36. TABULATION

This section comprises of questions in which certain data regarding common disciplines as production over a period of a few years : imports, exports, incomes of employees in a factory, students applying for and qualifying a certain field of study etc. are given in the form of a table. The candidate is required to understand the given information and thereafter answer the given questions on the basis of comparative analysis of the data.

Thus, here the data collected by the investigator are arranged in a systematic form in a table called the *tabular form*. In order to avoid some heads again and again, tables are made consisting of horizontal lines called *rows* and vertical lines called *columns* with distinctive heads, known as *captions*. Units of measurements are given with the captions.

SOLVED EXAMPLES

Ex. 1. ***The following table gives the sales of batteries manufactured by a company over the years. Study the table and answer the questions that follow :***

(S.B.I.P.O. 1998)

NUMBER OF DIFFERENT TYPES OF BATTERIES SOLD BY A COMPANY OVER THE YEARS (NUMBERS IN THOUSANDS)

Year	TYPES OF BATTERIES					
	4AH	7AH	32AH	35AH	55AH	Total
1992	75	144	114	102	108	543
1993	90	126	102	84	126	528
1994	96	114	75	105	135	525
1995	105	90	150	90	75	510
1996	90	75	135	75	90	465
1997	105	60	165	45	120	495
1998	115	85	160	100	145	605

1. The total sales of all the seven years is the maximum for which battery ?
   (*a*) 4AH (*b*) 7AH (*c*) 32AH (*d*) 35AH (*e*) 55AH
2. What is the difference in the number of 35AH batteries sold in 1993 and 1997 ?
   (*a*) 24000 (*b*) 28000 (*c*) 35000 (*d*) 39000 (*e*) 42000
3. The percentage of 4AH batteries sold to the total number of batteries sold was maximum in the year :
   (*a*) 1994 (*b*) 1995 (*c*) 1996 (*d*) 1997 (*e*) 1998
4. In the case of which battery there was a continuous decrease in sales from 1992 to 1997 ?
   (*a*) 4AH (*b*) 7AH (*c*) 32AH (*d*) 35AH (*e*) 55AH
5. What was the approximate percentage increase in the sales of 55AH batteries in 1998 compared to that in 1992 ?
   (*a*) 28% (*b*) 31% (*c*) 33% (*d*) 34% (*e*) 37%

Sol. 1. (*c*) : The total sales (in thousands) of all the seven years for various batteries are :

For 4AH = 75 + 90 + 96 + 105 + 90 + 105 + 115 = 676

For 7AH = 144 + 126 + 114 + 90 + 75 + 60 + 85 = 694

For 32AH = 114 + 102 + 75 + 150 + 135 + 165 + 160 = 901

For 35 AH = 102 + 84 + 105 + 90 + 75 + 45 + 100 = 601

For 55 AH = 108 + 126 + 135 + 75 + 90 + 120 + 145 = 799.

Clearly, sales are maximum in case of 32AH batteries.

2. (*d*) : Required difference = [(84 − 45) × 1000] = 39000.

3. (*d*) : The percentages of sales of 4AH batteries to the total sales in different years are :

For 1992 $= \left(\frac{75}{543} \times 100\right)\% = 13.81\%$; **For 1993** $= \left(\frac{90}{528} \times 100\right)\% = 17.05\%$;

For 1994 $= \left(\frac{96}{525} \times 100\right)\% = 18.29\%$; **For 1995** $= \left(\frac{105}{510} \times 100\right)\% = 20.59\%$;

For 1996 $= \left(\frac{96}{465} \times 100\right)\% = 19.35\%$; **For 1997** $= \left(\frac{105}{495} \times 100\right)\% = 21.21\%$;

For 1998 $= \left(\frac{115}{605} \times 100\right)\% = 19.01\%$.

Clearly, the percentage is maximum in 1997.

4. (*b*) : From the table it is clear that the sales of 7AH batteries have been decreasing continuously from 1992 to 1997.

5. (*d*) : Required Percentage $= \left[\frac{(145 - 108)}{108} \times 100\right]\% = 34.26\% = 34\%$.

Ex. 2. ***Study the following table carefully and answer these questions :*** (S.B.I.P.O. 2002)

NUMBER OF CANDIDATES APPEARED AND QUALIFIED IN A COMPETITIVE EXAMINATION FROM DIFFERENT STATES OVER THE YEARS

Year / State	1997		1998		1999		2000		2001	
	App.	Qual.	App.	Qual.	App.	Qual.	App.	Qual.	App.	Qual.
M	5200	720	8500	980	7400	850	6800	775	9500	1125
N	7500	840	9200	1050	8450	920	9200	980	8800	1020
P	6400	780	8800	1020	7800	890	8750	1010	9750	1250
Q	8100	950	9500	1240	8700	980	9700	1200	8950	995
R	7800	870	7600	940	9800	1350	7600	945	7990	885

1. Combining the states P and Q together in 1998, what is the percentage of the candidates qualified to that of the candidates appeared ?
(*a*) 10.87% (*b*) 11.49% (*c*) 12.35% (*d*) 12.54% (*e*) 13.05%

2. The percentage of the total number of qualified candidates to the total number of appeared candidates among all the five states in 1999 is :
(*a*) 11.49% (*b*) 11.84% (*c*) 12.21% (*d*) 12.57% (*e*) 12.73%

3. What is the percentage of candidates qualified from State N for all the years together, over the candidates appeared from State N during all the years together ?
(*a*) 12.36% (*b*) 12.16% (*c*) 11.47% (*d*) 11.15% (*e*) None of these

4. What is the average of candidates who appeared from State Q during the given yeas ?
(a) 8700 (b) 8760 (c) 8810 (d) 8920 (e) 8990

5. In which of the given years the number of candidates appeared from State P has maximum percentage of qualified candidates ?
(a) 1997 (b) 1998 (c) 1999 (d) 2000 (e) 2001

6. Total number of candidates qualified from all the states together in 1997 is approximately what percentage of the total number of candidates qualified from all the states together in 1998 ?
(a) 72% (b) 77% (c) 80% (d) 83% (e) 86%

Sol. 1. (c) : Required Percentage $= \left[\frac{(1020+1240)}{(8800+9500)} \times 100\right]\% = \left(\frac{2260}{18300} \times 100\right)\%$

$= 12.35\%.$

2. (b) : Required Percentage $= \left[\frac{(850+920+890+980+1350)}{(7400+8450+7800+8700+9800)} \times 100\right]\%$

$= \left(\frac{4990}{42150} \times 100\right)\% = 11.84\%.$

3. (d) : Required Percentage $= \left[\frac{(840+1050+920+980+1020)}{(7500+9200+8450+9200+8800)} \times 100\right]\%$

$= \left(\frac{4810}{43150} \times 100\right)\% = 11.15\%.$

4. (e) : Required average $= \frac{8100+9500+8700+9700+8950}{5} = \frac{44950}{5} = 8990.$

5. (e) : The percentages of candidates qualified to candidates appeared from State P during different years are :

For 1997 $= \left(\frac{780}{6400} \times 100\right)\% = 12.19\%$, **For 1998** $= \left(\frac{1020}{8800} \times 100\right)\% = 11.59\%$;

For 1999 $= \left(\frac{890}{7800} \times 100\right)\% = 11.41\%$; **For 2000** $= \left(\frac{1010}{8750} \times 100\right)\% = 11.54\%$;

For 2001 $= \left(\frac{1250}{9750} \times 100\right)\% = 12.82\%.$

$\therefore$ Maximum percentage is for the year 2001.

6. (c) : Required Percentage $= \left[\frac{(720+840+780+950+870)}{(980+1050+1020+1240+940)} \times 100\right]\%$

$= \left(\frac{4160}{5230} \times 100\right)\% = 79.54\% = 80\%.$

Ex. 3. ***The following table gives the percentage of marks obtained by seven students in six different subjects in an examination. Study the table and answer the questions based on it. The numbers in the brackets give the maximum marks in each subject.*** (Bank P.O. 2003)

Subjects (Max. Marks) / Student	Maths (150)	Chemistry (130)	Physics (120)	Geography (100)	History (60)	Computer Science (40)
Ayush	90	50	90	60	70	80
Aman	100	80	80	40	80	70
Sajal	90	60	70	70	90	70
Rohit	80	65	80	80	60	60
Muskan	80	65	85	95	50	90
Tanvi	70	75	65	85	40	60
Tarun	65	35	50	77	80	80

1. What was the aggregate of marks obtained by Sajal in all the six subjects ?
(a) 409 (b) 419 (c) 429 (d) 439 (e) 449
2. What is the overall percentage of Tarun ?
(a) 52.5% (b) 55% (c) 60% (d) 63% (e) 64.5%
3. What are the average marks obtained by all the seven students in Physics ? (rounded off to two digits after decimal)
(a) 77.26 (b) 89.14 (c) 91.37 (d) 96.11 (e) 103.21
4. The number of students who obtained 60% and above marks in all the subjects is :
(a) 1 (b) 2 (c) 3 (d) None (e) None of these
5. In which subject is the overall percentage the best ?
(a) History (b) Maths (c) Physics (d) Chemistry (e) Geography

Sol. **1.** (e) : Aggregate marks obtained by Sajal
= [(90% of 150) + (60% of 130) + (70% of 120) + (70% of 100) + (90% of 60) + (70% of 40)] = 135 + 78 + 84 + 70 + 54 + 28 = 449.

2. (c) : Aggregate marks obtained by Tarun
= [(65% of 150) + (35% of 130) + (50% of 120) + (77% of 100) + (80% of 60) + (80% of 40)] = 97.5 + 45.5 + 60 + 77 + 48 + 32 = 360.
Total maximum marks (of all the six subjects)
= (150 + 130 + 120 + 100 + 60 + 40) = 600.

$$\text{Overall percentage of Tarun} = \left(\frac{360}{600} \times 100\right)\% = 60\%.$$

3. (b) : Average marks obtained in Physics by all the seven students

$$= \frac{1}{7} \times [(90\% \text{ of } 120) + (80\% \text{ of } 120) + (70\% \text{ of } 120) + (80\% \text{ of } 120) + (85\% \text{ of } 120) + (65\% \text{ of } 120) + (50\% \text{ of } 120)]$$

$$= \frac{1}{7} \times [(90 + 80 + 70 + 80 + 85 + 65 + 50)\% \text{ of } 120]$$

$$= \frac{1}{7} \times [520\% \text{ of } 120] = \frac{624}{7} = 89.14.$$

4. (b) : From the table it is clear that Sajal and Rohit have 60% or more marks in each of the six subjects.

5. (b) : We shall find the overall percentage (for all the seven students) with respect to each subject.
The overall percentage for any subject is equal to the average of percentages obtained by all the seven students since the maximum marks for any subject is the same for all the students.

Therefore, overall percentage for :

(*i*) Maths $= \left[\frac{1}{7} \times (90 + 100 + 90 + 80 + 80 + 70 + 65)\right]\%$

$= \left[\frac{1}{7} \times (575)\right]\% = 82.14\%.$

(*ii*) Chemistry $= \left[\frac{1}{7} \times (50 + 80 + 60 + 65 + 65 + 75 + 35)\right]\%$

$= \left[\frac{1}{7} \times (430)\right]\% = 61.43\%.$

(*iii*) Physics $= \left[\frac{1}{7} \times (90 + 80 + 70 + 80 + 85 + 65 + 50)\right]\%$

$= \left[\frac{1}{7} \times (520)\right]\% = 74.29\%.$

(*iv*) Geography $= \left[\frac{1}{7} \times (60 + 40 + 70 + 80 + 95 + 85 + 77)\right]\%$

$= \left[\frac{1}{7} \times (507)\right]\% = 72.43\%.$

(*v*) History $= \left[\frac{1}{7} \times (70 + 80 + 90 + 60 + 50 + 40 + 80)\right]\%$

$= \left[\frac{1}{7} \times (470)\right]\% = 67.14\%.$

(*vi*) Computer Science $= \left[\frac{1}{7} \times (80 + 70 + 70 + 60 + 90 + 60 + 80)\right]\%$

$= \left[\frac{1}{7} \times (510)\right]\% = 72.86\%.$

Clearly, this percentage is highest for Maths.

Ex. 4. ***Study the following table carefully and answer the questions given below :*** **(Bank P.O. 2001)**

CLASSIFICATION OF 100 STUDENTS BASED ON THE MARKS OBTAINED BY THEM IN PHYSICS AND CHEMISTRY IN AN EXAMINATION

Marks out of 50 / Subject	40 and above	30 and above	20 and above	10 and above	0 and above
Physics	9	32	80	92	100
Chemistry	4	21	66	81	100
(Aggregate) Average	7	27	73	87	100

1. The number of students scoring less than 40% marks in aggregate is :
   (*a*) 13 (*b*) 19 (*c*) 20 (*d*) 27 (*e*) 34
2. If at least 60% marks in Physics are required for pursuing higher studies in Physics, how many students will be eligible to pursue higher studies in Physics ?
   (*a*) 27 (*b*) 32 (*c*) 34 (*d*) 41 (*e*) 68
3. What is the difference between the number of students passed with 30 as cut-off marks in Chemistry and those passed with 30 as cut-off marks in aggregate ?
   (*a*) 3 (*b*) 4 (*c*) 5 (*d*) 6 (*e*) 7

4. The percentage of the number of students getting at least 60% marks in Chemistry over those getting at least 40% marks in aggregate, is approximately :
(a) 21% (b) 27% (c) 29% (d) 31% (e) 34%

5. If it is known that at least 23 students were eligible for a Symposium on Chemistry, the minimum qualifying marks in Chemistry for eligibility to Symposium would lie in the range :
(a) 40-50 (b) 30-40 (c) 20-30 (d) Below 20 (e) Cannot be determined

Sol. 1. (d) : We have 40% of 50 $= \left(\frac{40}{100} \times 50\right) = 20$.

$\therefore$ Required number = Number of students scoring less than 20 marks in aggregate
= 100 – number of students scoring 20 and above marks in aggregate = 100 – 73 = 27.

2. (b) : We have 60% of 50 $= \left(\frac{60}{100} \times 50\right) = 30$.

$\therefore$ Required number = Number of students scoring 30 and above marks in Physics = 32.

3. (d) : Required difference = (Number of students scoring 30 and above marks in Chemistry) – (Number of students scoring 30 and above marks in aggregate) = 27 – 21 = 6.

4. (c) : Number of students getting at least 60% marks in Chemistry
= Number of students getting 30 and above marks in Chemistry = 21.
Number of students getting at least 40% marks in aggregate
= Number of students getting 20 and above marks in aggregate = 73.

$\therefore$ Required Percentage $= \left(\frac{21}{73} \times 100\right)\% = 28.77\% = 29\%$.

5. (c) : Since 66 students get 20 and above marks in Chemistry and out of these 21 students get 30 and above marks, therefore to select top 35 students in Chemistry, the qualifying marks should lie in the range 20-30.

EXERCISE 36

Directions (Questions 1 to 6) : ***Study the following table and answer the questions based on it.*** **(Bank P.O. 2003)**

NUMBER OF CANDIDATES APPEARED, QUALIFIED AND SELECTED IN A COMPETITIVE EXAMINATION FROM FIVE STATES DELHI, H.P., U.P., PUNJAB AND HARYANA OVER THE YEARS 1994 TO 1998

Year	Delhi			H.P.			U.P.			Punjab			Haryana		
	App.	Qual.	Sel.	App.	Qual.	Sel.	App.	Qual.	Sel.	App.	Qual.	Sel.	App.	Qual.	Sel.
1997	8000	850	94	7800	810	82	7500	720	78	8200	680	85	6400	700	75
1998	4800	500	48	7500	800	65	5600	620	85	6800	600	70	7100	650	75
1999	7500	640	82	7400	560	70	4800	400	48	6500	525	65	5200	350	55
2000	9500	850	90	8800	920	86	7000	650	70	7800	720	84	6400	540	60
2001	9000	800	70	7200	850	75	8500	950	80	5700	485	60	4500	600	75

1. In the year 1997, which state had the lowest percentage of candidates selected over the candidates appeared ?
(a) Delhi (b) H.P. (c) U.P. (d) Punjab (e) Haryana

2. The percentage of candidates qualified from Punjab over those appeared from Punjab is highest in the year :
(a) 1997 (b) 1998 (c) 1999 (d) 2000 (e) 2001

3. The percentage of candidates selected from U.P. over those qualified from U.P. is highest in the year :
(a) 1997 (b) 1998 (c) 1999 (d) 2000 (e) 2001

4. The number of candidates selected from Haryana during the period under review is approximately what percent of the number selected from Delhi during this period ?
(a) 79.5% (b) 81% (c) 84.5% (d) 88.5% (e) 92.5%

5. For which state the average number of candidates selected over the years is the maximum ?
(a) Delhi (b) H.P. (c) U.P. (d) Punjab (e) Haryana

6. What is the approximate percentage of total number of candidates selected to the total number of candidates qualified for all the five states together during the year 1999 ?
(a) 10% (b) 11% (c) 12% (d) 13% (e) 14%

Directions (Questions 7 to 11) : ***Study the following table to answer the questions that are given below it.*** (R.B.I. 2003)

EXPENDITURES OF A COMPANY (IN LAKH RUPEES) PER ANNUM OVER THE GIVEN YEARS

Item of Expenditure / Year	Salary	Fuel and Transport	Bonus	Interest on Loans	Taxes
1998	288	98	3.00	23.4	83
1999	342	112	2.52	32.5	108
2000	324	101	3.84	41.6	74
2001	336	133	3.68	36.4	88
2002	420	142	3.96	49.4	98

7. The ratio between the total expenditure on Taxes for all the years and the total expenditure on Fuel and Transport for all the years respectively is approximately :
(a) 4 : 7 (b) 10 : 13 (c) 15 : 18 (d) 5 : 8 (e) 2 : 3

8. The total expenditure of the Company over these items during the year 2000 is :
(a) Rs. 544.44 lakhs (b) Rs. 501.11 lakhs (c) Rs. 446.46 lakhs
(d) Rs. 478.87 lakhs (e) Rs. 612.13 lakhs

9. What is the average amount of interest per year which the Company had to pay during this period ?
(a) Rs. 32.43 lakhs (b) Rs. 33.72 lakhs (c) Rs. 34.18 lakhs
(d) Rs. 35.69 lakhs (e) Rs. 36.66 lakhs

10. Total expenditure on all these items in 1998 was approximately what percent of the total expenditure in 2002 ?
(a) 62% (b) 66% (c) 69% (d) 71% (e) 73%

11. The total amount of bonus paid by the Company during the given period is approximately what percent of the total amount of salary paid during this period ?
(a) 0.1% (b) 0.5% (c) 1% (d) 1.25% (e) 1.11%

Directions (Questions 12 to 16) : ***A school has four sections A, B, C, D of Class IX students. The results of half-yearly and annual examinations are shown in the table given below. Answer the questions based on this table.*** **(Bank P.O. 2000)**

Result	Number of Students			
	Section A	Section B	Section C	Section D
Students failed in both Exams	28	23	17	27
Students failed in half-yearly but passed in Annual Exams	14	12	8	13
Students passed in half-yearly but failed in Annual Exams	6	17	9	15
Students passed in both Exams	64	55	46	76

12. How many students are there in Class IX in the school ?
(*a*) 336 (*b*) 189 (*c*) 335 (*d*) 286 (*e*) 430

13. Which section has the minimum failure rate in half-yearly examination ?
(*a*) A (*b*) B (*c*) C
(*d*) D (*e*) Cannot be determined

14. Which section has the maximum success rate in annual examination ?
(*a*) A (*b*) B (*c*) C
(*d*) D (*e*) Cannot be determined

15. Which section has the maximum pass percentage in at least one of the two examinations ?
(*a*) A (*b*) B (*c*) C
(*d*) D (*e*) Cannot be determined

16. If the number of students passing an examination be considered a criteria for comparison of difficulty level of two examinations, which of the following statements is true in this context ?
(*a*) Half-yearly examinations were more difficult.
(*b*) Annual examinations were more difficult.
(*c*) Both the examinations had almost the same difficulty level.
(*d*) The two examinations cannot be compared for difficulty level.
(*e*) For students of Sections A and B, the annual examinations seem to be more difficult as compared to the half-yearly examinations.

Directions (Questions 17 to 21) : ***The following table shows the number of new employees added to different categories of employees in a Company and also the number of employees from these categories who left the company every year since the foundation of the Company in 1995.*** **(Bank P.O. 2001)**

Year	Managers		Technicians		Operators		Accountants		Peons	
	New	Left	New	Left	New	Left	New	Left	New	Left
1995	760	—	1200	—	880	—	1160	—	820	—
1996	280	120	272	120	256	104	200	100	184	96
1997	179	92	240	128	240	120	224	104	152	88
1998	148	88	236	96	208	100	248	96	196	80
1999	160	72	256	100	192	112	272	88	224	120
2000	193	96	288	112	248	144	260	92	200	104

17. During the period between 1995 and 2000, the total number of Operators who left the Company is what percent of the total number of Operators who joined the Company ?
(a) 19% (b) 21% (c) 27% (d) 29% (e) 32%

18. For which of the following categories the percentage increase in the number of employees working in the Company from 1995 to 2000 was the maximum ?
(a) Managers (b) Technicians (c) Operators (d) Accountants (e) Peons

19. What is the difference between the total number of Technicians added to the Company and the total number of Accountants added to the Company during the years 1996 to 2000 ?
(a) 128 (b) 112 (c) 96 (d) 88 (e) 72

20. What was the total number of Peons working in the Company in the year 1999 ?
(a) 1312 (b) 1192 (c) 1088 (d) 968 (e) 908

21. What is the pooled average of the total number of employees of all categories in the year 1997 ?
(a) 1325 (b) 1285 (c) 1265 (d) 1235 (e) 1195

Directions (Questions 22 to 25) : ***The following table gives the percentage distribution of population of five states, P, Q, R, S and T on the basis of poverty line and also on the basis of sex. Study the table and answer the questions based on it.***
(Bank P.O. 2000)

State	Percentage of Population below Poverty Line	Proportion of Males and Females	
		Below Poverty Line	Above Poverty Line
		M : F	M : F
P	35	5 : 6	6 : 7
Q	25	3 : 5	4 : 5
R	24	1 : 2	2 : 3
S	19	3 : 2	4 : 3
T	15	5 : 3	3 : 2

22. What will be the number of females above poverty line in the State S if it is known that the population of State S is 7 million ?
(a) 3 million (b) 2.43 million (c) 1.33 million
(d) 5.7 million (e) 1.61 million

23. If the male population above poverty line for State R is 1.9 million, then the total population of State R is :
(a) 4.5 million (b) 4.85 million (c) 5.35 million
(d) 6.25 million (e) 7.6 million

24. What will be the male population above poverty line for State P if the female population below poverty line for State P is 2.1 million ?
(a) 2.1 million (b) 2.3 million (c) 2.7 million
(d) 3.3 million (e) 3.4 million

25. If the population of males below poverty line for State Q is 2.4 million and that for State T is 6 million, then the total populations of states Q and T are in the ratio :
(a) 1 : 3 (b) 2 : 5 (c) 3 : 7 (d) 4 : 9 (e) 5 : 12

ANSWERS

1. (d)	2. (d)	3. (b)	4. (d)	5. (a)	6. (d)	7. (b)	8. (a)	9. (e)
10. (c)	11. (c)	12. (e)	13. (d)	14. (a)	15. (d)	16. (c)	17. (d)	18. (a)
19. (d)	20. (b)	21. (e)	22. (b)	23. (d)	24. (d)	25. (b)		

SOLUTIONS

1. The percentages of candidates selected over the candidates appeared in 1997, for various states are :

(*i*) For Delhi $= \left(\frac{94}{8000} \times 100\right)\% = 1.175\%$; (*ii*) For H.P. $= \left(\frac{82}{7800} \times 100\right)\% = 1.051\%$;

(*iii*) For U.P. $= \left(\frac{78}{7500} \times 100\right)\% = 1.040\%$; (*iv*) For Punjab $= \left(\frac{85}{8200} \times 100\right)\% = 1.037\%$;

(*v*) For Haryana $= \left(\frac{75}{6400} \times 100\right)\% = 1.172\%$.

Clearly, this percentage is lowest for Punjab.

2. The percentages of candidates qualified from Punjab over those appeared from Punjab during different years are :

For 1997 $= \left(\frac{680}{8200} \times 100\right)\% = 8.29\%$; **For 1998** $= \left(\frac{600}{6800} \times 100\right)\% = 8.82\%$;

For 1999 $= \left(\frac{525}{6500} \times 100\right)\% = 8.08\%$; **For 2000** $= \left(\frac{720}{7800} \times 100\right)\% = 9.23\%$;

For 2001 $= \left(\frac{485}{5700} \times 100\right)\% = 8.51\%$.

Clearly, this percentage is highest for the year 2000.

3. The percentages of candidates selected from U.P. over those qualified from U.P. during different years are :

For 1997 $= \left(\frac{78}{720} \times 100\right)\% = 10.83\%$; **For 1998** $= \left(\frac{85}{620} \times 100\right)\% = 13.71\%$;

For 1999 $= \left(\frac{48}{400} \times 100\right)\% = 12\%$; **For 2000** $= \left(\frac{70}{650} \times 100\right)\% = 10.77\%$;

For 2001 $= \left(\frac{80}{950} \times 100\right)\% = 8.42\%$.

Clearly, this percentage is highest for the year 1998.

4. Required Percentage $= \left[\frac{(75+75+55+60+75)}{(94+48+82+90+70)} \times 100\right]\%$

$= \left(\frac{340}{384} \times 100\right)\% = 88.54\% = 88.5\%$.

5. The average number of candidates selected over the given period for various states are :

For Delhi $= \frac{94+48+82+90+70}{5} = \frac{384}{5} = 76.8$

For H.P. $= \frac{82+65+70+86+75}{5} = \frac{378}{5} = 75.6$

For U.P. $= \frac{78+85+48+70+80}{5} = \frac{361}{5} = 72.2$

For Punjab $= \frac{85+70+65+84+60}{5} = \frac{364}{4} = 72.8$

For Haryana $= \frac{75+75+55+60+75}{5} = \frac{340}{5} = 68.$

Clearly, this average is maximum for Delhi.

6. Required Percentage $= \left[\frac{(82+70+48+65+55)}{(640+560+400+525+350)} \times 100\right]\%$

$= \left(\frac{320}{2475} \times 100\right)\% = 12.93\% \approx 13\%.$

7. Required Ratio $= \frac{(83+108+74+88+98)}{(98+112+101+133+142)} = \frac{451}{586} = \frac{1}{1.3} = \frac{10}{13}.$

8. Total expenditure of the Company during 2000
= Rs. (324 + 101 + 3.84 + 41.6 + 74) lakhs = Rs. 544.44 lakhs.

9. Average amount of interest paid by the Company during the given period
= Rs. $\left(\frac{23.4+32.5+41.6+36.4+49.4}{5}\right)$ lakhs = Rs. $\left(\frac{183.3}{5}\right)$ lakhs
= Rs. 36.66 lakhs.

10. Required Percentage $= \left[\frac{(288+98+3.00+23.4+83)}{(420+142+3.96+49.4+98)} \times 100\right]\%$

$= \left(\frac{495.4}{713.36} \times 100\right)\% = 69.45\%.$

11. Required Percentage $= \left[\frac{(3.00+2.52+3.84+3.68+3.96)}{(288+342+324+336+420)} \times 100\right]\%$

$= \left(\frac{17}{1710} \times 100\right)\% = 1\%.$

12. Since the classification of the students on the basis of their results and sections form independent groups, so the total number of students in the class :
$= (28 + 23 + 17 + 27 + 14 + 12 + 8 + 13 + 6 + 17 + 9 + 15 + 64 + 55 + 46 + 76) = 430.$

13. Total number of failures in half-yearly exams in a section
= [(Number of students failed in both exams) + (Number of students failed in half-yearly but passed in Annual exams)] in that section

∴ Failure rate in half-yearly exams in **Section A**

$= \left[\frac{\text{Number of students of Section A failed in half-yearly}}{\text{Total number of students in Section A}} \times 100\right]\%$

$= \left[\frac{(28+14)}{(28+14+6+64)} \times 100\right]\% = \left(\frac{42}{112} \times 100\right)\% = 37.5\%$

Similarly, failure rate in half-yearly exams in :

Section B $= \left[\frac{(23+12)}{(23+12+17+55)} \times 100\right]\% = \left(\frac{35}{107} \times 100\right)\% = 32.71\%$

Section C $= \left[\frac{(17+8)}{(17+8+9+46)} \times 100\right]\% = \left(\frac{25}{80} \times 100\right)\% = 31.25\%$

Section D $= \left[\frac{(27+13)}{(27+13+15+76)} \times 100\right]\% = \left(\frac{40}{131} \times 100\right)\% = 30.53\%$

Clearly, the failure rate is minimum for Section D.

14. Total number of students passed in annual exams in a section
= [(Number of students failed in half-yearly but passed in annual exams) + (Number of students passed in both exams)] in that section

$\therefore$ Success rate in annual examination in **Section A**

$$= \left[\frac{\text{Number of students of Section A passed in annual exams}}{\text{Total number of students in Section A}} \times 100\right]\%$$

$$= \left[\frac{(14+64)}{(28+14+6+64)} \times 100\right]\% = \left(\frac{78}{112} \times 100\right)\% = 69.64\%$$

Similarly, success rate in annual examinations in :

Section B $= \left[\frac{(12+55)}{(23+12+17+55)} \times 100\right]\% = \left(\frac{67}{107} \times 100\right)\% = 62.62\%$

Section C $= \left[\frac{(8+46)}{(17+8+9+46)} \times 100\right]\% = \left(\frac{54}{80} \times 100\right)\% = 67.5\%$

Section D $= \left[\frac{(13+76)}{(27+13+15+76)} \times 100\right]\% = \left(\frac{89}{131} \times 100\right)\% = 67.94\%$

Clearly, the success rate in annual examination is maximum for Section A.

15. Pass percentages in at least one of the two examinations for different sections are :

For **Section A** $= \left[\frac{(14+6+64)}{(28+14+6+64)} \times 100\right]\% = \left(\frac{84}{112} \times 100\right)\% = 75\%$

For **Section B** $= \left[\frac{(12+17+55)}{(23+12+17+55)} \times 100\right]\% = \left(\frac{84}{107} \times 100\right)\% = 78.5\%$

For **Section C** $= \left[\frac{(8+9+46)}{(17+8+9+46)} \times 100\right]\% = \left(\frac{63}{80} \times 100\right)\% = 78.75\%$

For **Section D** $= \left[\frac{(13+15+76)}{(27+13+15+76)} \times 100\right]\% = \left(\frac{104}{131} \times 100\right)\% = 79.39\%$

Clearly, the pass percentage is maximum for Section D.

16. Number of students who passed half-yearly exams in the school
= (Number of students passed in half-yearly but failed in annual exams) + (Number of students passed in both exams) = (6 + 17 + 9 + 15) + (64 + 55 + 46 + 76) = 288

Also, Number of students who passed annual exams in the school
= (Number of students failed in half-yearly but passed in annual exams) + (Number of students passed in both exams) = (14 + 12 + 8 + 13) + (64 + 55 + 46 + 76) = 288

Since, the number of students passed in half-yearly = the number of students passed in annual exams, therefore, it can be inferred that both the examinations had almost the same difficulty level.

Thus, Statements (*a*), (*b*) and (*d*) are false and Statement (*c*) is true.

Also, number of students from Sections A and B who passed the annual exams
= (14 + 12) + (64 + 55) = 145

And, number of students from Sections A and B who passed the half-yearly exams
= (6 + 17) + (64 + 55) = 142.

Since the number of students of Sections A and B who passed the annual exams is greater than those who passed the half-yearly exams it implies that for students of Sections A and B, the half-yearly exams were more difficult as compared to annual exams.

Hence, Statement (c) is false.

17. Total number of Operators who left the Company during 1996-2000
$= (104 + 120 + 100 + 112 + 144) = 580.$

Total number of Operators who joined the Company during 1995-2000
$= (880 + 256 + 240 + 208 + 192 + 248) = 2024.$

$\therefore$ Required Percentage $= \left(\frac{580}{2024} \times 100\right)\% = 28.66\% \approx 29\%.$

18. Number of Managers working in the Company :

In **1995** = 760.

In **2000** = $(760 + 280 + 179 + 148 + 160 + 193) - (120 + 92 + 88 + 72 + 96) = 1252.$

$\therefore$ Percentage increase in the number of Managers
$= \left[\frac{(1252 - 760)}{760} \times 100\right]\% = 64.74\%.$

Number of Technicians working in the Company :

In **1995** = 1200.

In **2000** = $(1200 + 272 + 240 + 236 + 256 + 288) - (120 + 128 + 96 + 100 + 112)$
$= 1936.$

$\therefore$ Percentage increase in the number of Technicians
$= \left[\frac{(1936 - 1200)}{1200} \times 100\right]\% = 61.33\%.$

Number of Operators working in the Company :

In **1995** = 880.

In **2000** = $(880 + 256 + 240 + 208 + 192 + 248) - (104 + 120 + 100 + 112 + 144)$
$= 1444.$

$\therefore$ Percentage increase in the number of Operators
$= \left[\frac{(1444 - 880)}{880} \times 100\right]\% = 64.09\%$

Number of Accountants working in the Company :

In **1995** = 1160.

In **2000** = $(1160 + 200 + 224 + 248 + 272 + 260) - (100 + 104 + 96 + 88 + 92)$
$= 1884.$

$\therefore$ Percentage increase in the number of Accountants
$= \left[\frac{(1884 - 1160)}{1160} \times 100\right]\% = 62.41\%$

Number of Peons working in the Company :

In **1995** = 820.

In **2000** = $(820 + 184 + 152 + 196 + 224 + 200) - (96 + 88 + 80 + 120 + 104)$
$= 1288.$

$\therefore$ Percentage increase in the number of Peons
$= \left[\frac{(1288 - 820)}{820} \times 100\right]\% = 57.07\%$

Clearly, the percentage increase is maximum in case of Managers.

19. Required difference = (272 + 240 + 236 + 256 + 288)
$- (200 + 224 + 248 + 272 + 260) = 88.$

20. Total number of Peons working in the Company in 1999
$= (820 + 184 + 152 + 196 + 224) - (96 + 88 + 80 + 120) = 1192.$

21. Total number of employees of various categories working in the Company in 1997 are :

Managers = $(760 + 280 + 179) - (120 + 92) = 1007$

Technicians = $(1200 + 272 + 240) - (120 + 128) = 1464$

Operators = $(880 + 256 + 240) - (104 + 120) = 1152$

Accountants = $(1160 + 200 + 224) - (100 + 104) = 1380$

Peons = $(820 + 184 + 152) - (96 + 88) = 972$

$\therefore$ Pooled average of all the five categories of employees working in the Company in 1997 $= \frac{1}{5} \times (1007 + 1464 + 1152 + 1380 + 972) = \frac{1}{5} \times 5975 = 1195.$

22. Total population of State S = 7 million.

$\therefore$ Population above poverty line = [(100 − 19)% of 7] million
= (81% of 7) million = 5.67 million.

And so, the number of females above poverty line in State S $= \left(\frac{3}{7} \times 5.67\right)$ million
$= 2.43$ million.

23. Let the total population of State R be x million.

Then, population of State R above poverty line = [(100 − 24)% of x] million
$= \left(\frac{76}{100} \times x\right)$ million.

And so, male population of State R above poverty line $= \left[\frac{2}{5} \times \left(\frac{76}{100} \times x\right)\right]$ million

But, it is given that male population of State R above poverty line = 1.9 million

$\therefore \quad \frac{2}{5} \times \left(\frac{76}{100} \times x\right) = 1.9 \Rightarrow x = \frac{5 \times 100 \times 1.9}{76 \times 2} = 6.25.$

$\therefore$ Total population of State R = 6.25 million.

24. Female population below poverty line for State P = 2.1 million.

Let the male population below poverty line for State P be x million.

Then, $5 : 6 = x : 2.1 \Rightarrow x = \frac{2.1 \times 5}{6} = 1.75$

$\therefore$ Population below poverty line for State P = (2.1 + 1.75) million = 3.85 million.

Let the population above poverty line for State P be y million.

Since, 35% of the total population of State P is below poverty line, therefore, 65% of the total population of State P is above poverty line *i.e.*, the ratio of population below poverty line to that above poverty line for State P is 35 : 65.

$\therefore \quad 35 : 65 = 3.85 : y \Rightarrow y = \frac{65 \times 3.85}{35} = 7.15$

i.e., population above poverty line for State P = 7.15 million and so, male population above poverty line for State P $= \left(\frac{6}{13} \times 7.15\right)$ million = 3.3 million.

25. **For State Q :**

Male population below poverty line = 2.4 million.

Let the female population below poverty line be x million.

Then, $3 : 5 = 2.4 : x \Rightarrow x = \dfrac{5 \times 2.4}{3} = 4$

$\therefore$ Total population below poverty line = (2.4 + 4) = 6.4 million.

If N_q be the total population of State Q, then,

25% of N_q = 6.4 million $\Rightarrow N_q = \left(\dfrac{6.4 \times 100}{25}\right)$ million = 25.6 million.

For State T :

Male population below poverty line = 6 million.

Let the female population below poverty line be y million.

Then, $5 : 3 = 6 : y \Rightarrow y = \dfrac{3 \times 6}{5} = 3.6$

$\therefore$ Total population below poverty line = (6 + 3.6) = 9.6 million.

If N_t be the total population of State T, then

15% of N_t = 9.6 million $\Rightarrow N_t = \left(\dfrac{9.6 \times 100}{15}\right)$ million = 64 million.

Thus, required ratio = $\dfrac{N_q}{N_t} = \dfrac{25.6}{64} = 0.4 = \dfrac{2}{5}$.