ਵੱਲ :-

ਸਮੂਹ ਜਿਲ੍ਹਾ ਸਿੱਖਿਆ ਅਫਸਰ (ਸੈ.ਸਿੱ)

ਸਮੂਹ ਸਕੂਲ ਮੁੱਖੀ (ਵੈਬਸਾਈਟ ਰਾਹੀਂ)

ਸਬੰਧਤ ਲੈਕਚਰਾਰ/ਅਧਿਆਪਕ

ਪੰਜਾਬ।

ਮੀਮੋ ਨੰ.SCERT,QP/UP/2018 53507            ਮਿਤੀ :- 25.10.2018

ਵਿਸ਼ਾ :- ਗਿਆਰਵੀਂ ਅਤੇ ਬਾਰ੍ਹਵੀ 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    ਮਾਨਯੋਗ ਸਕੱਤਰ ਸਕੂਲ ਸਿੱਖਿਆ ਪੰਜਾਬ ਜੀ ਦੇ ਆਦੇਸ਼ਾਂ ਹਿੱਤ, ਗਿਆਰੁਵੀਂ 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 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।

# 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 Inqualities, 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 & Differentation |
| 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 |

## SUBJECT: MATHEMATICS
### TEST- TRIGONOMETRY

M.M. 25         Class: ਗਿਆਰਵੀਂ         Time: 1 hour

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

1. $\sin\left(\frac{3\pi}{2} - x\right)$ equals :

   (A) $-\sin x$    (B) $\cos x$      (C) $\sin x$      (D) $-\cos x$

2. Radian measure of $450°$ is equal to :

   (A) $\frac{\pi}{2}$    (B) $\frac{3\pi}{2}$      (C) $\frac{5\pi}{2}$      (D $-\frac{3\pi}{2}$

3. Maximum value of $\sin 2x$ is :

   (A) $0$    (B) $1$      (C) $2$      D) $\infty$

4. $\tan\left(\frac{\pi}{4} + \theta\right)$ equals:

   (A) $\cot\theta$    (B) $\tan\theta$      (C) $\frac{1-\tan\theta}{1+\tan\theta}$      (D) $\frac{1+\tan\theta}{1-\tan\theta}$

5. $\cot\left(-\frac{\pi}{3}\right)$ is

   (A) $\sqrt{3}$    (B) $\frac{1}{\sqrt{3}}$      (C) $-\frac{1}{\sqrt{3}}$      (D) $-\sqrt{3}$

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

6. Prove that $\sin^6\theta + \cos^6\theta = 1 - 3\sin^2\theta\cos^2\theta$

7. 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.

8. Find value of $\cot\left(-\frac{15\pi}{4}\right)$

9. Prove that $\frac{\sin x + \sin 3x}{\cos x - \cos 3x} = \tan 2x$

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

10. If $\sin x = -\frac{1}{2}$ and $x$ lies in third quadrant, then find values of other five trigonometric functions.

11. Solve $\cos 3x + \cos x - \cos 2x = 0$

12. Prove that $2\cos\frac{\pi}{13}\cos\frac{9\pi}{13} + \cos\frac{3\pi}{13} + \cos\frac{5\pi}{13} = 0$

## 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) $A \cap B \cap C$

(4)

# 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.  $1 + 3 + 5 + \ldots\ldots\ldots\ldots\ldots\ldots + (2n - 1) = n^2$  , $n \epsilon N$

2.  $10^{2n-1} + 1$ *is divisible by* 11 *for all* $n \epsilon N$.

3.  $1 + 3 + 3^2 + \ldots\ldots\ldots\ldots\ldots + 3^{n-1} = \frac{3^n - 1}{2}$ , $n \epsilon N$.

4.  $1 + 2 + 3 + \ldots\ldots\ldots\ldots\ldots\ldots + n < \frac{1}{8}(2n + 1)^2$, $n \epsilon N$.

5.  $\frac{1}{1.2} + \frac{1}{2.3} + \frac{1}{3.4} + \ldots\ldots\ldots\ldots + \frac{1}{n(n+1)} = \frac{n}{n+1}$ , $n \in N$.

## 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 $10^{th}$ 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 ration 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. $10^{th}$ term of the series $2 + 4 + 8 + \cdots$ 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 $m^{th}$ and $n^{th}$ terms of an A.P. is $m^2 : n^2$. Show that the ratio of their $m^{th}$ and $n^{th}$ terms is $2m - 1 : 2n - 1$.

8. If the $p^{th}, q^{th}$ and $r^{th}$ of a G.P. are a, b and c respectively. Prove that $a^{q-r} . b^{r-p} . c^{p-q} = 1$

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 $a$ & $b$.

## 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 49th 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 $13^{th}$ term in the expansion of $\left(9x-\frac{1}{3}x\right)^{18}$, $x \neq 0$

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 $\left(\frac{3x^2}{2}-\frac{1}{3}x\right)^{15}$

(8)

# 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 tosses 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:   $x - 2y \leq 3, 3x + 4y \geq 12, x \geq 0, y \geq 1$

**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).

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 $\varepsilon$ 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 $\varepsilon$ Z such that xy is odd, then both x and y are odd.

8. Show by contradiction p=√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"

**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) $(0,\pm\sqrt{5})$   c) $(\pm\sqrt{5},0)$   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            1X4=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 lcilus rectum.

7. Find the equation of hyperbola where foci are(0,±12) and the length of the lotus 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

   $$\frac{x^2}{25}+\frac{y^2}{9}=1 \qquad\qquad 4*4=16$$

## SUBJECT: MATHEMATICS

## TEST- CONTINUITY AND DIFFERENTIABLITY

**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 continuous at $x = 0$, then 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) $x.2^{x-1}$          (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 $y = \left[x + \sqrt{x^2 + 1}\right]^m$, 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

**SUBJECT: MATHEMATICS**

**TEST- VECTORS**

M.M. 25        Class: ਬਾਰਵੀਂ        Time: 1 hour

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

1. This inequality $|\vec{a}.\vec{b}| \le |\vec{a}||\vec{b}|$ is called

  (A) Triangle Inequality        (B) Rolle's theorem

  (C) Lagrange's Mean Value Theorem    (D) Cauchy-Schwartz Inequality

2. If $\vec{a} = \hat{\imath} + 4\hat{\jmath} + 4\hat{k}$ and $\vec{b} = 4\hat{\imath} + \hat{\jmath} + \hat{k}$, then $\vec{a}.\vec{b}$ is equal to

  (A) 14       (B) 16       (C) 12       (D) 4

3. If $|\vec{a} \times \vec{b}| = |\vec{a}.\vec{b}|$ , 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 $\vec{a} = 2\hat{\imath} + \lambda\hat{\jmath} - 7\hat{k}$ and $\vec{b} = 2\hat{\imath} - 3\hat{\jmath} + 4\hat{k}$ are perpendicular vectors, then $\lambda$ is equal to

  (B) 0       (B) -8       (C) 8       (D) 1

5. The Value of $\hat{\imath}.(\hat{\jmath} \times \hat{k}) + \hat{\jmath}.(\hat{k} \times \hat{\imath}) + \hat{k}.(\hat{\imath} \times \hat{\jmath})$ is

  (A) 1       (B) 0       (C) -1       (D) 3

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

6. Find the scalar projection of the vector $7\hat{\imath} + \hat{\jmath} - 4\hat{k}$ on the vector $2\hat{\imath} + 6\hat{\jmath} + 3\hat{k}$.

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 $\vec{a}.\vec{b} + \vec{b}.\vec{c} + \vec{c}.\vec{a}$

8. Determine the area of a parallelogram whose adjacent sides are represented by the vectors $\vec{a} = \hat{\imath} - \hat{\jmath} + 3\hat{k}$ and $\vec{b} = 2\hat{\imath} - 7\hat{\jmath} + \hat{k}$

9. Find a vector of magnitude 5 units, perpendicular to each of the vectors $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ where $\vec{a} = \hat{\imath} + \hat{\jmath} + \hat{k}$ and $\vec{b} = \hat{\imath} + 2\hat{\jmath} + 3\hat{k}$

10. Show that $\hat{\imath} - 2\hat{\jmath} + 3\hat{k}, -2\hat{\imath} + 3\hat{\jmath} - 4\hat{k}, \hat{\imath} - 3\hat{\jmath} + 5\hat{k}$ 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) $< 3, 10, -7 >$
   - (B) $< 3, -5, -7 >$
   - (C) $< 3, 5, 7 >$
   - (D) $< 3, 5, -7 >$

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
   $$\vec{r} = 3\hat{i} + 2\hat{j} - 4\hat{k} + \lambda(\hat{i} + 2\hat{j} + 2\hat{k}) \text{ and } \vec{r} = 5\hat{i} - 2\hat{k} + \mu(3\hat{i} + 2\hat{j} + 6\hat{k})$$

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

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

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

# 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 $fog$ is :

   (A) $x^3 cos3x$          (B) $cos(3x^3)$ (C) $cos^3(3x)$          (D) $3cos(x^3)$

3. If $f(x) = x^2 - 1$ and $g(x) = \sqrt{x}$, then gof(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 $fof(x)$

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.

(17)

## 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 $P(neither\ A\ nor\ B)$ is

   (A) 41/60     (B) 19/30     (C) 41/120     (D) 19/60

2. In a single throw of two dice, the chances of throwing a sum of 8 is:

   (A) 7/36     (B) 1/18     (C) 1/9     (D) 5/36

3. A binomial distribution is given by B $\left[6, \frac{3}{4}\right]$, find the variance of the distribution

   (A) 9/2     (B) $\frac{3\sqrt{2}}{4}$     (C) 9/8     (D) 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.

ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

## SUBJECT: MATHEMATICS

## TEST- MATRICES AND DETERMINANTS

**M.M. 25**     **Class: ਬਾਰਵੀਂ**     **Time: 1 hour**

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

1. If $AB = C$ where $A$ is a matrix of order $3 \times 4$ and $C$ is a matrix of order $3 \times 5$, then the order of $B$ is :

   (A) $3 \times 5$     (B) $4 \times 5$     (C) $3 \times 3$     (D) $5 \times 5$

2. If $A = \begin{bmatrix} k & 10 \\ 3 & 5 \end{bmatrix}$ is a singular matrix, then the value of $k$ is equal to :

   (A) 0     (B) 6     (C) -6     (D1/6

3. A matrix which is both symmetric and skew-symmetric is a:

   (A) Zero matrix   (B) Scalar matrix   (C) Unit matrix   D) Diagonal matrix

4. If $A$ is a non-singular matrix of order 3 and $|A| = 2$, then $|Adj\ A|$ is

   (A) 8     (B) 4     (C) 6     (D) 9

5. Let $A$ be a square matrix of order $2 \times 2$, then $|kA|$ is

   (A) $k|A|$     (B) $k^2|A|$     (C) $k^3|A|$     (D) $2k|A|$

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

6. If $A = \begin{bmatrix} 3 & -2 \\ 4 & -2 \end{bmatrix}$, then find $k$ so that $A^2 = kA - 2I$

7. If $f(x) = x^2 - 5x + 7$ find $f(A)$   Where $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$

8. Using elementary operations, find the inverse of $\begin{bmatrix} 2 & 3 \\ 5 & 7 \end{bmatrix}$

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

9. For the matrix $A = \begin{bmatrix} 3 & 2 \\ 1 & 1 \end{bmatrix}$, find $a$ & $b$ so that $A^2 + aA + bI = O$. Hence find $A^{-1}$.

10. Express the matrix $A = \begin{bmatrix} -3 & 5 & 6 \\ -1 & 0 & 1 \\ 2 & 1 & 2 \end{bmatrix}$ as the sum of a symmetric and skew symmetric matrix.

### PART-D (Each question carries 6 mark)

11. Solve $2x - y + z = 4, x + 3y + 2z = 12, 3x + 2y + 3z = 16$

Or Using properties of determinants, prove that

$$\begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix} = 2(a+b+c)(ab+bc+ca-a^2-b^2-c^2)$$

## SUBJECT: MATHEMATICS

### TEST- LINEAR PROGRAMMING PROBLEM

**M.M. 24**                     **Class:** ਬਾਰਵੀਂ                     **Time: 1 hour**

*NOTE: Each question carries 6 mark*

1. Graphically maximize $Z = x + 2y$ subject to the constraints:

$$x + 2y \geq 10, 2x - y \leq 0, 2x + y \leq 200, x \geq 0, y \geq 0$$

2. Graphically minimize $Z = 5x + 10y$ subject to the constraints:

$$x + y \geq 60, x + 2y \leq 120, x - 2y \geq 0 \text{ and } x, y \geq 0$$

3. Every gram of wheat provides 0.1g of protein and 0.25 g of carbohydrates. The corresponding values for rice are 0.05g and 0.5g respectively. Wheat costs Rs. 4 per/kg and rice Rs. 6 per/kg. The minimum daily requirements of protein and carbohydrates for an average child are 50g and 200g respectively. In what quantities should wheat and rice be mixed in the daily diet so as to provide maximum daily requirements of protein and carbohydrates at minimum cost? Frame an L.P.P. and solve it graphically.

4. A shopkeeper manufactures gold rings and chains. The combined number of rings and chains manufactured per day is at most 24. It takes half an hour to make a ring and one hour for a chain. The maximum number of hours available is 16. If the profit on a ring is Rs. 100 and on a chain is Rs. 300. Frame a LPP to maximize the profit.

## SUBJECT: MATHEMATICS

## TEST- INVERSE TRIGONOMETRIC FUNCTIONS

**M.M. 25**     Class: ਬਾਰਵੀਂ     **Time: 1 hour**

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

1. If $y = \cos^{-1} x$, then

   A) $-\frac{\pi}{2} \le y \le \frac{\pi}{2}$   B) $-\pi \le y \le \pi$   C) $0 \le y \le \frac{\pi}{2}$   D) $0 \le y \le \pi$

2. The principal value of $sin^{-1}\left(\frac{1}{2}\right)$ is

   A) $\frac{5\pi}{6}$   B) $\frac{\pi}{6}$   C) $\frac{\pi}{3}$   d) $-\frac{5\pi}{6}$

3. $tan^{-1}(1) - cos^{-1}\left(\frac{1}{\sqrt{2}}\right)$ is equal to

   A) $\frac{\pi}{2}$   B) $\frac{\pi}{4}$   C) $0$   d) $\pi$

4. The value of $cosec(sec^{-1}x + cosec^{-1}x)$ is equal to

   A) $0$   B) $-\frac{\pi}{2}$   C) $1$   d) $\frac{\pi}{2}$

5. $cos^{-1}\left(cos\frac{7\pi}{6}\right)$ is equal to

   A) $\frac{7\pi}{6}$   B) $\frac{5\pi}{6}$   C) $\frac{\pi}{3}$   d) $\frac{\pi}{6}$

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

6. Prove that $tan^{-1}\frac{63}{16} = sin^{-1}\frac{5}{13} + cos^{-1}\frac{3}{5}$

7. Solve for $x$: $tan^{-1}(x + 2) + tan^{-1}(x - 2) = \frac{\pi}{4}$, $x > 0$

8. Prove that: $tan^{-1}\frac{\sqrt{1+z}+\sqrt{1-z}}{\sqrt{1+z}-\sqrt{1-z}} = \frac{\pi}{4} + \frac{1}{2}cos^{-1}z$

9. Prove that: $sin^{-1}\frac{4}{5} + sin^{-1}\frac{5}{13} + sin^{-1}\frac{16}{65} = \frac{\pi}{2}$

10. If $a, b, c$ are positive real numbers and $ab > -1, bc > -1, ca > -1$, then show that

$$cot^{-1}\frac{ab+1}{a-b} + cot^{-1}\frac{bc+1}{b-c} + cot^{-1}\frac{ca+1}{c-a} = 0$$

**SUBJECT: MATHEMATICS**

**TEST- INTEGRATION**

M.M. 25                        Class: ਬਾਰਵੀਂ                        Time: 1 hour

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

1. $\int \frac{1}{1+x^2} dx$ equals

   (A) $tan^{-1}x + c$        (B) $tan^{-1}x$        (C) $\log|1 + x^2| + c$        (D) $cot^{-1}x + c$

2. $\int e^x(\tan x + \log \sec x) \, dx$ equals

   (A) $e^x \tan x$        (B) $e^x \log \sec x + c$        (C) $e^x + \tan x + c$        (D) None of these

3. $\int (\cos x - \sin x) \, dx$ equals

   (A) $\cos x + \sin x + c$        (B) $\sin x - \cos x + c$        (C) $\cos x - \sin x + c$        (D) $\tan x + c$

4. $\int e^x(\frac{1}{x} - \frac{1}{x^2}) \, dx$ equals

   (A) $e^x \log x$        (B) $\frac{e^x}{x} + c$        (C) $-\frac{e^x}{x^2} + c$        (D) $x \log x + c$

5. $\int \frac{1}{x\sqrt{x^2-a^2}} dx$ equals

   (A) $\frac{1}{a} sec^{-1} \frac{x}{a} + c$        (B) $\frac{1}{a} cosec^{-1} \frac{x}{a} + c$        (C) $\frac{1}{a} tan^{-1} \frac{x}{a} + c$        (D) $sin^{-1} \frac{x}{a} + c$

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

6. Integrate:        $\int cot^2 x \, dx$

7. Integrate:        $\int_0^{\pi/2} \frac{dx}{1+\tan x}$

8. Integrate:        $\int \frac{1+\cos x}{1-\cos x} dx$

9. Integrate:        $\int x \log x^2 \, dx$

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

10. Evaluate $\int_1^4 (x^2 - x) \, dx$ as limit of a sum.

11. Integrate:        $\int \frac{2x+5}{\sqrt{4x^2+3x+2}} dx$

12. Integrate:        $\int \frac{x}{(x+1)^2(x+2)} \, dx$

## ਸਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

## SUBJECT: MATHEMATICS

## TEST- DIFFERENTIAL EQUATIONS

M.M. 25                 Class: ਬਾਰਵੀਂ                 Time: 1 hour

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

1. The degree of the differential equation $\frac{d^2y}{dx^2} + 3\left(\frac{dy}{dx}\right)^2 = x^2 \log\left(\frac{d^2y}{dx^2}\right)$

   (A) 1                 (B) 2                 (C) 3                 (D) not defined

2. The order of the differential equation $\frac{d^2y}{dx^2} - \left(\frac{dy}{dx}\right)^3 + 3y = 0$ is :

   (A) 3                 (B) 2                 (C) 1                 (D) 0

3. The integrating factor of the differential equation $\frac{dx}{dy} + \frac{x}{y} = y$ is:

   (A) $\log y$                 (B) $y$                 (C) $e^y$                 (D) none of these

4. The integrating factor of the differential equation $x\frac{dy}{dx} + 2y = x^2$ is:

   (A) $\log|x|$                 (B) $x$                 (C) $x^2$                 (D) $e^{\log x}$

5. The number of arbitrary constants in the general solution of a differential equation of fifth order is:

   (A) 0                 (B) 2                 (C) 3                 (D) 5

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

6. Find the differential equation of the family of curves given by $x^2 + (y - b)^2 = 1$

7. Find the particular solution of $\cos\left(\frac{dy}{dx}\right) = a, y = 1$ when $x = 0$

8. Solve : $\frac{dy}{dx} = \sin^2 y$

9. Find the general solution of $(1 + \cos x)\frac{dy}{dx} = (1 - \cos x)$

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

10. Solve :     $x\frac{dy}{dx} - y = 2x^3$

11. Solve :     $\frac{dy}{dx} = \frac{y-x}{x+y}$

12. Solve :     $x\cos\left(\frac{y}{x}\right)\frac{dy}{dx} = y\cos\left(\frac{y}{x}\right) + x$

## SUBJECT: MATHEMATICS

### TEST- APPLICATIONS OF INTEGRALS

**M.M. 20**           **Class: ਬਾਰਵੀਂ**           **Time: 1 hour**

*NOTE: Each question carries 4mark*

1. Find the area of the circle $x^2 + y^2 = 16$ and the line $y = x$ in the first quadrant.

2. Using integration, find the area of the region bounded by $(2, 1), (3, 4)$ and $(5, 2)$.

3. Find the area of the smaller region given by $\frac{x^2}{16} + \frac{y^2}{9} = 1$ and the straight line $3x + 4y = 12$.

4. Find the smaller area enclosed by the circle $x^2 + y^2 = 4$ and the line x+y = 2 .

5. Find the area included between the curves $y^2 = 4ax$ and $x^2 = 4ay$

सਕੂਲ ਸਿੱਖਿਆ ਵਿਭਾਗ, ਪੰਜਾਬ

## SUBJECT: MATHEMATICS

## TEST- APPLICATIONS OF DERIVATIVES

**M.M. 30**                    **Class: ਬਾਰਵੀਂ**                    **Time: 1 hour**

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

1. Find the point on the curve $y = x^3 - 2x^2 - 2x$ at which the tangent lines are parallel to the line $y = 2x - 3$.

2. Find the intervals for which the function $f(x) = 6 - 9x - 2x^2$ is strictly increasing and strictly decreasing.

3. Find the approximate value of $\sqrt{0.037}$ using differentials.

### PART-B (Each question carries 6 mark)

4. A wire of 36m length is to be cut into two pieces. One of the pieces is to be made into a square and the other into an equilateral triangle. What should be the lengths of the two pieces so that the combined area of the square and the triangle is minimum?

5. Find the height of a right circular cylinder of maximum volume, which can be inscribed in a sphere of radius 9 cm?

6. A window has the shape of a rectangle surmounted by semi-circle. If the perimeter of the window is 30 m, find the dimensions so that the greatest possible amount of light may be admitted in order that its area may be maximum.