

KCET EXAMINATION – 2020
SUBJECT : MATHEMATICS

DATE :- 30-07-2020

TIME : 02.30 PM TO 03.50 PM

1. If $2^x + 2^y = 2^{x+y}$, then $\frac{dy}{dx}$ is
a) 2^{y-x} b) -2^{y-x} c) 2^{x-y} d) $\frac{2^y - 1}{2^x - 1}$

Ans. b

2. If $f(x) = \sin^{-1}\left(\frac{2x}{1+x^2}\right)$, then $f'(\sqrt{3})$ is
a) $-\frac{1}{2}$ b) $\frac{1}{2}$ c) $\frac{1}{\sqrt{3}}$ d) $-\frac{1}{\sqrt{3}}$

Ans. b

3. The right hand and left hand limit of the function

$$f(x) = \begin{cases} \frac{e^{1/x} - 1}{e^{1/x} + 1}, & \text{if } x \neq 0 \\ 0, & \text{if } x = 0 \end{cases}$$

are respectively

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

Ans. b

4. If $y = 2x^{n+1} + \frac{3}{x^n}$, then $x^2 \frac{d^2y}{dx^2}$ is
a) $6n(n+1)y$ b) $n(n+1)y$
c) $x \frac{dy}{dx} + y$ d) y

Ans. b

5. If the curves $2x=y^2$ and $2xy=K$ intersect perpendicularly, then the value of K^2 is

- a) 4 b) $2\sqrt{2}$ c) 2 d) 8

Ans. d

6. if $(xe)^y = e^y$, then $\frac{dy}{dx}$ is

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

Ans. a

7. If the side of a cube is increased by 5%, then the surface area of a cube is increased by
a) 10% b) 60% c) 6% d) 20%

Ans. a

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

- a) $\tan^{-1} x + \tan^{-1} x^3 + C$
b) $\tan^{-1} x + \frac{1}{3} \tan^{-1} x^3 + C$
c) $\tan^{-1} x - \frac{1}{3} \tan^{-1} x^3 + C$
d) $\tan^{-1} x + \frac{1}{3} \tan^{-1} x^2 + C$

Ans. b

9. The maximum value of $\frac{\log_e x}{x}$, if $x > 0$ is

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

Ans. c

10. The value of $\int e^{\sin x} \sin 2x dx$ is

- a) $2e^{\sin x} (\sin x - 1) + C$
b) $2e^{\sin x} (\sin x + 1) + C$
c) $2e^{\sin x} (\cos x + 1) + C$
d) $2e^{\sin x} (\cos x - 1) + C$

Ans. a

11. The value of $\int_{-\frac{1}{2}}^{\frac{1}{2}} \cos^{-1} x dx$ is

- a) π b) $\frac{\pi}{2}$ c) 1 d) $\frac{\pi^2}{2}$

Ans. b

12. If $\int \frac{3x+1}{(x-1)(x-2)(x-3)} dx$
 $= A \log|x-1| + B \log|x-2| + C \log|x-3| + C$, then
 the values of A, B and C are respectively.
 a) 5, -7, -5 b) 2, -7, -5
 c) 5, -7, 5 d) 2, -7, 5

Ans. d

13. The value of $\int_0^1 \frac{\log(1+x)}{1+x^2} dx$ is
 a) $\frac{\pi}{2} \log 2$ b) $\frac{\pi}{4} \log 2$
 c) $\frac{1}{2}$ d) $\frac{\pi}{8} \log 2$

Ans. d

14. The area of the region bounded by the curve
 $y^2=8x$ and the line $y=2x$ is
 a) $\frac{16}{3}$ sq.units b) $\frac{4}{3}$ sq.units
 c) $\frac{3}{4}$ sq.units d) $\frac{8}{3}$ sq.units

Ans. b

15. The value of $\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}} \frac{\cos x}{1+e^x} dx$ is
 a) 2 b) 0 c) 1 d) -2

Ans. c

16. The order of the differential equation obtained
 by eliminating arbitrary constants in the
 family of curves $c_1 y = (c_2 + c_3) e^{x+c_4}$ is
 a) 1 b) 2 c) 3 d) 4

Ans. a

17. The general solution of the differential
 equation $x^2 dy - 2xy dx = x^4 \cos x dx$ is
 a) $y = x^2 \sin x + cx^2$ b) $y = x^2 \sin x + c$
 c) $y = \sin x + cx^2$ d) $y = \cos x + cx^2$

Ans. a

18. The area of the region bounded by the line
 $y=2x+1$, x-axis and the ordinates $x=-1$ and $x=1$
 is
 a) $\frac{9}{4}$ b) 2 c) $\frac{5}{2}$ d) 5

Ans. c

19. The two vectors $\hat{i} + \hat{j} + \hat{k}$ and $\hat{i} + 3\hat{j} + 5\hat{k}$
 represent the two sides \overline{AB} and \overline{AC}
 respectively of a ΔABC . The length of the
 median through A is
 a) $\frac{\sqrt{14}}{2}$ b) 14 c) 7 d) $\sqrt{14}$

Ans. d

20. If \vec{a} and \vec{b} are unit vectors and θ is the angle
 between \vec{a} and \vec{b} , then $\sin \frac{\theta}{2}$ is
 a) $|\vec{a} + \vec{b}|$ b) $\frac{|\vec{a} + \vec{b}|}{2}$ c) $\frac{|\vec{a} - \vec{b}|}{2}$ d) $|\vec{a} - \vec{b}|$

Ans. c

21. The curve passing through the point (1, 2)
 given that the slope of the tangent at any point
 (x, y) is $\frac{3x}{y}$ represents
 a) Circle b) Parabola
 c) Ellipse d) Hyperbola

Ans. d

22. If $|\vec{a} \times \vec{b}|^2 + |\vec{a} \cdot \vec{b}|^2 = 144$ and $|\vec{a}| = 6$ then $|\vec{b}|$ is
 equal to
 a) 6 b) 3 c) 2 d) 4

Ans. c

23. The point (1, -3, 4) lies in the octant
 a) Second b) Third c) Fourth d) Eighth

Ans. c

24. If the vectors
 $2\hat{i} - 3\hat{j} + 4\hat{k}$, $2\hat{i} + \hat{j} - \hat{k}$ and $\lambda\hat{i} - \hat{j} + 2\hat{k}$ are
 coplanar, then the value of λ is
 a) 6 b) -5 c) -6 d) 5

Ans. a

25. The distance of the point (1, 2, -4) from the line
 $\frac{x-3}{2} = \frac{y-3}{3} = \frac{z+5}{6}$ is
 a) $\frac{293}{7}$ b) $\frac{\sqrt{293}}{7}$ c) $\frac{293}{49}$ d) $\frac{\sqrt{293}}{49}$

Ans. b

26. The sine of the angle between the straight line $\frac{x-2}{3} = \frac{3-y}{-4} = \frac{z-4}{5}$ and the plane $2x - 2y + z = 5$ is

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

Ans. G

27. If a line makes an angle of $\frac{\pi}{3}$ with each of x and y-axis, then the acute angle made by z-axis is

a) $\frac{\pi}{4}$ b) $\frac{\pi}{6}$ c) $\frac{\pi}{3}$ d) $\frac{\pi}{2}$

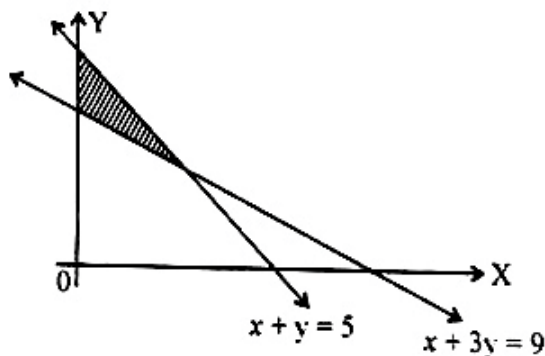
Ans. a

28. 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) $p = 2q$ b) $p = \frac{q}{2}$ c) $p = 3q$ d) $p = q$

Ans. b

29. The feasible region of an LPP is shown in the figure. If $Z = 11x + 7y$, then the maximum value of Z occurs at



a) (0,5) b) (3,3) c) (5,0) d) (3,2)

Ans. d

30. A die is thrown 10 times, the probability that an odd number will come up atleast one time is

a) $\frac{1}{1024}$ b) $\frac{1023}{1024}$ c) $\frac{11}{1024}$ d) $\frac{1013}{1024}$

Ans. b

31. If A and B are two events such that $P(A) = \frac{1}{3}, P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{6}$, then $P(A' / B)$ is

a) $\frac{2}{3}$ b) $\frac{1}{3}$ c) $\frac{1}{2}$ d) $\frac{1}{12}$

Ans. a

32. Events E_1 and E_2 from a partition of the sample space S. A is any event such that

$P(E_1) = P(E_2) = \frac{1}{2}, P(E_2 / A) = \frac{1}{2}$ and

$P(A / E_2) = \frac{2}{3}$, then $P(E_1 / A)$ is

a) $\frac{1}{2}$ b) $\frac{2}{3}$ c) 1 d) $\frac{1}{4}$

Ans. a

33. The probability of solving a problem by three persons A, B and C independently is $\frac{1}{2}, \frac{1}{4}$ and $\frac{1}{3}$ respectively. Then the probability of the problem is solved by any two of them is

a) $\frac{1}{12}$ b) $\frac{1}{4}$ c) $\frac{1}{24}$ d) $\frac{1}{8}$

Ans. b

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

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

Ans. d

35. The value of $\sin^2 51^\circ + \sin^2 39^\circ$ is

a) 1 b) 0 c) $\sin 12^\circ$ d) $\cos 12^\circ$

Ans. a

36. If $\tan A + \cot A = 2$, then the value of $\tan^4 A + \cot^4 A =$

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

Ans. a

37. If $A = \{1, 2, 3, 4, 5, 6\}$, then the number of subsets of A which contain atleast two elements is

a) 64 b) 63 c) 57 d) 58

Ans. c

38. If $z = x + iy$, then the equation $|z + 1| = |z - 1|$ represents
 a) a circle b) a parabola
 c) x-axis d) y-axis

Ans. d

39. The value of ${}^{16}C_9 + {}^{16}C_{10} - {}^{16}C_6 - {}^{16}C_7$ is
 a) 0 b) 1 c) ${}^{17}C_{10}$ d) ${}^{17}C_3$

Ans. a

40. The number of terms in the expansion of $(x + y + z)^{10}$ is
 a) 66 b) 142 c) 11 d) 110

Ans. a

41. If $P(n) : 2^n < n!$
 Then the smallest positive integer for which $P(n)$ is true if
 a) 2 b) 3 c) 4 d) 5

Ans. c

42. The two lines $lx + my = n$ and $l'x + m'y = n'$ are perpendicular if
 a) $ll' + mm' = 0$ b) $lm' = ml'$
 c) $lm + l'm' = 0$ d) $lm' + ml' = 0$

Ans. a

43. If the parabola $x^2 = 4ay$ passes through the point (2, 1), then the length of the latus rectum is
 a) 1 b) 4 c) 2 d) 8

Ans. b

44. 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) 4 b) 1 c) 2 d) 6

Ans. a

45. The negation of the statement "For all real numbers x and y , $x + y = y + x$ " is
 a) For all real numbers x and y , $x + y \neq y + x$
 b) For some real numbers x and y , $x + y = y + x$
 c) For some real number x and y , $x + y \neq y + x$
 d) for some real numbers x and y , $x - y = y - x$

Ans. a

46. The standard deviation of the data 6, 7, 8, 9, 10 is
 a) $\sqrt{2}$ b) $\sqrt{10}$ c) 2 d) 10

Ans. a

47. $\lim_{x \rightarrow 0} \left(\frac{\tan x}{\sqrt{2x+4}-2} \right)$ is equal to
 a) 2 b) 3 c) 4 d) 6

Ans. a

48. If a relation R on the set $\{1, 2, 3\}$ be defined by $R = \{(1, 1)\}$, then R is
 a) Reflexive and symmetric
 b) Reflexive and transitive
 c) symmetric and transitive
 d) Only symmetric

Ans. a

49. Let $f : [2, \infty) \rightarrow \mathbb{R}$ be the function defined $f(x) = x^2 - 4x + 5$, then the range of f is
 a) $(-\infty, \infty)$ b) $[1, \infty)$ c) $(1, \infty)$ d) $[5, \infty)$

Ans. b

50. 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) $\frac{1}{11}$ b) $\frac{2}{11}$ c) $\frac{3}{11}$ d) $\frac{4}{11}$

Ans. c

51. The domain of the function defined by $f(x) = \cos^{-1} \sqrt{x-1}$ is
 a) $[1, 2]$ b) $[0, 2]$ c) $[-1, 1]$ d) $[0, 1]$

Ans. a

52. The value of $\cos \left(\sin^{-1} \frac{\pi}{3} + \cos^{-1} \frac{\pi}{3} \right)$ is
 a) 0 b) 1 c) -0
 d) Does not exist

Ans. a

53. If $A = \begin{pmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{pmatrix}$, then A^4 is equal to
 a) A b) $2A$ c) I d) $4A$

Ans. a

54. If $A = \{a, b, c\}$, then the number of binary operations on A is

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

Ans. a

55. If $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix} A = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, then the matrix a is

- a) $\begin{pmatrix} 2 & 1 \\ 3 & 2 \end{pmatrix}$
 b) $\begin{pmatrix} 2 & -1 \\ -3 & 2 \end{pmatrix}$
 c) $\begin{pmatrix} -2 & 1 \\ 3 & -2 \end{pmatrix}$
 d) $\begin{pmatrix} 2 & -1 \\ 3 & 2 \end{pmatrix}$

Ans. b

56. If $f(x) = \begin{vmatrix} x^3 - x & a + x & b + x \\ x - a & x^2 - x & c + x \\ x - b & x - c & 0 \end{vmatrix}$ then

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

Ans. c

57. If A and B are square matrices of same order and B is a skew symmetric matrix, then $A'BA$ is

- a) Symmetric matrix
 b) Null matrix
 c) Diagonal matrix
 d) Skew symmetric matrix

Ans. a

58. If A is a square matrix of order 3 and $|A| = 5$, then $|A \text{ adj.} A|$ is

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

Ans. b

59. If $f(x) = \begin{cases} \frac{1 - \cos Kx}{x \sin x}, & \text{If } x \neq 0 \\ \frac{1}{2}, & \text{If } x = 0 \end{cases}$ is continuous at

$x=0$, then the value of K is

- a) $\pm \frac{1}{2}$ b) 0
 c) ± 2 d) ± 1

Ans. d

60. If $a_1 a_2 a_3 \dots a_9$ are in A.P. then the value of

$$\begin{vmatrix} a_1 & a_2 & a_3 \\ a_4 & a_5 & a_6 \\ a_7 & a_8 & a_9 \end{vmatrix} \text{ is}$$

- a) $\frac{9}{2}(a_1 + a_9)$ b) $a_1 + a_9$
 c) $\log_e(\log_e e)$ d) 1

Ans. c