MATHS

BOOKS - MHTCET PREVIOUS YEAR PAPERS AND PRACTICE PAPERS

PRACTICE SET 05

Paper 2 Mathematics

1. $\int \cos^3 x e^{\log(\sin x)} dx$ is equal to

A. $-\frac{\sin^4 x}{4} + c$

B. $-\frac{\cos^4}{4} + c$

C. $\frac{e^{\sin \quad x}}{4} + c$

D. None of these

Answer: B

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2. Distance between the pair of lines represented by the equation $x^2 - 6xy + 9y^2 + 3x - 9y - 4 = 0$, is

A. $\frac{15}{\sqrt{10}}$

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

C. $\sqrt{\frac{5}{2}}$

D. $\frac{1}{\sqrt{10}}$

Answer: C

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3. If (2,-1,3) is the foot of the perpendicular down from the origin to the plane, then the equation of the plane is

A. $2x + y - 3z + 6 = 0$

B. $2x - y + 3z - 14 = 0$

C. $2x - y + 3z - 13 = 0$

D. $2x + y + 3z - 10 = 0$

Answer: B

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4. A determinant of second order of is made with the elements 0,1 . What is the probability that the determinant is positive?

A. $\frac{7}{12}$

B. $\frac{11}{12}$

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

D. $\frac{15}{16}$

Answer: C

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5. In a triangle $ABC, a = 5, b = 7$ and $\sin A = \frac{3}{4}$ how many such triangles are possible.

A. 1

B. 0

C. 2

D. infinitely many

Answer: B

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6. The value of $\cos^{-1}\left(\frac{\cos(5\pi)}{3}\right) + \sin^{-1}\left(\frac{\sin(5\pi)}{3}\right)$ is

$\frac{\pi}{2}$ (b) $\frac{5\pi}{3}$ (c) $\frac{10\pi}{3}$ (d) 0

A. $\frac{10\pi}{3}$

B. 0

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

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

Answer: C

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7. $\int \frac{dx}{\sqrt{1-e^{2x}}}$ is equal to

A. $\log\left|e^{-x}+\sqrt{e^{-2x}-1}\right|+c$

B. $\log\left|e^{x}+\sqrt{e^{2x}-1}\right|+c$

C. $-\log\left|e^{-x}+\sqrt{e^{-2x}-1}\right)\right|+c$

D. $-\log\left|e^{-2x}+\sqrt{e^{-2x}-1}\right|+c$

Answer: C

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8. If x=sint and y=cos pt, then

A. $\left(1-x^2\right)y_2+xy_1+p^2y=0$

B. $\left(1-x^2\right)y_2+xy_1-p^2y=0$

C. $\left(1+x^2\right)y_2-xy_1+p^2y=0$

D. $\left(1-x^2\right)y_2-xy_1+p^2y=0$

Answer: D

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9. The derivative of log|x| is

A. $\frac{1}{x}, x > 0$

B. $\frac{1}{|x|}, x \neq 0$

C. $\frac{1}{x}, x \neq 0$

D. none of these

Answer: C

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10. The position verctors of the points A and B with respect of O are $2\hat{i}+2\hat{j}+\hat{k}$ and $2\hat{i}+4\hat{j}+4\hat{k}$, the length of the internal bisector of $\angle BOA$ of ΔAOB is

A. $\frac{\sqrt{136}}{9}$

B. $\frac{\sqrt{136}}{3}$

C. $\frac{20}{3}$

D. $\frac{\sqrt{217}}{9}$

Answer: B

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11. If $\sin\left(\frac{\pi}{4}\cos\theta\right)=\cos\left(\frac{\pi}{4}\tan\theta\right)$, then θ is equal to

A. $2n\pi + \frac{\pi}{4}$

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

C. $2n\pi - \frac{\pi}{4}$

D. $n\pi - \frac{\pi}{4}$

Answer: B

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12. For a binomial variate X with n=6, if $P(X = 2) = 9, P(X = 4)$, then its variance is

A. $\frac{8}{9}$

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

C. $\frac{9}{8}$

D. 4

Answer: C

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13. If a line in the space makes angle α, β and γ with the coordinate axes, then $\cos 2\alpha + \cos 2\beta + \cos 2\gamma + \sin^2 \alpha + \sin^2 \beta + \sin^2 \gamma$ equals

A. -1

B. 0

C. 1

D. 2

Answer: C

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14. सिद्ध कीजिए कि

$$\sin\left(\sin^{-1}\frac{1}{3}+\sec^{-1}3\right)+\cos\left(\tan^{-1}\frac{1}{2}+\tan^{-1}2\right)=1$$

A. 1

B. 2

C. 3

D. 4

Answer: A

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15. In triangle ABC, if $\cot A, \cot B, \cot C$ are in $A\dot{P}$; then a^2, b^2, c^2 are in _____ progression.

A. HP

B. GP

C. AP

D. None of these

Answer: C

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16. Equation of the line passing through the point $\left(a\cos^3\theta, a\sin^3\theta\right)$ and perpendicular to the line $x\sec\theta + y\cos ec\theta = a$ is $x\cos\theta - y\sin\theta = a\sin 2\theta$.

A. $x\cos\theta - y\sin\theta = a\cos 2\theta$

B. $x\cos\theta + y\sin\theta = a\cos 2\theta$

C. $x\cos\theta + y\sin\theta - a\cos 2\theta = 1$

D.

Answer: B

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17. The equation of the perpendicular bisector of the line segment joining A(-2,3) and B(6,-5) is

A. $x-y=-1$

B. $x-y=3$

C. $x+y=3$

D. $x+y=1$

Answer: B

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18. If the centre, one of the foci and semi-major axis of an ellipse are (0,0), (0,3) and 5, then its equation is

A. $\frac{x^2}{16} + \frac{y^2}{25} = 1$

B. $\frac{x^2}{25} + \frac{y^2}{16} = 1$

C. $\frac{x^2}{9} + \frac{y^2}{25} = 1$

D. None of these

Answer: A

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19. If the eccentricity of a hyperbola is $\sqrt{3}$, the eccentricity of its conjugate hyperbola, is

A. $\sqrt{2}$

B. $\sqrt{3}$

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

D. $2\sqrt{3}$

Answer: C

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20. Equation of unit circle concentric with circle

$x^2 + y^2 + 8x + 4y - 8 = 0$ is

A. $x^2 + y^2 + 8x + 4y + 19 = 0$

B. $x^2 + y^2 - 8x + 4y + 19 = 0$

C. $x^2 + y^2 - 8x - 4y + 19 = 0$

D. None of the above

Answer: A

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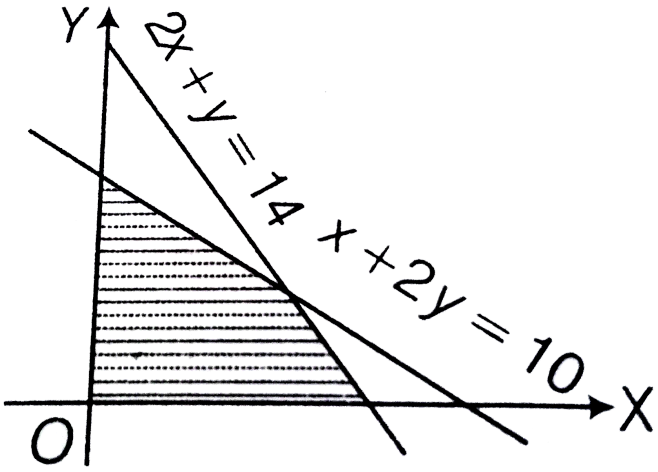
21. The maximum value of objective function z=2x+3y in the given feasible region is



A. 29

B. 18

C. 14

D. 15

Answer: B

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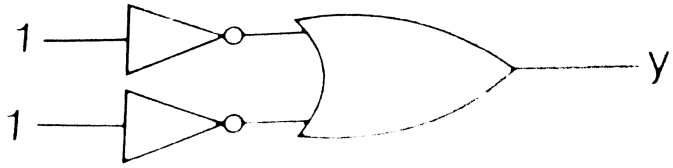
22. The shown gate has an output is equal to



A. 0

B. 1

C. uncertain

D. none of these

Answer: A

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23. The element in the first row and third column of the inverse of the matrix $\begin{bmatrix} 1 & 2 & -3 \\ 0 & 1 & 2 \\ 0 & 0 & 1 \end{bmatrix}$ is

A. -2

B. 0

C. 1

D. 7

Answer: D

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24. If $p = \Delta ABC$ is equilateral and q=each angle is 60° then symbolic form of statement.

"ΔABC is equilateral, if each of its angle is of 60°".

A. $p \vee q$

B. $p \wedge q$

C. $p \Rightarrow q$

D. $p \Leftrightarrow q$

Answer: D

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25. The area bounded by the curve y=x, X-axis and cordinates x=-1 to x=2, is

A. 0 sq unit

B. 1/2 sq unit

C. 3/2 sq unit

D. 5/2 sq unit

Answer: D

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26. The feasible region of an LPP belongs to

A. Ist annd Iind quadrant

B. Ist and IIIrd quadrant

C. II nd quadrant

D. only Ist quadrant

Answer: D

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27. If $\sec\left(\frac{x^2-y^2}{x^2+y^2}\right)=e^a$, then $\frac{dy}{dx}$ is

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

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

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

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

Answer: B

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28. Give vectors $x = 3\hat{i} - 6\hat{j} - \hat{k}, y = \hat{i} + 4\hat{j} - 3\hat{k}$ and $x = 3\hat{i} - 4\hat{j} - 12\hat{k}$, then the projection of x $\times$ y on vector z is

A. 14

B. -14

C. 12

D. 15

Answer: B

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29. The function $f(x) = 2x^3 - 15x^2 + 36x + 4$ is maximum at $x =$ (a) 3 (b) 0 (c) 4 (d) 2

A. $x = 2$

B. $x = 4$

C. $x = 0$

D. $x = 3$

Answer: A

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30. $\lim_{x \to 0} \left(\frac{4^x - 9^x}{(4^x + 9^x)} \right)$ is equal to

A. $\log\left(\frac{2}{3}\right)$

B. $\frac{1}{2}\log\left(\frac{3}{2}\right)$

C. $\frac{1}{2}\log\left(\frac{3}{2}\right)$

D. $\log\left(\frac{3}{2}\right)$

Answer: A

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31. If $y = \sec^{-1}\left(\frac{x+1}{x-1}\right) + \sin^{-1}\left(\frac{x-1}{x+1}\right), x > 0.$

Find $\frac{dy}{dx}$.

A. 1

B. 0

C. $\frac{x-1}{x+1}$

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

Answer: B

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32. $\lim_{x \to 0} \left(\frac{1 + \log x - x}{1 - 2x + x^2}\right.$ is equal to

A. 1

B. -1

C. 0

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

Answer: D

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33. Let $f(x) = \begin{cases} 0 & x < 0 \\ x^2 & x \geq 0 \end{cases}$, then for all values of x

A. f is continous and differentiable

B. f is differentiable but not continous

C. f is continous but not differentiable

D. none of the above

Answer: A

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34. For a random variable X, E(X)=3 and $E\left(X^2\right) = 11$

Then, variance of X is

A. 9

B. 5

C. 2

D. 1

Answer: C

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35. $\int_0^{\pi} \frac{x}{a^2 \cos^2 x + b^2 \sin^2 x} dx$

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

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

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

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

Answer: D

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36. If $\frac{d^2y}{dx^2} + \sin x = 0$, then the solution of differential equation is

A. $y = \sin x + cx + d$

B. $y = \cos x + cx^2 + d$

C. $y = \tan x + c$

D. $y = \log \sin x + cx$

Answer: A

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37. $\int \frac{a^{x/2}}{\sqrt{a^{-x} - a^x}} dx$ is equal to

A. $\frac{1}{\log a}\sin^{-1}(a^x)+c$

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

C. $2\sqrt{a^{-x}-a^x}+c$

D. $\log(a^x-1)+c$

Answer: A

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38. if $x=\log_e t, t>0$ and $y+1=t^2$ then $\frac{d^2y}{dx^2}$

A. $4e^{2x}$

B. $-\frac{1}{2}e^{-4x}$

C. $-\frac{3}{4}e^{5x}$

D. $4e^x$

Answer: B

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39. The line perpendicular to the plane $2x - y + 5z = 4$ passing through the point (-1,0,1) is (A) $(x+1) = -y = \frac{z-1}{-5}$ (B) $\frac{x+1}{-2} = y = \frac{z-1}{5}$ (C) $\frac{x=1}{2} = -y = \frac{z-1}{5}$ (D) $\frac{x+1}{2} = y = \frac{z-1}{5}$

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

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

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

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

Answer: C

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40. If in ΔABC, a=2b and A=3B, then A is equal to

A. 90°

B. 60°

C. 30°

D. None of these

Answer: A

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41. $\cot^{-1}\left(\frac{\alpha}{2}\right) - \tan^{-1}\left(\sqrt{\cos\alpha}\right) = x$, then sin x is equal to

A. $\tan^2\left(\frac{\alpha}{2}\right)$

B. $\cot^2\left(\frac{\alpha}{2}\right)$

C. $\tan\alpha$

D. $\cot\left(\frac{\alpha}{2}\right)$

Answer: A

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42. The solution of differential equation $(1+x)ydx + (1-y)xdy = 0$ is

A. $\log_e(xy) + x - y = c$

B. $\log_e\left(\frac{x}{y}\right) + x + y = c$

C. $\log_e\left(\frac{x}{y}\right) - x + y = c$

D. $\log_e(xy) - x + y = c$

Answer: A

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43. If $\int_{\log 2}^{x} \frac{du}{(e^u - 1)^{1/2}} = \frac{\pi}{6}$, then e^x is equal to

A. 1

B. 2

C. 4

D. -1

Answer: C

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44. 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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45. Three numbers are chosen from 1 to 20. Find the probability that they are consecutive.

A. $\frac{1}{190}$

B. $\frac{1}{120}$

C. $\frac{3}{190}$

D. $\frac{5}{190}$

Answer: C

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46. The general solution of $|\sin x| = \cos x$ is (When $n \in z$) given by

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

B. $2n\pi \pm \frac{\pi}{4}$

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

D. $n\pi - \frac{\pi}{4}$

Answer: B

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47. The equation of the tangent from the point (0, 1) to the circle $x^2 + y^2 - 2x - 6y + 6 = 0$

A. $y - 1 = 0$

B. $4x + 3y + 3 = 0$

C. $4x + 3y - 3 = 0$

D. $y + 1 = 0$

Answer: C

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48. The sum of first 8 terms of the geometric series 2+6+18+54+ . . . Is

A. 6506

B. 5650

C. 6650

D. 6560

Answer: D

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49. The sum of all two digit natural numbers which leave a remainder 5 when they are divided by 7 equal to

A. 715

B. 702

C. 615

D. 602

Answer: B

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50. if cosA=m cos B and $\cot\left(\frac{A+B}{2}\right)=\lambda.\tan\left(\frac{B-A}{2}\right)$ then λ is equal to

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

B. $\frac{m+1}{m}$

C. $\frac{m+1}{m-1}$

D. none of these

Answer: C

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