MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER 14

Part I

1. The rule f(x) = x^2 is a bijection if the domain and the co-domain are given by

A. R,R

B. $R, (0, \infty)$

C. $(0, \infty), R$

D. $[0, \infty), [, \infty)$

Answer: D

2. Given that x, y and b are real numbers $x < y, b > 0$, then

    A. xb lt yb

    B. xb gt yb

    C. $xb \leq yb$

    D. $x/b \geq y/b$

Answer: A

3. The value of $\log_{729} 81$ is ___

A. 2

B. 3

C. $\dfrac{2}{3}$

D. $3/2$

Answer: C

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4. $\left(1 + \cos \dfrac{\pi}{8}\right)\left(1 + \cos \dfrac{3\pi}{8}\right)\left(1 + \cos \dfrac{5\pi}{8}\right)\left(1 + \cos \dfrac{7\pi}{8}\right) =$

A. $\dfrac{1}{8}$

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

C. $\dfrac{1}{\sqrt{3}}$

D. $\dfrac{1}{\sqrt{2}}$

Answer: A

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5. $\cos 2\theta \cos 2\phi + \sin^2(\theta - \phi) - \sin^2(\theta + \phi)$ is equal to

A. $\sin 2(\theta + \phi)$

B. $\cos 2(\theta + \phi)$

C. $\sin 2(\theta - \phi)$

D. $\cos 2(\theta - \phi)$

Answer: B

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6. If $\left(1 + x^2\right)^2 (1 + x)^n = a_0 + a_1 x + a_2 x^2$ ____ $+ x^{n+4}$ ____

A. 1

B. 2

C. 3

D. 4

Answer: C

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7. The sum of the digits at the 10th place of all numbers formed with the help of 2,4,5,7 taken all at a time is

A. 432

B. 108

C. 36

D. 18

Answer: B

8. The value of the series $\dfrac{1}{2} + \dfrac{7}{4} + \dfrac{13}{8} + \dfrac{19}{16} + \ldots$ is

A. 14

B. 7

C. 4

D. 6

Answer: B

9. If the two straight lines

$$x + (2k - 7)y + 3 = 0 \quad \text{and} \quad 3kx + 9y - 5 = 0$$ are

perpendicular then the value of k is

A. k=3

B. $k = \dfrac{1}{3}$

C. $k = \dfrac{2}{3}$

D. $k = \dfrac{3}{2}$

Answer: A

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10. The equation of one of the line represented by the equation

$$x^2 + 2xy \cot \theta - y^2 = 0 \text{ is}$$

A. $x - y \cot \theta = 0$

B. $x + y \tan\theta = 0$

C. $x \cos\theta + y(\sin\theta + 1) = 0$

D. $x \sin\theta + y(\cos\theta + 1) = 0$

Answer: D

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11. The value of $\begin{vmatrix} 1 & 1 & 1 \\ 2x & 2y & 2z \\ 3x & 3y & 3z \end{vmatrix}$ is ____

A. 1

B. xyz

C. x+y+z

D. 0

Answer: D

12. If (-1,5,8) is the initial $-2\hat{i} - 3\hat{j}$ point of the vector of its terminal point is ____

A. $3\hat{i} + 2\hat{j} + 8\hat{k}$

B. $3\hat{i} + 2\hat{j} - 8\hat{k}$

C. $-3\hat{i} - 2\hat{j} - 8\hat{k}$

D. $-3\hat{i} + 2\hat{j} + 8\hat{k}$

Answer: D

13. Solve $\begin{vmatrix} x+a & b & c \\ a & x+b & c \\ a & b & x+c \end{vmatrix} = 0$

A. x

B. x+b

C. x-a+b+c

D. x+c

Answer: A

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14. If $\vec{a} = \hat{i} + \hat{j} + \hat{k}, \ \vec{b} = 2\hat{i} + x\hat{j} + \hat{k}, \ \vec{c} = \hat{i} - \hat{j} + 4\hat{k}$ and $\vec{a} \cdot \left(\vec{b} \times \vec{c} \right) = 70$, then x is equal to

A. 5

B. 7

C. 26

D. 0

Answer: C

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15. $\lim\limits_{x \to 0} \dfrac{e^{\tan x} - e^x}{\tan x - x} =$

A. 1

B. e

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

D. 0

Answer: A

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16. The remainder when 38^{15} is divided by 13 is

A. 12

B. 1

C. 11

D. 5

Answer: D

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17. If $y = f(x^2 + 2)$ and $f'(3) = 5$, then $\dfrac{dy}{dx}$ at x=1 is

A. 5

B. 25

C. 15

D. 10

Answer: D

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18. $\int \tan x \, dx =$ ___

    A. log cos x +c

    B. logsecx+c

    C. $\sec^2 x + c$

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

Answer: B

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19. If $\int f(x) \, dx = g(x) + c,\ then \int f(x) g'(x) \, dx$

A. $\int (f(x))^2 dx$

B. $\int f(x)g(x) dx$

C. $\int f'(x)g(x) dx$

D. $\int [g(x)]^2 dx$

Answer: A

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20. If two events A and B are independent such that

$P(A) = 0.35$ and $P(A \cup B) = 0.6$, then P(B) is

A. $\dfrac{5}{13}$

B. $\dfrac{1}{13}$

C. $\dfrac{4}{13}$

D. $\dfrac{7}{13}$

Answer: A

Part Ii

1. Write the values of f at -3,5,2,-1,0 if f(x)=

$$\begin{cases} x^2 + x - 5 & \text{if} & x \in (-\infty, 0) \\ x^2 + 3x - 2 & \text{if} & x \in (3, \infty) \\ x^2 & \text{if} & x \in (0, 2) \\ x^2 - 3 & & \text{otherwise} \end{cases}$$

2. Simplify by rationalising the denominator. $\dfrac{7 + \sqrt{6}}{3 - \sqrt{2}}$.

3. Find the first 6 terms of the sequence given by $a_1 = 1, a_n = a_{n-1} + 2, n \geq 2$

4. Prove that $\begin{vmatrix} 1 & x & x^2 \\ 1 & y & y^2 \\ 1 & z & z^2 \end{vmatrix} = (x - y)(y - z)(z - x)$

5. Find whether the matrix $\begin{pmatrix} 2 & -3 & 5 \\ 6 & 0 & 4 \\ 1 & 5 & -7 \end{pmatrix}$ is singular or non singular .

6. If $\overrightarrow{PO} + \overrightarrow{OQ} = \overrightarrow{QO} + \overrightarrow{OR}$, prove that the points P, Q,R, are collinear.

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7. Differentiate $\left(x^3 - 1\right)^{100}$ w.r.to .x.

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8. If A and B are two independent events such that P(A)=0.4 and $P(A \cup B) = 0.9$. Find P(B)

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Part lii

1. Solve $\dfrac{1}{|2x-1|} < 6$ and express the solution using the interval notation.

2. Show that the line $x^2 - 4xy + y^2 = 0$ and $x + y = 3$ from an equilateral triangle.

3. Show that the vectors $\vec{a} = 2\hat{i} + 3\hat{j} + 6\hat{k}$, $\vec{b} = 6\hat{i} + 2\hat{j} - 3\hat{k}$, and $\vec{c} = 3\hat{i} - 6\hat{j} + 2\hat{k}$, are mutually orthogonal.

Part Iv

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

2. The chances of A, B and C becoming manager of a certain company are $5:3:2$. The probabilities that the office canteen will be improved if A, B and C become managers are 0.4, 0.5 and 0.3 respectively. If the office canteen has been improved, what is the probability that B was appointed as the manager ?

3. Find all values of x that satisfies the inequality $\dfrac{2x - 3}{(x - 2)(x - 4)} < 0$

4. Prove that cos 50 = $16\cos^5\theta - 20\cos^3\theta + 5\cos\theta$

5. Find the co-efficient of x^4 in the expansion of $\dfrac{3 - 4x + x^2}{e^{2x}}$.

6. Evaluate $\displaystyle\lim_{x \to 0} \dfrac{\sqrt{x^2+1} - 1}{\sqrt{x^2+16} - 4}$

7. Evaluate $\displaystyle\lim_{x \to a} \dfrac{\sqrt{x-b} - \sqrt{a-b}}{x^2 - a^2}$ (a > b)

8. Differentiate : $y = e^x \cos x$