MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 13

Paper Ii Objective Type

1. The shortest distance between the lines $\frac{x-3}{3}=\frac{y-8}{-1}=\frac{z-3}{1} and \frac{x+3}{-3}=\frac{y+7}{2}=\frac{z-6}{4}$ is a. $\sqrt{30}$ b. $2\sqrt{30}$ c. $5\sqrt{30}$ d. $3\sqrt{30}$

A. $\sqrt{30}$

B. $2\sqrt{30}$

C. $5\sqrt{30}$

D. $3\sqrt{30}$

Answer: D

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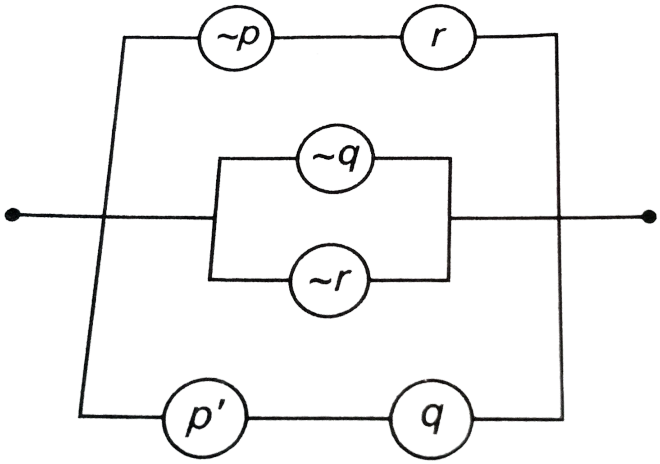
2. The switching function of network is



A. $-\rho . r + (- q + \sim r) + p' . q$

B. $(- p + r) + (\sim q . \sim r) + p' . q$

C. $(\sim p + r) + (\sim q . \sim r) + p' . q$

D. None of the above

Answer: A

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3. A five digit number is formed but the digits 1,2,3,4,5 without repetition. Find the probability that the number is divisible by 4.

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

B. $\frac{18}{5}$

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

D. $\frac{6}{5}$

Answer: C

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4. If $f(x) = \{\sin x, x \neq n\pi, n \in I2, otherwise$

$g(x) = \{x^2 + 1, x \neq 0, 4, x = 05, x = 2$ then

$(\lim)_{x \overrightarrow{0}} g\{f(x)\} is =$

A. 1

B. 0

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

D. $\frac{1}{4}$

Answer: A

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5. If $f(x) = \log_x(\log_e x)$, then $f'(x)$at $x = e$ is equal to

A. 1

B. 2

C. 0

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

Answer: D

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6. The value of $\lim_{x \to a} \frac{\log(x - a)}{\log(e^x - e^a)}$ is

A. 0

B. 1

C. a

D. does not exist

Answer: B

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7. if $2^x + 2^y = 2^{x+y}$ then the value of $\frac{dy}{dx}$ at $x = y = 1$

A. 0

B. -1

C. 1

D. 2

Answer: B

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8. $\int x^3 \log x dx$ is equal to

A. $\frac{x^4 \log x}{4} + C$

B. $\frac{1}{16}\left[4x^4 \log x - x^4\right] + C$

C. $\frac{1}{8}\left[x^4 \log xc - 4x^2\right] + C$

D. $\frac{1}{16}\left[4x^4 \log x + x^4\right] + C$

Answer: B

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9. The value of $\int_2^3 \frac{x+1}{x^2(x-1)}dx$ is

A. $\log\frac{16}{6}+\frac{1}{6}$

B. $\log\frac{16}{9}-\frac{1}{6}$

C. $2\log 2-\frac{1}{6}$

D. $\log\frac{4}{3}-\frac{1}{6}$

Answer: B

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10. if $\left|\vec{a}\right| = 4, \left|\vec{b}\right| = 2$ and the angle between $\vec{a}$ and $\vec{b}$ is $\frac{\pi}{6}$ then $\left(\vec{a} \times \vec{b}\right)^2$ is equal to

A. 48

B. 16

C. a

D. None of these

Answer: B

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11. The differential equation of the rectangular hyperbola whose axes are the asymptotes of the hyperbola, is

A. $y\frac{dy}{dx} = x$

B. $x\frac{dy}{dx} = -y$

C. $x\frac{dy}{dx} = y$

D. $xdy + ydx = c$

Answer: B

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12. The statement $p \vee \sim p$ is

A. lautology

B. contradiction

C. neigther a lautology nor a contradiction

D. None of the above

Answer: A

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13. If birth to amale child and birth to a femal child are equal probable, then what is the probability that at

least one of the three children born to a couple is male?

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

B. $\frac{7}{8}$

C. $\frac{8}{7}$

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

Answer: B

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14. If $y = \tan^{-1}\left[\frac{\sin x + \cos x}{\cos x - \sin x}\right]$ then $\frac{dy}{dx}$ is

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

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

C. 0

D. 1

Answer: D

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15. The equation $12x^2 + 7xy - 12y^2 - 18x + y + 6 = 0$ represents

A. a pair of straight lines

B. a parabola

C. an ellipse

D. a hyperbola

Answer: A

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16. A focus of an ellipse is at the origin. The directrix is the line $x = 4$ and the eccenricityh is $\frac{1}{2}$, then length of semi-major axis is

A. $5/3$

B. $8/3$

C. $2/3$

D. $4/3$

Answer: B

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17. A parabola is drawn with focus at (3,4) and vertex at the focus of the parabola $y^2 - 12y - 4y + 4 = 0$. The equation of the parabola is

A. $y^2 - 8x - 6y + 25 = 0$

B. $y^2 - 6x - 8y - 25 = 0$

C. $x^2 - 6x - 8y + 25 = 0$

D. $x^2 + 6x - 8y - 25 - 0$

Answer: C

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18. If a circle passes through (0,0) and $(a, 0)$ and $(0, b)$, then the coordinates of its centre are

A. $\left(\frac{b}{2}, \frac{a}{2}\right)$

B. $\left(\frac{a}{2}, \frac{b}{2}\right)$

C. (b, a)

D. (a, b)

Answer: B

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19. A line is drawn through the point $P(3, 11)$ to cut the circle $x^2 + y^2 = 9$ at A and B. Then $PA.PB$ is equal to

A. 9

B. 121

C. 205

D. 139

Answer: B

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20. If the first, second and last terms of an arithmetic series are a,b, and c respectively, then the number of terms is

A. $\frac{b+c-2a}{b-a}$

B. $\frac{b+c+2a}{b-a}$

C. $\frac{b+c-2a}{b+a}$

D. $\frac{b+c+2a}{b+a}$

Answer: A

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21. The denominator of a fraction is greater than 16 of the square of numerator, then least value of fraction is

A. $-\frac{1}{4}$

B. $-\frac{1}{8}$

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

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

Answer: B

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22. The equation of tangent to the curve $y = be^{-x/a}$ at the point where it crosses Y-axis is

A. $ax + by = 1$

B. $ax - by = 1$

C. $\frac{x}{a} - \frac{y}{b} = 1$

D. $\frac{x}{a} + \frac{y}{b} = 1$

Answer: D

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23. The function $f(x) = x^{-x}, (x \varepsilon R)$ attains a maximum value at x is

A. 2

B. 3

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

D. 1

Answer: C

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24. The mean and varaince of binomial distribution are 4 and 3, respectively. Then, the probability of getting exactly six success in this distribution is

A. $.^{16}C_6\left(\frac{1}{4}\right)^6\left(\frac{3}{4}\right)^{10}$

B. $.^{16}C_6\left(\frac{1}{4}\right)^6\left(\frac{3}{4}\right)^{20}$

C. $.^{16}C_6\left(\frac{1}{4}\right)^8\left(\frac{3}{4}\right)^{12}$

D. $.^{16}C_9\left(\frac{1}{4}\right)^{16}\left(\frac{3}{4}\right)^{20}$

Answer: A

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25. The value of

$$\lim_{n \to \infty} \left[\frac{n}{n^2 + 1^2} + \frac{n}{n^2 + 2^2} + \ldots\ldots\ldots\ldots + \frac{n}{n^2 + n^2} \right]$$

, is

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

B. $\log 2$

C. 0

D. 1

Answer: A

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26. The value of $\int_{-2}^{4} |x+1| dx$ is equal to

A. 12

B. 14

C. 13

D. 16

Answer: C

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27. The function $f: R\text{~}\{0\} \overrightarrow{R}$ given by $f(x) = \frac{1}{x} - \frac{2}{e^{2x}-1}$ can be made continuous at x = 0

by defining f(0) as (1) 2 (2) -1 (3) 0 (4) 1

A. 2

B. -1

C. 0

D. 1

Answer: D

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28. Define f on R into itself by $f(x) = \begin{cases} x\sin\frac{1}{x} & \text{when} x \neq 0 \\ 0 & \text{when} x = 0 \end{cases}$ then

A. f is continuous at 0 but not differentiable at 0

B. f is both continuous and differentiable at 0

C. f is differentiable but no continuous at 0

D. None of the above

Answer: A

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29. If $y = x - x^2$, then the derivative of y^2 w.r.t x^2 is

A. $2x^2 + 3x - 1$

B. $2x^1 - 3x + 1$

C. $2x^2 + 3x + 1$

D. $2x^2 - 3x - 1$

Answer: B

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30. If $f'(x) = g(x)$ and $g'(x) = -f(x)$ for all x and $f(2) = 4 = f'(2)$ then $f^2(4) + g^2(4)$ is

A. 8

B. 16

C. 32

D. 64

Answer: C

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31. The point on the curve $y^2 = x$ the tangent at which makes an angle 45° with X-axis is

A. $\left(\frac{1}{4}, \frac{1}{2}\right)$

B. $\left(\frac{1}{2}, \frac{1}{4}\right)$

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

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

Answer: A

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32. The smallest circle with centre on Y-axis and passing through the point $(7, 3)$ has radius

A. $\sqrt{58}$

B. 7

C. 3

D. 4

Answer: B

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33. The function $f(x) = x(x+3)e^{-\left(\frac{1}{2}\right)x}$ satisfies the conditions of Rolle's theorem in (-3,0). The value of c, is

A. 0

B. -1

C. -2

D. -3

Answer: C

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34. For what values of x the function $f(x) = x^4 - 4x^3 + 40$ si monotonic decreassing?

A. $0 < x < 1$

B. $1 < x < 2$

C. $2 < x < 3$

D. $4 < x < 5$

Answer: B

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35. If a is a positive number such that the arithmatic mean of a and 2 exceeds their geometric mean by 1. Then, the value of a is

A. 3

B. 5

C. 9

D. 8

Answer: D

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36. A line passing through origin and is perpendicular to two given lines $2x + y + 6 = 0$ and $4x + 2y - 9 = 0$. The ratio in which the origin divides this line is

A. $1:2$

B. $2:1$

C. $4:2$

D. $4:3$

Answer: D

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37. If A and B are two sets, then $(A \cup B)' \cup (A' \cap B)$ is equal to

A. A'

B. A

C. B'

D. None of these

Answer: A

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38. If a relation R on the set N of natural numbers is defined as $(x, y) \Leftrightarrow x^2 - 4xy + 3y^2 = 0, Aax, y \varepsilon N.$

Then the relation R is

A. reflexive

B. symmetric

C. transitive

D. an aquivalence relation

Answer: A

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39. If $5\cos 2\theta + 2\cos^2\frac{\theta}{2} + 1 = 0$, when $(0 < \theta < \pi)$ the the value of θ are

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

B. $\frac{\pi}{3}.\cos^{-1}\left(\frac{3}{5}\right)$

C. $\cos^{-1}\left(\frac{3}{5}\right)\pm\pi$

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

Answer: D

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40. If in $\Delta ABC, a=12cm, b=12cm$ and $c=5cm$ then distance from a to side BC is

A. $144/13$

B. $65/12$

C. $60/13$

D. $25/13$

Answer: C

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41. The value of $\cos\left[2\tan^{-1}(-7)\right]$ is

A. $\frac{49}{50}$

B. $-\frac{49}{50}$

C. $\frac{24}{25}$

D. $-\frac{24}{25}$

Answer: D

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42. Solution of the differential equation $x\frac{dy}{dx} = y + \sqrt{x^2 + y^2}$, is

A. $y - \sqrt{x^2 + y^2} = cx^2$

B. $y + \sqrt{x^2 + y^2} = cx^2$

C. $y + \sqrt{x^2 + y^2} = cy^2$

D. $x - \sqrt{x^2 + y^2} = cy^2$

Answer: B

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43. The differential equation satistied by the family of curves $y = ax\cos\left(\frac{1}{x} + b\right)$, where a,b are parameters, is

A. $x^2 y_2 + y = 0$

B. $x^4 y_2 + y = 0$

C. $xy_2 - y = 0$

D. $x^4 y_2 - y = 0$

Answer: B

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44. The value of $\sqrt{2}\int \frac{\sin x}{\sin\left(x-\frac{\pi}{4}\right)}dx$, is

A. $x-\log\left|\cos\left(x-\frac{\pi}{4}\right)\right|+C$

B. $x+\log\left|x-\frac{\pi}{4}\right|+C$

C. $x-\log\left|\sin\left(x-\frac{\pi}{4}\right)\right|+C$

D. $x+\log\left|\sin\left(x-\frac{\pi}{4}\right)\right|+C$

Answer: D

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45. The slope of the tangent to a curve $y=f(x)$ at $(x, f(x))$ is $2x+1$. If the curve passes through the

point $(1, 2)$ then the area of the region bounded by the curve, the x-axis and the line $x = 1$ is (A) $\frac{5}{6}$ (B) $\frac{6}{5}$ (C) $\frac{1}{6}$ (D) 1

A. $5/6$

B. $6/5$

C. 6

D. 1

Answer: A

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46. The area of the region bounded by the parabola $(y-2)^2 = x-1$, the tangent to the parabola at the point $(2, 3)$ and the x-axis is

A. $2:1$

B. $3:1$

C. $3:2$

D. None of these

Answer: A

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47. If a line makes an angle of $\frac{\pi}{4}$ with the positive directions of each of x-axis and y-axis, then the angle that the line makes with the positive direction of the z-axis is (1) $\frac{\pi}{6}$ (2) $\frac{\pi}{3}$ (3) $\frac{\pi}{4}$ (4) $\frac{\pi}{2}$

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

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

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

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

Answer: D

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48. Find the ratio in which the line joining (2,4,5) and (3,5,4) is divided by the yz-plane.

A. $2:3$

B. $3:2$

C. $-2:3$

D. $4:-3$

Answer: C

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49. If a and b are the two vectors such that $|a|-3\sqrt{3}, |b|=4$ and $|a+b|=\sqrt{7}$, then the angle

between a and b is

A. 120°

B. 60°

C. 30°

D. 150°

Answer: D

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50. If f be a function such that $f(9) = 9$ and $f'(9) = 3$, then $\lim_{x \to 9} \frac{\sqrt{f(x)} - 3}{\sqrt{x} - 3}$ is equal to

A. 9

B. 3

C. 1

D. None of these

Answer: B

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