

## Unit 1 : Vector Algebra

MCQs :

- 1) A vector in the direction of vector  $-2\hat{i} + 2\hat{j}$  that has magnitude 15 is  
a)  $-30\hat{i} + 30\hat{j}$   
b)  $-2\hat{i} + 15\hat{j}$   
c)  $-10\hat{i} + 10\hat{j}$   
d)  $-15\hat{i} + 15\hat{j}$
- 2) If Non zero vectors  $\vec{a}$  and  $\vec{b}$  and  $\hat{a}$  is a unit vector and  $\vec{a} \cdot \hat{a} = 1$   
Then angle between  $\vec{a}$  and  $\hat{a}$  is  
a)  $0^\circ$  b)  $45^\circ$  c)  $90^\circ$  d)  $180^\circ$
- 3) Area of Parallelogram whose diagonal is  $2\hat{i} - 2\hat{j}$  and one side is  $\hat{i} - \hat{j}$  is  
a)  $4$  b)  $3$  sq units  
c)  $6$  sq units d)  $6$  sq units
- 4) if  $|\vec{a}| = 8$  and  $|\vec{b}| = 3$  and  $|\vec{a} + \vec{b}| = 12$  then the value of  $|\vec{a} - \vec{b}|$  is  
a)  $12$  b)  $12$  c)  $6$  d)  $4$
- 5) A vector equally inclined to axes is  
a)  $\hat{i} + \hat{j}$  b)  $-\hat{i} + \hat{j}$  c)  $-\hat{i} - \hat{j}$  d)  $\hat{i} - \hat{j}$

Answer key :

- 1) d
- 2) c
- 3) b
- 4) a
- 5) a

**fill in the blanks:**

- (1) The value of the expression  $(\vec{a} \cdot \vec{b})^2$  is \_\_\_\_\_
- (2) If  $\vec{a}$  is any non - Zero vector , then  $(\vec{a} \cdot \vec{a}) \cdot (\vec{a} \cdot \vec{a})$  is \_\_\_\_\_

(3) The vectors  $\vec{a}$  and  $\vec{b}$  are adjacent sides of parallelogram, then angle between its diagonal is \_\_\_\_\_

(4) The angle bisects the angle between the non-collinear vectors  $\vec{a}$  and  $\vec{b}$  if \_\_\_\_\_

(5) If  $|\vec{a} + \vec{b}| = 144$  and  $|\vec{a} - \vec{b}| = 48$  then  $|\vec{a}|$  is \_\_\_\_\_

Answer :

1)  $|\vec{a}|$

3)

4)

5) 3

Short Question:

1) Find the unit vector in the direction of sum of vectors  $\vec{a}$  and  $2\vec{b}$   
Ans :  $\frac{\vec{a} + 2\vec{b}}{|\vec{a} + 2\vec{b}|}$

2) Find the area of a parallelogram whose adjacent sides are given by the vectors  $\vec{a}$  and  $\vec{b}$   
Ans :  $|\vec{a} \times \vec{b}|$

3) Find  $\vec{a} \cdot \vec{b}$  if  $|\vec{a}| = 3$  and  $|\vec{b}| = 5$   
Ans :  $15 \cos \theta$

4). A force of 50 N acts on the block at the angle  $30^\circ$  block moves a horizontal distance of 3.0 m. How much work is done by the applied force?  
Ans : 129.9 joules

5 ) A 200 g mass is placed on the meter stick 20 cm from the fulcrum. An unknown mass is positioned 8 cm from the fulcrum to balance the system. What is the mass of this unknown object?  
Ans : 0.5 kg [ hint :  $\tau = r \times F \sin \theta$ ]

## Unit 2: Introduction of Statistics

**MCQ:**

1) Which of the following is a qualitative variable? ...

- a) Annual salary
- b) Weight
- c) Age
- d) Eye Colour

2) A population value or characteristic that is of interest to us and that we would like to estimate is...

- a) hypothesis
- b) statistic
- c) population
- d) parameter ...

3) What is statistical inference? ...

- a) The process of drawing conclusions about a sample based on population data
- b) The process of drawing conclusions about a statistic based on a parameter.
- c) The process of drawing conclusions about a population based on sample data.
- d) None of the above

4) If you have data on the yearly average temperature at Cape Town International Airport from 1900 to 2000, and if you are particularly interested in change over time, what is the most effective graphical display ?

- a) Histogram
- b) Bar graph
- c) Pie diagram
- d) Line graph

5) A histogram is a graphical representation of which of the following:

- a) An ogive
- b) A frequency distribution
- c) A cumulative relative frequency distribution

d) All of the above

Answer key :

1) d    2) d    3) c    4) d    5) b

**Fill in the blanks:**

- 1) \_\_\_\_\_ is an orderly arrangement of data in rows and column.
- 2) \_\_\_\_\_ is a visual form of presenting tabulated data.
- 3) Vertical rectangles representing class frequencies in a frequency distribution is called \_\_\_\_\_
- 4) A frequency polygon is a \_\_\_\_\_ line curve.
- 5) \_\_\_\_\_ diagrams are used for comparisons

Answer Key:

- 1) Table      2) diagram      3) Histogram      4) Straight Line      5) Multi  
bar

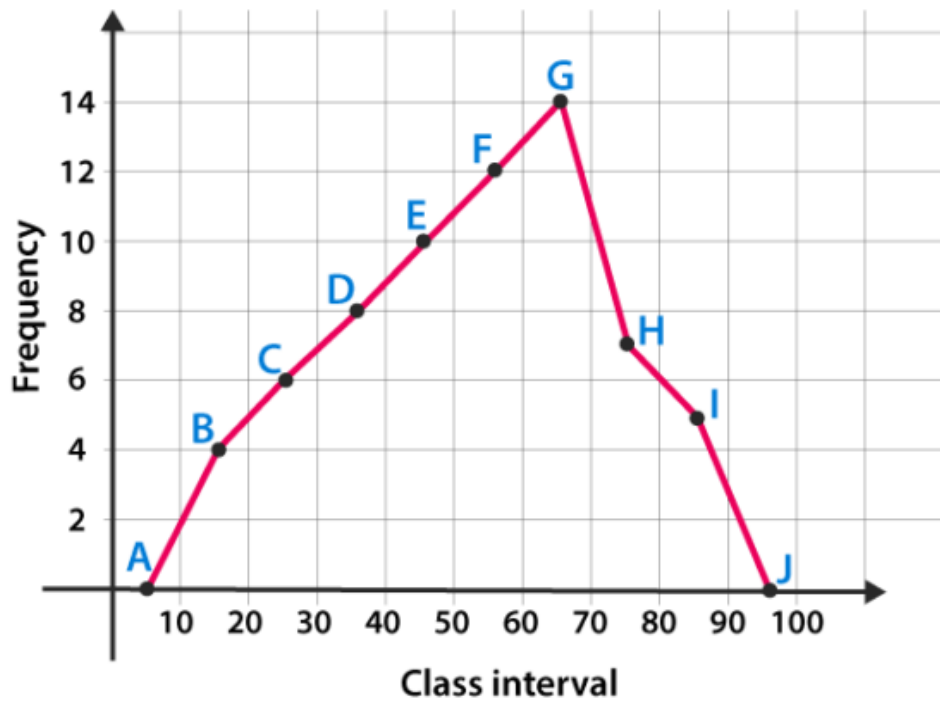
Questions: Solve the following Question.

- 1) Draw the frequency polygon for the following data

|                |       |       |       |       |       |       |       |       |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Class interval | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
| Frequency      | 4     | 6     | 8     | 10    | 12    | 14    | 7     | 5     |

Sol

:



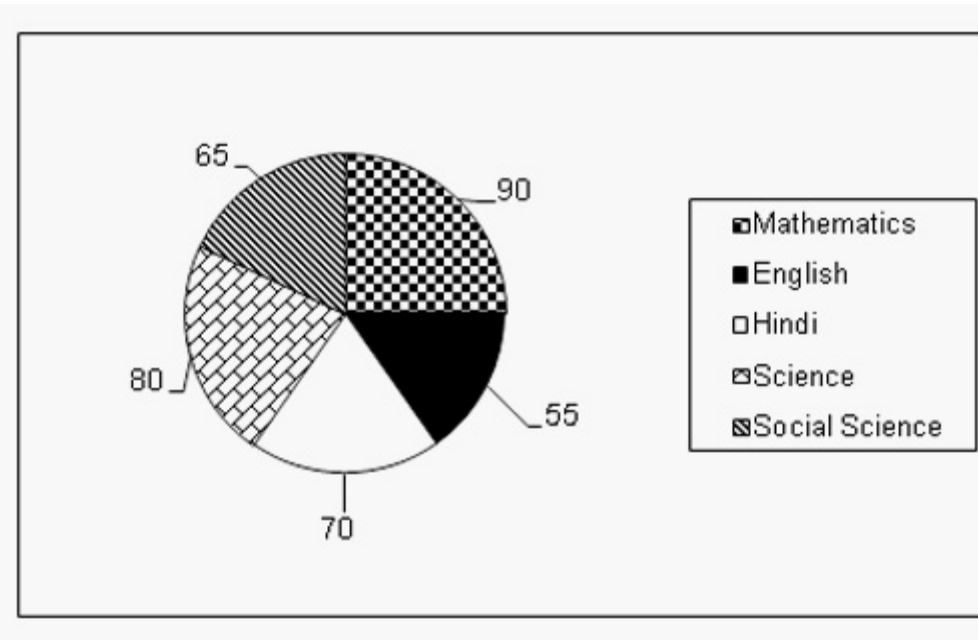
2) The population of Delhi state in different census year is as given below.

|                   |      |      |      |      |      |
|-------------------|------|------|------|------|------|
| Census year       | 1961 | 1971 | 1981 | 1991 | 2001 |
| Population (lakh) | 30   | 55   | 70   | 110  | 150  |

3) refer to the pie chart given below and answer the questions that follow.

The given pie chart shows the marks scored by a student in different subjects- English, Hindi, Mathematics, Science and Social Science in an examination. The values given are in degrees.

**Assumption:** Total marks obtained in the examination are 900.



1) If the total marks were 3000, then marks in Mathematics would be

1. 800
2. 750
3. 850
4. 900

2) The Marks scored in English and Mathematics is less than the marks scored in Science and Hindi by

1. 5%
2. 4.33%
3. 3.33%
4. 6%

3) 3. If the marks scored by the student are 137.5, then the subject is

1. English
2. Hindi
3. Mathematics
4. Science

4) Total marks scored in Social Science and English is

1. 400

2. 350

3. 500

4. 300

5) The difference of marks scored in Social Science and Science is

1. 37.5

2. 40

3. 20

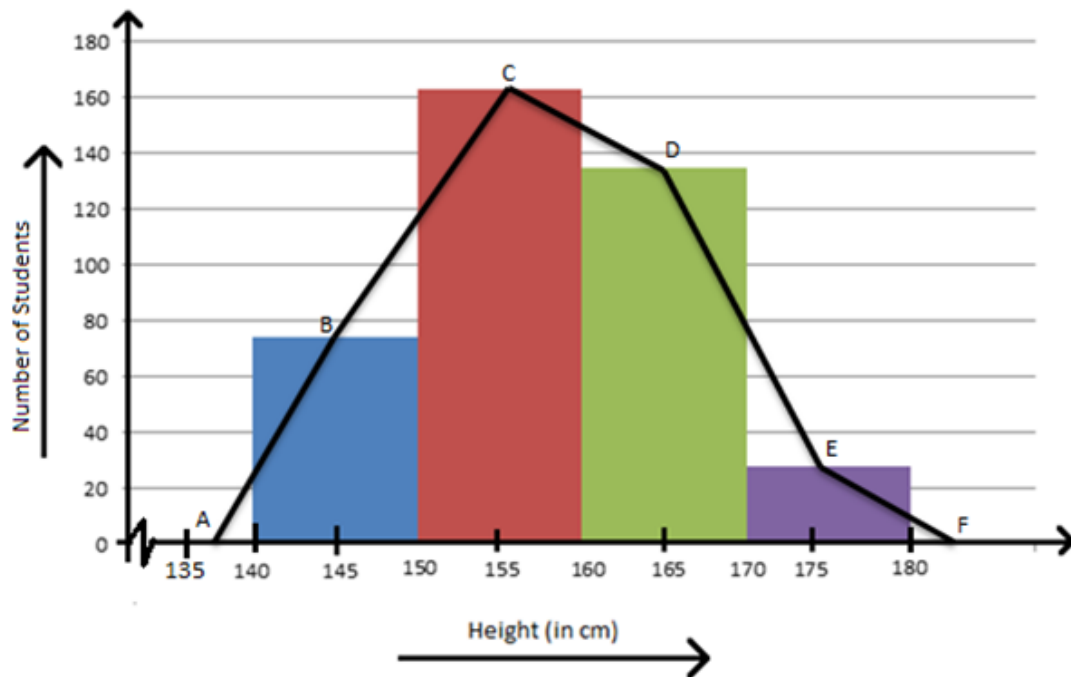
4. 15

Ans : 2, 3 , 1, 4, 1

4 ) In a batch of 400 students, the height of students is given in the following table. Represent it through a frequency polygon

| Height ( in cm) | No of students |
|-----------------|----------------|
| 140-150         | 74             |
| 150-160         | 163            |
| 160-170         | 135            |
| 170-180         | 28             |
| Total           | 140            |

**Solution :**



### Unit 3: Measures of central tendency and Dispersion

#### MCQ s:

- 1) Which of the following statistics measures the most frequently occurring value in a set of data?  
a) median      b) mode      c) mean      d) None of above
- 2) The mean temperature for the past ten days was  $22^{\circ}$  Celsius. If the sum of the temperatures for the first nine days was 200, what was the temperature on day 10?  
a) 22      b) 32      c) 10      d) 20
- 3) The method used to compute average or central value of the collected data is considered as  
a) measures of positive variation      b) measures of central tendency  
c) measures of negative skewness      d) measures of negative variation
- 4) Given the following set of data, what is the variance? [ 2 6 8 3 7 9 1 4 ]



a) 40

b) 2.74

c) 5

d) 7.5

5) Let be the ordered

pairs of the variables . What is the value of the rank correlation coefficient between u and v ?

a)  $r = 1$

b)  $r = 0.5$

c)  $r = 0$

d)  $r = -1$

Ans key : 1 ) b

2) d

3 ) b

4) d

5) c

### Fill in the blanks :

- 1) Range of correlation coefficient is \_\_\_\_\_
- 2) The arithmetic mean is 12 and the number of observations are 20 then the sum of all the values are \_\_\_\_\_
- 3) For two variables and , if an increment in values of ensures a decrement in values of then correlation is said to be \_\_\_\_\_
- 4) \_\_\_\_\_ correlation between variable u and v if \_\_\_\_\_
- 5) The central tendency median to be measured must lie in \_\_\_\_\_

Ans key : 1) -1 to 1

2) 240

3) Negative correlation

4) positive correlation

5) Second quartile

### Questions : Solve the following

- 1) Ten competitors in a beauty contest are ranked by three judges in the following order. Use rank correlation coefficient to determine which of the two judges have similar approach.

|                          |   |   |   |    |   |    |   |    |   |   |
|--------------------------|---|---|---|----|---|----|---|----|---|---|
| 2) 1 <sup>st</sup> judge | 1 | 6 | 5 | 10 | 3 | 2  | 4 | 9  | 7 | 8 |
| 2 <sup>nd</sup> judge    | 3 | 5 | 8 | 4  | 7 | 10 | 2 | 1  | 6 | 9 |
| 3 <sup>rd</sup> judge    | 6 | 4 | 9 | 8  | 1 | 2  | 3 | 10 | 5 | 7 |

Ans :  $r_1 = -0.212$ ,  $r_2 = 0.284$ ,  $r_3 = 0.637$

First and Third judge have similar approach .

2) From the following table calculate the coefficient of correlation by Karl Pearson's method. Arithmetic means of X and Y series are 6 and 8 respectively.

|   |   |    |    |   |   |
|---|---|----|----|---|---|
| X | 6 | 2  | 10 | 4 | 8 |
| Y | 9 | 11 | ?  | 8 | 7 |

Ans : Missing value = 5,  $r = -0.920$

3) Find Mean, Median and Mode for below observation.

15, 17, 12, 13, 14, 16, 1, 8, 18, 14

Ans : Mean : 12.8 , Median : 14 , Mode 14

4) Find mode of the following data

| X                | 0-10 | 10-20 | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 | 90-100 |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Y(No of student) | 3    | 5     | 7     | 10    | 12    | 15    | 12    | 6     | 2     | 8      |

Ans : 55

5 ) The scores for student are 40, 45, 49, 53, 61, 65, 71, 79, 85, 91. What is the percentile for score 71?

Ans: 60

6 Calculate Quartile-2, Percentiles-45 from the following data  
85, 96, 76, 108, 85, 80, 100, 85, 70, 95)

Ans : 85 , 85

