MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 08

Paper 2 Objective Type

1. If the angle $A, BandC$ of a triangle are in an arithmetic propression and if $a, bandc$

denote the lengths of the sides opposite to $A, BandC$ respectively, then the value of the expression $\frac{a}{c}\sin 2C + \frac{c}{a}\sin 2A$ is $\frac{1}{2}$ (b) $\frac{\sqrt{3}}{2}$ (c) 1 (d) $\sqrt{3}$

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

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

C. 1

D. $\sqrt{3}$

Answer: D

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2. The sides of a triangle are in the ratio $1:\sqrt{3}:2$. Then the angles are in the ratio

A. $1:3:5$

B. $2:3:4$

C. $3:2:1$

D. $1:2:3$

Answer: D

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3. The normal to the curve $x = a(1 + \cos\theta), y = a\sin\theta$ at $'\theta'$ always passes through the fixed point

A. $(a, 0)$

B. $(0, a)$

C. $(0, 0)$

D. (a, a)

Answer: A

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4. The solution of $\sin x + \sin 5x = \sin 3x$ in $\left(0, \frac{\pi}{2}\right)$

A. $\frac{\pi}{4}, \frac{\pi}{10}$

B. $\frac{\pi}{6}, \frac{\pi}{3}$

C. $\frac{\pi}{4}, \frac{\pi}{2}$

D. $\frac{\pi}{8}, \frac{\pi}{16}$

Answer: D

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5. If $\sin^{-1} x + \sin^{-1}(1-x) = \cos^{-1} x$, then x belongs to

A. $\{1, 0\}$

B. $\{-1, 1\}$

C. $\left\{0, \frac{1}{2}\right\}$

D. $\{2, 0\}$

Answer: C

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6. If A is a square matrix of order 3 such that $|A|=3$, then find the value of $|adj(adjA)|$.

A. 625

B. 125

C. 3025

D. None of the above

Answer: A

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7. The angle between lines joining origin and intersection points of line $2x + y = 1$ and curve $3x^2 + 4yx - 4x + 1 = 0$, is

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

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

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

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

Answer: A

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8. If

$$\int \frac{1}{x^3 + x^4} dx = \frac{A}{x^2} + \frac{B}{x} + \log\left|\frac{x}{x+1}\right| + C$$

, then

A. $A = \frac{1}{2}, B = 1$

B. $A = 1, B = -\frac{1}{2}$

C. $A = -\frac{1}{2}, B = 1$

D. $A = 1, B = 1$

Answer: C

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9. The area bounded by the curves $y = 2 - |2 - x|$ and $|x|y = 3$ is

A. $\frac{(5 - 4In2)}{3}$

B. $\frac{(2 - In3)}{2}$

C. $\frac{(4 - 3In3)}{2}$

D. None of these

Answer: C

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10. If $g(x) = \frac{f(x) - f(-x)}{2}$ defined over $[-3, 3]$

$f(x) = 2x^2 - 4x + 1$, then $\int_{-3}^{3} g(x)dx$ is equal to

A. 0

B. 4

C. -4

D. 8

Answer: A

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11. $\int_{-1}^{1} \frac{e^x + e^{-x}}{2(1+e^{2x})} dx$ is equal to

A. 0

B. 1

C. $\frac{e^2 - 1}{2e}$

D. $\frac{e^2 + 2}{2e}$

Answer: C

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12. If $\log_{10}(2), \log_{10}(2^x + 1), \log_{10}(2^x - 3)$ are in A.P then x is equal to (i) $\log_2(5)$ (ii) $\log_2(-1)$ (iii) $\log_2\left(\frac{1}{5}\right)$ (iv) $\log_5(2)$

A. $\log_2 5$

B. $\log_2(-1)$

C. $\log_2(1/5)$

D. $\log_5 2$

Answer: A

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13. The value of x which satisfies $8^{1+\cos x \cos^2 x + \cdots} = 64$ in $[-\pi, \pi]$ is

A. $\pm\frac{\pi}{2}, \pm\frac{\pi}{3}$

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

C. $\pm\frac{\pi}{2}, \pm\frac{\pi}{6}$

D. $\pm\frac{\pi}{6}, \pm\frac{\pi}{3}$

Answer: B

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14. A ray of light along $x + \sqrt{3}y = \sqrt{3}$ gets reflected upon reaching x-axis, the equation of the reflected ray is

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

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

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

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

Answer: B

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15. A line passes through the point $(2, 2)$ and is perpendicular to the line $3x + y = 3,$ then its y-intercept is

A. 2

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

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

D. $\frac{3}{4}$

Answer: C

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16. The eccentricity of the hyperbola with latursrectum 12 and semi-conjugate axis is $2\sqrt{3}$, is

A. 3

B. $\sqrt{3/2}$

C. $2\sqrt{3}$

D. 2

Answer: D

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17. Let $f(x) = \begin{cases} x^p \sin\frac{1}{x} & x \neq 0 \\ 0 & x = 0 \end{cases}$

then $f(x)$ is continuous but not differentiable

at $x = 0$, if

A. $0 < p \leq 1$

B. $1 \leq p < \infty$

C. $-\infty < p < o$

D. $p = 0$

Answer: A

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18. If the volume of a sphere is increasing at a constant rate, then the rate at which its radius is increasing, is

A. a constant

B. proportional to the radius

C. inversely proportional to the radius

D. inversely proportional to the surface area

Answer: D

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19. If the distance s metre traversed by a particle in t seconds is given by $s = t^3 - 3t^2$, then the velocity of the particle when the acceleration is zero, in metre/second is

A. 3

B. -2

C. -3

D. 2

Answer: C

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20. Let y be an implicit function of x defined by $x^{2x} - 2x^x \cot y - 1 = 0.$ Then $y'(1)$ equals: 1 b. $\log 2$ c. $-\log 2$ d. -1

A. -1

B. 1

C. $\log 2$

D. $-\log 2$

Answer: A

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21. The equation of the plane passing through the points (0,1,2) and (-1,0,3) and perpendicular to the plane $2x + 3y + z = 5$ is

A. $3x - 4y + 18z + 32 = 0$

B. $3x + 4y - 18z + 32 = 0$

C. $4x + 3y - 17z + 31 = 0$

D. $4x - 3y + z + 1 = 0$

Answer: D

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22. The line passing through the points $(5, 1, a)$ and $(3, b, 1)$ crosses the yz-plane at the point $\left(0, \frac{17}{2}, \frac{-13}{2}\right)$.Then

A. $a = 8, b = 2$

B. $a = 2, b = 8$

C. $a = 4, b = 6$

D. $a = 6, b = 4$

Answer: D

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23. If the plane $2x - y + z = 0$ is parallel to the line $\frac{2x-1}{2} = \frac{2-y}{2} = \frac{z+1}{a}$, then the value of a is

A. 4

B. -4

C. 2

D. -2

Answer: B

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24. The unit vector perpendicular to $\hat{i} - \hat{j}$ and coplanar with $\hat{i} + 2\hat{j}$ and $\hat{i} + 3\hat{j}$ is

A. $\frac{2\hat{i} - 5\hat{j}}{\sqrt{29}}$

B. $2\hat{i} + 5\hat{j}$

C. $\frac{1}{\sqrt{2}}\left(\hat{i}+\hat{j}\right)$

D. $\hat{i}+\hat{j}$

Answer: C

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25. $\int \frac{x+\sin x}{1+\cos x} dx$ is equal to

A. $x\tan\frac{x}{2}+c$

B. $x\sin^2\frac{x}{2}+c$

C. $\log\cos\frac{x}{2}+c$

D. None of these

Answer: A

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26. If $a = 2\hat{i} - 3\hat{j} + 4\hat{k}, b = 3\hat{i} - 4\hat{j} + 5\hat{k}$ and $c = 5\hat{i} - 3\hat{j} - 2\hat{k}$ then the volume of the parallelopiped with coterminous edges $a + b, b + c, c + a$ is

A. 14

B. 16

C. 63

D. 8

Answer: B

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27. A variable plane moves so that the sum of the reciprocals of its intercepts on the coordinate axes is $(1/2)$. Then, the plane passes through the point

A. $\left(\frac{1}{2}, \frac{1}{2}, -\frac{1}{2}\right)$

B. $(-1, 1, 1)$

C. $(2, 2, 2)$

D. $(0, 0, 0)$

Answer: C

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28. $\lim_{x \to 0} \frac{a^{\sin x} - 1}{b^{\sin x} - 1}$ is equal to

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

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

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

D. $\frac{\log_e b}{\log_e a}$

Answer: C

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29. $\sim(p \vee q) \vee (\sim p \wedge q)$ is logically equivalent to

A. $\sim p$

B. p

C. q

D. $\sim q$

Answer: A

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30. The line $x = 2y$ intersects the ellipse $\frac{x^2}{4} + y^2 = 1$ at the points P and Q. The equation of the circle with PQ as diameter is

A. $x^2 + y^2 = \frac{1}{2}$

B. $x^2 + y^2 = 1$

C. $x^2 + y^2 = 2$

D. $x^2 + y^2 = \frac{5}{2}$

Answer: D

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31. The equation of tangent of $y^2 = 12x$ and making an angle $\frac{\pi}{3}$ with X-axis is

A. $\pm y - \sqrt{3}x + \sqrt{3} = 0$

B. $\pm y + \sqrt{3}x + 3 = 0$

C. $\pm y - \sqrt{3}x - \sqrt{3} = 0$

D. $\pm y + \sqrt{3}x - 3 = 0$

Answer: A

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32. If $\sin(x + 3\alpha) = 3\sin(\alpha - x)$ then

A. $\tan x = \tan \alpha$

B. $\tan x = \tan^2 \alpha$

C. $\tan x = \tan^3 \alpha$

D. $\tan x = 3 \tan \alpha$

Answer: C

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33. The distance of the mid -point of line joining two ponts (4,0) and (0,4) from the centre of the circle $x^2 + y^2 = 16$ is

A. $\sqrt{2}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

D. $2\sqrt{3}$

Answer: B

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34. The locus of the point from which the length of the tangent to the circle $x^2 + y^2 - 2x - 4y + 4 = 0$ is 3 units is

A. 1

B. 2

C. 3

D. 4

Answer: C

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35. If the function $f(x) = x^3 - 6x^2 + ax + b$ satisfies Rolle's theorem in the interval $[1, 3]$

and $f'\left(\frac{\sqrt{3}+1}{\sqrt{3}}\right) = 0$, then

A. $a = -11$

B. $a = -6$

C. $a = 6$

D. $a = 11$

Answer: D

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36. If $y = \sqrt{x + \sqrt{x + \sqrt{x + \ \to \infty}}}$, then $\frac{dy}{dx}$ is equal to.....

A. $\frac{x}{2y - 1}$

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

C. $-\frac{1}{2y - 1}$

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

Answer: D

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37. If $A = \begin{bmatrix} 2 & -1 \\ -1 & 2 \end{bmatrix}$ and l is the unit matrix of order 2, then A^2 equals to

A. $4A - 3l$

B. $3A - 4l$

C. $A - l$

D. $A + l$

Answer: A

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38. If two dice are thrown simultaneously then probability that 1 comes on first dice, is

A. $1/36$

B. $5/36$

C. $1/6$

D. None of these

Answer: C

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39. The value of f at x =0 so that funcation $f(x) = \frac{2^x - 2^{-x}}{x}, x \neq 0$ is continuous at x =0 is

A. 0

B. $\log 2$

C. $\log 4$

D. e^4

Answer: C

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40. Let p and q be two statements. Then, $(\sim p \vee q) \wedge (\sim p \wedge \sim q)$ is a

A. tautology

B. contradiction

C. neither tautoloty nor contradiction

D. both tautology and contradiction

Answer: C

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41. The function $f(x) = 2x^3 - 3x^2 - 12x - 4$ has

A. no maxima and minima

B. one maximum and one minimum

C. two maxima

D. two minima

Answer: B

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42. $\int_0^1 \frac{x^7}{\sqrt{1-x^4}} dx$ is equal to

A. 1

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

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

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

Answer: B

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43. If $x^y = e^{x-y}$, then $\frac{dy}{dx}$ is equal to

A. $\frac{1}{1+\log x}$

B. $\frac{\log x}{(1+\log x)^2}$

C. $\frac{x}{(1+\log x)^2}$

D. $\frac{\log x}{1+\log x}$

Answer: B

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44. The value of $a.\ a'$ is

A. 0

B. a

C. a+a'`

D. None of these

Answer: A

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45. If a plane meets the coordinate axes at A,B and C such that the centroid of the triangle is (1,2,4) then the equation of the plane is

A. $x + 2y + 4z = 12$

B. $4x + 2y + z = 12$

C. $x + 2y + 4z = 3$

D. $4x + 2y + z = 3$

Answer: B

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46. Minimise $z = 3x + y,$ subject to $2x + 3y \leq 6, x + y \geq 1, x \geq 0, y \geq 0$

A. $x = 1, y = 1$

B. $x = 0, y = 1$

C. $x = 1, y = 0$

D. $x = -1, y = -1$

Answer: B

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47. A paticle acted on by constant forces $4\hat{i} = \hat{j} - 3\hat{k}$ and $3\hat{i} + \hat{j} - \hat{k}$ is displaced

from the point $\hat{i} + 2\hat{j} + 3\hat{k} \rightarrow 5\hat{i} + 4\hat{j} + \hat{k}$.

Find the work done

A. 20 units

B. 30 units

C. 40 units

D. 50 units

Answer: C

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48. Solution of the differential equation $\tan y.\sec^2 x dx + \tan x.\sec^2 y dy = 0$ is

A. $\tan x + \tan y = k$

B. $\tan x - \tan y = k$

C. $\frac{\tan x}{\tan y} = k$

D. $\tan x \tan y = k$

Answer: A

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