31,August,2021 Shift-2 1-15

EE24BTECH11050 - Pothuri Rahul

1) If $\alpha + \beta + \gamma = 2\pi$,Then the system of equations
$x + (\cos\gamma)\,y + (\cos\beta)\,z{=}0$
$(\cos\gamma)\,x + y + (\cos\alpha)\,z{=}0$
$(\cos\beta)\,x + (\cos\alpha)\,y + z{=}0$
has :
   a) no solution
   b) infinitely many solutions
   c) exactly two solutions
   d) a unique solution

2) let $\overrightarrow{a},\overrightarrow{b},\overrightarrow{c}$ be three vectors mutually perpendicular to each other and have same magnitude. If a vector $\overrightarrow{r}$ satisfies
$\overrightarrow{a} \times \{\left(\overrightarrow{r} - \overrightarrow{b}\right) \times \overrightarrow{a}\} + \overrightarrow{b} \times \{\left(\overrightarrow{r} - \overrightarrow{c}\right) \times \overrightarrow{b}\} + \overrightarrow{c} \times \{\left(\overrightarrow{r} - \overrightarrow{a}\right) \times \overrightarrow{c}\} = \overrightarrow{o}$
Then $\overrightarrow{r}$ is equal to :
   a) $\frac{1}{3}\left(\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c}\right)$
   b) $\frac{1}{3}\left(2\overrightarrow{a} + \overrightarrow{b} - \overrightarrow{c}\right)$
   c) $\frac{1}{2}\left(\overrightarrow{a} + \overrightarrow{b} + \overrightarrow{c}\right)$
   d) $\frac{1}{2}\left(\overrightarrow{a} + \overrightarrow{b} + 2\overrightarrow{c}\right)$

3) The domain of the function
$f(x){=} \sin^{-1}\left(\frac{3x^2+x-1}{(x-1)^2}\right) + \cos^{-1}\left(\frac{x-1}{x+1}\right)$ is:
   a) $\left[0, \frac{1}{4}\right]$
   b) $[-2, 0] \cup \left[\frac{1}{4}, \frac{1}{2}\right]$
   c) $\left[\frac{1}{4}, \frac{1}{2}\right] \cup \{0\}$
   d) $\left[0, \frac{1}{2}\right]$

4) Let $S = \{1, 2, 3, 4, 5, 6\}$. Then the probability that a randomly chosen onto function g from S to S satisfies $g(3) = 2g(1)$ is :
   a) $\frac{1}{10}$
   b) $\frac{1}{15}$
   c) $\frac{1}{5}$
   d) $\frac{1}{30}$

5) Let $f : \mathbb{N} \mapsto \mathbb{N}$ be a function such that $f(m + n) = f(m) + f(n)$ for every $m, n \in \mathbb{N}$. If $f(6) = 18$ then $f(2).f(3)$ is equal to :

a) 6 b) 54

c) 18 d) 36

6) The distance of the point $(-1, 2, -2)$ from the line of intersection of the planes $2x + 3y + 2z = 0$ and $x - 2y + z = 0$ is:

a) $\frac{1}{\sqrt{2}}$ b) $\frac{5}{2}$

c) $\frac{\sqrt{42}}{2}$ d) $\frac{\sqrt{34}}{2}$

7) Negation of the statement $(p \vee r) \implies (q \vee r)$ is :

a) $p \wedge \sim q \wedge \sim r$ b) $\sim p \wedge q \wedge r \sim$

c) $\sim p \wedge q \wedge r$ d) $p \wedge q \wedge r$

8) If $\alpha = \lim\limits_{x \to \frac{\pi}{4}} \frac{\tan^3 x - \tan x}{\cos\left(x + \frac{\pi}{4}\right)}$ and $\beta = \lim\limits_{x \to 0} (\cos x)^{\cot x}$ are the roots of the equation $ax^2 + bx - 4 = 0$, then the ordered pair (a, b) is :

a) $(1, -3)$ b) $(-1, 3)$

c) $(-1, -3)$ d) $(1, 3)$

9) The locus of the midpoints of the line segments joining $(-3, -5)$ and the points on the ellipse $\frac{x^2}{4} + \frac{y^2}{4} = 1$ is :

a) $9x^2 + 4y^2 + 18x + 8y + 145 = 0$
b) $36x^2 + 16y^2 + 90x + 56y + 145 = 0$
c) $36x^2 + 16y^2 + 108x + 80y + 145 = 0$
d) $36x^2 + 16y^2 + 72x + 32y + 145 = 0$

10) If $\frac{dy}{dx} = \frac{2^x y + 2^y . 2^x}{2^x + 2^{x+y} \log_e 2}, y(0) = 0$, then for $y = 1$, the value of x lies in the interval

a) $(1, 2)$ b) $(\frac{1}{2}, 1]$

c) $(2, 3)$ d) $(0, \frac{1}{2}]$

11) An angle of intersection of the curves $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ and $x^2 + y^2 = ab$, $a > b$ is :

a) $\tan^{-1}\left(\frac{a+b}{\sqrt{ab}}\right)$ b) $\tan^{-1}\left(\frac{a-b}{2\sqrt{ab}}\right)$

c) $\tan^{-1}\left(\frac{a-b}{\sqrt{ab}}\right)$ d) $\tan^{-1}\left(2\sqrt{ab}\right)$

12) If $y\frac{dy}{dx} = x\left[\frac{y^2}{x^2} + \frac{\phi\left(\frac{y^2}{x^2}\right)}{\phi'\left(\frac{y^2}{x^2}\right)}\right]$, $x > 0$, $\phi > 0$, and $y(1) = -1$, then $\phi\left(\frac{y^2}{4}\right)$ is equal to :

a) $4\phi(2)$

b) $4\phi(1)$

c) $2\phi(1)$

d) $\phi(1)$

13) The sum of the roots of the equation
$x + 1 - 2\log_2(3 + 2^x) + 2\log_4(10 - 2^{-x}) = 0$, is:

a) $log_2 14$

b) $log_2 11$

c) $log_2 12$

d) $log_2 13$

14) If z is a complex number such that $\frac{z-i}{z-1}$ is purely imaginary the the minimum value of $|z - (3 + 3i)|$ is :

a) $2\sqrt{2} - 1$

b) $3\sqrt{2}$

c) $6\sqrt{2}$

d) $2\sqrt{2}$

15) Let $a_1, a_2, a_3, ...$ be an AP. If $\frac{a_1+a_2+...+a_{10}}{a_1+a_2+...+a_p} = \frac{100}{p^2}$, $p \neq 10$, then $\frac{a_{11}}{a_{10}}$ is equal to :

a) $\frac{19}{21}$

b) $\frac{100}{121}$

c) $\frac{21}{19}$

d) $\frac{121}{100}$