\frac{180^\circ}{\pi}$

So,

$\frac{3\pi}{4} rad = \frac{3\pi}{4} \times 1\, rad = \frac{3\pi}{4} \times \frac{180^\circ}{\pi} = 135^\circ$

(b)

$\frac{7\pi}{6} rad = \frac{7\pi}{6} \times 1\ rad = \frac{7\pi}{6} \times \frac{180^\circ}{\pi} = 210^\circ$

Q3 Text Solution:

(B)

Given length of circular arc (l) = π cm

From figure, radius of circle (r) = 6 cm

$\theta = \frac{l}{r} = \frac{\pi}{6} rad$

$\left[\because 1\, rad \ = \ \frac{180^\circ}{\pi}\right]$

$= \frac{\pi}{6} \times \frac{180^\circ}{\pi} = 30^\circ$

Q4 Text Solution:

(C)

Equation of straight line : $y = mx + c$ ------(1)

Here m is slope, c is y – intercept

Given equation: $2y = 3x + 5$

$y = \frac{3x}{2} + \frac{5}{2}$

Comparing it with eq(1)

$m = \frac{3}{2}, \ \ c = \frac{5}{2}$

$\therefore$ slope is $\frac{3}{2}$

Q5 Text Solution:

(C)

$y = \log_e x + \sin x + e^x$

Differentiating on both sides w.r.t x we get

$\frac{dy}{dx} = \frac{d}{dx}(\log_e x + \sin x + e^x)$

$= \frac{d}{dx}(\log_e x) + \frac{d}{dx}(\sin x) + \frac{d}{dx}(e^x)$

$\frac{dy}{dx} = \frac{1}{x} + \cos x + e^x$

Q6 Text Solution:

(B)

$y = x^3 + \frac{4}{3}x^2 - 5x + 1$

Differentiating on both sides w.r.t. x we get

$\frac{dy}{dx} = \frac{d}{dx}\left[x^3 + \frac{4}{3}x^2 - 5x + 1\right]$

$= \frac{d}{dx}\left[x^3\right] + \frac{d}{dx}\left[\frac{4x^2}{3}\right] + \frac{d}{dx}\left[-5x\right] + \frac{d}{dx}\left[1\right]$

$\left[\because \frac{d}{dx}\left[x^n\right] = nx^{n-1}\right]$

$= 3x^{3-1} + \frac{4}{3} \times 2x^{2-1} - 5x^{1-1} + 0$

$\frac{dy}{dx} = 3x^2 + \frac{8}{3}x - 5$

Q7 Text Solution:

(B)

$\frac{9/8}{6/5} = \frac{9}{8} \times \frac{5}{6} = \frac{15}{16}$

Q8 Text Solution:

(B)

$\frac{d}{dx}\left(e^{100}\right)$

Here e^{100} is a constant value and differentiation of a constant value is zero

$\therefore \quad \frac{d}{dx}\left(e^{100}\right) = 0$

Q9 Text Solution:

(B)

$g_n = g_0\left(1 + \frac{h}{R}\right)^{-2}$

Using the binomial theorem

$(1 + \ x)^n = 1 + nx \quad if\ x << 1$

Now from the ques,

$h \ << R,$

$\frac{h}{R} \ << 1$

So, $g_n = g_0\left(1 - \frac{2h}{R}\right)$

Q10 Text Solution:

(A)

Let radius of spherical bubble at any instant be r

Given r = 0.5 t

$\Rightarrow \frac{dr}{dt} = \frac{d}{dt}(0.5t) = 0.5$

Rate of change of volume of bubble is

$\frac{dV}{dt} = \frac{d}{dt}\left(\frac{4}{3}\pi r^3\right)$

$= \frac{4}{3}\pi \frac{d}{dt}\left(r^3\right) = \frac{4\pi}{3} \times 3r^2 \frac{dr}{dt}$

$= \frac{4}{3}\pi \times 3r^2 \times 0.5$

$= 2\pi r^2 = 2\pi(0.5t)^2$

Rate of change of volume at $t = 4$s

$2\pi(0.5 \times 4)^2$

$= 2\pi \times 4$

$= 8\pi$

Q11 Text Solution:

(B)

Let p = xy

$\therefore p = x(8 - x)$

$\Rightarrow p = 8x - x^2$

$\Rightarrow \frac{dp}{dx} = 8 - 2x$

For maximum and minimum value of p

$\frac{dp}{dx} = 0$

$\Rightarrow 8 - 2x = 0$

$x = 4$

$\Rightarrow \frac{d^2p}{dx} = -2 < 0$

Hence, maximum value of p at x=4 will be

p= 4×4 = 16

Q12 Text Solution:

(A)

We can write the given expression as

$\frac{10^{-4}}{8} = \frac{10}{8} \times 10^{-5} = 1.25 \times 10^{-5}$

Q13 Text Solution:

(D)

$\int\left(x^2 - \cos x + \frac{1}{x}\right)dx$

We know that $\int x^n\,dx = \frac{x^{n+1}}{n+1} + c \quad \left[n \neq -1\right]$

$\int \cos x\,dx = \sin\ x + c$

$\int \frac{1}{x}dx = \log_e x + c$

$\therefore \quad \int\left(x^2 - \cos x + \frac{1}{x}\right)dx = \frac{x^{2+1}}{2+1} - \sin x$

$+ \log_e x + c$

$= \frac{x^3}{3} - \sin x + \log_e x + c$

$= \frac{x^3}{3} - \sin x + \ln\left(x\right) + c$

$\{\log_e x = \ln x\}$

Q14 Text Solution:

(B)

$\int_0^{\pi/2} \cos x\,dx = [\sin x]_0^{\pi/2}$

$= \left[\sin\frac{\pi}{2} - \sin\ 0\right]$

$= [1 - 0] = 1$

Q15 Text Solution:

(D)

$\int_2^3\left(x^3 - 4x^2 + 5x - 10\right)dx$

$= \left[\frac{x^{3+1}}{3+1} - \frac{4x^{2+1}}{2+1} + \frac{5x^{1+1}}{1+1} - 10x\right]_2^3$

$= \left[\frac{x^4}{4} - \frac{4x^3}{3} + \frac{5x^2}{2} - 10x\right]_2^3$

$= \left[\frac{(3)^4}{4} - \frac{4(3)^3}{3} + \frac{5(3)^2}{2} - 10\left(3\right)\right]$

$- \left[\frac{(2)^4}{4} - \frac{4(2)^3}{3} + \frac{5(2)^2}{2} - 10\left(2\right)\right]$

$= \frac{-79}{12}$

Q16 Text Solution:

(C)

$\log_{10} 1000 - \log_{10} 100$

$= \log_{10} 10^3 - \log_{10} 10^2$

$= 3\log_{10} 10 - 2\log_{10} 10$

$= 3 - 2 = 1 \quad [\because \log_{10} 10 = 1]$

Q17 Text Solution:

(C)

$1 - \frac{1}{2} + \frac{1}{4} - \frac{1}{8} + \frac{1}{16} - \frac{1}{32} + \ldots.\infty$

This is an infinite G.P. since there is a common ratio between each term which is $\frac{-1}{2}$

Sum of infinite G.P. $= \frac{a}{1-r}$

Here $a = 1, \quad r = \frac{-1}{2}$

$\therefore$ sum $= \frac{1}{1-\left(\frac{-1}{2}\right)} = \frac{1}{\frac{3}{2}} = \frac{2}{3}$

Q18 Text Solution:

(A)

$1 + 3 + 5 + 7 + \ldots\ldots 10$ terms

This is arithmetic progression (A.P.). Here common difference between terms (d) is 2.

Sum of n terms of A.P.

$= \frac{n}{2}[2a + (n-1)d]$

Here $a = 1, \quad d = 2, \quad n = 10$

sum $= \frac{10}{2}[2 \times 1 + (10-1)2]$

$= 5\,[2 + 18] = 100$

Q19 Text Solution:

(A)

Given,

$n = \; 2\;,\; T = 300\;K,$

$V_1 = 2m^3,\; V_2 = 8\;m^3$

$W = nRT \int_{V_1}^{V_2} \frac{1}{V} dV$

$= 2R \times 300 \;\; \ln \left[\frac{V_2}{V_1}\right]$

$= 600R \;\ln \left[\frac{8}{2}\right]$

$=600\;R\;\ln\;(4)$

Q20 Text Solution:

(A)

$\frac{1}{2} + \frac{1}{4} + \frac{1}{12} + \frac{1}{3} = \frac{6+3+1+4}{12} = \frac{14}{12} = \frac{7}{6}$

Q21 Text Solution:

(A)

PV = constant

$\mathrm{P} \;\propto\; \frac{1}{\mathrm{V}}$

Graph will be a hyperbola

Q22 Text Solution:

(B)

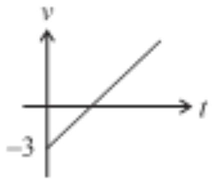
$v = 2t - 3$, this is equation of straight line

Comparing with equation

$y = mx + c$

Hence m is slope and c is y intercept

$m = 2$, $c = -3$



Q23 Text Solution:

(C)

$y^2 - 2y - 3 = 0$

$y^2 - 3y + y - 3 = 0$

$y(y - 3) + 1\,(y - 3) = 0$

$(y + 1)\,(y - 3) = 0$

$y = -1, +3$

Q24 Text Solution:

(A)

$y = t^4 + 8t^2 + 3$

$\frac{dy}{dt} = \frac{d}{dt}\left(t^4 + 8t^2 + 3\right)$

$= \frac{d}{dt}\left(t^4\right) + \frac{d}{dt}\left(8t^2\right) + \frac{d}{dt}(3)$

$= 4t^3 + 16t + 0$

$\frac{d^2y}{dt^2} = \frac{d}{dt}\left(\frac{dy}{dt}\right) = \frac{d}{dt}\left(4t^3 + 16t\right)$

$= \frac{d}{dt}\left(4t^3\right) + \frac{d}{dt}(16t) = 12t^2 + 16$

Q25 Text Solution:

(B)

As θ increases from 0° to 90°, the value of $\cos\;\theta$ decreases.

For a very small angle , $\sin\;\theta \simeq \theta$

Statement I is incorrect but Statement II is correct.

Q26 Text Solution:

(D)

All the equation given in column I are equation of straight line,

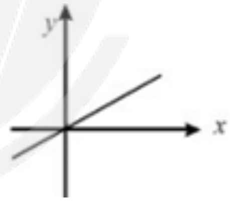
Straight line equation is given as

$y = mx + c$

Were m is slope, c is y intercept

(i) y = 4x

Here m = 4, The line will pass through origin and have positive slope of = 4

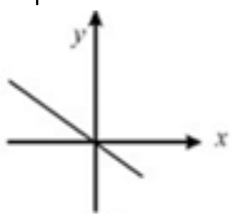


$i \rightarrow (a)$

(ii) y = – 6x

m = – 6

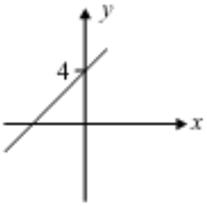
This line pass through origin and have negative Slope of –6



$ii \rightarrow b$

(iii) $y = x + 4$

Comparing it with $y = mx + c$



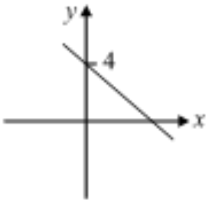
Here $m = 1$, $c = 4$

$iii \to (c)$

(iv) $y = -2x + 4$

$m = -2 \quad c = 4$

(negative slope)



$iv \to d$

Q27 Text Solution:

(A)

$U = 5x^2$, it is the equation of parabola with concavity upward.

At $x = 0, U = 0$, it means graph is passing through origin.

Hence, option (A) is correct.

Q28 Text Solution:

(C)

(i)

$$\log_e 125 + \log_e 4 - 2 \ \log_e 5$$

$$= \log_e 5^3 + \log_e 4 - 2 \ \log_e 5$$

$$[\because \log_e a^m = m \log_e a]$$

$$= 3\log_e 5 + \log_e 4 - 2 \log_e 5$$

$$= \log_e 5 + \log_e 4 = \log_e (20)$$

$$[\because \log_e (ab)] = \log_e a + \log_e b]$$

(ii)

$$\log_e 16 = \log_e 2^4 = 4\log_e 2$$

(iii)

$$\log_{10} 10 = 1 \ [\because \log_a a = 1]$$

(iv)

$$\log_2 16 = \log_2 (2)^4 = 4\log_2 2 = 4$$

Q29 Text Solution:

(D)

(I)

$$\int_1^5 x^2 \, dx = \left(\frac{x^3}{3}\right)_1^5 = \left[\frac{5^3}{3} - \frac{1^3}{3}\right] = \frac{125}{3} - \frac{1}{3}$$

$$= \frac{124}{3}$$

(II) $(\sin \ 180 \ + \ \cos \ 90)^2 = (0 \ + \ 0)^2 = 0$

(III) $\frac{x}{2} - \frac{y}{4} = 1 \Rightarrow 2x - y = 4$

$y = 2x - 4$

Compare it with y = mx + c

we get m = 2.

Q30 Text Solution:

(A)

Distance between two points (1, 2, 3) and (1,6,6):

$$r = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}$$

$$= \sqrt{(1-1)^2 + (6-2)^2 + (6-3)^2}$$

$$= \sqrt{0 + 16 + 9} = \sqrt{25} = 5$$

Both Assertion and Reason are correct and Reason is the correct explanation of Assertion.