MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER - 14 (UNSOLVED)

Part I 1 Choose The Correct Answer Answer All The Questions

1. If adj A = $\begin{bmatrix} 2 & 3 \\ 4 & -1 \end{bmatrix}$ and adj B = $\begin{bmatrix} 1 & -2 \\ -3 & 1 \end{bmatrix}$ then adj (AB) is

A. $\begin{bmatrix} -7 & -1 \\ 7 & -9 \end{bmatrix}$

B. $\begin{bmatrix} -6 & 5 \\ -2 & -10 \end{bmatrix}$

C. $\begin{bmatrix} -7 & 7 \\ -1 & -9 \end{bmatrix}$

D. $\begin{bmatrix} -6 & -2 \\ 5 & -10 \end{bmatrix}$

Answer: B

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2. In the system of equations with 3 unknowns, if $\Delta = 0$ and one of $\Delta_x, \Delta_y, \text{of}\Delta_z$ is non zero then the system is .....

A. consistent

B. inconsistent

C. consistent and the system reduces or two equations

D. consistent and the system reduces to a single equation

Answer: B

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3. The principal argument of the complex number $\frac{\left(1+i\sqrt{3}\right)^2}{4i\left(1-i\sqrt{3}\right)}$ is

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

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

C. $\frac{5\pi}{6}$

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

Answer: D

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4. Which of the following is incorrect?

A. $|z_1 + z_2| \leq |z_1| + |z_2|$

B. $|z_1 - z_2| \leq |z_1| + |z_2|$

C. $|z_1 - z_2| \geq |z_1| - |z_2|$

D. $|z_1 + z_2| \geq |z_1| + |z_2|$

Answer: D

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5. The number of positive zeros of the polynomial $\sum_{j=0}^{n} {}^{n}C_r(-1)^r x^r$ is

A. 0

B. n

C. $< n$

D. r

Answer: B

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6. $\tan^{-1}\left(\frac{1}{4}\right) + \tan^{-1}\left(\frac{2}{9}\right)$ is equal to

A. $\frac{1}{2}\cos^{-1}\left(\frac{3}{5}\right)$

B. $\frac{1}{2}\sin^{-1}\left(\frac{3}{5}\right)$

C. $\frac{1}{2}\tan^{-1}\left(\frac{3}{5}\right)$

D. $\tan^{-1}\left(\frac{1}{2}\right)$

Answer: D

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7. If x + y = k is a normal to the parabola $y^2 = 12x$ then the value of k is

A. 3

B. -1

C. 1

D. 9

Answer: D

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8. The vector equation $\vec{r} = \left(\hat{i} - 2\hat{j} - \hat{k}\right) + t\left(6\hat{j} - \hat{k}\right)$ represents a straight

line passing through the points

A. (0, 6,-1) and (1, -2, -1)

B. (0,6, -1) and (-1, 4,-2)

C. (1, -2, -1) and (1,4,-2)

D. (1, -2, -1) and (0, -6, 1)

Answer: C

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9. The value of $\left[\hat{i}-\hat{j}, \hat{j}-\hat{k}, \hat{k}-\hat{i}\right]$ is :

A. 0

B. 1

C. 2

D. 3

Answer: A

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10. A stone is thrown up vertically. The height it reaches at time t seconds is given by $x = 80t - 16t^2$. The stone reaches the maximum height in time t seconds is given by

A. 2

B. 2.5

C. 3

D. 3

Answer: B

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11. The approximate change in the volume V of a cube of side x metres caused by increasing the side by 1% is

A. 0.3 xdm m^3

B. $0.03xm^3$

C. $0.03x^2m^3$

D. $0.03x^3m^3$

Answer: D

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12. The differential of y if y $= \sqrt{x^4 + x^2 - 1}$

A. $\frac{1}{2}\left(4x^3 + 2x\right)^{\frac{1}{2}}dx$

B. $\frac{1}{2}\left(x^4 + x^2 + 1\right)^{-\frac{1}{2}}\left(4x^3 + 2x\right)dx$

C. $\frac{1}{2}\left(4x^3 + 2x\right)^{\frac{1}{2}}$

D. $\frac{1}{2}\left(x^4 + x^2 + 1\right)^{\frac{1}{2}}\left(4x^3 + 2x\right)$

Answer: B

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13. If $f(x) = \int_1^x \frac{e^{\sin x}}{u} du, x > 1$ and $\int_1^3 \frac{e^{\sin x^2}}{x} dx = \frac{1}{2}[f(a) - f(1)]$, then one of the possible value of a is

A. 3

B. 6

C. 9

D. 5

Answer: C

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14. $\int_a^b f(x)dx =$

A. $2\int_0^a f(x)dx$

B. $\int_a^b f(a-x)dx$

C. $\int_a^b f(b-x)dx$

D. $\int_a^b f(a+b-x)dx$

Answer: D

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15. If $\sin x$ is the integrating factor of the linear differential equation $\frac{dy}{dx} + Py = Q$, then P is

A. log sin x

B. cos x

C. tan x

D. cot x

Answer: D

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16. The general solution of the differential equation $\log\left(\frac{dy}{dx}\right) = x + y$ is

A. $e^x + e^y = c$

B. $e^x + e^{-y} = c$

C. $e^{-x} + e^{y} = c$

D. $e^{-x} + e^{-y} = c$

Answer: B

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17. Let X have a Bernoulli distribution with mean 0.4, then the variance of (2X-3) is

A. 0.24

B. 0.48

C. 0.6

D. 0.96

Answer: D

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18. Which of the following is a discrete random variable?

I. The number of cars crossing a particular signal in a day.

II. The number of customers in a queue to buy train tickets at a moment.

III. The time taken to complete a telephone call.

A. I and II

B. II only

C. III only

D. II and III

Answer: A

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19. Which one of the following is a binary operation on N?

A. Subtraction

B. Multiplication

C. Division

D. All the above

Answer: B

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20. Which one is the contrapositive of the statement $(p \wedge q) \rightarrow r$?

A. $\sim r \rightarrow (\sim p \wedge \sim q)$

B. $-r \rightarrow (-p \wedge q)$

C. $r \rightarrow (p \wedge q)$

D. $p \rightarrow (q \vee r)$

Answer: A

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Part Ii Ii Answer Any Seven Questions Question No 30 Is Compulsory

1. Find the inverse of the non-singular matrix A = $\begin{bmatrix} 0 & 5 \\ -1 & 6 \end{bmatrix}$, by Gauss Jordan method.

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2. Formulate into a mathematical problem to find a number such that when its cube root is added to it, the result is 6.

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3. Find the value of $\tan\left[\frac{1}{2}\sin^{-1}\left(\frac{2a}{1+a^2}\right)+\frac{1}{2}\cos^{-1}\left(\frac{1-a^2}{1+a^2}\right)\right]$

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4. Obtain the equation of the circle for which (3,4) and (2,-7) are the ends of a diameter.

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5. Find the angle between the following lines $\vec{r}=3\vec{i}+2\vec{j}-\vec{k}+t\left(\vec{i}+2\vec{j}+2\vec{k}\right)$ and $\vec{r}=5\vec{j}+2\vec{k}+s\left(3\vec{i}+2\vec{j}+6\vec{k}\right)$

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6. Evaluate $\int_0^{\pi/6} \cos^7 3x\,dx$

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7. Find value of m so that the function $y = e^{mx}$ is a solution of the given differential equation.

$y'' - 5y' + 6y = 0$

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8. Compute $P(X = K)$ for the binomial distribution B(n,p) where

$n = 9, p = \frac{1}{2}, k = 7$

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9. Verify the

Associative property

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10. Simplify : $i^{59} + \frac{1}{i^{59}}$.

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Part Iii Iii Answer Any Seven Questions Question No 40 Is Compulsory

1. If p and q are the roots of the equation $lx^2 + nx + n = 0$, show that $\sqrt{\frac{p}{q}} + \sqrt{\frac{q}{p}} + \sqrt{\frac{n}{l}} = 0.$

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2. Find the domain of the following

$$f(x) = \sin^{-1}\left(\frac{x^2 + 1}{2x}\right)$$

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3. Find the vertex, focus, directrix, and length of the latus rectum of the parabola $x^2 - 4x - 5y - 1 = 0$

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4. If the area of the parallelogram having diagonals $\vec{a} = 3\hat{i} + \hat{j} - 2\hat{k}$, $\vec{b} = \hat{i} - 3\hat{j} + 4\hat{k}$ is :

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5. A sphere is made of ice having radius 10 cm. Its radius decreases from 10 cm to 9.8 cm. Find approximations for the following:

(i) change in the volume

(ii) change in the surface area

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6. Evaluate $\int_0^{\pi} \frac{x}{1+\sin x} dx$.

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7. Solve $y' = \sin^2(x - y + 1)$

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8. If μ and σ^2 are the mean and variance of the discrete random variable X, and $E(X+3)=10$ and $E(X+3)^2=116$, find μ and σ^2.

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9. Establish the equivalence property: $p \rightarrow q \equiv \neg p \vee q$

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10. Evaluate: $\lim_{x \rightarrow \frac{\pi}{2}} (\sin x)^{\tan x}$

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Part Iv Iv Answer All The Questions

1. Find the condition on a, b and c so that the following system of linear equations has one parameter family of solutions: x + y + z = a, x + 2y + 3z = b, 3x + 5y + 7z = c.

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2. Find the equation of the tangents to the curve $y = 1 + x^3$ for which the tangent is orthogonal with the line $x + 12y = 12$.

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3. Find the equations of tangents to the hyperbola $\frac{x^2}{16} - \frac{y^2}{64} = 1$ which are parallelto $10x - 3y + 9 = 0$

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4. Solve the system: x + y - 2z = 0, 2x - 3y + z = 0, 3x - 7y + 10z = 0, 6x - 9y + 10z = 0.

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5. Find the vector equation in parametric form and Cartesian equations of a straight passing through the

points (-5, 7, -4) and (13,-5,2). Find the point where the straight line crosses the xy - plane.

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6. The parabolic communication antenna has a focus at 2 m distance from the vertex of the antenna. Find the width of the antenna 3 m from the vertex.

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7. If the imaginary part of $\frac{2z+1}{iz+1}$ is -2, then show that the locus of the point representing z in the argand plane is straight line.

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8. Solve: $x\frac{dy}{dx} + 2y - x^2 \log x = 0$

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9. Let

$U(x, y, z) = xyz, x = e^{-t}, y = e^{-t}\cos t, z = \sin t, t \in R$

. Find $\frac{dU}{dt}$.

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10. Solve : $12x^4 - 56x^3 + 89x^2 - 56x + 12 = 0$

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11. Show that $(Z_7 - \{[0]], .7)$ write to the binary operation multification module7 satisfies closure, associative, identify and inverse properties.

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12. Find the area of the region bounded by the parabola $y = x^2 + 2$, x-axis, x = 0 and x = 3.

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13. Simplify : $\tan^{-1}\left(\frac{x}{y}\right) - \tan^{-1}\left(\frac{x-y}{x+y}\right)$.

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14. In a binomial distribution consisting of 5 independent trials the probability of 1 and 2 sucesses are 0.4096 and 0.2048 respectively. Find the mean and variance of the distribution .

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