MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER 16 (UNSOLVED

Part I

1. If the function $f:[-3,3] \to S$ defined by $f(x) = x^2$ is onto, then S is ..... .

A. [-9,9]

B. R

C. [-3,3]

D. [0,9]

Answer:

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2. The soloution set of the inequality $|x-1| \leq |x-3|$ is ..... .

A. [0,2]

B. [2,∞)

C. (0,2)

D. $(-\infty,2]$

Answer: B

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3. If $\frac{kx}{(x-2)(x+1)} = \frac{2}{x-2} + \frac{1}{x+1}$ then the value of k is ..... .

A. 1

B. 2

C. 3

D. 4

Answer: C

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4. The number of ways in which the following prizes be given to a class of 30 boys, first and second in mathematics, first and second in

physics, first in chemistry and first in english ..... .

A. $30^4 \times 29^2$

B. $30^3 \times 29^3$

C. $30^2 \times 29^4$

D. 30×29^5

Answer: B::C::D

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5. If $\sin\theta = \frac{24}{25}$ and θ lies in II quadrant, then $\sec\theta + \tan\theta = \ldots\ldots\ldots$.

A. -9

B. -5

C. -3

D. -7

Answer:

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6. $.^{n-1}C_r + .^{n-1}C_{r-1}$ is ..... .

A. $^{n+1}C_r$

B. $^{n-1}C_r$

C. $^{n}C_r$

D. $^{n}C_{r-1}$

Answer: C

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7. If $(n+2)!=2550 \times n!$ then the value of n is ..... .

A. 48

B. 49

C. 50

D. 51

Answer: D

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8. The cofficient of x^5 in the series e^{-2x} is

..... .

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

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

C. $-\frac{4}{15}$

D. $\frac{4}{15}$

Answer: A::D

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9. Which of the following equation is the locus of $(at^2, 2at)$ ..... .

A. $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$

B. $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

C. $x^2 + y^2 = a^2$

D. $y^2 = 4ax$

Answer: A::B::D

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10. The point on the line $2x - 3y = 5$ is equidistance form $(1, 2)$ and $(3, 4)$ is ..... .

A. $(7, 3)$

B. $(4, 1)$

C. $(1, -1)$

D. $(3, 4)$

Answer: A::D

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11. The angle between the line $3x - 2y = 0$ and $2x + 3y + 5 = 0$ is ..... .

A. 60^o

B. 90^o

C. 45^o

D. 210^o

Answer:

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12. A root of the equation

$$\begin{vmatrix} 3-x & -6 & 3 \\ -6 & 3-x & 3 \\ 3 & 3 & -6-x \end{vmatrix} = 0$$ is

A. 6

B. 3

C. 0

D. -6

Answer:

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13. The unit vector in the direction of $4\hat{i} + 5\hat{j}$ is ..... .

A. $\pm \frac{4\hat{i} + 5\hat{j}}{9}$

B. $\pm \frac{4\hat{i} + 5\hat{j}}{41}$

C. $\pm \frac{4\hat{i} + 5\hat{j}}{\sqrt{41}}$

D. none of these

Answer: A::D

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14. $\lim_{x \to 1} \frac{x^{\frac{1}{3}} - 1}{x - 1}$ is ..... .

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

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

C. $-\frac{1}{3}$

D. $-\frac{2}{3}$

Answer: A::C

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15. $\lim_{x \to 0} \frac{e^{\tan x} - e^{x}}{\tan x - x} =$

A. 1

B. e

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

D. 0

Answer: A

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16. $\lim_{\theta \to 0} \frac{\sin\sqrt{\theta}}{\sqrt{\sin\theta}} = \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots$

A. 1

B. -1

C. 0

D. 2

Answer: A

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17. The derivative of $\frac{1-\sin x}{1+\cos x}$ with respect to x at $x = \frac{\pi}{2}$ is equal to ..... .

A. 0

B. 1

C. 2

D. 3

Answer:

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18. $\int \tan x dx = \ldots\ldots\ldots\ldots\ldots\ldots .$

A. $\log \cos x + c$

B. $\log \sec x + c$

C. $\sec^2 x + c$

D. $\frac{\tan^2 x}{2} + c$

Answer: C

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19. $\int \sqrt{\frac{1-x}{1+x}} dx$ is

A. $\sqrt{1-x^2} + \sin^{-1} + c$

B. $\sin^{-1} x - \sqrt{1-x^2} + c$

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

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

Answer: A::B::C

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20. Four persons are selected at random from a group of 3 men, 2 women and 4 children. The probability that exactly two of them are children is

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

B. $\frac{10}{23}$

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

D. $\frac{10}{21}$

Answer: A::B

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Part Ii

1. Let P be the set of all triangles in a plane and R be the relation defined on P as a Rb if a

is similar to b. Prove that R is an equivalence relation .

A.

B.

C.

D.

Answer: A::B::C::D

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2. Find the value of

$\tan 315^o \cot(-405^o) + \cot 495^o \tan(-585^o)$

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3. If ${}^nP_r = 720$ and ${}^nC_r = 120$, find n

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4. Find $\sum_{n=1}^{\infty} \frac{1}{n^2 + 5n + 6}$

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5. If O is origin and R is a variable point on $y^2 = 4x$, then find the equation of the locus of the mid-point of the line segmet OR.

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6. Find $\lim_{x \to 0} \frac{(2+x)^5 - 2^5}{x}$

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7. Find $\frac{dy}{dx}$ if $\sin y = y \cos 2x$

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8. Evaluate $\int \frac{\tan x}{\cos x} dx$

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9. An integer is chosen at random from the ten positive integer. Find the pobability it is (i)an even number (ii)multiples of three

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10. Without expanding the determinant prove that $\begin{vmatrix} s & a^2 & b^2+c^2 \\ s & b^2 & c^2+a^2 \\ s & c^2 & a^2+b^2 \end{vmatrix} = 0$

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Part Iii

1. In the set z of integers, define mRn if $m-n$ is $\div 7$, prove that R is an equivalence

relation.

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2. Solve: $\log_4 2^{8x} = 2^{\log_2^8}$

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3. Find x from the equation

$$\cos ec(90^o + A) + x \cos A \cot(90^o + A)$$

$$= \sin(90^o + A)$$

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4. Differentiate the following :

$y = \left(x^2 + 1\right)\sqrt[3]{x^2 + 2}.$

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5. Show that the equation

$2x^2 - xy - 3y^2 - 6x + 19y - 20 = 0$

represents a pair of intersecting lines. Show further that the angle between them is $\tan^{-1}(5)$.

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6. Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $\left|\vec{a}\right| = 3, \left|\vec{b}\right| = 4, \left|\vec{c}\right| = 12$ and each one of them being perpendicular to the sum of the other two. Find $\left|\vec{a} + \vec{b} + \vec{c}\right|$.

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7. Evaluate $\lim_{x \to 5} \frac{\sqrt{x+4} - 3}{x - 5}$

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8. Given $f'(x) = 4x - 5$ and $f(2) = 1$, find $f(x)$

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9. Evaluate: $\int x \cos x dx$

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10. A firm manufactures PVC pipes in three plants viz, X, Y and Z. The daily production

volumes from the three firms X,Y and Z are respectively 2000 units, 3000 units 5000 units. It is known from the past experience that $3\,\%$ of the output from plant X, $4\,\%$ from plant Y and $2\,\%$ from plant Z are defective. A pipe is selected at random from a day's total production,

(i) find the probability that the selected pipe is a defective one.

(ii) if the selected pipe is a défective, then what is the probability that it was plant Y?

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Part Iv

1. The formula for converting from Fahrenheit to Celsius temperatures is $y = \frac{5x}{9} - \frac{160}{9}$. Find the inverse of this function and determine whether the inverse is also a function.

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2. If one root of $k(x-1)^2 = 5x - 7$ is double the other root, then show that $k = 2$ or -25

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3. Solve the triangle ABC if $a = 5$, $b = 4$ and $\angle A = 60^\circ$, then side c is

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4. Evaluate $\lim_{x \to 1} \frac{\sqrt[3]{7 + x^3} - \sqrt{3 + x^2}}{x - 1}$

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5. Find the length of the perpendicular and the coordinates of the foot of the perpendicul from $(-10, -2)$ to the line $x + y - 2 = 0$

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6. Express the matrix $A = \begin{bmatrix} 7 & 1 & 5 \\ -4 & 0 & 3 \\ -2 & 6 & 1 \end{bmatrix}$ as the sum of a symmetric and a skew-symmetric matrices.

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7. Find $\frac{dy}{dx}$ for $y = \frac{\left(x^2+2\right)\left(x+\sqrt{2}\right)}{\sqrt{x+4}(x-7)}$

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