MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

MHTCET 2016

Mathematics

1. Let $X \sim B(n, p)$, if E(X)=5,Var(X) $= 2.5$ then $P(X < 1)$ is equal to

A. $\left(\frac{1}{2}\right)^{11}$

B. $\left(\frac{1}{2}\right)^{10}$

C. $\left(\frac{1}{2}\right))^6$

D. $\left(\frac{1}{2}\right)^9$

Answer: B

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2. Derivative of $\tan^{-1}\left(\frac{x}{\sqrt{1-x^2}}\right)$ with respect to $\sin^{-1}\left(3x-4x^3\right)$ is

A. $\frac{1}{\sqrt{1-x^2}}$

B. $\frac{3}{\sqrt{1-x^2}}$

C. 3

D. $\frac{1}{3}$

Answer: D

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3. Form the differential equation of the family of circles touching the y-axis at origin.

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

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

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

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

Answer: B

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4. If $A = \begin{bmatrix} 1 & 1 & 0 \\ 2 & 1 & 5 \\ 1 & 2 & 1 \end{bmatrix}$ then $a_{11}A_{21} + a_{12}A_{22} + a_{13}A_{23}$ is equal to

A. 1

B. 0

C. -1

D. 2

Answer: B

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5. If the Rolle's theorem for $f(x) = e^x(\sin x - \cos x)$ is verified on $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$ then the value of C is

A. $\frac{\pi}{3}$

B. $\frac{\pi}{2}$

C. $\frac{3\pi}{4}$

D. π

Answer: B

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6. The joint equation of lines passing through the origin and trisecting the first quadrant is

A. $x^2 + \sqrt{3}xy - y^2 = 0$

B. $x^2 - \sqrt{3}xy - y^2 = 0$

C. $\sqrt{3}x^2 - 4xy + \sqrt{3}y^2 = 0$

D. $3x^2 - y^2 = 0$

Answer: C

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7. If $2\tan^{-1}(\cos x) = \tan^{-1}(2\cos ecx)$ then $\sin x + \cos x =$

A. $2\sqrt{2}$

B. $\sqrt{2}$

C. $\frac{1}{\sqrt{2}}$

D. $\frac{1}{2}$

Answer: B

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8. Find the direction cosines of teh line $\frac{x-2}{2} = \frac{2y-5}{-3}, z = -1$. Also, find the vector equation of the line.

A. $\frac{4}{3}, \frac{3}{5}, 0$

B. $\frac{3}{5}, \frac{4}{5}, \frac{1}{5}$

C. $-\frac{3}{5}, \frac{4}{5}, 0$

D. $\frac{4}{5}, -\frac{2}{5}, \frac{1}{5}$

Answer: A

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9. $\int \frac{dx}{\sqrt{8+2x-x^2}}$

A. $\frac{1}{3}\sin^{-1}\left(\frac{x-1}{3}\right)+c$

B. $\sin^{-1}\left(\frac{x+1}{3}\right)+C$

C. $\frac{1}{3}\sin^{-1}\left(\frac{x+1}{3}\right)+c$

D. $\sin^{-1}\left(\frac{x-1}{3}\right)+c$

Answer: D

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10. The a[[rpxo,ate va,ie pf $f(x)=x^3+5x^2-7x+9$ at $x=1$ is

A. 8

B. 8.5

C. 8.4

D. 8.3

Answer: A

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11. If a random variable waiting time in minutes for bus and probability density function of x is given by

$$f(x) = \begin{cases} \frac{1}{5}, 0 \leq x \leq 5 \\ 0, \text{otherwise} \end{cases}$$

Then probability of waiting time not more than 4 minutes is equal to

A. 0.3

B. 0.8

C. 0.2

D. 0.5

Answer: B

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12. In ΔABC, $(a-b)^2\cos^2\frac{C}{2}+(a+b)^2\sin^2\frac{C}{2}$ is equal to

A. b^2

B. c^2

C. a^2

D. $a^2+b^2+c^2$

Answer: B

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13. Derivative of $\log(\sec\theta + \tan\theta)$ with respect top $\sec\theta$ at $\theta = \frac{\pi}{4}$ is

A. 0

B. 1

C. $\frac{1}{\sqrt{2}}$

D. $\sqrt{2}$

Answer: B

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14. The joint equation of bisectors of angles between lines $x = 5$ and $y = 3$ is

A. $(x - 5)(y - 3) = 0$

B. $x^2 - y^2 - 10x + 6y + 16 = 0$

C. $x^2 - y^2 - 10x + 6y + 16 = 0$

D. $xy = 0$

Answer: B

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15. एक कण वक्र $6y = x^3 + 2$ के अनुगत गति कर रहा है वक्र पर उन बिंदुओं को ज्ञात कीजिए जबकि x-निर्देशांक की तुलना में y-निर्देशांक 8 गुना तीव्रता से बदल रहा है

A. (4,11)

B. $(4, -11)$

C. $(-4, 11)$

D. $(-4, -11)$

Answer: A

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16. If the function f(x) defined by

$$f(x) = \begin{cases} x\sin\frac{1}{x}, & \text{for } x \neq 0 \\ k, & \text{for } x = 0 \end{cases}$$

is continuous at x = 0, then k is equal to

A. 0

B. 1

C. -1

D. $\frac{1}{2}$

Answer: A

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17. If $y = e^m \sin^{-1} x$ and $(1 - x^2)\left(\frac{dy}{dx}\right)^2 = At^2$, then A is equal to

A. m

B. $-m$

C. m^2

D. $-m^2$

Answer: C

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18. $\int\left(\frac{4e^x-25}{2e^x-5}\right)dx = Ax + B\frac{\log}{2e^x} - \frac{5}{+c}$ then

A. A=5 and B=3

B. A=5 and B=-3

C. A=-5 and B=3

D. A=-5 and B=-3

Answer: B

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19. $\frac{\tan^{-1}\left(\sqrt{3}\right) - \sec^{-1}(-2)}{\cos ec^{-1}\left(-\sqrt{2}\right) + \cos^{-1}\left(-\frac{1}{2}\right)}$ is equal to

A. $\frac{4}{5}$

B. $-\frac{4}{5}$

C. $\frac{3}{5}$

D. 0

Answer: B

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20. For what value of k, the function defined by

$$f(x) = \begin{cases} \frac{\log(1+2x)\sin x^{\circ}}{x^2}, & \text{for } x \neq 0 \\ k, & \text{for } x = 0 \end{cases}$$

is continuous at x = 0 ?

A. 2

B. $\frac{1}{2}$

C. $\frac{\pi}{90}$

D. $\frac{90}{\pi}$

Answer: C

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21. If $\log_{10}\left(\frac{x^2-y^2}{(x^2)+y^2}\right)=2$ then $\frac{dy}{dx}$ is equal to

A. $\frac{99x}{101y}$

B. $\frac{99x}{101y}$

C. $-\frac{99y}{101x}$

D. $\frac{99y}{101x}$

Answer: A

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22. $\left(\frac{\int \frac{x}{2}}{-\frac{x}{2}}\right)\log\left(\frac{2-\sin x}{2+\sin x}\right)$ dx is equal to

A. 1

B. 3

C. 2

D. 0

Answer: D

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23. $\int\left((x^2+2)\frac{a^{\left(x+\tan^{-1}x\right)}}{x^2+1}\right)$ dx is equal to

A. $\log a.\, a^{x+\tan^{-1}x}+c$

B. $\frac{\frac{x+\tan^{-1}}{\log a}}{\log a}+c$

C. $\frac{a^{x+\tan^{-1}x}}{\log a}+c$

D. $\log a\left(x+\tan^{-1}+c\right.$

Answer: C

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24. The degree and order of the differential equation $\left[1+\left(\frac{dy}{dx}\right)^3\right]^{\frac{7}{3}}=7\left(\frac{d^2y}{dx^2}\right)$ respectively are

A. 3 and 7

B. 3 and 2

C. 7 and 3

D. 2 and 3

Answer: B

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25. The acute angle between the line $r=\left(\hat{i}+2\hat{j}+\hat{k}\right)+\lambda\left(\hat{i}+\hat{j}+\hat{k}\right)$ and the plane

$r.\ \left(2\hat{i} - \hat{j} + \hat{k}\right) = 5$

A. $\cos^{-1}\left(\frac{\sqrt{2}}{3}\right)$

B. $\sin^{-1}\left(\frac{\sqrt{2}}{3}\right)$

C. $\tan^{-1}\left(\frac{\sqrt{2}}{3}\right)$

D. $\sin^{-1}\left(\frac{\sqrt{2}}{3}\right)$

Answer: B

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26. Find by integration the area of the region bounded by the curve $y = 2x - x^2$ and the x-axis.

A. $\frac{2}{3}$ sq units

B. $\frac{4}{3}$ sq units

C. $\frac{5}{3}$ sq units

D. $\frac{8}{3}$ sq units

Answer: B

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27. If $\int \frac{f(x)}{\log \sin x} dx = \log \cdot \log \sin x,$ then f(x) is equal to

A. cot x

B. tan x

C. sec x

D. cosec x

Answer: A

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28. If A and B are foot of perpendicular drawn from point Q(a,b,c) to the planes yz and zx, then equation of plane through the point A,B, and O is

A. $\frac{x}{a}+\frac{y}{b}-\frac{z}{c}=0$

B. $\frac{x}{a}-\frac{y}{b}+\frac{z}{c}=0$

C. $\frac{x}{a}-\frac{y}{b}-\frac{z}{c}=0$

D. $\frac{x}{a}+\frac{y}{b}+\frac{z}{c}=0$

Answer: A

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29. If

$a = \hat{i} + \hat{k} - 2\hat{k}, b = 2\hat{i} - \hat{j} + \hat{k}$ and $c = 3\hat{i} - \hat{k}c = ma + nb$

then m+n ios equal to

A. 0

B. 1

C. 2

D. -1

Answer: C

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30. $\int_0^{\pi/2} \left(\frac{n\sqrt{\sec x}}{n\sqrt{\sec x} + n\sqrt{\cos ecx}} \right) dx$ is equal to

A. $\frac{\pi}{2}$

B. $\frac{\pi}{3}$

C. $\frac{\pi}{4}$

D. $\frac{\pi}{6}$

Answer: C

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31. If the probability density function of a random varaible X is given as

then F(0) is equal to

A. $P(X < 0)$

B. $P(X > 0)$

C. $1 - P(X > 0)$

D. $1 - P(X < 0)$

Answer: C

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32. Find the particular solutions of the following differential equation :

(1) $y(1 + \log x)\frac{dx}{dy} - x \log x = 0, when, x = e, y = e^2$

A. y=ex log x

B. ey=x log x

C. xy=e log x

D. y logx=ex

Answer: A

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33. If M and N are the mid-points of the diagonals AC and BD respectively of a quadrilateral ABCD, then the of $\overrightarrow{AB} + \overrightarrow{AD} + \overrightarrow{CB} + \overrightarrow{CD}$ equals

A. 2MN

B. 2NM

C. 4MN

D. 4MN

Answer: C

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34. If $\sin x$ is an integrating factor of the differential equation $\frac{dy}{dx} + Py = Q$, then write the value of P.

A. log sin x

B. cos x

C. tan x

D. cot x

Answer: D

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35. Which of the following equation does not represent a pair of lines ?

A. $x^2 - x = 0$

B. $xy - x = 0$

C. $y^2 - x + 1 = 0$

D. $xy + x + y + 1 = 0$

Answer: C

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36. Probability of guessing correctly atleast 7 out of 10 answers in a 'True' or 'False' test is equal to

A. $\frac{11}{64}$

B. $\frac{11}{32}$

C. $\frac{11}{16}$

D. $\frac{27}{32}$

Answer: A

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37. Principal solutions of the equation $\sin 2x + \cos 2x = 0$, where $\pi < x < 2\pi$

A. $\frac{7\pi}{8}, \frac{11\pi}{8}$

B. $\frac{9\pi}{8}, \frac{13\pi}{8}$

C. $\frac{11\pi}{8}, \frac{15\pi}{8}$

D. $\frac{15\pi}{8}, \frac{19\pi}{8}$

Answer: C

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38. If line joining points A and B having position vectors $6\bar{a} - 4\bar{b} + 4\bar{c}$ and $-4\bar{c}$ respectively, and the line joining the points C and D having position vectors $-\bar{a} - 2\bar{b} - 3\bar{c}$ and $\bar{a} + 2\bar{b} - 5\bar{c}$ intersect, then their point of intersection is (A) B (B) C (C) D (D) A

A. B

B. C

C. D

D. A

Answer: A

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39. If $A = \begin{bmatrix} 2 & 2 \\ -3 & 2 \end{bmatrix}, B = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix}$ then $\left(B^{-1}A^{-1}\right)^{-1}$ is equal to

A. $\begin{bmatrix} 2 & -2 \\ 2 & 3 \end{bmatrix}$

B. $\begin{bmatrix} 2 & 2 \\ -2 & 3 \end{bmatrix}$

C. $\begin{bmatrix} 2 & -3 \\ 2 & 2 \end{bmatrix}$

D. $\begin{bmatrix} 1 & -1 \\ -2 & 3 \end{bmatrix}$

Answer: A

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40. If p : Every square is a rectangle.

q : Every rhombus is a kite, then truth values of $p \rightarrow q$ and $p \leftrightarrow q$ are _____ and _____ respectively.

A. F,F

B. T,F

C. F,T

D. T,T

Answer: A

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41. If $G(\bar{g}), H(\bar{h})$ and $P(\bar{p})$ are centroid, orthocenter and circumcenter of a triangle and $x\bar{p} + y\bar{h} + z\bar{g} = 0$ then $(x, y, z) =$

A. 1,1,-2

B. 2,1,-3

C. 1,3,-4

D. 2,3,-5

Answer: B

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42. Which of the following quantified statement is true?A) The square of every real number is positive

A. The square of a every number is positive

B. There exists a real number, whose square is negative

C. There exists a real number, whose square is not positive

D. Every real number is rational

Answer: A

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43. The general solution of the equation $\tan^2 x = 1$ is

A. $n\pi + \frac{\pi}{4}$

B. $n\pi - \frac{\pi}{4}$

C. $n\pi\frac{\pi}{4}$

D. $2n\pi \pm \frac{\pi}{4}$

Answer: C

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44. The shaded part of given figure indicates in feasible region.

then the constraints are

A. $x, y > 0, x + y > 0, x \geq 5, y < 3$

B. $x, y \geq 0, x - y \geq 0, x \leq 5, y \leq 3$

C. $x, y \geq 0, x - y \geq 0, x \leq 5, y \geq 3$

D. $x, y \geq 0, x - y \geq 0, x \leq 5, y \geq 3$

Answer: B

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45. Direction ratios of the line which is perpendicular to the lines with direction ratios (-1,2,2) and (0,2,1) are

A. 1,1,2

B. 2,-1,2

C. $-2, 1, 2$

D. 2,1,-2

Answer: B

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46. If matrix $A = \begin{bmatrix} 1 & 2 \\ 4 & 3 \end{bmatrix}$, such that $AX = I$, then X is equal to

A. $\frac{1}{5}\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$

B. $\frac{1}{5}\begin{bmatrix} 4 & 2 \\ 4 & -1 \end{bmatrix}$

C. $\frac{1}{5}\begin{bmatrix} -3 & 2 \\ 4 & -1 \end{bmatrix}$

D. $\frac{1}{5}\begin{bmatrix} -1 & 2 \\ -1 & 4 \end{bmatrix}$

Answer: C

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47. If $a = \hat{i} + \hat{j} + \hat{k}, b = 2\hat{i} + \lambda\hat{i} + \lambda\hat{j} + \hat{k}, c = \hat{i} - \hat{j} + 4\hat{k}$ and $a.(b \times c) = 10$ then λ is equal to

A. 6

B. 7

C. 9

D. 10

Answer: A

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48. If random variable $X \sim B\left(n = 5, P = \frac{1}{3}\right)$, then `P(2 lt X lt 4) is equal to

A. $\frac{80}{243}$

B. $\frac{40}{243}$

C. $\frac{40}{343}$

D. $\frac{80}{343}$

Answer: B

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49. The objective function $z = x_1 + x_2$, subject to $x_1 + x_2 \leq 10, -2x_1 + 3x_2 \leq 15, x_1 \leq 6, x_1, x_2 \leq 0$ has maximum value of the feasible region.

A. at only one point

B. at only two points

C. at every point of the segment joining two points

D. at every of the segment joining two equivalent to'

Answer: C

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50.

A. $p \vee \ - q$

B. $p \vee \ - q$

C. $P \Leftrightarrow q$

D. `None of these

Answer: D

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