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ਵੱਲ :-

ਸਮੂਹ ਜਿਲ੍ਹਾ ਸਿੱਖਿਆ ਅਫਸਰ (ਸੈ.ਸਿੱ)  
ਸਮੂਹ ਸਕੂਲ ਮੁੱਖੀ (ਵੈਬਸਾਈਟ ਰਾਹੀਂ)  
ਸਬੰਧਤ ਲੈਕਚਰਾਰ/ਅਧਿਆਪਕ  
ਪੰਜਾਬ।

ਮੀਮੋ ਨੰ. SCERT, CP/UP/201853507


ਮਿਤੀ :- 25.10.2018

ਵਿਸ਼ਾ :- ਗਿਆਰਵੀਂ ਅਤੇ ਬਾਰ੍ਹਵੀਂ ਜਮਾਤ ਦੇ ਗਣਿਤ ਵਿਸ਼ੇ ਦੇ ਸਿਲੇਬਸ ਵੰਡ ਅਤੇ **Test Series**  
ਸਬੰਧੀ।

- 1.0 ਉਪਰੋਕਤ ਵਿਸ਼ੇ ਵੱਲ ਧਿਆਨ ਦੇਣ ਦੀ ਖੇਚਲ ਕੀਤੀ ਜਾਵੇ ਜੀ।
- 2.0 ਮਾਣਯੋਗ ਸਕੱਤਰ ਸਕੂਲ ਸਿੱਖਿਆ ਪੰਜਾਬ ਜੀ ਦੇ ਆਦੇਸ਼ਾਂ ਹਿੱਤ, ਗਿਆਰ੍ਹਵੀਂ ਅਤੇ ਬਾਰ੍ਹਵੀਂ ਜਮਾਤ ਦਾ ਗਣਿਤ ਵਿਸ਼ੇ ਦੀ ਮਹੀਨਾਵਾਰ ਸਿਲੇਬਸ ਵੰਡ ਅਤੇ ਚੈਪਟਰ ਵਾਈਜ਼ **Test Series** ਤਿਆਰ ਕੀਤੀ ਗਈ ਹੈ। ਇਸ ਨੂੰ ਅਧਿਆਪਕ ਵਰਗ ਅਤੇ ਵਿਦਿਆਰਥੀਆਂ ਦੀ ਸਹੂਲਤ ਲਈ [www.ssapunjab.org](http://www.ssapunjab.org) ਦੀ **website** ਤੇ ਅਪਲੋਡ ਕੀਤਾ ਜਾ ਰਿਹਾ ਹੈ।

ਨੱਥੀ :- 1) **Test Series** 11ਵੀਂ ਅਤੇ 12ਵੀਂ (ਗਣਿਤ)

2) ਸਿਲੇਬਸ ਵੰਡ (ਗਣਿਤ)

  
ਸ੍ਰੀ ਡਾਇਰੈਕਟਰ  
ਐਸ.ਸੀ.ਈ.ਆਰ.ਟੀ, ਪੰਜਾਬ।  
Nak

## Monthly Division of Class 11<sup>th</sup> Syllabus (Mathematics)

Chapter No.	Month	Chapter Name
3	April	Trigonometric functions
1,5	May	Sets, Complex No. & Quadratic equations
4,6,7	July	Principle of Mathematical induction, Linear Inequalities, Sequence & Series
8,9	Aug	Permutations & Combinations, Binomial theorem
	Sep	Revision & Sep test
10,12	Oct	Straight lines & 3`D
11,14	Nov	Conic Sections & Mathematical reasoning
15,16	Dec	Statistics & Probability
2,13	Jan	Relations & functions, limits and derivatives
	Feb	Revision

## Monthly Division of Class 12<sup>th</sup> Syllabus (Mathematics)

Chapter No.	Month	Chapter Name
3,1	April	Matrices and determinats , Relations and Functions
2,4,5	May	Inverse Trigonometric functions, Continuty & Differentiation
6, 12	July	Application of Derivatives, linear Programming
7	Aug	Integration
	Sep	Revision and September test
8	Oct	Applications of integrals
9,10	Nov	Differential equations, vectors
11,13	Dec	3-D Geometry , Probability
	Jan, Feb	Revision & Pre-board

# ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

**SUBJECT: MATHEMATICS**

**TEST- TRIGONOMETRY**

M.M. 25

Class: ਗਿਆਰਵੀਂ

Time: 1 hour

**PART-A (Each question carries 1 mark)**

- $\sin\left(\frac{3\pi}{2} - x\right)$  equals :  
(A)  $-\sin x$  (B)  $\cos x$  (C)  $\sin x$  (D)  $-\cos x$
- Radian measure of  $450^\circ$  is equal to :  
(A)  $\frac{\pi}{2}$  (B)  $\frac{3\pi}{2}$  (C)  $\frac{5\pi}{2}$  (D)  $-\frac{3\pi}{2}$
- Maximum value of  $\sin 2x$  is :  
(A) 0 (B) 1 (C) 2 (D)  $\infty$
- $\tan\left(\frac{\pi}{4} + \theta\right)$  equals:  
(A)  $\cot \theta$  (B)  $\tan \theta$  (C)  $\frac{1-\tan \theta}{1+\tan \theta}$  (D)  $\frac{1+\tan \theta}{1-\tan \theta}$
- $\cot\left(-\frac{\pi}{3}\right)$  is  
(A)  $\sqrt{3}$  (B)  $\frac{1}{\sqrt{3}}$  (C)  $-\frac{1}{\sqrt{3}}$  (D)  $-\sqrt{3}$

**PART-B (Each question carries 2 mark)**

- Prove that  $\sin^6 \theta + \cos^6 \theta = 1 - 3\sin^2 \theta \cos^2 \theta$
- In a circle of diameter 80 cm, the length of a chord is 40 cm. Find the length of the minor arc of the circle.
- Find value of  $\cot\left(-\frac{15\pi}{4}\right)$
- Prove that  $\frac{\sin x + \sin 3x}{\cos x - \cos 3x} = \tan 2x$

**PART-C (Each question carries 4 mark)**

- If  $\sin x = -\frac{1}{2}$  and  $x$  lies in third quadrant, then find values of other five trigonometric functions.
- Solve  $\cos 3x + \cos x - \cos 2x = 0$
- Prove that  $2 \cos \frac{\pi}{13} \cos \frac{9\pi}{13} + \cos \frac{3\pi}{13} + \cos \frac{5\pi}{13} = 0$

# ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

SUBJECT: MATHEMATICS

## TEST-SETS

M.M. 25

Class: ਗਿਆਰਵੀਂ

Time: 1 hour

### PART-A (Each question carries 1 mark)

- 1) If A and B are two disjoint sets then  $n(A \cup B)$  is equal to?  
a)  $n(A) + n(B)$                       b)  $n(A) - n(B)$   
c)  $n(B) - n(A)$                       d) None of these
- 2) The set  $A = \{x: x \text{ is a prime number and a divisor of } 6\}$  is:  
a)  $\{1,2,3\}$     b)  $\{1,2,3,6\}$     c)  $\{2,3,6\}$     d)  $\{2,3\}$
- 3) The number of subsets of a set having n elements is:  
a)  $2n$                       b)  $n^2$                       c)  $2^n$                       d)  $2^n - 1$
- 4) Solution set of equation  $x^2 + x - 30 = 0$  in roster form is:  
a)  $\{-6,5\}$     b)  $\{-6,-5\}$     c)  $\{-5,6\}$     d)  $\{5,6\}$
- 5) The set of equilateral triangles in a plane is:  
a) Finite set                      b) infinite set                      c) Singleton set                      d) None of these

### PART-B (Each question carries 4 mark)

Ques 2. If  $U = \{1,2,3,4,5,6,7,8,9\}$ ,  $A = \{1,2,3,4\}$ ,  $B = \{2,4,6,8\}$  and  $C = \{3,4,5,6\}$

Find 1)  $(A \cup B)'$     2)  $(B - C)'$

Ques 3. In a survey of 600 students in a school, 150 students were found to be taking tea and 225 taking coffee, 100 were taking both tea and coffee. Find how many student were taking neither tea nor coffee.

Ques 4. a) Write the set  $\{\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \frac{5}{6}, \frac{6}{7}, \frac{7}{8}\}$  in the set builder form.

b) Are the following pairs of sets equal? Give reason.

i)  $A = \{1,2\}$ ,  $B = \{x: x \text{ is a solution of } x^2 + 3x + 2 = 0\}$

ii)  $A = \{x: x \text{ is a letter in the word FOLLOW}\}$

$B = \{x: x \text{ is a letter in the word WOLF}\}$

Ques 5. In a group of 65 people, 40 like cricket, 10 like both cricket and tennis. How many like tennis only and not cricket?

Ques 6. Let  $A = \{3, 5, 7, 9, 11\}$ ,  $B = \{7, 9, 11, 13\}$ ,  $C = \{11, 13, 15\}$  and  $D = \{15, 17\}$

Find:                      i)  $A \cup B$                       ii)  $A \cup B \cup C$                       iii)  $A \cap B$                       iv)  $A \cap B \cap C$

ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

SUBJECT: MATHEMATICS

TEST- PRINCIPAL OF MATHEMATICAL INDUCTION

Time: 1 hour

Class: ਗਿਆਰਵੀਂ

M.M. 20

Prove the following by using Principle of Mathematical Induction:-

1.  $1 + 3 + 5 + \dots + (2n - 1) = n^2, n \in \mathbb{N}$
2.  $10^{2n-1} + 1$  is divisible by 11 for all  $n \in \mathbb{N}$ .
3.  $1 + 3 + 3^2 + \dots + 3^{n-1} = \frac{3^n - 1}{2}, n \in \mathbb{N}$ .
4.  $1 + 2 + 3 + \dots + n < \frac{1}{8}(2n + 1)^2, n \in \mathbb{N}$ .
5.  $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \dots + \frac{1}{n(n+1)} = \frac{n}{n+1}, n \in \mathbb{N}$ .

ਸਕੂਲਸਿੱਖਿਆਵਿਭਾਗ, ਪੰਜਾਬ

**SUBJECT: MATHEMATICS**

**TEST- SEQUENCES AND SERIES**

Time: 1 hour

Class: ਗਿਆਰਵੀਂ

M.M. 25

***PART-A (Each question carries 1 mark)***

1. If the third term of an A.P. is 12 and the seventh term is 24, then the 10<sup>th</sup> term is  
(A) 36      (B) 39      (C) 30      (D) 33
2. If  $a, b, c$  are in A.P., then  $3^a, 3^b, 3^c$  are in  
(A) A.P.      (B) G.P.      (C) H.P.      (D) A.G.
3. Common ratio of the sequence 512, 256, 128, ... is :  
(A) 2      (B)  $\frac{1}{2}$       (C) 4      (D)  $\frac{1}{4}$
4. Sum to infinity for G.P.  $1, \frac{1}{3}, \frac{1}{9}, \dots$  equals:  
(A)  $\frac{1}{3}$       (B)  $\frac{1}{2}$       (C)  $\frac{2}{3}$       (D)  $\frac{3}{2}$
5. 10<sup>th</sup> term of the series  $2 + 4 + 8 + \dots$  is  
(A)  $2^n$       (B)  $2^{10}$       (C)  $2^9$       (D) 16

***PART-B (Each question carries 4 mark)***

6. The first term of a G.P. is 1. The sum of the third and fifth terms is 90. Find the common ratio of the G.P.
7. The ratio of the sum of  $m^{\text{th}}$  and  $n^{\text{th}}$  terms of an A.P. is  $m^2 : n^2$ . Show that the ratio of their  $m^{\text{th}}$  and  $n^{\text{th}}$  terms is  $2m - 1 : 2n - 1$ .
8. If the  $p^{\text{th}}, q^{\text{th}}$  and  $r^{\text{th}}$  of a G.P. are  $a, b$  and  $c$  respectively. Prove that  $a^{q-r} \cdot b^{r-p} \cdot c^{p-q} = 1$
9. The sum of four terms in G.P. is 60 and the arithmetic mean of the first and last is 18. Find the numbers.
10. Find  $n$  so that  $\frac{a^{n+1} + b^{n+1}}{a^n + b^n}$  may be the A.M. between  $a$  &  $b$ .

# ਸਕੂਲਸਿੱਖਿਆਵਿਭਾਗ, ਪੰਜਾਬ

## SUBJECT: MATHEMATICS

### TEST- PERMUTATIONS AND COMBINATIONS

Time: 1 hour

Class: ਗਿਆਰਵੀਂ

M.M. 25

#### SECTION A (5X1)

Q1.

- I. Find  $9!$
- II. If  ${}^n C_8 = {}^n C_{11}$  Then find the value of  $n$ .
- III. Write the value of  ${}^{1000} C_1$ .
- IV. What is the value of  $0!$
- V. How many 4 digits numbers can be formed by using the digits 1 to 9 if the digit can be repeated?

#### SECTION B (5X4)

- Q2. Prove that  ${}^n C_r + {}^n C_{r-1} = {}^{n+1} C_r$ .
- Q3. In how many ways can 8 girls and 4 boys be seated in a row so that no two boys are together?
- Q4. A bag contains 8 black and 9 red balls. Determine the number of ways in which 5 black and 6 red balls can be selected.
- Q5. Find number of words with or without meaning, which can be made from the letters of the word AGAIN. If these words are written in dictionary then what will be 49<sup>th</sup> word ?
- Q6. In how many ways can a student choose a program of 6 courses if 10 courses are available and 3 specific courses are compulsory for every student?

# ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

**SUBJECT: MATHEMATICS**

**TEST- BINOMIAL THEOREM**

**Time: 1 hour**

**Class: ਗਿਆਰਵੀਂ**

**M.M. 20**

**Note: Each question carries 2 marks**

- 1) Expand  $(1 - x)^6$
- 2) Expand  $\left(\frac{x}{3} + \frac{1}{x}\right)^5$
- 3) Using Binomial Expansion, expand  $(1+x+x^2)^3$  in powers of  $x$
- 4) Simplify  $(x+a)^6 - (x-a)^6$  and hence evaluate  $(\sqrt{2} + 1)^6 - (\sqrt{2} - 1)^6$
- 5) Using Binomial Theorem, evaluate  $(99)^5$
- 6) Write down the general term in the expansion of  $(x^2 - y^3)^6$ .
- 7) Find the 13<sup>th</sup> term in the expansion of  $(9x - \frac{1}{3}x)^{18}$ ,  $x \neq 0$
- 8) Find the coefficient of  $x^{10}$  in the expansion of  $(2x^2 - \frac{3}{x})^{11}$ ,  $x \neq 0$
- 9) Find the middle term in the expansion of  $(3 - \frac{x^6}{6})^7$ .
- 10) Find the term independent of  $x$  in the expansion of  $(\frac{3x^2}{2} - \frac{1}{3}x)^{15}$



ਸਕੂਲਸਿੱਖਿਆਵਿਭਾਗ, ਪੰਜਾਬ

**SUBJECT: MATHEMATICS**

**TEST- PROBABILITY**

M.M. 25

Class: ਗਿਆਰਵੀਂ

Time: 1 hour

***PART-A (Each question carries 1 mark)***

1. When a coin is tossed thrice, the number of possible outcomes is :  
(A) 2 (B) 4 (C) 6 (D) 8
2. If  $A$  and  $B$  are mutually exclusive events, then  $P(A \cap B)$  equals:  
(A) 0 (B) 1 (C) 2 (D)  $\frac{1}{2}$
3. A die is thrown, the probability of getting prime number is :  
(A)  $\frac{2}{3}$  (B)  $\frac{1}{6}$  (C)  $\frac{1}{2}$  (D) 1
4. If  $P(A) = \frac{3}{5}$ , then  $P(\bar{A})$  equals:  
(A)  $\frac{3}{5}$  (B)  $\frac{1}{5}$  (C)  $\frac{2}{5}$  (D)  $\frac{8}{5}$
5. If  $P(A) = \frac{1}{4}$ ,  $P(B) = \frac{1}{2}$ ,  $P(A \cap B) = \frac{1}{8}$ , then  $P(A \cup B)$  is  
(A)  $\frac{5}{8}$  (B)  $\frac{3}{8}$  (C)  $\frac{3}{4}$  (D) 0

***PART-B (Each question carries 4 mark)***

6. In a single throw of two dice, find the probability that neither a doublet nor a total of 10 will appear.
7. Find the probability of getting exactly 2 heads when a coin is tossed thrice.
8. Find the probability of getting a total of 8 or an even number on the first dice, when two dice are tossed once.
9. In a class XI of a school 40% of the students study Mathematics and 30% study Biology. 10% of the class study both Mathematics and Biology. If a student is selected at random from the class, find the probability that he neither studies Mathematics nor Biology.
10. If 4-digit numbers greater than 5,000 are randomly formed from the digits 0, 1, 3, 5 and 7, what is the probability of forming a number divisible by 5 when the repetition of digits is not allowed?

# ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

**SUBJECT: MATHEMATICS**

**TEST- LINEAR INEQUALITIES**

**Time: 1 hour**

**Class: ਗਿਆਰਵੀਂ**

**M.M. 30**

1. A man wants to cut three lengths from a single piece of board of length 91cm. The second length is to be 3cm longer than the shortest and the third length is to be twice as long as the shortest. What are the possible lengths of the shortest board if the third piece is to be at least 5 cm longer than the second?
2. Solve the inequality and represent the solution graphically on the number line:  
$$5x + 1 > -24, 5x - 1 < 24$$
3. Solve the inequality and represent the solution graphically on the number line:  
$$5(2x - 7) - 3(2x + 3) \leq 0, 2x + 19 \leq 6x + 47$$
4. Solve the inequalities graphically:  $x + y \leq 9, y > x, x \geq 0$
5. Solve the inequalities graphically:  $x - 2y \leq 3, 3x + 4y \geq 12, x \geq 0, y \geq 1$

ਸਕੂਲਸਿੱਖਿਆਵਿਭਾਗ, ਪੰਜਾਬ

**SUBJECT: MATHEMATICS**

**TEST- THREE DIMENSIONAL GEOMETRY**

Time: 30minutes

Class: ਗਿਆਰਵੀਂ

M.M. 10

*Note: Each question carries 2 mark*

1. Find the ratio in which the plane  $2x + 3y + 5z = 1$  divides the line joining the points  $(1, 0, -3)$  and  $(1, -5, 7)$ .
2. Find the value of  $x$  so that the point  $(6, 5, -3)$  is at a distance of 13 units from the point  $(x, -7, 0)$ .
3. Using distance formula, prove that the points  $(2, -1, 3)$ ,  $(4, 3, 1)$  and  $(3, 1, 2)$  are collinear.
4. Find the ratio in which the line segment joining the points  $(4, 8, 10)$  and  $(6, 10, -8)$  is divided by  $yz$ -plane.
5. Find the lengths of the medians of the triangle  $A(0, 0, 6)$ ,  $B(0, 4, 0)$  and  $C(6, 0, 0)$ .

Time Allowed:-40 Min

Mathematical Reasoning

Max Marks 20

Each Question Carries 2 Marks

Dated 20/10/2018

1. Write the negation of following statements.
  - 1) Chennai is the capital of Tamil Naidu.
  - 2) All triangle are not equilateral triangle.
2. Find the component statement of the following component statement and check whether they are true or false: -
  - 1) Number 3 is a prime or it is odd.
  - 2) 100 is divide by 3,11 and 5.
3. Identify the quantifier in the following statements and write the negation of statements.

For every real number  $x$ ,  $x$  is less than  $x+1$ .
4. Identify the quantifier in the following statement and write the negation of the statement.

There is not a number which is equal to its square.
5. Using the words "necessary and sufficient" rewrite the statement. "The integer  $n$  is odd if and only if  $n^2$  is odd. Also Check whether the statement is true.
6. Check whether the following statement are true or not

If  $x, y \in \mathbb{Z}$  are such that  $x$  and  $y$  are odd, then  $xy$  is odd.
7. Check whether the following statement is true or false by proving its contrapositive if  $x, y \in \mathbb{Z}$  such that  $xy$  is odd, then both  $x$  and  $y$  are odd.
8. Show by contradiction  $p=\sqrt{2}$  is rational.
9. For given statement identify the necessary and efficient condition.

If you drive over 80km/hr, then you will get fine.
10. Check the validity of the statement

"100 is a multiple of 4 and 5"

Time Allowed:-40 Min

Conic Section

Max Marks 20

Each Question Carries 2 Marks

Dated 20/10/2018

1. The eccentricity of parabola  $y^2=-8x$  is  
a) -2    b) -1    c) -1    d) 2
2. The focus of parabola  $y^2=4ax$  is  
a) (a,0)    b) (0,a)    c) (0,0)    d) None of these
3. The foci of ellipse  $9x^2+4y^2=36$  are  
a) (-5,0)    b) (0,±√5)    c) (±√5,0)    d) (0,-5)
4. The eccentricity of hyperbola can never be equal to  
a)  $\sqrt{9/5}$     b)  $2\sqrt{1/9}$     c)  $3\sqrt{1/8}$     d) 2  
 $1 \times 4 = 4$
5. Find the equation of ellipse, which major axis along the X-axis and passing through the points (4,3) and (-1,4).
6. Find the area of the triangle formed by the lines joining the vertex of the parabola  $x^2=12y$  to the ends of its latus rectum.
7. Find the equation of hyperbola where foci are (0,±12) and the length of the latus rectum is 36.
8. Find the co-ordinates of the foci, the vertices, the length of major axis, the minor axis, the eccentricity and the latus rectum of the ellipse

$$\frac{x^2}{25} + \frac{y^2}{9} = 1$$

$$4 \times 4 = 16$$

ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

SUBJECT: MATHEMATICS

TEST- CONTINUITY AND DIFFERENTIABILITY

M.M. 25

Class: ਬਾਰਵੀਂ

Time: 1 hour

PART-A (Each question carries 1 mark)

1. If  $f(x) = \begin{cases} \frac{\sin 3x}{2x}, & x \neq 0 \\ m, & x = 0 \end{cases}$  is discontinuous at  $x = 0$ , then the value of  $m$  is:  
(A)  $3/2$  (B)  $2/3$  (C) 3 (D) 2
2.  $\frac{d}{dx}(\sin^{-1}x + \cos^{-1}x)$  is equal to :  
(A)  $\frac{1}{\sqrt{1-x^2}}$  (B)  $\frac{2}{\sqrt{1-x^2}}$  (C) 0 (D)  $\sqrt{1-x^2}$
3. If  $\cos y = x$ , then  $\frac{dy}{dx}$  is :  
(A)  $\frac{-1}{\sqrt{1-x^2}}$  (B)  $\frac{1}{\sqrt{1-x^2}}$  (C)  $\frac{1}{\sin y}$  (D)  $\frac{1}{\cos y}$
4. If  $y = 2^x$ , then  $\frac{dy}{dx}$  is :  
(A)  $2^x$  (B)  $2^x \log 2$  (C)  $x \cdot 2^{x-1}$  (D) 0
5. If  $y = \sin^{-1}x$ , then  $\frac{dy}{dx}$  is :  
(A)  $\frac{1}{\sqrt{1-x^2}}$  (B)  $-\frac{1}{\sqrt{1-x^2}}$  (C)  $\frac{1}{1+x^2}$  (D)  $-\frac{1}{1+x^2}$

PART-B (Each question carries 2 mark)

6. Differentiate:  $x^2 = \frac{x+3y}{x-3y}$  w.r.t.  $x$
7. If  $x^{16}y^9 = (x^2 + y)^{17}$ , prove that  $\frac{dy}{dx} = \frac{2y}{x}$

PART-C (Each question carries 4 mark)

8. Verify Rolle's theorem for the function  $f(x) = x(x-1)(x-2)$  in  $[0,2]$
9. If  $x = \left(\cos \theta + \log \tan \frac{\theta}{2}\right)$ ,  $y = \sin \theta$ , find  $\frac{d^2y}{dx^2}$  at  $\theta = \frac{\pi}{4}$
10. If  $y = [x + \sqrt{x^2 + 1}]^m$ , prove that  
$$(1 + x^2)y_2 + xy_1 - m^2y = 0$$
11. Differentiate:  $\cot^{-1}\left(\frac{1+\cos x}{\sin x}\right)$  w.r.t.  $x$

ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

SUBJECT: MATHEMATICS

TEST- VECTORS

M.M. 25

Class: ਬਾਰਵੀਂ

Time: 1 hour

PART-A (Each question carries 1 mark)

1. This inequality  $|\vec{a} \cdot \vec{b}| \leq |\vec{a}||\vec{b}|$  is called  
(A) Triangle Inequality (B) Rolle's theorem  
(C) Lagrange's Mean Value Theorem (D) Cauchy-Schwartz Inequality
2. If  $\vec{a} = \hat{i} + 4\hat{j} + 4\hat{k}$  and  $\vec{b} = 4\hat{i} + \hat{j} + \hat{k}$ , then  $\vec{a} \cdot \vec{b}$  is equal to  
(A) 14 (B) 16 (C) 12 (D) 4
3. If  $|\vec{a} \times \vec{b}| = |\vec{a} \cdot \vec{b}|$ , then angle between  $\vec{a}$  and  $\vec{b}$  is  
(A)  $\frac{\pi}{4}$  (B)  $\frac{\pi}{6}$  (C)  $\frac{\pi}{3}$  (D)  $\frac{\pi}{2}$
4. If  $\vec{a} = 2\hat{i} + \lambda\hat{j} - 7\hat{k}$  and  $\vec{b} = 2\hat{i} - 3\hat{j} + 4\hat{k}$  are perpendicular vectors, then  $\lambda$  is equal to  
(B) 0 (C) -8 (D) 1
5. The Value of  $\hat{i} \cdot (\hat{j} \times \hat{k}) + \hat{j} \cdot (\hat{k} \times \hat{i}) + \hat{k} \cdot (\hat{i} \times \hat{j})$  is  
(A) 1 (C) -1 (D) 3

PART-B (Each question carries 4 mark)

6. Find the scalar projection of the vector  $7\hat{i} + \hat{j} - 4\hat{k}$  on the vector  $2\hat{i} + 6\hat{j} + 3\hat{k}$ .
7. If  $\vec{a}$ ,  $\vec{b}$  and  $\vec{c}$  be unit vectors such that  $\vec{a} + \vec{b} + \vec{c} = \vec{0}$ , then find the value of  $\vec{a} \cdot \vec{b} + \vec{b} \cdot \vec{c} + \vec{c} \cdot \vec{a}$
8. Determine the area of a parallelogram whose adjacent sides are represented by the vectors  $\vec{a} = \hat{i} - \hat{j} + 3\hat{k}$  and  $\vec{b} = 2\hat{i} - 7\hat{j} + \hat{k}$
9. Find a vector of magnitude 5 units, perpendicular to each of the vectors  $\vec{a} + \vec{b}$  and  $\vec{a} - \vec{b}$  where  $\vec{a} = \hat{i} + \hat{j} + \hat{k}$  and  $\vec{b} = \hat{i} + 2\hat{j} + 3\hat{k}$
10. Show that  $\hat{i} - 2\hat{j} + 3\hat{k}$ ,  $-2\hat{i} + 3\hat{j} - 4\hat{k}$ ,  $\hat{i} - 3\hat{j} + 5\hat{k}$  are coplanar.

# ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

## SUBJECT: MATHEMATICS

### TEST- THREE-DIMENSIONAL GEOMETRY

M.M. 25

Class: ਬਾਰਵੀਂ

Time: 1 hour

#### *PART-A (Each question carries 1 mark)*

1. Distance of plane  $2x - 3y + 6z + 14 = 0$  from point  $(0, 2, 1)$  is  
 (A) 4 units (B) 3 units (C) 2 units (D) 5 units
2. The line  $\frac{x+2}{3} = \frac{y-3}{4} = \frac{z+4}{5}$  is parallel to plane  
 (A)  $3x + 4y + 5z = 7$  (B)  $5x + 2y + 3z = 9$   
 (C)  $2x + y - 2z = 0$  (D)  $2x + 3y + 4z = 0$
3. The direction ratios of the line  $\frac{x-1}{3} = \frac{2y+6}{10} = \frac{1-z}{-7}$  are  
 (A)  $\langle 3, 10, -7 \rangle$  (B)  $\langle 3, -5, -7 \rangle$   
 (C)  $\langle 3, 5, 7 \rangle$  (D)  $\langle 3, 5, -7 \rangle$
4. The point which lies on the plane  $2x + y - z = 10$  is  
 (A)  $(0,0,0)$  (B)  $(1,1,1)$  (C)  $(\frac{1}{2}, 10, 1)$  (D)  $(1,11,1)$
5. If the lines  $\frac{x-1}{6} = \frac{y-3}{1} = \frac{z+6}{-2}$  and  $\frac{x-1}{1} = \frac{y-3}{2} = \frac{z+6}{2k}$  are perpendicular to each other, then  $k$  is  
 (A) 2 (B) 1 (C) -2 (D) 3

#### *PART-B (Each question carries 2 mark)*

6. Find the angle between the lines  
 $\vec{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \lambda(\hat{i} + 2\hat{j} + 2\hat{k})$  and  $\vec{r} = 5\hat{i} - 2\hat{k} + \mu(3\hat{i} + 2\hat{j} + 6\hat{k})$
7. The cartesian equation of the line is  $\frac{x-5}{3} = \frac{y+4}{7} = \frac{z-6}{2}$ . Find its vector equation.
8. The equation of the line is  $\frac{2x-5}{4} = \frac{y+4}{3} = \frac{6-z}{6}$ . Find the direction cosines of a line parallel to this line.
9. Find the distance of the plane  $2x - y + 2z + 1 = 0$  from origin.

#### *PART-C (Each question carries 6 mark)*

10. Find the image of the point  $(5, 1, 0)$  in the line  $\frac{x-1}{2} = \frac{y-3}{-1} = \frac{z-4}{3}$ .
11. Find the shortest distance between the lines

$$\frac{x+1}{7} = \frac{y+1}{-6} = \frac{z+1}{1}$$

and  $\frac{x-3}{1} = \frac{y-5}{-2} = \frac{z-7}{1}$



ਸਕੂਲਸਿੱਖਿਆਵਿਭਾਗ, ਪੰਜਾਬ

**SUBJECT: MATHEMATICS**

**TEST- RELATIONS & FUNCTIONS**

M.M. 25

Class: ਬਾਰਵੀਂ

Time: 1 hour

**PART-A (Each question carries 1 mark)**

1. If a binary operation “\*” is defined on  $N$  by  $a*b = a^b$  then  $3*2$  is  
A) 4                      B) 2    C) 9                      D) 8
2. If  $f(x) = x^3$ ,  $g(x) = \cos(3x)$ , then  $f \circ g$  is :  
(A)  $x^3 \cos 3x$                       (B)  $\cos(3x^3)$     (C)  $\cos^3(3x)$                       (D)  $3\cos(x^3)$
3. If  $f(x) = x^2 - 1$  and  $g(x) = \sqrt{x}$ , then  $g \circ f(1)$  is :  
(A) -1                      (B) 0                      (C) 1                      (D) 2
4. If  $a * b = \frac{a}{a+b}$  defined on rational numbers, then the value of  $2 * 3$  is :  
(A)  $\frac{2}{3}$                       (B)  $\frac{2}{5}$                       (C)  $\frac{3}{5}$                       (D)  $\frac{4}{5}$
5. Let  $R$  be a relation on  $N$  defined by  $x + 2y = 8$ , then domain of  $R$  is :  
(A) {2, 4, 6}                      (B) {3, 5, 7}                      (C) {1, 3, 5}                      (D) {2, 3, 5}

**PART-B (Each question carries 4 mark)**

6. Prove that  $f(x) = \frac{6-5x}{7}$  is invertible. Also find  $f^{-1}$
7. Show that the relation  $R = \{(x, y) : x - y \text{ is divisible by } 5; x, y \in Z\}$  is an equivalence relation.
8. Check whether  $R = \{(a, b) : a \leq b^3\}$  on  $R$  is an equivalence relation or not.
9. If  $f(x) = \frac{3x-1}{x+1}$ ,  $x \neq -1$ , then find  $f \circ f(x)$
10. Show that the relation  $R$  defined on the set  $A$  of all lines as  $R = \{(L_1, L_2) : L_1 \text{ and } L_2 \text{ are parallel lines}\}$  is an equivalence relation.

ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

**SUBJECT: MATHEMATICS**

**TEST- PROBABILITY**

M.M. 25

Class: ਬਾਰਵੀਂ

Time: 1 hour

***PART-A (Each question carries 1 mark)***

1. If  $P(A) = \frac{1}{3}$ ,  $P(B) = \frac{3}{5}$ ,  $P(A \cap B) = \frac{1}{4}$ , then  $P(\text{neither } A \text{ nor } B)$  is  
(A)  $\frac{41}{60}$  (B)  $\frac{19}{30}$  (C)  $\frac{41}{120}$  (D)  $\frac{19}{60}$
2. In a single throw of two dice, the chances of throwing a sum of 8 is:  
(A)  $\frac{7}{36}$  (B)  $\frac{1}{18}$  (C)  $\frac{1}{9}$  (D)  $\frac{5}{36}$
3. A binomial distribution is given by  $B\left[6, \frac{3}{4}\right]$ , find the variance of the distribution  
(A)  $\frac{9}{2}$  (B)  $\frac{3\sqrt{2}}{4}$  (C)  $\frac{9}{8}$  (D)  $\frac{3}{2}$
4. Two events  $A$  and  $B$  will be independent, if  
(A)  $A$  and  $B$  are mutually exclusive (B)  $P(A'B') = [1 - P(A)][1 - P(B)]$   
(C)  $P(A) = P(B)$  (D)  $P(A) + P(B) = 1$
5. The probability of obtaining an even prime number on each die, when a pair of dice is rolled is  
(A) 0 (B)  $\frac{1}{3}$  (C)  $\frac{1}{12}$  (D)  $\frac{1}{36}$

***PART-B (Each question carries 2 mark)***

6. A problem is given to three students, whose chances of solving it are  $\frac{1}{3}$ ,  $\frac{1}{5}$ ,  $\frac{1}{6}$ . What is the probability that exactly one of them may solve it.
7. A coin is tossed 6 times. Find the probability of obtaining no head.
8. Find the probability distribution of the number of heads when three coins are thrown simultaneously.
9. Find the binomial distribution whose mean is 3 and variance is 2.

***PART-C (Each question carries 4 mark)***

10. In a tape recorder factory three machines A, B and C produced 50%, 30% and 20% of total production. The percentage of the defective output of those machines is 3%, 4% and 5% respectively. A tape recorder is selected randomly and found to be defective, find the probability it is produced by machine A.
11. The sum of mean and variance of a Binomial distribution is 15 and the sum of their squares is 117. Find the distribution.
12. Two dice are rolled at random 5 times. Obtain the mean and variance of a distribution of doublets obtained.