HOTEL MANAGEMENT
National Council for Hotel Management & Catering Technology

SOLVED PAPER
2017

Time Allowed : 3 hrs
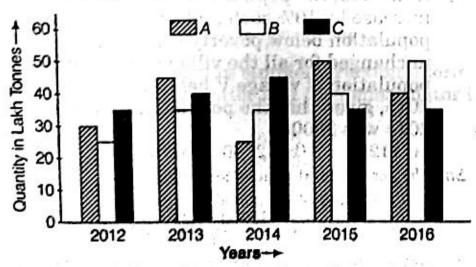
Max. Marks : 200

Instructions

- There are five sections in this solved paper.
- For every correct attempt 1 mark will be awarded.
- All questions are in MCQs form and each having four options.

Numerical Ability and Analytical Aptitude

DIRECTIONS (Q. Nos. 1-5) *The bar graph shown below gives the data of the production of cement (in lakh tonnes) by three different companies A, B and C over five years. Study the graph and answer the questions that follow.*

Production of Cement (in lakh tonnes) by Three Companies A, B and C over the Years

1. What is the ratio of the average production of Company A in the period 2014-2016 to the average production of Company B in the same period?
(a) 1 : 1
(b) 15 : 17
(c) 23 : 25
(d) 27 : 29

Sol. (c) Average production of company
$$A = \frac{25 + 50 + 40}{3} \text{ lakh tonnes} = \frac{115}{3} \text{ lakh tonnes}$$
Average production of company
$$B = \frac{35 + 40 + 50}{3} \text{ lakh tonnes} = \frac{125}{3} \text{ lakh tonnes.}$$
$$\therefore \text{ Required ratio} = \frac{115}{3} : \frac{125}{3} = 23 : 25$$

2. What is the percentage increase in the production of Company B from 2012 to 2015?
(a) 30%
(b) 45%
(c) 50%
(d) 60%

Sol. (d) Required percentage increase $= \frac{40 - 25}{25} \times 100\%$
$$= \frac{15}{25} \times 100\% = 60\%$$

3. The average production for five years was maximum for which Company(ies)?
(a) A
(b) B
(c) C
(d) Both A and C

Sol. (d) Average production of company A
$$= \frac{30 + 45 + 25 + 50 + 40}{5} = \frac{190}{5} \text{ lakh tonnes}$$
Average production of company B
$$= \frac{25 + 35 + 35 + 40 + 50}{5} = \frac{185}{5} \text{ lakh tonnes}$$

Average production of company C

$$= \frac{35 + 40 + 45 + 35 + 35}{5} = \frac{190}{5} \text{ lakh tonnes}$$

∴ The average production for five years was maximum for both Companies A and C.

4. For which of the following years, the percentage rise/fall in production from the previous year is the maximum for Company B?
(a) 2013   (b) 2014   (c) 2015   (d) 2016

Sol. (a) Percentage rise in 2013 $= \dfrac{35 - 25}{25} \times 100\% = 40\%$

Percentage rise in 2014 $= 0\%$

Percentage rise in 2015 $= \dfrac{40 - 35}{35} \times 100\% = 14\dfrac{2}{7}\%$

Percentage rise in 2016 $= \dfrac{50 - 40}{40} \times 100\% = 25\%$

∴ The percentage rise in production was maximum in the year 2013.

5. In which year was the percentage of production of Company C to the production of Company B the maximum?
(a) 2012   (b) 2013   (c) 2014   (d) 2015

Sol. (a) Percentage of production of Company C to the production of Company B in

$$2012 = \frac{35}{25} \times 100\% = 140\%$$
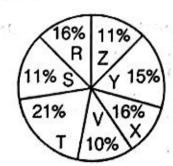
$$2013 = \frac{40}{35} \times 100\% = 114\frac{2}{7}\%$$

$$2014 = \frac{45}{35} \times 100\% = 128\frac{4}{7}\%$$

$$2015 = \frac{35}{40} \times 100\% = 87\frac{1}{2}\%$$

∴ The percentage was maximum in the year 2012.

IRECTIONS (Q. Nos. 6-10) *Study the following pie-chart nd table to answer the questions based on them.*

Proportion of Population of Seven Villages in 2014

Village	% Population Below Poverty Line
X	38
Y	52
Z	42
R	51
S	49
T	46
V	58

6. Find the population of village S, if the population of village X below poverty line in 2014 is 12160.
(a) 18500   (b) 20500   (c) 22000   (d) 26000

Sol. (c) Population of village X below poverty line
$$= 38\% = 12160$$

Let the total population of villages be x.

∴ 38% of 16% of $x = 12160$

$$\Rightarrow \quad \frac{38}{100} \times \frac{16}{100} \times x = 12160$$

$$\Rightarrow \quad x = \frac{12160 \times 10000}{38 \times 16} = 200000$$

∴ Population of $S = 11\%$ of $200000 = 22000$

7. The ratio of population of village T below poverty line to that of village Z below poverty line in 2014 is ………… .
(a) 11 : 23   (b) 13 : 11
(c) 23 : 11   (d) 11 : 13

Sol. (c) Required ratio $= \dfrac{46\% \text{ of } 21\% \text{ of } x}{42\% \text{ of } 11\% \text{ of } x}$

$$[\because x = \text{total population}]$$

$$= \frac{46 \times 21}{42 \times 11} = 23 : 11$$

8. If the population of village R in 2014 is 32000, then what will be the population of village Y below poverty line in that year?
(a) 14100   (b) 15600
(c) 16500   (d) 17000

Sol. (b) Given, 16% of $x = 32000$ $[\because x = \text{total population}]$

$$\therefore \quad x = \frac{32000 \times 100}{16}$$

$$= 200000$$

∴ Population of Y below poverty line
$$= 52\% \text{ of } 15\% \text{ of } 200000$$
$$= 52 \times 15 \times 20 = 15600$$

9. If in 2015, the population of villages Y and V increase by 10% each and the percentage of population below poverty line remains unchanged for all the villages, then find the population of village V below poverty line in 2015, given that the population of village Y in 2014 was 30000.
(a) 11250   (b) 12760   (c) 13140   (d) 13780

Sol. (b) Let the total population be x.

Then, 15% of $x = 30000$

$$\Rightarrow \quad x = \frac{30000 \times 100}{15} = 200000$$

Now, population of V in 2015 $= 20000 \times \dfrac{110}{100}$

$$= 22000$$

∴ Population of V below poverty line in 2015
$$= 58\% \text{ of } 22000$$
$$= \frac{58}{100} \times 22000$$
$$= 12760$$

0. If in 2016, the population of village R increases by 10% while that of village Z reduces by 5% compared to that in 2014 and the percentage of population below poverty line remains unchanged for all the villages, then find the approximate ratio of population of village R below poverty line to the ratio of population of village Z below poverty line for the year 2016.

(a) 2 : 1   (b) 3 : 2   (c) 4 : 3   (d) 5 : 4

Sol. (a) Population of R in 2016 = 110% of 16% of x

[where, x = total population in 2014]

Population of Z in 2016 = 95% of 11% of x

∴ Required ratio $= \dfrac{51\% \text{ of } 110\% \text{ of } 16\% \text{ of } x}{42\% \text{ of } 95\% \text{ of } 11\% \text{ of } x}$

$= \dfrac{51 \times 110 \times 16}{42 \times 95 \times 11}$

$= 272 : 133 \approx 2 : 1$

1. The LCM of two numbers is 48. The numbers are in the ratio 2 : 3. The sum of the numbers is

(a) 28   (b) 32   (c) 40   (d) 64

Sol. (c) Let the numbers be $2x$ and $3x$.

We know that,

Product of numbers = HCF × LCM

$\Rightarrow \quad 2x \times 3x = x \times 48$

$\Rightarrow \quad 6x = 48$

$\Rightarrow \quad x = 8$

∴ Sum of the numbers $= 5x = 5 \times 8 = 40$

2. The difference of the squares of two consecutive odd integers is divisible by which of the following integers?

(a) 3   (b) 6   (c) 7   (d) 8

Sol. (d) Taking first two odd integers, we have

$3^2 - 1^2 = 9 - 1 = 8$ which is divisible by 8.

Now, let the two odd integers be $(2n + 1)$ and $(2n + 3)$.

Then, $(2n + 3)^2 - (2n + 1)^2$

$= 4n^2 + 9 + 12n - 4n^2 - 1 - 4n$

$= 8 + 8n$ which is divisible by 8.

3. When 0.36 is written in simplest fractional form, the sum of the numerator and the denominator is ....

(a) 34   (b) 45

(c) 114   (d) 135

Sol. (a) $0.36 = \dfrac{36}{100} = \dfrac{9}{25}$

∴ Required sum $= 25 + 9 = 34$

4. A crate of mangoes contains one bruised mango for every 30 mangoes in the crate. If 3 out of every 4 bruised mangoes are considered unsalable, and there are 12 unsalable mangoes in the crate, then how many mangoes are there in the crate?

(a) 360   (b) 480

(c) 520   (d) 430

Sol. (b) Let the total mangoes be x.

Total bruised mangoes $= \dfrac{x}{30}$

Total unsalable mangoes $= \dfrac{x}{30} \times \dfrac{3}{4}$

As per question,

$\dfrac{3x}{120} = 12 \Rightarrow x = \dfrac{1440}{3} = 480$

15. Nine persons went to a hotel for taking their meals. Eight of them spent ₹ 12 each on their meals and the ninth spent ₹ 8 more than the average expenditure of all the nine. What was the total money spent by them?

(a) 115   (b) 116

(c) 117   (d) 108

Sol. (c) Spending of eight persons $= 12 \times 8 = ₹ 96$

Average expenditure $= \dfrac{96 + x}{9}$

[x = spending of 9th person]

∴ $\dfrac{96 + x}{9} + 8 = x$

$\Rightarrow \quad 96 + x + 72 = 9x$

$\Rightarrow \quad 168 = 8x$

$\Rightarrow \quad x = 21$

∴ Total money spent $= 96 + 21 = ₹ 117$

16. A number is as much greater than 36 as is less than 86. Find the number.

(a) 61   (b) 50

(c) 65   (d) 67

Sol. (a) Let the number be x.

As per question,

$x - 36 = 86 - x$

$\Rightarrow \quad 2x = 122$

$\Rightarrow \quad x = 61$

17. Abhay's age after six years will be three-seventh of his father' age. Ten years ago, the ratio of their ages was 1 : 5. What is Abhay's father's age at present?

(a) 52   (b) 50   (c) 54   (d) 48

Sol. (b) Let present age of Abhay's father be x yr and present age of Abhay be y yr.

As per question,

$y + 6 = \dfrac{3}{7}(x + 6)$

$\Rightarrow \quad 7y + 42 = 3x + 18$

$\Rightarrow \quad 3x - 7y = 24$ ...(i)

Also, $\dfrac{y - 10}{x - 10} = \dfrac{1}{5}$

$\Rightarrow \quad 5y - 50 = x - 10$

$\Rightarrow \quad x - 5y = -40$ ...(ii)

Solving Eqs. (i) and (ii), we get

$\Rightarrow \quad y = 18$ yr, $x = 50$ yr

$\Rightarrow$ Abhay's father age is 50 yr.

(a) 0   (b) 2   (c) -1 (d) -2

Sol. (d) $2^{n+4} - 2^{n+2} = 3$

$\Rightarrow \quad 2^{n+2}(2^2 - 1) = 3$

$\Rightarrow \quad\quad 2^{n+2} = 2^0$

$\Rightarrow \quad\quad n + 2 = 0$

$\Rightarrow \quad\quad n = -2$

19. Due to a reduction of $6\dfrac{1}{4}\%$ in the price of sugar, a man is able to buy 1 kg more for ₹ 120. Find the reduced rate of sugar.

(a) ₹ 7.25 per kg   (b) ₹ 7.50 per kg

(c) ₹ 8.00 per kg   (d) ₹ 7.75 per kg

Sol. (c) Let the price of sugar be x per kg.

As per question,

$$\frac{120}{x - \dfrac{25x}{400}} - \frac{120}{x} = 1$$

$\Rightarrow \quad \dfrac{120 \times 400}{375x} - \dfrac{120}{x} = 1$

$\Rightarrow \quad \dfrac{48000 - 45000}{375x} = 1$

$\Rightarrow \quad\quad 3000 = 375x$

$\Rightarrow \quad\quad x = \dfrac{3000}{375} = 8$

∴ Price of sugar is ₹8 per kg.

20. What per cent of 7 is 84?

(a) 300%   (b) 120%

(c) 1200%   (d) 12%

Sol. (c) Required per cent $= \dfrac{84}{7} \times 100\% = 1200\%$

21. A, B and C started a business by investing ₹ 120000, ₹ 135000 and ₹ 150000 respectively. Find the share of C, out of an annual profit of ₹ 56700.

(a) ₹ 16800   (b) ₹ 18900

(c) ₹ 21000   (d) ₹ 23000

Sol. (c) Ratio of profits of A, B and C

$= 120000 : 135000 : 150000$

$= 120 : 135 : 150$

$= 24 : 27 : 30$

$= 8 : 9 : 10$

∴ Share of $C = 56700 \times \dfrac{10}{27} = ₹\ 21000$

22. If 15 men, working 9 h a day, can reap a field in 16 days, in how many days will 18 men reap the field, working 8 h a day?

(a) 14 days   (b) 15 days

(c) 13 days   (d) 16 days

Sol. (b) Let the number of days be x.

Then, $\quad 15 \times 9 \times 16 = x \times 18 \times 8$

$\Rightarrow \quad x = \dfrac{15 \times 9 \times 16}{18 \times 8} = 15$ days

23. A and B undertake to do a piece of work for ₹ 600. A alone can do it in 6 days while B alone can do it in 8 days. With the help of C, they finish it in 3 days. Find the share of C.

(a) ₹ 100   (b) ₹ 150

(c) ₹ 75   (d) ₹ 125

Sol. (c) Work done by A in one day $= \dfrac{1}{6}$

Work done by B in one day $= \dfrac{1}{8}$

Let work done by C in one day $= \dfrac{1}{x}$

∴ $\quad \dfrac{1}{6} + \dfrac{1}{8} + \dfrac{1}{x} = \dfrac{1}{3}$

$\Rightarrow \quad \dfrac{4+3}{24} + \dfrac{1}{x} = \dfrac{1}{3}$

$\Rightarrow \quad \dfrac{1}{x} = \dfrac{1}{3} - \dfrac{7}{24}$

$\Rightarrow \quad\quad x = 24$

Now, ratio of share of A, B and C

$= \dfrac{1}{6} : \dfrac{1}{8} : \dfrac{1}{24} = 4 : 3 : 1$

∴ Share of $C = \dfrac{600 \times 1}{8} = ₹\ 75$

24. Two pipes can fill a tank in 10 h and 12 h respectively while a third pipe empties the full tank in 20 h. If all the three pipes operate simultaneously, in how much time will the tank be filled?

(a) 6 h 45 min   (b) 7 h 30 min

(c) 7 h 15 min   (d) 7 h 45 min

Sol. (b) Part filled in 1 h $= \dfrac{1}{10} + \dfrac{1}{12} - \dfrac{1}{20}$

$= \dfrac{6+5-3}{60}$

$= \dfrac{8}{60} = \dfrac{2}{15}$

∴ Required time $= \dfrac{15}{2}$ h $= 7$ h 30 min

25. A man travelled from the village to the post-office at the rate of 25 km/h and walked back at the rate of 4 km/h. If the whole journey took 5 h 48 min, find the distance of the post-office from the village.

(a) 20 km   (b) 22 km

(c) 24 km   (d) 26 km

Sol. (a) Let the total distance be $2x$.

Then, Average speed $= \dfrac{\text{Total distance}}{\text{Total time}}$

$\Rightarrow \quad \dfrac{2 \times 25 \times 4}{25 + 4} = \dfrac{2x}{29/15}$

$\left[\because 5 \text{ h } 48 \text{ min} = 5 + \dfrac{48}{60} = \dfrac{29}{5} \text{ h}\right]$

$\Rightarrow \quad \dfrac{2 \times 25 \times 4}{29} = \dfrac{10x}{29}$

$\Rightarrow \quad x = 20$ km

5. A train 150 m long is running with a speed of 68 km/h. In what time will it pass a man who is running at 8 km/h in the same direction in which the train is going?

(a) 12 s (b) 11 s (c) 9 s (d) 10 s

ol. (c) Relative speed $= 68 - 8 = 60$ km/h

$$= 60 \times \frac{5}{18} \text{ m/s}$$

$$= \frac{150}{9} \text{ m/s}$$

Distance $= 150$ m

$\therefore$ Required time $= \dfrac{150}{\frac{150}{9}} \text{ s} = 9 \text{ s}$

7. A man can row $7\frac{1}{2}$ km/h in still water. If in a river running at 1.5 km/h, it takes him 50 min to row to a place and back, how far is the place?

(a) 4 km (b) 3 km (c) 5 km (d) 7 km

Sol. (b) Speed in still water $= 7\frac{1}{2}$ km/h

Speed of stream $= 1.5$ km/h

$\therefore$ Downstream speed $= 7\frac{1}{2} + 1.5$

$$= 7.5 + 1.5 = 9 \text{ km/h}$$

Upstream speed $= 7\frac{1}{2} - 1.5$

$$= 7.5 - 1.5 = 6 \text{ km/h}$$

$\therefore \qquad \dfrac{x}{9} + \dfrac{x}{6} = \dfrac{50}{60}$

[x = distance upstream/downstream]

$\Rightarrow \qquad \dfrac{2x + 3x}{18} = \dfrac{5}{6}$

$\Rightarrow \qquad \dfrac{5x}{18} = \dfrac{5}{6}$

$\Rightarrow \qquad x = 3 \text{ km}$

28. In what ratio must water be mixed with milk to gain 20% by selling the mixture at cost price?

(a) 1 : 2 (b) 1 : 3 (c) 1 : 5 (d) 1 : 6

Sol. (d) Let the ratio of water and milk $= x : 100$.

As per question,

$$20 = \frac{x}{100 - x} \times 100$$

$\Rightarrow \qquad 2000 - 20x = 100x$

$\Rightarrow \qquad 2000 = 120x$

$\Rightarrow \qquad x = \dfrac{50}{3}$

$\therefore$ Required ratio $= \dfrac{50}{3} : 100 = 1 : 6$

29. A sum at simple interest at $13\frac{1}{2}\%$ per annum amounts to ₹ 2502.50 after 4 yr. Find the sum.

(a) ₹ 1575 (b) ₹ 1605
(c) ₹ 1625 (d) ₹ 1655

Sol. (c) $A = \dfrac{P \times R \times T}{100} + P$

$\Rightarrow \qquad 2502.50 = \dfrac{P \times 27 \times 4}{2 \times 100} + P$

$\Rightarrow \qquad 2502.50 = P\left(1 + \dfrac{27}{50}\right)$

$\Rightarrow \qquad 2502.50 = P \times \dfrac{77}{50}$

$\Rightarrow \qquad P = \dfrac{2502.50 \times 50}{77} = ₹ 1625$

30. Find the compound interest on ₹ 16000 at 20% per annum for 9 months, compounded quarterly.

(a) ₹ 2512 (b) ₹ 2522
(c) ₹ 2372 (d) ₹ 2462

Sol. (b) Since, the interest is compounded quarterly.

$\therefore$ Rate of interest $= \dfrac{20}{4} = 5\%$

and time period $= \dfrac{9}{12} \times 4 = 3$

$\therefore \qquad \text{CI} = P\left(1 + \dfrac{r}{100}\right)^t - P$

$$= 16000\left[\left(1 + \dfrac{5}{100}\right)^3 - 1\right]$$

$$= 16000\left[\left(\dfrac{21}{20}\right)^3 - 1\right]$$

$$= 16000\left[\dfrac{9261 - 8000}{8000}\right]$$

$$= \dfrac{16000 \times 1261}{8000}$$

$$= ₹ 2522$$