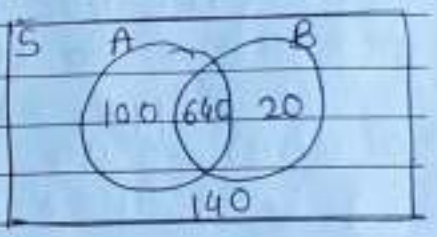
Semester : III Subject : DSGT Academic Year: 2022-2023

ex (1) In an examination, there were two papers A and B 900 students appeared for the examination. Exactly 740 and 660 passed in papers A and B respectively 640 passed in both. Find the no of students who failed in both papers.

⇒

$n(S) = 900$
$n(A) = 740$
$n(B) = 660$
$n(A \cap B) = 640$



The number of students who passed in either A or B or both.

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$= 740 + 660 - 640$
$= 760$

∴ The no of students who failed in both papers

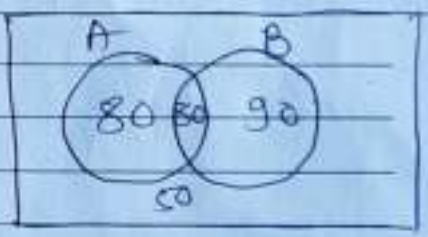
$n(A \cup B) = n(S) - n(A \cup B)$
$= 900 - 760$
$= 140$

Semester: III Subject: DSGT Academic Year: 2022-2023

ex. (2) In a group of 300 persons 160 drink tea and 170 drink coffee, 80 of them drink both. How many persons do not drink either?

$n(S)$ = the no. of persons surveyed = 300
$n(A)$ = the no. of persons who drink tea = 160
$n(B)$ = the no. of persons who drink coffee = 170
$n(A \cap B)$ = the no. of persons who drink both = 80

∴ The no. of persons who drink either tea or coffee or both.



$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$= 160 + 170 - 80$
$= 250$

∴ The no. of persons who do not drink either
$n(\overline{A \cup B}) = n(S) - n(A \cup B)$
$= 300 - 250$
$= 50$

Semester: III Subject: DSGT Academic Year: 2022-2023

(3) In a class of 25 students of Economics and Politics, 12 students have taken Economics. Out of these 8 have taken Economics but not Politics. Find the no. of students who have taken Economics and Politics and those who have taken Politics but not Economics.

⇒

We have,

$n(S)$ = no of students in class = 25

$n(E)$ = no. of students who have Economics = 12

$n(P)$ = no of students who have taken Politics but not Economics

$= n(S) - n(E) = 1$

$= 25 - 12$

$= 13$

$n(E - P)$ = no. of students have taken Economics ~~and~~ but not Politics

$= n(E \cap \bar{P}) = 8$ ... given

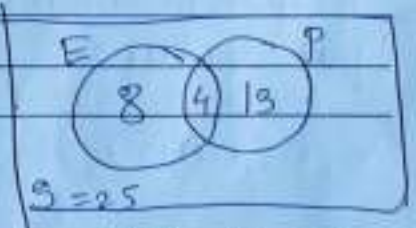
$n(E-P) = n(E) - n(E \cap P)$

$8 = 12 - n(E \cap P)$

$n(E \cap P) = 12 - 8$

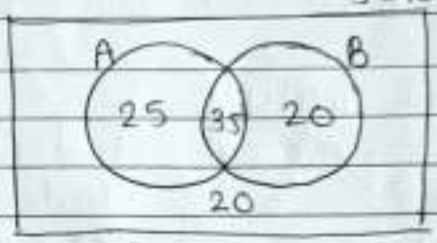
$= 4$

no. of students have taken Economics ~~but not~~ and Politics = 4.



Semester: III Subject: DSGT Academic Year: 2022-2023

ex. (5) In a town there are 2000 literate persons - 60% of them read newspaper A. 55% of them read newspaper B. and 20% read ~~newspaper~~ neither A nor B. How many persons read i) both the newspapers A & B? ii) only one newspaper?



Let $n(S)$ = no. of persons = 100

$n(A)$ = % of persons who read A = 60

$n(B)$ = % of persons who read B = 55

$n(\bar{A} \cap \bar{B}) = n(\overline{A \cup B})$ = ~~no~~ % of persons neither read A nor B.

$= 20$

$n(A \cup B)$ = % of persons read either A or B or both

$n(A \cup B) = n(S) - n(\overline{A \cup B})$

$= 100 - 20$

$= 80$

Now we find % of persons who read both

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

put values

$80 = 60 + 55 - n(A \cap B)$

$n(A \cap B) = 60 + 55 - 80$

$= 35$

∴ The percentage(%) of persons who read A only

$n(A-B) = n(A \cap \bar{B})$

$= n(A) - n(A \cap B)$

$= 60 - 35 = 25$

% of persons who read B only.

$n(B-A) = n(B \cap \bar{A})$

$= n(B) - n(A \cap B)$

$= 55 - 35 = 20$

% of persons who read only one newspaper

$n(A-B) + n(B-A) = 25 + 20$

$= 45$

i) Number of persons who read both

$= 2000 \times \frac{35}{100} = 700$

ii) Number of persons who read only one

$= 2000 \times \frac{45}{100} = 900.$

Semester: III Subject: DSGT Academic Year: 2022-2023

ex. 5) In a class of 60 students, 30 students got first class in sem I exam and 25 got first class in sem II. If 20 students did not get first class in either exam. How many got first class in both exam?

⇒

$n(S) = 60$ = no. of students in a class

$n(A)$ = no. of students got first class in sem I = 30

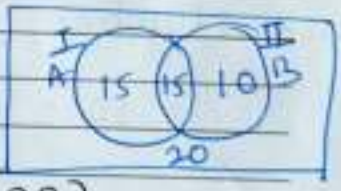
$n(B)$ = no. of students got first class in sem II = 25

$n(\bar{A} \cup \bar{B}) = n(\bar{A} \cap \bar{B})$

= no. of students did not get first class

= 20

No. of students got first class in in either sem I or sem II or both.



$n(A \cup B) = n(S) - n(\overline{A \cup B})$

$= 60 - 20$

$= 40$

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

$40 = 30 + 25 - n(A \cap B)$

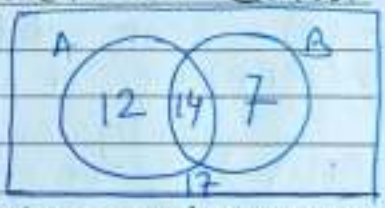
$n(A \cap B) = 30 + 25 - 40 = 15$

no. of students got first class in both exam = 15.

Semester : III Subject : DSGT Academic Year: 2022-2023

ex. (6) Among 50 students in a class, 26 got A in the exam and 21 got A in the second exam. If 17 students did not got an A in either exam, how many students got A in both exam?

$n(S) = 50$ = no. of students in class
$n(A)$ = no. of students got A = 26
$n(B)$ = no. of students got A in second exam = 21
$n(\bar{A} \cup \bar{B}) = n(\bar{A} \cap \bar{B})$ = no. of students did not get A in either exam
$= 17$



$n(A \cup B) = n(S) - n(\overline{A \cup B})$
$= 50 - 17$
$= 33$

no. of students got A in either or both exam $= 33$

no. of students got A in both exam

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$
$33 = 26 + 21 - n(A \cap B)$
$n(A \cap B) = 26 + 21 - 33$
$= 14$.

Semester : III Subject : DSGT Academic Year: 2022-2023

ex. (7) In a class 42 % students passed in Maths, 45 % in Physics, 41 % of passed Chemistry, 16 % passed in Maths & physics, 19 % passed in Phy. & Chem, 18 % in Chem and Maths. Find no. of students who passed in all 3 subjects, if there were 260 students in a class & 15 % students failed in all subjects.

⇒ ~~% of~~ no. of students in class = 100

$n(M)$ = % of students passed in Maths = 42

$n(P)$ = % of students passed in Physics = 45

$n(C)$ = % of students passed in Chemistry = 41

$n(M \cap P)$ = % of students passed in Maths & Physics = 16

$n(M \cap C)$ = % of students passed in Maths & Chemistry = 18

$n(P \cap C)$ = % of students passed in Physics & chemistry = 19.

$n(\overline{M \cup P \cup C})$ = ~~no.~~ % of students failed in all subjects = 15

% no. of students passed in all subjects.

$n(M \cup P \cup C) = n(S) - n(\overline{M \cup P \cup C})$

$= 100 - 15$

$= 85$

Semester : III Subject : DSGT Academic Year: 2022-2023

$n(M \cup P \cup C) = n(M) + n(P) + n(C) - n(M \cap P) - n(M \cap C) - n(P \cap C) + n(M \cap P \cap C)$

$85 = 42 + 45 + 41 - 16 - 18 - 19 + n(M \cap P \cap C)$

$n(M \cap P \cap C) = 42 + 45 + 41 - 16 - 18 - 19 + 85$

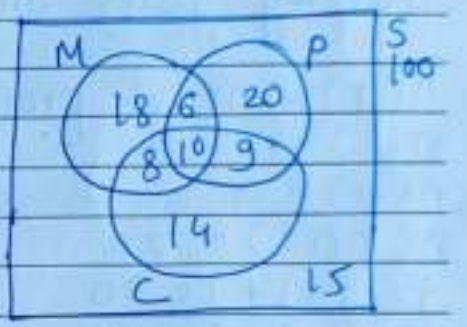
$= 85 - 42 - 45 - 41 + 16 + 18 + 19$

$= 10$

Number of students passed in all subjects

$= 260 \times \frac{10}{100}$

$= 26$



ex. (8) Out of 250 students who failed in an exam it was found that 128 failed in Maths, 87 failed in Physics, 134 in Applied Mechanics, 31 failed in Maths & Phy, 54 failed in Applied Mechanics and Maths, 30 failed in Applied Mechanics & Physics. Find how many candidates failed in i) all the three subjects, ii) in Maths but not in Phy iii) in Applied Mechanics but not in Maths iv) in Phy but not in Applied Mechanics nor in Maths.

Semester : III Subject : DSGT Academic Year: 2022-2023

ex. (9) In an university, it was found that, 60% of the professors play tennis, 50% of them play cricket, 70% of them play football, 20% of them play tennis and cricket, 30% play tennis and football, 40% play cricket & football. If someone claimed that 20% of the professors play tennis, & cricket and also football. Would you accept this claim? Justify your answer?

$n(T)$ = no. of professors play tennis = 60
$n(C)$ = play cricket = 50
$n(F)$ = play football = 70
$n(T \cap C) = 20$
$n(T \cap F) = 30$
$n(C \cap F) = 40$
$n(T \cap C \cap F) = 20$

$$n(T \cup C \cup F) = n(T) + n(C) + n(F) - n(T \cap F) - n(C \cap F) - n(T \cap C) + n(T \cap C \cap F)$$
$$= 60 + 50 + 70 - 20 - 30 - 40 + 20$$
$$= 110$$

The claim is not acceptable as given total should be 100.