Name : **JEE - MATHEMATICS** **Time :**

Code : **Date :**

Mathematics Paper

1. If α,β are roots of equation $7x^2 - 3x + 2 = 0$ then find the value of $\frac{\alpha}{1-\alpha^2} + \frac{\beta}{1-\beta^2}$

(1) $\frac{7}{24}$ (2) $\frac{5}{24}$ (3) $\frac{24}{5}$ (4) $\frac{24}{7}$

2. If $\vec{a},\vec{b},\vec{c}$ are three vectors such that $|\vec{a}|=2,|\vec{b}|=4,|\vec{c}|=4,\vec{b}\vec{c}=0,\vec{b}.\vec{a}=\vec{c}.\vec{a}$ then find the value of $|\vec{a}+\vec{b}-\vec{c}|$

(1) 6 (2) $\sqrt{6}$ (3) 7 (4) $2\sqrt{6}$

3. If the line $x + 2y = 3$ cuts a chord of length r unit with the circle $x^2 + y^2 = r^2$ then find r^2.

(1) $\frac{12}{5}$ (2) $\sqrt{12}$ (3) $\frac{5}{12}$ (4) $\sqrt{\frac{12}{5}}$

4. Find the coefficient of x4 in the expansion of $(1+ x + x^2 + x^3)^6$

(1) 100 (2) 110 (3) 120 (4) 125

5. If the mean and standard deviation of 5, 3, 7, a, b are 5 and 2 respectively, then a and b are roots of equation.

(1) $x^2 - 10x + 18 = 0$ (2) $x^2 - 20x + 18 = 0$ (3) $x^2 - 20x + 19 = 0$ (4) $x^2 - 10x + 19 = 0$

6. There are three section A, B, C in a paper each section having 5 questions. In how many ways a student can solve exactly 5 questions taken at least one question from each section.

(1) 2200 (2) 2225 (3) 2250 (4) 2275

7. $\left(\frac{-1+\sqrt{3}i}{1-i}\right)^{30}$ simplifies to

(1) $-2^{15}i$ (2) $2^{15}i$ (3) -2^{15} (4) -2^{15}

8. If the lines $x - y = a$ and $x+y = b$ are tangents for $y = x^2 - 3x + 2$ then $\frac{a}{b} =$

9. Let $y_1 = \tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ and $y_2 = \tan^{-1}\left(\frac{2x\sqrt{1+x^2}}{1-2x^2}\right)$ then $\frac{dy_1}{dy_2} =$

(1) $\frac{\sqrt{1-x^2}}{2(1+x^2)}$ (2) $\frac{\sqrt{1-x^2}}{4(1+x^2)}$ (3) $\frac{1}{(1+x^2)\sqrt{1-x^2}}$ (4) $\frac{1}{4(1+x^2)\sqrt{1-x^2}}$

10. If a G.P. sum of 2nd, 3rd and 4th term is 3 and that of 6th, 7th and 8th term is 243 then $S_{50} =$

(1) $\frac{3^{50}+1}{26}$ (2) $\frac{3^{50}-1}{13}$ (3) $\frac{3^{50}-1}{26}$ (4) $\frac{3^{49}-1}{26}$

11. $\int \frac{\cos\theta}{7+\sin\theta-2\cos^2\theta}d\theta$ is equal to

(1) $\frac{2}{\sqrt{39}}\tan^{-1}\left(\frac{2\sin\theta+1}{\sqrt{39}}\right)+C$ (2) $\frac{2}{\sqrt{39}}\tan^{-1}\left(\frac{4\sin\theta+1}{\sqrt{39}}\right)+C$

(3) $\frac{4}{\sqrt{39}}\tan^{-1}\left(\frac{4\sin\theta+1}{\sqrt{39}}\right)+C$ (4) $\frac{4}{\sqrt{39}}\tan^{-1}\left(\frac{2\sin\theta+1}{\sqrt{39}}\right)+C$

12. The area enclosed by $[x].(x-1) \le y \le 2\sqrt{x}$ from x = 0 to 2 where [x] is the greatest integer less than or equal to x. is equal to

(1) $\frac{8\sqrt{2}}{3}+\frac{1}{2}$ (2) $\frac{8\sqrt{2}}{3}$ (3) $\frac{8\sqrt{2}}{3}-\frac{1}{2}$ (4) $\frac{8}{3}-\frac{1}{\sqrt{2}}$

13. If x + a = y + b+ 1 = z + c then the value of $\begin{vmatrix} x & a+y & a+x \\ y & b+y & b+y \\ z & c+y & c+z \end{vmatrix}$ is

(1) y (a – b) (2) y (b – c) (3) y(c – a) (4) 0

14. If $\log_{\frac{1}{7^2}} x + \log_{\frac{1}{7^3}} x + \log_{\frac{1}{7^4}} x + ...20$ times = 460 then x = ?

15. A function f : A → B where A = {a, b, c}, B = {1, 2, 3, 4}. How many function can be defind from A to B wheich are not one-one such that 2 ∈ f(A)

16. If the system of equations x+ y + z = 0, x + 3y + k^2z = 0 and x + 2y + z = 0 have a non zero solution then the value of $y+\frac{x}{z}$ is

(1) 1 (2) 0 (3) –1 (4) 2

17. If y = mx + C is a common tangent of circle $x^2 + y^2 = 3$ and hyperbola $\frac{x^2}{64}-\frac{y^2}{100}=1$ then which of the following statement is true :

(1) 8m = 4 (2) $61C^2$ =492 (3) $4C^2$ = 369 (4) 8m + 5 = 0