MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 03

Paper 2 Mathematics

1. If $AandB$ each toss three coins. The probability that both get the same number of heads is $1/9$ b. $3/16$ c. $5/16$ d. $3/8$

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

B. $\frac{3}{16}$

C. $\frac{5}{16}$

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

Answer: C

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2. A random variable X takes the values $0, 1, 2, 3, \ldots,$ with prbability $PX(=x) = k(x+1)\left(\frac{1}{5}\right)^x$, where k is a constant, then $P(X=0)$ is.

A. $\frac{7}{25}$

B. $\frac{18}{25}$

C. $\frac{13}{25}$

D. $\frac{16}{25}$

Answer: D

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3. Form of the differential equation of all family of lines $y = mx + \frac{4}{m}$ by eliminating the arbitrary constant m is

A. $\frac{d^2y}{dx^2} + 0$

B. $x\left(\frac{dy}{dx}\right)^2 - y\frac{dy}{dx} + 4 = 0$

C. $x\left(\frac{dy}{dx}\right)^2 + y\frac{dy}{dx} + 4 = 0$

D. $\frac{dy}{dx} = 0$

Answer: B

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4. The solution of differential edquation $\frac{dy}{dx} + 1 = \cos ec(x + y)$ is

A. $\cos(x + y) + x = c$

B. $\cos(x+y)=c$

C. $\sin(x+y)+x=c$

D. $\sin(x+y)+\sin(x+y)=c$

Answer: A

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5. $\sin^{-1}\frac{4}{5}+2\tan^{-1}\frac{1}{3}$ is equal to

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

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

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

D. 0

Answer: C

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6. if $\cos\theta + \cos 2\theta + \cos 3\theta = 0$, the general value of θ is

A. $\theta = 2n\pi \pm \frac{\pi}{4}$

B. $\theta = n\pi + (-1)^n \frac{2\pi}{3}$

C. $\theta = n\pi + (-1)^n \frac{\pi}{3}$

D. $\theta = 2n\pi \pm \frac{2\pi}{3}$

Answer: D

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7. If in $\Delta ABC, \frac{\cos A}{a} = \frac{\cos B}{b} = \frac{\cos C}{c}$ and side a=2, then the area of the triangle is

A. 1

B. 2

C. $\left(\sqrt{3}\right)/2$

D. $\sqrt{3}$

Answer: D

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8. The equation $12x^2 + 7xy + ay^2 + 13x - y + 3 = 0$ represents a pair of perpendicular lines. Then, the value of a is

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

B. -19

C. -12

D. 12

Answer: C

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9. The value of integral $\int_{-1}^{1} \frac{|x+2|}{x+2}\,dx$ is

A. 1

B. 2

C. 0

D. -1

Answer: B

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10. If $b > a$, then $\int_a^b \frac{dx}{\sqrt{(x-a)(b-x)}}$ is equal to

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

B. π

C. $\frac{\pi}{2}(b-a)$

D. $\frac{\pi}{4}(b-a)$

Answer: B

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11. If A is a skew-symmetric matrix of order n, then the maximum number of no-zero elements in A is

A. $\frac{1}{2}n(2n+1)$

B. $\frac{1}{2}n(n+1)$

C. $n(n-1)$

D. None of these

Answer: C

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12. If $y = \log_a x + \log_x a + \log_x x + \log_a a$, then $\frac{dy}{dx}$ is equal to

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

B. $\frac{\log a}{x} + \frac{x}{\log a}$

C. $\frac{1}{x \log a} + x \log a$

D. $\frac{1}{x \log a} - \frac{\log a}{x (\log x)^2}$

Answer: D

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13. A force of magnitude 4 unit acting along the vector $2\hat{i} - 2\hat{j} + \hat{k}$ displaces the point of applications from (1,2,3) to (5,3,7), then the work done is

A. 50/7 unit

B. 40/3 unit

C. 25/3 unit

D. 25/4 unit

Answer: B

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14. $\lim_{\theta \to \frac{\pi}{2}} \frac{\frac{\pi}{2} - \theta}{\cot \theta}$ is equal to

A. 0

B. -1

C. 1

D. ∞

Answer: C

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15. Area bounded by x=1,x=2,xy=1 and X-axis is

A. (log 2)sq unit

B. 2 sq unit

C. 1 sq unit

D. None of these

Answer: A

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16. The point on the curve $\sqrt{x}+\sqrt{y}=\sqrt{a}$, the normal at which is parallel to the x-axis, is

A. (0,0)

B. (0,a)

C. (a,0)

D. (a,a)

Answer: B

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17. The function f(x)=x+sinx has

A. a minimum but no maximum

B. a maximu but no minimum

C. neither maximum nor minimum

D. both maximum and minimum

Answer: C

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18. If a particle is moving such that the velocity acquired is proportional to the square root of the distance covered, then its acceleration is

A. a constant

B. $\propto s^2$

C. $\propto \frac{1}{s^2}$

D. $\propto s$

Answer: A

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19. The function $f(x) = x^2 \sin \frac{1}{x},\ x \neq 0, f(0) = 0$ at x=0

A. is continuous but not differentiable

B. is discontinuous

C. is having discontinuous and differentiable

D. is continuous and differentiable

Answer: D

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20. The equation to the straight line passing through the points (4,-5,2) and (-1,5,3) is

A. $\frac{x-4}{1}=\frac{y+5}{-2}=\frac{z+2}{-1}$

B. $\frac{x+1}{1}=\frac{y-5}{2}=\frac{z-3}{-1}$

C. $\frac{x}{-1}=\frac{y}{5}=\frac{z}{3}$

D. $\frac{x}{4}=\frac{y}{-5}=\frac{z}{-2}$

Answer: A

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21. The statement $(\sim p \wedge q) \vee \sim q$ is equivalent

A. $p \vee q$

B. $p \wedge q$

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

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

Answer: D

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22. 5 boys and 5 girls are sitting in a row randomly . The probability that boys and girls sits alternatively , is

A. $\frac{5}{126}$

B. $\frac{1}{42}$

C. $\frac{4}{126}$

D. $\frac{1}{126}$

Answer: D

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23. If $\vec{a}$ is any vector, then $\left(\vec{a} \times \vec{i}\right)^2 + \left(\vec{a} \times \vec{j}\right)^2 + \left(\vec{a} \times \vec{k}\right)^2$ is equal to

A. a^2

B. $2a^2$

C. $3a^2$

D. 0

Answer: B

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24. A unit vector perpendicular to the plane of $\vec{a} = 2\hat{i} - 6\hat{j} - 3\hat{k}$ and $\vec{b} = 4\hat{i} + 3\hat{j} - \hat{k}$ is

A. $\frac{4\hat{i} - 3\hat{j} - \hat{k}}{\sqrt{26}}$

B. $\frac{2\hat{i} - 6\hat{j} - 3\hat{k}}{7}$

C. $\frac{3\hat{i} - 2\hat{j} + 6\hat{k}}{7}$

D. $\frac{2\hat{i} - 3\hat{j} - 6\hat{k}}{7}$

Answer: C

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25. The equation

$8x^2 + 8xy + 2y^2 + 26x + 13y + 15 = 0$

represents a pair of straight lines. The distance between them is

A. $\frac{7}{\sqrt{5}}$

B. $\frac{7}{2\sqrt{5}}$

C. $\sqrt{\frac{7}{5}}$

D. None of these

Answer: B

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26. The area of the triangle having vertices as $\hat{i} - 2\hat{j} + 3\hat{k}, \ -2\hat{i} + 3\hat{j} - \hat{k}, 4\hat{i} - 7\hat{j} + 7\hat{k}$ is

A. 36 sq unit

B. 0 sq unit

C. 39 sq unit

D. 11 sq unit

Answer: B

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27. Order of the differential equation of the family of all concentric circles centred at (h, k) is

A. 1

B. 2

C. 3

D. 4

Answer: A

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28. If the constraints in a linear programming problem are changed

A. the problem is to be revaluated

B. solution is not defined

C. the objective function has to be modified

D. the change in constraints is ignored

Answer: A

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29. If $A = \{(x, y) : y = e^{-x}\}$ and $B = \{(x, y) : y = -x\}$. Then,

A. $A \cap B = \phi$

B. $A \subset B$

C. $B \subset A$

D. $A \cap B = \{(0, 1), (0, 0)\}$

Answer: A

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30. If $f(x) = |x - 2|$, where x is a real number, then, which one of the following is correct?

A. f is periodic

B. f(x+y)=f(x)+f(y)

C. f is an odd function

D. f is not one-one function

Answer: D

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31. If the second and fifth terms of a GP are 24 and 3 respectively, then the sum of first six terms is

A. 181

B. $\frac{181}{2}$

C. 189

D. $\frac{189}{2}$

Answer: D

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32. वृत का समीकरण ज्ञात कीजिए :

केंद्र $(-a, -b)$ और त्रिज्या $\sqrt{a^2 - b^2}$ इकाई

A. $x^2 + y^2 + 2ax + 2by + 2b^2 = 0$

B. $x^2 + y^{\cdot 2} - 2ax - 2by - 2b^2 = 0$

C. $x^2 + y^2 - 2ax - 2by + 2b^2 = 0$

D. $x^2 + y^2 - 2ax - 2by + 2a^2 = 0$

Answer: A

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33. Let $\phi(x)$ be the inverse of the function $f(x)$ and $f' = \frac{1}{1+x^5}$, then $\frac{d}{dx}\phi(x)$ is

A. $\frac{1}{1+[\phi(x)]^5}$

B. $\frac{1}{1+[f(x)]^5}$

C. $1+[\phi(x)]^5$

D. $1+f(x)$

Answer: C

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34. The minimum value of $z = 2x_1 + 3x_2$ subjected to the constraints $2x_1 + 7x_2 \geq 22, x_1 + x_2 \geq 6, 5x_1 + x_2 \geq 10$ and $x_1, x_2 \geq 0$, is

A. 14

B. 20

C. 10

D. 16

Answer: A

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35. Simplest form of switching function

$x \cdot y \cdot z + x \cdot y' \cdot z + x' \cdot y' \cdot z$ is

A. $(x + y) \cdot z$

B. $z \cdot (x + y')$

C. $x \cdot (y + z')$

D. None of these

Answer: B

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36. If $\int \frac{1}{(\sin x + 4)(\sin x - 1)} dx$

$= A \frac{1}{\tan \frac{x}{2} - 1} + B \tan^{-1}\{f(x)\} + C$. Then,

A. $A = \frac{1}{5}, B = \frac{-2}{5\sqrt{15}}, f(x) = \frac{4\tan x + 3}{\sqrt{15}}$

B. $A = -\frac{1}{5}, B = \frac{1}{\sqrt{15}}, f(x) = \frac{4\tan\left(\frac{x}{2}\right) + 1}{\sqrt{15}}$

C. $A = \frac{2}{5}, B = \frac{-2}{5}, f(x) = \frac{4\tan x + 1}{5}$

D. $A = \frac{2}{5}, B = \frac{-2}{5\sqrt{15}}, f(x) = \frac{4\tan \frac{x}{2} + 1}{\sqrt{15}}$

Answer: D

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37. The value of f(0) so that $f(x) = \frac{(-e^x + 2^x)}{x}$ may be continuous at x = 0 is

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

B. 0

C. 4

D. $-1 + \log 2$

Answer: D

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38. If $f(x) = \begin{cases} \text{x} \sin\frac{1}{x}, & x \neq 0 \\ k, & x = 0 \end{cases}$ is continuous at x=0, then the value of k is

A. 1

B. -1

C. 0

D. 2

Answer: C

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39. The derivative of $a^{\sec x}$ w.r.t. $a^{\tan x}(a > 0)$ is

A. $\sec x a^{\sec x - \tan x}$

B. $\sin x a^{\tan x - \sec x}$

C. $\sin x a^{\sec x - \tan x}$

D. $a(\sec x - \tan x)$

Answer: C

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40. . If $f(x) = |x - 2| + |x + 1| - x$ then $f'(-10)$ is equal to:

A. -3

B. -2

C. -1

D. 0

Answer: A

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41. If n positive integers are taken at random and multiplied together, then the probability that the last digit of the product is 2,4,6 or 8, is

A. $\frac{4^n + 2^n}{5^n}$

B. $\frac{4^n \times 2^n}{5^n}$

C. $\frac{4^n - 2^n}{5^n}$

D. None of these

Answer: C

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42. The equation of the plane through the intersection of the planes $x + y + z = 1$ and $2x + 3y - z + 4 = 0$ and parallel to x-axis is

A. y-3z+6=0

B. 3y-z+6=0

C. y+3z+6=0

D. 3y-2z+6=0

Answer: A

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43. If the lines $\frac{x-1}{-3}=\frac{y-2}{2k}=\frac{z-3}{2}$ and $\frac{x-1}{3k}=\frac{y-1}{1}=\frac{z-6}{-5}$ are perpendicular, find the value of k.

A. $\frac{-10}{7}$

B. $\frac{10}{7}$

C. $\frac{-10}{11}$

D. $\frac{10}{11}$

Answer: A

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44. The function $x\sqrt{1-x^2}, (x > 0)$ has

A. a local maxima

B. a local minima

C. neigher a local maxima nor a local minima

D. none of the above

Answer: A

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45. Sum of n terms of the following series $1^3 + 3^3 + 5^3 + 7^3 +$

A. $n^2\left(2n^2 - 1\right)$

B. $n^3(n - 1)$

C. $n^3 + 8n + 4$

D. $2n^4 + 3n^2$

Answer: A

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46. If p is the length of the perpendicular from the origin to the line, whose intercepts with the coordinate axes are $\frac{1}{3}$ and $\frac{1}{4}$, then the value of p is :

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

B. $\frac{1}{12}$

C. 5

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

Answer: D

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47. An ellipse passing through $\left(4\sqrt{2}, 2\sqrt{6}\right)$ has foi at $(-4, 0)$ and $(4, 0)$. Then, its eccentricity is

A. $\sqrt{2}$

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

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

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

Answer: B

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48. If the foci of the ellipse $\frac{x^2}{16}+\frac{y^2}{b^2}=1$ and the hyperbola $\frac{x^2}{144}-\frac{y^2}{81}=\frac{1}{25}$ coincide, then find the value

A. 1

B. 5

C. 7

D. 9

Answer: C

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49. The angle between the tangents drawn from the point $(1, 4)$ to the parabola $y^2 = 4x$ is

A. 0

B. $\pi/6$

C. $\pi/4$

D. $\pi/3$

Answer: A