MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2011

Methematics

1. The multiplicative inverse of $A = \begin{bmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{bmatrix}$ is

A. $\begin{bmatrix} -\cos\theta & \sin\theta \\ -\sin\theta & -\cos\theta \end{bmatrix}$

B. $\begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$

C. $\begin{bmatrix} -\cos\theta & -\sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$

D. $\begin{bmatrix} \cos\theta & \sin\theta \\ \sin\theta & -\cos\theta \end{bmatrix}$

Answer: B

Watch Video Solution

2. The value of a for which system of equation , $a^3x + (a+1)^3y + (a+2)^3z = 0, ax + (a+1)y + (a+2)z = 0, x + y +$ has a non-zero solution is:

A. 1

B. 0

C. -1

D. None of these

Answer: C

Watch Video Solution

3. The angle between a pair of tangents from a point P to the circe $x^2 + y^2 + 4x - 6y + 9\sin 2\alpha + 13\cos^2\alpha = 0$ is 2α. Find the equation of the locus of the point P.

A. $x^2 + y^2 + 4x - 6y + 4 = 0$

B. $x^2 + y^2 + 4x - 6y - 9 = 0$

C. $x^2 + y^2 + 4x - 6y - 9 = 0$

D. $x^2 + y^2 + 4x - 6y + 9 = 0$

Answer: D

Watch Video Solution

4. If one of the lines of the pair $ax^2 + 2hxy + by^2 = 0$ bisects the angle between positive direction of the axes, then a, b and h satisfy the relation.

A. $a + b = 2|h|$

B. $a + b = -2h$

C. $a - b = 2|h|$

D. $(a - b)^2 = 4h^2$

Answer: B

Watch Video Solution

5. If the pair of straight lines $x^2 - 2pxy - y^2 = 0$ and $x^2 - 2qxy - y^2 = 0$ be such that each pair bisects the angle between the other pair, then

A. $pq = -1$

B. $pq = 1$

C. $\frac{1}{p} + \frac{1}{q} = 0$

D. $\frac{1}{p} - \frac{1}{q} = 0$

Answer: A

Watch Video Solution

6. If the circles $x^2 + y^2 + 2x + 2ky + 6 = 0$ and $x^2 + y^2 + 2ky + k = 0$ intersect orthogonally then k equals (A) 2 or $-\frac{3}{2}$ (B) -2 or $-\frac{3}{2}$ (C) 2 or $\frac{3}{2}$ (D) -2 or $\frac{3}{2}$

A. $2 \text{ or } -3/2$

B. $-2 \text{ or } -3/2$

C. $2 \text{ or } 3/2$

D. $-2 \text{ or } 3/2$

Answer: A

Watch Video Solution

7. The equation of a circle which has a tangent $3x + 4y = 6$ and two normals given by $(x-1)(y-2) = 0$ is

A. $(x-3)^2 + (y-4)^2 = 5^2$

B. $x^2 + y^2 - 4x - 2y + 4 = 0$

C. $x^2 + y^2 - 2x - 4y + 4 = 0$

D. $x^2 + y^2 - 2x = 4y + 5 = 0$

Answer: C

Watch Video Solution

8. The equation of the common tangents to the circle$(x-3)^2+y^2=9$ and the parabola $y^2=4ax$ the x-axis, is

A. $\sqrt{2}y=3x+1$

B. $\sqrt{3}y=-(x+3)$

C. $\sqrt{3}y=x+3$

D. $\sqrt{3}y=-(3x+1)$

Answer: C

Watch Video Solution

9. Find the equations of normal to the parabola $y^2=4ax$ at the ends of the latus rectum.

A. $x^2-y^2-3ax+9s^2=0$

B. $x^2 - y^2 - 6ax - 6ay + 9a^2 = 0$

C. $x^2 - y^2 - 6ay + 9a^2 = 0$

D. None of the above

Answer: A

Watch Video Solution

10. From point $P(8, 27)$ tangents PQ and PR are drawn to the ellipse $\frac{x^2}{4} + \frac{y^2}{9} = 1$. Then, angle subtended by QR at origin is

A. $\tan^{-1} \frac{2\sqrt{6}}{65}$

B. $\tan^{-1} \frac{4\sqrt{6}}{65}$

C. $\tan^{-1} \frac{8\sqrt{2}}{65}$

D. None of these

Answer: D

Watch Video Solution

11. If the normal to the given hyperbola at the point $\left(ct, \frac{c}{t}\right)$ meets the curve again at $\left(ct', \frac{c}{t'}\right)$, then $t^3t' = 1$ (b) $t^3t' = -1$ ˆ $(') = 1$ (d) ˆ $(') = -1$

A. $t^2t' = -1$

B. $t^3t' = -1$

C. $' = -1$

D. None of these

Answer: B

Watch Video Solution

12. If $\vec{u} = \vec{a} - \vec{b}, \vec{v} = \vec{a} + \vec{b}$ and $\left|\vec{a}\right| = \left|\vec{b}\right| = 2$, then $\left|\vec{u} \times \vec{v}\right|$ is equal to

A. $2\sqrt{16(a \cdot b)^2}$

B. $\sqrt{16(a \cdot b)^2}$

C. $2\sqrt{4-(a \cdot b)^2}$

D. $2\sqrt{4+(a \cdot b)^2}$

Answer: A

Watch Video Solution

13. If the vectors a, b and c are coplanar, then $\begin{vmatrix} a & b & c \\ a \cdot a & a \cdot b & a \cdot c \\ b \cdot a & b \cdot b & b \cdot c \end{vmatrix}$ is equal to

A. 1

B. 0

C. -1

D. None of these 3

Answer: B

Watch Video Solution

14. A vector v is equally inclined to the X-axis, Y-axis and Z-axis respectively the dirction cosines are

A. $< \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} >$

B. $< -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}} >$

C. $< \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}} >$ or $< -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}} >$

D. None of the above

Answer: C

Watch Video Solution

15. If a plane meets the coordinates axes at A, Band C, in such a way that the centroid of ΔABC is at the point $(1, 2, 3)$, the equation of the plane is

A. $x + y/2 + z/3 = 1$

B. $x/3 + y/6 + z/9 = 1$

C. $x + 2y + 3z = 1$

D. None of the above

Answer: B

Watch Video Solution

16. If a line makes angles α, β, γ with the positive direction of coordinate axes, then write the value of $\sin^2\alpha + \sin^2\beta + \sin^2\gamma$.

A. 1

B. 2

C. 0

D. -1

Answer: B

Watch Video Solution

17. Find the angle between the following pair of lines: A lines with direction ratios 2,2,1 A line joning (3,1,4)to (7,2,12)

A. $\cos^{-1}(2/3)$

B. $\cos^{-1}(3/2)$

C. $\tan^{-1}(-2/3)$

D. None of the above

Answer: A

Watch Video Solution

18. If from each of the three boxes containing 3 white and 1 black, 2 white and 2 black, 1 white and 3 black balls, one ball is drawn at random, then the probability that 2 white and 1 black balls will be drawn, is

A. $13/12$

B. $1/4$

C. $1/32$

D. $2/3$

Answer: A

Watch Video Solution

19. If X follows the binomial distribution with parameters n=6 and p and 9p(X=4)=P(X=2), then p is

A. $1/4$

B. $1/3$

C. $1/2$

D. $2/3$

Answer: A

Watch Video Solution

20. If E_1 denots the envent sof coming sum 6 in throwing two dice and E_2 be the event of coming 2 in any one of two, then $P(E_2 / E_1)$ is

A. $1/5$

B. $4/5$

C. $3/5$

D. $2/5$

Answer: D

Watch Video Solution

21. Let $f(x) = \begin{cases} \{1 + |\sin x|\}^{a/|\sin x|}, & \frac{\pi}{6} < x < 0 \\ \text{b}, & x = 0 \\ e^{\tan 2x / \tan 3x}, & 0 < x < \frac{\pi}{6} \end{cases}$

Determine a and b such that f(x) is continous at x = 0.

A. $3/2, ^{3/2}$

B. $-2/3, e^{-3/2}$

C. $2/3, e^{2/3}$

D. None of these

Answer: C

Watch Video Solution

22. If $f(x) = e^x g(x), g(0) = 2, g'(0) = 1, then f'(0)$ is

A. 1

B. 3

C. 2

D. 0

Answer: B

Watch Video Solution

23. If a, b, c and d are positive then $\lim_{x \to \infty} \left(1 + \frac{1}{a + bx}\right)^{x + dx}$ is eqqual

A. $e^{d/b}$

B. $e^{c/a}$

C. $e^{(c+d)/(a+b)}$

D. e

Answer: A

Watch Video Solution

24. Let $f(x + y) = f(x) \cdot f(y) \forall x, y \in R$,suppose that $f(3) = 3$ and $f'(0) = 11$, then $f'(3)$ is given by

A. 22

B. 44

C. 28

D. 33

Answer: D

Watch Video Solution

25. If $G(x) = -\sqrt{25 - x^2}$, *then* $\lim_{x \to 1} \frac{G(x) - G(t)}{x - 1}$ is

A. $\frac{1}{24}$

B. $\frac{1}{5}$

C. $-\sqrt{24}$

D. None of these

Answer: D

Watch Video Solution

26. At the point x = 1 , then function

$f(x) = \begin{cases} x^3 - 1 & 1 < x < \infty \\ x - 1 & 1 - \infty < x \leq 1 \end{cases}$ is

A. continouous and differentiable

B. continous and not differentiable

C. discontinouss and diffentiable

D. discontinuous and not differentiable

Answer: B

Watch Video Solution

27. If $x^p y^q = (x+y)^{(p+q)}$ then $\frac{dy}{dx} = ?$

A. y/x

B. py/qx

C. x/y

D. qy/px

Answer: A

Watch Video Solution

28. If $x = 2\cos t - \cos 2t$, $y = 2\sin t - \sin 2t$, then the value of $\left|\frac{d^2y}{dx^2}\right|_{t=\pi/2}$ is

A. $3/2$

B. $5/2$

C. $5/2$

D. $-3/2$

Answer: D

Watch Video Solution

29. $y = \log\tan\left(\frac{x}{2}\right) + \sin^{-1}(\cos x)$, then $\frac{dy}{dx}$ is

A. $\cos ecx - 1$

B. $\cos ecx$

C. $\cos ecx + 1$

D. x

Answer: A

Watch Video Solution

30. x,के सभी वास्तविक मानों के लिए $\frac{1 - x + x^2}{1 + x + x^2}$ का न्यूनतम मान है :

A. 0

B. $1/3$

C. 1

D. 3

Answer: B

Watch Video Solution

31. If $x + y = k$ is normal to $y^2 = 12x,$ then k is 3 (b) 9 (c) -9 (d) -3

A. 3

B. 9

C. -9

D. -3

Answer: B

Watch Video Solution

32. A particle moves along a straight line according to the law $s = 16 - 2t + 3t^3$, where s metres is the distance of the particle from a fixed point at the end of t second. The acceleration of the particle at the end of $2s$ is

A. $3.6m/s^2$

B. $36m/s^2$

C. $36km/s^2$

D. $360m/s^2$

Answer: B

Watch Video Solution

33. $\int[\sqrt{\cot x}+\sqrt{\tan x}]dx$ ज्ञात कीजिए!

A. $\sqrt{2}\tan^{-1}\left(\frac{\tan x}{\sqrt{2\tan x}}\right)+C$

B. $\sqrt{2}\tan^{-1}\left(\frac{\tan x-1}{\sqrt{2\tan x}}\right)+C$

C. $\frac{\tan x}{\sqrt{2}}\cdot\tan^{-1}\left(\frac{\cot x+1}{\sqrt{2\tan x}}\right)+C$

D. $\frac{\tan x}{\sqrt{2}}\cdot\tan^{-1}\left(\frac{\cot x+1}{\sqrt{\tan x}}\right)+C$

Answer: B

Watch Video Solution

34. $\int \frac{x^2}{(x\sin x+\cos x)^2}dx$ is equal to

A. $\frac{\sin x+\cos x}{x\sin x+\cos x}+C$

B. $\frac{x\sin x-\cos x}{x\sin x+\cos x}+C$

C. $\frac{\sin x-x\cos x}{x\sin x+\cos c}+C$

D. None of these

Answer: C

Watch Video Solution

35. Evaluate $\int_0^{\pi}\frac{xdx}{1+\cos\alpha\sin x}$,where $0<\alpha<\pi$.

A. $\frac{\pi\alpha}{\sin\alpha}$

B. $\frac{\pi\alpha}{\cos\alpha}$

C. $\frac{\sin\alpha}{1+\sin\alpha}$

D. $\frac{\pi\alpha}{1+\cos\alpha}$

Answer: A

Watch Video Solution

36. $\int_{\pi/2}^{\pi/2} \frac{\cos x}{1+e^x} dx$ is equal to

A. 1

B. 0

C. -1

D. None of these

Answer: A

Watch Video Solution

37. $\int_0^{\pi/2} \frac{1}{(1+\tan x)} dx = ?$

A. π

B. $\pi/2$

C. $\pi/3$

D. $\pi/4$

Answer: D

Watch Video Solution

38. The area bounded by the parabola $y^2 = x$, straight line $y = 4$ and y-axis is

A. 16/3 sq. unit

B. 64/3 sq. unit

C. $7\sqrt{2}$ sq. unit

D. None of these

Answer: B

Watch Video Solution

39. Find the differential equation of all the circles which pass through the origin and whose centres lie on y-axis.

A. $\left(x^2-y^2\right)\frac{dy}{dx}-2xy=0$

B. $\left(x^2-y^2\right)\frac{dy}{dx}+2xy=0$

C. $\left(x^2-y^2\right)\frac{dy}{dx}-xy=0$

D. $\left(x^2-y^2\right)\frac{dy}{dx}+xy=0$

Answer: A

Watch Video Solution

40. If m and n are order and degree of the differential equation $\left(\frac{d^2y}{dx^2}\right)^5+\frac{4\left(\frac{d^2y}{dx^2}\right)^3}{\frac{d^3y}{dx^3}}+\frac{d^3y}{dx^3}=x^2-1$ (A) $m=3, n=1$ (B) $m=3, n=3$ (C) $m=3, n=2$ (D) $m=3, n=5$

A. $m=3, n=3$

B. $m = 3, n = 2$

C. $m = 3, n = 5$

D. $m = 3, n = 1$

Answer: D

Watch Video Solution

41. The integrating factor of the differential equation $\frac{dy}{dx}\left(x(\log)_e x\right) + y = 2(\log)_e x$ is given by (a) $(b)x(c)$ (d) (b) $(e)(f)(g)e^{(h)x(i)}(j)(k)$ (l) (c) $(m)(n)(o)((p)\log)_q e(r)(s)x(t)$ (u) (d) *[Math Processing Error]* (ii)

A. e^x

B. log x

C. log (log x)

D. x

Answer: B

Watch Video Solution

42. The differential equation whose solution is $(x-h)^2+(y-k)^2=a^2$ is (a is a constant)

A. $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3=a^2\frac{d^2y}{dx^2}$

B. $\left[1+\left(\frac{dy}{dx}\right)^2\right]^3=a^2\left(\frac{d^2y}{dx^2}\right)^2$

C. $\left[1+\left(\frac{dy}{dx}\right)\right]^3=a^2\left(\frac{d^2y}{dx^2}\right)^2$

D. None of the above

Answer: B

Watch Video Solution

43. A diet of a stic person must contain atleast 4000 unit of vitamins, 50 unit of proteins and 1400 calories. Two foods A and B are available at cos

of Rs. 4 and Rs. 3 per unit respectively. If one unit of A contains 200 unit of vitamis, 1 unit of protein and 40 calories, while one unit of food B contains 100 unit of vitamins, 2 unit of protein and 40 calories. Formulate the problem, so that the diet be cheapest.

A. $200x + 100y \geq 400, x + 2y \geq 50$

$40x + 40y \geq 1400, x \geq 0$ and $y \geq 0$

$O. Fz = 4x + 3y$

B. $400x + 200y \geq 100, x + 2y \geq 50$

$40x + 40y \geq 1400, x \geq 0$ and $y \geq 0$

$O. Fz = 4x + 3y$

C. $100x + 200y \geq 4000, x + 2y \geq 50,$

$40x + 40y \geq 1400, x \geq 0$ and $y \geq 0$

$O. Fz = 4x + 3y$

D. None of the above

Answer: A

Watch Video Solution

Watch Video Solution

44. The constraints $-x_1 + x_2 < 1, \ -x_1 + 3x_2 \leq 9, x_1, x_2 > , 0$ difines on

A. bounded feasible space

B. unbounded feasible space

C. both bounded and unbounded feasible space

D. None of the above

Answer: B

Watch Video Solution

45. By Simpson rule taking $n = 4,$ the value of the integral $\int_0^1 \frac{1}{1+x^2} dx$ is equal to

A. 0.788

B. 0.781

C. 0.785

D. None of these

Answer: C

Watch Video Solution

46. The propositions $(p \Rightarrow \sim p) \wedge (-p \Rightarrow p)$ is a

A. tautology and contradication

B. tneither tautology nor contradiction

C. contradiction

D. tautology

Answer: C

Watch Video Solution

47. The inverse of the proposition $(p \wedge \ -q) \Rightarrow r$ is

A. $\sim r \Rightarrow \sim p \vee q$

B. $\sim p \vee q \Rightarrow \sim r$

C. $r \Rightarrow p \wedge \sim q$

D. None of these

Answer: B

Watch Video Solution

48. In a boolean algebra B, for all x,y in B, $x \cdot (x + y)$ is equal to

A. y

B. x

C. 1

D. 0

Answer: B

Watch Video Solution

49. For the circuit show below, the Boolean polynomial is

A. $(\sim p \vee qq) \vee (p \vee \sim q)$

B. $(\sim p \wedge q) \wedge (p \wedge q)$

C. $(\sim p \wedge \sim q) \wedge (q \wedge p)$

D. $(\sim p \wedge q) \vee (p \wedge \sim q)$

Answer: D

View Text Solution

50. The value of $(1 + \Delta)(1 - \Delta)$ is

A. 0

B. -1

C. 1

D. None of these

Answer: C

View Text Solution