# 2024-January
# Session-31-01-2024-shift-1-16-30

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21) If the integral

$$525\int_0^{\frac{\pi}{2}} \sin 2x \cos^{\frac{11}{2}} x\left(1+\cos^{\frac{5}{2}} x\right) dx$$

is equal to $\left(n\sqrt{2}-64\right)$ then n is equal to

22) Let $S=(-1,\infty)$ and $f: S \to \mathbf{R}$ defined as

$$f(x)=\int_{-1}^{x}\left(e^{11}-1\right)^{11}(2t-1)^5(t-3)^{12}(2t-10)^{61}\ dt$$

Let p = Sum of square of the values of x, where f($x$) attains local maxima on S. and q = Sum of the values of x, where f($x$) attains local minima on S. Then, the value of $p^2$+2q is

23) The total number of words with or without meaning that can be formed out of the letters of the word 'DISTRIBUTION' taken four at a time, is equal to,

24) Let Q and R be the feet of perpendiculars from the point $p(a,a,a)$ on the lines x = y, z = 1 and x = -y,z = -1 respectively. If $\angle QPR$ is a right angle, then $12a^2$ is equal to

25) In the expansion of

$$(1+x)\left(1-x^2\right)\left(1+\frac{3}{x}+\frac{3}{x^2}+\frac{1}{x^3}\right)^5, x \neq= 0$$

then the sum of coefficients of $x^3$ and $x^{-13}$

26) if $\alpha$ denotes the number of solutions of $|1-i|^x = 2^x$ and $\beta = \left(\frac{z}{arg(z)}\right)$ where z= $\frac{\pi}{4}(i+1)^4\left(\left(\frac{1-\sqrt{\pi}i}{\sqrt{\pi}+i}\right)+\left(\frac{\sqrt{\pi}-1}{1+\sqrt{\pi}i}\right)\right), i=\sqrt{-1}$ then the distance of the point $(\alpha,\beta)$ from the line 4x-3y=7

27) Let the foci and length of the latus rectum of an ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$, a>b be $(\pm 5,0)$ and $\sqrt{50}$ then the square of eccentrcity of hyperbola $\frac{x^2}{b^2}+\frac{y^2}{a^2b^2}=1$

28) Let $\mathbf{a},\mathbf{b}$ be two vectors such that $|a|=1, |b|=4$ and a.b=2. If $\mathbf{c}=(2\mathbf{a}\times\mathbf{b})-3\mathbf{b}$ and the angle between $\mathbf{b}$ and $\mathbf{c}$ is $\alpha$ then $192\sin^2\alpha$

29) Let A = $\{1,2,3,4\}$ and R = $\{(1,2),(2,3),(1,4)\}$ be a relation on A. Let S be the equivalence relation on A such that R $\subset$ S and the number of elements in S is n. Then, the minimum value of n is

30) Let f : $\mathbf{R} \to \mathbf{R}$ be a function defined by f($x$) = $\frac{4^x}{4^x+2}$ and

$$M = \int_{f(a)}^{f(1-a)} x \sin^4(x(1-x))\, dx$$

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$\alpha M = \beta N$ then the value of $\alpha^2 + \beta^2$ is