MODEL CET QUESTION PAPER-1

1. In a group of 75 persons, every one takes either tea or coffee. If 45 take tea and 35 take coffee, then the number of persons who take tea only is

(1) 35 (2) 40 (3) 45 (4) 50

2. The central angle of a sector of a circle of area 9π sq. cm is 60^0, the perimeter of the sector is

(1) π (2) $3+\pi$ (3) $6+\pi$ (4) 6

3. The value of $cos\frac{\pi}{5}cos\frac{2\pi}{5}cos\frac{4\pi}{5}cos\frac{8\pi}{5}$ is

(1) $\frac{1}{16}$ (2) 0 (3) $-\frac{1}{8}$ (4) $-\frac{1}{16}$

4. If $2^{1+cos^2x+cos^4x+\cdots\ldots\infty}=4$, then the values of x are

(1) $\frac{\pi}{4},-\frac{\pi}{4}$ (2) $\frac{2\pi}{3},-\frac{2\pi}{3}$ (3) $\frac{7\pi}{6},-\frac{7\pi}{6}$ (4) $\frac{\pi}{2},-\frac{\pi}{2}$

5. The sum of 6+66+666+………. to n terms is

(1) $\frac{6}{121}[10^n+3.4^{n+2}-8]$ (2) $\frac{7}{99}[10^{2n}-1]$

(3) $\frac{2}{27}[10^{n+1}-9n-10]$ (4) $\frac{6}{81}[10^n-1]^2$

6. 1.2+2.3+3.4+……… to n terms is

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

7. The solution of the equation $z(\overline{z-2i})=2(2+i)$

(1) $3+i, 3-i$ (2) $1+3i, 1-3i$ (3) $1+3i, 1-i$ (4) $1-3i, 1+i$

8. The inequalities $5x+4y\geq 20, x\leq 6, y\leq 4$ form

(1) a square (2) a rhombus (3) a triangle (4) a quadrilateral

9. The line joining two points $A(2,0)$, $B(3,1)$ is rotated about A in the anticlockwise

direction through an angle of 15^0. Then the equation of the line in the new position, through C is

(1) $\frac{x+2}{\frac{1}{2}} = \frac{y}{\frac{\sqrt{3}}{2}}$ (2) $\frac{x-2}{\frac{1}{2}} = \frac{y}{\frac{\sqrt{3}}{2}}$ (3) $\frac{x}{\frac{1}{2}} = \frac{y}{\frac{\sqrt{3}}{2}}$ (4) None of these

10. With reference to the line $7x + 3y + 4 = 0$, the points $A(2, -3)$ and $B(-1, 0)$ are

(1) on the same side of the line
(2) on the opposite sides of the line
(3) on the line
(4) One is on the line and the other is outside the line

11. C is the centre of the ellipse $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and S is one focus. The ratio of CS to semi-major axis of the ellipse is

(1) $\sqrt{7} : 16$ (2) $\sqrt{7} : 4$ (3) $4 : \sqrt{7}$ (4) $16 : \sqrt{7}$

12. The co-ordinates of the point which is three fifth of the way from $(3,4,5)$ to $(-2,-1,0)$

(1) $(1, 2, 0)$ (2) $(3, 4, 5)$ (3) $(-2, -1, 5)$ (4) $(0, 1, 2)$

13. $\lim_{n\to\infty}\left[\frac{3.2^{n+1} - 4.5^{n+1}}{5.2^n + 7.5^n}\right] =$

(1) $-\frac{4}{7}$ (2) $-\frac{20}{7}$ (3) 0 (4) $\frac{3}{5}$

14. $\lim_{x\to\frac{\pi}{3}} \frac{\sqrt{1 - cos6x}}{\sqrt{2}\left(\frac{\pi}{3} - x\right)} =$

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

15. If $p \to (\sim p \vee q)$ is false, the truth values of p and q are respectively

(1) F, T (2) F, F (3) T, T (4) T, F

16. The standard deviation of the following data is

Class	0 - 10	10 - 20	20 – 30	30 - 40
Frequency	1	3	4	2

(1) 81 (2) 7.6 (3) 9 (4) 2.26

17. The function $f(x) = \begin{cases} \frac{1-cosx}{x^2}, & x \neq 0 \\ 1, & x = 0 \end{cases}$ is

(1) continuous at $x = 0$ (2) discontinuous at $x = 0$
(3) continuous everywhere (4) none

18. $x = \frac{\pi}{4}$, where $f'(1) = 2$, $g'(\sqrt{2}) = 4$ is

(1) $\frac{1}{\sqrt{2}}$ (2) $\sqrt{2}$ (3) 1 (4) 0

19. If $sin(x + y) = log(x + y)$, then $\frac{dy}{dx} =$

(1) 2 (2) -2 (3) 1 (4) -1

20. If $x = a(cos\theta + \theta\, sin\theta)$ and $y = a(sin\theta - \theta\, cos\theta)$, where $0 < \theta < \frac{\pi}{2}$, then $\frac{dy}{dx}$ at $\theta = \frac{\pi}{4}$ is equal to

(1) $\frac{4\sqrt{2}}{a\pi}$ (2) 1 (3) $\frac{4}{a\pi\sqrt{2}}$ (4) none of these

21. If $y = \log\left(x + \sqrt{1 + x^2}\right)$, then $\frac{d^2y}{dx^2} =$

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

22. Differentiation $\sec^{-1}\left(\frac{1}{2x^2-1}\right)$ with respect to $\sqrt{1 - x^2}$ at $x = \frac{1}{2}$ is

(1) 2 (2) 4 (3) 3 (4) 1

23. The approximate value of tan 46^0 if it is given that $1^0 = 0.01745$ is

(1) 1.03490 (2) 1.3490 (3) 1.4390 (4) 1.9430

24. If a particle moving along a line obeys the laws $s = \sqrt{1 + t}$ then the acceleration is inversely proportional to

(1) square of the velocity (2) cube of the displacement

(3) cube of the velocity (4) constant

25. If $f(x) = -2x^3 + 21x^2 - 60x + 41$ is a function in the interval $(-\infty, 1)$ then

(1) $f(x) < 0$ (2) $f(x) \leq 0$ (3) $f(x) > 0$ (4) $f(x) \geq 0$

26. The maximum value of the function $= x(x-1)^2$, $0 < x \leq 2$ is

(1) 0 (2) $\frac{4}{27}$ (3) -4 (4) none of these

27. The maximum value of $\left(\frac{1}{x}\right)^{2x^2}$

(1) $e^{-1/2}$ (2) $e^{1/2}$ (3) e^1 (4) e^{-1}

28. If $x = cos\theta$, $y = sin5\theta$, then $(1-x^2)\frac{d^2y}{dx^2} - x\frac{dy}{dx} =$

(1) $-5y$ (2) $-25y$ (3) $5y$ (4) $25y$

29. If $A = \begin{bmatrix} 1 & 2 \\ 3 & 5 \end{bmatrix}$ then the value of the determinant $|A^{2009} - 5A^{2008}|$ is

(1) -6 (2) -5 (3) -4 (4) 4

30. If $A = \begin{bmatrix} 1 & 2 \\ 2 & 1 \end{bmatrix}$ and $f(x) = \frac{1+x}{1-x}$ then $f(1)$ is

(1) $\begin{bmatrix} 1 & 1 \\ 1 & 1 \end{bmatrix}$ (2) $\begin{bmatrix} -1 & -1 \\ -1 & -1 \end{bmatrix}$ (3) $\begin{bmatrix} 2 & 2 \\ 2 & 2 \end{bmatrix}$ (4) $\begin{bmatrix} -2 & -2 \\ -2 & -2 \end{bmatrix}$

31. The value of the determinant $\begin{vmatrix} 1 & sin(\alpha-\beta)\theta & cos(\alpha-\beta)\theta \\ a & sin\alpha\theta & cos\alpha\theta \\ a^2 & sin(\alpha-\beta)\theta & cos(\alpha-\beta)\theta \end{vmatrix}$ is

(1) α (2) β (3) θ (4) 0

32. The value of $\begin{vmatrix} cos(x-\alpha) & cos(x+\alpha) & cos\, x \\ sin(x+\alpha) & sin(x-\alpha) & \sin x \\ cos\alpha.tanx & cos\alpha.cotx & cosec\, 2x \end{vmatrix}$ is

(1) 1 (2) 0 (3) $\frac{1}{2}sin2\alpha$ (4) $cosec\, 2x$

33. On the set R, which of the following is a binary operation?

(1) $a * b = \frac{a+b}{a-b}$ (2) $a * b = \sqrt{1+ab}$ (3) $a * b = \frac{a}{b}$ (4) $a * b = \frac{ab}{3}$

34. The inverse of the function $y = \frac{10^x - 10^{-x}}{10^x - 10^{-x}}$ is

(1) $\frac{1}{2}\log_{10}\left(\frac{1+x}{1-x}\right)$ (2) $\frac{1}{2}\log_{10}\left(\frac{1-x}{1+x}\right)$ (3) $\log_{10}\left(\frac{1-x}{1+x}\right)$ (4) none of these

35. In the set of nonzero rationals Q_0, $a * b = \frac{ab}{4}$, $\forall\, a, b \in Q_0$, 5^{-1} is

(1) $\frac{1}{5}$ (2) $\frac{16}{5}$ (3) $\frac{5}{16}$ (4) $\frac{16}{17}$

36. $\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} + \tan^{-1}\frac{1}{13} + \cdots \ldots \ldots + \tan^{-1}\frac{1}{n^2+n+1} + \ldots \ldots to\ \infty$ is

(1) 0 (2) $\frac{2\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$

37. $sin[\cot^{-1}\{cos(\tan^{-1} x)\}]$ is equal to

(1) $\sqrt{\frac{x^2+2}{x^2+1}}$ (2) $\sqrt{\frac{x^2+1}{x^2+2}}$ (3) $\sqrt{x^2+1}$ (4) none of these

38. The value of $\begin{vmatrix} 1/a & 1 & bc \\ 1/b & 1 & ca \\ 1/c & 1 & ab \end{vmatrix}$ is equal to

(1) 0 (2) abc (3) $1/abc$ (4) 1

39. $\begin{vmatrix} 1 & -1 & 4 & -1 \\ 0 & 1 & 0 & 0 \\ 5 & 2 & 3 & 0 \\ 0 & -2 & 2 & -3 \end{vmatrix} =$

(1) 41 (2) 51 (3) 31 (4) 26

40. Let $f(x) = \frac{\sqrt{\tan x}}{\sin x \cos x}$ and $F(x)$ is its anti-derivative. If $F\left(\frac{\pi}{4}\right) = 6$ then $F(x)$ is equal to

(1) $2\sqrt{\tan x + 1}$ (2) $2\sqrt{\tan x + 3}$ (3) $2\sqrt{\tan x} + 2$ (4) None

41. $\int 2^{2^{2x}}\ 2^{2^x}\ 2^x\, dx$ is equal to

(1) $\frac{1}{(log2)} 2^{2x} + C$ (2) $\frac{1}{(log2)^3} 2^{2^{2x}} + C$ (3) $\frac{2^x}{(log2)^3} + C$ (4) None

42. $\int \frac{dx}{(x-1)(x-2)} =$

(1) $\log_e \left[\frac{x-1}{x+2}\right] + c$ (2) $\log_e \left[\frac{x+2}{x-1}\right] + c$

(3) $\log_e \left[\frac{x+1}{x-2}\right] + c$ (4) $\log_e \left[\frac{x-2}{x-1}\right] + c$

43. If $I = \int \tan^{-1}\left(\frac{2x}{1-x^2}\right) dx$ then $I - 2x.\ \tan^{-1} x =$

(1) $\log_e(1+x^2) + c$ (2) $\log_e \left|\frac{2x}{1+x^2}\right| + c$

(3) $-\log_e(1+x^2) + c$ (4) $tan^{-1}\left(\frac{2x}{1-x^2}\right) + c$

44. $\int \frac{e^x(1+sinx)}{1+\cos x} dx =$

(1) $e^x tan\frac{x}{2} + c$ (2) $e^x tanx + c$ (3) $e^x \frac{(1+sinx)}{1-cosx} + c$ (4) $c - e^x\, cot\frac{x}{2}$

45. The value of $\int_{-\pi}^{\pi} sin^3 x cos^{2x} dx$ is

(1) $\frac{\pi^4}{2}$ (2) $\frac{\pi^4}{4}$ (3) 0 (4) none of these

46. $\int_0^1 \sin^{-1}\left(\frac{2x}{1+x^2}\right) dx$

(1) $\frac{\pi}{4} + \log 2$ (2) $\frac{\pi}{4} - \log 2$ (3) $\frac{\pi}{2} + \log 2$ (4) $\frac{\pi}{2} - \log 2$

47. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} log\left(\frac{2-sinx}{2+sinx}\right) dx$ is

(1) 0 (2) 1 (3) 2 (4) $\frac{\pi}{4}$

48. The area bounded by the curve $x = 2 - y - y^2$ and y-axis is

(1) $\frac{9}{2}$ (2) $\frac{7}{2}$ (3) $\frac{5}{2}$ (4) none of these

49. The degree and order of the differential equation of the family of all parabolas whose axis is x −axis, are respectively

(1) 1, 2 (2) 3, 2 (3) 2, 3 (4) 2,1

50. The differential equation $\frac{dy}{dx} = \frac{\sqrt{1-y^2}}{y}$ determines a family of circles with

(1) variable radius and a fixed centre at $(0,1)$

(2) variable radius and a fixed centre at $(0,-1)$

(3) fixed radius 1 and variable centres along x −axis

(4) fixed radius 1 and variable centres along y−axis

51. The solution of the differential equation $\frac{dy}{dx}+\frac{y}{x}=x^2$

(1) $x+y=\frac{x^2}{2}+c$ (2) $x-y=\frac{1}{3}x^3+c$

(3) $xy=\frac{1}{4}x^4+c$ (4) $x-y=\frac{1}{4}x^4+c$

52. If $\vec{a}, \vec{b}$ and $\vec{c}$ are any three vectors, then $[\vec{a}+\vec{b}, \vec{b}+\vec{c}, \vec{c}+\vec{a}] =$

(1) $2\,[\vec{a}\ \vec{b}\ \vec{c}]$ (2) $[\vec{a}\ \vec{b}\ \vec{c}]^2$ (3) $[\vec{a}\ \vec{b}\ \vec{c}]$ (4) $[\vec{a}+\vec{b}+\vec{c}]$

53. If $(\vec{a}\times\vec{b})^2+(\vec{a}\,.\,\vec{b})=144$ and $|\vec{a}|=4$ then $|\vec{b}|=$

(1) 16 (2) 8 (3) 3 (4) 12

54. If $\vec{a}+\vec{b}+\vec{c}=\vec{0}$ and $|\vec{a}|=3$, $|\vec{b}|=5$, $|\vec{c}|=7$, then the angle between $\vec{a}$ and $\vec{b}$ is

(1) $\frac{\pi}{2}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{6}$

55. The distance of the point $(2,3,4)$ from the plane $3x-6y+2z+11=0$ is

(1) 9 (2) 10 (3) 2 (4) 1

56. The lines $\frac{x-3}{1}=\frac{y-1}{2}=\frac{z-3}{-\lambda}$ and $\frac{x-1}{\lambda}=\frac{y-2}{2}=\frac{z-1}{-\lambda}$ are coplanar, if value of λ is

(1) 2 (2) 13 (3) -13 (4) no value exists

57. The maximum value of $z=6x+4y$ subject to constraints $2x+y\le 30$, $x+y\le 24$, $x\ge 0, y\ge 0$ is

(1) 90 (2) 96 (3) 120 (4) 240

58. If A and B are two independent events with $P(1)=0.3$ and $P(A\cup B)=0.8$. $P(2)$ is

(1) $\frac{6}{7}$ (2) $\frac{5}{7}$ (3) $\frac{3}{7}$ (4) $\frac{4}{7}$

59. A bag contains 4 green and 3 red balls and bag B contains 4 red and 3 green balls. One bag is taken at random and a ball is drawn and noted to be green. The probability that it comes from bag B, is

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

60. Algebraic sum of the intercepts made by the plane $2x + 3y - 4z + 6 = 0$ on the co-ordinate axes is

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