Jee 13 April Shift - 1 - 1-15

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I. Section - A

1) $\int_0^\infty \frac{6}{e^{3x}+6e^{2x}+11e^x+6}\,dx$
   a) $\log_e(\frac{32}{27})$
   b) $\log_e(\frac{256}{81})$
   c) $\log_e(\frac{512}{81})$
   d) $\log_e(\frac{64}{27})$
2) Among
   $(S1) : \lim_{n\to\infty} \frac{1}{n^2}(2+4+6+....+2n) = 1$
   $(S2) : \lim_{n\to\infty} \frac{1}{n^16}\left(1^15+2^15+3^15+.....+n^15\right) = \frac{1}{16}$
   a) Only $(S1)$ is true
   b) Both $(S1)$ and $(S2)$ are true
   c) Both $(S1)$ and $(S2)$ are false
   d) Only $(S2)$ is true
3) The number of symmetric matrices of order 3, with all the entries from the set 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, is
   a) 10^9
   b) 10^6
   c) 9^{10}
   d) 6^{10}
4) Let $\bar{a} = \hat{i}+4\hat{j}+2\hat{k}$, $\bar{b} = 3\hat{i}-2\hat{j}+7\hat{k}$ and $\bar{c} = 2\hat{i}-\hat{j}+4\hat{k}$. If a vector $\bar{d}$ satisfies $\bar{d}*\bar{b} = \bar{c}*\bar{b}$ and $\bar{d}.\bar{a} = 24$, then $|\bar{d}|^2$ is equal to
5) A coin is biased so that the head is 3 times as likely to occur as tail. This coin ias tossed until a head or three tails occur. If X denotes the number of tosses of the coin, then the mean of X is
   a) $\frac{21}{16}$
   b) $\frac{15}{16}$
   c) $\frac{81}{64}$
   d) $\frac{37}{16}$
6) $max_{0\leq x\leq\pi} x - 2sinxcosx + \frac{1}{3}sin3x =$
   a) 0
   b) π
   c) $\frac{5\pi+2+3\sqrt{3}}{6}$
   d) $\frac{\pi+2-3\sqrt{3}}{6}$
7) The set of all $a \in R$ for which the equation $x|x-1|+|x+2| = a = 0$ has exactly one real root, is
   a) $(-\infty,-3)$
   b) $(-\infty,\infty)$
   c) $(-6,\infty)$
   d) $(-6,-3)$
8) Let PQ be a focal chord of the parabola $y^2 = 36x$ of length 100, making an acute with the position x-axis. Let the ordinate of P be positive and M be the point on the line segment PQ such that

$PM : MQ = 3 : 1$. Then wich of the following points does NOT lie on the line passing through M and perpendicular to the line PQ?

a) $(3, 33)$
b) $(6, 29)$
c) $(-6, 45)$
d) $(-3, 43)$

9) For the system of linear equations
$2x + 4y + 2az = b$
$x + 2y + 3z = 4$
$2x - 5y + 2z = 8$
which of the following is NOT correct?

a) It has infinitely many solutions if $a = 3, b = 8$
b) It has unique solution if $a = b = 8$
c) It has unique solution if $a = b = 6$
d) It has infinitely many solutions if $a = 3, b = 6$

10) Let $s_1, s_2, s_3, ...s_{10}$ respectively be the sum of 12 terms of 10 A.P.s whose first terms are 1, 2,v 3, ..., 10 and the common differencce arev 1, 3, 5,....., 19 respectively. Then $\sum_{i=1}^{10} s_i$ is equal to

a) 7260
b) 7380
c) 7220
d) 7360

11) For the differentiable function $f : R - 0 \to R$, let $3f(x) + 2f\left(\frac{1}{x}\right) = \frac{1}{x} - 10$, then $\left|f(3) + f'\left(\frac{1}{4}\right)\right|$ is equal to

a) 13
b) $\frac{29}{5}$
c) $\frac{33}{5}$
d) 7

12) The negation of the statement $((A \wedge (B \vee C)) \Rightarrow (A \vee B)) \Rightarrow A$ is

a) equivalent to $B \vee \sim C$
b) a fallacy
c) equivalent to $\sim C$
d) equivalent to $\sim A$

13) Let the tangent and normal at the point $\left(3\sqrt{3}, 1\right)$ on the ellipse $\frac{x^2}{36} + \frac{y^2}{4} = 1$ meet the y-axis at the points A and B respectively. Let the circle C be drawn taking AB as a diameter and the line $x = 2\sqrt{5}$ intersect C at the points P and Q. If the tangents at the points P and Q on the circle intersect at the point (α, β), then $\alpha^2 - \beta^2$ is equal to

a) $\frac{304}{4}$
b) 60
c) $\frac{314}{5}$
d) 61

14) The distance of the points $(-1, 2, 3)$ from the plane $\bar{r}.\left(\hat{i} - 2\hat{j} + 3\hat{k}\right) = 10$ parallel to the line of the shortest distance between the lines $\bar{r} = \left(\hat{i} - \hat{j}\right) + \lambda\left(2\hat{i} + \hat{k}\right)$ and $\bar{r} = \left(2\hat{i} - \hat{j} + \mu\left(\hat{i} - \hat{j} + \hat{k}\right)\right)$ is

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

15) Let $B = \begin{bmatrix} 1 & 3 & \alpha \\ 1 & 2 & 3 \\ \alpha & \alpha & 4 \end{bmatrix}$, $\alpha > 2$ be the adjoint of matrix A and $|A| = 2$, then $\begin{bmatrix} \alpha & -2\alpha & \alpha \end{bmatrix}$ B $\begin{bmatrix} \alpha \\ -2\alpha \\ \alpha \end{bmatrix}$ is equal to

a) 16
b) 32
c) 0
d) -16