



# MATHS

## **BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)**

# SAMPLE PAPER -11 (UNSOLVED)



**1.** If A, B and C are invertible matrices of some order, then which one of the following is not true?

A. adj A =  $|A|A^{-1}$ 

B. adj (AB) = (adj A) (adj B)

C. det 
$$A^{-1} = (\mathrm{det} A)^{-1}$$

D. (ABC)<sup>-1</sup> = 
$$C^{-1}B^{-1}A^{-1}$$

#### Answer: A::B::D

2.	$z_1, z_3,$	and $z_3$	are	complex	numbers	such	that
$z_1 +$	$-z_2 + z_3$	$= 0   \mathrm{and}  \mid$	$ z_1  =  z $	$ z_2 = z_3 $ = 1	then $z_1^2+z_2^2$	$+ z_3^3$	
A	<b>A.</b> 3						
B	3. 2						
C	2.1						
-							
L	0.0						

#### Answer:

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**3.** If a + ib = (8 - 6i) - (2i - 7) then the values of a and b are ............

A. 8, - 15

B. 8, 15

C. 15, 9

D. 15, - 8

Answer: A

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**4.** If  $\rho$  (A) =  $\rho$  ([A|B]), then the system AX = B of linear equations is

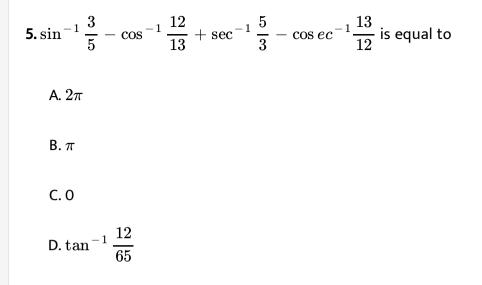
A. consistent and has a unique solution

B. consistent

C. consistent and has infinitely many solution

D. inconsistent

Answer: C



#### Answer:

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**6.** If 
$$\sin^{-1}rac{x}{5}+\cos ec^{-1}rac{5}{4}=rac{\pi}{2},\,$$
 then the value of x is

A. 4

B. 5

C. 2

D. 3

### Answer: C



7. The circle  $x^2 + y^2 = 4x + 8y + 5$  intersects the line 3x -4y =m at two distinct points if

A. 15 < m < 65

B. 35 < m < 85

- ${\sf C}.-85 < m < -35$
- ${\sf D.} 35 < m < 15$

#### Answer: A::C



**8.** The equation of the tangent at (3,-6) to the parabola  $y^2$  = 12x is ............

A. x - y - 3 = 0B. x + y - 3 = 0C. x - y + 3 = 0D. x + y + 3 = 0

#### Answer: C

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**9.** If direction cosines of a line are  $\frac{1}{c}, \frac{1}{c}, \frac{1}{c}$ , then.

A. c =  $\pm$  3

B. c =  $\pm \sqrt{3}$ 

C. c < 0

 $\mathsf{D.0} < c < 1$ 

#### Answer: C

10. Find the point on the curve  $6y = x^3 + 2$  at which y-coordinate changes 8 times as fast as x-coordinate is:

A. (4,11)

B. (4,-11)

C. (-4,11)

D. (-4,-11)

#### Answer: A::D



11. 
$$x \stackrel{ ext{lim}}{ o} 0 rac{x}{ an x}$$
 is ......

A. 1

 $\mathsf{B.}-1$ 

C. 0

### Answer: A

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12. If 
$$v(x, y) = \log(e^x + e^y)$$
, then  $\frac{\partial v}{\partial x} + \frac{\partial v}{\partial y}$  is equal to  
A.  $e^x + e^y$   
B.  $\frac{1}{e^x + e^y}$   
C. 2  
D. 1

### Answer: A



13. The curve  $y^2 = \left(x-1
ight) \left(x-2
ight)^2$  is not defined for ..............

A.  $x \ge 1$ B.  $x \ge 2$ C. x < 2D. x < 1

#### Answer: A

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14. The value of 
$$\int_{0}^{1} x(1-x)^{99} dx$$
 is  
A.  $\frac{1}{1100}$   
B.  $\frac{1}{10100}$   
C.  $\frac{1}{10010}$   
D.  $\frac{1}{10001}$ 

#### Answer: A

15. The differential equation of the family of curves  $y = Ae^x + be^{-x}$ , where A and B are arbitrary constant is

A. 
$$\frac{d^2y}{dx^2} + y = 0$$
  
B.  $\frac{d^2y}{dx^2} - y = 0$   
C.  $\frac{dy}{dx} + y = 0$   
D.  $\frac{dy}{dx} - y = 0$ 

#### Answer: B::D

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16. The differential equation representing the family of curves  $y = A\cos(x+B)$ , where A and B are parameters, is

A. 
$$\frac{d^2y}{dx^2} - y = 0$$
  
B.  $\frac{d^2y}{dx^2} + y = 0$ 

C. 
$$\displaystyle rac{d^2 y}{dx^2} = 0$$
  
D.  $\displaystyle rac{d^2 x}{dy^2} = 0$ 

Answer: B::D

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**17.** Four buses carrying 160 students from the same school arrive at a football stadium. The buses carry, respectively, 42, 36, 34, and 48 students. One of the students is randomly selected. Let X denote the number of students that were on the bus carrying the randomly selected student. Let Y denote the number of students on that bus. Then E[X] and E[Y] respectively are

A. 50,40

B. 40,50

C. 40,75,40

D. 41,41

## Answer: D



**18.** If in 6 trials, X is a binomial variate which follows the relation 9P(X=4)=P(X=2), then the probability of success is

A. 0.125

B. 0.25

C. 0.375

D. 0.75

Answer: B



**19.** In the set R of real number \* is defined as follows. Which one of the

following is not a binary operation on R?

A. a•b = min (a.b) B. a•b = max (a,b) C. a•b = a D. a •b =  $a^b$ 

#### Answer: A::B

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**20.** The dual of 
$$au(p \lor q) \lor [p \lor (p \land au r)]$$
 is

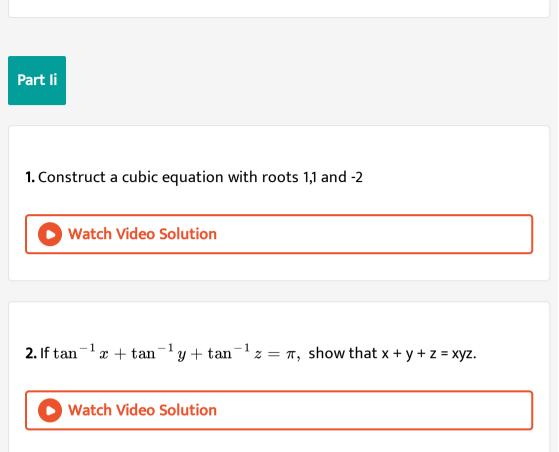
A. 
$$eg (p \wedge q) \wedge [p \vee (p \wedge \neg r)]$$

B. 
$$(p \wedge q) \wedge [p \vee (p \wedge \neg r)]$$

C. 
$$eg (p \wedge q) \wedge [p \wedge (p \wedge r)]$$

D. 
$$eg (p \wedge q) \wedge [p \wedge (p \vee \ \neg r)]$$

#### Answer:



**3.** Find the equation of the circlue with centre (2,-1) and passing through the point (3,6) in standard form.

**4.** Prove that 
$$\left(\overrightarrow{a}, \left(\overrightarrow{b} \times \overrightarrow{c}\right)\overrightarrow{a} = \left(\overrightarrow{a} \times \overrightarrow{b}\right) \times \left(\overrightarrow{a} \times (c)\right)$$
.

5. Suppose f(x) is a differentiable function for all x with  $f'(x) \leq 29$  and f(2) = 17. What is the maximum value of f (7)?

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6. In each of the following cases , determine whether the following function is homogeneous or not. If it is so , find the degree. (i)  $f(x, y) = x^2y + 6x^3 + 7 \text{ (ii)} h(x, y) = \frac{6x^2y^3 - \pi y^5 + 9x^4y}{2020x^2 + 2019y^2}$ (iii)  $g(x, y, z) = \frac{\sqrt{3x^2 + 5y^2 + z^2}}{4x + 7y}$ (iv)  $U(x, y, z) = xy + \sin\left(\frac{y^2 - 2z^2}{xy}\right)$ 

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7. Evaluate 
$$\int_{-1}^{1} \log \left( rac{3-x}{3+x} 
ight) dx.$$

**8.** Verify that function  $y = ax^2 + bx + c$  is a solution of the differential

equation 
$$rac{d^2y}{dx^2}=2a$$

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9. Verify (i) closure property (ii) commutative property and (iii) associati ve

property of the following operation on the given set.

(a•b) =  $a^b, \ orall a, b \in \mathbb{N}$  (exponentiation property )

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10. The probability density function of X is given by  

$$f(x) = \begin{cases} kxe^{-2x} & \text{for } x > 0 \\ 0 & \text{for } x \le 0 \end{cases}$$
Find the value of k.  
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**1.** In a competitive examination, one mark is awarded for every correct answer while  $\frac{1}{4}$  mark is deducted for every wrong answer. A student answered 100 questions and got 80 marks. How many questions did he answer correctly ? (Use Cramer's rule to solve the problem).

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2. If  $z = (\cos \theta + i \sin \theta)$ , show that  $z^n + (1)/(z^n) = 2 \cos n\theta$  and

z^(n)-(1)(z^(n))=2isinntheta

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3. Find the value of

$$\sin\left(\tan^{-1}\left(\frac{1}{2}\right) - \cos^{-1}\left(\frac{4}{5}\right)\right)$$

4. Find centre, foci, vertices, and directrices of the following  $\frac{x^2}{25} - \frac{y^2}{144} = 1$ 

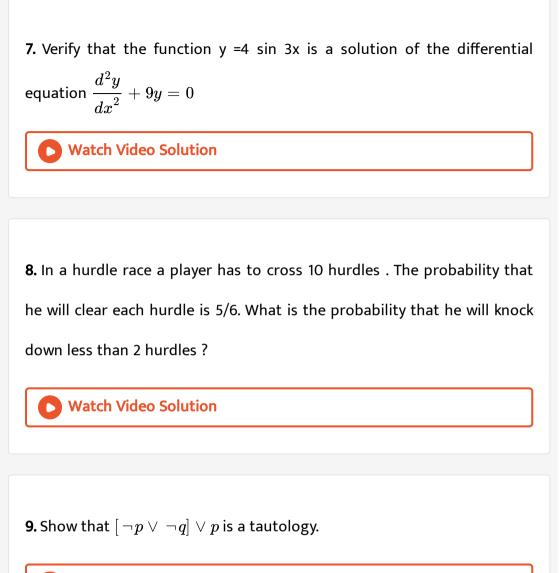
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5. Find the torque of the resultant of the three forces represented by  $-3\overrightarrow{i} + 6\overrightarrow{j} - 3\overrightarrow{k}, 4\overrightarrow{i} - 10\overrightarrow{j} + 12\overrightarrow{k}$ , and  $4\overrightarrow{i} + 7\overrightarrow{j}$  acting at the point with position vector  $8\overrightarrow{i} - 6\overrightarrow{j} - 4\overrightarrow{k}$ , about the point with position vector  $18\overrightarrow{i} + 3\overrightarrow{j} - 9\overrightarrow{k}$ .

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6. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} x^2 \cos 2x dx$$



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10. Solve the cubic equation :  $2x^3 - 9x^2 + 10x = 3$ 

**1.** The prices of three commodities A,B and C are Rs x, y and z per unit respectively. A person P purchases 4 units of B and sells two units of A and 5 units of C. Person Q purchases 2 units of C and sells 3 units of A and one unit of B. Person R purchases one unit of A and sells 3 unit of B and one unit of C. In the process, PQ and R earn Rs 15,000, Rs 1,000 and Rs 4,000 respectively. Find the prices per unit of A,B and C. (Use matrix inversion method to solve the problem.)

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2. Solve :

 $\frac{1}{x} + \frac{2}{y} - \frac{1}{z} = 1$  $\frac{2}{x} + \frac{4}{y} + \frac{1}{z} = 5$  $\frac{3}{x} - \frac{2}{y} - \frac{2}{z} = 0$ Using Crammer's rule.

**3.** If  $z_1, z_2$ , and  $z_3$  are three complex numbers such that  $|z_1| = 1$ ,  $|z_2| = 2$ ,  $|z_3| = 3$  and  $|z_1 + z_2 + z_3| = 1$ , show that  $|9z_1z_2 + 4z_1z_3 + z_2z_3| = 6$ .

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

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5. If  $a_1, a_2, a_3, \ldots, a_n$  is an arithmetic progression with common

difference d. Prove that  

$$\tan\left[\tan^{-1}\left(\frac{d}{1+a_1a_2}\right) + \tan^{-1}\left(\frac{d}{1+a_2a_3}\right) + \ldots + \tan^{-1}\left(\frac{d}{1+a_na_{n-1}}\right)\right]$$

**6.** Find the parametric form vector eqution and Cartesian equations of the plane passing through the points (2, 2, 1), (1, -2, 3) and parallel to the straight line passing through the points (2, 1, -3) and (-1, 5, -8).

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7. Find the area of the region bounded by the curve  $2 + x - x^2 + y = 0$ ,

x-axis,  $x=\,-\,3$  and x= 3



**8.** Verify (i) closure property (ii) commutative property (iii) associative property (iv) existence of identity and (v) existence of inverse for the operation  $\times_{11}$  on a subset A = {1,3,4,5,9} of the set of remainders {0,1,2,3,4,5,6,7,8,9,10}.

**9.** A rod of length 1.2 m moves with its ends always touching the coordinate axes. The locus of a point Pon the rod, which is 0.3 m from the end in contact with x-axis is an ellipse. Find the eccentricity.

10. Solve the following differential equations :

$$xrac{dy}{dx}=y-x\cos^2\Bigl(rac{y}{x}\Bigr)$$

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11. Evaluate : 
$$\int_0^2 ig(x^2+x+2ig) \mathsf{d} \mathsf{x}$$

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**12.** Sketch the curve y = 
$$rac{x^2-3x}{(x-1)}$$

**13.** A multiple choice examination has ten questions, each question has four distractors with exactly one correct answer. Suppose a student answers by guessing and it X denotes the number of correct answers, find (i) binomial distribution (ii) probability that the student will get seven correct answers (iii) the probability of getting at least one correct answer.

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**14.**  $W(x,y,z) = xy + yz + zx, x = u - v, y = uv, z = u + v, u, v \in R$ . Find  $\frac{\partial w}{\partial u}, \frac{\partial w}{\partial v}$  and evaluate then at  $\left(\frac{1}{2}, 1\right)$ .