

Solutions

Chapter – 1 (Tables)

Exercise – 1(a)

Solutions for questions 1 to 5:

1. Number of fan regulators accepted = $(550/10) (90) = 4950$
Ans: (4950)
2. Percentage of assemblies rejected from machines P, Q, R, S, T, is 10%, 20%, 10%, 14%, 15%
So 10% of production of assemblies of P = 600
20% of production of assemblies of Q = 1000
10% of production of assemblies of R = 550
14% of production of assemblies of S = 840
15% of production of assemblies of T = 1650
So 10% of production of T = $1650/15 \times 10 = 1100$
By observation we can say that the number of assemblies by machine T is highest.
Ans: (T)
3. Number of fan regulators from P, that were rejected = 600
Number of fan regulators from Q, that were rejected = 550
Required percentage = $\frac{600 - 550}{550} \times 100\% = 9\frac{1}{11}\%$.
Ans: (9)
4. Number of fan regulators assembled by T = $(1650/15) (100) = 11,000$
Number of fan regulators assembled by P = $600/10 \times 100 = 6,000$
Number of fan regulators assembled by Q = $1000/20 \times 100 = 5,000$
Number of fan regulators assembled by T is equal to the total number of fan regulators assembled by P and Q. Therefore required percentage is zero.
Ans: (0)
5. Number of fan regulators assembled by machine, R and S are $550/10 \times 100 = 5500$ and $840/14 \times 100 = 6000$ respectively.
Their average number of assemblies

$$= \left(\frac{5500 + 6000}{2} \right) = 5750 \quad \text{Ans: (5750)}$$

Solutions for questions 6 to 10:

6. In Pallis, the number of employees of age 30 years and above but below 50 years = $165 - 125 = 40$. Total number of employees in Pallis = those below 50 years + those aged 50 years and above
 $= 165 + 36 = 201$. The required ratio = $\frac{40}{201} \approx \left(\frac{1}{5} \right)$
Similarly the ratio for Dagritech
 $= \frac{187 - 96}{187 + 60} = \frac{91}{247}$, which lies between $\frac{1}{2}$ and $\frac{1}{3}$.
For Greenhorn = $\frac{213 - 68}{231 + 68} = \frac{145}{299} \approx \frac{1}{2}$
For Farmtech = $\frac{148 - 97}{148 + 48} = \frac{51}{196} \approx \frac{1}{4}$
For Starshine = $\frac{141 - 108}{141 + 72} = \frac{33}{213} \approx \frac{1}{7}$
The highest ratio is $\frac{145}{299}$ Choice (C)
7. The total number of employees aged above 20 years but below 30 years for all the companies = 494.
Those aged above 20 years but below 50 years = 854. Those aged 30 years or above but below 50 years = $854 - 494 = 360$.

Those aged forty years or above but less than 50 years = $854 - 646 = 208$.
Those aged 50 years or above but below 60 years = 284. Those aged 30 years or more = $360 + 284 = 644$.
In this age group, there are maximum number of employees.
Choice (D)

8. In Greenhorn with the inclusion of 27 employees, those aged below 50 years but above 20 years = $213 + 27 = 240$. Those aged below 40 years but above 20 years will be $93 + 27 = 120$. The required percentage
 $= \frac{120}{240} \times 100 = 50\%$. Choice (B)
9. In Pallis, the minimum age of the employees in the age group of above 20 years and below 30 years can be nearly 20 years and maximum age will be nearly 30 years. In the age group of 30 years to below 40 years, minimum age is 30 years. Maximum age will be 40 years. Considering the lower bounds in each case, we get the minimum average age as
 $= \frac{20 \times 125 + 30 \times 23 + 40 \times 17 + 50 \times 36}{125 + 23 + 17 + 36} = \frac{5670}{201} = \frac{5670}{200}$
 $= 28$ years. (approximately) Maximum average age
 $= \frac{30 \times 125 + 40 \times 23 + 50 \times 17 + 60 \times 36}{201} = \frac{7680}{201} = \frac{7680}{200}$
 $= 38$ years.
(Actually 29 years should be considered, but by considering 30, the average will not be affected). Therefore the average age of the employees of Pallis should lie between 28 years and 38 years and among the given choices only Choice (B) satisfies this condition. Choice (B)
10. By adding the number of employees aged below 50 years and those aged 50 years or above, the total number of employees of a company can be determined. By observation we can say that Greenhorn is the company with the highest number of employees i.e. $213 + 68 = 281$.
Choice (C)

Solutions for questions 11 to 15:

11. Required percentage = $\frac{640}{2240} \times 100 = 28.5\%$
Choice (C)
12. Required percentage = $\frac{2790}{3540} \times 100 = 78.8\%$
Choice (D)
13. Required percentage = $\frac{1640}{5995} \times 100 = 27.35\%$
Choice (C)
14. Required percentage = $\frac{1098}{4250} \times 100 = 25.8\%$
Choice (D)
15. The percentage of students who got selected in all the six years together is
IBM $\rightarrow \frac{1720}{6330} \times 100 = 27.17\%$
Microsoft $\rightarrow \frac{1731}{6570} \times 100 = 26.34\%$
Wipro $\rightarrow \frac{1825}{6770} \times 100 = 26.95\%$
CSC $\rightarrow \frac{1850}{6750} \times 100 = 27.4\%$
Lucent $\rightarrow \frac{1805}{6825} \times 100 = 26.44\%$ Choice (A)

Solutions for questions 16 to 20:

16. Let the investments of SPML and Arthurs be ₹200 and ₹300 respectively.

$$\text{Debt component of SPML} = \frac{28}{100} \times 200 = ₹56 \text{ and that of}$$

$$\text{the Arthurs} = \frac{21}{100} \times 300 = ₹63.$$

The percentage by which the debt component of the Arthurs'

$$\text{is more} = \frac{63-56}{56} \times 100 = \frac{7}{56} \times 100 = 12.5\%.$$

Choice (A)

17. The best return for Ispat during any one year = 58%. 58% of ₹1200 crores = $\frac{58}{100} \times 1200 = ₹696$ crores. Choice (D)

18. For Tatas, the best return = 106% and other one year return = 27%

Over all return for three years = 51%

Let the returns during the third year be x%.

$$\frac{106 + 27 + x}{3} = 51\% \Rightarrow x = 20\%.$$

The return that is neither the best nor the worst is 27%

Choice (C)

19. Overall returns for the three years is given, but the return on particular components of the investment is not given.

Choice (D)

20. Best returns in any one year + returns in one of the remaining years + returns during the still remaining year) ÷ 3 = Over all returns in the three years.

$$\text{For JMM, } \frac{(53 + 11 + x)}{3} = 29 \Rightarrow x = 23\%$$

$$\text{For Arthurs} = \frac{(88 + 32 + y)}{3} = 65 \Rightarrow y = 75\%$$

$$\text{For KNBC} = \frac{(93 + 12 + z)}{3} = 26 \Rightarrow z = (-) 27\%$$

$$\text{For Kones} = \frac{(76 + 21 + p)}{3} = 56 \Rightarrow p = 71\%$$

'-' sign indicates loss.

Choice (C)

Exercise – 1(b)

Solutions for questions 1 to 6:

1. Let us assume that the sales of each bike is 'Z' in the year 1990.

$$\text{Sales of Suzuki in 2000} = z \times 1.2 \times 1.25 = 1.5z$$

$$\text{Sales of Kawasaki in 2000} = z \times 1.1 \times 1.2 = 1.32z$$

$$\text{Sales of Honda in 2000} = z \times 1.1 \times 1.2 = 1.32z$$

$$\text{Sales of Ducati in 2000} = z \times 1.1 \times 1.3 = 1.43z$$

$$\text{Sales of Aprilla in 2000} = z \times 1.1 \times 1.1 = 1.21z$$

∴ Highest percentage increase is for Suzuki Hayabusa

Choice (C)

2. Sales of Ducati in 2002 = 42900

we know sales in 1990 × 1.1 × 1.3 = 42900

$$\therefore \text{sales in 1990} = \frac{42900}{1.1 \times 1.3} = 30000$$

$$\text{sales of Ducati in 2005} = 42900 \times 1.4 = 60060$$

∴ difference in sales in 2005 and the sales in 1990 is 60060 – 30000 = 30,060

Choice (B)

3. In 1990, sales of Kawasaki = $\frac{264000}{1.1 \times 1.2} = 200000$

$$\text{Sales of Aprilla AS} - x100 = \frac{544500}{1.1 \times 1.1 \times 1.5} = 300000$$

∴ Ratio of sales of Kawasaki to that of Aprilla is 2 : 3

Choice (A)

$$4. \text{ Sales of Suzuki in 1990} = \frac{2,35,950}{1.2 \times 1.25} = 1,57,300$$

$$\text{Sales of Kawasaki in 1990} = \frac{2,35,950}{1.1 \times 1.2} = 1,78,750$$

$$\text{Sales of Honda in 1990} = \frac{2,35,950}{1.1 \times 1.2} = 1,78,750$$

$$\text{Sales of Ducati in 1990} = \frac{2,35,950}{1.1 \times 1.3} = 1,65,000$$

$$\text{Sales of Aprilla in 1990} = \frac{2,35,950}{1.1 \times 1.1} = 1,95,000$$

3 bikes have sales of more than 1,65,000 in 1990.

Choice (C)

5. Let us assume that the sales of Honda Mag-EV in 1995 were 100

sales of Honda Mag-EV in 2005

$$= 100 \times 1.2 \times 1.3 = 156$$

∴ Honda sales are 56% more in 2005 than that of 1995.

Choice (B)

6. This question cannot be answered as we need to know the distribution of the sales of the 7,07,850 bikes sold in 1990 amongst the various brands given here and which is not specified here.

Choice (D)

Solutions for questions 7 to 10:

7. The given table tells us the export of India but does not specify the production hence the output of petroleum and crude cannot be estimated.

Choice (D)

8. $5\% \times 74.7\% \times \text{total India's exports} = 54.6$

$$\therefore \text{Total India's exports} = 6000$$

Choice (C)

9. Value of manufactured goods in 1995-1996 = $\frac{300}{16.6} \times 100$

Value of India's total exports in 02-03

$$= \frac{300}{16.6\%} \times 77.6\% \times 2.5$$

Value of ore and Mineral

$$\text{In India's exports in 02-03 is } \frac{300}{1/6} \times \frac{1}{7/9} \times 2.5 \times 3.6\%$$

$$= \frac{1800 \times 9 \times 2.5 \times 3.6}{7 \times 100} = 18 \times 9 \times 2.5 \times 0.5 > 200$$

Choice (D)

10. Let India's exports in 1991-1992 be 100,

∴ in 02-03 it will be 120.

Exports of the Engineering goods sector in 1991-1992

$$= 12.5\% \times 73.6\% \times 100 = 1/8 \times 73.6 = 9.2$$

$$\text{in 02-03} = 16.6\% \times 77.4\% \times 120 = 1/6 \times 7/9 \times 120 = 15.5$$

$$\text{Percentage increase} = \left(\frac{15.5}{9.2} - 1 \right) 100$$

$$= (1.684 - 1) 100 = 68.4\%$$

Choice (B)

Solutions for questions 11 to 15:

11. We need to find out the number of people whose 1st preference is either Games or Quiz and whose 2nd preference is either Horror or Music.

This means we need to count all those people whose 1st preference is Games and 2nd preference is either Horror/Music or all those whose 1st preference is Quiz and 2nd preference is Horror/Music.

1 st preference	2 nd preference	No of people
Games	Horror	74
Games	Music	53
Quiz	Horror	43
Quiz	Music	68

Total number of people satisfying this criteria is 238

Total number of people whose 1st and only preference is Cartoon = 760

$$\therefore \frac{238}{760} \times 100 = 31.3\% \quad \text{Choice (B)}$$

12. Only one game of programming is only Cartoons, only Sports, ... etc. The fastest way to solve it is to count all the numbers along the diagonal

$$\text{i.e. } 760 + 214 + 152 + 112 + 112 + 72 + 83 + 23 = 1528$$

Choice (B)

13. Number of kids whose 1st preference is cartoons (A) = 525 + 311 + 440 + 590 + 200 + 370 + 68 = 2504
 No of kids whose 2nd preference is cartoons (B) = 892 + 222 + 151 + 127 + 63 + 132 + 59 = 1646
 No. of kids who watch only cartoons (C) = 760
 Amount Collected from A = 2504 × 10 = 25040
 Amount Collected from B = 1646 × 8 = 13168
 Amount Collected from C = 760 × 5 = 3800
 Total amount collected = 25040 + 13168 + 3800 = 42008
- Choice (A)

14. By observation we know that the most popular programme is cartoon and the least popular is News.

$$\begin{aligned} \text{Total number of people watching cartoons} \\ 760 + 525 + 311 + 440 + 590 + 200 + 370 + 68 + 892 + 222 \\ + 151 + 127 + 63 + 132 + 59 = 4910 \end{aligned}$$

(count all 1st preference and 2nd preference as well as only preference)

$$\begin{aligned} \text{Total no. watching News} &= 68 + 74 + 118 + 63 + 69 + 132 + \\ &74 + 23 + 59 + 88 + 53 + 48 + 68 + 31 + 29 = 997 \end{aligned}$$

$$\text{Difference in cartoons and News} = 3913$$

$$\therefore \frac{3913}{997} \times 100 = 392.4$$

Approximately it is 400% Choice (C)

15. 1st preference is cartoons = 3264
 1st preference is News = 399
 those whose 1st preference is news and cartoons = 3663 → (A)
 1st preference is movies = 1292 → (B)
 Difference in (A) and (B)
 3663 – 1292 = 2371 Choice (B)

Solutions for questions 16 to 20:

16. The percentage of students who won prizes for athletics from each college is

$$A \rightarrow \frac{20}{120} \times 100 = 16\frac{2}{3}\%$$

$$B \rightarrow \frac{25}{200} \times 100 = 12.5\%$$

$$C \rightarrow \frac{15}{80} \times 100 = \frac{75}{4} = 18\frac{3}{4}\%$$

$$D \rightarrow \frac{2}{20} \times 100 = 10\%$$

$$E \rightarrow \frac{10}{60} \times 100 = 16\frac{2}{3}\%$$

⇒ The students of college C performed the best when compared to the other colleges. Choice (C)

17. The ratio of the number of prizes won to the number of participants gives us the answer. The highest value indicates the best performance

$$\Rightarrow \text{Athletics} = \frac{25}{200} \times 100 = 12.5\%$$

$$\text{Cultural} = \frac{28}{80} \times 100 = 35\%$$

$$\text{Outdoor games} = \frac{5}{30} \times 100 = 16\frac{2}{3}\%$$

$$\text{Indoor games} = \frac{4}{10} \times 100 = 40\%$$

The students of college 'B' performed the best in Indoor games as compared to the performance in the other events.

Choice (D)

18. In cultural events, the total number of prizes won is

$$= 30 + 28 + 16 + 25 + 8 = 107$$

$$\text{The total number of participants} = 400$$

$$\Rightarrow \text{The percentage of participants winning prizes is} = \frac{107}{400}$$

$$\times 100 = 26\frac{3}{4}\%$$

Ans: (27)

19. The total number of prizes won by students of college C = 15 + 16 + 2 + 5 = 38

$$\text{The total number of prizes won by students of college D} = 2 + 25 + 16 + 12 = 55$$

$$\text{The total number of prizes distributed}$$

$$= 72 + 107 + 57 + 30 = 266$$

⇒ The percentage of prizes won by the students of colleges

$$C \text{ and } D \text{ together} = \frac{93}{266} \times 100 = 34.9\%$$

Ans: (35)

20. The total number of participants from college E

$$= 60 + 50 + 60 + 35 = 205$$

$$\text{The total number of prizes won by students from college}$$

$$E = 10 + 8 + 24 + 7 = 49$$

⇒ The number of students who did not win prizes

$$= 205 - 49 = 156$$

$$\Rightarrow \text{The required percentage} = \frac{156}{205} \times 100 = 76.09\%.$$

Ans: (76)

Chapter – 2 (Bar Graphs)

Exercise – 2(a)

Solutions for questions 1 to 5:

1. By keenly observing we can find, that the turnover of A is the highest. Choice (A)

2. Let the profits of the four companies for the second quarter be ₹8x, ₹7x, ₹6x and ₹5x respectively.
 Profit to sales ratio turnover of A, B, C and D are as follows.

$$A = \frac{8x}{572} = \frac{x}{71}; \quad B = \frac{7x}{366} = \frac{x}{52};$$

$$C = \frac{6x}{514} = \frac{x}{86}; \quad D = \frac{5x}{308} = \frac{x}{61}$$

x is the common number for each of the fractions. For company B, the denominator is the lowest among all the denominators. Hence B's profit percentage is the highest.

Choice (B)

3. The ratio of A's turnover to that of the total turnover

$$\text{in } Q1 = \frac{428}{1740} < \frac{1}{4} \quad \text{in } Q2 = \frac{572}{1760} > \frac{1}{4}$$

$$\text{in } Q3 = \frac{473}{1590} > \frac{1}{4} \quad \text{in } Q4 = \frac{527}{1600} > \frac{1}{4}$$

Alternate method:

If A's turnover is greater than the average turnover of the other three companies we can say that A's turnover is more than 25% of the total sales turnover of all the companies. In the first quarter by observation we find that A's turnover, is less than the average turnover of the other three companies. And further we find that in II, III and IV quarters, A's turnover is greater than the average turnover of the other companies. Therefore in three quarters A's turnover is greater than 25% of the total turnover of all the companies in that particular quarter.

Ans: (3)

4. Percentage decrease in the sales turnover of all the companies from Q₂ to Q₃

$$= \frac{1760 - 1590}{1760} \times 100 \Rightarrow 9.6\% \approx 10\%$$

Ans: (10)

5. By observation we find that the sales turnover of only company B is consistently decreasing. Ans: (1)

Solutions for questions 6 to 10:

6. Number of invalid votes by the female voters
= number of votes polled by the females – number of valid votes polled by the females
= $(453 - 226) - 187 = 227 - 187 = 40$ millions
The required percentage = $\frac{40}{227} \times 100 = 17.6\%$
Choice (C)
7. Valid votes in 1995 = valid votes polled by males + valid votes polled by females. = $233 + 219 = 452$.
Valid votes in 2000 = $269 + 254 = 523$
Percentage increase = $\frac{523 - 452}{452} \times 100 = 15.7\%$
Choice (A)
8. Invalid votes = total number of votes polled – total number of valid votes polled by males and females.
Invalid votes in 1985 = $453 - (187 + 196) = 70$
The required ratio in 1985 = $70/453 \approx 1/6$
Similarly, the required ratio in 1990 = $72/503 \approx 1/7$
In 1995 = $131/583 \approx 1/4$
In 2000 = $148/671 \approx 1/4$
1/7 is the least. Hence the required percentage is the least in 1990.
Choice (B)
9. Number of invalid votes polled by males
= $329 - 254 = 75$ millions.
Number of invalid votes by the females
= $(671 - 329) - (269) = 73$ millions.
The required difference = $75 - 73 = 2$ millions
Choice (A)
10. The ratio of number of votes polled by males to the total number of votes polled will hold good for a comparison of the ratio of the number of votes polled by males to that polled by females.
Therefore the required ratio in 1985 = $226/453 = 1/2$
In 1990 = $248/503$
In 1995 = $281/583$
In 2000 = $329/671$
 $226/453$ is much closer to half where as other fractions are much less than $1/2$. Hence, the ratio in 1985 was the greatest.
Choice (A)

Solutions for questions 11 to 15:

11. Average income from foreign trade
= $\frac{20 + 10 + 35 + 15 + 25}{5} = 21$ crores
Choice (C)
12. Expenditure in 2001 = $(90/125) (100)$ crores = 72 crores
Choice (D)
13. Since the cost per unit is not known, the extra number of units exported in 2003 over 2002 cannot be determined.
Choice (D)
14. By observation we can say that in the year 2001 the ratio of income from foreign trade to the total income is the highest.
Choice (C)
15. Income from Japan = 20% of 10 crores = 2 crores
Required percentage = $(2/70) (100\%) = 20/7\% = 2^{6/7}\%$
Choice (A)

Solutions for questions 16 to 20:

16. Total sales in 2002-03
= $105 + 96 + 208 + 165 + 73 = 647 \rightarrow$ (i)
Total sales in 2000-01 = $94 + 68 + 165 + 112 + 57 = 496$
Let $647 \approx 650$ and $496 \approx 500$
Sales target in 2002-02 = $1.2 \times 500 = 600$ m tones
Hence there is surplus in the sales target
 \therefore required percentage = $\frac{650 - 600}{600} \times 100 \approx 9\%$
Choice (B)

17. Sales of Tin in 2000-2001 = $0.4132 \times 57 = 23.55$ million tonnes
In 2002-2003, Sales of Tin = $23.55 \times 1.1 \times 1.1 \approx 28.5$ million tonnes
Total sales = $105 + 96 + 208 + 165 + 73 = 647$ million tonnes

$$\text{Required percentage} = \frac{28.5}{647} \times 100 = 4.4\%$$

Choice (B)

18. Sales of copper in 2002-2003 = 96
The sales increased by 25% in the next year, but still remained 80% of the quantity available.

$$\therefore \text{Quantity of copper available in 2003-04} = \frac{96}{0.8} \times 1.25$$

$$= 150$$

Choice (B)

19. Sales of all metals in 2000-2001 = 496

$$\text{Sales of all metals in 2002-2003} = 647$$

Annual percentage increase

$$= \frac{647 - 496}{496} \times \frac{1}{(x - 1)} \times 100\% [x = 3] = 15.2\%$$

Choice (D)

20. Sales of Gold in 2002-03 = 25% of 73 = $\frac{73}{4}$

$$\text{Sales of Silver in 2000-01} = 20\% \text{ of } 57 = \frac{57}{5}$$

$$\text{Required ratio} = \frac{73}{4} \times \frac{5}{57} \approx \frac{72}{4} \times \frac{5}{55} = \frac{18}{11} \approx 1.67$$

The nearest value is given in Choice (C) as 1.6

Choice (C)

Exercise – 2(b)

Solutions for questions 1 to 5:

1. Total imports = $17 + 18 + 13 + 8 + 21 + 13 + 17 + 15 + 16 + 15 = 153$
Total exports = $18 + 22 + 10 + 10 + 19 + 14 + 14 + 12 + 17 + 16 = 152$
Trade deficit = $153 - 152 = 1$
average imports = $\frac{153}{10} = 15.3$

$$\therefore \text{Required percentage} = \frac{1}{15.3} \times 100 = 6.5\%$$

Choice (C)

2. Total tonnage of exports = $\frac{152 \times 10^{10}}{2000} = 76 \times 10^7$

$$\text{Total tonnage of imports} = \frac{153 \times 10^{10}}{3000} = 51 \times 10^7$$

$$\therefore \text{required percentage} \approx \frac{76 - 51}{51} \times 100 \approx 49\% \text{ more}$$

Choice (D)

3. The highest exports are to USA and the least imports are from Australia.
Imports from USA = 18
Exports to Australia = 10

$$\therefore \text{Required percentage} = \frac{18 - 10}{10} \times 100 = 80\%$$

Choice (B)

4. Statement (A): As calculated before, the company's imports are ₹1 crore more than the company's exports, hence a trade deficit (not trade surplus). Hence, this statement is false.
Statement (B): The cumulative trade deficit is ₹1 crore and the total imports of the company is ₹153 crores.
 $1/153 \neq 1/15$, hence this statement is false.
Statement (C): The trade deficit with China is $(15 - 12) = 3$, which is only 200% more than the cumulative deficit.

Statement (D): The difference between the highest exports and the lowest imports = $22 - 8 = ₹14$ crores.

Average exports to Brazil and Germany $\frac{14 + 14}{2} = ₹14$ crores

As both the figures are equal, hence only statement (D) is definitely true
Choice (D)

5. Total imports from Brazil, Japan, S.A, Russia and China = $13 + 16 + 13 + 21 + 15 = ₹78$ crores
Total exports to the other five countries = $18 + 22 + 10 + 14 + 16 = 80$
Ratio = $78/80 = 0.975$ Choice (A)

Solutions for questions 6 to 10:

6. China is growing at the fastest rate, i.e. $22 - 16.5 = 5.5$ per 1000
France is growing at the slowest rate, i.e. $1.5 - 0.5 = 1$ per 1000
 $\therefore \frac{5.5}{1000} \times 100 - \frac{1}{1000} \times 100 = 0.55\% - 0.1\% = 0.45$
(percentage points) Choice (B)

7. Total births in U.S.A
 $250 \times 10^6 \times 6/1000 = 15 \times 10^5$
Total deaths in Russia = $150 \times 10^6 \times 2/1000 = 3 \times 10^5$
Required % age = $\frac{15-3}{3} \times 100 = 400\%$
Choice (D)

8. Total no. of deaths in Japan = $\frac{6.5}{1000} \times 150 \times 10^6$
Total no. of births in Japan = $\frac{9}{1000} \times 150 \times 10^6 = 9 \times 150 \times 10^3$
When the no. of births is 1000
Then no. of infants who die = 3
When no. of births is $9 \times 150 \times 10^3$
Then, number of infants who die (per 1000 persons)
 $= \frac{9 \times 150 \times 10^3}{1000} \times 3 = 27 \times 150$
Required Percentage = $\frac{27 \times 150}{6.5 \times 150 \times 10^3} \times 100$
 $= \frac{27}{65} \approx \frac{27}{63} = \frac{3}{7} \approx 0.42\%$ Choice (A)

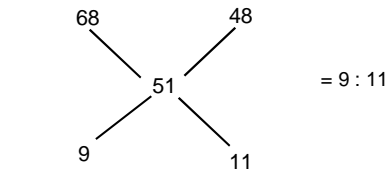
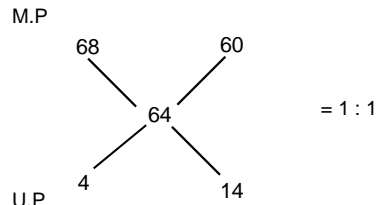
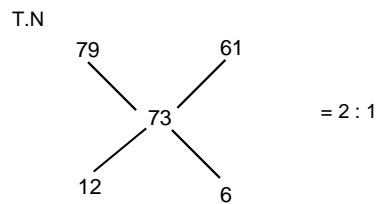
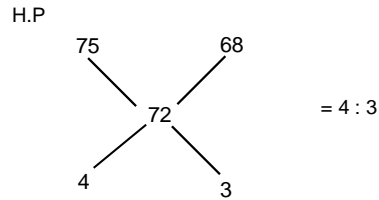
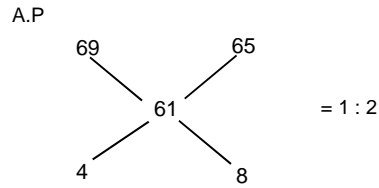
9. For India in 2000 :
Birth rate = 18 per 1000
Death rate = 13 per 1000
Net increase in population = $18 - 13 = 5$ per 1000 = 0.5%.
Let the total population of India (in 2000) be = 1000
Then, population of India after 2 years (in 2003)
 $= 1000 \times 1.005 \times 1.005$
 $= 1005 \times 1.005 = 1010.025$
 \therefore increase in population in % = $\frac{1010.025 - 1000}{1000} \times 100$
 $= \frac{10.025}{10} \approx 1\%$ Choice (B)

10. Only for India and China are the percentage growth rates of population greater than 0.25%, i.e. 2.5 persons per 1000 persons.
Choice (C)

Solutions for questions 11 to 15:

11. Let the number of females and males be x and y respectively. 61% of $x + 79\%$ of $y = 73\%$ of $(x + y)$
 $\Rightarrow 61x + 79y = 73x + 73y$ $6y = 12x$ $\frac{x}{y} = \frac{1}{2}$ or $1 : 2$.
Choice (B)

12. By alligation rule, the ratio of number of males to that of females in



Number of males in A.P = $\frac{1}{3} \times 7 = 2.3$ crore

Number of males in H.P = $\frac{4}{7} \times 6.3 = 3.6$ crore

Number of males in T.N = $\frac{2}{3} \times 6.5 = 4.3$ crore

Number of males in M.P = $\frac{1}{2} \times 6 = 3$ crore

Number of males in U.P = $\frac{9}{20} \times 16 = 7.2$ crore

Number of literate males in UP = $\frac{68}{100} \times 7.2 = 4.896$ crore

Number of literate males in U.P is more than number of males in remaining states so number of literate males in U.P is the highest.
Choice (D)

13. In U.P the total number of literate males and literate females
 $= \frac{68}{100} \times 16$ crores
 $= 1088,00,000$ or 10.88 crores. Ans: (10.88)

14. The population of other states is 25.8 crores and in U.P it is 16 crores
Required percentage = $\frac{25.8 - 16}{25.8} \times 100$

$= \frac{9.8}{25.8} \times 100 \approx 38\%$ Ans: (38)

15. Let the number of females and males in H.P be x and y.
 $68\% \text{ of } x + 75\% \text{ of } y = 72\% \text{ of } (x + y) \Rightarrow x : y = 3 : 4$
 Number of males = $\frac{4}{7} \times 6.3 \text{ crores} = 3.6 \text{ crores}.$

Ans: (3.6)

Solutions for questions 16 to 20:

16. Number of women players participating in Volleyball
 $= \frac{10}{100} \times 1,10,000 = 11,000$
 Total number of players participating in Hockey (both male and female) = $\frac{6}{100} \times 1,50,000 + \frac{4}{100} \times 1,10,000$
 $= 6 \times 1,500 + 4 \times 1,100 = 9,000 + 4,400 = 13,400$
 Required % age = $\frac{11,000}{13,400} \times 100 = \frac{110}{134} \times 100$
 $= \frac{55}{67} \times 100 \approx 82\%$ Choice (D)

17. For Golf:

$$\text{No. of male players} = \frac{4}{100} \times 1,50,000 = 6000$$

$$\text{No. of trainers} = \frac{3}{100} \times 5000 = 150$$

For Basket ball:

$$\text{No. of female players} = \frac{3}{100} \times 1,10,000 = 3300$$

$$\text{No. of trainers} = \frac{5}{100} \times 5000 = 250$$

$$\frac{6000}{150} : \frac{3300}{250} = \frac{40 \times 250}{3300} = 100 : 33 \approx 3 : 1 \text{ Choice (A)}$$

18. For track events :

$$\text{Number of Coaches} = \frac{40}{100} \times \frac{13}{100} \times 5000 = 260$$

$$\text{Number of Female players} = \frac{30}{100} \times \frac{22}{100} \times 1,10,000 = 7260$$

$$\text{Number of male players} = \frac{20}{100} \times \frac{21}{100} \times 1,50,000 = 6300$$

$$\text{Number of sports persons/coach} = \frac{7260 + 6300}{260} \approx 52$$

Choice (C)

19. For Cricket:

Total earnings for male players

$$= \left(\frac{28}{100} \times 1,50,000 \right) \times (1,00,000) = ₹42 \times 10^8$$

Total earnings for female players

$$= \frac{20}{100} \times 1,10,000 \times 50,000 = ₹11 \times 10^8$$

Total earnings for cricket players = 53×10^8

For Lawn Tennis :

Total earnings for male players

$$= \frac{6}{100} \times 1,50,000 \times 5,00,000 = ₹45 \times 10^8$$

Total earnings for female players =

$$= \frac{8}{100} \times 1,10,000 \times 200,000 = ₹17.6 \times 10^8$$

Total earnings of Lawn Tennis players

$$62.6 \times 10^8 =$$

$$\text{Required \%} = \frac{62.6 - 53}{53} \times 100 \approx 18\% \text{ Choice (B)}$$

20. Given that Chess players = $\frac{1}{2}$ Wrestlers

Also Chess players + Wrestlers

$$\frac{1}{2} \left(\frac{4}{100} \times 150000 + \frac{13}{100} \times 110000 \right) = 10150$$

$$\Rightarrow \text{Chess players} = \frac{10,150}{3} \approx 3380$$

$$\text{Now, no. of female basketball players} = \frac{3}{100} \times 110000$$

$$\text{Required percentage} = \frac{3380}{3300} \times 100 \approx 100\%$$

Choice (B)

Chapter – 3

(Pie Charts)

Exercise – 3(a)

Solutions for questions 1 to 5:

- By inspection we know that the most selling brand is Pulsar (19%) and the least selling brand is Adreno (1%)
 Difference in the shares of Pulsar and Adreno = 18%
 Number of motorcycles of Pulsars sold in excess
 $= \frac{92,00,000 \times 18}{100} = 16.56 \text{ lakhs}$ Choice (B)
- Share of Bajaj = 32%
 Share of Hero Honda = 36%
 Share of TVS = 21%
 Share of Kinetic + LML = 11%
 33 lacs motorcycles is more than $\frac{1}{3}^{\text{rd}}$ of total motorcycles sold and the only manufacturer selling more than 33% is Hero Honda. Choice (C)
- No. of Pulsars sold = $\frac{92 \times 19}{100} = 17.48 \text{ lacs}$
 Profit made on Pulsar sold = 17.48×6000
 $= 104880 \text{ lacs} \rightarrow (A)$
 No. of CD - 100 Dawns Sold = $\frac{92 \times 10}{100} = 9.2 \text{ lacs}$
 Profit made on Dawns sold = 9.2×10500
 $= 9600 \text{ lacs} \rightarrow (B)$
 Difference of A and B = $104880 - 96600 = 8280 \text{ lacs}$ Choice (D)
- % share of Bajaj and TVS = $32 + 21 = 53\%$
 % Share of Hero Honda, LML and Kinetic = 47%
 \therefore The required percentage is $\frac{53 - 47}{47} \times 100 \approx 13\%$ Choice (C)
- In 2004, Bajaj + TVS + Hero Honda = $1.2(32 + 36 + 21)$
 LML + Kinetic = $1.5 \times (7 + 4) \dots \dots \dots (2)$
 $\therefore (1) + (2) = 123.33$
 \therefore The percentage growth = 23.3% Choice (C)

Solutions for questions 6 to 10:

- VSNL's revenue from 1 Mbps connections in 2001
 $= \frac{72}{360} \times 15 = ₹3 \text{ lacs}$
 In 2000 = ₹2,20,000
 \therefore % increase = $\frac{80,000}{2,20,000} \times 100 = 36.36\%$ Choice (A)
- Number of one 1 Mbps connections = 25% of 10000 = 2500
 \therefore Number of 512 kbps connections = 20% of 10000 = 2000
 Cost of one 512 Kbps connection in 2001
 $= 15 \times \frac{43.2}{360} \times \frac{1}{2000} = ₹90$
 Cost of hundred 512 Kbps connections = ₹9000
 Cost of buying fifty 1 Mbps connections
 $= 15 \times \frac{72}{3600} \times \frac{1}{2500} \times 50 = ₹6000$
 Discount offered to GE = 12.5%
 \therefore Amount paid by GE = $(9000 + 6000) \times \frac{87.5}{100}$
 $= ₹13,125$ Choice (A)

8. Revenue from 2 Mbps connection in 2001
 $= 15 \times \frac{144}{360} = 6$ lacs
 Revenue from 2 Mbps connection in 2000
 $= 6 \times \frac{100}{125} = 4.8$ lacs \rightarrow (A)
 Revenue from 512 Kbps connection in 2001
 $= 15 \times \frac{43.2}{360} = 1.8$ lacs
 Revenue from 512 Kbps connection in 2000
 $= 1.8 \times \frac{144}{120} = 1.5$ lacs \rightarrow (B)
 (A) as a percentage of (B) is $= \frac{4.8}{1.5} \times 100 = 320\%$
 Choice (B)
9. 256 Kbps subtends an angle of 38.4° whereas 128 kbps subtends an angle of 33.6°
 \therefore Ratio of their charges is $38.4 : 33.6 \approx 1.14$
 Choice (D)
10. Revenue from 2 Mbps connection in 2001 $= 15 \times \frac{144}{360}$
 $= 6$ lacs
 Revenue from 2 Mbps connector in 2002 $= 6 + 2 = 8$ lacs
 \therefore angle subtended by 2 Mbps connector $= \frac{8}{(15+2)} \times 360$
 $\approx 170^\circ$
 Choice (A)

Solutions for questions 11 to 15:

11. Given angle representing 30° is showing 60,000. Difference between the angles showing viewership of Set Max and Tensports is $150^\circ - 15^\circ = 135^\circ$
 \therefore The number equidistant to $135^\circ = \frac{135 \times 60,000}{30}$
 $= 2,70,000$
 Ans: (2,70,000)
12. Angle showing 20% viewership $= \frac{20}{100} \times 360 = 72^\circ$
 Only set max has shown angle more than 72°
 Ans: (1)
13. Viewership of DD Sports during second half of February
 $= 60 \times \frac{2}{3} = 40^\circ$
 \therefore Required ratio $= 40^\circ : 45^\circ = 8 : 9$
 Ans: (8 : 9)
14. Given, $80\% \times$ (Actual value of DD sports) $= 60^\circ$
 \therefore Actual value of DD sports $= 75^\circ$
 The total share is $360 + (75 - 60) = 375$
 \therefore % share of Set Max $= \frac{150}{375} \times 100 = 40\%$
 Ans: (40)
15. Given $45^\circ - 90,000$
 $360^\circ - ?$
 $? = \frac{360 \times 90,000}{45} = 7,20,000$
 Ans: (7,20,000)

Solutions for questions 16 to 20:

16. Total value of Kerosene consumed
 $= 60,000 \times \frac{12}{100} = 7200$ Crores
 Total Kerosene consumed by India (Quantity) = 150 lakh kilolitres.
 \therefore Value of 1 litre of Kerosene $= \frac{7,200 \times 100 \text{ (in lacs)}}{150 \times 1000}$
 Value of 1 Litre of Kerosene $= ₹4.8$
 Choice (B)
17. The graph here shows the consumption of electricity by India but does not state anything about the production of electricity. Hence the amount of electricity generated in India cannot be estimated.
 Choice (D)

18. Price of 1 Barrel of crude oil imported by India
 $= \frac{60,000 \times 0.3}{25}$ (250 million = 2500 lacs = 25 crores)
 \therefore Price of 1 barrel of Crude oil imported by India $= ₹720$.
 Price of 1 barrel of oil that Oman sells to India $= ₹720$.
 Price of Crude oil in Oman (domestic) is 25% more than $₹720 = 900$.
 Choice (A)
19. Current Domestic Production of Crude oil
 $= 250 \times \frac{25}{100} = 62.5$ million barrels
 16% of TRR = 62.5 million Barrels.
 \therefore TRR $= 62.5 \times \frac{100}{16} = 390.625$ million Barrels.
 We know that 100% more implies twice.
 Similarly 200% more implies thrice.
 In the scene every 4000% more implies 41 times.
 \therefore TER are 41 times the TRR.
 \therefore TER $= 41 \times 390.625 \approx 16000$ million barrels.
 Choice (D)
20. Total value of Crude oil consumed in India $= 60,000 \times 0.3 = 18,000$ Crores.
 Domestic production $= 250 \times 0.25 = 62.5$ million barrels
 Crude oil from sources other than Domestic = 187.5 Mn barrels.
 Assuming 1 barrel from other sources costs ₹ X, then the price of 1 barrel of Domestic Crude costs $= \frac{3X}{4}$
 $\therefore 187.5 X + 62.5 \times \frac{3X}{4} = 18000$
 $234.375 X = 18000$
 $X = \frac{18,000 \times 100 \text{ (in lacs)}}{234.375 \times 10 \text{ (in lacs)}} X = 768$
 Choice (B)

Exercise – 3(b)

Solutions for questions 1 to 5:

1. Amount of IR rays received in 1 minute $= 3600 \times \frac{36}{360}$
 $= 360$ units
 Maximum tolerable limit of IR rays = 9720 units
 \therefore Maximum time one can be exposed to the sun
 $= \frac{9720}{360} = 27$ min
 Ans: (27)
2. Beta rays in 1 minute of sunshine $= 3600 \times \frac{18}{360} = 180$ units
 Beta rays in 10 minutes of sunshine $= 180 \times 10 = 1800$ units \rightarrow (A)
 IR rays in 1 minute of sunshine $= 3600 \times \frac{36}{360} = 360$ units
 Amount of IR rays in 3 minutes of sunshine
 $= 3 \times 360 = 1080$ units \rightarrow (B)
 $\frac{1800}{1080} = 1.66$ times
 Ans: (1.66)
3. Beta rays in 1 minute $= 3600 \times \frac{18}{360} = 180$ units
 \therefore 30 units of Beta Rays = 1 unit of Vitamin D.
 \therefore 180 units of Beta Rays = 6 units of Vitamin D.
 \therefore 1 minute of Sunshine = 6 units of Vitamin D.
 \therefore 40 units of Vitamin D is generated in $= 6\frac{2}{3}$ minutes
 Ans: (6.67)
4. Alpha rays received in 2 min $= 2 \times 3600 \times \frac{36}{360} = 720$ units
 Radio waves received in 4 min $= 4 \times 3600 \times \frac{54}{360} = 2160$ units
 Alpha rays is 1440 units less than radio waves.
 Ans: (1440)

5. In atmosphere with ozone, gamma rays = 180 units per minute
180 units comprise 60% of the rays. If the ozone layer were to disappear, we would receive 100% of the rays.

$$\text{Ans} = \frac{100 \times 180}{40} = 450 \text{ units} \quad \text{Ans: (450)}$$

Solutions for questions 6 to 10:

6. The value can be calculated directly as:

$$\text{Value of Jute} = 3,20,000 \times \frac{72}{360} \times \frac{54}{100} \times \frac{20}{100} = ₹6912 \text{ crores}$$

Choice (C)

7. Banking sector is 30% of the Tertiary Sector which in turn is 16% of the GDP of India.

$$\therefore \% \text{ of Banking Sector in GDP of India is } 30\% \text{ of } 16\% = 4.8\% \quad \text{Choice (B)}$$

8. Value of Entertainment Sector

$$= 3,20,000 \times \frac{16}{100} \times \frac{25}{100} = 12,800 \text{ Crores}$$

Value of Transport Sector

$$= 3,20,000 \times \frac{16}{100} \times \frac{15}{100} = 7,680 \text{ Crores}$$

Difference in these values = 12,800 – 7,680

= 5120 crores → (A)

Value of Iron & Steel Sector

$$= 3,20,000 \times \frac{30}{100} \times \frac{72}{100} = 19,200 \text{ Crores}$$

Value of Tool & Die Sector

$$= 3,20,000 \times \frac{30}{100} \times \frac{36}{360} = 9,600 \text{ Crores}$$

Difference in these values = 19,200 – 9,600

= 9,600 crores → (B)

$$\text{A as a \% of B} = \frac{5120}{9600} \times 100 = 53.33\%$$

Choice (D)

9. Value of Export Quality Basmati Rice

$$= 3,20,000 \times \frac{54}{100} \times \frac{162}{360} \times \frac{40}{100} \times \frac{15}{100}$$

Value of Export Quality Basmati Rice = 4665.6 Cr.

Choice (A)

10. Value of Secondary Sector in 1980-81

$$= 3,20,000 \times \frac{30}{100} \times 2 = 1,92,000 \text{ Crores}$$

Value of Tertiary Sector in 1980-81

$$= 3,20,000 \times \frac{16}{100} \times 3 = 1,53,600 \text{ Crores}$$

Value of Primary Sector in 1980-81

$$= 3,20,000 \times \frac{54}{100} = 1,72,800 \text{ Crores}$$

Value of Primary Sector in 1980-81 in terms of

$$X = \frac{1,72,800}{(1,72,800 + 1,92,000 + 1,53,600)} \times X$$

$$= \frac{1,72,800}{5,18,400} \times 33.33\% \text{ of } X = 0.33 X \quad \text{Choice (A)}$$

Solutions for questions 11 to 15:

11. Difference in the number of warheads possessed by Russia and USA is $90 - 72 = 18^\circ \rightarrow A$

Difference in the number of warheads possessed by India and Israel = $18^\circ - 9^\circ = 9^\circ \rightarrow B$

A is 2 times B.

Choice (C)

12. Number of nuclear warheads possessed by China

$$= \frac{80,000 \times 36}{360} = 8000$$

Cost incurred by China in building & maintaining these

$$\text{warheads} = \frac{2500 \times 14}{100} = \$350 \text{ million}$$

\therefore Average cost incurred on one warhead

$$= \frac{350}{8000} = .04375 \text{ Mn}$$

$$.04375 \times 1000,000 = 43,750 \$ \quad \text{Choice (B)}$$

13. Number of warheads possessed by Russia

$$= \frac{80,000 \times 90}{360} = 20000$$

$$\text{Expenditure incurred by Russia} = \frac{2500 \times 30}{100} = 750 \text{ million}$$

$$\text{Avg. Cost per warhead for Russia} = \frac{750}{20000} \times 100000 = 3750 \$$$

Number of warheads possessed by USA

$$= \frac{80,000 \times 72}{360} = 16000$$

$$\text{Expenditure incurred by USA} = \frac{2500 \times 25}{100} = 625 \text{ million}$$

$$\text{Avg. cost per warhead for USA} = \frac{625 \times 100000}{16000} = 3906.25 \$$$

$$\therefore \text{Difference} = 3906.25 - 3750 = \$1562.5 \quad \text{Choice (B)}$$

14. Warhead of 'Others' = 1000 kg

Warhead of other countries = 2000 kg

$$\text{Number of warheads of 'Others'} = \frac{80,000 \times 45}{360} = 10000$$

\therefore Total weight = 10000 × 1000 = 10000 tonnes.

Number of warheads possessed by other countries = 70000.

\therefore Total weight = 70000 × 2000 = 1,40,000 tonnes.

Weight of all warheads put together = 1,50,000 tonnes.

Choice (D)

15. Let the total number of warheads with all countries be 360

The reduction by Russia = 40% of 90 = 36

That by USA = 30% of 72 = 21.6

That by UK and China put together = 20% of (36 + 36) = 14.4

That by the other countries = 10% of (9 + 18 + 54 + 45) = 12.6

\therefore Total reduction = 84.6

\therefore The reduced number of warheads = 360 – 84.6 = 275.4

$\therefore 360 \rightarrow 80,000$

$275.4 \rightarrow ?$

$$= \frac{275.4}{360} \times 80,000 = 61,200 \quad \text{Choice (A)}$$

Solutions for questions 16 to 20:

16. Students from China and India = 20 + 24 = 44% → (A)

Students from all countries in the graph except 'others' category = 46% → (B)

$$(A) \text{ as a percentage of } (B) = \frac{44}{46} \times 100 = 95.65\%$$

Choice (C)

17. The country with the maximum representation in 2000 is India.

$$\text{Number of students from India} = \frac{80,000 \times 24}{100} = 19200$$

Students from India taking up management

$$= \frac{19200 \times 135}{360} = 7200 \quad \text{Choice (A)}$$

18. Portugal + Spain = 20% = $\frac{80,000 \times 20}{100} = 16000$

16000 is 25% of domestic students pursuing MS in USA

\therefore Domestic students pursuing MS in USA = 64000

Choice (D)

19. Students of Asian Countries comprise = $24 + 20 + 7 + 6 + 4 = 61\%$

$$\text{Students of Asian Countries comprise} = \frac{80,000 \times 61}{100} = 48800$$

\therefore 48800 as a percentage of 3,60,000 is

$$\frac{48800}{360000} \times 100 = 13.5\% \quad \text{Choice (B)}$$

20. Indian students pursuing Engineering on Management

$$= 24\% \text{ of } 80,000 \times \frac{270}{360} \rightarrow (A)$$

Chinese students pursuing other courses

$$= 20\% \text{ of } 80,000 \times \frac{90}{360} \rightarrow (B)$$

(A) as percentage of (B) = 360% Choice (C)

Chapter – 4 (Line Graphs)

Exercise – 4(a)

Solutions for questions 1 to 5:

1. The ratios of actual exports of tea to the estimated exports of tea from 1992 to 1997 are 3 : 2, (1.5), 9 : 8 (1.25), 13 : 12 (1.083), 12 : 10, (1.2), 14 : 15 (0.93), 17 : 17 (1)

So, in 1992 the ratio of actual exports is the highest when compared to estimated exports.

Hence in 1992, the ratio of the actual exports to the estimated exports is the highest. Ans: (1992)

2. Total actual exports for the given period = $(3 + 9 + 13 + 12 + 15 + 17)$ lakhs = 69 lakhs Total exports to the US = $1.6 + 4 + 6 + 6 + 5 + 10 = 32.6$ lakhs
Required percent = $(32.6/69) (100) = 47\%$ Ans: (47)

3. Let the actual value of 1 dollar be ₹x. Number of dollars to be received when 1 dollar is ₹40

$$= \frac{5.5 \times 10^5}{40}$$

$$\text{Number of dollars received when 1 dollar is ₹x} = \frac{5 \times 10^5}{x}$$

$$\Rightarrow \frac{5.5 \times 10^5}{40} = \frac{5 \times 10^5}{x} \Rightarrow x = ₹36.36 \quad \text{Ans: (36.36)}$$

4. Quantity exported to the US = $\frac{6 \times 10^5}{8 \times 40} = 1875 \text{ kg}$

Ans: (1875)

5. The ratio of exports of tea to the U.S. to actual exports from 1992 to 1997 are in the same order as 1.6 : 3 (i.e. 0.53) ; 4 : 9 (i.e. 0.44) ; 6 : 13 (i.e. 0.46) ; 6 : 12 (i.e. 0.50) ; 5 : 14 (i.e. 0.33) ; 10 : 17 (i.e. 0.58)
Hence in 1997, the required ratio is the highest.

Ans: (1997)

Solutions for questions 6 to 10:

6. We need the car for which the ratio of $\frac{M}{A}$ is least by observation, Zen (50%) and Versa (66%) are amongst the least and the correct answer is Zen. Choice (D)

7. Profit = $3000 \times (9.3 - 7.6)$ lacs
= $1.7 \times 10^5 \times 3000 = 51$ crores
2% of 51 crores = 1.02 crores

$$\text{Bonus per engineer} = \frac{1.02 \times 10^7}{2040} = ₹50,000.$$

Choice (B)

8. Choice (C)

9. Zen \rightarrow 500 cars/day
Profit/ car = 1.5 lacs/car
City = 600 cars/day
Profit/car = 0.8 lacs/car
Total profit for Zen = 750 lacs/day
Total profit for City = 480 lacs/day
 $\frac{750}{480} \approx 156\%$ Choice (B)

10. $\frac{\text{Manufacturing cost}}{\text{Total Cost}} = \frac{M}{M+A}$ is least
 $\Rightarrow \frac{M+A}{M}$ is highest
 $\Rightarrow 1 + \frac{A}{M}$ is highest
 $\Rightarrow A$ is % of M is highest, this is true for Zen.
 \therefore Least for Zen Choice (B)

Solutions for questions 11 to 15:

11. Given S.P = 3.9 lakhs

$$3.9 = \text{C.P} \left(1 + \frac{30}{100} \right)$$

$$\Rightarrow \text{C.P} = 3 \text{ lakhs}$$

$$\therefore \text{Profit} = \text{S.P} - \text{C.P} = 3.9 - 3 = 0.9 \text{ lakhs} \quad \text{Choice (D)}$$

12. Let the C.P of A and C in 2013 and 2017 respectively be ₹100. Then the
S.P of A in 2013 = 120
S.P of C in 2017 = 145

$$\therefore \text{Required ratio} = \frac{120}{145} = \frac{24}{29} \quad \text{Choice (A)}$$

13. Let the S.P of B in 2014 and 2015 be ₹100.
Then their

$$\text{C.P in 2014} = \frac{160}{1.4}$$

$$\text{C.P in 2015} = \frac{100}{1.45}$$

$$\therefore \text{Required ratio} = \frac{100}{1.4} : \frac{100}{1.45} = 1.45 : 1.4 = 29 : 28 \quad \text{Choice (A)}$$

14. Let the S.P of B in 2016 and its C.P in 2017 be ₹100 S.P of B in 2017 = 150
 \therefore Required ratio = 100 : 150 = 0.66. Choice (B)

15. Percentage rise or fall in A is as follows:

$$2013: \frac{20}{40} \times 100 = 50\%$$

$$2014: \frac{15}{20} \times 100 = 75\%$$

$$2015: \frac{15}{35} \times 100 = 42.85\%$$

$$2016: \frac{5}{50} \times 100 = 10\%$$

$$2017: \frac{10}{45} \times 100 = 22.22\% \quad \text{Choice (D)}$$

Solutions for questions 16 to 20:

$$16. \frac{\text{Income} - 15,00,000}{15,00,000} \times 100 = 20$$

$$\Rightarrow \text{Income} = 18,00,000 = ₹18 \times 10^5 \quad \text{Choice (A)}$$

17. Let the incomes of two companies in 2014 be 2P and 3P respectively.

Percentage of profit made by company X = 10

$$\Rightarrow \frac{2P - \text{Expenditure}}{\text{Expenditure}} \times 100 = 10$$

$$\Rightarrow \text{Expenditure} = 20P/11$$

Percentage of profit made by company Y = 15.

$$\Rightarrow \frac{3P - \text{Expenditure}}{\text{Expenditure}} \times 100 = 15$$

$$\Rightarrow \text{Expenditure} = 60P/23$$

$$\text{Required ratio} = \frac{20P}{11} : \frac{60P}{23} = 23 : 33 \quad \text{Choice (C)}$$

18. Let, the expenditure of each of the companies be ₹e

$$\text{Income of Company X is } \left(\frac{120}{100} \times e \right) = \frac{120e}{100}$$

$$\text{Income of Company Y is } \frac{115}{100} \times e = \frac{115e}{100}$$

$$\text{Required ratio is } \frac{12e}{10} : \frac{115e}{100} = 24 : 23 \quad \text{Choice (B)}$$

19. We do not know the expenditures of company X and company Y. So, we cannot answer the question.

Choice (D)

20. In years 2015 and 2016, company X got more percentage of profit than company Y.

Choice (A)

Exercise – 4(b)

Solutions for questions 1 to 5:

1. In the year 2018, the number of employees and profit per employee per annum is also the maximum. So in the year 2018, the profit of the company was the highest.

Ans: (2018)

2. Profit in year 2015 = 145 x 2.6 lakhs
30% of total sales value in the year 2015 = 145 x 2.6 lakhs
Total sales value in the year 2015

$$= \frac{145 \times 2.6 \times 100}{30} \text{ lakhs} = 1257 \text{ lakhs} = 12.57 \text{ crores}$$

Ans: (12.6)

3. Average number of employees for the given period

$$= \frac{120 + 145 + 218 + 150 + 192}{5} = 165$$

In the years 2016 and 2018, the number of employees is more than the average number of employees.

Ans: (2)

4. Profit made in the year 2018 = 192 x 3.2 lakhs
192 x 3.2 lakhs is 64% of the profit made in 2019.

$$\text{Profit in 2019} = \frac{192 \times 3.2}{64} \times 100 \text{ lakhs} = 960 \text{ lakhs} = 9.6 \text{ crores}$$

Ans: (9.6)

5. Profit in the year 2014 = 120 x 2 lakhs = ₹240 lakhs
Profit in the year 2015 = ₹145 x 2.6 lakhs = ₹377 lakhs

$$\text{Required percentage} = \frac{377 - 240}{240} \times 100 = 57\%$$

Ans: (57)

Solutions for questions 6 to 10:

6. In 1993-94
1 dollar = 49 rupees
12,000 rupees = 245 dollars
In 93-94 1 dollar is 3.99 Ringgits
245 dollars = 977 Ringgit (approx)

Choice (B)

7. In the years 92-93, 93-94 and 95-96, we see that at least two of the three currencies gained with respect to the U.S. Dollar. A total of three years.

Choice (B)

8. In 1990-91
1 dollar = 1.95 Australian dollars = 47 rupees = 3.98 Ringgits
 $\Rightarrow 725 \$ = 1413.75 \text{ Australian dollars}$
 $= 34075 \text{ rupees} = 2885 \text{ Ringgits}$
So, only 1420 Australian dollars are sufficient.

Choice (C)

9. Avg. annual percentage increase in Dollar/Rupee

$$= \frac{0.5}{47} \times \frac{100}{5} = 0.21\%$$

Avg. annual percentage increase in Dollar/ Ringgits

$$= -\frac{0.01}{3.98} \times \frac{100}{5} = -0.05\%$$

Difference is 0.26.

Choice (D)

10. 1 Dollar = 47.5 Rupees (in 1994-95)

₹94525 = 1990 Dollars

In (94-95) \Rightarrow 1 dollar

= 1.99 sing dollars

$$\therefore 1990 \text{ dollars} = \frac{(199)^2}{10} \text{ Sing dollars}$$

which is very close to 4000

from choices Choice (A) i.e. 3960 is close

Choice (A)

Solutions for questions 11 to 15:

$$11. \text{Capacity} = \frac{\text{Output}}{\text{Utilization}} \times 100$$

$$= \frac{9.1}{45} \times 100 = 20.2 \text{ bn tonnes}$$

Choice (A)

$$12. \text{In } 1996-1997 \rightarrow \frac{8.9}{75} \times 100 \approx 11.86$$

$$\text{In } 1991-1992 \rightarrow \frac{9}{60} \times 100 = 15$$

$$\text{In } 1994-1995 \rightarrow \frac{9.1}{45} \times 100 \approx 20.2$$

$$\text{In } 1989-1990 \rightarrow \frac{4.5}{45} \times 100 = 10$$

Choice (D)

13. In Statement I, the decreases are not in the same proportion. In Statement II

1991-92, capacity = 15

1993-94, capacity = 32

Statement III is obviously wrong (by observation)

Choice (C)

14. As shown in the graph during (93-94) to (94-95) Imports increased from 150 to 200 exports decreased from 600 to 500

Choice (B)

$$15. \text{Capacity in } 1989-1990 = \frac{4.5}{45} \times 100 \text{ billion tonnes}$$

= 10 billion tonnes

$$\text{Capacity in } 1996-1997 = \frac{8.9}{75} \times 100 \text{ billion tonnes}$$

= 11.9 billion tonnes

$$\text{Avg. annual increase} = \left(\frac{11.9 - 10}{10} \right) \times \frac{1}{7} \times 100 \approx 2.7\%$$

Choice (D)

Solutions for questions 16 to 20:

16. In 2014-2015 profit available to share holders of CTs is

$$15000 \times 33 = ₹4,95,000$$

In 2015-2016, profit available to share holders = 31,000 x 23 = ₹7,13,000

$$\% \text{ Change in profit} = \frac{2,18,000}{4,95,000} \times 100 = 44.04\%$$

Choice (C)

- 17.

Choice (A)

$$18. \text{Profit for STC} = ₹(25,000 \times 38)$$

$$\text{Profit for TSC} = ₹(10,000 \times 25)$$

$$\text{Profit for MIE} = ₹(15000 \times 49)$$

\therefore STC has maximum

profit available for shareholders.

Choice (B)

19. EPS of TSC = 40

EPS of STC = 50

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Since profit available is same, the ratio of
No. of shares of STC : TSC = 40 : 50
(Inverse of EPS)
 $\Rightarrow 4 : 5$

Choice (B)

20. No. of shares for STC = 12,000
Earnings Per share for STC in (2013-2014)
Profit = $46 \times 12000 = 5,52,000$
10% of profit = ₹55,200

Choice (B)

Chapter – 5 (Caselets)

Exercise – 5(a)

Solutions for questions 1 to 5:

Let the amount with Doorva be ₹x.
Given, (amount with Radha – amount with Doorva) = (amount with Doorva – amount with Suman)
 \Rightarrow Total amount with Radha and Suman = ₹2x.
Amount with Deepa = ₹x – 200 and that with Mangala = ₹2x.
Also the amount with Srikanth = ₹x + 200.
Given, $x + 2x + x - 200 + 2x + x + 200 = 2100 \Rightarrow x = 300$.
Hence the amounts with Doorva, Deepa, Mangala and Srikanth are ₹300, ₹100, ₹600 and ₹500 respectively. Also the average amount with six persons = $\frac{2100}{6} = ₹350$.

- As there is no exact information about Radha and Suman, the question cannot be answered. Choice (D)
- The amount with Srikanth is ₹500. Choice (B)
- The required ratio is 100 : 600 = 1 : 6 Choice (D)
- From the given information, amount with Radha cannot be found. Choice (D)
- To have least number of notes, Radha and Suman should have ₹350 and ₹250 respectively. Then the total number of currency notes with them will be 24. Choice (C)

Solutions for questions 6 to 10:

- Amar's share = $\frac{1}{2} \times 1700 + 50 = 900$
Akbar's share = $\frac{6}{17} \times 1700 = 600$
Anthony's share = $1700 - 1500 = ₹200$
Difference between the amount with Amar and Anthony = ₹900 – ₹200 = ₹700 Choice (B)
- The amount Amar has more than Akbar and Anthony = ₹900 – (₹600 + ₹200) = ₹100. Choice (C)
- The amount Akbar has more than Amar = ₹(600 – 200) = ₹400. Choice (C)
- Required ratio = 6 : 9 : 2. Choice (D)
- Required percentage = $\frac{(600 - 200)}{900} \times 100 = 44 \frac{4}{9}\%$ Choice (B)

Solutions for questions 11 to 15:

Given 60% of boys who either like tennis or formula 1, like tennis, hence 40% of them like formula 1. Let these boys number be x.
i.e. $\frac{40}{100} \times x = 4 \Rightarrow x = 10$
Hence the number of girls who like either tennis or formula 1.
 $\therefore \frac{10}{G} = \frac{2}{9} \Rightarrow G = 45$

$$= \frac{9}{2} \times 10 = 45$$

This on simplification can be tabulated as below

	Tennis	Formula 1	
Boys	6	4	10
Girls	29	16	45
	35	20	

Also the number of students in the school = $\frac{6}{5} \times 55 = 66$.

Among the remaining students who did not like any of these games, the number of boys = $11 \times \frac{6}{11} = 6$ and the number of girls = 5.

$$\text{Number of boys who like tennis} = \frac{60}{100} \times 10 = 6$$

$$\therefore \text{Number of girls who like tennis} = 35 - 6 = 29$$

$$\text{Number of boys who like } F_1 = 4$$

$$\text{Number of girls who like } F_1 = 20 - 4 = 16$$

- Required percentage = $\frac{16}{6} \times 100 = 266 \frac{2}{3}\%$ Choice (B)
- Total number of girls = 45 + 5 i.e., 50 Choice (D)
- Total number of boys = 10 + 6 = 16
No of girls who like tennis = 29
 \therefore Required ratio = 16 : 29 Choice (C)
- Total number of students in the college = number of boys + girls = 66 Choice (B)
- Required percentage = $\frac{29}{66} \times 100 = 43.93$ Choice (A)

Solutions for questions 16 to 20:

Let the total savings be 100%. Divisions of the savings will be
Stocks $\rightarrow 20\%$
NSC $\rightarrow 30\%$
Land $\rightarrow 40\%$ of the remaining $\rightarrow 40\%$ of $50\% = 20\%$,
FD $\rightarrow (100 - (20 + 30 + 20)) = 30\%$

- Since the same amount is invested in shares and land, let us assume this is 100x each \Rightarrow total amount is 100x
 $\times \frac{100}{20} = 500x$.
Value of my shares after two years
 $= 100x \left(1 + \frac{20}{100}\right) \left(1 + \frac{45}{100}\right) = 174x$.
The value of land is $100x \left(1 + \frac{10}{100}\right) \left(1 + \frac{10}{100}\right)$
 $= 121x$.
My gain from land is $121x - 100x = 21x$ on which I pay 10% tax.
 \therefore Net gain = $21x - 2.1x = 18.9x$
Differences in gain = $74x - 18.9x = 55.1x$
 $55.1x = 55,100$
 $\therefore x = 1,000$
Investment in shares and land = $1000 \times 100 = 1$ lakh
Ans: (1)
- The total amount invested initially was ₹5 lakh. Ans: (5)
- Amount invested in NSC = 1,50,000
After 1 year it becomes $1,50,000 \left(1 + \frac{8}{100}\right) = 1,62,000$
After the second year it is $1,62,000 \times \left(1 + \frac{8}{100}\right)$
 $= 1,74,960 \approx 1.75$ lakh

Amount from shares = 1,74,000
 Amount from land = 1,18,900 = 1,19,000
 Amount from FD after 1 year

$$= 1,50,000 \left(1 + \frac{6}{100}\right) = 1,59,000$$

$$= 1,59,000 - \left(\frac{5}{100} \times 9,000\right) = 1,58,550$$

In the second year I get another 8,500 (which is same as first year net interest) and 5.7% on 8,500

$$\frac{5.7}{100} \times 8,550 = ₹488 \approx ₹500 \text{ (since 5% is paid as tax, 5% of 100)}$$

6% is 0.3%, $\therefore 6 - 0.3 = 5.7$

\therefore Total amount from FD's = ₹1,67,500

\therefore Total amount = 1.75 + 1.74 + 1.19 + 1.67 = 6.35 lakh.
 Ans: (6.35)

19. 5 lakh invested becomes 6.35 lakh in two years.

Since the actual gain is $\frac{1.35}{5.00} \times 100 = 27\%$ for two years,

compounded annual rate of return should be a little less than half of it. (i.e., $(\sqrt{1.27} - 1) = 12\%$)

Ans: (12)

20. From solution to Q.18, amount in NSC after two years = 1,74,960

Total amount from FD = 1,67,500

The difference = 1,74,960 - 1,67,500 = 7500

Ans: (7500)

Exercise - 5(b)

Solutions for questions 1 to 3:

1. Maximum non-taxable income after deduction = 1 lakh
 Maximum deduction on investments in securities = 1 lakh
 Now he can also avail of housing loan such that the loan repayment is equal to 20% of his annual income.
 If X is the annual income $2 + 0.2x = X$
 $X = 2.5$ lakh. Choice (C)

2. For an income of ten lakh, maximum housing loan repayment of 20% of 10 lakhs = 2 lakh
 Maximum deductions = 2 + 1 = 3 lakh
 Income on which tax is applicable = 7 lakh.

Tax on 7 lakh:

Upto 1.5 lakh = 5,000

1.5 to 5 lakh = 70,000

5 lakh, to 7 lakh = 60,000 + 0.1 (60,000)

Total tax (minimum) = 1,41,000.

Choice (D)

3. Maximum tax is applicable when the deductions are zero.
 Upto 1.5 lakh = 5,000
 1.5 to 5 lakh = 70,000
 5 to 6 lakh = 30,000 + 3,000 \Rightarrow total = 1,08,000
 Minimum tax is when he has a deduction of one lakh on investments and 1.2 lakh (20% of 6 lakh) as housing loan repayment.
 \therefore Taxable income = 3.8 lakh
 Upto 1.5 lakh = 5,000
 1.5 to 3.8 lakh = 46,000
 total tax (minimum) = 51,000
 difference = 57,000. Choice (C)

Solutions for questions 4 to 6:

4. Total amount on 1st January, 2015 = 16 + 4.5 = ₹20.5 lakhs

Bank	Shares	Real Estate
12.3 lakhs	4.1 lakhs	4.1 lakhs

 Bank = $12.3 \times 1.1 = 13.53$ lakhs
 Shares = $4.1 \times 1.15 = 4.715$ lakhs
 Real estate = $4.1 \times 1.1 = 4.51$ lakhs
 Total value = 22.75 lakhs

Choice (B)

5. Money in bank = $12.3 \times 1.33 = 16.36$ lakhs
 Value of shares = $4.1 \times 1.15 \times 1.06 \times 0.9 = 4.5$ lakhs
 Value of real estate = $4.1 \times 1.1 \times .9 = 4.06$ lakhs
 Total Value = 16.36 + 4.5 + 4.06 = 24.92 lakhs

Choice (C)

6. Value of Investment on 1st January, 2015 = 20.5 lakhs
 Value of Investment on 1st January, 2016 = 22.75 lakhs
 Value of Investment on 1st January, 2017 = 23.93 lakhs
 Value of Investment on 1st January, 2018 = 24.92 lakhs
 It is clearly seen that the maximum % increase is in 2016.

Choice (A)

Solutions for questions 7 to 10:

Let the number of samosas that Murali sells on the first day i.e., on Monday be n.

It is given that the number of samosas that he sells on one day will be X less than the previous day twice during the week and X more than the previous day thrice during the week. The maximum and minimum number of samosas he sells on any day are 150 and 90 respectively.

So we have to arrange 2 decrease by X and 3 increase by X from Tuesday to Saturday, which can be done in $\frac{5!}{2!3!} = 10$ ways

The 10 possible cases as below.

Case	Mon	Tue	Wed	Thrs	Fri	Sat	Total
1	n	n - x	n - 2x	n - x	n	n + x	6n - 3x
2	n	n - x	n	n - x	n	n + x	6n - x
3	n	n - x	n	n + x	n	n + x	6n + x
4	n	n - x	n	n + x	n + 2x	n + x	6n + 3x
5	n	n + x	n	n - x	n	n + x	6n + x
6	n	n + x	n	n - x	n	n + x	6n + 3x
7	n	n + x	n	n - x	n + 2x	n + x	6n + 5x
8	n	n + x	n + 2x	n + x	n	n + x	6n + x
9	n	n + x	n	n - x	n	n + x	6n + x
10	n	n + x	n	n - x	n	n + x	6n + x

For case I, $n - 2x = 90$ and $n + x = 150$

$$\text{Difference} = 3x \quad 3x = 60$$

$$x = 20$$

So the number of samosas he sells are as follows.

Mon	Tue	Wed	Thur	Fri	Sat
130	110	90	110	130	150

Case	Mon	Tue	Wed	Thu	Fri	Sat	Total	Money Earned in the week
1	130	110	90	110	130	150	720	2880
2	120	90	120	90	120	150	690	2760
3	120	90	120	150	120	150	750	3000
4	110	90	110	130	150	130	720	2880
5	120	150	120	90	120	150	750	3000
6	90	150	90	150	90	150	720	2880
7	90	120	90	120	150	120	690	2760
8	90	120	150	120	90	120	690	2760
9	90	120	150	120	150	120	750	3000
10	90	110	130	150	130	110	720	2880

7. If Murali sells 750 samosas in a particular week, it must be case 3, case 5 or case 9.

Number of samosas he sells on Friday

Case 3 120

Case 5 120

Case 9 150

So he sells either 120 or 150 samosas on Friday.

Choice (D)

8. Murali sells the minimum number of samosas on Friday. So it is either case 6 or case 8. Since he does not sell the maximum number of samosas on Thursday, it is not case 6. So it must be case 8 and he earns ₹2760 in that week. Choice (A)
9. Since Murali sells 130 samosas on Friday, it can be either case 1 or case 10. In both the above cases, he sells 110 samosas on Tuesday. Choice (B)
10. Since he sells 130 samosas on Wednesday, the number of samosas he sells on Saturday can only be 110. Thus we do not need any other information in this case to answer the question. Choice (D)

Solutions for questions 11 to 15:

Let the number of engineers and that of non-engineers be e and n respectively.

- (i) $\Rightarrow e = n \left(1 + \frac{20}{100}\right) \cdot e = \frac{6}{5}n$.
- (ii) \Rightarrow Number of employees who specialised in Finance = $\frac{8}{15}n$.
- (iii) \Rightarrow Number of employees who specialised in HR = $5/12$
i.e. $= \frac{5}{12} \left(\frac{6}{5}n\right) = \frac{n}{2}$

$$\text{Total number of employees} = \frac{8}{15}n + 35 + \frac{n}{2} = e + n = \frac{6}{5}n + n.$$

$$35 = \frac{11}{5}n - \left(\frac{8}{15}n + \frac{n}{2}\right) = \frac{35n}{30}$$

$$n = 30 \therefore e = 36 \therefore e + n = 66$$

$$\frac{8}{15}n = 16 \text{ and } \frac{n}{2} = 15$$

The conclusions above are represented below.

SP \ EB	F	M	H	T
E	a	b	c	36
N.E	7	d	5	30
T	16	35	15	66

$$a + 7 = 16 \therefore a = 9.$$

$$7 + d + 5 = 30 \therefore d = 18$$

$$b + d = 35 \therefore b = 17$$

$$c + 5 = 15 \therefore c = 10.$$

11. Required number = $d = 18$. Choice (D)
12. Required number = Total number of non-engineers - Number of non-engineers who specialised in Finance = $30 - 7 = 23$. Choice (C)
13. Required number = 15. Choice (B)
14. Choice (A) = 5, Choice (B) = $a = 9$, Choice (C) = $d = 18$, Choice (D) = $b = 17$ Choice (A)
15. Required percentage = Percentage that 36 forms of 66
 $= \frac{36}{66} (100)\% = \frac{6}{11} (100)\% = 54\frac{6}{11}\%$. Choice (C)

Solutions for questions 16 to 20:

Let the weights of lightest, 2nd lightest, 3rd lightest, 4th lightest and heaviest boys be l_1, l_2, l_3, l_4 and l_5 respectively. When they are weighed in groups of three, the possible combinations are $l_1l_2l_3, l_1l_2l_4, l_1l_2l_5, l_1l_3l_4, l_1l_3l_5, l_1l_4l_5, l_2l_3l_4, l_2l_3l_5, l_2l_4l_5$ and $l_3l_4l_5$.

When we add we get

$$6(l_1 + l_2 + l_3 + l_4 + l_5) = 106 + 116 + 122 + 126 + 132 + 146 + 120 + 126 + 136 + 142$$

$$\therefore l_1 + l_2 + l_3 + l_4 + l_5 = \frac{1272}{6} = 212$$

Since the weights are in the order, l_1, l_2, l_3, l_4 and l_5 .

$l_1 + l_2 + l_3 = 106$ kg (lowest weight) and

$l_3 + l_4 + l_5 = 146$ kg (heaviest weight)

$$\therefore l_1 + l_2 + 2l_3 + l_4 + l_5 = 252 \text{ kg and}$$

since $l_1 + l_2 + l_3 + l_4 + l_5 = 212$ kg

$$l_3 = 40 \text{ kg.}$$

$$\therefore l_1 + l_2 = 106 - 40 = 66 \text{ kg and}$$

$$l_4 + l_5 = 146 - 40 = 106 \text{ kg.}$$

The group with the second heaviest weight must be $l_2l_4l_5$, which is 142 kg.

$$\therefore l_2 = 142 - 106 = 36 \text{ kg.}$$

$$\text{And } l_1 = 66 - 36 = 30 \text{ kg.}$$

The group with the second lightest weight is $l_1l_2l_4$, and $l_1 + l_2 + l_4 = 116$ kg.

$$\therefore l_4 = 116 - 66 = 50 \text{ kg and } l_5 = 106 - 50 = 56 \text{ kg.}$$

$$\Rightarrow l_1 = 30, l_2 = 36, l_3 = 40, l_4 = 50 \text{ and } l_5 = 56$$

Given, Ajay = Average of Bhushan and Emmanuel and also Chetan < Emmanuel < Deepak

$$\Rightarrow \text{Bhushan} = 30, \text{Ajay} = 40, \text{Emmanuel} = 50, \text{Chetan} = 36, \text{Deepak} = 56$$

16. The weight of the heaviest boy is 56 kg. Ans: (56)

17. Bhushan's weight is 30 kg. Ans: (30)

18. Emmanuel's weight is 50 kg. Ans: (50)

19. Chetan's weight is 36 kg. Ans: (36)

20. Average weight = $\frac{212}{5} = 42.4$ kg. Ans: (42.4)

Chapter – 6 (Games and Tournaments)

Exercise – 6(a)

Solutions for questions 1 to 4:

Take the rating of 2750 as a base and now adding up the difference of individual rating with 2750 we get

+ 62 (Kasparov)

+ 38 (Anand)

+ 24 (Kramnik)

– 31 (Adams)

+ 36 (Topalov)

– 15 (Svidler)

+ 13 (Leko)

+ 1 (Ivanchuk)

+ x (Grischuk)

Average rating of all the male players is 2760 ($2751 + 9$)

So when we add up the difference

$$\text{We should get } (2760 - 2750) \times 9 = 90 \text{ i.e., } 128 + x = 90$$

$$\therefore x = -38$$

$$\therefore \text{The rating of Grischuk is } 2750 - 38 = 2712$$

Since the average rating of all ten players is 2751, Polgar's rating is 2670.

Now look at the row corresponding to Kasparov

We can see his score in the second column is 1/2, i.e. he scored half point against the Anand, so the match between Kasparov and Anand is, a draw, both scoring 1/2 point each. So we can fill the first column in Anand's row with 1/2.

Similarly look at column 4 for the first row, we can see that Kasparov has scored 1 point against Adams. So in the match between Kasparov and Adams, Kasparov won. So we can fill the first column of Adam's row with a 0, as he lost against Kasparov. In this way we can fill all the vacant spaces and then add up the points to determine the final position.

After filling all the details the table would be like this:

Name	Seeding	1	2	3	4	5	6	7	8	9	10	Total
Kasparov	1	X	$\frac{1}{2}$	0	1	$\frac{1}{2}$	$\frac{1}{2}$	1	$\frac{1}{2}$	0	$\frac{1}{2}$	$4\frac{1}{2}$
Anand	2	$\frac{1}{2}$	X	$\frac{1}{2}$	$\frac{1}{2}$	$\frac{1}{2}$	1	$\frac{1}{2}$	1	1	$\frac{1}{2}$	6
Kramnik	4	1	$\frac{1}{2}$	X	0	0	$\frac{1}{2}$	$\frac{1}{2}$	0	$\frac{1}{2}$	0	3
Adams	8	0	$\frac{1}{2}$	1	X	0	1	0	$\frac{1}{2}$	1	0	4
Tapalov	3	$\frac{1}{2}$	$\frac{1}{2}$	1	1	X	1	$\frac{1}{2}$	1	1	0	$6\frac{1}{2}$
Svidler	7	$\frac{1}{2}$	0	$\frac{1}{2}$	0	0	X	$\frac{1}{2}$	0	$\frac{1}{2}$	0	2
Leko	5	0	$\frac{1}{2}$	$\frac{1}{2}$	1	$\frac{1}{2}$	$\frac{1}{2}$	X	$\frac{1}{2}$	$\frac{1}{2}$	1	5
Polgar	10	$\frac{1}{2}$	0	1	$\frac{1}{2}$	0	1	$\frac{1}{2}$	X	1	1	$5\frac{1}{2}$
Grischuk	9	1	0	$\frac{1}{2}$	0	0	$\frac{1}{2}$	$\frac{1}{2}$	0	X	$\frac{1}{2}$	3
Ivanchuk	6	$\frac{1}{2}$	$\frac{1}{2}$	1	1	1	1	0	0	$\frac{1}{2}$	X	$5\frac{1}{2}$

The table gives the seeding and the final placing of the players.

Name	Seeding	Points	Final Placing
Topolov	3	6.5	1
Anand	2	6.0	2
Ivanchuk	6	5.5	3
Polgar	10	5.5	4
Leko	5	5.0	5
Kasporov	1	4.5	6
Adams	8	4.0	7
Kramnik	4	3.0	8
Grischuk	9	3.0	9
Svidler	7	2.0	10

- Choice (C)
- Choice (D)
- Adams scored 4.0 points Choice (C)
- | | |
|----------|-----------------------|
| Player | No. of Decisive games |
| Anand | 3 |
| Kramnik | 5 |
| Ivanchuk | 6 |
| Adams | 7 |
| Kasporov | 4 |

Choice (D)
- Manchester united has to get at least 15 points to guarantee itself the second place from seven matches. Minimum number of wins required is 4.
4 wins and 3 draws will give it 15 points. Choice (D)
- Manchester united has seven games left and can score maximum of 21 points. It can reach 95 points
∴ Chelsea should get at least 96 points to be guaranteed of the title. It has to get a minimum of 8 more points.
Choice (B)
- Since the results of the remaining matches for these teams are not known, we can't determine who finishes third.
Choice (D)

Solutions for questions 5 to 8:

- Since Arsenal has six more games left to play, it can score a maximum of $6 \times 3 = 18$ points more
∴ Maximum points = $74 + 18 = 92$ Choice (B)
- Since there are 20 teams and it is a double round -robin, each team plays 38 matches.
Arsenal has six games left. At most it could have had four wins and two draws getting 14 points.

Solutions for questions 9 to 11:

- Since one can't reach home with 1, 4 or 6, are have to be at 44, 46, or 47 just before the last round.
Since, if one advance 13 places when you reach 4, always opt for that condition whenever possible.
- The shortest route to 'HOME' would be
1st round $1 \rightarrow 4 \rightarrow 17$ (Advance 13)

2nd round 17 → 22 (can't go to 23 since we reach 48 and get stuck there)
 3rd round 22 → 7 (Go to 45, because (2 + 7 and 4 + 5 are equal))
 4th round 45 → 46 or 47 and
 5th round 46 or 47 → 49. Choice (B)

10. 1st round → 1 → 6
 2nd round → 6 → 12 (max possible)
 3rd round → 12 → 17 (can't go to 18 because 3 consecutive 6's take you to 23 and then to 48)
 4th round → 17 → 22 (can't go to 23 since we reach 48 and get stuck there)
 5th round → 22 → 27 (go to 45) then 2 more rounds as in the previous question. Choice (B)

11. 1st round 1 → 4 → 17
 2nd round 17 → 22 (can't go to 23 since we reach 48 and get stuck there)
 3rd round 22 → 28
 4th round 28 → 34
 5th round 34 → 39 (condition (a) or 31 to (40 + 5) and then two more rounds, as in the previous question)
 6th round 39 → 44
 7th round 44 → 49 Choice (D)

Solutions for questions 12 to 15:

Round	Number of Matches
I→	16
II→	8
Quarter finals	4
Semi Finals	2
Finals	1

Round I:

Each match is played between the players, for whom sum of the ranks = 33.

{(1, 32), (2, 31), (3, 30), (4, 29), (5, 28), (6, 27), (7, 26), (8, 25), (9, 24), (10, 23), (11, 22), (12, 21), (13, 20), (14, 19), (15, 18), (16, 17)}

Round II:

Exactly seven matches, (since there was one upset in round I), are played between players (for whom sum of ranks is 17).

12. Kapil is ranked 29th, exactly one upset was there in every round. This was created by Kapil.
 In semi-finals, (1, 29) and (2, 3) matches were played.
 Finals held will be between Kapil and Vijay Choice (A)

13. Peter created upset in the first round. But, he may or may not have created an upset in the other rounds. We cannot determine the winner. Choice (D)

14. Ist round: (5, 28)
 IInd round: (5, 12) or (5, 21)
 QF: (5, 4)
 or (5, 29)
 or (5, 13)
 Anand must not have played against Ramesh. Choice (A)

15. Ramiz reached the semi finals.
 1st round
 (12, 21)
 2nd round
 (12, 5) or (12, 28)
 QF
 (12, 4) or (12, 29) or (12, 13) or (12, 20)
 Semifinals
 (12, 1) or (12, 32) or (12, 16) or (12, 8) Choice (B)

Solutions for questions 16 to 20:

16. It is given that each player scored exactly one point less than its seeding, i.e. seed 1 scored 0 points, seed 2 scored 1 point and so on such that the seed 8 scored 7 points, which is possible only if he beats all the other teams in the tournament, the player seeded seventh won 6 points or he must have won against all the other players and so on and this can be tabulated as follows.

Seed	Won against	Lost to	Points
8	7, 6, 5, 4, 3, 2, 1	-	7
7	6, 5, 4, 3, 2, 1	8	6
6	5, 4, 3, 2, 1	8, 7	5
5	4, 3, 2, 1	8, 7, 6	4
4	3, 2, 1	8, 7, 6, 5	3
3	2, 1	8, 7, 6, 5, 4	2
2	1	8, 7, 6, 5, 4, 3	1
1	-	8, 7, 6, 5, 4, 3, 2	0

From the tables it is clear that

A beats D & E, D beats B and B beats F. So also, G beats E & A, E beats C, C beats H and H beats F. All the other players except F has won at least one match.

∴ F must be seed 1.

Ans: (6)

17. F lost against all other persons.
 H lost against C.
 C won against F and H.
 Now, we have to find seed 2, who has won only one match. But among the given person only H can win one match, as all others have at least two wins already. Similarly, we can find out the number of the wins of the other persons and we can tabulate the information as follows:

- 1) G
- 2) A
- 3) E
- 4) D
- 5) B
- 6) C
- 7) H
- 8) F

B won three points or he won three matches. Ans: (3)

18. From the arrangement, it is clear that A scored 6 points. Ans: (6)

19. D won 4 points and his rank was 4. Ans: (4)

20. G who won all his matches scored the maximum number of matches in the tournament. Ans: (7)

Exercise – 6(b)

Solutions for questions 1 to 4:

1. As each team plays two matches with six other teams and one match each with the remaining three teams, each team plays 15 matches in the league phase.

$$\therefore \text{Total matches in the league phase} = \frac{15 \times 10}{2} = 75$$

Three are four matches in the next phase.

$$\therefore \text{Total matches} = 75 + 4 = 79. \text{ Choice (C)}$$

2. Assuming the top three teams plays each other only once, the points scored by them can be 30, 28 and 26 respectively, i.e. a total of 84 points. As the total number of matches in the league phase is 75, the total points available is 150. The remaining 150 – 84 = 66 points if shared by the remaining seven teams nearly evenly, a team with 10 points would be ranked fourth and would advanced to the next stage.

Choice (D)

3. Divide the ten teams into two imaginary groups of five each with teams in group 1 being numbered 1, 2, 3, 4, 5 and teams in group 2 being numbered 6, 7, 8, 9 and 10. Let teams 1, 2, 3 from group 1 and 6 and 7 from group 2 be among the top five teams. Let the matches played by the top five teams be as follows.

Team 1

Two matches each against teams → 2, 3, 4, 5, 8, and 9

One match each against teams → 6, 7, and 10

Team 2

Two matches each against teams → 1, 3, 4, 5, 9, and 10

One match each against teams → 6, 7, and 8

Team 3

Two matches each against teams → 1, 2, 4, 5, 8, and 10

One match each against teams → 6, 7, and 9

Team 6

Two matches each against teams → 7, 8, 9, 10, 4, and 5

One match each against teams → 1, 2, and 3

Team 7

Two matches each against teams → 6, 8, 9, 10, 4, 5

One match each against teams → 1, 2, and 3

If we assume that these teams beat all the other teams (i.e. 4, 5, 8, 9, and 10) and nearly shares the matches among themselves, then three teams will end up with 24 points and the other two teams (6 and 7) would end up with a total of 50 points. ∴ One team with 24 points would be eliminated.

Choice (A)

4. Assume a team scores 15 points (all ties) and finishes in the first or second position. It can lose P₁, but win the next two matches and win the tournaments.

$$\therefore \text{Required percentage} = \frac{2}{18} \times 100 = 11.11\%$$

Choice (C)

Solutions for questions 5 to 7:

5. When a player has to remove a minimum of 1 and a maximum of 4 coins in his turn, he can ensure that a total of 5(1 + 4) coins are removed from the table in a round. As the player who clears the table wins the game, A has to make sure that the number of coins left on the table just before B's turn is a multiple of 5. As there are 73 coins now, he has to leave 70 coins on the table or he has to remove three coins. Choice (C)
6. If the value of x is 6, for A to win the game, he has to leave p coins on the table where p is of the form $7k$. As A removed 5 coins in his turn, the number of coins before A's turn was a number of the form $7k + 5$. None of the given numbers is in the form $7k + 5$. Choice (D)
7. If the player to clear the table loses the game, B should make sure that before A plays, the number of coins left on the table is one more than a multiple of 6(5 + 1) or the number of coins before A's turn should be of the form $6k + 1$. As the closest value of $6k + 1 = 133$, B should remove two coins in his turn. Choice (A)

Solutions for questions 8 to 11:

8. In the first round, the third seeded player would have beaten the player seeded 126. In the second round, he would have beaten the player seeded 62 or 67. In the third round, the third seeded player would have played against the player seeded 30 (in case of no *upset*) or player seeded 35 (potential opponent of player seeded 30 in the second round) or player seeded 99 (opponent of player seeded 30 in the first round) or player seeded 94 (opponent of player seeded 35 in the first round).
∴ Any of these players could have beaten seed 3 in the third round. Choice (D)
9. If there are no *upsets* in the first two rounds, the top 32 players will reach the third round. Now, we need to find the lowest seeded player who could have won the tournament by himself causing just a single *upset*. Now

assume that the single *upset* happened in the third round, and along with the match, all other matches in the third round resulted in *upsets*. This would mean that players seeded from 17 to 32 would reach the fourth round. Now seed 32 would play seed 17 (originally scheduled seed 1 and seed 16), seed 31 would play seed 18 and so on. As the only *upset* of the player who won the tournament already happened in the previous round, the lowest seed player who can reach the next round without an *upset* is seed 24 (who plays seed 25). Assume that all the matches in this round, except that involving seed 24, also resulted in *upsets*. In that case seed 24 becomes the highest seeded player left and he can win without any further *upsets*. Choice (C)

10. For minimum number of *upsets*, we assume that only the matches of the winner of the tournament were *upsets*. If the winner of the tournament was any person with a seeding of 51 to 64, then he can win the tournament with six *upsets* (all rounds except the first round). Choice (B)
11. Had there been *upsets* in matches 5, 8, 12 and 14 of the third round, players seeded 28, 25, 21 and 19 would have reached the fourth round, instead of seeds 5, 8, 12 and 14. As there are no *upsets* in the fourth round, the quarter final line up would be seed 1 Vs seed 9, seed 2 Vs seed 7, seed 3 Vs seed 6 and seed 4 Vs seed 21. Choice (A)

Solutions for questions 12 to 15:

12. The player seeded 1 would have faced the last seed (seed 64) in the first round. His probable opponents in the other rounds.
Rounds 2 (Round of 32) – Seed 32 or seed 33. Round 3 (Round of 16) – seed 16 or seed 17 or seed 48 or seed 49. Round 4 (quarter finals) – seed 8 or seed 9 or seed 24 or seed 25 or seed 40 or seed 41 or seed 56 or seed 57. Choice (B)
13. Had there been no *upsets*, the seeding of the players that the player seeded 4 could have faced are
Round 1 – Seed 61
Round 2 – Seed 29
Round 3 – Seed 13
Round 4 – Seed 5
Round 5 – Seed 1
As the player seeded 4 reached the finals, he would have defeated all these players in the previous rounds and so they would not have reached the finals. Choice (D)
14. The probable opponents of the players seeded 21 in the different rounds are
Round 1 – Seed 44
Round 2 – Seed 12 or seed 53
Round 3 – Seed 5 or seed 28 or seed 37 or seed 60
He would face seed 3 only in the finals and so the player seeded 3 was definitely not one of the player he defeated in any of the previous rounds. Choice (D)
15. Assume that all the matches in the first round resulted in *upsets*. In this case all players seeded from 33 to 64 would reach the next round and assume that all the matches except that between seed 48 and 49 resulted in *upsets*. Now seed 48 would be the highest seed left and can win the tournament without any more *upsets*. Choice (D)

Solutions for questions 16 to 20:

The teams in the four pools are as follows:

Pool 1	Pool 2	Pool 3	Pool 4
Seed 1	Seed 2	Seed 3	Seed 4
Seed 8	Seed 7	Seed 6	Seed 5
Seed 9	Seed 10	Seed 11	Seed 12
Seed 16	Seed 15	Seed 14	Seed 13

16. There are 8 teams in the Super Eight stage. If each team plays all other teams, there must be $7 + 6 + 5 + 4 + 3 + 2 + 1 = 28$ matches. Since teams from the same pool don't play again in the Super eight, the four matches between these teams must be deducted.
 \therefore Total matches = $28 - 4 = 24$ Ans: (24)
17. In any pool, of the four teams – the best seed; 2nd best seed, 3rd best seed and worst seed, even the worst seed can reach the next round by causing only one upset, i.e., by beating the 2nd best seed. In this case, the 2nd best, 3rd best and the worst seed will have one win, i.e., 2 points, each. Hence, the worst seed can move to the next round.
 If this happens in pool 1, all of the seeds 8, 9 and 16 would have one win each and seed 16 can enter the Super Eight stage and go on to win the tournament. Ans: (16)
18. Since all teams that reach the Super Eight stage carry forward the points gained in the pool stage against the other qualifier in the group, for calculating the points it can be taken that all teams play every other team once.
 \therefore Total points in the Super Eight stage = $28 \times 2 = 56$.
 As there are no ties, let us assume that the top three teams have won the maximum number of points i.e., 14, 12 and 10 respectively and the remaining points are equally distributed i.e., remaining five teams would have won 4 points each.
 \therefore A team that scores only four points in total can possibly advance to the semi-finals. Ans: (4)
19. To find the maximum points a team can score and still be left out of the semi-finals, assume that five teams score evenly and the remaining three score points only in matches between themselves.
 Total points = 56
 Points scored by the bottom three teams = 6
 All the five teams can score 10 points each and one of the teams is eliminated.
 \therefore To guarantee itself a place in the semi-finals a team has to score 12 points (as there are no ties in the tournament the team can't score 11) Ans: (12)
20. Number of matches in the pool stage = $6 \times 4 = 24$.
 Number of matches in the super six stage = 24
 Then - semifinals (2) + finals (1) + 3rd place match (1)
 \therefore total = $24 + 24 + 2 + 1 + 1 = 52$ matches. Ans: (52)

Chapter – 7 (Routes, Networks, 3D)

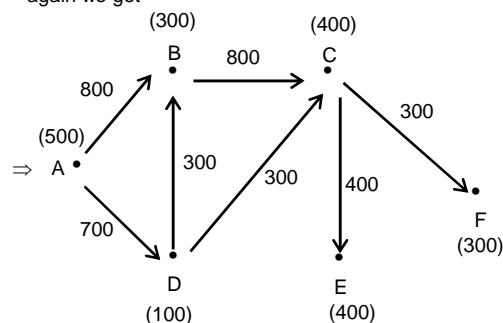
Exercise – 7(a)

Solutions for questions 1 to 5:

1. During 2017, A's Profit = 12.5% of 3000 crores
 $= \frac{1}{8} \times 3000 = ₹375$ Crores
 B's Profit = 25% of 4000 Crores = ₹1000 Crores
 C's Profit = 37.5% of 5000 = $\frac{3}{8} \times 5000 = ₹1875$ Crores
 D's Profit = 50% of 4000 Crores = ₹2000 Crores.
 Choice (D)
2. Since the profit percentage of both C and D in 2015 are the same, ratio of expenditure of C and D in 2015 will be same as that of their sales revenues.
 $\left(\text{Since expenditure} = \text{Revenue} \times \frac{(100 - \text{profit}\%)}{100} \right)$
 Choice (B)
3. From earlier solution, in 2017, D made a maximum profit of ₹2000 crores. Using this as reference we see that in 2016 C exceeds this, C = ₹2,500 crores and then in 2015 no company exceeds this. Ans: (2500)
4. A's total profit = 62.5% of 2000 + 25% of 3000 + 12.5% of 3000 = ₹2375 Crores Ans: (2375)
5. During 2018, Sales Revenue of B = 125% of 4000 Crores = 5000 crores.
 Expenditure in 2018 = 80% of 0.75 of 4000 = 2400 crores.
 $\text{Profit} = \left(\frac{5 - 2.4}{5} \right) \times 100 = 52\%$
 Actual Profit of B in 2017 = 25%
 $52 - 25 = 27\%$ points Ans: (27)
- Solutions for questions 6 to 8:**
6. Work required to finish each task is in the ratio 12 : 15 : 20 : 10 : 18
 \therefore That done by Ramesh

$$= \frac{\left(\frac{20}{100} \times 12 + \frac{30}{100} \times 15 + \frac{50}{100} \times 20 + \frac{10}{100} \times 10 + \frac{30}{100} \times 18 \right)}{(12 + 15 + 20 + 10 + 18)}$$

$$= \frac{(2.4 + 4.5 + 10 + 1 + 5.4)}{75} = \frac{23.3}{75} = 31\%.$$
 Choice (B)
7. Rajesh did 60% of A, 30% of B and C, 50% of D and 10% of E
 He will get
 60% of 12,000
 30% of 15,000 and 20,000 each.
 50% of 10,000 and 10% of 18,000.
 Of this 60% of 12,000 is the maximum. Choice (A)
8. Rakesh gets
 $20\% \text{ of } 12,000 + 40\% \text{ of } 15,000 + 20\% \text{ of } 20,000 + 40\% \text{ of } 10,000 + 60\% \text{ of } 18,000 = ₹27,200.$ Choice (C)
- Solutions for questions 9 to 12:**
- Maximum capacity = 1000 m³ per day – (1)
 – Requirement at C = 400 – (2)
 – Slack in CE – Slack in CF = 100 – (2)
 – AD = 1000 – 300 = 700 – (4)
 – D = 100, C = 400 – (5)
 – BC = 800 – (6)
 – Slack in CE : Slack in CF = 6 : 7 – (7)
 – DB : DC = 1 : 1
 $\Rightarrow \text{DB} = 300, \text{ DC} = 300$ } – (8)
 – Slack in AB = 200 – (9)
9. From (3) and (7)
 Slack in CE = 600
 Slack in CF = 700
 \Rightarrow Water flowing through CE = Requirement at city
 E = 1000 – 600 = 400 Choice (B)
10. Water flowing through CF = Requirement at city
 F = 1000 – 700 = 300 Choice (A)
11. By using the above 9 conditions and drawing the diagram again we get



Water that should flow through the pipeline
 $= 500 + 800 + 700 = 2000 \text{ m}^3$
 Slack = $5000 - 2000 = 3000 \text{ m}^3$ Choice (B)

12. In the above figure if the pipeline joining D and B is damaged then the amount of water wasted = 300 m^3 Choice (C)

Solutions for questions 13 to 15:

13. Distinct paths from city A to city G are
 A – B – C – F – G
 A – B – C – G
 A – E – C – G
 A – D – E – C – G
 A – E – C – F – G
 A – D – E – C – F – G \therefore A total of 6 ways. Choice (D)
14. City G can be reached from city E in the following ways;
 E – C – F – G
 E – D – A – B – C – F – G
 \therefore A total of 2 ways. Choice (D)
15. If all the roads allow two-way traffic, then city G can be reached from city E in the following ways;
 E – C – F – G
 E – D – A – B – C – F – G
 E – G
 E – A – B – C – F – G \therefore a total of 4 ways. Choice (C)

Solutions for questions 16 to 20:

We can get the following table but it is suggested that only the required data be calculated, in order to save time.

Region					
Company	North	South	East	West	Total
Voltas	25% = 0.92	50% = 1.22	50% = 0.72	25% = 0.652	3.45L
Blue Star	50% = 1.82	25% = 0.62	12.5% = 0.1752	25% = 0.652	3.225L
Carrier Aircon	25% = 0.92	25% = 0.62	37.5% = 0.5252	50% = 1.32	3.325L
Total	3.6L	2.4L	1.4L	2.6L	10L

16. Voltas sold maximum no. of ACs. i.e. 1.2 Lakhs in South region. Choice (B)
17. Total number of ACs sold by carrier Aircon in all four regions = 3,32,500. Choice (B)
18. No. of ACs sold by Blue Star in East & North = $17,500 + 1,80,000 = 1,97,500$ Choice (C)
19. Required percentage = $\frac{1.2 - 0.6}{0.6} \times 100 = 100\%$ Choice (B)
20. Required Ratio
 Voltas in East : Total of North
 70,000 : 3,60,000
 1 : 5 (approx) Choice (D)

Exercise – 7(b)

Solutions for questions 1 to 3:

1. For contestant 5 = $\sqrt{(3)^2 + (3)^2} = \sqrt{18}$ units
 For contestant 6 = $\sqrt{7^2 + 1^2} = \sqrt{50}$ units
 For contestant 7 = $\sqrt{1^2 + 3^2} = \sqrt{10}$ units
 For contestant 8 = $\sqrt{1^2 + 4^2} = \sqrt{17}$ units
 \therefore Contestant number 7 has run the minimum distance and so he has the least average speed. Choice (B)
2. Distances are to be calculated taking GC as (1, 1) and the rest of the locations being the same.

$$\text{For contestant number 1} = \sqrt{6^2 + 2^2} = \sqrt{40}$$

$$\text{For contestant number 6} = \sqrt{6^2 + 2^2} = \sqrt{40}$$

$$\text{For contestant number 2} = \sqrt{2^2 + 4^2} = \sqrt{20}$$

$$\text{For contestant number 5} = \sqrt{2^2 + 2^2} = \sqrt{8}$$

Contestants 1 and 6 have covered the maximum distance. Choice (D)

3. The answer can be found by first observing the given figure and eliminating the options.
 (or)

$$\text{Distance between 2 \& 8} = \sqrt{85}$$

$$\text{Distance between 1 \& 5} = \sqrt{136}$$

$$\text{Distance between 1 \& 4} = \sqrt{130}$$

$$\text{Distance between 2 \& 5} = \sqrt{100} \quad \text{Choice (B)}$$

Solutions for questions 4 to 8:

4. All the refineries are currently filled to 50% of their capacity. By taking the route A – 2 – 4 – 7 – 8 we can ensure minimum quantity to be sent to reach 8. We need to send (in ₹000 lts) $150 + 100 + 50 + 50$ (for depot 8) = 350 (in ₹000 lts) Ans: (3,50,000)
5. We can send to A – 1 – 6, A – 3 – 5 and A – 2 – 7. A total of $250 + 200 + 200 + 150 + 150 + 100 + 50 = 1100$ ('000 litres) can be consumed with no part reaching depot 8. Ans: (1100)
6. The shortest route is from A – 3 – 4 – 7 – 8 which is 760 km.
 \therefore Cost = $760 \times 150 = 1,14,000$ Ans: (1,14,000)
7. Now the shortest route is A – 1 – 6 – 8 which is 790 km.
 \therefore Cost = $790 \times 150 = 1,18,500$ Ans: (1,18,500)
8. Total capacity of all depots (in ₹000) = 2,700
 Capacity to be filled (in litres) = 50% of 2,700,000 = 13,50,000 Ans: (13,50,00)

Solutions for questions 9 to 13:

9. In country D,
 The total number of passengers using airways = 400
 Passengers of country D using Q airlines = 30% = 120
 In country B
 The total number of passengers using airways = 400
 Passengers using P airlines = 10% = 40
 \therefore Difference = $120 - 40 = 80$ Choice (B)
10. The number of passengers using R airlines in country A = 50% of 350 = 175
 The number of passengers using roadways = 250
 $\therefore \frac{175}{250} \times 100 = 70\%$ Choice (A)
11. The passengers of country C using railways = 250
 Those using Q airlines currently = 40
 Those using P airlines currently = 40
 Those using R airlines currently = 20
 Now after the addition of the passengers,
 The number of passengers of Q airlines = $125 + 40 = 165$
 The number of passengers of P airlines = $125 + 40 = 165$
 \therefore required % = $\frac{20}{165} \times 100 = 12.1\%$ Choice (C)
12. The total number of passengers = 3600
 Those using R airlines in
 Country A $\Rightarrow \frac{50}{100} \times 350 = 175$

$$\text{Country B} \Rightarrow \frac{30}{100} \times 400 = 120$$

$$\text{Country C} \Rightarrow \frac{20}{100} \times 100 = 20$$

$$\text{Country D} \Rightarrow 0, \text{ Total} = 315$$

$$\Rightarrow \text{required percentage} = \frac{315}{3600} \times 100 = 8.75\%$$

Choice (C)

13.

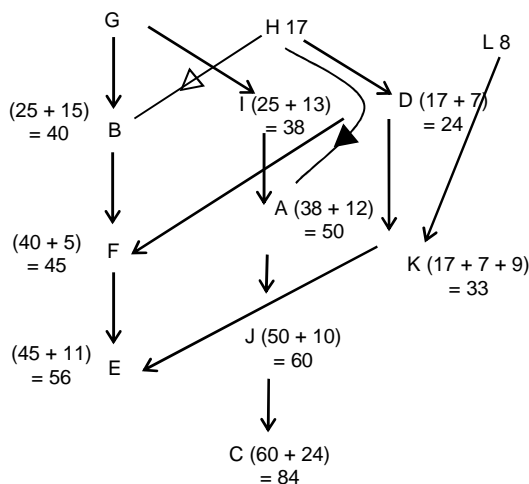
	P	Q
B \Rightarrow	40	240
D \Rightarrow	280	120
\Rightarrow Total =	680	

$$\text{Required \%} = \frac{680}{1900} \times 100 = 35.7\%$$

Choice (D)

Solutions for questions 14 to 16:

14. E can be executed only after K, which can be done only after D, which can be done only after H. Choice (C)
15. E can be done only after completing G, H, B, D, F, L and K. If these some can be done simultaneously. Minimum time = 25 + 15 + 5 + 11 = 56 mins. Choice (D)
16. The order in which the processes are executed and the minimum time taken to execute them are



Choice (A)

Solutions for questions 17 to 20:

The possible values of scores (range of scores) for the students in the Aimcats are as follows:

Test	A	B	C	D	E
Aimcat 1	75	68	52	20-35	20-35
Aimcat 2	52	20-28	20-28	60	40
Aimcat 3	28-59	60	78	28-59	65

17. Only 36 can possibly be the score of D in Aimcat 3. Choice (C)
18. The highest value of the C index for the students is as follows.

Student	C index
A	47
B	48
C	58
D	40
E	45

The highest value of the C index for any student = 58

Choice (A)

19. The values of the R index for the students are

Student	R index
A	52-59
B	60
C	52
D	28-59
E	40

\therefore Only D or E can have the lowest value of the R-index.

Choice (D)

20. Only B can have the highest value of the R index.

Choice (C)

Chapter – 8 (Reasoning Based DI)

Exercise – 8(a)

Solutions for questions 1 to 5:

1. The percentage of the number of villages that have a population in the range of 3001 – 5000, to the total number of villages having a population in the range of 6001 to 10,000 = $15/25 = 60$ Ans: (60)
2. The percentage of villages having a population in the range of 1000 - 3000 = $10 + 8 = 18\%$.
The percentage of villages having a population in the range of 3001- 5000 = 15%.
The required percentage increase = $\frac{3}{15} \times 100 = 20\%$.
Ans: (20)
3. The percentage of villages having a population in the range of 5001 - 6000 = 20%
The percentage of villages having a population in the range of (6001 - 20,000) = $25 + 22 = 47\%$.
Given that 20% = 60
 $\therefore 47\% = \frac{47}{20} \times 60 = 141$ Ans: (141)
4. The percentage of villages having a population of at least 3000 = $15 + 20 + 25 + 22 = 82\%$.
The number of villages having a population of at least 3000 = $\frac{82}{100} \times 500 = 410$.
Ans: (410)
5. Since the number of villages in group-B has to be the minimum, the population of each village has to be the greatest.
 \therefore each village should have a population of 5000 people.
The number of villages = $\frac{45000}{5000} = 9$.
Ans: (9)

Solutions for questions 6 to 10:

6. Number of students who scored 50 or more marks in Social = 131.
Number of students who scored 60 and above in Social = 104.
Those who scored 50 or more but less than 60 in Social = $131 - 104 = 27$.
Choice (B)
7. Total number of students = 160.
Those who scored 50 and above = 117
Those who scored less than 50 = $160 - 117 = 43$
Choice (B)
8. Number of students who scored 50 or more but less than 70.
in Maths = $127 - 83 = 44$
in Marati = $139 - 91 = 48$
in Social = $131 - 103 = 28$
in Statistics = $149 - 108 = 41$
In English = $117 - 93 = 24$
The number of students is the highest for Marati.
Choice (D)

9. A student who scored more than 60 marks in Maths might not have not scored more than 60 marks in Marati. Hence, we cannot determine the number of students who scored more than 60 marks in all the given subjects.

Choice (D)

10. Total number of students = 160
Those who scored 60 or more in Marati = 113
Those who scored less than 60 = $160 - 113 = 47$

Choice (D)

Solutions for questions 11 and 12:

11. $64 - (5 + 8 + 6 + 13 + 7 + 14 + 9) = 2$ Choice (B)
12. Physics and Mathematics = $5 + 6 + 7 + 9 = 27$
Biology and Chemistry = $13 + 7 + 11 + 2 = 33$
Maths, Physics, Chemistry and Biology = 7
 $\therefore 27 + 33 - 7 = 27 + 33 - 7 = 53$ Choice (C)

Solutions for questions 13 to 16:

As it is mentioned that 35 students passed out of class IV at the end of year I, three students who were in class IV in year I failed in the class and as the number of students in class IV in year II was 32, it means that 29 students got promoted from class III at the end of year I.

\therefore 2 students failed in class III in year I, as there were 39 students in class III in year II, 37 students were promoted from class II.

\therefore 5 students failed in class II in year I and as there were 38 students in class II in year II, 33 students were promoted from class I. \therefore 3 students failed in class I in year I and 31 students newly joined in year II. The following can be represented in a table as follows.

Class	Students in Year I	Promoted	Failed	Students in Year II
I	36	33	3	34
II	42	37	5	38
III	31	29	2	39
IV	38	35	3	32

13. 31 students joined the school in year II. Choice (D)
14. 3 students failed in class I in year I. Choice (C)
15. 29 students were promoted from class III at the end of year I. Choice (B)
16. 13 students in the school failed in the annual exams in year I. Choice (D)

Solutions for questions 17 to 20:

17. The maximum number of emails (in billion) expected to be sent from hotmail to hotmail account.
 $= (2074) - (300 + 317 + 3) = 2074 - 620 = 1454$.
Choice (A)
18. The required number = $(317 + 198 + 1 + 1) = 517$.
Choice (C)
19. The maximum number of emails expected (from yahoo to hotmail)
 $= \text{Min} [(2074) - (300 + 317 + 3), (2183) - (180 + 100 + 85 + 2)]$
 $= \text{Min} [(2074 - 620), (2183 - 367)]$
 $= \text{Min} [1454, 1816] = 1454$.
Choice (B)
20. Maximum number of emails can be sent from msn or Eudora
The maximum number of emails that could be sent from msn = $10,000 - (1182 + 1784 + 2074 + 85 + 372 + 4 + 1818)$
 $= 10,000 - (7319) = 2681$

The maximum number of emails that could be sent from Eudora = $10,000 (1182 + 1784 + 2074 + 386 + 198 + 4 + 1818)$
 $= 10,000 - (7446) = 2554$

The maximum number of emails sent from msn to mailcity = $2681 - (386 + 198 + 3) = 2094$

The maximum number of emails sent from Eudora to hotmail or msn = $2554 - (372 + 85 + 3) = 2094$

\therefore The maximum number of emails sent from one email account to another = 2094. Choice (D)

Exercise – 8(b)

Solutions for questions 1 to 3:

1. If the sales in the year 2013 were ₹120 crores then its value in the year 2016 was
 $120 \times 1.21 \times 1.18 \times 1.14$
 $= 120 \times 1.65 = 198$ crores. Choice (C)
2. Let the value of sales in 2013 be 100.
The approximate values in the other years would be 2014-121, 2015-143, 2016-163, 2017-174.
The highest increase is in 2015. Choice (B)
3. As, till the year 2016 the growth in profit in each year is less than that of sales, and growth in profit in 2017 is more than that of sales, the profitability would be the least in 2016. Choice (C)

Solutions for questions 4 to 7:

The runs scored in the matches are as follows.

$$\text{Match I} = \frac{63}{360} \times 100 = 17.5\%$$

Similarly, in

$$\text{Match 2} = 25\%$$

$$\text{Match 3} = 15\%$$

$$\text{Match 4} = 20\%$$

$$\text{Match 5} = 22.5\%$$

The runs made in the different matches are in the ratio 7 : 10 : 6 : 8 : 9

Let the total runs scored in match 1, match 2, match 3, match 4 and match 5 be 7k, 10k, 6k, 8k and 9k respectively.

$$\text{Total} = 40k,$$

Similarly the ratio of the total runs scored by the 6 batsmen are as follows:

A	B	C	D	E	F
10%	20%	27.5%	12.5%	22.5%	7.5%
4	8	11	5	9	3

Let the total runs scored by the 6 batsmen by 4k₂, 8k₂, 11k₂, 5k₂, 9k₂ and 3k₂ respectively.

$$\text{Total} = \frac{90}{100} (40k_1) = 36k_1$$

so depending on the value of k₁ we can have the following scores
k₁ = 10, 20, 30....

Match 1	70	140	210	280	350
Match 2	100	200	300	400	500
Match 3	60	120	180	240	300
Match 4	80	160	240	320	400
Match 5	90	180	270	360	450

Similarly we can find the total runs scored by the 6 batsmen.

4. Runs scored by C in the entire series = 11k₂

$$= 11 \times \frac{9}{10} k_1 = 9.9k_1$$

C scored 20% of the total runs in each of the 5 matches.

$$\text{So C scored } \frac{20}{100} (40k_1) = 8k_1$$

In addition C scored $9.9k_1 - 8k_1 = 1.9k_1$

Now runs scored by C in a match as a percentage of the total runs scored in the match will be highest when the total runs scored in that match is the least i.e., in Match 3.

Out of a total of $6k_1$, C scored

$$= \frac{20}{100} (6k_1) + 1.9k_1 = 3.1k_1$$

$$\text{Now } \frac{3.1k_1}{6k_1} \times 100 = 51.66\% \quad \text{Choice (D)}$$

5. Total runs scored in Match 2 = $10k_1$
Total runs scored by C in the entire series = $11k_2$
 $= 11 \times \frac{9}{10} = 9.9k_1$
Difference = $0.1k_1$
Now $0.1k_1 = 4$ or, $k_1 = 40$
Therefore $k_2 = \frac{9}{10} (40) = 36$
Total runs scored by A = $4k_2 = 4(36) = 144$
Total runs scored by D = $5k_2 = 5(36) = 180$
Thus total runs scored by A and D in the entire series = $(144 + 180)$ runs = 324 runs Choice (C)
6. Total runs scored in Match 2 = $10k_1$
Total runs scored by the 6 batsmen in the entire series.
- | A | B | C | D | E | F |
|----------|----------|----------|----------|----------|----------|
| $3.6k_1$ | $7.2k_1$ | $9.9k_1$ | $4.5k_1$ | $8.1k_1$ | $2.7k_1$ |
- Total runs scored by a batsman in Match 2 as a percentage of the total runs scored by the batsmen in the entire series will be maximum for the batsman who scored the least runs i.e., F.
Since each batsman scored at least 16% of the total runs in match 2, the remaining 5 batsmen scored at least (16% of $10k_1$) 5
 $= 80\% \text{ of } 10k_1 = \frac{4}{5} (10k_1) = 8k_1$
Thus F scored the remaining $2k_1$ runs.
Now $\frac{2k_1}{2.7k_1} \times 100 = 74\% \quad \text{Choice (A)}$
7. The minimum runs scored by team in the entire series was 180.
Minimum runs was scored in match 3, $6k_1 = 180$
So $k_1 = 30$
So the total runs scored by B in the entire series was $7.2k_1$
 $= 7.2(30) = 216 \quad \text{Choice (A)}$

Solutions for questions 8 to 12:

8. The maximum number of students in section A who passed in all the four subjects is 26. Ans: (26)
9. In section C, 14 students have failed in Maths, 6 students in Physics, 9 students in Chemistry and 11 students in Biology. If all these students are distinct, $14 + 6 + 9 + 11 = 40$ students would have failed in one subject each and so no student passed in all the four subjects. Ans: (0)
10. For having the maximum number of students passing in exactly one subject, you should have the maximum number of students passing in all the four.
If x is the number of students in section B who passed in exactly one subject and y is the number of students who passed in exactly four subjects,
 $x + y = 40$ and $x + 3y = 136$
 $x = 8$ and $y = 32 \quad \text{Ans: (8)}$
11. The maximum number of students who passed in both Physics and Chemistry in the different sections are A-31, B-32 and C-31, i.e., $31 + 32 + 31 = 94$. Ans: (94)

12. We need to find the maximum number of students who passed in all the four subjects in each of the three sections the values are
Section A – 26
Section B – 32
Section C – 26

Total 84.

\therefore at least $120 - 84 = 36$ students in the school failed to clear the class X exam. Ans: (36)

Solutions for questions 13 to 16:

13. The medical expenses increased from 6% of total expenses to 10% of the total which is the highest increase along with expenses on clothing. But as the increase of medical expenses is on a lower base, the expenses under that head would have the highest percentage increase. Choice (C)
14. The percentage share of entertainment expenses has fallen the most from 2015 to 2017. As it is given that the expenses under each head in 2017 was more than the corresponding value in 2015, assuming the total expenses in 2015 and 2017 to be x and y respectively.
 $0.15y > 0.17x$
 $\therefore 15y > 17x$
 $\frac{y}{x} > \frac{17}{15}$
 \therefore total expenses in 2017 was at least 13.33% more than the corresponding value in 2015. Choice (B)
15. If the total expenses in 2016 and 2018 are x and y respectively,
 $\frac{5}{4} \times 0.05x = .10y$
 $\frac{0.25}{4} x = .10y$
 $\frac{x}{y} = \frac{40}{25} = \frac{8}{5}$
 \therefore expenses on clothing in 2018 = $14 \times 5 = 70$
Expenses on entertainment in 2016 = $15 \times 8 = 120$
 \therefore the required percentage = $\frac{70}{120} \times 100 = 58.33\%$ Choice (D)
16. Let expenses on rent in 2015 be ₹14
 \therefore total expenses in 2015 = ₹100
Expenses on rent in 2018 = $14 \times 1.1 \times 1.1 \times 1.1$
 $= 14 \times 1.331$
 $= 18.65$
Expenses on food in 2015 = ₹15
Expenses on food in 2018 = ₹18.65
 \therefore the percentage increase = $\frac{18.65 - 15}{15} \times 100 = 24.3\%$ Choice (B)

Solutions for questions 17 to 20:

As it is said that in reasoning none of the other three persons scored more than Chetan, Chetan is either A or C. From the second condition we can conclude that Balu and Anand is one among A or D in any order or one among B or C in any order.

17. If Deepak scored the lowest marks in the reasoning section, Deepak is student B which means Balu and Anand are one of A and D in any order and so statement II would be false. Choice (B)
18. If Balu's lowest score is in the reasoning section, Balu is student B and Anand is student C and the statement that Anand's lowest score is in the quantitative section is true. Choice (C)

19. If Anand gets the highest score in the verbal section, he is student B and Balu is student C.
 \therefore Both statements cannot be simultaneously true. Anand and Balu can also be A or D in any order in which case both statements would be false.
 \therefore At most one of the statements is true. Choice (C)
20. If Deepak gets his lowest score in the verbal section, he is student D in which case Chetan is student A. Choice (C)

Chapter – 9
(Omet Based DI)
Exercise – 9(a)

Solutions for questions 1 to 5:

1. The total tonnage of fish caught in the inland waters in 1998 = (Total quantity of fish caught in 1998) – (Total quantity of fish caught in the sea in 1998)
 $= (10,229) - (947 + 6164) = 3118$ tonnes. Choice (D)
2. The tonnage of fish caught in the inland waters during 1999 = $61 + 129 + 297 = 487$.
 Similarly the tonnage in 2000 = 516, in 2001 = 519 and in 2002 = 589
 There has been an increase in every year statement (I) is true. Statement (I) is maintained in choice (A) as well as choice (D). By checking statement (IV), the quantity of fish caught, using the traditional method has decreased successively in two years.
 \therefore IV cannot be inferred.
 Only statement (I) can be inferred. Choice (A)
3. During the given years, the total quantity of fish caught by the modern methods
 $= 5841 + 2463 + 11997 + 44668 = 64,969 \approx 65,000$
 The quantity of fish caught by traditional methods
 $= 374 + 731 + 1930 + 7675 = 10,710 \approx 11,000$; $\frac{65,000}{11,000} \approx 6$
 Choice (D)
4. The percentage increase in the quantity (tonnage) of fish caught over previous year in 1999 = $\frac{684}{10,229}$
 In 1998 = $\frac{1262}{8,967}$, In 2000 = $\frac{864}{10,913}$,
 in 2001 = $\frac{590}{11,777}$ and in 1997 = $\frac{759}{8208}$
 Among the given fractions, in the fraction pertaining to 2001, the denominator is the greatest and the numerator is the least. Hence the value of this fraction is the least.
 Choice (D)
5. Number of fish caught = $\frac{\text{Quantity of fish}}{\text{Average weight}}$
 Number of fish caught in artificial tanks
 $= \frac{374 + 5841}{2} = \frac{6215}{2} = 3017.5$
 In lakes = $\frac{731 + 2463}{3} = 1064$
 In rivers = $\frac{1930 + 11997}{4} = 3481$.
 In seas = $\frac{7675 + 44668}{5} = \frac{52343}{5} = 10468.6$
 The number of fish caught in the lakes is the least.
 Choice (B)

Solutions for questions 6 to 10:

6. Income tax paid by Sharma = $(30/100) \times 4.5$
 $= 1.35 > 1$ lakh rupees,

Income tax paid by Rao = $(25/100) \times 3.5$
 $= 1/4 \times 3.5 < 1$ lakh rupees,
 Income tax paid by Gupta = $(25/100) \times 3 < 1$ lakh rupees
 Income tax paid by Solkar = $(30/100) \times 40 > 1$ lakh rupees
 Income tax paid by Kuchroo = $(35/100) \times 5 > 1$ lakh rupees
 There are three such persons Ans: (3)

7. The two doctors are Sharma and Solkar.
 Sharma's income = ₹4.50 lakhs
 PPF = ₹50,000 or ₹0.50 lakhs
 Taxable income = $4.5 - 0.5 = ₹4.00$ lakh
 Tax payable = $(30/100) \times 4 = ₹1.20$ lakh
 Solkar's taxable income = $4.00 - 0.50 = ₹3.50$ lakh.
 Tax payable = $25/100 \times 3.50 = ₹87,500$
 Total tax payable by these two doctors
 $= 1,20,000 + 87,500 = ₹2,07,500$ Ans: (2,07,500)
8. 35% of Gupta's Income = $(35/100) \times 3$ lakhs = ₹1.05 lakhs
 Savings of Gupta currently = ₹50,000
 Gupta should save ₹55,000 more to reach the target of 35%
 Ans: (55,000)
9. Total investments in PPF by the five persons
 $= 50 + 50 + 25 + 50 + 80 = ₹2.55$ lakhs = ₹2,55,000
 Interest payable per annum
 $= (8/100) \times 2,55,000 = ₹20,400$
 Average interest payable per person = $20,400/5 = ₹4,080$
 Ans: (4,080)
10. The ratio of savings to expenditure for
 Sharma = $\frac{1.5}{3} = \frac{1}{2}$ Rao = $\frac{1}{2.5} = \frac{2}{5}$
 Solkar = $\frac{1.5}{2.5} = \frac{3}{5}$ Gupta = $\frac{0.5}{2.5} = \frac{1}{5}$
 Kuchroo = $\frac{1.5}{3.5} = \frac{3}{7}$
 We can observe that Gupta has the least ratio.
 Choice (C)

Solutions for questions 11 to 15:

11. The total costs per unit of the different companies are as follows.
 A = $10 + 15 + 20 = ₹45$ B = $15 + 10 + 20 = ₹45$
 C = $5 + 10 + 15 = ₹30$ D = $20 + 10 + 15 = ₹45$
 E = $25 + 15 + 20 = ₹60$ F = $25 + 5 + 30 = ₹60$
 Choice (D)
12. Sales income of the company
 B = $5,000 \times 68 = ₹3,40,000$
 Total cost of production of B for 5,000 units
 $= 5,000 \times 45 = ₹2,25,000$
 \therefore Profit = ₹1,15,000 Choice (C)
13. If we observe the total cost of all the companies, then total costs of A and D are ₹45 and ₹45 respectively.
 \therefore Ratio of total costs = 1 : 1
 Similarly, for E and F, ratio of total costs = 1 : 1
 \therefore Statement C is correct. Choice (C)
14. Profit of company D for one day production
 $= 1,000 (60 - 45) = ₹1,50,000$
 Profit of company F for one day production
 $= 800 (80 - 60) = ₹1,60,000$
 The ratio will be the same whether it is calculated for one day or for ten days.
 \therefore Ratio of profits = 15 : 16 Choice (A)
15. The labour cost of B and C is same, say x.
 \therefore Total cost of B is $x + 20 + 10 = x + 30$
 Total cost of C is $x + 15 + 10 = x + 25$
 \therefore The ratio of the total cost is $x + 30 = x + 25$
 Cannot be determined Choice (D)

Solutions for questions 16 to 20:

16. During the year 2003, the total number of garments manufactured by A = 168 + 295 + 332 + 100 = 895.
Similarly, those manufactured by B = 473, C = 798 and D = 1069 Hence, D > A > C > B

Alternate method:

By observation, we can find that the total number of garments is the greatest for company D, and the next highest for A. Choice (C)

17. The percentage increase in the number of garments manufactured by company C for female segment for

$$\text{second quarter} = \frac{59 - 35}{35} = \frac{24}{35}$$

$$\text{for third quarter} = \frac{68 - 59}{59} = \frac{9}{59}$$

$$\text{for fourth quarter} = \frac{75 - 68}{68} = \frac{7}{68}$$

$\frac{7}{68}$ is the least as the numerator is the smallest and the denominator is the greatest.

Note: First quarter need not be considered since the number of garments for the previous quarter is not given.

Choice (D)

18. If the total number of garments manufactured in 2002 was 100, then the total number of garments manufactured in 2003 was 125. Since the total number of garments manufactured in 2003 is 3235, those

$$\text{manufactured in 2002} = \frac{100}{125} \times 3235 = 2588 \text{ thousands}$$

Choice (B)

19. The ratio of the total number of garments manufactured for the male segment to that of female segment
= (168 + 103 + 180 + 227) : (295 + 125 + 237 + 321)
= 678 : 978 = 113 : 163. Choice (A)

20. Only for company B there is a growth in every segment for every quarter. Choice (B)

Exercise – 9(b)

Solutions for questions 1 to 4:

- Distance between Cochin and Jaipur which is 2745 km, is the maximum. Choice (D)
- Distance between the cities:
Kanpur – Chandigarh = 661 km
Mumbai – Nagpur = 849 km
Difference = 188 km. Choice (B)
- From Nagpur, Cochin is the farthest among the given cities. Choice (D)
- We can see that the direct distance between Hyderabad and Cochin is 1090 kms while
Hyderabad – Bangalore – Cochin is
(563 + 512) = 1075 kms.
So travelling to Cochin from Hyderabad through Bangalore shortens the journey. Choice (B)

Solutions for questions 5 to 9:

5. Total Earnings = EPS × Total number of shares
The number of shares of company A has increased from 12.5L to 17.5L
 $\frac{17.5 - 12.5}{12.5} \times 100 = 40\%$
Assume that company A had only 10 shares in 2017.
∴ Total earnings = 10 × 6 = ₹60

Now, the next year the number of shares increases by 40% that is 10 becomes 14.

$$\therefore \text{Total earnings} = 14 \times 12 = 168$$

∴ Required percentage increase

$$= \frac{168 - 60}{60} \times 100 = \frac{108}{60} \times 100 = 180\% \quad \text{Ans: (180)}$$

6. For A it is 180% (from the previous question).
For B, as the number of shares hasn't changed, we can directly calculate the increase in total earnings from the increase in EPS.

$$\text{Increase} = \frac{18 - 8}{8} \times 100 = \frac{10}{8} \times 100 = 125\%$$

For C the number of shares increases from 27.0L to 40.5 lakh, that is a 50% increase.

Assume that C had only 10 shares in 2017.

$$\text{Total earnings } 10 \times 2 = 20$$

The next year, the number of shares increases by 50%, that is 10 becomes 15.

$$\text{Total earnings } 15 \times 6 = 90$$

$$\text{Increase} = \frac{90 - 20}{20} \times 100 = 350\%$$

For D, as the number of shares does not change, we can use the same logic as used for company B and find that the increase is 50%. Ans: (C)

7. Share price = EPS × P/E = 18 × 12 = ₹216

Ans: (216)

8. Since the share price = P/E × EPS the prices of companies on 1st April, 2017 and 1st April, 2018 can be found as

Company	2017	2018
A	90	96
B	160	216
C	50	96
D	360	432
E	120	72
F	50	36

It is the highest for C.

Choice (C)

9. Total earnings of D in 2018
∴ EPS × the number of shares = 18 × 8.5L = ₹153 lakh
Earnings in 2019 = $\frac{90}{100} \times 153$
∴ Earnings of E in 2019
EPS = $\frac{90 \times 153}{100 \times 27} = 5.1$ Choice (D)

Solutions for questions 10 to 12:

10. Total for Amar:
 $68 + 80 + 62 + \frac{46}{2} + \frac{90}{2} = 278$
For Ajay
 $48 + 60 + 96 + \frac{54}{2} + \frac{98}{2} = 280$
For Akbar
 $40 + 64 + 66 + \frac{62}{2} + \frac{72}{2} = 237$
For Arun
 $78 + 44 + 66 + \frac{70}{2} + \frac{60}{2} = 253$
For Antony
 $88 + 86 + 76 + \frac{42}{2} + \frac{78}{2} = 310$

Choice (C)

11.

Subject	Amar	Ajay	Akbar	Arun	Antony
A	4	2	3	1	5
B	3	5	1	2	4
C	2	3	5	4	1
D	3	2	1	5	4
E	4	5	2	1	3
Total	16	17	12	13	17

Choice (D)

12. New totals would have been

Amar – 346, Ajay = 356, Akbar – 306, Arun – 318 and Antony – 370.

Choice (B)

Solutions for questions 13 to 17:

13. We have to select amongst the solutions Q, R, T and U (as they have higher concentration as compared to others).

$$(R, Q) : C = \frac{(80)(34) + (16)(60)}{16 + 34}$$

$$= \frac{2720 + 960}{50} = \frac{3680}{50} = 73.6$$

$$(R, U) : C = \frac{(80)(34) + (10)(70)}{44}$$

$$= \frac{2720 + 700}{44} = \frac{3420}{44} = 77.7$$

$$(R, T) : C = \frac{(80)(34) + (60)(5)}{39}$$

$$= \frac{2720 + 300}{39} = \frac{3020}{39} = 77.4$$

For Q and U the concentration is less than 70%

∴ Solutions R and U have to be mixed to get maximum concentration.

Choice (D)

14. $P + Q + R = X$

$S + T + U = Y$

By observation X has more concentration than Y.

Choice (A)

15. (Concentration) R & S

$$= \frac{(80)(34) + (30)(20)}{34 + 20} = \frac{2720 + 600}{54}$$

$$\Rightarrow \frac{3320}{54} = 61.5\%$$

Choice (C)

16. The solution which contains the maximum quantity of milk is R since its concentration as well as its total quantity is maximum.

Choice (B)

17. Pairs of solutions are (P, Q), (P, R), (P, U)

(Q, R), (Q, T), (Q, U)

(R, S), (R, T), (R, U), (T, U)

A total of 10 pairs of solutions are there.

Choice (C)

Solutions for questions 18 to 20:

18. Since the answer choices are not close we can approximate the values

Urban population in 1901 ≈ 26 million

Rural population in 1901 ≈ eight times the urban population

∴ rural population = $26 \times 8 = 208$ million.

In 1991 urban population ≈ 215

In 1991 rural population = three times urban population

∴ Rural population in 1991 = $215 \times 3 = 645$ million increase

$$= \frac{645 - 208}{208} \times 100 = 210$$

Choice (C)

19. The approximate population in the years was

$$1941 : \frac{44.0}{19} \times 100 = 315$$

$$1951 : \frac{62.5}{17.6} \times 100 = 355$$

$$1961 : \frac{79}{18.3} \times 100 = 430$$

$$1971 : \frac{109}{20.2} \times 100 = 540$$

$$1981 : \frac{162}{23.7} \times 100 = 685$$

$$1991 : \frac{218}{25.7} \times 100 = 847$$

Among the years mentioned only for 1961-71 and 1971-81 there is more than 25% increase

$$= \frac{540 - 430}{430} \times 100 = 25.5\% \text{ and}$$

$$\frac{685 - 540}{540} \times 100 \approx 27\%$$

Choice (C)

20. Closely observing the values for urban population and the percentage of urban population in the total population we can see that only for the period 1911-1921, the actual increase in urban population

$$= \frac{28 - 25.9}{25.9} \times 100 = 8 \text{ which is less than the percentage}$$

increase in the percentage of urban population

$$= \frac{11.3 - 10.4}{10.4} \times 100 \approx 8.5\% \text{ which means there is a}$$

decrease in the base i.e., total population. Choice (B)

TEST - I

Solutions for questions 1 to 5:

1. 31 students had 70% or more marks in Biology and 8 students among them had 90% or above. So the number of students who had 70% or above but less than 90% marks in Biology is $31 - 8 = 23$.

Choice (C)

2. The number of students who didn't score 60% or above in the different subjects are Maths – 13, Physics – 16, Biology – 7, English – 19 and Chemistry – 16. The total adds upto more than 45 and so it is possible that all the 45 students in the class scored less than 60% in one of the subjects.

Choice (A)

3. The minimum value for 70% or above in any of the five subjects is 18. So at most 18 students scored 70% or more in each of the five subjects.

Choice (B)

4. Number of students who failed in the different subjects are as follows – Maths – 4, Physics – 5, Biology – 1, English – 10 and Chemistry – 7. A total of 27 instances ∴ the maximum

$$\text{number of students who failed in two or more subjects is } \frac{27}{2} = 13.$$

Choice (C)

5. As the pass mark is not mentioned, we cannot find the answer.

Choice (D)

Solutions for questions 6 to 10:

6. We have to distribute products such that maximum products can fit into individual regions. Products Q and T could be sold only in the North, R and V only in the South, S in Central, T in West and U in the East region only. So only product P need to be sold in more than one region.

Choice (B)

7. North definitely had sales of more than one product as no product had a share as high as 26%. Also there are three other regions with at least 18% share and only one product with at least 18% of sales. So two of these three regions also should have sales of more than one product, i.e., a total of three regions.

Choice (C)

8. 15% in all the regions would be 15% of the total. As product Q had a share of 16% in the total sales, if the remaining 1% of the total sales is in the central region, the total sales in the central region is $\frac{15\% \text{ of } 13 + 1}{13} \times 100$
 $= \frac{2.95}{13} \times 100 = 22.7\%$. Choice (A)
9. P and Q could be sold in any region except the central region. For the share of product V to be maximum, it should be sold in the central region. The required percentage $= \frac{9}{13} \times 100 = 69.2\%$. Choice (C)
10. Excluding the product with the highest share, the share of the remaining five products is 76%, and 25% of that is 19%. Only three regions had a share of more than 19%. So at most three regions had sales of at least five products. Choice (B)

Solutions for questions 11 to 15:

11. Let the total sales in 2017 be 1000.
 The revenue of the different brands are
 Aka = $360 \times 30,000$
 Bika = $210 \times 40,000$
 Doka = $180 \times 40,000$
 Eka = $130 \times 60,000$
 Clearly Aka had the highest revenue. Choice (A)
12. Assuming the total sales to be 1000, the profits of the different brands are
 Aka – $360 \times 30,000 \times 0.20 = 216 \times 10^4$
 Bika – $210 \times 40,000 \times 0.30 = 252 \times 10^4$
 Cika – $120 \times 50,000 \times 0.40 = 240 \times 10^4$
 Eka – $130 \times 60,000 \times 0.20 = 156 \times 10^4$
 Bika had the highest profit. Choice (B)
13. The unit selling price and the profitability of the different brands in 2018 are as follows
 Aka – $(\frac{31}{100} \times 1500) \times 30,000 \times 0.20 = 279 \times 10^4$
 Bika – $(\frac{16}{100} \times 1500) \times 40,000 \times 0.30 = 288 \times 10^4$
 Cika – $(\frac{32}{100} \times 1500) \times 30,000 \times 0.15 = 216 \times 10^4$
 Eka – $(\frac{8}{100} \times 1500) \times 60,000 \times 0.20 = 144 \times 10^4$
 Cika had the highest profit in 2018 Choice (B)
14. The profits for Doka in 2017 and 2018 are as follows
 In 2017,
 $180 \times 40,000 \times 0.30 = 216 \times 10^4$
 In 2018
 $(\frac{13}{100} \times 1500) \times 40,000 \times 0.30 = 234 \times 10^4$
 The profits went up for all companies except Eka and Cika. Choice (C)
15. The total profit in 2017 = $(216 + 252 + 240 + 156 + 216) = 1080$
 The total profit in 2018 = $(279 + 288 + 216 + 144 + 234) = 1161$
 The percentage increase = $\frac{81}{1080} \times 100 = 7.5$. Choice (C)
- Solutions for questions 16 to 20:
16. A player has to play all his opponents twice, i.e., $24 \times 2 = 48$ matches. Every player also sits out in two rounds. So there are 50 rounds. The tournament gets over in 10 days. Ans: (10)

17. Each player plays 48 matches. So the total number of matches $= \frac{25 \times 48}{2} = 600$. Ans: (600)
18. The winner could have scored 144 points if he wins all his matches. Ans: (144)
19. The maximum points would be $144 + 138 + 132 + 126 + 120 = 660$ (assuming the second ranked player lost only to the first ranked player, the third ranked player only to the players ranked 1st and 2nd and so on). Ans: (660)
20. If all the matches between the top 24 players are draws and all of them beat the player who finished ranked 25th, all the 24 players can have more wins the loses. Ans: (24)

TEST - II

Solutions for questions 1 to 5:

On day 3, R drew with W, and, on day 4, P drew with V. Similarly on day 5, P drew with T. So, we can conclude that P, T, V and S are in one group and R and W are in the other group. On day 6, Q drew with R; so, the four teams in the pool are Q, R, W and U.

1. Team P scored three points on day 2. As P had two draws, it must be against T and V and it beat S on day 2. Choice (B)
2. The teams in the same pool as S are P, T and V. Choice (A)
3. The team in the same pool as Q are R, U and W. Q had a draw with R on day 6, R had a draw with W and with Q and R beat U. So Q beat U as if Q beats W, then W beats U on the second day and U beats Q on the last day, this is not possible as Q score one point on the last day. Choice (B)
4. Team S lost to team P on Day 2. Choice (A)
5. The teams in the pool were Q, R, U and W. The total points scored is $4 + 5 + 3 + 4 = 16$. Choice (C)

Solutions for questions 6 to 10:

6. The average weights of the students in divisions A, B and C are 35, 42 and 38 kg respectively.
 If both the students who shifted from A to B together weight less than 70 kg, the average weight of division A would increase and that of B would decrease. If they together weigh between 70 and 84 kg, the average weight of both divisions A and B would decrease. If they together weigh more than 84 kg, the average weight of A would decrease, but, that of B would increase. Choice (D)
7. If the average weight of students in divisions C and A both increased, the students who shifted weighed less than 76 and more than 70 kg. If one of them weighed 44 kg, the minimum weighed of the other is $71 - 44 = 27$ kg. Choice (C)
8. The average weight of the students who shifted $= \frac{112}{3} = 37.33$ kg.
 As the average weight of both the divisions decreased, the students shifted from a division for which the average weight of students was less than 37.33 and shifted to a division for which the average weight was more than 37.33. So the students shifted from division A to B or C. Choice (A)
9. When the students shifted from B to C, the average weight of both the divisions, increased. This means that the students who shifted weighed less than 84 kg but more than 70 kg. When they shifted to C, the average weight of students in division C reduced. This means that the total weight of the two students lies between 70 and 76 kg. Choice (B)

10. The total weight of all the students would remain the same even after the shifting of students. So the average weight of

$$\text{students would be } \frac{35 \times 40 + 42 \times 40 + 38 \times 40}{120} = \frac{115}{3}$$

= 38.33 kg
Choice (C)

Solutions for questions 11 to 15:

The outlet received 88,000 units of P by selling Q. So it received 1,58,400 units of P by selling R as it is given that the ratio is 5 : 9. As the outlet had no change in the number of units of

$$R, \frac{1,58,400}{1.10} = \frac{X}{0.95}, \text{ where } x \text{ is the number of units of P used}$$

to buy R.

(As the selling price is 10% above and the buying price is 5% below the base exchange rate, taken as 1.0 here)
∴ x = 1,36,800.

So the number of units of P used to buy Q

$$\text{is } \frac{136800}{3} \times 5 = 2,28,000.$$

As the outlet had 800 units of Q at the end of the day

$$\frac{88,000}{1 - 1(x)} = \frac{228000}{0.95(x+800)}, \text{ where } x \text{ is the number of units sold.}$$

On solving, we get x = 400 and as the outlet had 800 units more at the end of the day, it bought 1200 units of Q on that day.

11. The outlet bought 1200 units of Q on that day.
Choice (B)
12. The amount of P used to buying S is equal to the amount of P it received by selling S. As the ratio of the buying and selling prices are 95 : 110, and it had 3000 units more of S at the end of the day, $0.95(x + 3000) = 1.10(x)$, where x is the number of units of S sold.
∴ X = 19,000
Choice (C)
13. The base exchange rate is $\frac{88,000}{1.1(400)} = 200$ Ans: (200)
14. The buying exchange rate of 100 units of currency S is $100 \times 0.95 \times 4 = 380$
Ans: (380)

15. The selling exchange rate of currency R is $240 \times 1.1 = 264$
Ans: (264)

Solutions for questions 16 to 20:

16. All 47 movies released in week 1 would be running in week 2. So nine of the 21 movies released before week 1 are running in week 2. In week 3, all 29 movies released in week 2 would be running along with at most 10 movies released in week 1. In week 4, all 38 movies released in week 3 would be running and the number of movies from week 1 can be at most 10. So, atleast 4 (52-38-10) movies released in week 2 were running in week 4.
Choice (C)
17. From the previous question, we have seen that at most 10 movies released in week 1 were running in week 4. These 10 movies can continue to run till week 6 as the difference in the number of movies running in weeks 5 or 6 and the number of movies released in week 4 or 5 is more than 10.
Ans : (10)
18. Nine movies released before week 1 could have been running in weeks 1, 2 and 3 ($56 - 47 = 9$). So, in week 3, 29 movies released in week 2, 9 movies released before week 1 and only one movie released in week 1 need to be running. So, 46 of the 47 movies released in week 1 could have run for exactly 7 days. Similarly, 14 movies released in week 2 need to be running in week 4. So, 15 movies released in week 2 run for 7 days. These 14 movies could continue to run in weeks 5 and 6 also which means that 10 movies released in week 3 were running in week 5 and 28 movies released in week 3 run for exactly 7 days. In the same way, all 41 movies released in week 4 run for exactly 7 days as the total of 71 movies could be $14(\text{week } 2) + 1(\text{week } 3) + 56(\text{week } 5) = 71$
The required total is $46 + 15 + 28 + 41 = 130$
Ans: (130)
19. In week 3, the movies running could be 29 from week 2 and 10 from week 1. In week 4, it could be 38 from week 3 and 14 from week 2. In week 5, it could be 41 from week 4, 14 from week 2 and at least 10 ($65 - 41 - 10$) from week 3.
Ans: (10)
20. A movie released in week 3 can be running in weeks beyond week 6. So we cannot determine the maximum number of days for which it could have run.
Choice (D)