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## MATHS

## BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

## SAMPLE PAPER-07 (UNSOLVED)

## Part I

1. Let $R$ be the set of all real numbers. Consider the following subsets of the plane
$R \times R: S=\{(x, y): y=x+1$ and $0<x<2\}$ and $T=\{(x, y): x-y$
is an integer\}
Then which of the following is true?
A. $T$ is an equivalence relation but $S$ is not an equivalence relation.
B. Neither S nor T is an equivalence relation
C. Both S and T are equivalence relation
D. $S$ is an equivalence relation but $T$ is not an equivalence relation.

## Answer:

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2. If the set $A$ has $m$ elements the set $B$ has $n$ elements and the number of elements in $A \times B$ is
A. $m+n$
B. $m n$
C. $\frac{m}{n}$
D. $m^{2}$

## Answer:

3. If $\frac{a x}{(x+2)(2 x-3)}=\frac{2}{x+2}+\frac{3}{2 x-3}$ than $\mathrm{a}=. . . . . . . . . . .$.
A. 8
B. 7
C. 5
D. 4

## Answer:

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4. The number of solutions of $x^{2}+|x-1|=1$ is
A. 1
B. 0
C. 2
D. 3

## Answer:

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5. If $a, 8, b$ are in A.P. , $a, 4, b$ are in G.P. and $a, x, b$ are in H.P. then $\mathrm{x}=$. $\qquad$
A. 2
B. 1
C. 4
D. 16

## Answer:

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6. If 10 lines are drawn in a plane such that no two of them are parallel
intersection are .... .....
A. 45
B. 40
C. 10 !
D. $2^{10}$

## Answer:

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7. The value of $e^{2 \log x}=\ldots . . . . .$.
A. $2 x$
B. $x^{2}$
C. $\sqrt{x}$
D. $\frac{x}{2}$

## Answer: B

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8. The $n^{\text {th }}$ term of the sequence $1,2,4,7,11, \ldots$ is
A. $n^{3}+3 n^{2}+2 n$
B. $n^{3}-3 n^{2}+3 n$
C. $\frac{n(n+1)(n+2)}{3}$
D. $\frac{n^{2}-n+2}{2}$

## Answer:

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9. The last term in the expansion $(2+\sqrt{3})^{8}$ is
A. 81
B. 27
C. 9
D. 3

Answer: A

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10. If $\lambda \hat{i}+2 \lambda \hat{j}+2 \lambda \hat{k}$ is a unit vector, then the value of $\lambda$ is
A. $\frac{1}{3}$
B. $\frac{1}{4}$
C. $\frac{1}{9}$
D. $\frac{1}{2}$

Answer:
11. One of the diagonals of parallelogram $\operatorname{ABCD}$ with $\vec{a}$ and $\vec{b}$ as adjacent sides is $\vec{a}+\vec{b}$. The other diagonal $\overrightarrow{B D}$ is
A. $\vec{a}-\vec{b}$
B. $\vec{b}-\vec{a}$
C. $\vec{a}+\vec{b}$
D. $\frac{\vec{a}+\vec{b}}{2}$

## Answer:

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12. If $(1,2,4)$ and $(2,-3 \lambda,-3)$ are the initial and terminal points of the vector $\hat{i}+5 \hat{j}-7 \hat{k}$, then value of $\lambda$ is equal to

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13. If $y=m x+c$ and $f(0)=f^{\prime}(0)=1$, then $f(2)$ is
A. 1
B. 2
C. 3
D. 4

## Answer:

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14. The derivative of $\left(x+\frac{1}{x}\right)^{2}$ w.r.to.x is
A. $2 x-\frac{2}{x^{3}}$
B. $2 x+\frac{2}{x^{3}}$
C. $2\left(x+\frac{1}{x}\right)$
D. 0

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15. $\int \frac{\sqrt{\tan x}}{\sin 2 x} d x$ is
A. $\sqrt{\tan x}+c$
B. $2 \sqrt{\tan x}+c$
C. $\frac{1}{2} \sqrt{\tan x}+c$
D. $\frac{1}{4} \sqrt{\tan x}+c$

## Answer:

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16. An urn contains 5 red and 5 black balls. A ball is drawn at random, its colour is noted and is returned to the urn. Moreover, 2 additional balls
of the colour drawn are put in the urn and then a ball is drawn at random. The probability that the second ball drawn is red will be
A. $\frac{5}{12}$
B. $\frac{1}{2}$
C. $\frac{7}{12}$
D. $\frac{1}{4}$

## Answer:

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17. It is given that the events $A$ and $B$ are such that $P(A)=\frac{1}{4}, P(A / B)=\frac{1}{2}$ and $P(B / A)=\frac{2}{3}$. Then $\mathrm{P}(\mathrm{B})$ is
A. $\frac{1}{6}$
B. $\frac{1}{3}$
C. $\frac{2}{3}$
D. $\frac{1}{2}$

## Answer:

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## Part li

1. If $n(p(A))=1024, n(A \cup B)=15$ and $n(P(B))=32$, then find $n(A \cap B)$.

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2. Simplify: $(125)^{2 / 3}$

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3. Show that $\cos 36^{\circ} \cos 72^{\circ} \cos 108^{\circ} \cos 144^{\circ}=\frac{1}{16}$
4. Find the number of ways of selecting 9 ball from 6 red balls, 5 white balls and 5 blue balls if each selection consists of 3 balls of each colour.

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5. Find $|A|$ if $A=\left[\begin{array}{lll}0 & \sin \alpha & \cos \alpha \\ \sin \alpha & 0 & \sin \beta \\ \cos \alpha & -\sin \beta & 0\end{array}\right]$

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6. 

For
any
vector
prove
that
$\vec{r}=(\vec{r} \cdot \vec{i}) i+(\vec{r} \cdot \vec{j}) j+(\vec{r} \cdot \vec{k}) k$

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7. Calculate $\lim _{x \rightarrow-2}\left(x^{3}-3 x+6\right)\left(-x^{2}+15\right)$

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8. Find the derivatives of the following functions with respect to corresponding independent variables.
$y=e^{x} \sin x$

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9. Integrate the following with respect to x

$$
\frac{4}{(3+4 x)}+(10 x+3)^{9}-3 \cos e c(2 x+3) \cot (2 x+3)
$$

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10. $P(A)=0.6, P(B)=0.5$ and $P(A \cap B)=0.2$ find $P(A / B)$

## Part iif

1. A quadratic polynomial has one of its zeros as $1+\sqrt{5}$ and it satisfies $p(1)=2$. find the quadratic polynomial.

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2. Prove that $\tan ^{-1}\left(\frac{1}{7}\right)+\tan ^{-1}\left(\frac{1}{13}\right)=\tan ^{=-1}\left(\frac{2}{9}\right)$

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3. Find the equation of the line passing through the point $(5,2)$ and perpendiular to the line joining the points $(2,3)$ and $(3,-1)$.

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4. Find the area of the triangle whose vertices are ( 0,0 ), $(1,2)$ and $(4,3)$.

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5. If $\vec{a}, \vec{b}, \vec{c}$ are three vectors such that $\vec{a}+2 \vec{b}+\vec{c}=\overrightarrow{0}$ and $|\vec{a}|=3,|\vec{b}|=4,|\vec{c}|=7$ find the angle between $\vec{a}$ and $\vec{b}$

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6. Evaluate: $\lim _{x \rightarrow 0} \frac{3^{x}-1}{\sqrt{1+x}-1}$

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7. Find the derivatives of the following :
$\tan ^{-1}\left(\frac{\cos x+\sin x}{\cos x-\sin x}\right)$
8. $x^{5} e^{x^{2}}$

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## Part lv

1. If $\mathrm{f}: \mathrm{R}-(-1,1) \rightarrow \mathrm{R}$ is defined by $\mathrm{f}(\mathrm{x})=\frac{x}{x^{2}-1}$, verify whether f is one to one.

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2. Prove that $\frac{\sin x+\sin 3 x+\sin 5 x+\sin 7 x}{\cos x+\cos 3 x+\cos 5 x+\cos 7 x}=\tan 4 x$

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3. If the letters of the word GARDEN are permuted in all possible ways and the strings thus formed are arranged in the dictionary order, then find the ranks of the words

Q GARDEN

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4. Find the derivatives of the following :
$\sqrt{x^{2}+y^{2}}=\tan ^{-1}\left(\frac{y}{x}\right)$

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5. Let $\vec{a}, \vec{b}, \vec{c}$ be three vectors such that $|\vec{a}|=3,|\vec{b}|=4,|\vec{c}|=5$ and each one of them being perpendicular to the sum of the other two , find $|\vec{a}+\vec{b}+\vec{c}|$.
6. Find all the equations of the straight lines in the family of the lines $y=m x-3$, for which $m$ and the $x$-coordinate of the point of intersection of the lines with $x-y=6$ are integers.

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7. Express the matrices as the sum of a symmetric matrix and a skew symmetric matrix:
$\left[\begin{array}{ccc}3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2\end{array}\right]$.

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