



## MATHS

# BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

## SAMPLE PAPER - 01

### Part I

1. The number of students who take both the subjects Mathematics and Chemistry is 70. This represent 10 % of the enrollment in Mathematics and 14% of the

enrollment in Chemistry. The number of students take at least one of these two subjects, is

A. 1120

B. 1130

C. 1100

D. insufficient data

**Answer:**

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2. If 8 and 2 are the roots of  $x^2 + ax + c = 0$  and 3,3 are the roots of  $x^2 + dx + b = 0$ , then the roots of the equation  $x^2 + ax + b = 0$  are

A. 1, 2

B. -1, 1

C. 9, 1

D. -1, 2

**Answer:**



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3. If  $\tan 40^\circ = \lambda$ , then  $\frac{\tan 140^\circ - \tan 130^\circ}{1 + \tan 140^\circ \tan 130^\circ} =$

A.  $\frac{1 - \lambda^2}{\lambda}$

B.  $\frac{1 + \lambda^2}{\lambda}$

C.  $\frac{1 + \lambda^2}{2\lambda}$

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

**Answer:**



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4. The value of  $2 \sin A \cos^3 A - 2 \cos A \sin^3 A$  is .....

A.  $\sin 4A$

B.  $\cos 4A$

C.  $\frac{1}{2} \sin 4A$

D.  $\frac{1}{2} \cos 4A$

**Answer:**



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5. In a triangle  $ABC$ ,  $\sin^2 A + \sin^2 B + \sin^2 C = 2$ , then the triangle is

- A. equilateral
- B. isosceles
- C. right
- D. scalene

**Answer:**



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6. The number of ways in which a host lady invite 8 people for a party of 8 out of 12 people of whom two do not want to attend the party together is

A.  $2 \times {}^{11}C_7 + {}^{10}C_8$

B.  ${}^{11}C_7 + {}^{10}C_8$

C.  ${}^{12}C_8 - {}^{10}C_6$

D.  ${}^{10}C_6 + 2!$

**Answer:**



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7. If  $a$  is the arithmetic mean and  $g$  is the geometric mean of two numbers, then

A.  $a \leq g$

B.  $a \geq g$

C.  $a = g$

D.  $a > g$

**Answer:**



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8. The number of rectangles that a chessboard has

A. 81

B.  $9^9$

C. 1296

D. 6561

**Answer:**



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**9.** The intercepts of the perpendicular bisector of the line segment joining (1,2) and (3,4) with coordinate axes are

A. 5,  $-5$

B. 5, 5



C. 5, 3

D. 5, - 4

**Answer:**



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**10.** The co-ordinates of the four vertices of quadrilateral are  $(-2, 4)$ ,  $(-1, 2)$ ,  $(1, 2)$  and  $(2, 4)$ , taken in order.

The equation of the line through the vertex  $(-1, 2)$  and

dividing the quadrilateral in two equal parts is:

A.  $x + 1 = 0$

B.  $x + y = 1$

C.  $x + y + 3 = 0$

D.  $x - y + 3 = 0$

**Answer: D**



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11. The vectors  $\vec{a} - \vec{b}$ ,  $\vec{b} - \vec{c}$ ,  $\vec{c} - \vec{a}$  are

A. parallel

B. unit

C. mutually perpendicular

D. coplanar

**Answer:**



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**12.**

**If**

$$\left| \vec{a} + \vec{b} \right| = 60, \left| \vec{a} - \vec{b} \right| = 40 \quad \text{and} \quad \left| \vec{b} \right| = 46, \text{ then } \left| \vec{a} \right|$$

**is**

A. 42

B. 12

C. 22

D. 32

**Answer:**



13.

Given

$$\vec{a} = 2\vec{i} + \vec{j} - 8\vec{k} \text{ and } \vec{b} = \vec{i} + 3\vec{j} - 4\vec{k} \text{ then}$$

$$|\vec{a} + \vec{b}| = \dots\dots\dots .$$

A. 13

B.  $\frac{13}{3}$ C.  $\frac{4}{13}$ D.  $\frac{3}{13}$ **Answer: A**

14. If  $\vec{r} = \frac{9\vec{a} + 7\vec{b}}{16}$  then the point P whose position vector  $\vec{r}$  divides the line joining the points with position vectors  $\vec{a}$  and  $\vec{b}$  in the ratio

- A. 7 : 9 internally
- B. 9 : 7 internally
- C. 9 : 7 externally
- D. 7 : 0 externally

**Answer:**



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15. If  $f(x) = x + 2$ , then  $f'(f(x))$  at  $x=4$  is

A. 8

B. 1

C. 4

D. 5

**Answer:**



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16. The derivative of  $\left(x + \frac{1}{x}\right)^2$  w.r.to x is .....

A.  $2x - \frac{2}{x^3}$

B.  $2x + \frac{2}{x^3}$

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

D. 0

**Answer:**



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17. If  $y = \frac{1}{a - z}$ , then  $\frac{dz}{dy}$  is

A.  $(a - z)^2$

B.  $-(z - a)^2$

C.  $(z + a)^2$

D.  $-(z + a)^2$

**Answer:**



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18.  $\int \sin 7x \cos 5x dx = \dots\dots\dots$

A.  $\frac{1}{2} \left[ \frac{\cos 12x}{2} + \frac{\cos 2x}{2} \right] + c$

B.  $-\frac{1}{2} \left[ \frac{\cos 12x}{12} + \frac{\cos 2x}{2} \right] + c$

C.  $-\frac{1}{2} \left[ \frac{\cos 6x}{6} + \cos x \right] + c$

D.  $-\frac{1}{2} \left[ \frac{\sin 12x}{2} + \frac{\sin 2x}{2} \right] + c$

**Answer: B**



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19.  $\int \frac{1}{e^x} dx = \dots\dots\dots$



A.  $\log e^x + c$

B.  $x + c$

C.  $\frac{1}{e^x} + c$

D.  $\frac{-1}{e^x} + c$

**Answer:**



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**20.** A letter is taken at random from the letters of the word "GANGA" and another letter is taken at random from the letters of the word "BANGA". The probability that the selected letters are the same is:

A.  $\frac{7}{45}$

B.  $\frac{17}{90}$

C.  $\frac{29}{90}$

D.  $\frac{19}{90}$

**Answer:**



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## Part ii

1. For a set  $A$ ,  $A \times A$  contains 16 elements and two of its elements are  $(1,3)$  and  $(0,2)$ . Find the elements of  $A$ .



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2. Find the area of the triangle whose sides are 13 cm, 14 cm and 15 cm.

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3. IF  $\frac{1}{7!} + \frac{1}{9!} = \frac{x}{10!}$ , find x

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4. Find  $\sqrt[3]{1001}$  approximately. (two decimal places).

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5. The slope of one of the straight lines  $ax^2 + 2hxy + by^2 = 0$  is three times the other, show that  $3h^2 = 4ab$ .

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6. Simplify  $\sec \theta \begin{bmatrix} \sec \theta & \tan \theta \\ \tan \theta & \sec \theta \end{bmatrix} - \tan \theta \begin{bmatrix} \tan \theta & \sec \theta \\ \sec \theta & \tan \theta \end{bmatrix}$

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7. Find a point whose position vector has magnitude 5 and parallel to the vector  $4\hat{i} - 3\hat{j} + 10\hat{k}$ .

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8. Evaluate  $\lim_{x \rightarrow -1} (x^2 - 3)^{10}$

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9. Evaluate  $\int \frac{e^{2x} + e^{-2x} + 2}{e^x}$

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10. If  $A$  and  $B$  are mutually exclusive events

$P(A) = \frac{3}{8}$  and  $P(B) = \frac{1}{8}$ , then find

(i)  $P(\bar{A})$  (ii)  $P(A \cup B)$  (iii)  $P(\bar{A} \cap B)$

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1. Find the range of the function  $f(x) = \frac{1}{1 - 3 \cos x}$

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2. Solve  $-x^2 + 3x - 2 \leq 0$ .

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3. Solve the equations for which solution lies in the interval  $0^\circ < \theta < 360^\circ$ .

$$\sin^4 x = \sin^2 x$$

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4. If  ${}^{n-1}P_3 : {}^n P_4 = 1 : 9$  find  $n$ .



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5. A family is using Liquefied petroleum gas (LPG) of weight 14.2 kg for consumption (Full weight 29.5 kg includes the empty cylinders tare weight of 15.3 kg.). IF it is used with constant rate then it lasts for 24 days. Then the new cylinder is replaced (i) Find the equation relating the quantity of gas in the cylinder to the days. (ii) Draw the graph for first 96 days.



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6. If  $\cos 2\theta = 0$ , determine  $\begin{vmatrix} 0 & \cos \theta & \sin \theta \\ \cos \theta & \sin \theta & 0 \\ \sin \theta & 0 & \cos \theta \end{vmatrix}^2$

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7. Show that the points  $(4, -3, 1)$ ,  $(2, -4, 5)$  and  $(1, -1, 0)$  form a right angled triangle.

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8. Compute  $\lim_{x \rightarrow 0} \left[ \frac{x^2 + x}{x} + 4x^3 + 3 \right]$

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9. If for two events  $A$  and  $B$ ,  
 $P(A) = \frac{3}{4}$ ,  $P(B) = \frac{2}{5}$  and  $A \cup B = S$  (Sample  
space) find the conditional probability  $P(A/B)$

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10. Evaluate  $\int \frac{(x-1)^2}{x^3+x} dx$

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11. In any triangle prove that  
$$a^2 = (b+c)^2 \sin^2\left(\frac{A}{2}\right) + (b-c)^2 \cos^2\left(\frac{A}{2}\right)$$

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12. Find all values of  $x$  for which  $\frac{x^3(x-1)}{(x-2)} > 0$ .

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13. 7 relatives of a man comprises 4 ladies and 3 gentlemen, his wife also has 7 relatives, 3 of them are ladies and 4 gentlemen. In how many ways can they invite a dinner party of 3 ladies and 3 gentlemen, so that there are 3 of man's relative and 3 of the wife's relatives ?

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14. If  $a$  and  $b$  are distinct Integers, prove that  $a - b$  is a factor of  $a^n - b^n$ , whenever  $n$  is a positive integer. [Hint: write  $a^n = (a - b + b)^n$  and expand]

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15.  $\lim_{x \rightarrow \infty} x \left[ 3^{\frac{1}{x}} + 1 - \cos\left(\frac{1}{x}\right) - e^{\frac{1}{x}} \right]$

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16. (a) Evaluate :  $\int \tan^{-1}\left(\frac{2x}{1-x^2}\right) dx.$

(b) Suppose the chance of hitting a target by a person X is 3 times in 4 shots, by Y is 4 times in 5 shots, and by Z

ius 2 times in 3 shots. They fire simultaneously exactly one time. What is the probability that the target is damaged by exactly 2 hits?



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