I. Choose the correct answer. $7 \times 1 = 7$

1. If P(E) = 0.09, then find P(Not E) = ...

Sol. P(not E)= $1 - P(E) = 1 - 0.09 = 0.91$

2. If sin**θ** = cos**θ** then, **θ** = ... [C]

A) 0^0 B) 35^0 B) 45^0 B) 60^0

3. In the formula, Mean $(\bar{x}) = a + \left(\frac{\sum f_i u_i}{\sum f_i}\right) \times h$, the value of u_i = [D]

A) $\frac{x_i + a}{h}$ B) $(x_i - a)h$ B) $\frac{a - x_i}{h}$ B) $\frac{x_i - a}{h}$

4. A single letter is selected at random from the word "MATHEMATICS", the probability that it is a vowel is.....

Sol. $\frac{4}{11}$

5. Assertation (A) : Mode of $sin\ 0^0, tan\ 45^0, cos\ 0^0, sin\ 90^0, and\ cos\ 90^0$ is 1. [A]

Reason (R) : Mode is the most frequently occurred observation in the given data.

A) Both A and R are true and R is the correct explanation of A

B) Both A and R are true but R is the not correct explanation of A

C) A is true but R is false

D) A is false but R is true.

6. Match the following [B]

i)	**Sin θ**	a) $\frac{1}{cos\theta}$
ii)	**Tan θ**	b) $\sqrt{1 - cos^2\theta}$
iii)	**Sec θ**	c) $\frac{sin\theta}{cos\theta}$

Choose the correct answer :

A) i – c, ii – b, iii – a

B) i – b, ii – c, iii – a

C) i – b, ii – a, iii – c

D) i – c, ii – a, iii – b

7. Find the value of $sin^2\theta + cos^2\theta =$

Sol. $sin^2\theta + cos^2\theta = 1$

II. Solve the following problems. $6 \times 2 = 12$

8. A dice is thrown once, find the Probability of getting

i) an even number ii) a number lying between 2 and 6

Sol. Probability of an event E = P(E) = $\frac{\text{Number of outcomes favourable to E}}{\text{Number of all possible outcomes}} = \frac{n(E)}{n(S)}$

A dice is thrown once then S = {1, 2, 3, 4, 5, 6} n(S) = 6

i) A= The event "getting Even numbers" = { 2, 4, 6} n(A) 3

P(An even number) = $\frac{n(A)}{n(S)} = \frac{3}{6} = \frac{1}{2}$

ii) B = The event "getting A number lying between 2 and 6" = { 3, 4, 5} n(B)= 3

P(A number lying between 2 and 6) = $\frac{n(B)}{n(S)} = \frac{3}{6} = \frac{1}{2}$

9. Write the formula to find mode of grouped data and explain each term in it.

Sol. Mode for Grouped data :

$$\text{Mode} = l + \left(\frac{f_1 - f_0}{2f_1 - f_0 - f_2}\right) \times h$$

where l = lower boundary of the modal class

f_1 = frequency of the modal class

f_0 = frequency of the class preceding the modal class

f_2 = frequency of the class succeeding the modal class

h = size of the modal class

10. Prove that $\sqrt{\frac{1+sinA}{1-sinA}} = \sec A + \tan A$

Sol. $\sqrt{\frac{1+sinA}{1-sinA}} = \sqrt{\frac{(1+sinA)(1+sinA)}{(1-sinA)(1+sinA)}}$

$$= \sqrt{\frac{(1+sinA)^2}{1-sin^2A}}$$

$$= \frac{\sqrt{(1+sinA)^2}}{\sqrt{cos^2A}} = \frac{1+sinA}{cosA}$$

$$= \frac{1}{cosA} + \frac{sinA}{cosA}$$

$$= secA + tan A$$

Hence Proved.

11. *If* $Sin\,(A-B)=\frac{1}{2}, Cos\,(A+B)=\frac{1}{2},\ 0^0<A+B\le 90^0, A>B$, *Find A and B*

Sol. $Sin\,(A-B)=\frac{1}{2}$ $\qquad$ $Cos\,(A+B)=\frac{1}{2}$

$\Rightarrow Sin\,(A-B)=\text{Sin}\,30^0$ $\qquad$ $\Rightarrow Cos\,(A+B)=\text{Cos}\,60^0$

$\Rightarrow A-B=30^0$ ..... (1) $\qquad$ $\Rightarrow A+B=60^0$ ..... (2)

$(1)+(2)\Rightarrow A-B+A+B=30^0+60^0$

$\Rightarrow 2A=90^0$

$\Rightarrow A=\frac{90^0}{2}$

$\Rightarrow A=45^0$

$From\ (2), 45^0+B=60^0$

$\Rightarrow B=60^0-45^0=15^0$

12. *A bag contains 3 red balls and 5 black balls. A ball is drawn at random from the bag. What is the probability that the ball drawn is not red.*

Sol. S= A bag contains 3 red balls and 5black balls

$n(S)=3+5=8$

E = The event "Not getting a red ball"

$n(E)=5$

P(Not getting red ball) $=\frac{n(E)}{n(S)}=\frac{5}{8}$

13. *State whether* $sin(A+B)=sinA+sinB$ *is true or false. Justify your answer.*

Sol. $sin(A+B)=sinA+sinB\ is\ false$

Let us take A= 30^0 and B = 60^0

L.H.S. $=sin(A+B)=sin(30^0+60^0)=\text{sin}90^0=1$

R.H.S. $=sinA+sinB=\text{sin}30^0+sin60^0=\frac{1}{2}+\frac{\sqrt{3}}{2}=\frac{1+\sqrt{3}}{2}$

L.H.S. $\neq$ R. H. S. $\Rightarrow sin(A+B)=sinA+sinB$ is False

III. Solve the following problems. $6\times 2=12$

14. *Prove that* $(sinA+cosecA)^2+(cosA+secA)^2=7+tan^2A+cot^2A$

Sol. $L.H.S = (sinA+cosecA)^2+(cosA+secA)^2$

$=sin^2A+cosec^2A+2.sinA.cosecA+cos^2A+sec^2A+2.cosA.secA$

$=sin^2A+cos^2A+cosec^2A+sec^2A+2sinA\times\frac{1}{sinA}\times 2cosA\times\frac{1}{cosA}$

$=1+cosec^2A+sec^2A+2+2$

$=1+(1+cot^2A)+(1+tan^2A)+4=7+tan^2A+cot^2A=$R.H.S

15. ***A box contains 100 discs which are numbered from 1 to 100. If one disc is drawn at random from the box. Find the probability that it bears***
i) a two digit number ***ii) a perfect square***

Sol. Probability of an event E = P(E) $= \frac{\text{Number of outcomes favourable to E}}{\text{Number of all possible outcomes}} = \frac{n(E)}{n(S)}$

$S = (1, 2, 3 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 100)$ n(S) = 100

i) A = The event "getting a two digit number"

Favourable out comes = {10, 11, 12, ……..99}

n(A) = 90

P(getting a two digit number) $= \frac{n(A)}{n(S)} == \frac{90}{100} = \frac{9}{10}$

ii) B = The event "getting a perfect square"

Favourable out comes = {1, 4, 9, 16, 25, 36, 49, 64, 81, 100}

n(B) = 10

P(getting a perfect square) $= \frac{n(B)}{n(S)} = \frac{10}{100} = \frac{1}{10}$

IV. Solve the following problems. $1 \times 8 = 8$

16. ***a) Determain the median of the following frequency distribution.***

Class intervals	15-20	20-25	25-30	30-35	35-40	40-45
Frequency	8	15	20	12	9	6

Sol:

Class interval	frequency	Cumulative frequency
15-20	8	8
20-25	15	23→ cf
l←25-30	20→f	43
30-35	12	55
35-40	9	64
40-45	6	70

→ Median class

$n = 70, \quad \frac{n}{2} = \frac{70}{2} = 35$

So, Median class is $25 - 30$

$l = 25, \quad cf = 23, f = 20, h = 5$

$$\text{Median} = l + \left(\frac{\frac{n}{2} - cf}{f}\right) \times h$$

$$= 25 + \left(\frac{35 - 23}{20}\right) \times 5$$

$$= 25 + 3 = 28$$

$$\therefore Median = 28$$

16. *b*) One card is drawn from a well shuffled deck of 52 cards. Find the Probability of getting .

i) a face card ii) a spade iii) the queen of heart iv) a king

Sol. Probability of an event E = P(E) = $\frac{\text{Number of outcomes favourable to E}}{\text{Number of all possible outcomes}} = \frac{n(E)}{n(S)}$

i) A = The event "getting a face card"

$$n(A) = 3+3+3+3 = 12$$

$$\text{P(getting a face card)} = \frac{n(A)}{n(S)} = \frac{12}{52} = \frac{3}{13}$$

ii) B = The event "getting a spade"

$$n(B) = 13$$

$$\text{P(getting a spade)} = \frac{n(B)}{n(S)} = \frac{13}{52} = \frac{1}{4}$$

iv) C = The event "getting the queen of heart"

$$n(C) = 1$$

$$\text{P(getting the queen of heart)} = \frac{n(C)}{n(S)} = \frac{1}{52}$$

v) D = The event "getting a king"

$$n(D) = 4$$

$$\text{P(getting a king)} = \frac{n(D)}{n(S)} = \frac{4}{52} = \frac{1}{13}$$