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Time: 1 Hour 30 Mins Total Marks: 100

MHCET

Subject : Mathematics

MCQ SINGLE CORRECT

1. Vishnu, Tarun and Amit in order toss a coin. One who throws head first, wins the game. Their respective chances of winning are:

(a) $\frac{2}{3}, \frac{1}{3}, 0$ **(b)** $\frac{1}{3}, \frac{1}{3}, \frac{1}{3}$

(c) $\frac{4}{7}, \frac{2}{7}, \frac{1}{7}$ **(d)** None of these

2. The value of λ such that the straight line $(2x+3y+4)+\lambda(6x-y+12)=0$ is parallel to Y -axis is

(a) $\frac{1}{3}$ **(b)** 3

(c) -3 **(d)** 0

3. Which of the following is not correct?

(a) $\sin\theta = -\frac{1}{5}$ **(b)** $\cos\theta = 1$

(c) $\sec\theta = \frac{1}{2}$ **(d)** $\tan\theta = 20$

4. The expression $6x^2 + 14x + 4$ = ?

(a) (6x + 2) (x + 2) **(b)** (6x - 2) (x + 2)

(c) (6x + 2) (x - 2) **(d)** (6x - 2) (x - 2)

5. The L.C.M of $(x^2 - 4)$ and $(x^3 + 8)$ = ?

(a) $x^2 - x - 1$ **(b)** $x^2 - x + 1$

(c) $x^2 + x + 1$ **(d)** (x - 2)(x + 2) (x -2x + 4)

6. The area of the triangle whose sides are 13 , 5 and 12 is

(a) 10 sq.units **(b)** 5 sq.units

(c) 15 sq.units **(d)** none

7. The domain of definition of f (x) $= \frac{\log_2(x+3)}{x^2+3x+2}$ is

All The Best!!!

(a) R - {-1, -2} **(b)** $(-2, \infty)$

(c) R - {-1, -2, -3} **(d)** $(-3, \infty)$ - {-1, -2}

8. If $-\frac{2}{7}, x, \frac{-7}{2}$ are in G.P then x =

(a) – 1 **(b)** 1

(c) 2 **(d)** – 2

9. The equation of the circle touching y – axis at (0, 3) and making an intercept of 8 on the x – axis is

(a) $x^2 + y^2 + 10x - 6y + 9 = 0$ **(b)** $x^2 + y^2 - 10x - 6y + 9 = 0$

(c) both (A) and (B) **(d)** none of these

10. If $x^2 + y^2 + 8x - 6y - 24 = 0$ represents a circle then (0, 0) lies

(a) Outside circle **(b)** Inside circle

(c) On circle **(d)** None

11. If $\left[\bar{a}\,\bar{b}\,\bar{c}\right] = 4$. Then the volume of the tetrahedron with sides $\bar{a}+\bar{b}, \bar{b}+\bar{c}, \bar{c}+\bar{a}$ is – (cu. u)

(a) $\frac{1}{3}$ **(b)** $\frac{2}{3}$

(c) $\frac{4}{3}$ **(d)** $\frac{7}{3}$

12. If one of the lines represented by $ax^2 + 2hxy + by^2 = 0$ is $y = mx$, then

(a) $bm^2 + 2hm + a = 0$ **(b)** $bm^2 + 2hm - a = 0$

(c) $am^2 + 2hm + b = 0$ **(d)** $bm^2 - 2hm + a = 0$

13. If $y = \sec^3 x$, then $\frac{dy}{dx} =$

(a) $3\sec^3 x \tan x$ **(b)** $3\sec^2 x$

(c) $\sec^3 x \tan^3 x$ **(d)** none

14. The volume of a ball is increasing at the rate of 4 π c.c / sec. The rate of increase of the radius when the volume in 288 π cc is

(a) $\frac{1}{6}$ mm / sec **(b)** $\frac{1}{36}$ cm / sec

(c) $\frac{1}{9}$ cm / sec **(d)** $\frac{1}{224}$ cm / sec

15. If $\bar{a}$ and $\bar{b}$ are the adjacent sides of a parallelogram, then $|\bar{a}+\bar{b}|=|\bar{a}-\bar{b}|$ is a necessary and sufficient condition for the parallelogram to be a :

(a) rhombus **(b)** rectangle

(c) square **(d)** trapezium

16. $y=t-\frac{1}{t}, \quad x=t+\frac{1}{t}$, then $\frac{d^2y}{dx^2}$ is :

(a) $-4t^2(t^2-1)^{-2}$ **(b)** $(t^2+1)(t^2-1)^{-1}$

(c) $-4t^3(t^2-1)^{-3}$ **(d)** $-4t^2(t^2-1)^{-2}$

17. If the lines represented by $x^2 + hxy + 2y^2 = 0$ is coincident, then h is equal to

(a) $\pm 2\sqrt{2}$ **(b)** $\sqrt{2}$

(c) ± 2 **(d)** none

18. If $\tan^2 x - \sec x = 1$ then the values of x in $[0, \pi]$ are

(a) $\frac{\pi}{3}, \frac{\pi}{6}$ **(b)** $\frac{\pi}{4}, \frac{\pi}{3}$

(c) $\frac{\pi}{3}, \pi$ **(d)** $\frac{2\pi}{3}, \frac{3\pi}{4}$

19. A die is thrown 100 times. If getting an even number is considered a success, then the variance of the number of successes is

(a) 50 **(b)** 25

(c) 10 **(d)** 100

20. The solution set of $x \in \left[-\pi, -\frac{3\pi}{4}\right] \cup \left[-\frac{\pi}{4}, \frac{\pi}{4}\right] \cup \left[\frac{3\pi}{4}, \pi\right]$ is

(a) $\left[-\frac{\pi}{4}, -\frac{3\pi}{4}\right] \cup \left[-\frac{\pi}{4}, \frac{\pi}{4}\right] \cup \left[\frac{3\pi}{4}, \pi\right]$ **(b)** $\left[-\frac{\pi}{4}, \frac{\pi}{4}\right]$

(c) $\left[+\frac{\pi}{4}, -\frac{\pi}{4}\right]$ **(d)** None of these

21. The maximum value of z = 6x + 5y subject to $3x+5y \le 15,\ 5x+2y \le 10,\ x, y \ge 0$ occurs at

(a) $\left(\frac{1}{9}, \frac{40}{19}\right)$ **(b)** (1, 4)

(c) $\left(\frac{20}{19}, \frac{45}{19}\right)$ **(d)** (1, 1)

22. The negation of contrapositive of $p \rightarrow \sim q$ is

(a) $p \vee q$ **(b)** $\sim p \rightarrow \sim q$

(c) $p \wedge q$ **(d)** $p \rightarrow \sim q$

23. If $\bar{a}$ has magnitude 5 and points north-east and vector $\bar{b}$ has magnitude 5 and points north-west, then $|\bar{a} - \bar{b}|$ is

(a) 25 **(b)** 5

(c) $7\sqrt{3}$ **(d)** $5\sqrt{2}$

24. The equation of the plane passing through the line $\frac{x-1}{5} = \frac{y+2}{6} = \frac{z-3}{4}$ and the point (4, 3, 7) is

(a) 4x + 8y + 7z = 41 **(b)** $4x - 8y + 7z = 41$

(c) $4x - 8y - 7z = 41$ **(d)** $4x - 8y + 7z = 39$

25. $\int \frac{(4x+1)\,dx}{\sqrt{2x^2+x-3}}$ is

(a) $\sqrt{(2x^2+x-3)} + c$ **(b)** $\log|2x^2+x-3| + c$

(c) $2\sqrt{2x^2+x-3} + c$ **(d)** $\frac{1}{2}\log|2x^2+x-3| + c$

26. $\int_{-a}^{a} \sin x\, f(\cos x)\, dx = 0$

(a) $2\int_{0}^{a} f(\cos x)\, dx$ **(b)** $\frac{a}{2}$

(c) 0 **(d)** none

27. If $f(x) = (1+3x)^{1/x}, \quad x \neq 0$
$= k, \quad x = 0$

(a) e^{-3} **(b)** e

(c) e^{3} **(d)** none of these

28. Given X - B (n, p) if n = 10 and p = 0.4 then E(X) and Var (X) respectively are

(a) 4, 2.4 **(b)** 4, 4.2

(c) 2.4, 4 **(d)** 2, 4.4

29. If $A = \begin{bmatrix} a & b \\ c & d \end{bmatrix}$ then (adj. A) is =

(a) adj. A **(b)** A

(c) A' **(d)** -A

30. Let $f(x) = \log(x + \sqrt{x^2+1})$, the f'(x) =

(a) $\sqrt{x^2+1}$ **(b)** $1 + \frac{x}{\sqrt{x^2+1}}$

(c) $\frac{x}{\sqrt{x^2+1}}$ **(d)** $\frac{1}{\sqrt{x^2+1}}$

31. Consider the numbers 1, 2, 3, 4, 5, 6, 7, 8, 9, 10

If 1 is added to each number the variance of the number so obtained is

(a) 6.5 **(b)** 2.87

(c) 3.87 **(d)** 8.25

32. If 'p' and 'q' are two simple statements then the compound statement "p if and only if q" is called the _____ statement.

(a) conditional **(b)** alternation

(c) biconditional **(d)** implication

33. Equation of the line passing through (1, 1, 1) and $\perp$ to $2x - 3y + z = 5$ is

(a) $\frac{x-1}{-1} = \frac{y-1}{1} = \frac{z-1}{1}$ **(b)** $\frac{x-1}{1} = \frac{y-1}{3} = \frac{z-1}{2}$

(c) $\frac{x-1}{3} = \frac{y-1}{3} = \frac{z-1}{1}$ **(d)** $\frac{x-1}{2} = \frac{y-1}{-3} = \frac{z-1}{1}$

34. If A is a square matrix of order 3 and A = 5B, then | A | =

(a) 125 | B | **(b)** 5 | B |

(c) 25 | B | **(d)** none

35. The probability of an event A occurring is 0.5 and of B occurring is 0.3. If A and B are mutually exclusive events, then the probability of neither A nor B occurring is :

(a) 0.2 **(b)** 0.8

(c) 0 **(d)** none

36. The value of 'b' for which the function

$f(x) = 5x - 4 \quad \text{if } 0 < x \le 1$

$= 4x^2 + 3bx \quad \text{if } 1 < x < 2$

is continuous at every point of its domain is :

(a) –1 **(b)** 0

(c) 1 **(d)** 13/3

37. If $\int \frac{1+x+x^2}{x^2(1+x)}dx = \frac{k}{x} + l\log(1+x) + c$ then

(a) k = 1, l = 1 **(b)** k = 1, l = -1

(c) k = -1, l = 1 **(d)** none

38. The solution of $\frac{dy}{dx} = xe^{y-x}$, when x = 0, y = 0 is

(a) $e^{x+y} = x+1$ **(b)** $e^{x} + e^{y} = x+1$

(c) $e^{x-y} = x+1$ **(d)** none

39. $f(x) = x^3 - 27x + 5$ is an increasing function, when

(a) $x < -3$ **(b)** $|x| > 3$

(c) $x \le -3$ **(d)** $|x| < 3$

40. The area cut off the parabola $4y = 3x^2$ by the straight line $2y = 3x + 12$ in sq. units is

(a) 16 **(b)** 21

(c) 27 **(d)** 36

41. The maximum value of $z = 80x + 120y$ subject to the constraints $x + y \le 9, x \ge 2, y \ge 3$; $20x + 50y \le 360, x, y \ge 0$ occurs at

(a) (2, 5) **(b)** (2, 3)

(c) (3, 6) **(d)** (6, 3)

42. A line makes angles $\frac{\alpha}{2}, \frac{\beta}{2}, \frac{\gamma}{2}$ with positive directions of co-ordinate axes, then $\cos\alpha + \cos\beta + \cos\gamma$ is equal to

(a) 1 **(b)** -1

(c) 2 **(d)** 3

43. The foot of perpendicular form the point (1, 2, 3) to the line $\frac{x}{2} = \frac{y-1}{3} = \frac{z-1}{3}$ is

(a) $\left(1, \frac{5}{2}, \frac{5}{2}\right)$ **(b)** $\left(1, \frac{9}{4}, \frac{11}{4}\right)$

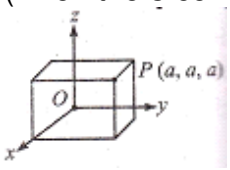
(c) (1, 3, 2) **(d)** (3, 1, 2)

44. $\int \frac{dx}{x\left(x^7 + 3\right)}$ is

(a) $\frac{1}{21}\log\left|\frac{x^7}{x^7+3}\right| + c$ **(b)** $\frac{1}{7}\log\left|x^7 + 3\right| + c$

(c) $\frac{1}{7}\log\left|\frac{x^7+3}{x^7}\right| + c$ **(d)** $\frac{1}{21}\log\left|x^7 + 3\right| + c$

45. The direction ratios of the diagonal of the cube joining the origin to the opposite corner are (when the 3 concurrent edges of the cube are coordinate axes)



(a) $\frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}, \frac{2}{\sqrt{3}}$ **(b)** 1, 1, 1

(c) 2, -2, 1 **(d)** 1, 2, 3

46. The point intersection of the lines $\frac{x-5}{3} = \frac{y-7}{-1} = \frac{z+2}{1}$; $\frac{x+3}{-36} = \frac{y-3}{2} = \frac{z-6}{4}$ is

(a) (2, 10, 4) **(b)** $\left(21, \frac{5}{3}, \frac{10}{3}\right)$

(c) $(5, 7, -2)$ **(d)** $(-3, 3, 6)$

47. Area bounded by the curve $y^2 = 16x$ and line $y = mx$ is $\frac{2}{3}$, then m is

(a) 3 **(b)** 4

(c) 1 **(d)** 2

48. If $S = 4t^3 - 3t^2 + 2$, then acceleration is 42 units/sec^2 at the time t =

(a) 1 sec **(b)** 2 sec

(c) 4 sec **(d)** 8 sec

49. The differential equation of $y = a\cos(x + b)$ is

(a) $\frac{dy}{dx} + y = 0$ **(b)** $\frac{d^2y}{dx^2} + x = 0$

(c) $\frac{d^2y}{dx^2} + y = 0$ **(d)** $\frac{d^2y}{dx^2} + \frac{dy}{dx} + y = 0$

50. A and B appear for an interview for two posts. The probability of A's selection is 1/3 and that of B's selection is 2/5. The probability that only one of them is selected is

(a) 8/15 **(b)** 2/15

(c) 13/15 **(d)** 7/15