jee-main-maths-13-04-2023-shift-2

EE24BTECH11030 - J.KEDARANANDA

1) Let A={-4,-3,-2,0,1,3,4} and R = {(a , b) ∈ A×A : b = $|a|$ or b^2 = a + 1} be a relation on A. Then the minimum number of elements, that must be added to the relation R so that it becomes reflexive and symmetric, is _____.

2) Let $f_n = \int_0^{\frac{\pi}{2}} \left(\sum_{k=1}^{n} \sin^{(k-1)} x\right)\left(\sum_{k=1}^{n}(2k-1)\sin^{(k-1)} x\right)\cos x dx, n \in N$. Then $f_{21} - f_{20}$ is equal to _____.

3) If y = y(x) is the solution of the differential equation $\frac{dy}{dx} + \frac{4x}{x^2-1}y = \frac{x+2}{(x^2-1)^{\frac{5}{2}}}, x > 1$ such that y(2) = $\frac{2}{9}\ln 2 + \sqrt{3}$ and y($\sqrt{2}$) = $\alpha \ln \sqrt{\alpha} + \beta + \beta - \sqrt{\gamma}, \alpha, \beta, \gamma \in N$ then $\alpha\beta\gamma$ is equal to _____.

4) Total numbers of 3-digit numbers that are divisible by 6 and can be formed by using the digits 1, 2, 3, 4, 5 with repetition, is _____

5) The remainder, when 7^{103} is divided by 17, is _____.

6) Let f(x) = $\sum_{k=1}^{10} kx^k, x \in R$ If 2f(2) - f'(2) = 119(2^n) + 1 then n is equal to _____.

7) For x ∈ (-1 , 1], the number of solutions of the equation $sin^{-1}x = 2tan^{-1}x$ is equal to _____.

8) The mean and standard deviation of the marks of 10 students were found to be 50 and 12 respectively, Later, it was observed that two marks 20 and 25 were wrongly read as 45 and 50 respectively. Then the correct variance is _____.

9) The foci of a hyperbola are $(\pm 2, 0)$ and its eccentricity is $\frac{3}{2}$. A tangent, perpendicular to the line 2x + 3y = 6,is drawn at a point in the first quadrant on the hyperbola. If the intercepts made by the tangent on the x and y - axes are a and b respectively, then $|6a| + |5b|$ is equal to _____.

10) Let $[\alpha]$ denote the greatest integer $\leq \alpha$. Then $[\sqrt{1}] + [\sqrt{2}] + [\sqrt{3}] + \cdots + [\sqrt{120}]$ is equal to_____.