KCET MATHEMATICS MODEL QUESTION PAPER SET-04

1) If $y = 2x^{n+1} + \frac{3}{x^n}$ then $x^2 \frac{d^2y}{dx^2}$ is

a) y b) 6n(n+1)y c) n(n+1)y d) $x\frac{dy}{dx} + y$

2) Everybody in a room shakes hands with everybody else. The total number of handshakes is 45. The total number of persons in the room is

a) 9 b) 10 c) 5 d) 15

3) If $(xe)^y = e^x$, then dy/dx is

a) $\frac{e^x}{x(y-1)}$ b) $\frac{logx}{(1+logx)^2}$ c) $\frac{1}{(1-logx)^2}$ d) $\frac{logx}{(1+logx)}$

4) If $P(n): 2^{2n} - 1$ is divisible by k for all $n \in N$ is true, then the value oof k is

a) 6 b) 3 c) 7 d) 2

5) The value of $\int \frac{1+x^4}{1+x^6} dx$ is

a) $tan^{-1}x + (1/3)tan^{-1}x^2$+c b) $tan^{-1}x + tan^{-1}x^3 + c$

c) $tan^{-1}x + (1/3)tan^{-1}x^3$+c d) $tan^{-1}x - (1/3)tan^{-1}x^3 + c$

6) If $\left(\frac{[1-i]}{[1+i]}\right)^{96} = a + ib$ then (a,b) is

a) (1,1) b) (1,0) c) (0,1) d) (0,-1)

7) The value of $\int e^{sinx}\ sin2x\ dx$ is

a) $2e^{sinx}(cosx - 1) + c$ b) $2e^{sinx}(sinx + 1) + c$

c) $2e^{sinx}(sinx - 1) + c$ d) $2e^{sinx}(cosx + 1) + c$

8) The number of ways in which 5 girls and 3 boys can be seated in a row so that no two boys are together is

a) 14040 b) 14440 c) 14000 d) 14400

9) If $\int \frac{3x+1}{(x-1)(x-2)(x-3)} dx = Alog|x-1| + Blog|x-2| + Clog|x-3| + c$, then the values of A, B and C are respectively

a) 2,-7,5 b) 5,-7,-5 c) 2,-7,-5 d) 5, -7, 5

10) The value of $\lim_{x \to 0} \left(\frac{|x|}{x}\right)$ is

a) 1 b) -1 c) 0 d) Does not exist

11) The area of the region bounded by the curve $\boldsymbol{y^2 = 8x}$ and the line y = 2x is

a) (8/3) sq.units b) (16/3) sq.units c) (4/3) sq.units d) (3/4) sq.units

12) The negation of the statement "72 is divisible by 2 and 3" is

a) 72 is not divisible by 2 or 72 is not divisible by 3

b) 72 is divisible by 2 or 72 is divisible by 3

c) 72 is divisible by 2 and 72 is divisible by 3

d) 72 is not divisible by 2 and 3

13) The order of the differential equation obtained by eliminating arbitrary constants in the family of curves $\boldsymbol{c_1 y = (c_2 + c_3) e^{x+c_4}}$ is

a) 4 b) 1 c) 3 d) 2

14) In a simultaneous throw of a pair of dice, the probability of getting a total of more than 7 is

a) 7/12 b) 5/36 c) 5/12 d) 7/36

15) The area of the region bounded by the line y = 2x+1, x- axis and the ordinates x = -1 and x = 1 is

a) 5 b) 9/4 c) 2 d) 5/2

16) Let f, g : R → R be two functions define as f (x) = |x| + x and g (x) = |x| – x ∀ x ∈ R.

Then (fog) (x) for x < 0 is

a) 0 b) 4x c) -4x d) 2x

17) If $\vec{a}$ and $\vec{b}$ are two unit vectors and $\boldsymbol{\theta}$ is the angle between two vectors $\vec{a}$ and $\vec{b}$ then $\sin(\boldsymbol{\theta}/2)$ is

a) $|\vec{a}-\vec{b}|$ b) $|\vec{a}+\vec{b}|$ c) $\frac{|\vec{a}-\vec{b}|}{2}$ d) $\frac{|\vec{a}+\vec{b}|}{2}$

18) Let $f: R \to R$ be defined by $f(x) = \begin{cases} 2x & ; x > 3 \\ x^2 & ; 1 < x \leq 3 \\ 3x & ; x \leq 1 \end{cases}$ then $f(-1)+f(2)+f(4)$ is

a) 9 b) 14 c) 5 d) 10

19) If $|\vec{a}\times\vec{b}|^2 + |\vec{a}.\vec{b}|^2$ and $|\vec{a}| = 6$, then $|\vec{b}|$ is equal to

a) 4 b) 6 c) 3 d) 2

20) The value of the expression $\tan\left[\left(\frac{1}{2}\right)cos^{-1}\left(\frac{2}{\sqrt{5}}\right)\right]$ is

a) $2-\sqrt{5}$ b) $\sqrt{5}-2$ c) $2+\sqrt{5}$ d) 2+5

21) If the vector $2\hat{\imath}-3\hat{\jmath}+4\hat{k}$, $2\hat{\imath}+\hat{\jmath}-\hat{k}$ and $\lambda\,\hat{\imath}-\hat{\jmath}+2\hat{k}$ are coplanar, then the value of λ is

a) 5 b) 6 c) -5 d) -6

22) If $\begin{bmatrix}1 & 1\\ -1 & 1\end{bmatrix}\begin{bmatrix}x\\ y\end{bmatrix} = \begin{bmatrix}2\\ 4\end{bmatrix}$ then the value of x and y respectively are

a) -3, -1 b) 1, 3 c) 3, 1 d) -1, 3

23) The sine of the angle between the straight line (x-2)/3 = (3-y)/(-4) = (z-4)/5 and the plane

a) $\frac{\sqrt{2}}{10}$ b) $\frac{3}{\sqrt{50}}$ c) $\frac{3}{50}$ d) $\frac{4}{5\sqrt{2}}$

24) If $x, y, z \in R$ then the value of the determinant $\begin{vmatrix}(5^x+5^{-x})^2 & (5^x-5^{-x})^2 & 1\\ (6^x+6^{-x})^2 & (6^x-6^{-x})^2 & 1\\ (7^x+7^{-x})^2 & (7^x-7^{-x})^2 & 1\end{vmatrix}$ is

a) 10 b) 12 c) 1 d) 0

25) Corner points of the feasible region determined by the system of linear constraints are (0,3),(1,1) and (3,0). Let z = px+qy, where p,q>0. Condition on p and q so that the minimum of z occurs at (3,0) and (1,1) is

a) p = q b) p = 2q c) p = q/2 d) p = 3q

26) If $(x_1, y_1), (x_2, y_2) and\ (x_3, y_3)$ are the vertices of a triangle whose area is 'k' square units, then $\begin{vmatrix} x_1 & y_1 & 4 \\ x_2 & y_2 & 4 \\ x_3 & y_3 & 4 \end{vmatrix}^2$ is

a) $32k^2$ b) $16k^2$ c) $64k^2$ d) $48k^2$

27) A die is thrown 10 times, the probability that an odd number will come up at least one time is

a) 1013/1024 b) 1/1024 c) 1023/1024 d) 11/1024

28) If $f(x) = \begin{cases} \frac{\sqrt{1+kx}-\sqrt{1-kx}}{x} & if\ -1 \le x < 0 \\ \frac{2x+1}{x-1} & if\ 0 \le x \le 1 \end{cases}$ is continuous at x=0, then the value of k is

a) 1 b) -1 c) 0 d) 2

29) Events E_1 and E_2 form a partition of the sample space S.A is any event such that $P(E_1) = P(E_2) = 1/2$, $P(E_2 \mid A) = 1/2$ and $(A \mid E_2) = 2/3$. Then $P(E_1 \mid A)$ is

a) 1/4 b) 1/2 c) 2/3 d) 1

30) If $f(x) = |cosx - sinx|, then\ \ f'\left(\frac{\pi}{6}\right)$ is equal to

a) $\left(-\frac{1}{2}\right)(1+\sqrt{3})$ b) $\left(\frac{1}{2}\right)(1+\sqrt{3})$ c) $\left(-\frac{1}{2}\right)(1-\sqrt{3})$ d) $\left(\frac{1}{2}\right)(1-\sqrt{3})$

31) If n(A) = 2 and total number of possible relations from set A to set B is 1024, then n(B) is

a) 5 b) 512 c) 20 d) 10

32) If $f(x) = \begin{cases} \frac{\log_e x}{x-1} & ; x \neq 1 \\ k & ; x = 1 \end{cases}$ is continuous at x=1, then the value of k is

a) e b) 1 c) -1 d) 0

33) If tan A+cot A=2, then the value of $\boldsymbol{tan^4 A + cot^4 A}$ is

a) 5 b) 2 c) 1 d) 4

34) The maximum value of $\left(\frac{1}{x}\right)^x$ is

a) e b) e^e c) $e^{\frac{1}{e}}$ d) 0

35) If z = x + iy, then the equation |z+1| = |z-1| represents

a) y-axis b) a circle c) a parabola d) x-axis

36) The maximum area of a rectangle inscribed in the circle $(x+1)^2 + (y-3)^2 = 64$ is

a) 64 sq. units b) 72 sq. units c) 128 sq. units d) 8 sq. units

37) The number of terms in the expansion of $(x+y+z)^{10}$ is

a) 110 b) 66 c) 142 d) 11

38) $\int \left(\frac{1}{\sqrt{3}-6x+9x^2}\right) dx$ is equal to

a) $\sin^{-1}\left(\frac{[3x+1]}{2}\right) + c$ b) $\sin^{-1}\left(\frac{[3x+1]}{6}\right) + c$ c) $\left(\frac{1}{3}\right)\sin^{-1}\left(\frac{[3x+1]}{2}\right) + c$ d) 0

39) The two lines lx+my = n and l'x+m'y= n' are perpendicular if

a) lm' + ml'= 0 b) ll'+mm'=0

c) lm'=ml' d) lm+l'm'=0

40) $\int -2^2 |x\ cos\pi x| dx$ is equal to

a) $\frac{8}{\pi}$ b) $\frac{4}{\pi}$ c) $\frac{2}{\pi}$ d) $\frac{1}{\pi}$

41) If the sum of n terms of an A.P. is given by $S_n = n^2 + n$, then the common difference of the A.P. is

a) 6 b) 4 c) 1 d) 2

42) $\int_0^{1/2} \frac{1}{[(1+x^2)\sqrt{1-x^2}]}\,dx$ is equal to

a) $\left(\frac{1}{\sqrt{2}}\right) tan^{-1}\left(\frac{\sqrt{2}}{3}\right)$ b) $\left(\frac{2}{\sqrt{2}}\right) tan^{-1}\left(\frac{\sqrt{2}}{3}\right)$ b) $\left(\frac{1}{\sqrt{2}}\right) tan^{-1}\left(\frac{\sqrt{3}}{3}\right)$ c) $\left(\frac{3}{\sqrt{2}}\right) tan^{-1}\left(\frac{\sqrt{2}}{3}\right)$

43) The standard deviation of the data 6,7,8,9,10 is

a) 10 b) $\sqrt{\mathbf{2}}$ c) $\sqrt{\mathbf{10}}$ d) 2

44) The area bounded by the line y = x, x-axis and ordinates x = –1 and x = 2 is

a) 3/2 b) 5/2 c) 2 d) 3

45) If a relation R on the set {1,2,3} be defined by R = {(1,1)}, then R is

a) Only symmetric b) Reflexive and symmetric

d) Reflexive and transitive d) Symmetric and transitive

46) The solution of the differential equation $x\left(\frac{dy}{dx}\right) - y = 3$ represents a family of

a) Straight lines b) Circles c) Parabolas d) Ellipses

47) If A, B, C are three mutually exclusive and exhaustive events of an experiment such that P(A) = 2P(B) = 3P(C), then P(B) is equal to

a) 4/11 b) 1/11 c) 2/11 d) 3/11

48) If $\left|\vec{a} \times \vec{b}\right|^2 + \left|\vec{a}.\vec{b}\right|^2 = 144 \ and \ |\vec{a}| = 4$ then the value of $\left|\vec{b}\right|$ is

a) 1 b) 2 c) 3 d) 4

49) The value of $\cos\left[\sin^{-1}\pi/3 + \cos^{-1}\pi/3\right]$ is

a) does not exist b) 0 c) 1 d) -1

50) If the vectors $ai + j + k,\ i + bj + k \ and \ i + j + ck$ are coplanar $(a \neq b \neq c \neq 1)$, then the value of $abc - (a + b + c)$

a) 2 b) -2 c) 0 d) -1

51) If A = {a,b,c}, then the number of binary operations on A is

a) 3^9 b) 3 c) 3^3 d) 3^6

52) The image of the point (1,6,3) in the line $\frac{x}{1} = \frac{y-1}{2} = \frac{z-2}{3}$ is

a) (1, 0, 7) b) (7,0, 10 c) (2, 7, 0) d) (-1, -6, -3)

53) If $\begin{vmatrix} x^3 - x & a + x & b + x \\ x - a & x^2 - x & c + x \\ x - b & x - c & 0 \end{vmatrix}$, then

a) f(-1) = 0 b) f(1) = 0 c) f(2) = 0 d) f(0) = 0

54) The value of k such that the line $\frac{x-4}{1} = \frac{y-2}{1} = \frac{z-k}{2}$ lies on the plane $x - 4y + z = 7$ is

a) -7 b) 4 c) -4 d) 7

55) If A is a square matrix of order 3 and |A| = 5, then |A adj A| is

a) 625 b) 5 c) 125 d) 25

56) For the LPP; maximize $z = x + 4y$ subject to the constraints $x + 2y \leq 2,\ x + 2y \geq 8, x \geq 0$

a) $Z_{max} = 4$ b) $Z_{max} = 18$ c) $Z_{max} = 16$ d) Has no feasible solution

57) If $a_1, a_2, a_3, \ldots\ldots, a_9$ are in A.P. then the value of $\begin{vmatrix} \boldsymbol{a_1} & \boldsymbol{a_3} & \boldsymbol{a_3} \\ \boldsymbol{a_4} & \boldsymbol{a_5} & \boldsymbol{a_6} \\ \boldsymbol{a_7} & \boldsymbol{a_8} & \boldsymbol{a_9} \end{vmatrix}$ is

a) 1 b) $9/2(a_1+a_9)$ c) (a_1+a_9) d) $\log_e(\log_e e)$

58) A bag contains 17 tickets numbered from 1 to 17. A ticket is drawn at random, then another ticket is drawn without replacing the first one. The probability that both the tickets may show even numbers is

a) 7/34 b) 8/17 c) 7/16 d) 7/17

59) If $f(x) = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$ then $f'(\sqrt{3})$ is

a) $-1/\sqrt{3}$ b) -1/2 c) 1/2 d) $1/\sqrt{3}$

60) The right hand and left limit of the function $f(x) = \begin{cases} \frac{e^{1/x}-1}{e^{1/x}+1}, & if\ x \neq 0 \\ 0, & if\ x = 0 \end{cases}$ are

respectively

a) -1 and 1 b) 1 and 1 c) 1 and -1 d) -1 and -1