MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 11

Paper 2 Mathematics

1. In the Mean Value theorem $\frac{f(b)-f(a)}{b-a}=f'(c)$ if $a=0, b=\frac{1}{2}$ and f(x)=x(x-1)(x-2) the value of c is

A. $1-\frac{\sqrt{15}}{6}$

B. $1+\sqrt{15}$

C. $1-\frac{\sqrt{21}}{6}$

D. $1+\sqrt{21}$

Answer: C

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2. $2x^3-6x+5$ is an increasing function, if

A. $0<x<1$

B. $-1<x<1$

C. $x<-1$ or $x>1$

D. $-1<x<-\frac{1}{2}$

Answer: C

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3. $\frac{d}{dx}\int_2^{x^2}(t-1)\,dt$ is equal to

A. x^2-1

B. $x\left(x^2-1\right)$

C. $x-1$

D. $2x\left(x^2-1\right)$

Answer: D

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4. $\int_0^{\pi/2} \frac{\cos\theta}{\sqrt{4-\sin^2\theta}} d\theta$ is equal to

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

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

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

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

Answer: B

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5. $\int x\left\{f(x)^2 g''(x^2) - f''(x^2) g(x^2)\right\} dx$ is equal to

A. $f(x^2)g'(x^2) - g(x^2)f'(x^2) + c$

B. $\frac{1}{2}\{f(x^2)g'(x^2) - g(x^2)f(x^2)\} + c$

C. $\frac{1}{2}\{f(x^2)g'(x^2) - g(x^2)f'(x^2)\} + c$

D. None of the above

Answer: C

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6. $\lim_{x \to \frac{\pi}{6}} \left[\frac{3\sin x - \sqrt{3}\cos x}{6x - \pi}\right]$ is equal to

A. $\sqrt{3}$

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

C. $-\sqrt{3}$

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

Answer: B

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7. Let $f(x) = \begin{cases} x+1 & \text{where } x < 2 \\ 2x-1 & \text{where} x \geq 2 \end{cases}$ then $f'(2)$ is equal to

A. 0

B. 1

C. 2

D. done not exist

Answer: D

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8. Show that the area' bounded by the curve $y = ce^x (c > 0)$, the x-axis and two ordinates is proportional to the difference between the ordinates.

A. $f(p)f(q)$

B. $|f(p) - f(q)|$

C. $f(p) + f(q)$

D. $\sqrt{f(p)f(q)}$

Answer: B

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9. Let inputs of p and q be 1 and 0 respectively in electric circuit . Then output of $p \wedge q$ is

A. 1

B. 0

C. Both 1 and 0

D. Neither 1 nor 0

Answer: B

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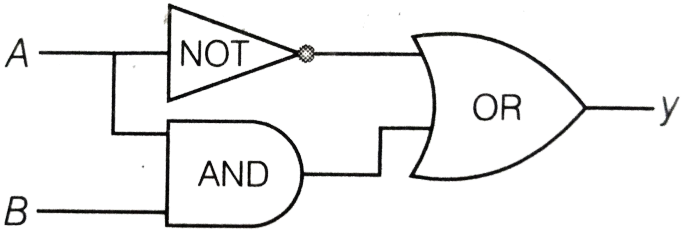
10. Digital circuit shown beow represents Boolea expression as



A. $A + A'B$

B. $A + A.B$

C. $A + A'B$

D. $A.B$

Answer: B

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11. If a^2, b^2, c^2 are in AP, then which of the following is also an AP?

A. sin A,sin B , sin c

B. tan A, tan B tan C

C. cot A , cot B , cot C

D. None of these

Answer: C

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12. Geometric mean of $7, 7^2, 7^3, \ldots\ldots\ldots 7^n$ is

A. $7^{\frac{n+1}{2}}$

B. 7

C. $7^{n/2}$

D. 7^n

Answer: A

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13. The sum of the distance of a point $(2, -3)$ form the foci of an ellips $16(x-2)^2 + 25(y+3)^3 = 400$ is

A. 8

B. 6

C. 50

D. 32

Answer: B

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14. $A = \{1, 2\}, B = \{\{1\}, \{2\}\}, C = \{\{1, 2\}\}$. Then, which of the following relation is correct ?

A. A=B

B. $B \subset C$

C. $A \in C$

D. $A \subset B$

Answer: C

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15. R is a relation on N given by

$R = \{(x, y) : 4x + 3y = 20\}$. Which of the following belongs to R?

A. $(-4, 12)$

B. $(5, 0)$

C. $(3, 4)$

D. $(2, 4)$

Answer: C

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16. At what point on the curve $x^3 - 8a^2y = 0$ the slope of the normal is $-2/3$?

A. (a,a)

B. (2a,-a)

C. (2a,a)

D. None of these

Answer: C

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17. The radius of a cylinder is increasing at the rate of $3ms^{-1}$ and its altitude is decreasing at the rate of $4ms^{-1}$. The rate of change of volume when radius is $4m$ and altitude is 6m is

A. $80\pi cum/s$

B. $144\pi cum/s$

C. $80cum/s$

D. $64cum/s$

Answer: A

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18. The inverse matrix of $A = \begin{bmatrix} 0 & 1 & 2 \\ 1 & 2 & 3 \\ 3 & 1 & 1 \end{bmatrix}$ is

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

B. $\begin{bmatrix} \frac{1}{2} & -4 & \frac{5}{2} \\ 1 & -6 & 3 \\ 1 & 2 & -1 \end{bmatrix}$

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

D. $\frac{1}{2}\begin{bmatrix} 1 & -1 & -1 \\ -8 & 6 & -2 \\ 5 & -3 & 1 \end{bmatrix}$

Answer: A

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19. If the x-coordinate of a point P on the jon of $Q(2, 2, 1)$ and $R(5, 1, -2)$ is 4, then its z-coordinate is

A. -2

B. -1

C. 1

D. 2

Answer: B

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20. The length of longer diagonal of the parallelogram constructed on $5a + 2b$ and $a - 3b$. If it is given that $|a| = 2\sqrt{2}$, $|b|$ = 3 and angle between a and b is $\frac{\pi}{4}$ is

A. 15

B. $\sqrt{113}$

C. $\sqrt{593}$

D. $\sqrt{369}$

Answer: C

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21. If a,b,c are three non-coplanar vector, then the vectors equation r = (1 -p-q) a +p b +qc` respesents a

A. string line

B. plane

C. plane passing through the origin

D. sphere

Answer: B

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22. Let a,b,c be three vectors such that $a \neq 0$ and $a \times b = 2a \times c, |a| = |c| = 1, |b| = 4$ and $|b \times c| = \sqrt{15}$. If $b - 2c = \lambda a,$ then λ is equal ot

A. 1

B. $+4$

C. 3

D. -2

Answer: B

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23. Consider the inequalities $5x_1 + 4x_2 \geq 9, x_1x_2 \geq 3,$ $x_1 > 0, x_2 > 0$. Which of the following point does not lie inside the solution set ?

A. $(1, 3)$

B. $(1, 2)$

C. $(1, 4)$

D. $(1, 1)$

Answer: D

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24. $\lim_{x \to \frac{\pi}{2}} \frac{a^{\cot x} - a^{\cos x}}{\cot x - \cot x}$ is equalt o

A. $\log a$

B. $\log 2$

C. a

D. log x

Answer: A

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25. If $x = \frac{1 - t^2}{1 + t^2}$ and $y = \frac{2t}{1 + t^2}$, then $\frac{dy}{dx}$ is equal to

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

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

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

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

Answer: C

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26. The equations

$x + 2y + 3z = 1, 2x + y + 3x = 2, 5x + 5y + 9z = 5$

have

A. unique solution

B. infinite many solution

C. inconsistent

D. None of these

Answer: A

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27. If a is perpedicular to b and $c|a| = 2, |b| = 3|c| = 4$ and the angle between b and c is $\frac{2\pi}{3}$, then $[a, b, c]$ is equal to

A. $4\sqrt{3}$

B. $6\sqrt{3}$

C. $12\sqrt{3}$

D. $18\sqrt{3}$

Answer: C

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28. $\int\{(1+2\tan x(\tan x+\sec x))^{1/2}$ dx is equal to

A. $\log(\sec x+\tan x)+c$

B. $\log(\sec x+\tan x)^{1/2}+c$

C. $\log\sec x(\sec x+\tan x)+c$

D. None of these

Answer: C

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29. If in a trial the probability of success is twice the probability of failure. In six trials the probability of at least four successes is

A. $\frac{496}{729}$

B. $\frac{400}{729}$

C. $\frac{500}{729}$

D. $\frac{600}{729}$

Answer: A

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30. $\int_1^x \frac{\log(x^2)}{x}$ dx is equal to

A. $(\log x)^2$

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

C. $\frac{\log x^2}{2}$

D. None of these

Answer: A

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31. If $y = 1 + \frac{1}{x} + \frac{1}{x^2} + \frac{1}{x^3} + \ldots\ldots\ldots + \infty$ with $|x| > 1$ then $\frac{dy}{dx}$ is .

A. $\frac{x^2}{y^2}$

B. x^2y^2

C. $\frac{y^2}{x^2}$

D. $-\frac{y^2}{x^2}$

Answer: D

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32. The equation of second degree $x^2 + 2\sqrt{2}x + 2y^2 + 4x + 4\sqrt{2}y + 1 = 0$ represents a pair of straight lines.The distance between them is a. 4 b. $\frac{4}{\sqrt{3}}$ c. 2 d. $2\sqrt{3}$

A. 1 units

B. 2 units

C. 3 units

D. 4 units

Answer: B

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33. If $f(x) = \log\left(\frac{1+x}{1-x}\right)$, where $-1 < x < 1$ then $f\left(\frac{3x+x^2}{1+3x^2}\right) - f\left(\frac{2x}{1+x^2}\right)$ is equal to

A. $[f(x)]^3$

B. $\left[f(x)^2\right]$

C. $-f(x)$

D. $f(x)$

Answer: B

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34. The equation of circle which touches X and Y-axes at the points $(1, 0)$ and $(0, 1)$ respectively is

A. $x^2 + y^2 - 4y + 3 = 0$

B. $x^2 + y^2 - 2y - 2 = 0$

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

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

Answer: D

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35. The length of the common chord of the two circles $x^2 + y^2 - 4y = 0$ and $x^2 + y^2 - 8x - 4y + 11 = 0$ is

A. $\frac{\sqrt{145}}{4}$ cm

B. $\frac{\sqrt{11}}{2} cm$

C. $\sqrt{135}$ cm

D. $\frac{\sqrt{135}}{4} cm$

Answer: D

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36. The distance between the directices of the hyperboltic $x = 8\sec\theta, y = 8\tan\theta is$

A. $8\sqrt{2}$

B. $16\sqrt{2}$

C. $4\sqrt{2}$

D. $6\sqrt{2}$

Answer: A

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37. The eccentricity of the ellipse $25x^2 + 16y^2 - 150x - 175 = 0$ is

A. $\frac{2}{5}$

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

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

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

Answer: D

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38. If O is the original and A is the point (a,b,c) then the equation of the plane throught A and at right angles to OA is .

A. $a(x-a)-b(y-b)-c(z-c)=0$

B. $a(x+a)+b(y+b)+c(z+c)=0$

C. $a(x-a)+b(y-b)+c(z-C)=0$

D. None of the above

Answer: C

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39. Find the equation of a plane which passes through the point (3, 2, 0) and contains the line $\frac{x-3}{1}=\frac{y-6}{5}=\frac{z-4}{4}$.

A. $x-y+z=1$

B. $x+y+z=5$

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

D. $2x-y+z=5$

Answer: A

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40. The value of $\cos^{-1}(\cos 12) - \sin^{-1}(\sin 14)$ is

A. 2

B. $8\pi - 26$

C. $4\pi + 2$

D. None of these

Answer: B

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41. If one side of a triangle is double the other, and the angles on opposite sides differ by 60^0, then the

triangle is equilateral (b) obtuse angled (c) right angled (d) acute angled

A. obtuse abgled

B. acute angled

C. isosceles

D. right angled

Answer: D

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42. The most general solution of θ satisfying the equations $\sin\theta = \sin\alpha$ and $\cos\theta = \cos\alpha$ is

A. $2n\pi + \alpha$

B. $2n\pi - \alpha$

C. $n\pi + \alpha$

D. $n\pi - \alpha$

Answer: C

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43. The function $f(x) = \tan^{-1}(\sin x + \cos x)$ is an increasing function in $\left(-\frac{\pi}{2}, \frac{\pi}{4}\right)$ (b) $\left(0, \frac{\pi}{2}\right)$ $\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$ (d) $\left(\frac{\pi}{4}, \frac{\pi}{2}\right)$

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

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

C. $\left(0, \frac{\pi}{2}\right)$

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

Answer: B

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44. Let f(x) be given that

$$f(x) = \begin{cases} x & \text{if x is rational} \\ 1 - x & \text{if x is irrational} \end{cases}$$

The number of points at which f(x) is continuous, is

A. ∞

B. 1

C. 0

D. None of these

Answer: C

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45. If $\alpha = \frac{\sin^{-1}\sqrt{3}}{2} + \frac{\sin^{-1}1}{3}, \beta = \frac{\cos^{-1}\sqrt{3}}{2} + \frac{\cos^{-1}1}{3}$ then

A. $\alpha > \beta$

B. $\alpha = \beta$

C. $\alpha < \beta$

D. $\alpha + \beta$

Answer: C

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46. In ΔABC, the value of $\dfrac{\frac{\cot\frac{A}{2}}{2}\frac{\cot\frac{B}{2}}{2} - 1}{\frac{\cot\frac{A}{2}}{2}\frac{\cot\frac{B}{2}}{2}}$ is

A. $\dfrac{a}{a+b+c}$

B. $\dfrac{2c}{a+b+c}$

C. $\dfrac{2a}{a+b+c}$

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

Answer: B

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47. Write the value of the derivative of $f(x) = |x - 1| + |x - 3|$ at $x = 2$.

A. 2

B. 1

C. 0

D. -2

Answer: C

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48. If tangent tto the curve $x = at^2, y = 2at$ is perpendicular to X-axis, then its pointt of contact is

A. (a, a)

B. $(0, a)$

C. $(0, 0)$

D. $(a, 0)$

Answer: C

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49. The foot of the perpendicular form $(2, 4, -1)$ to the line $x + 5 = \frac{1}{4}(y + 3) = -\frac{1}{9}(z - 6)$ is

A. $(-4, 1, -3)$

B. $(4, -1, -3)$

C. $(-4, -1, 3)$

D. $(-4, -1, 3)$

Answer: A

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50. The solution of the differential equation $(1+y^2)\tan^{-1}x dx + y(1+x^2)dy = 0$ is

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

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

C. $\log\left(1+x^2\right)+\log\left(\tan^{-1}y\right)+c$

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

Answer: B

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