MATHEMATICS

SECTION - A

Multiple Choice Questions: This section contains 20 multiple choice questions. Each question has 4 choices (1), (2), (3) and (4), out of which **ONLY ONE** is correct.

Choose the correct answer :

1. Let a die rolled till 2 is obtained. The probability that 2 obtained on even numbered toss is equal to

(1) $\frac{5}{11}$ (2) $\frac{5}{6}$

(3) $\frac{1}{11}$ (4) $\frac{6}{11}$

Answer (1)

Sol. P(2 obtained on even numbered toss) = k(let)

$$P(2)=\frac{1}{6}$$

$$P(\bar{2})=\frac{5}{6}$$

$$k=\frac{5}{6}\times\frac{1}{6}+\left(\frac{5}{6}\right)^3\times\frac{1}{6}+\left(\frac{5}{6}\right)^5\times\frac{1}{6}+...$$

$$=\frac{\frac{5}{6}\times\frac{1}{6}}{1-\left(\frac{5}{6}\right)^2}$$

$$=\frac{5}{11}$$

2. $\lim_{x\to\frac{\pi}{2}^-}\frac{\int_{x^3}^{\left(\frac{\pi}{2}\right)^2}\cos t^{1/3}dt}{\left(x-\frac{\pi}{2}\right)^2}$

(1) $\frac{3\pi^2}{4}$ (2) $\frac{3\pi}{4}$

(3) $\frac{3\pi^2}{8}$ (4) $\frac{3\pi}{8}$

Answer (3)

Sol. $\lim_{h\to 0}\frac{\int_{\left(\frac{\pi}{2}-h\right)^3}^{\left(\frac{\pi}{2}\right)^3}\cos\left(t^{1/3}\right)dt}{h^2}$

$$=\lim_{h\to 0}\frac{0+3\left(\frac{\pi}{2}-h\right)^2\cos\left(\frac{\pi}{2}-h\right)}{2h}$$

$$=\lim_{h\to 0}\frac{3\left(\frac{\pi}{2}-h\right)^2\sin h}{2h}$$

$$=\frac{3\pi^2}{8}$$

3. Consider the equation $4\sqrt{2}x^3-3\sqrt{2}x-1=0$.

Statement 1: Solution of this equation is $\cos\frac{\pi}{12}$.

Statement 2: This equation has only one real solution.

(1) Both statement 1 and statement 2 are true

(2) Statement 1 is true but statement 2 is false

(3) Statement 1 is false but statement 2 is true

(4) Both statement 1 and statement 2 are false

Answer (2)

Sol. $12x = \pi$

$$\Rightarrow 3x=\frac{\pi}{4}$$

$$\cos 3x=\frac{1}{\sqrt{2}}$$

$$\Rightarrow 4\cos^3 x-3\cos x=\frac{1}{\sqrt{2}}$$

$$\Rightarrow 4\sqrt{2}\cos^3 x-3\sqrt{2}\cos x-1=0$$

$x=\frac{\pi}{12}$ is the solution of above equation.

$\therefore$ Statement 1 is true

$$f(x)=4\sqrt{2}x^3-3\sqrt{2}x-1$$

$$f'(x)=12\sqrt{2}x^2-3\sqrt{2}=0$$

$$\Rightarrow x=\pm\frac{1}{2}$$

$$f\left(-\frac{1}{2}\right)=-\frac{1}{\sqrt{2}}+\frac{3}{\sqrt{2}}-1=\sqrt{2}-1>0$$

$f(0) = -1 < 0$

$\therefore$ one root lies in $\left(-\frac{1}{2},0\right)$, one root is $\cos\frac{\pi}{12}$ which is positive. As the coefficients are real, therefore all the roots must be real.

$\therefore$ Statement 2 is false.

4. If $|2A|^3 = 2^{21}$

and $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & \alpha & \beta \\ 0 & \beta & \alpha \end{bmatrix}$ then α is (if $\alpha, \beta \in I$)

(1) 5 (2) 3

(3) 9 (4) 17

Answer (1)

Sol. $|2A| = 2^7$

$8|A| = 2^7$

$|A| = 2^4$

Now $|A| = \alpha^2 - \beta^2 = 2^4$

$\alpha^2 = 16 + \beta^2$

$\alpha^2 - \beta^2 = 16$

$(\alpha - \beta)(\alpha + \beta) = 16$

$\Rightarrow \alpha + \beta = 8$ and

$\alpha - \beta = 2$

$\Rightarrow \alpha = 5$, and $\beta = 3$

5. In a 64 terms GP if sum of total terms is seven times sum of odd terms, then common ratio is

(1) 3 (2) 4

(3) 5 (4) 6

Answer (4)

Sol. $a, ar, ar^2, \ldots\ldots ar^{63}$

$a + ar + ar^2 + \ldots.. + ar^{63} = 7[a + ar^2 + ar^4 + \ldots.. + ar^{62}]$

$\frac{a(1-r^{64})}{(1-r)} = 7\frac{a(1-r^{64})}{(1-r^2)}$

$1 + r = 7$

$r = 6$

6. If $\frac{dy}{dx} - \left(\frac{\sin 2x}{1+\cos^2 x}\right)y = \frac{\sin x}{1+\cos^2 x}$ and $y(0) = 0$ then $y\left(\frac{\pi}{2}\right)$ is

(1) –1 (2) 1

(3) 0 (4) 2

Answer (2)

Sol. $\frac{dy}{dx} - \left(\frac{\sin 2x}{1+\cos^2 x}\right)y = \frac{\sin x}{1+\cos^2 x}$

$\text{IF} = e^{-\int \frac{\sin 2x\, dx}{1+\cos^2 x}}$

$= e^{\ln(1+\cos^2 x)} = (1+\cos^2 x)$

So, $y(1 + \cos^2 x) = \int \frac{\sin x}{(1+\cos^2 x)} \cdot (1+\cos^2 x)dx$

$y(1 + \cos^2 x) = -\cos x + c$

$\because y(0) = 0$

$0 = -1 + c$

$\Rightarrow c = 1$

$y = \frac{1-\cos x}{1+\cos^2 x}$

Now, $y\left(\frac{\pi}{2}\right) = 1$

7. $4\cos\theta + 5\sin\theta = 1$

Then find $\tan\theta$, where $\theta \in \left(\frac{-\pi}{2}, \frac{\pi}{2}\right)$.

(1) $\frac{10-\sqrt{10}}{6}$ (2) $\frac{10-\sqrt{10}}{12}$

(3) $\frac{\sqrt{10}-10}{6}$ (4) $\frac{\sqrt{10}-10}{12}$

Answer (4)

Sol. $16\cos^2\theta + 25\sin^2\theta + 40\sin\theta\cos\theta = 1$

$16 + 9\sin^2\theta + 20\sin 2\theta = 1$

$16 + 9\left(\frac{1-\cos 2\theta}{2}\right) + 20\sin 2\theta = 1$

$\frac{-9}{2}\cos 2\theta + 20\sin 2\theta = \frac{-39}{2}$

$-9\cos 2\theta + 40\sin 2\theta = -39$

$-9\left(\frac{1-\tan^2\theta}{1+\tan^2\theta}\right) + 40\left(\frac{2\tan\theta}{1+\tan^2\theta}\right) = -39$

$48\tan^2\theta + 80\tan\theta + 30 = 0$

$24\tan^2\theta + 40\tan\theta + 15 = 0$

$\tan\theta = \frac{-40 \pm \sqrt{(40)^2 - 15\times 24\times 4}}{2\times 24}$

$\tan\theta = \frac{-40 \pm \sqrt{160}}{2\times 24}$

$= \frac{-10 \pm \sqrt{10}}{12}$

$\Rightarrow \tan\theta = \frac{\sqrt{10}-10}{12}$, $\tan\theta = \frac{-\sqrt{10}-10}{12}$

So $\tan\theta = -\frac{\sqrt{10}-10}{12}$ will be rejected as $\theta \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

Option (4) is correct.

8. In an increasing arithmetic progression $a_1, a_2, \ldots .a_n$ if $a_6 = 2$ and product of a_1, a_5 and a_4 is greatest, then the value of d is equal to

(1) 1.6 (2) 1.8

(3) 0.6 (4) 2.0

Answer (1)

Sol. First term = a

Common difference = d

Given: $a + 5d = 2$ … (1)

Product $(P) = (a_1a_5a_4) = a(a + 4d)(a + 3d)$

Using (1)

$P = (2 - 5d)(2 - d)(2 - 2d)$

$$\Rightarrow \frac{dP}{dd} = (2-5d)(2-d)(-2)+(2-5d)(2-2d)(-1)+(-5)(2-d)(2-2d)$$

$= -2[(d - 2)(5d - 2) + (d - 1)(5d - 2) + 5(d - 1)(d - 2)]$

$= -2[5d^2 + 4 - 12d + 5d^2 + 2 - 7d + 5d^2 + 10 - 15d]$

$= -2[15d^2 - 34d + 16]$

$$\Rightarrow d = \frac{8}{5} \text{ or } \frac{2}{3}$$

at $\left(\frac{8}{5}\right)$, product attains maxima

$$\Rightarrow \boxed{d = 1.6}$$

9. If relation R : $(a, b)\, R(c, d)$ is only if $ad - bc$ is divisible by 5 ($a, b, c, d \in Z$) then R is

(1) Reflexive

(2) Symmetric, Reflexive but not Transitive

(3) Reflexive, Transitive but not symmetric

(4) Equivalence relation

Answer (2)

Sol. Reflexive : for $(a, b)\, R\, (a, b)$

$\Rightarrow$ $ab - ab = 0$ is divisible by 5.

So $(a, b)\, R(a, b)\, \forall\; a, b \in Z$

$\therefore$ R is reflexive

Symmetric :

For $(a, b)\, R(c, d)$

If $ad - bc$ is divisible by 5.

Then $bc - ad$ is also divisible by 5.

$\Rightarrow$ $(c, d)\, R(a, b)\, \forall\, a, b, c, d \in Z$

$\therefore$ R is symmetric

Transitive :

If $(a, b)\, R(c, d) \Rightarrow ad - bc$ divisible by 5

and $(c, d)\, R\, (e, f) \Rightarrow cf - de$ divisible by 5

$ad - bc = 5k_1$ k_1 and k_2 are integers

$cf - de = 5k_2$

$afd - bcf = 5k_1f$

$bcf - bde = 5k_2b$

$afd - bde = 5(k_1f + k_2b)$

$d(af - be) = 5(k_1f + k_2b)$

$\Rightarrow$ $af - be$ is not divisible by 5 for every $a, b, c, d, e, f \in Z$.

$\therefore$ R is not transitive

For e.g., take $a = 1, b = 2, c = 5, d = 5, e = 2, f = 2$

10. Let $f(x) = \begin{cases} 2+2x, & x \in (-1, 0) \\ 1-\dfrac{x}{3}, & x \in [0,3) \end{cases}$

$g(x) = \begin{cases} x, & x \in [0, 1) \\ -x, & x \in (-3,0) \end{cases}$

The range of $fog(x)$ is

(1) [0, 1] (2) [–1, 1]

(3) (0, 1] (4) (–1, 1)

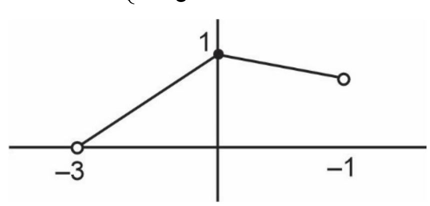
Answer (3)

Sol. $f(x) = \begin{cases} 2+2x, & x \in (-1, 0) \\ 1-\dfrac{x}{3}, & x \in [0, 3) \end{cases}$

$g(x) = \begin{cases} x, & x \in [0, 1) \\ -x, & x \in (-3, 0) \end{cases} \Rightarrow g(x) = |x|,\, x \in (-3, 1)$

$f(g(x)) = \begin{cases} 2+2|x|, & |x| \in (-1, 0) \Rightarrow x \in \phi \\ 1-\dfrac{|x|}{3}, & |x| \in [0, 3) \Rightarrow x \in (-3, 1) \end{cases}$

$f(g(x)) = \begin{cases} 1-\dfrac{x}{3}, & x \in [0, 1) \\ 1+\dfrac{x}{3}, & x \in (-3, 0) \end{cases}$



Range of $fog(x)$ is [0, 1]

11. If $\displaystyle\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \left(\frac{x^2 \cos x}{1+\pi^x} + \frac{1+\sin^2 x}{1+e^{(\sin x)^{2023}}} \right) dx = \frac{\pi}{4}(\pi+\alpha) - 2$

Then the value of ‘α’ is equal to

(1) 1 (2) 2

(3) 3 (4) 4

Answer (3)

Sol. Given

$$\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\left(\frac{x^2\cos x}{1+\pi^x}+\frac{1+\sin^2 x}{1+e^{(\sin x)^{2023}}}\right)dx=\frac{\pi}{4}(\pi+\alpha)-2$$

$$\int_0^{\frac{\pi}{2}}\left\{\left(\frac{x^2\cos x}{1+\pi^x}+\frac{1+\sin^2 x}{1+e^{(\sin x)^{2023}}}\right)+\left(\frac{x^2\cos x}{1+\pi^{-x}}+\frac{1+\sin^2 x}{1+e^{-(\sin x)^{2023}}}\right)\right\}dx$$

$$=\frac{\pi}{4}(\pi+\alpha)-2$$

$$\int_0^{\frac{\pi}{2}}\left(x^2\cos x+1+\sin^2 x\right)dx=\frac{\pi}{4}(\pi+\alpha)-2$$

$$\int_0^{\frac{\pi}{2}}x^2\cos x\,dx+\int_0^{\frac{\pi}{2}}(1+\sin^2 x)dx=\frac{\pi}{4}(\pi+\alpha)-2 \quad \ldots(1)$$

Let $I_1=\int_0^{\frac{\pi}{2}}(1+\sin^2 x)dx$

$$I_1=\int_0^{\frac{\pi}{2}}1\cdot dx+\int_0^{\frac{\pi}{2}}\left(\frac{1-\cos 2x}{2}\right)dx$$

$$I_1=\frac{\pi}{2}+\frac{1}{2}\left[\frac{\pi}{2}+0\right]$$

$$I_1=\frac{\pi}{2}+\frac{\pi}{4}$$

$$\boxed{I_1=\frac{3\pi}{4}}$$

Let $I_2=\int_0^{\frac{\pi}{2}}x^2\cos x\,dx$

$$I_2=\left[x^2(\sin x)-\int 2x\int\cos x\,dx\right]_0^{\frac{\pi}{2}}$$

$$I_2=\left[x^2(\sin x)-2\int x\sin x\right]_0^{\frac{\pi}{2}}$$

$$I_2=\left[x^2\sin x-2\left(x(-\cos x)+\int\cos x\right)\right]_0^{\frac{\pi}{2}}$$

$$I_2=\left[x^2\sin x-2(-x\cos x+\sin x)\right]_0^{\frac{\pi}{2}}$$

$$I_2=\left(\frac{\pi^2}{4}-2\right)$$

$\therefore$ Put I_1 and I_2 in (1)

$$\therefore\ \frac{\pi^2}{4}-2+\frac{3\pi}{4}$$

$$\frac{\pi^2}{4}+\frac{3\pi}{4}-2$$

$$\frac{\pi}{4}(\pi+3)-2$$

$$\therefore\ \boxed{\alpha=3}$$

12. Area under the curve $x^2 + y^2 = 169$ and below the line $5x - y = 13$ is

(1) $\frac{169\pi}{4}-\frac{65}{2}+\frac{169}{2}\sin^{-1}\frac{12}{13}$

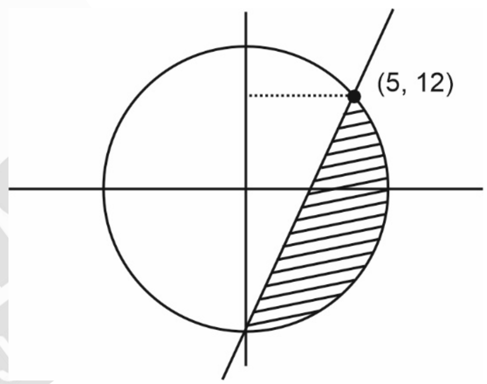
(2) $\frac{169\pi}{4}+\frac{65}{2}-\frac{169}{2}\sin^{-1}\frac{12}{13}$

(3) $\frac{169}{4}-\frac{65}{2}+\frac{169}{2}\sin^{-1}\frac{13}{14}$

(4) $\frac{169\pi}{4}+\frac{65}{2}+\frac{169}{2}\sin^{-1}\frac{13}{14}$

Answer (1)

Sol.



$$\text{Area}=\frac{\pi(13)^2}{2}-\left[\frac{1}{2}\times 25\times 5+\int_{12}^{13}\sqrt{\left(169-y^2\right)}\cdot dy\right]$$

$$=\frac{169\pi}{2}-\left[\frac{125}{2}+\left[\frac{y}{2}\sqrt{169-y^2}+\frac{169}{2}\sin^{-1}\frac{y}{13}\right]_{12}^{13}\right]$$

$$=\frac{169}{2}\pi-\frac{125}{2}-\left[\frac{169}{2}\times\frac{\pi}{2}-6\times 5-\frac{169}{2}\sin^{-1}\frac{12}{13}\right]$$

$$=\frac{169\pi}{4}-\frac{65}{2}+\frac{169}{2}\sin^{-1}\frac{12}{13}$$

13. If $f(x)=\frac{(2^x+2^{-x})(\tan x)\sqrt{\tan^{-1}(2x^2-3x+1)}}{(7x^2-3x+1)^3}$, then $f'(0)$ is equal to

(1) $\sqrt{\pi}$

(2) $\sqrt{\frac{\pi}{4}}$

(3) π

(4) $2\cdot\pi^{3/2}$

Answer (1)

Sol. $f(x)=\dfrac{(2^x+2^{-x})\tan x\sqrt{\tan^{-1}(2x^2-3x+1)}}{(7x^2-3x+1)^3}$

$f(x)=(2^x+2^{-x}).\tan x.\sqrt{\tan^{-1}(2x^2-3x+1)}.(7x^2-3x+1)^{-3}$

$f'(x)=(2^x+2^{-x}).\sec^2 x.\sqrt{\tan^{-1}(2x^2-3x+1)}.(7x^2-3x+1)^{-3}+\tan x.(Q(x))$

$\therefore f'(0)=2.1.\sqrt{\dfrac{\pi}{4}}.1$

$=\sqrt{\pi}$

14. $\displaystyle\int\frac{(\sin x-\cos x)\sin^2 x}{\sin x\cos^2 x+\tan x\sin^3 x}dx$ is equal to

(1) $\dfrac{\ln|\sin^3 x-\cos^3 x|}{3}+c$

(2) $\dfrac{\ln|\sin^3 x+\cos^3 x|}{3}+c$

(3) $\dfrac{\ln|\sin^3 x-\cos^3 x|}{2}+c$

(4) $\dfrac{\ln|\sin^3 x+\cos^3 x|}{4}+c$

Answer (2)

Sol. $\displaystyle\int\frac{(\sin x-\cos x)\sin^2 x}{\tan x(\sin^3 x+\cos^3 x)}dx$

$\displaystyle\int\frac{(\sin x-\cos x)\sin x\cos x}{\sin^3 x+\cos^3 x}dx$, put $\sin^3 x+\cos^3 x=t$

$(3\sin^2 x\cdot\cos x-3\cos^2 x\sin x)\,dx=dt$

$\Rightarrow\ \dfrac{1}{3}\displaystyle\int\frac{dt}{t}$

$=\dfrac{\ln t}{3}+c$

$=\dfrac{\ln|\sin^3 x+\cos^3 x|}{3}+c$

15.

16.

17.

18.

19.

20.

SECTION - B

Numerical Value Type Questions: This section contains 10 Numerical based questions. The answer to each question should be rounded-off to the nearest integer.

21. $\dfrac{^{11}C_1}{2}+\dfrac{^{11}C_2}{3}+.....+\dfrac{^{11}C_9}{10}=\dfrac{m}{n}$

Then $m+n$ is

Answer (2041)

Sol. $(1+x)^{11}={}^{11}C_0+{}^{11}C_1x+{}^{11}C_2x^2+....+{}^{11}C_{11}x^{11}$

$\displaystyle\int_0^1(1+x)^{11}dx=\left[{}^{11}C_0x+\frac{^{11}C_1x^2}{2}+\frac{^{11}C_2x^3}{3}+....+\frac{^{11}C_9x^{10}}{10}+\frac{^{11}C_{10}x^{11}}{11}+\frac{^{11}C_{11}x^{12}}{12}\right]_0^1$

$\left.\dfrac{(1+x)^{12}}{12}\right]_0^1={}^{11}C_0+\dfrac{^{11}C_1}{2}+\dfrac{^{11}C_2}{3}+....+\dfrac{^{11}C_9}{10}+\dfrac{^{11}C_{10}}{11}+\dfrac{^{11}C_{11}}{12}$

$\dfrac{2^{12}-1}{12}-1-1-\dfrac{1}{12}=\dfrac{^{11}C_1}{2}+\dfrac{^{11}C_2}{3}+....+\dfrac{^{11}C_{10}}{11}$

$=\dfrac{2^{12}-2-24}{12}$

$=\dfrac{2^{12}-26}{12}=\dfrac{4070}{12}=\dfrac{2035}{6}=\dfrac{m}{n}$

$m+n=2035+6=2041$

22. Rank of the word 'GTWENTY' in dictionary is

Answer (553)

Sol. Start with

(1) $\bar{E}:\dfrac{6!}{2!}=360$

(2) $\overline{GE}:\dfrac{5!}{2!},\ \overline{GN}:\dfrac{5!}{2!}$

(3) GTE : 4!, GTN: 4!, GTT : 4!

(4) GTWENTY = 1

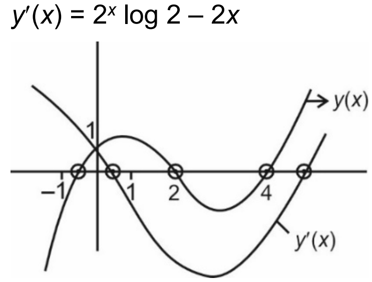
$\Rightarrow$ 360 + 60 + 60 + 24 + 24 + 24 + 1 = 553

23. Curve $y=2^x-x^2$, $y(x)$ & $y'(x)$ cut x-axis in M & N number of points respectively, find $M+N$.

Answer (5)

Sol. $y(x)=2^x-x^2$

$y'(x)=2^x\log 2-2x$



$M=3$

$N=2$

$M+N=5$

24. Given data

60, 60, 44, 58, 68, α, β, 56 has mean 58, variance = 66.2 then find $\alpha^2 + \beta^2$

Answer (7182)

Sol. Variance $= \frac{\Sigma x^2}{n} - (\bar{x})^2$

$$\frac{60^2 + 60^2 + 44^2 + 58^2 + 68^2 + \alpha^2 + \beta^2 + 56^2}{8} - (58)^2 = 66.2$$

$$\frac{7200 + 1936 + 3364 + 4624 + 3136 + \alpha^2 + \beta^2}{8} - 3364 = 66.2$$

$$2532.5 + \frac{\alpha^2 + \beta^2}{8} - 3364 = 66.2$$

$\alpha^2 + \beta^2 = 897.7 \times 8$

$= 7181.6$

25. If $|z + 1| = \alpha z + \beta (i + 1)$ and $z = \frac{1}{2} - 2i$, find $\alpha + \beta$.

Answer (3)

Sol. $\left|\frac{1}{2} - 2i + 1\right| = \alpha\left(\frac{1}{2} - 2i\right) + \beta(1 + i)$

$$\sqrt{\frac{9}{4} + 4} = \alpha\left(\frac{1}{2} - 2i\right) + \beta(1 + i)$$

$$\frac{5}{2} = \alpha\left(\frac{1}{2}\right) + \beta + i(-2\alpha + \beta)$$

$\frac{\alpha}{2} + \beta = \frac{5}{2}$ ...(1)

$-2\alpha + \beta = 0$ ...(2)

Solving (1) and (2)

$$\frac{\alpha}{2} + 2\alpha = \frac{5}{2}$$

$$\frac{5}{2}\alpha = \frac{5}{2}$$

$\alpha = 1$

$\beta = 2$

$\Rightarrow \alpha + \beta = 3$

26. If $\vec{a}, \vec{b}, \vec{c}$ are non-zero and $\vec{b}$ and $\vec{c}$ are non-collinear. $\vec{a} + 5\vec{b}$ is collinear with $\vec{c}$ and $\vec{b} + 6\vec{c}$ is collinear with $\vec{a}$. If $\vec{a} + \alpha\vec{b} + \beta\vec{c} = 0$, then find $\alpha + \beta$.

Answer (35)

Sol. $\because \vec{a} + 5\vec{b}$ is collinear with $\vec{c}$

$\Rightarrow \vec{a} + 5\vec{b} = \lambda\vec{c}$ ...(1)

$\vec{b} + 6\vec{c}$ is collinear with $\vec{a}$

$\Rightarrow \vec{b} + 6\vec{c} = \mu\vec{a}$ ...(2)

From (1) and (2)

$\vec{b} + 6\vec{c} = \mu(\lambda\vec{c} - 5\vec{b})$

$\Rightarrow (1 + 5\mu)\vec{b} + (6 - \lambda\mu)\vec{c} = 0$

$\because \vec{b}$ and $\vec{c}$ are non-collinear

$\Rightarrow 1 + 5\mu = 0 \Rightarrow \mu = \frac{-1}{5}$ and

$6 - \lambda\mu = 0 \Rightarrow \lambda\mu = 6$

$\Rightarrow \lambda = -30$

Now,

$\vec{b} + 6\vec{c} = \frac{-1}{5}\vec{a}$

$5\vec{b} + 30\vec{c} = -\vec{a}$

$$\left.\begin{array}{l}\vec{a} + 5\vec{b} + 30\vec{c} = 0 \\ \vec{a} + \alpha\vec{b} + \beta\vec{c} = 0\end{array}\right]$$

On comparing

$\alpha = 5, \beta = 30 \Rightarrow \alpha + \beta = 35$

27.

28.

29.

30.

❑ ❑ ❑