Assignment-3

EE24BTECH11049

MCQ

1) If the coefficients of x and x^2 in $(1+x)^p\ (1-x)^q$ are 4 and -5 respectively, then $2p+3q$ is equal to

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a) 60 b) 63 c) 66 d) 69

2) let $A = \{2,3,4\}$ and $B = \{8,9,12\}$. . Then the number of elements in the relation $R = \{((a_1,b_1),(a_2,b_2)) \in (A \times B, A \times B) : a_1$ divides b_2 and a_2 divides $b_1\}$ is

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a) 18 b) 24 c) 12 d) 36

3) Let time image of the point $\mathbf{P}(1,2,6)$ n the plane passing through the points $\mathbf{A}(1,2,0)$, $\mathbf{B}(1,4,1)$ and $\mathbf{C}(0,5,1)$ be $\mathbf{Q}(\alpha,\beta,\gamma)$. Then $\left(\alpha^2+\beta^2+\gamma^2\right)$ is equal to

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a) 70 b) 76 c) 62 d) 65

4) The statement $\sim\ [p \vee (\sim(p \wedge q))]$ is equivalent to

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a) $(\sim(p \wedge q)) \wedge q$ b) $\sim(p \vee q)$ c) $\sim(p \wedge q)$ d) $(p \wedge q) \wedge (\sim)$

5) let

$$S = \left\{x \in \left(-\frac{\pi}{2}, \frac{\pi}{2}\right) : 9^{1-\tan^2 x} + 9^{\tan^2 x} = 10\right\} \text{ and } b = \sum_{x \in S} \tan^2\left(\frac{x}{3}\right),$$

then $\frac{1}{6}(\beta - 14)^2$ is equal to

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a) 16 b) 32 c) 8 d) 64

6) If the points $\mathbf{P}$ and $\mathbf{Q}$ are respectively the circumcenter and the orthocentre of a ΔABC, the $\overline{\mathbf{PA}} + \overline{\mathbf{PB}} + \overline{\mathbf{PC}}$ is equal to

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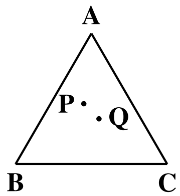
a) $2\overline{\mathbf{QP}}$ b) $\overline{\mathbf{QP}}$ c) $2\overline{\mathbf{PQ}}$ d) $\overline{\mathbf{PQ}}$



7) Let **A** be the point $(1, 2)$ and **B** be any point on the curve $x^2 + y^2 = 16$. **f** the centre of the locus of the point **P**, which divides the line segment **AB** in the ratio $3 : 2$ is the point $\mathbf{C}(\alpha, \beta)$ then the length of the line segment **AC** is

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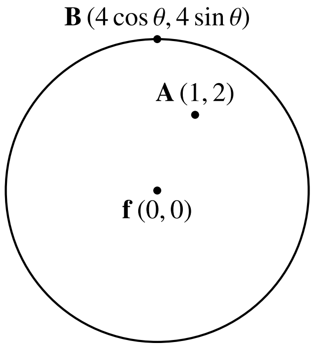
a) $\frac{6\sqrt{5}}{5}$ b) $\frac{2\sqrt{5}}{5}$ c) $\frac{3\sqrt{5}}{5}$ d) $\frac{4\sqrt{5}}{5}$



8) Let m be the mean and σ be the standard deviation of the distribution

x_i	0	1	2	3	4	5
f_i	$k+2$	$2k$	k^2-1	k^2-1	k^2+1	$k-3$

where $\sum f_i = 62$. If $[x]$ denotes the greatest integer $\leq x$, then $\left[\mu^2 + \sigma^2\right]$ is equal to

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a) 8 b) 7 c) 6 d) 9

9) If $S_n = 4 + 11 + 21 + 34 + 50 + \ldots$ to n terms, then $\frac{1}{60}(S_{29} - S_9)$

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a) 220 b) 227 c) 226 d) 223

10) Eight persons are to be transported from city A to city B in three cars different makes. If each car can accommodate at most three persons, then the number of ways, in which they can be transported, is

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a) 1120 b) 560 c) 3360 d) 1680

11) If

$$A = \frac{1}{5!6!7!}\begin{pmatrix} 5! & 6! & 7! \\ 6! & 7! & 8! \\ 7! & 8! & 9! \end{pmatrix},$$

then $\left|\operatorname{adj}(\operatorname{adj}(2A))\right|$ is equal to

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a) 2^{16} b) 2^{8} c) 2^{12} d) 2^{20}

12) Let the number $(22)^{2022} + (2022)^{22}$ leave the remainder α when divided by 3 and β when divided by 7. Then $\left(\alpha^2 + \beta^2\right)$ is equal to

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a) 13 b) 20 c) 10 d) 5

13) let

$$g(x) = f(x) + f(1-x) \text{ and } f^n(x) > 0, x \in (0,1).$$

If g is decreasing in the interval $(0,\alpha)$ and increasing in the interval $(\alpha,1)$, then

$$\tan^{-1}(2\alpha) + \tan^{-1}\left(\frac{\alpha+1}{\alpha}\right)$$

is equal to

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a) $\frac{5\pi}{4}$ b) π c) $\frac{3\pi}{4}$ d) $\frac{3\pi}{2}$

14) For $\alpha,\beta,\gamma,\delta \in \mathbf{N}$, if

$$\int\left(\left(\frac{x}{e}\right)^{2x} + \left(\frac{e}{x}\right)^{2x}\right)\log_e x\,dx = \frac{1}{\alpha}\left(\frac{x}{e}\right)^{\beta x} - \frac{1}{\gamma}\left(\frac{e}{x}\right)^{\delta x} + C, \text{ where } e = \sum_{n=0}^{\infty}\frac{1}{n!}$$

and C is constant of integration, then $\alpha + 2\beta + 3\gamma - 4\delta$ is equal to

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a) 4 b) -4 c) -8 d) 1

15) Let f be a continuous function satisfying

$$\int_0^{t^2} \left(f(x) + x^2\right) dx = \frac{4}{3}t^3, \forall t > 0.$$

Then $f\left(\frac{\pi^2}{4}\right)$ is equal to

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a) $-\pi^2\left(1 + \frac{\pi^2}{16}\right)$ b) $\pi\left(1 - \frac{\pi^3}{16}\right)$ c) $-\pi\left(1 + \frac{\pi^3}{16}\right)$ d) $\pi^2\left(1 - \frac{\pi^3}{16}\right)$