MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 10

Paper 2 Mathematics

1. If $A = \begin{bmatrix} \cos^2\theta & \cos\theta\sin\theta \\ \cos\theta\sin\theta & \sin^2\theta \end{bmatrix}$ B= $\begin{bmatrix} \cos^2\phi & \cos\phi\sin\phi \\ \cos\phi\sin\phi & \sin^2\phi \end{bmatrix}$ and

$\theta - \phi = (2n+1)\frac{\pi}{2}$ Find AB.

A. $\theta = n\phi, n = 0, 1, 2, \ldots.$

B. $\theta + \phi = n\pi, n = 0, 1, 2 \ldots$

C. $\theta = \phi + (2n+1)\frac{\pi}{2}, n = 0, 1, 2 \ldots$

D. $\theta = \phi + n\frac{\pi}{2}, n = 0, 1, 2, \ldots$

Answer: C

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2. If f(0) = 0 and $f(x) = \frac{1}{\left(1 - e^{-1/x}\right)}$ for $x \neq 0$. Then, only one of the following statements on f(x) is true. That is f(x) is

A. continuous at x=0

B. not continuous at x=0

C. both continuous and differentiable at x=0

D. not defined at x=0

Answer: B

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3. if statements p and r are false and q is true, then trueth value of ~$\pi mplies(q \wedge r) \vee r$ is

A. T

B. F

C. Either T or F

D. Neither T nor F

Answer: B

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4. Let p and q be two statements, then $(p \wedge q) \vee \sim p$ is

A. tautology

B. contradiction

C. both (a) and (b)

D. none of the above

Answer: A

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5. If $\int\sqrt{2}(\sqrt{1+\sin x}dx = 4\cos(ax+b)+c,$

then the value of a,b are

A. $\frac{1}{2}, \frac{\pi}{4}$

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

C. 1,1`

D. none of these

Answer: A

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6. $\int_{-1}^{1} \log\left(x + \sqrt{x^2 + 1}\right) dx = ?$

A. 0

B. log 2

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

D. none of these

Answer: A

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7. Area lying between parabola $y^2 = 4ax$ and it's latuscrectum is

A. $\frac{4}{3}a^2$ sq unit

B. $\frac{16}{3}a^2$ sq unit

C. $\frac{8}{3}a^2$ sp unit

D. None of these

Answer: C

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8. Solution of y $dx - xdy = x^2 ydx$ is

A. $\frac{y}{x} + e^x = c$

B. $\frac{x}{y} + e^x = c$

C. $x + e^y = c$

D. $y + e^x = c$

Answer: A

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9. The second order derivative of $a\sin^3 t$ w.r.t, $a\cos^3 t$ at $t = \frac{\pi}{4}$ is

A. $\frac{4\sqrt{2}}{3a}$

B. 2

C. $\frac{1}{12a}$

D. None of these

Answer: A

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10. The equation of the plane passing through the points (1,2,3), (-1,4,2) and (3,1,1) is

A. 5x+y+12z-23=0

B. 5x+6y+2z-23=0

C. $x + 6y + 2z - 13 = 0$

D. $x + y + z - 13 = 0$

Answer: B

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11. To maximise the objective function $z = x + 2y$ under the constraints $x - y \leq 2, x + y \leq 4$ and $x, y \geq 0$ is

A. 1x=0,y=4,z=8`

B. $x = 1, y = 2, z = 5$

C. $x = 1, y = 4, z = 9$

D. $x = 0, y = 3, z = 6$

Answer: A

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12. If $\frac{\sin(x+y)}{\sin(x-y)} = \frac{a+b}{a-b}$, then show that $\frac{\tan x}{\tan y} = \frac{a}{b}$.

A. $\frac{a^2}{b^2}$

B. $\frac{a}{b}$

C. $\frac{b}{a}$

D. $\frac{a^2+b^2}{a^2-b^2}$

Answer: B

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13. If the equation $\lambda x^2 + (2\lambda - 3)y^2 - 4x - 1 = 0$ represents a circle, then its radius is

A. $\frac{\sqrt{11}}{3}$

B. $\frac{\sqrt{13}}{3}$

C. $\frac{\sqrt{7}}{3}$

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

Answer: C

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14. If the lines joining the origin to the points of intersection of the line $y = mx + 2$ and the curve $x^2 + y^2 = 1$ are at right-angles, then

A. $m = \sqrt{3}$

B. $m = \pm\sqrt{7}$

C. $m = 1$

D. $m = \sqrt{5}$

Answer: B

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15. The distance between the foci of the conic $7x^2 - 9y^2 = 63$ is equal to

A. 8

B. 4

C. 3

D. 7

Answer: A

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16. The line $lx + my + n = 0$ is a normal to the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$. then prove that $\frac{a^2}{l^2} + \frac{b^2}{m^2} = \frac{\left(a^2 - b^2\right)^2}{n^2}$

A. n

B. n^2

C. n^3

D. None of these

Answer: B

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17. The angle of intersection of the curves $y = x^2$ and $x = y^2$ at (1,1) is

A. $\tan^{-1}\left(\frac{4}{3}\right)$

B. $\tan^{-1}(1)$

C. 90°

D. $\tan^{-1}\left(\frac{3}{4}\right)$

Answer: D

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18. A straight line passing through the point $(2, 2)$ and the axes enclose an area λ. The intercepts on the axes made by the line are given by the two roots of:

(A) $x^2 - 2|\lambda|x + |\lambda| = 0$ (B) $x^2 + |\lambda|x + 2|\lambda| = 0$

(C) $x^2 - |\lambda|x + |2\lambda| = 0$ (D) None of these

A. $x^{2-2\lambda x+\lambda=0}$

B. $x^2 + \lambda x + 2\lambda = 0$

C. $x^2 - \lambda x + 2\lambda = 0$

D. None of these

Answer: C

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19. If a committee of 3 is to be chosen from a group of 38 people of which you are a member. What is the probability that you will be on the committee?

A. $\left(\frac{38}{3}\right)$

B. $\left(\frac{37}{2}\right)$

C. $\left(\frac{37}{2}\right) / \left(\frac{38}{2}\right)$

D. $\frac{666}{8436}$

Answer: D

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20. The real number x when added to its inverse given the minimum value of the sum at x equal to 1 (b) -1 (c) -2 (d) 2

A. -2

B. 2

C. 1

D. -1

Answer: C

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21. The value of $\lim_{x \to 2} \frac{e^{3x-6} - 1}{\sin(2-x)}$

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

B. 3

C. -3

D. -1

Answer: C

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22. If $f(x) = 3x^4 + 4x^3 - 12x^2 + 12,$ then f(x) is

A. increasing in $(-\infty, 2)$ and in (0,1)

B. increasing in (-2,0) and in $(1, \infty)$

C. decreasing in $(-2, 0)$ and in (0,1)

D. decreasing in $(-\infty, -2)$ and in $(1,\infty)$

Answer: B

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23. In which of the following functions, Rolle's theorem is applicable?

A. $f(x) = |x|$ in $-2 \leq x \leq 2$

B. $f(x) = \tan x$ in $0 \leq x \leq \pi$

C. $f(x) = 1 + (x-2)^{\frac{2}{3}}$ in $1 \leq x \leq 3$

D. $f(x) = x(x-2)^2$ in $0 \leq x \leq 2$

Answer: D

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24. An edge of a variable cube is increasing at the rate of 10cm/sec. How fast the volume of

the cube is increasing when the edge is 5cm long?

A. $750cm^2/s$

B. $75\ cm^3/s$

C. $300\ cm^3/s$

D. $150\ cm^3/s$

Answer: A

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25. The general solution of

$y^2dx + \left(x^2 - xy + y^2\right)dy = 0$, is

A. $\tan^{-1}\left(\frac{x}{y}\right) + \log y + c = 0$

B. $2\tan^{-1}\left(\frac{x}{y}\right) + \log x + c = 0$

C. $\log\left(y + \sqrt{x^2 + y^2}\right) + \log y + c = 0$

D. $\sinh^{-1}\left(\frac{x}{y}\right) + \log y + c = 0$

Answer: A

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26. $\cos\left\{\cos^{-1}\left(-\frac{1}{7}\right)+\sin^{-12}\left(-\frac{1}{7}\right)\right\}=$

A. $-\frac{1}{3}$

B. 0

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

D. $\frac{4}{9}$

Answer: B

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27. In any triangle ABC, if $a = 18, b = 24, c = 30$, find sinA, sinB, sinC

A. 43835

B. 43895

C. 43866

D. None of these

Answer: B

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28. $\frac{d}{dx}(\log x)^4$ is equal to

A. $4\log x^3$

B. $\frac{4(\log x)^3}{x}$

C. $\frac{(4\log x)^3}{x}$

D.

Answer: C

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29. The set of points where the function $f9x) = x|x|$ is differentiable is $(-\infty, \infty)$ (b) $(-\infty, 0) \cup (0, \infty)$ $(0, \infty)$ (d) $[0, \infty)$

A. $(-\infty, \infty)$

B. $(-\infty, 0) \cup (0, \infty)$

C. $(0, \infty)$

D. $[0, \infty)$

Answer: A

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30. The value of α, which satisfy $\int_{\frac{\pi}{2}}^{\alpha} \sin x dx = \sin 2\alpha (\alpha \in [0, 2\pi]$ are equal

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

B. $\frac{3\pi}{2}$

C. $\frac{7\pi}{6}$

D. all of these

Answer: D

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31. For a party 7 guests are invited by a husband and his wife. They sit in a row for dinner. The probability that the husband and his wife sit together, is

A. $\frac{2}{7}$

B. $\frac{2}{9}$

C. $\frac{1}{9}$

D. $\frac{4}{9}$

Answer: B

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32. Find the area of the closed figure bounded by the curves $y = \sqrt{x}, y = \sqrt{4 - 3x} and y = 0$

A. $4/9$

B. 44052

C. 16/9

D. none of these

Answer: B

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33. $\int \frac{dx}{x\sqrt{x^6-16}} =$

A. $\frac{1}{3}\sec^{-1}\left(\frac{x^3}{4}\right)+c$

B. $\cos^{-1}\left(\frac{x^3}{4}\right)+c$

C. $\frac{1}{12}\sec^{-1}\left(\frac{x^3}{4}\right)+c$

D. $\sec^{-1}\left(\frac{x^3}{4}\right)+c$

Answer: C

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34. The locus of the point which divides the double ordinates of the ellipse $\frac{x^2}{a^2}+\frac{y^2}{b^2}=1$ in the ratio $1:2$ internally is $\frac{x^2}{a^2}+\frac{9y^2}{b^2}=1$

(b) $\frac{x^2}{a^2}+\frac{9y^2}{b^2}=\frac{1}{9}$ $\frac{9x^2}{a^2}+\frac{9y^2}{b^2}=1$ (d) none of these

A. $\frac{x^2}{a^2}-\frac{9y^2}{b^2}=\frac{1}{9}$

B. $\frac{x^2}{a^2}+\frac{9y^2}{b^2}=1$

C. $\frac{9x^2}{a^2}+\frac{9y^2}{b^2}=1$

D. None of these

Answer: B

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35. Determine the ratio in which the line $3x + y - 9 = 0$ divides the segment joining the points (1,3) and (2,7).

A. 3:4 externally

B. 3:4 internally

C. 4:5 internally

D. 5:6 externally

Answer: B

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36. The angle between the lines $\sqrt{3}x - y - 2 = 0$ and $x - \sqrt{3}y + 1 = 0$ is

A. 90°

B. 60°

C. 45°

D. 30°

Answer: D

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37. The bisector of the acute angle formed between the lines $4x - 3y + 7 = 0$ and $3x - 4y + 14 = 0$ has the equation

A. $x+y+3=0$

B. $x-y-3=0$

C. $x-y+3=0$

D. $3x+y-7=0$

Answer: C

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38. The value of $i^2 + i^4 + i^6 + i^8 \ldots$. upto (2n+1) terms , where i^2 = -1, is equal to:

A. 0

B. 1

C. -1

D. k

Answer: C

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39. The coordinate of the point of intersection of the line $\frac{x-1}{1}=\frac{y+2}{3}=\frac{z-2}{-2}$ with the plane

A. (5,10,6)

B. (10,5,6)

C. (5,5,-6)

D. (5,10,-6)

Answer: D

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40. The acute angle between the line joining the points (2,1,-3) and (-3,1,7)and a line parallel to $\frac{x-1}{3}=\frac{y}{4}=\frac{z+3}{5}$ through the point (-1,0,4) is

A. $\cos^{-1}\left(\frac{1}{\sqrt{10}}\right)$

B. $\cos^{-1}\left(\frac{1}{5\sqrt{10}}\right)$

C. $\cos^{-1}\left(\frac{7}{5\sqrt{10}}\right)$

D. $\cos^{-1}\left(\frac{3}{5\sqrt{10}}\right)$

Answer: C

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41. If 0ltaltb, then $\lim_{n \to \infty} \frac{a^n + b^n}{a^n - b^n}$

A. equals 0

B. equals -1

C. equals 1

D. does not exist

Answer: B

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42. if $\tan(k+1)\theta = \tan\theta$, then θ belongs to the set

A. $\{n\pi : n \in l\}$

B. $\{n\pi/2 : n \in l\}$

C. $\{n\pi/k : n \in l\}$

D. $\{n\pi/2k : n \in l\}$

Answer: C

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43. If A and B are two matrices such that AB=B and BA=A , then $A^2 + B^2 =$

A. 2BA

B. A+B

C. 2AB

D. None of these

Answer: B

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44. If $|a| = |b| = 1$ and $|a + b| = \sqrt{3}$, then the value of $(3a - 4b)(2b + 5b)$ is

A. -21

B. $-\frac{21}{2}$

C. 21

D. $\frac{21}{2}$

Answer: B

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45. The value of $\sec\left[\tan^{-1}\left(\frac{b+a}{b-a}\right)-\tan^{-1}\left(\frac{a}{b}\right)\right]$ is

A. 2

B. $\sqrt{2}$

C. 4

D. 1

Answer: B

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46. If, in ΔABC, $a = 16, b = 24, c = 20$ then, $\sin\left(\frac{A}{2}\right) =$ _ _

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

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

C. $\frac{3}{2\sqrt{2}}$

D. None of these

Answer: A

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47. A person draws a card from a well shuffled pack of 52 playing cards. Replaces it and shuffles the pack. He continues doing so until he draws as pade. The chance that he fails first two times is

A. $\frac{9}{64}$

B. $\frac{1}{64}$

C. $\frac{1}{16}$

D. $\frac{9}{16}$

Answer: D

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48. The mean and the variance of a binomial distribution are 4 and 2 respectively. Then, the probability of 2 successes is

A. $\frac{37}{256}$

B. $\frac{219}{256}$

C. $\frac{128}{256}$

D. $\frac{28}{256}$

Answer: D

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49. if $\Delta ABC, a = 18, b = 24, c = 30,$ then the area of the triangle is

A. 196

B. 216

C. 64

D. none of these

Answer: B

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50. The number of values of θ in the interval $[-\pi, \pi]$ satisfying the equation $\cos\theta + \sin 2\theta = 0$ is

A. 1

B. 2

C. 3

D. 4

Answer: D

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