

# 2020

## MADE EASY WORKBOOK

Engg. Mathematics + Aptitude &  
Reasoning + General English

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#### Aptitude & Reasoning

##### SI. Unit

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# Aptitude & Reasoning

## Part-I. Aptitude

### 1. Number System

Q.1 Number of factors of 1800

- (a) 48
- (b) 36
- (c) 54
- (d) 72

Q.2 Number of different prime factors of  $(30)^7 \times (22)^5 \times (34)^{11}$

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

Q.3 Number of even factors of N, where  $N = 10800$

- (a) 48
- (b) 60
- (c) 36
- (d) 12

Q.4 50! ends with how many trailing zeroes?

- (a) 16
- (b) 11
- (c) 12
- (d) 14

Q.5 The highest power of 3 in 80!

- (a) 36
- (b) 34
- (c) 23
- (d) 24

Q.6 Number of trailing zeroes in  $40^{140}$ :

- (a)  $8 \times 40!$
- (b)  $9 \times 40!$
- (c)  $8^{40}$
- (d)  $9^{40}$

Q.7 If  $137 + 276 = 435$  how much is  $731 + 672?$

- (a) 534
- (b) 1433
- (c) 1531

Q.8 The unit digit of the following addition is \_\_\_\_\_.

$$1! + 2! + 3! + 4! + \dots + 999!$$

Q.9 Red light flashes after every 15 seconds and green light flashes after every 10 seconds. How many times will they be flashing together in a day \_\_\_\_\_.

Q.10 The numeral in the units position of  $21^{180} + 146^{127} \times 3^{424}$  is \_\_\_\_\_.

Q.11 The last digit of  $(2171)^7 + (2172)^9 + (2173)^{11} + (2174)^{13}$  is \_\_\_\_\_.

- (a) 2
- (b) 4
- (c) 6
- (d) 8

### Try Yourself

### 2. Calendar

Q.1 What was the day on 22<sup>nd</sup> July 1992?

- (a) Friday
- (b) Saturday
- (c) Wednesday
- (d) Sunday

Q.2 If 11<sup>th</sup> August 2010 was Wednesday, then what was the day on 11<sup>th</sup> August 2017?

- (a) Sunday
- (b) Saturday
- (c) Friday
- (d) Monday

Q.3 Which dates of August 1988 will fall on Friday?

- (a) 6, 13, 20, 27
- (b) 4, 11, 18, 25
- (c) 5, 12, 19, 26
- (d) 3, 10, 17, 24

Q.4 If 16<sup>th</sup> July 2000 was Sunday, then what will be the day on 20<sup>th</sup> December 2000?

- (a) Monday
- (b) Saturday
- (c) Wednesday
- (d) Friday

**Q.5** If any calendar consists of 365 days and 8 days in a week, how many odd days will be there in that year?

- (a) 4      (b) 3  
(c) 2      (d) 1

**Q.6** In a leap year, January 26<sup>th</sup> is Friday. What is the day of August 15<sup>th</sup> in the same year?

- (a) Monday      (b) Tuesday  
(c) Thursday      (d) Friday

**Q.7** What was the day on 15th August 1947?

- (a) Sunday      (b) Tuesday  
(c) Wednesday      (d) Friday

**Q.8** 14th February 2016 will be which day of the week?

- (a) Sunday      (b) Monday  
(c) Tuesday      (d) Saturday

**Q.9** Total number of odd days till first 1900 years of calendar \_\_\_\_\_**3. Ratio, Proportion & Mixtures****Q.1** If A : B = 3 : 2, B : C = 5 : 4, C : D = 3 : 7, then

- A : B : C : D  
(a) 45 : 30 : 24 : 56  
(b) 45 : 24 : 30 : 56  
(c) 45 : 56 : 30 : 24  
(d) 45 : 30 : 56 : 24

**Q.2** In a bag, number of 25 p coins, 20 p coins and 10 p coins are in the ratio 3 : 7 : 9 and together worth of ₹ 61. Find the number of 20 p coins.

- 180      (b) 60  
(c) 140      (d) 90

**Q.3** The ratio of the age of a man and his wife is 6 : 5. After 16 years, the ratio becomes 10 : 9. Find the husband's age when the wife was born

- (a) 3      (b) 4  
(c) 24      (d) 6

**Q.4** There are peacocks and deer in a park. If the total number of their heads is 150 and that of legs is 400, the number of deer is

- (a) 50      (b) 100  
(c) 60      (d) 80

**Q.5**

- Find the fourth proportion of 175, 5, 25, 35  
(a) 105      (b) 65  
(c) 125      (d) 45

**Q.6**

- Find the third proportion of 36 and 48  
(a) 64      (b) 48  
(c) 60      (d) 72

**Q.7**

- 5 chairs cost as much as 12 stools, 7 stools as much as 2 tables. 3 tables as much as 2 sofa. If the cost of 5 sofas is ₹ 875, then find the cost of a chair  
(a) ₹ 60      (b) ₹ 80  
(c) ₹ 75      (d) ₹ 90

**Q.8**

- The mean proportion of 0.7 and 2.8 is \_\_\_\_\_  
0.9 A mixture contains milk and water in the ratio 4 : 3. When 5 litres of water is added, then ratio becomes 1 : 1. Find the amount of milk in the mixture  
(a) 15 litres      (b) 20 litres  
(c) 25 litres      (d) 30 litres

**Q.10**

- In what ratio must tea at ₹ 62 per kg be mixed with tea at ₹ 72 per kg so that the mixture must be worth ₹ 64.50 per kg?  
(a) 3 : 1      (b) 3 : 2  
(c) 4 : 3      (d) 5 : 3

**Q.5**

- If  $\frac{1}{2}x + \frac{1}{3}y = \frac{1}{4}$ , then  
(a)  $x = 1, y = 2$   
(b)  $x = 2, y = 1$   
(c)  $x = 2, y = 3$   
(d) None of these

**Q.6**

- A mixture 40 litre contains milk and water in 3 : 5. From this mixture 8 litre was withdrawn and replaced by 4 litre of water. Then find ratio of milk and water  
(a) 2 : 5      (b) 1 : 2  
(c) 2 : 3      (d) None of these

**Q.7**

- A rectangular field is 15 m long and 10 m wide. If the length and breadth of a rectangle increased by 10% and 20%. What is the percentage increase in the area of the rectangle?  
(a) 32%      (b) 40%  
(c) 30%      (d) 38%

**Try Yourself****T1.** A mixture 40 litre contains milk and water in 3 : 5. From this mixture 8 litre was withdrawn and replaced by 4 litre of water. Then find ratio of milk and water

- (a) 2 : 5      (b) 1 : 2  
(c) 2 : 3      (d) None of these

**T2.** A mixture 40 litre contains milk and water in 3 : 5. From this mixture 8 litre was withdrawn and replaced by 4 litre of water. Then find ratio of milk and water

- (a) 2 : 5      (b) 1 : 2  
(c) 2 : 3      (d) None of these

**T3.** A mixture 40 litre contains milk and water in 3 : 5. From this mixture 8 litre was withdrawn and replaced by 4 litre of water. Then find ratio of milk and water

- (a) 2 : 5      (b) 1 : 2  
(c) 2 : 3      (d) None of these

**T4.** A mixture 40 litre contains milk and water in 3 : 5. From this mixture 8 litre was withdrawn and replaced by 4 litre of water. Then find ratio of milk and water

- (a) 2 : 5      (b) 1 : 2  
(c) 2 : 3      (d) None of these



0.2 The population of a city increases by 20% every year. If the present population is 5,76,000, what was population of the city two years ago?

- (a) 4,00,000  
(b) 4,40,000  
(c) 4,20,000  
(d) 4,10,000

0.3 40 litres of mixture of milk and water contains 25% of water. When 10 litres of water is added, what will be percentage of milk in the final mixture?

- (a) 40%  
(b) 60%  
(c) 80%  
(d) 70%

0.4 If ₹ 656 is divided between A, B, C such that A gets 20% more than B, and B gets 25% less than C, find the share of C.

- (a) ₹ 280  
(b) ₹ 240  
(c) ₹ 220  
(d) ₹ 200

0.5 The income of a person decreased by 20% and then again decreased by 20%. Find the total percentage decrease in his income.

- (a) 36%  
(b) 40%  
(c) 28%  
(d) 32%

0.6 A man spent 5% of his money and then after spending 75% of the remainder, he had ₹ 950 left with him. How much money he had at the beginning?

- (a) ₹ 9000  
(b) ₹ 6575  
(c) ₹ 4000  
(d) ₹ 6000

0.7 A shopkeeper increased the selling price of an article by 25% and then decreased by 25%. If the present selling is ₹ 225. Then what was his original selling price?

- (a) ₹ 240  
(b) ₹ 300  
(c) ₹ 320  
(d) ₹ 225

0.8 In an election between two candidates, one got 52% of the total valid votes. 25% of the total votes were invalid. The total number of votes was 8400. How many valid votes did the other candidate get? \_\_\_\_\_

0.9 If price of spices is increased by 10%, by how much percentage should a household woman reduce her consumption of spices so as not to alter her allotted budget for spices? \_\_\_\_\_

### Try Yourself

T3.

In an exam 80% passed in English, 70% passed in Science and 15% failed in both the subjects. If 195 passed in both the subjects. Find the total number of students.

- (a) 250  
(b) 300  
(c) 400  
(d) 350

T4.

The price of Paruti car per unit rises by 30%. While number of cars sold came down by 20%. Then the total percentage change in revenue is \_\_\_\_\_.

### 5. Profit and Loss

Q.1

A shopkeeper sells two computers for ₹ 24,000 each. On first he gained 20% and on the other, he lost 20%. What is the overall gain or loss percentage?

- (a) 4% gain  
(b) 4% loss  
(c) 6% gain  
(d) 6% loss

Q.2

Ravi purchases two TVs at ₹ 3500 each. He sold one TV at 10% gain and the other at 10% loss. What is his overall gain or loss percentage?

Q.3 By selling an article for ₹ 3000, a person loses 20%. What will be gain or lose, if he sells it for ₹ 3900?

- (a) 6% gain  
(b) 6% loss  
(c) 4% gain  
(d) 4% loss

Q.4

A man buys an article for ₹ 7790 and sells at a loss of  $\frac{2}{7}$  of selling price. Find the S.P.

- (a) 5620  
(b) 5670  
(c) 6000  
(d) 6120

- Q.5** If the cost price of 15 tables is equal to the selling price of 12 tables, find gain or loss percentage  
 (a) 25% loss      (b) 25% gain  
 (c) 20% gain      (d) 20% loss
- Q.6** The single discount equivalent to two successive discounts 10% and 20% will be
- Q.7** An article is marked at ₹ 2500 and the shopkeeper allows three successive discounts 10%, 20% and 10%. Find the S.P.  
 (a) ₹ 1620      (b) ₹ 1840  
 (c) ₹ 2000      (d) ₹ 2100
- Q.8** A person gives 25% discount on M.P. and still gains 20%. How much percent is M.P. above the C.P?  
 (a) 25%      (b) 60%  
 (c) 40%      (d) 30%
- Q.9** After giving two successive discounts of 10% and 20%, the selling price of an article is ₹ 216. Find the marked price  
 (a) ₹ 250      (b) ₹ 300  
 (c) ₹ 280      (d) ₹ 400
- Q.10** A person marks a product at 50% over the cost price and then gives some discount. If he makes a profit of 5%, what is the percentage discount that he offered on the marked price?  
 (a) 10%      (b) 20%  
 (c) 30%      (d) 40%
- Q.11** 'A' sells a DVD to 'B' at a gain of 17% and 'B' sells it to 'C' at a loss of 25%. If 'C' pays ₹ 1053 to 'B', then what is the cost price of the DVD to 'A'?  
 (a) ₹ 1200      (b) ₹ 1450  
 (c) ₹ 1250      (d) ₹ 1375
- Q.12** A fruit seller buys apples at the rate of ₹ 12 Per dozen and sells them at the rate of 15 apples for ₹ 12. Find his percentage gain or loss.  
 (a) 20% gain      (b) 20% loss  
 (c) 25% gain      (d) 25% loss

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## 6. Set Theory & Logical Venn Diagram

- Q.13** A dishonest shopkeeper uses a false weight of 900 gms instead of 1 kg. If he promises to sell his goods at cost price, which of the following is true?  
 (a) Profit of 10%      (b) Profit of 11.11%  
 (c) Loss of 10%      (d) Loss of 11.11%

- Q.6**

Directions (Q.1-3): A TV survey gives this data for TV viewing. 60% see programme A, 50% see programme B, 30% see programme C, 30% see programmes A and B, 20% see programmes B and C and 10% see programmes A and C. 10% see all programmes A, B, C. Then answer the following questions.

- Q.1** What percent view A and B but not C?  
 (a) 20      (b) 10  
 (c) 30      (d) 7

- Q.2** What percent do not view any of the three programmes?  
 (a) 30      (b) 10  
 (c) 15      (d) 17

- Q.3** What percent view exactly two programmes?  
 (a) 20      (b) 30  
 (c) 50      (d) 24

- Q.4**

- Q.5**

- Q.6**

- Q.7**

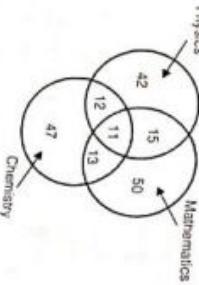
- Q.8**

- Q.9**

- Q.10**

- Q.11**

- Q.12**



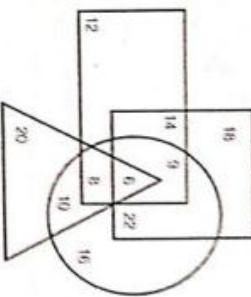
Directions (Q.4-6): The diagram given below shows the number of students who got distinction in 3 subjects out of 500 students. Study the diagram and answer the following:

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- Q.4 What is the percentage of the student who got distinction in exactly two subjects?  
 (a) 8%  
 (b) 9%  
 (c) 10%  
 (d) 12%
- Q.5 What is the percentage of students who got distinction?  
 (a) 25%  
 (b) 30%  
 (c) 35%  
 (d) 40%
- Q.6 The percentage of students with distinctions in Mathematics is  
 (a) 17.8%  
 (b) 18.6%  
 (c) 19.2%  
 (d) 20.6%
- Q.7 In a certain locality of Delhi, there are 1000 families. A survey indicated of 300 subscribe to the Hindustan Times Daily News Paper and 250 subscribe to Statesman Daily News Paper and of these two categories 100 subscribe both. Find the number of families which do not subscribe to any of these New Papers
- 
- Directions (Q.8-11):** In an organization 500 employees are working. Among them 200 are Technicians, 220 are Managers and 120 are Supervisors. 100 employees are Managers who are also technicians but not Supervisors. There are 10 employees who are Supervisors, Technicians and also Managers. There are 50 employees who are only Technicians. 40 employees are only Supervisors. Then answer the following questions.
- Q.8 How many employees are only managers?  
 (a) 80  
 (b) 120  
 (c) 140  
 (d) 160
- Q.9 How many employees do exactly one type of job?  
 (a) 160  
 (b) 150  
 (c) 170  
 (d) 180
- Q.10 How many employees are neither technicians nor managers nor supervisors?  
 (a) 100  
 (b) 250  
 (c) 150  
 (d) 200
- Q.11 How many employees are managers and supervisors but not technicians?

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Square represents the people who are intelligent. Rectangle represents the people who work hard. Triangle represents the people who are employees. Circle represents the people who are professors.

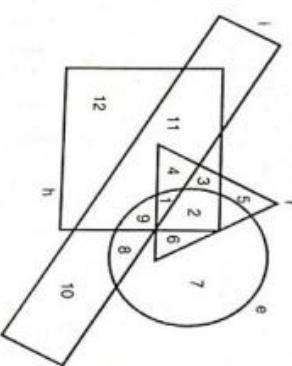
- Q.12 How many intelligent people who work hard, are neither employees nor professors?  
 (a) 14  
 (b) 18  
 (c) 30  
 (d) 20

- Q.13 Which of the following numbers represents people who are only intelligent?  
 (a) 14  
 (b) 1  
 (c) 12  
 (d) 18

- Q.14 How many professors are intelligent and work hard but are not employees?  
 (a) 6  
 (b) 9  
 (c) 10  
 (d) 16

- Q.15 What does number 10 represent in the above diagram?  
 (a) Only employees who work hard  
 (b) Only intelligent  
 (c) Only employees who are professors  
 (d) Only hard worker

**Directions (Q.16):** In the following figure, the circle stands for employed, the square stands for hard working, the triangle stands for rural and the rectangle stands for intelligent. Study the figure carefully and answer the questions that follow.



- Q.5 (a) 50 (b) 52.5  
(c) 48 (d) 51.5

Q.4 Two trains are approaching each other from opposite sides and cross each other in 14 seconds. What is the speed of second train if speed of first train is 7 km/hr and the lengths of the trains are 126 m and 240 m respectively?

16. (a) 67.14 kmph (b) 87.11 kmph  
(c) 77.14 kmph (d) 97.11 kmph

Q.16 Non-rural, employed, hard working and intelligent people are indicated by region

- (a) 8 (b) 9  
(c) 10 (d) 11

### Try Yourself

T5.

In a certain school 30 students play football, 15 play hockey and 25 take part in athletics. 8 play both football and hockey, 6 play hockey and athletics, 12 play football and athletics. 4 take part in all three games. How many students in all are involved in any of the three games? \_\_\_\_\_.

### 7. Time, Speed and Distance

Q.1

In a 200 m race, 'A' beats 'B' by 20 m. 'B' beats C by 10 m in a 250 m race. By how many meters will 'A' beat C in a 1 km race?

- (a) 146 m (b) 164 m  
(c) 136 m (d) 144 m

Q.2 If a boat with speed 20 m/s in still water takes

1/3 hr and 1/2 hr in order to cover same distance downstream and upstream respectively, then the speed of the current is

- (a) 6 m/s (b) 8 m/s  
(c) 3 m/s (d) 4 m/s

Q.3 Vijay goes from Delhi to Bhopal at a uniform speed of 40 km/hr and comes back at a uniform speed of 60 km/hr. His average speed over the entire journey is

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Q.5 A bus has to cover a distance of 80 km in 10 hrs. If it covers first half of journey in 3/5 of time, what should be its speed to cover the remaining distance in the assigned time?

- (a) 20 km/hr (b) 10 km/hr  
(c) 5 km/hr (d) 8 km/hr

Q.6 A boy covers a certain distance between his house and school on a cycle. Having an average

speed of 15 kmph, he is late by 10 min. How ever, with an average speed of 20 kmph, he reaches the school 5 min. earlier. Find the distance between his house and school.

- (a) 15 km (b) 20 km  
(c) 25 km (d) 30 km

Q.7 If A and B run at 6 km/hr and 12 km/hr on a circular track 6 km long. When will they meet for the first time if they are running in opposite direction?

- (a) 20 min (b) 28 min  
(c) 29 min (d) 10 min

Q.8 A and B run around a circular track of length

600 m at the respective speeds of 15 m/sec and 20 m/sec starting from the same point and at the same time travelling in the same direction. When will they meet each other at the starting point for the first time?

- (a) 2 min (b) 4 min  
(c) 6 min (d) 7 min

Q.9 A Car travels a distance 840 km at a uniform speed. If the speed of the car is 10 km/hr more, it takes 2 hours less to cover the same distance.

The original speed of the car was

- (a) 80 km/hr (b) 70 km/hr  
(c) 60 km/hr (d) 40 km/hr

- 0.16

- (a) 50 (b) 52.5  
(c) 48 (d) 51.5

- 0.16

Q.10 A car travels 8 km in the first quarter of an hour, 6 km in the second quarter and 16 km in the third quarter. The average speed of the car in km per hour over the entire journey is \_\_\_\_\_.

### Try Yourself

Q.11 Two trains separated by 480 kms are approaching each other with speed 70 kmph and 50 kmph respectively. A bird with speed

100 kmph started from the front of first train goes to front of second train and comes back to first train and continues to go to and from till the trains collide. What is the total distance travelled by the bird?

- (a) 500 kms
- (b) 400 kms
- (c) 480 kms
- (d) 600 kms

### 8. Clocks

Q.1 At what time between 3 O' clock and 4 O' clock, hands of the clock are together?

- (a)  $3:15\frac{4}{11}$
- (b)  $3:16\frac{4}{11}$
- (c)  $3:17\frac{4}{11}$
- (d)  $3:16\frac{11}{4}$

Q.2 At what time between 4 O' clock and 5 O' clock, hands of the clock are at right angle?

- (a)  $4:5\frac{5}{11}$
- (b)  $4:38\frac{2}{11}$
- (c)  $4:5\frac{5}{11} : 4:38\frac{2}{11}$
- (d) None of these

Q.3 At what time between 8 O' clock and 9 O' clock, hands of the clock opposite to each other?

- (a)  $8:10\frac{10}{11}$
- (b)  $8:10\frac{9}{10}$
- (c)  $8:10\frac{11}{14}$
- (d)  $8:10\frac{2}{11}$

Q.4 What is the angle between the two hands of a clock when the clock shows 5 hours 20 minutes?

- (a)  $40^\circ$
- (b)  $60^\circ$
- (c)  $30^\circ$
- (d)  $70^\circ$

Q.5 If the time in a watch is 9 hours 30 minutes, what time does it show on the minor?

- (a) 2:30
- (b) 2:45
- (c) 3:30
- (d) 2:15

Q.6 At what time between 2 O' clock and 3 O' clock, the angle between the hands will be  $40^\circ$ ?

- (a)  $2:3\frac{7}{11}$
- (b)  $2:5\frac{6}{11}$
- (c)  $2:10\frac{5}{12}$
- (d)  $2:16\frac{4}{11}$

### Try Yourself

Q.7 A Clock is set right at 7 A.M. and the clock loses 15 min in 24 hrs. What is the correct time when it shows 4 P.M. after 2 Days.

- (a) 4:32 PM
- (b) 4:30 PM
- (c) 4:36 PM
- (d) 4:35 PM

### 9. Time and Work

Q.1 A and B can do a work in 3 days. B and C can do it in 4 days. A and C can do it in 6 days. How long will it take A alone to do it?

- (a) 8 days
- (b) 6 days
- (c) 4 days
- (d) 12 days

Q.2 4 Men or 7 Women can do a work in 40 days. In how many days 8 men and 6 women can do that work?

- (a) 18
- (b) 14
- (c) 20
- (d) 12

Q.3 If A is 20% less efficient than B, if B alone can do the work in 40 days, in how many days can A and B together complete the same work?

- (a)  $22\frac{2}{9}$
- (b)  $20\frac{1}{9}$
- (c)  $21\frac{2}{9}$
- (d)  $32\frac{2}{9}$

Q.4

A and B earn ₹ 320 in 4 days. B and C earn ₹ 450 in 10 days. A, B and C earn ₹ 600 in 5 days. Find the daily earning of B.

- (a) ₹ 15      (b) ₹ 5  
(c) ₹ 25      (d) ₹ 40

Q.5

4 Men and 3 Women can do a work in 8 days. 6 men and 9 women can do the same work in 4 days. In how many days can 20 men and 6 women do the same work?

- (a) 2      (b) 4  
(c) 5      (d) 6

Q.6

A, B and C can do a work in 20, 15 and 12 days respectively. A is assisted by B on first day and by C on the next day, alternatively. How long the work would take to finish?

- (a) 8 days      (b) 6 days  
(c) 10 days      (d) 4 days

Q.7

A and B can do a work in 10 days and 12 days respectively. If they work on alternate days beginning with A, when will the work be completed?

- (a) 11 days      (b)  $10\frac{5}{6}$  days  
(c) 12 days      (d)  $12\frac{2}{3}$  days

Q.8

A can finish a piece of work in 15 days of 8 hours each and B finishes it in  $6\frac{2}{3}$  days of 9 hours each. In how many days can they finish the work, if they work together for 10 hours each day?

- (a) 2      (b) 4  
(c) 50      (d) 6

Q.9

A and B can do a work in 24 days and 36 days respectively. A starts the work and B joins him after some days and they do the remaining work in 6 days. After how many days did B join A?

Q.10

5 men and 7 boys can do a work in 24 days working 10 hrs per day. 9 men and 18 boys can do the same work in 15 days working 8 hrs per day. In how many days 3 men and 6 boys can do that work working 8 hrs per day?

- (a) 40 Days      (b) 36 Days  
(c) 45 Days      (d) 48 Days

Q.11

A drainage pipe can completely drain a tank in 1 hr. Along with a filling pipe, it can completely fill the tank in 15 minutes. How long will filling pipe alone take in (mins) for filling the same tank? \_\_\_\_\_

### Try Yourself

Q.1

In a hostel there is enough food for 25 days for 40 students. After 5 days 10 students left from the hostel. Find the number of days for which the remaining food will be sufficient for remaining students.

- (a)  $13\frac{1}{3}$       (b)  $16\frac{2}{3}$   
(c)  $26\frac{2}{3}$       (d)  $24\frac{2}{3}$

### 10. Simple Interest and Compound Interest

Q.1

Find the simple interest on ₹ 22,000 for 5 years at 8% per annum.

- (a) ₹ 8000      (b) ₹ 8200  
(c) ₹ 8800      (d) ₹ 8400

Q.2

A certain sum of money amounts to ₹ 3080 in 3 years and ₹ 3400 in 5 years at S.I. What is the sum?

- (a) ₹ 2600      (b) ₹ 3600  
(c) ₹ 4600      (d) ₹ 1700

Q.3

In how many years will a sum of money become 5 times at 8% p.a. simple interest?

- (a) 10 years      (b) 20 years  
(c) 30 years      (d) 50 years

Q.4

A sum of money ₹ 15000 is lent in two parts: one at 7% p.a. and other at 4% p.a. If the annual interest received is ₹ 800, what is the amount lent at 4% p.a.?

- (a) ₹ 4000      (b) ₹ 6000  
(c) ₹ 5000      (d) ₹ 8000

- Q.5 Find the compound interest on ₹ 2000 for 9 months at 40% p.a compounded quarterly  
 (a) ₹ 662      (b) ₹ 362  
 (c) ₹ 662      (d) ₹ 962
- Q.6 Find the difference between C.I. and S.I. on ₹ 6400 for 2 years at 12.5% p.a.  
 (a) ₹ 400      (b) ₹ 300  
 (c) ₹ 100      (d) ₹ 200
- Q.7 The S.I. on a certain sum of money for 2 years at 5% p.a. is ₹ 600. What is the C.I. on the same sum at the same rate and for the same time?  
 (a) ₹ 415      (b) ₹ 615  
 (c) ₹ 815      (d) ₹ 960
- Q.8 At C.I., a certain sum becomes twice itself in 7 years. In how many years will it become 32 times? \_\_\_\_\_.
- Try Yourself**
- Q.9 A sum of money amounts to ₹ 4840 in 2 years and ₹ 5324 in 3 years at C.I. What is the rate percent?  
 (a) 9%      (b) 8%  
 (c) 4%      (d) 10%
- Q.10 The difference between C.I. and S.I. on ₹ 32,000 for 3 years at rate 5% p.a. in ₹ \_\_\_\_\_.
- 11. Permutation, Combination and Probability**
- Q.1 In a party every one hand shakes with each presentee exactly once. If total number of hand shakes made were 153, then the number of people present in the party  
 (a) 17      (b) 18  
 (c) 19      (d) 36
- Q.2 If number of diagonals of an 'n' sided polygon is 50% higher than its number of sides, then the polygon is an  
 (a) Quadrilateral      (b) Hexagon  
 (c) Octagon      (d) None of these
- Q.3 Line 'l' has 6 points on it and 'm' has five points lying on it. If  $l \parallel m$ , then how many triangles can we get from these 11 points  
 (a) 60      (b) 75  
 (c) 135      (d) 125
- Q.4 What is the probability of getting 53 Sundays in a leap year?  
 (a)  $\frac{1}{7}$       (b)  $\frac{2}{7}$   
 (c)  $\frac{3}{7}$       (d)  $\frac{1}{2}$
- Q.5 A problem is given to four students A, B, C, D. Their respective individual probability of solving the problem is  $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}, \frac{1}{6}$ . Find the probability that the problem will be solved  
 (a)  $\frac{1}{3}$       (b)  $\frac{2}{3}$   
 (c)  $\frac{4}{5}$       (d) None of these
- Q.6 A speaks truth in 60% cases and B in 75% cases. While stating the same fact in either 'yes' or 'no' only, they are likely to contradict in what percentage cases?  
 (a) 25      (b) 35  
 (c) 45      (d) 55
- Q.7 An automobile plant contracted to buy shock absorbers from two suppliers X and Y. X supplies 60% and Y supplies 40% of the shock absorbers. All shock absorbers are subjected to a quality test. The ones that pass the quality test are considered reliable. Of X's shock absorbers, 96% are reliable. Of Y's shock absorbers, 72% are reliable. The probability that a randomly chosen shock absorber, which is found to be reliable, is made by Y is  
 (a) 0.288      (b) 0.334  
 (c) 0.667      (d) 0.720
- Q.8 How many four digit numbers can be formed with the 10 digits 0, 1, 2, ..., 9 if no number can start with 0 and if repetitions are not allowed?

**Q.9**

Shaquille O'Neal is a 60% career free throw shooter, meaning that he successfully makes 60 free throws out of 100 attempts on average.

What is the probability that he will successfully make exactly 6 free throws in 10 attempts?

- (a) 0.2568
- (b) 0.2816
- (c) 0.2934
- (d) 0.6000

**Q.10**

Given digits 2, 2, 3, 3, 3, 4, 4, 4 how many distinct 4 digit numbers greater than 3000 can be formed?

- (a) 50
- (b) 51
- (c) 52
- (d) 54

### Try Yourself

**T11.** A and B are friends. They decide to meet between 1 P.M. and 2 P.M. on a given day. There is a condition that whoever arrives first will not wait for the other for more than 15 minutes. The probability that they will meet on that day is

- (a)  $\frac{1}{4}$
- (b)  $\frac{1}{16}$
- (c)  $\frac{7}{16}$
- (d)  $\frac{9}{16}$

## Part-II. Reasoning

### 1. Cubes, Dice and Directions

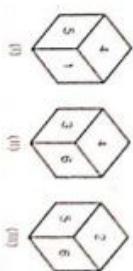
**Directions (Q.1-4):** A large cube after painting it on all faces was divided into 125 smaller equal cubes. Answer the following.

- Q.1** How many cubes are not painted at all?  
 (a) 8      (b) 27  
 (c) 64     (d) 12
- Q.2** How many cubes are painted from 3 sides?  
 (a) 8      (b) 12  
 (c) 24     (d) 4
- Q.3** How many cubes are painted from exactly 2 sides?  
 (a) 48     (b) 24  
 (c) 12     (d) 36
- Q.4** How many cubes are painted from only one side?  
 (a) 54     (b) 64  
 (c) 48     (d) 36

**Directions (Q.5-7):** A cube of side 8 cm has been painted black, red and blue on pair of opposite faces. Then it is divided into smaller equal cubes of side 2 cm each. Answer the following:

- Q.5** How many cubes will be having two faces painted black  
 (a) 2      (b) 4  
 (c) 8      (d) None of these
- Q.6** How many cubes will have one face painted blue and one face painted red? (The other faces may or may not be painted)  
 (a) 16     (b) 8  
 (c) 0      (d) None of these
- Q.7** How many cubes will have exactly one face painted and that too with red colour?  
 (a) 8      (b) 16  
 (c) 12     (d) None of these

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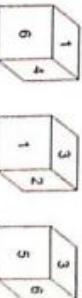
- Q.8** Which number is just opposite to 6?  
 (a) 1      (b) 4  
 (c) 2      (d) 5

- Q.9** Which number is opposite to 5?  
 (a) 3      (b) 2  
 (c) 1      (d) 6

**Q.10** Three views of a dice following a particular motion are given below. Which letter is opposite to A?

- (a) H      (b) P  
 (c) B      (d) M

**Q.11** A dice has six numbers marked 1, 2, 3, 4, 5 and 6 on its faces. Three views of the dice are shown below:



What possible numbers can exist on the two faces marked (A) and (B), respectively on the cube?

- (a) 2 and 3  
 (b) 6 and 1  
 (c) 1 and 4  
 (d) 3 and 1

**Directions (Q.12-15): Answer the following:**

**Q.12** Dalbir is facing south. He turns  $135^\circ$  in the anticlockwise direction and then  $180^\circ$  in the clockwise direction. Which direction is he facing now?

- (a) North-east
- (b) North-west
- (c) South-east
- (d) South-west

**Q.13** Rakesh starts walking straight towards east. After walking 75 metres, he turns to the left and walks 25 metres straight. Again he turns to the left, walks a distance of 40 metres straight, again he turns to the left and walks a distance of 25 metres. How far is he from the starting point?

- (a) 25 metres
- (b) 50 metres
- (c) 140 metres
- (d) none of these

**Q.14** Michael walks 20 m North. Then he turns right and walks 30 m. Then he turns right and walks 35 m. Then he turns left and walks 15 m. Then he again turns left and walks 15 m. In which direction and how many metres away is he from his original position?

- (a) 15 metres west
- (b) 30 metres east
- (c) 30 metres west
- (d) 45 metres east

**Q.15** A child is looking for his father. He goes 90 metres in the East and turns to his right and goes 20 metres and then again turns to his right and moves 30 metres to look for his father. From here, he went 100 metres to the North and met his father in a street. How far did the son meet his father from the starting point? \_\_\_\_\_

### Try Yourself

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X is 1 km northeast of Y. Y is 1 km southeast of Z. W is 1 km west of Z. P is 1 km south of W. Q is 1 km east of P. What is the distance between X and Q in km? \_\_\_\_\_

### 2. Seating Arrangement

**Q.1** There are five different houses A to E in a row. A is to the right of B. E is to the left of C and right of A. B is to the right of D. Which of the houses is in the middle?

- (a) A
- (b) B
- (c) D
- (d) E

**Directions (Q.2-3):** Six friends A, B, C, D, E, F are sitting in a close circle facing the centre. E is to the left of D. C is between A and B. F is between E and A.

**Q.2** Who is to the left of B?

- (a) C
- (b) A
- (c) D
- (d) E

**Q.3** Who is to the right of C?

- (a) E
- (b) B
- (c) A
- (d) F

**Directions (Q.4-6):** Eight boys P, Q, R, S, T, U, V, W are sitting around a circular table facing the centre. Further information as follows:

- (i) W sits between T and Q, while O sits opposite to U
- (ii) P sits to the immediate right of T and P sits opposite to R
- (iii) S does not sit next to R

**Q.4** Who sits opposite to V?

- (a) O
- (b) R
- (c) S
- (d) T

**Q.5** Who sits two places left of S?

- (a) P
- (b) T
- (c) R
- (d) Q

Q.6 If S and Q interchange their places then who sits opposite to Q?

- (a) W  
(b) U  
(c) R  
(d) T

Directions (Q.7-8): 6 persons A, B, C, D, E, F are sitting in two rows, three in each row facing each other. E is not at the end of any row. D is the second to the left of F. C, who is the neighbour of E is sitting diagonally opposite to D. B is the neighbour of F.

Q.7 Which of the following are in one of the two rows?  
(a) FBC  
(b) CEB  
(c) DBF  
(d) AEF

Q.8 Who is facing B?  
(a) A  
(b) C  
(c) D  
(d) E

Directions (Q.9-10): A, B, C, D, E, F are sitting in a closed circle facing the centre. D is between F and B. A is the second to the left of D and second to the right of E.

Q.9 Who is facing D?  
(a) A  
(b) C  
(c) F  
(d) Can't be determined

Q.10 Who is facing A?  
(a) B  
(b) D  
(c) A  
(d) Can't be determined

### 3. Blood Relations

Q.1 Introducing a man, a woman said, "He is the only son of my mother's mother". How is the woman related to the man?

- (a) Sister  
(b) Aunt  
(c) Niece  
(d) Mother

Q.2 If Kamal says Ravi's mother is only daughter of my mother, how is the Kamal related to Ravi  
(a) Brother  
(b) Father  
(c) Maternal uncle  
(d) Grand father

Q.3 A is the brother of B, C is the father of A, D is the brother of E, E is the daughter of B, then uncle of D is  
(a) B  
(b) C  
(c) E  
(d) O

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Q.4 If X is the brother of the son of Y's son. How is X related to Y?  
(a) Brother  
(b) Grand son  
(c) Son  
(d) None of these

Q.5 How is my paternal aunt's only brother's wife related to me?  
(a) Daughter  
(b) Mother  
(c) Niece  
(d) Cousin

Q.6 How is my wife's sister's brother's mother's husband related to me?  
(a) Brother in law  
(b) Son-in-law  
(c) Cousin  
(d) Father in law

Q.7 A and B are brothers. C and D are sisters. A's sister is mother of C. What is C to A?  
(a) Uncle  
(b) Niece  
(a) Aunt  
(d) Nephew

Q.8 Mr. A has a son B and daughter C. D is the wife of B and E is the daughter of C. How is D related to E?  
(a) Sister  
(b) Grand Mother  
(c) Uncle  
(d) Aunt

Q.9 A + B means A is the brother of B.  
A - B means A is the mother of B.  
A × B means A is the sister of B  
Which of the following means M is maternal uncle of R?  
(a) M + k + R  
(b) M - k + R  
(c) M + k - R  
(d) M + k × R

Q.10 P × Q means P is the sister of Q.  
P + Q means P is the father of Q.  
P - Q means P is the mother of Q.  
If S × m + T, then how is S related to T?  
(a) Uncle  
(b) Aunt  
(c) Nephew  
(d) Niece

Directions for Q.11: A + B means A is the son of B and A - B means A is the wife of B

Q.11 If P × Q - S, which of the following is True?  
(a) S is wife of Q  
(b) S is the father of P  
(c) P is the daughter of Q  
(d) O is the Father of P

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<b>4. Number Series, Analogy and Number Oddman Out</b>	
<b>Direction (Q.1-16):</b> Find out the missing term in each	
<b>Q.1</b> 113, 85, 61, 41, ..... 13, 5	
(a) 29 (b) 23 (c) 25 (d) 22	
<b>Q.2</b> 2, 5, 16, 65, .....	
(a) 131 (b) 36 (c) 325 (d) 327	
<b>Q.3</b> 15, 10, 5, 150, 16, 12, 4, 192, 20, 15, 5 .....	
(a) 400 (b) 300 (c) 600 (d) 700	
<b>Q.4</b> 3, 10, 33, 104, .....	
(a) 318 (b) 319 (c) 300 (d) 321	
<b>Q.5</b> 55, 66, 187, 200, 368, 386, .....	
(a) 475 (b) 575 (c) 475 (d) 875	
<b>Q.6</b> 20, 141, 310, 599, 960, 1489, .....	
(a) 2430 (b) 2330 (c) 2230 (d) 2130	
<b>Q.7</b> 1900, 939, ....., 377, 376	
(a) 398 (b) 609 (c) 498 (d) 598	
<b>Q.8</b> 1, 3, 11, 47, ..... 1439	
(a) 187 (b) 239 (c) 339 (d) 259	
<b>Q.9</b> 2, 12, 56, 182, 462, .....	
(a) 670 (b) 900 (c) 982 (d) 982	
<b>Q.10</b> 2, 20, 110, ..... 992	
(a) 280 (b) 380 (c) 480 (d) 580	
<b>Q.11</b> 2, 12, 38, 80, 150, .....	
(a) 242 (b) 282 (c) 252 (d) 232	

<b>5. Letter Series, Analogy, L Oddman Out and Codin Decoding</b>													
<b>Q.14</b> 4 : 9 : 25 : .....													
(a) 36 (b) 49 (c) 125 (d) 30													
<b>Q.15</b> 6 : 30 : : ..... : 992													
(a) 552 (b) 532 (c) 522 (d) 562													
<b>Q.16</b> 23 : 125 : 34 : .....													
(a) 500 (b) 216 (c) 162 (d) 600													
<b>Q.17</b> (a) 43 (b) 47 (c) 53 (d) 64													
<b>Q.18</b> 2, 8, 20, 44, 92, 184, 380													
(a) 92 (b) 184 (c) 380 (d) 44													
<b>Q.19</b> Consider the following figures.													
<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>2</td><td>6</td></tr> <tr> <td>80</td><td>24</td></tr> </table> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>3</td><td>7</td></tr> <tr> <td>120</td><td>36</td></tr> </table> What is the missing number?		2	6	80	24	3	7	120	36				
2	6												
80	24												
3	7												
120	36												
(a) 7 (b) 8 (c) 9 (d) 10													
<b>Q.20</b> Examine the following three figures in which the numbers follows a specific pattern:													
<table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>64</td><td></td></tr> <tr> <td>14</td><td>12</td></tr> </table> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>81</td><td></td></tr> <tr> <td>18</td><td>9</td></tr> </table> <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>86</td><td></td></tr> <tr> <td>7</td><td>11</td></tr> </table> The missing number (?) in the third figure above is		64		14	12	81		18	9	86		7	11
64													
14	12												
81													
18	9												
86													
7	11												
(a) 7 (b) 16 (c) 71 (d) 28													

<b>6. Coding-Decoding</b>	
<b>Directions (Q.1-6):</b> All of these relationships, while one is different. Identify the odd one which is different.	
<b>Q.1</b> (a) PCR (b) XYZ (c) ABC (d) DEF	
<b>Q.2</b> (a) ABD (b) EPH (c) IJK (d) LMN	
<b>Q.3</b> (a) AB = E (b) CD = F (c) EA = Y (d) BC = G	
<b>Q.4</b> (a) GJ (b) MP (c) KR (d) HI	
<b>Q.5</b> (a) BE (b) EG (c) MO (d) NO	
<b>Q.6</b> (a) CAT = 24 (b) MAT = 36 (c) RAT = 39 (d) COT = 45	
<b>Directions (Q.7-12):</b> Fill in the blank	
<b>Q.7</b> CGKO : AEIM :: DHLF : .....	
(a) BFJN (b) GJFI (c) FHJI (d) BUJI	
<b>Q.8</b> 876 : FGH :: 345 : .....	
(a) CDE (b) EDC (c) DEC (d) CEC	
<b>Q.9</b> BARODA : CBSPEB :: .....	
(a) MADRAS (b) BOI (c) BANGURU (d) BAI	
<b>Q.10</b> CARRET : TCEAPR :: .....	
(a) UVAANTOI (b) NATIONPL (c) NATIONAL (d) NA	
<b>Q.11</b> RANCHI : SZOBIIH : .....	
(a) UNMBSB (b) NAK (c) KOLKATA (d) KOLKACS	
<b>Q.12</b> ABK : V : BCD : .....	
(a) N (b) I (c) X (d) Y	

**5. Letter Series, Analogy, Letter Oddman Out and Coding Decoding**

Directions (Q.1-6): All of these have same relationship, while one is different. Identify the odd, which is different.

- Q.1 (a) PQR (b) XYZ (c) ABC (d) MLN  
 Q.2 (a) ABD (b) EFH (c) IJK (d) POS  
 Q.3 (a) AB = E (b) CD = Y (c) EA = Y (d) BC = M  
 Q.4 (a) GU (b) MP (c) KR (d) CF  
 Q.5 (a) BE (b) EG (c) MO (d) GI  
 Q.6 (a) CAT = 24 (b) MAT = 34 (c) RAT = 39 (d) COT = 39

Directions (Q.7-12): Fill in the blanks.

- Q.7 CGKO : AEIM :: DHLR : \_\_\_\_\_  
 (a) BFJN (b) GFJN (c) FNJI (d) BJNF
- Q.8 876 : FGH :: 345 : \_\_\_\_\_  
 (a) CDE (b) EDC (c) DEC (d) CED
- Q.9 BARODA : CBSPEB : \_\_\_\_\_  
 CPNCBZ  
 (a) MADRAS (b) BOMBAY (c) BANGRU (d) BANGLA
- Q.10 CARPET : TCEAPR : \_\_\_\_\_  
 LNAANTOI  
 (a) NATIONPL (b) NATIONAL (c) NATIONLN (d) NATERNL
- Q.11 RANCHI : SZOBIN : \_\_\_\_\_  
 UNMJSBB  
 (a) KOLKATA (b) KOLKATA (c) KOLKACS (d) KALMADI
- Q.12 ABK : V :: BCD : \_\_\_\_\_  
 (a) N (b) I (c) X (d) Y

Directions (Q.13-15): Fill in the blanks.

- Q.13 XUW, TQS, PMO, \_\_\_\_\_, HEG  
 (a) LKJ (b) LIK (c) LOR (d) LOB

- Q.14 A, CD, GHI, \_\_\_\_\_, LMNO, UNWXY  
 (a) EF100 (b) EF64 (c) EF121 (d) EF144
- Q.15 AB9, BC25, CD49, DE81, \_\_\_\_\_  
 (a) MNOP (b) MIVO (c) NOPO (d) MNOP

Directions (Q.16-22): Choose the correct answer for the following:

- Q.16 If code of BOARD is CPBSE then code of CHAIR  
 (a) DJUBS (b) DIBJS (c) DJUSB (d) DISJB
- Q.17 If code BHOPAL is EERMIDI then code of NAGPUR  
 (a) OXJMKO (b) OXJMXQ (c) OXMJKO (d) OXJMXP

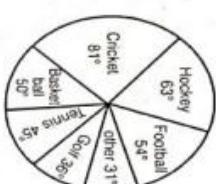
- Q.18 MONKEY is coded as XDJMNLL, then code of TIGER  
 (a) QDFHS (b) SDFHS (c) SFDFS (d) UFRHS
- Q.19 Code of APPLE is 50. Then code of ORANGE is  
 (a) 60 (b) 70 (c) 80 (d) 50
- Q.20 If CIRCLE is coded as DKUFINF, then code of SQUARE  
 (a) TSXDFT (b) TSXDTF (c) TXSDFT (d) TXDFTS

- Q.21 Given the sequence of terms, AD CG FK JP, the next term is  
 (a) OV (b) OW (c) PV (d) PW

- Q.22 If 'KCLFTSB' stands for 'best of luck' and 'SHSWDG' stands for 'good wishes', which of the following indicates ace the exam?  
 (a) MCHIX (b) MXITC (c) XMHTC (d) XMHTC

### 6. Data Interpretation

**Directions (Q.1-3):** The pie-chart drawn here shows the spending of a country at various sports during a particular year.



**Q.1** How much percent of the total spending is done on Tennis?

- (a) 45%
- (b)  $22\frac{1}{2}\%$
- (c)  $12\frac{1}{2}\%$
- (d) 25%

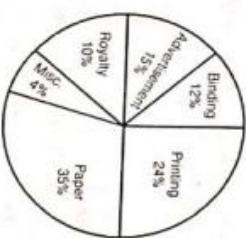
**Q.2** How much percent more is spent on Hockey than that on Golf?

- (a) 27%
- (b) 35%
- (c) 37.5%
- (d) 75%

**Q.3** If the total amount spent on sports during the year was ₹ 2 crores then the amount spent on Cricket and Hockey together was

- (a) ₹ 80,000
- (b) ₹ 80,00,000
- (c) ₹ 16,000
- (d) ₹ 16,00,000

**Directions (Q.4-6):** The pie chart given below shows the expenditure incurred in bringing out a book by a publisher.



**Q.4** What is the central angle of the sector of the paper?

- (a)  $140^\circ$
- (b)  $105^\circ$
- (c)  $122.5^\circ$
- (d)  $126^\circ$

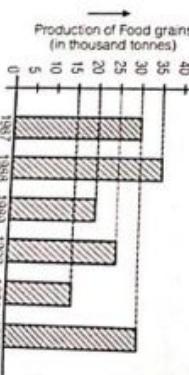
**Q.5** Royalty on the book is less than the advertisement charges by

- (a) 50%
- (b)  $33\frac{1}{3}\%$
- (c)  $26\frac{1}{4}\%$
- (d) 5%

**Q.6** If 5500 copies are published and miscellaneous expenditure on them amounts to ₹ 15,730 and the publisher earns a profit of 30%, then selling price of each copy is

- (a) ₹ 71.50
- (b) ₹ 55
- (c) ₹ 74.36
- (d) ₹ 92.95

### Directions (Q.7-9)



**Q.7** The following bar chart shows the production of food grains of a country in different years

**Q.8** The percentage increase in production from 1991 to 1992 was

- (a) 15%
- (b) 30%
- (c) 50%
- (d) 100%

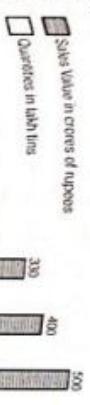
**Q.9** The two consecutive years in which rate of change of production of food grains is minimum are

- (a) 1987 and 1988
- (b) 1988 and 1989
- (c) 1990 and 1991
- (d) 1991 and 1992

**Q.10** The difference of the production of food grains for the years 1988 and 1992 is

- (a) 500 tonnes
- (b) 1000 tonnes
- (c) 5000 tonnes
- (d) 10,000 tonnes

**Directions (Q.10-12): Study the following bar graph and answer the following**



**Q.10 In which year the Sales Value per tin was minimum?**

- (a) 1983
- (b) 1984
- (c) 1985
- (d) 1986

**Q.11 What was the approximate percent increase in Sales Value from 1983 to 1987?**

- (a) 350
- (b) 233.33
- (c) 133.33
- (d) 96

**Q.12 If, in 1986, the tins were exported at the same rate per tin as that in 1985, what would be the Sales Value in crores of rupees of export in 1986?**

- (a) 400
- (b) 352
- (c) 375
- (d) 360

**Directions (Q.13-14): Study the following table and answer the questions that follows:**  
**Income of employees from different heads in different categories of a company.**

Source of income	Employees				
	K	L	M	N	O
Salary	12000	6000	21000	9000	12000
Bonus	2400	1200	4500	2400	3000
Overtime	5400	2100	6000	5100	6000
Arrears	6000	5400	12000	4200	7500
Miscellaneous	1200	300	1500	300	1500
Total	21000	15000	45000	21000	30000

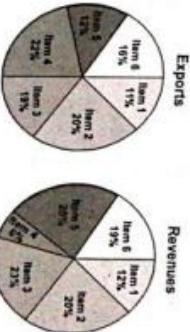
**Q.13 How many employees have their salary less than four times of their bonus?**

- (a) 0
- (b) 1
- (c) 2
- (d) 3

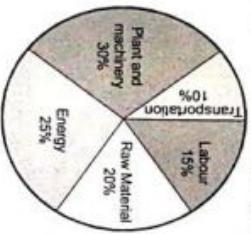
**Q.14 The income from overtime is what percent of income from arrears in case of employees in Category O?**

- (a) 80
- (b) 25
- (c) 70
- (d) 60

**Q.15** The total exports and revenues from the exports of a country are given in the two pie charts below. The pie chart for exports shows the quantity of exports as a percentage of the total quantity of exports. The pie chart for the revenues shows the percentage of the total revenue generated through export of each item. The total quantity of exports of all the items is 5 lakh tonnes and the total revenues is 250 crore. What is the ratio of the revenue generated through export of item 1 per kilogram to the revenue generated through export of item 4 per kilogram?



**Q.16 A firm producing air purifiers sold 200 units in 2012. The following pie chart presents the share of raw material, labour, energy, plant & machinery, and transportation costs in the total manufacturing cost of the firm in 2012. The expenditure on labour in 2012 is ₹ 4,50,000. In 2013, the raw material expenses increased by 30% and all other expenses increased by 20%. If the company registered a profit of ₹ 10 lakhs in 2012, at what price (in ₹) was each air purifier sold?**



of the reproductive system and its function in the life cycle of the organism.

The reproductive system consists of the gonads, ducts, glands, and associated structures.

### **Male Reproductive System**

#### **Testis**



The testes are the primary organs of the male reproductive system. They are located in the scrotum, which is a sac of skin and muscle located outside the body cavity. The testes produce sperm and雄性激素 (androgen).

#### **Sperm Production**

Sperm production occurs in the seminiferous tubules of the testes. These tubules are lined with germinal epithelium, which contains stem cells that divide and differentiate into sperm cells. The process of sperm production is called spermatogenesis.

#### **Hormones**

Hormones play a role in the regulation of sperm production. Gonadotropin-releasing hormone (GnRH) stimulates the pituitary gland to release luteinizing hormone (LH) and follicle-stimulating hormone (FSH). LH stimulates the Leydig cells in the testes to produce androgen, while FSH stimulates the Sertoli cells to produce inhibin.

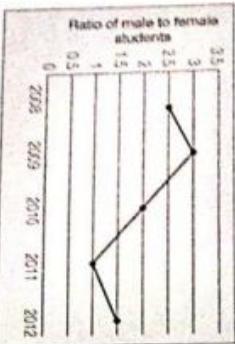
#### **Penis**

The penis is the organ used for sexual intercourse and urination. It is composed of three cylindrical chambers called the corpora cavernosa, which are surrounded by a layer of smooth muscle called the corpus spongiosum. The glans is the tip of the penis, and the urethra passes through it.

#### **Scrotum**

The scrotum is a sac of skin and muscle located outside the body cavity. It contains the testes and provides a cool environment for sperm production. The scrotum also contains the vas deferens, which carries sperm from the testes to the penis.

- O.17 The ratio of male to female students in a college for five years is plotted in the following line graph. If the number of female students doubled in 2009 by what percent did the number of male students increase in 2009? \_\_\_\_\_



## 7. Logical Reasoning

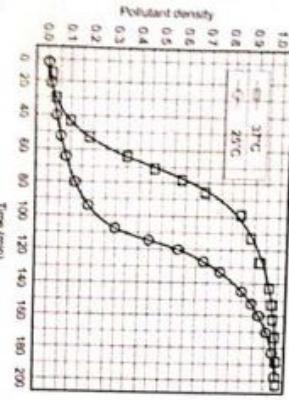
Directions (Questions 1-4): In each question below are given two statements followed by two conclusions numbered I and II. You have to take the given two statements to be true even if they seem to be a variance from commonly known facts. Read the conclusion and then decide which of the given statements logically follows from the two given statements, disregarding commonly known facts.

Give answer:

- (a) If only conclusion I follows
- (b) If only conclusion II follows
- (c) If either conclusion I or II follows
- (d) If neither conclusion I nor II follows

- O.18 This Gross Domestic Product (GDP) in Rupees grew at 7% during 2012-2013. For international comparison, the GDP is compared in US Dollars (USD) after conversion based on the market exchange rate. During the period 2012-2013 the exchange rate for the USD increased from ₹ 50 USD to ₹ 60 USD. India's GDP in USD during the period 2012-2013

- (a) Increased by 5%
- (b) Decreased by 13%
- (c) Decreased by 20%
- (d) Decreased by 11%



Consider the following statements based on the data shown above.

- i. The growth in bacterial population starts earlier at 37°C as compared to 25°C

- ii. The time taken for curd formation at 25°C is twice the time taken at 37°C

Which one of the following options is correct?

- (a) only I
- (b) only II
- (c) both i and ii
- (d) neither i nor ii

Give a

- (a) Direct
- (b) are giv
- (c) number
- (d) statem
- (e) statem
- (f) statem
- (g) statem
- (h) statem
- (i) statem
- (j) statem
- (k) statem
- (l) statem
- (m) statem
- (n) statem
- (o) statem
- (p) statem
- (q) statem
- (r) statem
- (s) statem
- (t) statem
- (u) statem
- (v) statem
- (w) statem
- (x) statem
- (y) statem
- (z) statem

**Directions (Questions 5-8):** In each question below are given two statements followed by two conclusions numbered I and II. You have to take the given two statements to be true even if they seem to be at variance from commonly known facts. Read the conclusion and then decide which of the given conclusions logically follows from the two given statements, disregarding commonly known facts.

**Give answer**

- (a) If only conclusion I follows
  - (b) If only conclusion II follows
  - (c) If neither conclusion I nor II follows
  - (d) If both conclusion I and II follows
- 5. Statements :**
1. All mangoes are bananas.
  2. Some doors are mangoes.
- Conclusions :**
- I. All doors are bananas.
  - II. Some doors are mangoes.
  - III. Some mangoes are doors.
  - IV. All mangoes are doors.
- 6. Statements :**
1. All film stars are black singers.
  2. All film directors are film stars.
- Conclusions :**
- I. All film directors are play back singers.
  - II. Some film stars are film directors.
- 7. Statements:**
1. All men are married.
  2. Some men are educated.
- Conclusions:**
- I. Some married are educated.
  - II. Some educated are married.
- 8. Statements:**
1. All roads are poles.
  2. No pole is a house.
- Conclusions:**
- I. Some roads are houses.
  - II. Some houses are poles.
- 9. Statements:**
1. All film stars are stars.
  2. All stars are planets.
- Conclusions :**
- I. All planets are stars.
  - II. All stars are trees.
  - III. All trees are planets.
  - IV. Some trees are stars.
- 10. Statements**
1. All stars are planets.
  2. All planets are trees.
- Conclusions :**
- I. Only II and IV follow
  - II. Only I and II follow
  - III. All follow
  - IV. Only III and IV follow

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**Directions (Questions 9-11):** In each of the following questions, two statements are followed by four conclusions numbered I, II, III, IV. You have to take the given statements to be true even if they seem to be at variance from the commonly known facts and then decide which of the given conclusions logically follows from the given statements disregarding commonly known facts.

## 8. Analytical Ability

This section of analytical ability comprises of questions put in the form of puzzles involving certain number of items, persons or things. Questions based upon analytical ability are undoubtedly the longest and time consuming. The candidate is required to analyse the given information, condense it in the suitable form and answer the questions asked. The questions on puzzle test may be any of the following types.

**Directions (Questions 1-2):** Read the following information and answer the questions below it.

Rakesh and Kunal are good in Hockey and Volleyball. Sachin, Gaurav and Madan are good in football and baseball.

**Q.1** Who is good in Hockey, Cricket and Volleyball?

- (a) Gaurav
- (b) Rakesh
- (c) Kunal
- (d) Sachin

**Q.2** Who is good in Basque ball, Cricket, Volleyball and Foot ball?

- (a) Rakesh
- (b) Gaurav
- (c) Sachin
- (d) Kunal

**Directions (Questions 3-5):** Read the following information and answer the questions below it.

A Business school with six professors A,B,C,D,E and F has decided to implement a new scheme of course management. Each professor has to coordinate one course and support another course. This semester D's support course is Finance while three others have it in their subjects. E and F have marketing as one of their subjects. F coordinates operations, which is a supportive course for both C and E. Finance and IT are A's subjects. Both A and D have same subjects. Strategy is a support course for exactly one of the professors.

**Q.3** Who coordinates the IT course?

- (a) A
- (b) C
- (c) D
- (d) None of these

**Q.4** Which course is supported by B?

- (a) Operations
- (b) IT
- (c) Strategy
- (d) Finance

**Q.5** Who among the following are coordinating the finance course?

- (a) A and C
- (b) C and D
- (c) A,B,C
- (d) B,C,D

**Directions (Question 6):** Study the following information and answer the questions below it.

There are 7 books one each on Psychology, Hindi,

English, Sociology, Economics, Education and

- Q.10 Who wins the  
race?  
(a) V  
(b) P

- Directions (Question 11-12):** Read the following information and answer the questions below it.
- Five days of a week, C to Friday off a week. C to be staged. D or E should be staged. E should be staged between A and B.
- Q.11** Which is the first day?
- (a) A
  - (b) C
  - (c) C
- Q.12** Which of the following is staging all 1 of staging all 1?
- (a) ADBOE
  - (b) BDACE
  - (c) BDAEC

- Directions (Questions 8-10):** Read the following information and answer the questions below it.

A family consists of three members. There are two married brothers. The father of T, U is Grant. Grant's grandmother of T is doctor. One contract to two students in the

information and answer the questions below it.

Seven executives P,Q,R,S,T,U and W reach office in a particular sequence. U reaches immediately before P. Also U follows S but does not immediately follows S. R is the last one to reach office. T follows immediately after P and is subsequently followed by W.

**Q.9** Among the executives, who reaches the office first?

- (a) Q
- (b) S
- (c) U
- (d) None of these

Q.10 Who ranks fourth in the sequence of reaching office?

- (a) W
- (b) U
- (c) P
- (d) None of these

Directions (Questions 11-12): Read the following information and answer the questions below it.

Five plays A,B,C,D,E are to be staged from Monday to Friday of a week. On each day, only one play will be staged. D or E should not be either the first or last to be staged. E should be immediately followed by C. B should be staged immediately after D. One play is staged between A and B.

Q.11 Which is the first play to be staged?

- (a) A
- (b) B
- (c) C
- (d) None of these

Q.12 Which of the following is the correct sequence of staging all the plays?

- (a) ADBCE
- (b) AECDL
- (c) BDAC
- (d) ABEC

Directions (Questions 13-15): Read the following information and answer the questions below it.

A family consists of six members P,Q,R,S,T and U. There are two married couples. Q is a doctor and the father of T. U is grandfather of R and is a contractor. S is grandmother of T and is a house wife. There is one doctor, one contractor, one nurse, one house wife and two students in the family.

Q.13 Who is the father of T?

- (a) Q
- (b) R
- (c) S
- (d) None of these

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Q.14 What is the profession of P?

- (a) Nurse
- (b) Doctor
- (c) House wife
- (d) Doctor or Nurse?

Q.15 Which of the following are two married couples?

- (a) US,OT
- (b) TS,RU
- (c) US,GP
- (d) US,RP

Directions (Questions 16-18): Read the following information and answer the questions below it.

(i) Five friends Amar, Kapil, Sarvesh, Rohan and Nagesh pull on five shirts of different colours i.e., Red, Yellow, Blue, White and Green, while they were going to attend a party. These colours are not in order. (ii) They have different hobbies as Reading, Playing, Outing, Singing and Writing. (iii) Kapil, who likes singing, does not wear yellow shirt. Sarvesh wears red shirt and he does not like reading as well as writing. Nagesh likes playing and he does not wear blue or yellow shirt. Amar likes writing and Rohan does not wear yellow or green shirt.

Q.16 What is the colour of Kapil's shirt?

- (a) White
- (b) Green
- (c) Blue
- (d) Can't be determined

Q.17 Who likes reading?

- (a) Rohan
- (b) Amar
- (c) Kapil
- (d) None of these

Q.18 Which is the following combination of person-colour-hobby is correct?

- (a) Rohan-Blue-Reading
- (b) Nagesh-White-Playing
- (c) Amar-Yellow-Writing
- (d) Nagesh-Green-Playing

## Part-III. Previous Years ESE (Pre) Questions (GS Paper-1)

**MADE EASY**  
Engineering

**mat**

- Q.1 Three hundred passengers are travelling in white, silver and black cars. Each of these cars is carrying 6, 5 and 3 passengers respectively. If the number of white and silver cars is equal and there is only one black car, what is the total number of cars?
- 52
  - 53
  - 54
  - 55

[ESE (Pre) 2017, 2 Marks]

- Q.2 The present ages of 3 brothers are in the proportion 3 : 4 : 5. After 10 years the sum of their ages will be 78. What are their ages now?

- 12, 16 and 20
- 15, 20 and 25
- 21, 28 and 35
- 24, 32 and 40

[ESE (Pre) 2017, 2 Marks]

- Q.3 A total of 324 notes comprising of ₹ 20 and ₹ 50 denominations makes a sum of ₹ 12,450. The number of ₹ 20 notes is

- 200
- 144
- 125
- 110

[ESE (Pre) 2017, 2 Marks]

- Q.4 Five Men can paint the same building in 25 days and 10 Boys can paint it in 30 days. If a team has 2 Men, 6 Women and 5 Boys, how long will it take to paint the building?

- 12 days
- 13 days
- 14 days
- 15 days

[ESE (Pre) 2017, 2 Marks]

- Q.5 Rajiv spends 40% of his salary on food, 20% on house rent, 10% on entertainment and 10% on conveyance. If his savings at the month end are ₹ 2,000, then his monthly salary is:

- ₹ 6,000
- ₹ 8,000
- ₹ 10,000
- ₹ 12,000

[ESE (Pre) 2017, 2 Marks]

- Q.6 A group of workers estimate to finish a work in 10 days, but 5 workers could not join the work. If the rest of them finished the work in 12 days, the number of members present in the team originally is
- 50
  - 45
  - 35
  - 30

[ESE (Pre) 2017, 2 Marks]

- Q.7 The sum of squares of successive integers from 16, both inclusive, will be
- 1125
  - 1174
  - 1222
  - 1356

[ESE Pre-2018 : 2 Marks]

- Q.8 Given that 0.8 is one root of the equation,  $x^3 - 0.6x^2 - 1.84x + 1.344 = 0$ . The other roots of this equation will be
- 1.1 and -1.4
  - 1.2 and 1.4
  - 1.2 and -1.4
  - 1.1 and 1.4

[ESE Pre-2018 : 2 Marks]

- Q.9 The equation,  $x^3 - 8x^2 + 37x - 50 = 0$  is factored and it has  $(3 + 4i)$  as one of its roots. What is the real root of this equation?
- 2
  - 4
  - 6.5
  - 13

[ESE Pre-2018 : 2 Marks]

- Q.10 Circle A is 4 cm in diameter, circle B is 5 cm in diameter. Circle C has its circumference equal to the sum of the circumferences of both A and B together. What will be the ratio of the area of circle C, with respect to the area of circle A and circle B respectively?

- 5.0625 and 1.84
- 3.875 and 1.84
- 5.0625 and 3.24
- 3.875 and 3.24

[ESE Pre-2018 : 2 Marks]

- Q.11 In a particular test, the marks scored by 4 candidates – A, B, C and D are as follows:  
 • Marks obtained by A and B add to 100;  
 • Marks obtained by C and D add up to those scored by A;

- Q.12 If the rest of them finished the work in 12 days, the number of members present in the team originally is

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- B scores 4 times of D.
  - D scores 10 marks less than C
- The marks obtained by C will be
- 30
  - 15
  - 25

[ESE Pre-2018 : 2 Marks]

- 0.12 What is the form of the function  $f(x)$  for the following data?
- | x      | 0 | 1 | 2  | 3  |
|--------|---|---|----|----|
| $f(x)$ | 3 | 6 | 11 | 18 |

- $x^2 + 2x + 3$
- $x^2 - 2x + 3$
- $x^2 + 2x - 3$
- $x^2 - 2x - 3$

- 0.13. What is the maximum value of  $z$ , if  $z = 10x + 6y$  subject to the constraints  
 $3x + y \leq 12$ ,  $2x + 5y \leq 34$ ,  $x \geq 0$ ,  $y \geq 0$ ?
- 56
  - 52
  - 50
  - 40

[ESE Pre-2018 : 2 Marks]

- 0.14 Let the sum of the squares of successive integers  $0, 1, 2, \dots, n-1, n$  be denoted by  $S$ . Let the sum of the cubes of the same integers be denoted by  $C$ . It is desirable that  $\frac{C}{S}$ , as  $n$  increases in steps of 'unity' from 'zero', is given by the series:

$$\frac{0}{1}, \frac{3}{5}, \frac{9}{7}, \frac{18}{9}, \dots \quad (\text{for } n=0, 1, 2, 3, 4, \dots) \quad \text{What will this ratio be for } n=8?$$

$$\begin{array}{ll} \text{(a)} & \frac{108}{17} \\ \text{(b)} & \frac{103}{17} \\ \text{(c)} & \frac{103}{15} \\ \text{(d)} & \frac{100}{15} \end{array}$$

[ESE Pre-2018 : 2 Marks]

- 0.15 The objective function  $z = 3x_1 + 5x_2$  is to be maximized subjected to constraints.
- $$\begin{aligned} x_1 + 2x_2 &\leq 200 \\ x_1 + x_2 &\leq 150 \\ x_1, x_2 &\geq 0 \end{aligned}$$

The values of  $x_1$  and  $x_2$  in this context are, respectively

- 100 and 75
- 125 and 75
- 100 and 50
- 125 and 50

[ESE Pre-2018 : 2 Marks]

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- 0.16 Consider the length of a room is 15 m and width is 10 m. If the sum of the areas of the floor and ceiling is equal to the sum of the areas of the four walls, then the volume of the room is
- 900 m<sup>3</sup>
  - 1000 m<sup>3</sup>
  - 1200 m<sup>3</sup>
  - 1500 m<sup>3</sup>

[ESE Pre-2018 : 2 Marks]

- 0.17 A person travelled by car 70 km towards north to A then covered 30 km turning left to B. Again he turned towards left and travelled 110 km to C. Then he cycled at the rate of 10 km/hour towards the starting point. The time taken by him to reach the starting point from C will be
- 3 hours
  - 5 hours
  - 7 hours
  - 21 hours

[ESE Pre-2019 : 2 Marks]

- 0.18 A student purchases some books for Rs. 1600. If he had bought 8 more books for the same amount, each book would cost Rs. 10 less. The number of books he buys is
- 30
  - 32
  - 34
  - 36

[ESE Pre-2019 : 2 Marks]

- 0.19 A hemisphere depression is cutout from one face of the cubical wooden block such that the radius  $r$  of the hemisphere is equal to half of the edge of the cube. What will be the surface area of the remaining solid?
- $2r^2(\pi + 24)$
  - $r^2(\pi + 24)$
  - $2r^2(\pi + 36)$
  - $r^2(\pi + 36)$

[ESE Pre-2019 : 2 Marks]

- 0.20 A rod of length  $l$  is to be divided into two parts, such that if 5 times the smaller portion is added to half of the larger portion, it will always be less than  $l$ . This can be achieved by taking length of the larger portion more than

- $\frac{9}{10}l$
- $\frac{7}{8}l$
- $\frac{6}{7}l$
- $\frac{5}{6}l$

[ESE Pre-2019 : 2 Marks]

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- Q.21** Which of the following conditions hold good for a train which crosses the bridge of length  $l$  in time  $t_1$  and crosses another bridge of length  $\frac{l}{2}$  in time  $t_2$ ?
- $t_2 = \frac{t_1}{2}$
  - $2t_2 > t_1$
  - $t_2 < \frac{t_1}{2}$
  - Speed of train is  $\frac{l}{10}$  if  $t_1 - t_2 = 5$

Select the correct answer using the codes given below:

- 1 and 4 only
- 2 and 4 only
- 1 and 3 only
- 2 and 3 only

[ESE Pre-2019 : 2 Marks]

- Q.22** A tourist covers half of his journey by train at 60 km/h, half of the remainder by bus at 30 km/h and the rest by cycle at 10 km/h. Average speed of the tourist during the journey is
- 36 km/h
  - 33 km/h
  - 24 km/h
  - 18 km/h

[ESE Pre-2019 : 2 Marks]

- Q.23** In a lake, the tip of a bud of lotus is seen 10 cm above the surface of water. Forced by the wind, it gradually moved and just submerged at a distance of 30 cm. The depth of water at the root of the lotus plant will be
- 40 cm
  - 50 cm
  - 60 cm
  - 70 cm

[ESE Pre-2019 : 2 Marks]

- Q.24** A man sold a chair and a table together for 7,600, thereby making a profit of 25% on the chair and 10% on the table. By selling them together for Rs. 7,500 he would make a total of 10% on the chair and 20% on the table. Then the cost price of chair and table will be
- Rs. 3600 and Rs. 4000
  - Rs. 3500 and Rs. 4000
  - Rs. 3000 and Rs. 3500
  - Rs. 3500 and Rs. 3500

[ESE Pre-2019 : 2 Marks]

- Q.25** In two concentric circles, a chord length 80 cm of larger circle becomes a tangent to the smaller circle whose radius is 9 cm. The radius of the larger circle will be
- 13 cm
  - 41 cm
  - 52 cm
  - 75 cm

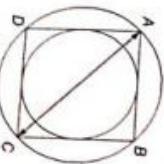
[ESE Pre-2019 : 2 Marks]

- Q.26** Consider following diagram: AC is a diameter of the large circle and  $AB = BC$ .
- 

0.3

0.2

0.1



The ratio of areas of the large circle to the small circle of a square is

- 4 : 1
- 1 : 4
- 2 : 1
- 1 : 2

[ESE Pre-2019 : 2 Marks]

0.4

0.5

0.6

**Q.24** Which of the following conditions hold good for a train which crosses the bridge of length  $l$  in time  $t_1$  and crosses another bridge of length  $\frac{l}{2}$  in time  $t_2$ ?

$$1. t_2 = \frac{t_1}{2}$$

$$2. 2t_2 > t_1$$

$$3. t_2 < \frac{t_1}{2}$$

$$4. \text{Speed of train is } \frac{l}{10} \text{ if } t_1 - t_2 = 5.$$

Select the correct answer using the codes given below:

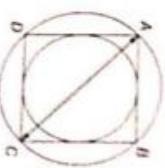
- (a) 1 and 4 only
- (b) 2 and 4 only
- (c) 1 and 3 only
- (d) 2 and 3 only

[ESE Pre-2019 : 2 Marks]

**Q.22** A tourist covers half of his journey by train at 60 kmph, half of the remainder by bus at 30 kmph and the rest by cycle at 10 kmph. Average speed of the tourist during the journey is

- (a) 36 kmph
- (b) 33 kmph
- (c) 24 kmph
- (d) 18 kmph

[ESE Pre-2019 : 2 Marks]



The ratio of areas of the large circle to the small circle of a square is

- (a) 4 : 1
- (b) 1 : 4
- (c) 2 : 1
- (d) 1 : 2

[ESE Pre-2019 : 2 Marks]

**Q.23** In a lake, the tip of a bud of lotus is seen 10 cm above the surface of water. Forced by the wind, it gradually moved, and just submerged at a distance of 30 cm. The depth of water at the root of the lotus plant will be

- (a) 40 cm

- (b) 50 cm

- (c) 60 cm

- (d) 70 cm

[ESE Pre-2019 : 2 Marks]

**Q.24** A man sold a chair and a table together for Rs. 7,000, thereby making a profit of 25% on the chair and 10% on the table. By selling both together for Rs. 7,500 he would make a profit of 10% on the chair and 20% on the table. Then, the cost price of chair and table will be

- (a) Rs. 3,000 and Rs. 4,000
- (b) Rs. 3,500 and Rs. 4,000
- (c) Rs. 3,000 and Rs. 3,500
- (d) Rs. 3,500 and Rs. 3,000

[ESE Pre-2019 : 2 Marks]

**Q.25** In two concentric circles, a chord length 80 cm of larger circle becomes a tangent to the smaller circle whose radius is 9 cm. The radius of the larger circle will be

- (a) 13 cm
- (b) 41 cm
- (c) 52 cm
- (d) 75 cm

[ESE Pre-2019 : 2 Marks]

**Q.26** Consider following diagram.  $AC$  is a diameter of the large circle and  $AB = BC$ .

**Q.23**

**Q.24**



## Part-IV. Previous Years GATE Questions

- Q.1 25 persons are in a room. 15 of them play Hockey, 17 of them play Football and 10 of them play both Hockey and Football. Then the number of persons playing neither Hockey nor Football is
- 2
  - 17
  - 3
  - 13
- [GATE 2010 : 1 Mark]
- Q.2 If  $137 + 276 = 435$  how much is  $731 + 672?$
- 534
  - 1403
  - 1623
  - 1531
- [GATE 2010 : 2 Marks]
- Q.3 5 skilled workers can build a wall in 20 days; 8 semiskilled workers can build a wall in 25 days; 10 unskilled workers can build a wall in 30 days. If a team has 2 skilled, 6 semiskilled and 5 unskilled workers, how long will it take to build the wall?
- 20 days
  - 18 days
  - 16 days
  - 15 days
- [GATE 2010 : 2 Marks]
- Q.4 Given digits 2, 2, 3, 3, 4, 4, 4, 4 how many distinct 4 digit numbers greater than 3000 can be formed?
- 50
  - 51
  - 52
  - 54
- [2 Marks]
- Q.5 If  $\log(P) = \frac{1}{2}(\log(Q) - \frac{1}{3}\log(R))$ , then which of the following options is TRUE?
- $P^2 = QPR^2$
  - $Q^2 = PR$
  - $Q^2 = R^3P$
  - $R = P^2Q^3$
- [GATE 2011: CE, ME & CS, 1 Mark]
- Q.6 A container originally contains 10 litres of pure spirit. From this container 1 litre of spirit is replaced with 1 litre of water. Subsequently, 1 litre of the mixture is again replaced with 1 litre of water and this processess is repeated one more time. How much spirit is now left in the container?
- 7.58 litres
  - 7.84 litres
  - 7 litres
  - 7.9 litres
- [GATE 2011: CE, ME & CS, 2 Marks]
- Q.7 The variable cost ( $V$ ) of manufacturing a product varies according to the equation  $V = 4q$ , where  $q$  is the quantity produced. The fixed cost ( $F$ ) of production of same product reduces with  $q$  according to the equation  $F = 100/q$ . How many units should be produced to minimize the total cost ( $V + F$ )?
- 5
  - 4
  - 7
  - 6
- [GATE 2011: CE, ME & CS, 2 Marks]
- Q.8 P, Q, R and S are four types of dangerous microbes recently found in a human habitat. The area of each circle with its diameter printed in brackets represents the growth of a single microbe surviving human immunity system within 24 hours of entering the body. The danger to human beings varies proportionately with the toxicity, potency and growth attributed to a microbe shown in the figure below:
- 
- | Toxicity (mg/kg/mm) | Growth (micrometers) |
|---------------------|----------------------|
| 1000                | 0.1                  |
| 800                 | 0.2                  |
| 400                 | 0.4                  |
| 200                 | 0.6                  |
- A pharmaceutical company is contemplating the development of a vaccine against the most dangerous microbe. Which microbe should the company target in its first attempt?
- P
  - O
  - R
  - S
- [GATE 2011: CE, ME & CS, 2 Marks]
- Q.9 There are two candidates P and Q in an election. During the campaign 40% of the voters promised to vote for P, and 60% for Q. However, on the day of election 15% of the voters went back on their promise to vote for P and instead voted for Q. 25% of the voters went back on

their promise to vote for Q and instead voted for P. Suppose, P lost by 2 votes, then what was the total number of voters?

- (a) 100                   (b) 110  
(c) 90                   (d) 95

[GATE 2011 : EE & EC, 1 Mark]

**Q.10** Three friends, R, S and T shared toffee from a bowl. R took  $\frac{1}{3}$ rd of the toffees, but returned four to the bowl. S took  $\frac{1}{4}$ th of what was left but returned three toffees to the bowl. T took half of the remainder but returned two back into the bowl. If the bowl had 17 toffees left, how many toffees were originally there in the bowl?

- (a) 38                   (b) 31  
(c) 48                   (d) 41

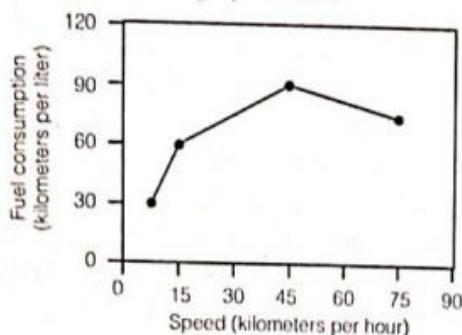
[GATE 2011 : EE & EC, 2 Marks]

**Q.11** The sum of  $n$  terms of the series  $4 + 44 + 444 + \dots$  is

- (a)  $(4/81)[10^{n+1} - 9n - 1]$   
(b)  $(4/81)[10^{n-1} - 9n - 1]$   
(c)  $(4/81)[10^{n+1} - 9n - 10]$   
(d)  $(4/81)[10^n - 9n - 10]$

[GATE 2011 : EE & EC, 2 Marks]

**Q.12** The fuel consumed by a motorcycle during a journey while travelling at various speeds is indicated in the graph below:



The distance covered during four laps of the journey are listed in the table below:

Lap	Distance (kilometers)	Average speed (kilometers per hour)
P	15	15
Q	75	45
R	40	75
S	10	10

From the given data, we can conclude that the fuel consumed per kilometer was least during the lap

- (a) P                   (b) Q  
(c) R                   (d) S

[GATE 2011 : EE & EC, 2 Marks]

**Q.13** The cost function for a product in a firm is given by  $5q^2$ , where  $q$  is the amount of production. The firm can sell the product at a market price of ₹ 50 per unit. The number of units to be produced by the firm such that the profit is maximized is

- (a) 5                   (b) 10  
(c) 15                   (d) 25

[GATE 2012 : CE, ME & CS, 1 Mark]

**Q.14** A political party orders an arch for the entrance to the ground in which the annual conventions is being held. The profile of the arch follows the equation  $y = 2x - 0.1x^2$  where  $y$  is the height of the arch in meters. The maximum possible height of the arch is

- (a) 8 meters           (b) 10 meters  
(c) 12 meters           (d) 14 meters

[GATE 2012 : CE, ME & CS, 2 Marks]

**Q.15** Given the sequence of terms, AD CG FK JP, the next term is

- (a) OV                   (b) OW  
(c) PV                   (d) PW

[GATE 2012 : CE, ME & CS, 2 Marks]

**Q.16** Which of the following assertions are CORRECT?

P: Adding 7 to each entry in a list adds 7 to the mean of the list

Q: Adding 7 to each entry in a list adds 7 to the standard deviation of the list

R: Doubling each entry in a list doubles the mean of the list

S: Doubling each entry in a list leaves the standard deviation of the list unchanged

- (a) P, Q                   (b) Q, R  
(c) P, R                   (d) R, S

[GATE 2012 : CE, ME & CS, 2 Marks]

**Q.17** An automobile plant contracted to buy shock absorbers from two suppliers X and Y. X supplies 60% and Y supplies 40% of the shock absorbers. All shock absorbers are subjected to a quality test. The ones that pass the quality test are considered reliable. Of X's shock absorbers, 96% are reliable. Of Y's shock absorbers, 72% are reliable.

The probability that a randomly chosen shock absorber, which is found to be reliable, is made by Y is

- (a) 0.288      (b) 0.334  
(c) 0.667      (d) 0.720

[GATE 2012 : CE, ME & CS, 2 Marks]

**Q.18** A and B are friends. They decide to meet between 1 P.M. and 2 P.M. on a given day. There is a condition that whoever arrives first will not wait for the other for more than 15 minutes. The probability that they will meet on that day is

- (a)  $\frac{1}{4}$       (b)  $\frac{1}{16}$   
(c)  $\frac{7}{16}$       (d)  $\frac{9}{16}$

[GATE 2012 : EE & EC, 2 Marks]

**Q.19** Raju has 14 currency notes in his pocket consisting of only ₹ 20 notes and ₹ 10 notes. The total money value of the notes is ₹ 230. The number of ₹ 10 notes that Raju has is

- (a) 5      (b) 6  
(c) 9      (d) 10

[GATE 2012 : EE & EC, 2 Marks]

**Q.20** A reduction of 5% in price of sugar enables a housewife to buy 3 kg more for ₹ 280. Find the reduced price.

- (a) 4.67/kg      (b) 5.5/kg  
(c) 3.33/kg      (d) 7.76/kg

[GATE 2013 : CE (Online Exam)1 Mark]

**Q.21** x and y are two positive real numbers, satisfying the equations

$$2x + y \leq 6 ; x + 2y \leq 8$$

For which values of (x, y), the function  $f(x, y) = 3x + 6y$  will give maximum value

- (a)  $\frac{4}{3}, \frac{10}{3}$       (b)  $\frac{8}{3}, \frac{20}{3}$   
(c)  $\frac{8}{3}, \frac{10}{3}$       (d)  $\frac{4}{3}, \frac{20}{3}$

[GATE 2013 : CE (Online Exam)2 Marks]

**Q.22** Abhishek is elder to Savan, Savan is younger to Anshul. The correct relations is

- (a) Abhishek is elder to Anshul  
(b) Anshul is elder to Abhishek  
(c) Abhishek and Anshul are of same age  
(d) No conclusion can be drawn

[GATE 2013 : CE (Online Exam)2 Marks]

**Q.23** What will be the maximum sum of

44, 42, 40, ....

- (a) 502      (b) 504  
(c) 506      (d) 500

[GATE 2013 : ME, PI & CS, 1 Mark]

**Q.24** Out of all the 2-digit integers between 1 and 100, a 2-digit number has to be selected at random. What is the probability that the selected number is not divisible by 7?

- (a)  $\frac{13}{90}$       (b)  $\frac{12}{90}$   
(c)  $\frac{78}{90}$       (d)  $\frac{77}{90}$

[GATE 2013 : ME, PI & CS, 2 Marks]

**Q.25** A tourist covers half of this journey by train at 60 km/hr, half of the remainder by bus at 30 km/hr and the rest by cycle at 10 km/hr. The average speed of the tourist in km/hr during his entire journey is

- (a) 36      (b) 30  
(c) 24      (d) 18

[GATE 2013 : ME, PI & CS, 2 Marks]

**Q.26** Find the sum of the expression

$$\frac{1}{\sqrt{1}+\sqrt{2}} + \frac{1}{\sqrt{2}+\sqrt{3}} + \frac{1}{\sqrt{3}+\sqrt{4}} + \dots + \frac{1}{\sqrt{80}+\sqrt{81}}$$

- (a) 7      (b) 8  
(c) 9      (d) 10

[GATE 2013 : ME, PI & CS, 2 Marks]

**Q.27** In the summer of 2012, in New Delhi, the mean temperature of Monday to Wednesday was  $41^{\circ}\text{C}$  and of Tuesday to Thursday was  $43^{\circ}\text{C}$ . If the

temperature on Thursday was 15% higher than that of Monday, then the temperature in °C on Thursday was

- (a) 40      (b) 43  
(c) 46      (d) 49

[GATE 2013 : EE, EC & IN, 1 Mark]

**Q.28** The set of values of  $p$  for which the roots of the equation  $3x^2 + 2x + p(p - 1) = 0$  are of opposite sign is

- (a)  $(-\infty, 0)$       (b)  $(0, 1)$   
(c)  $(1, \infty)$       (d)  $(0, \infty)$

[GATE 2013 : EE, EC & IN, 2 Marks]

**Q.29** A car travels 8 km in the first quarter of an hour, 6 km in the second quarter and 16 km in the third quarter. The average speed of the car in km per hour over the entire journey is

- (a) 30      (b) 36  
(c) 40      (d) 24

[GATE 2013 : EE, EC & IN, 2 Marks]

**Q.30** What is the chance that a leap year, selected at random, will contain 53 Saturdays

- (a)  $2/7$       (b)  $3/7$   
(c)  $1/7$       (d)  $5/7$

[GATE 2013 : EE, EC & IN, 2 Marks]

**Q.31** Anuj, Bhola, Chandan, Dilip, Eswar and Faisal live on different floors in a six-storeyed building (the ground floor is numbered 1, the floor above it 2, and so on). Anuj lives on an even-numbered floor. Bhola does not live on an odd numbered floor. Chandan does not live on any of the floors below Faisal's floor. Dilip does not live on floor number 2. Eswar does not live on a floor immediately above or immediately below Bhola. Faisal lives three floors above Dilip. Which of the following floor-person combinations is correct?

	Anuj	Bhola	Chandan	Dilip	Eswar	Faisal
(a)	6	2	5	1	3	4
(b)	2	6	5	1	3	4
(c)	4	2	6	3	1	5
(d)	2	4	6	1	3	5

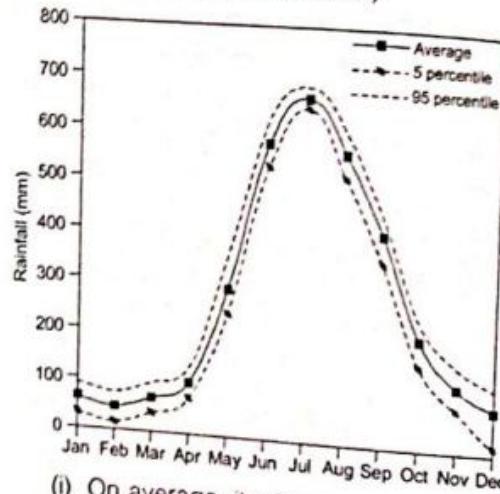
[2014 : CE (Online Exam) 2 Marks, Set-I]

**Q.32** One percent of the people of country X are taller than 6 ft. Two percent of the people of country Y are taller than 6 ft. There are thrice as many people in country X as in country Y. Taking both countries together, what is the percentage of people taller than 6 ft?

- (a) 3.0      (b) 2.5  
(c) 1.5      (d) 1.25

[2014 : CE (Online Exam) 2 Marks, Set-II]

**Q.33** The monthly rainfall chart based on 50 years of rainfall in Agra is shown in the following figure. Which of the following are true? ( $k$  percentile is the value such that  $k$  percent of the data fall below that value)



- (i) On average, it rains more in July than in December
  - (ii) Every year, the amount of rainfall in August is more than that in January
  - (iii) July rainfall can be estimated with better confidence than February rainfall
  - (iv) In August, there is at least 500 mm of rainfall
- (a) (i) and (ii)      (b) (i) and (iii)  
(c) (ii) and (iii)      (d) (iii) and (iv)

[2014 : CE (Online Exam) 2 Marks, Set-I]

**Q.34** The population of a new city is 5 million and is growing at 20% annually. How many years would it take to double at this growth rate?

- (a) 3-4 years      (b) 4-5 years  
(c) 5-6 years      (d) 6-7 years

[2014 : CE & IN (Online Exam) 1 Mark, Set-II]

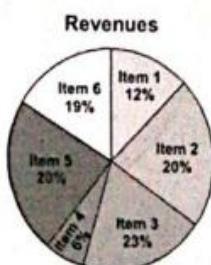
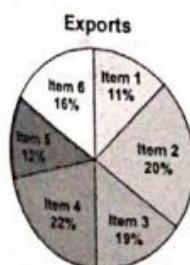
Q.35 In a group of four children, Som is younger to Riaz. Shiv is elder to Ansu. Ansu is youngest in the group. Which of the following statements is/are required to find the eldest child in the group?

## Statements

- Shiv is younger to Riaz.
  - Shiv is elder to Som.
- (a) Statement 1 by itself determines the eldest child.
- (b) Statement 2 by itself determines the eldest child.
- (c) Statements 1 and 2 are both required to determine the eldest child.
- (d) Statements 1 and 2 are not sufficient to determine the eldest child.

[2014 : CE & IN (Online Exam) 2 Marks, Set-II]

Q.36 The total exports and revenues from the exports of a country are given in the two pie charts below. The pie chart for exports shows the quantity of each item as a percentage of the total quantity of exports. The pie chart for the revenues shows the percentage of the total revenue generated through export of each item. The total quantity of exports of all the items is 5 lakh tonnes and the total revenues are 250 crore rupees. What is the ratio of the revenue generated through export of Item 1 per kilogram to the revenue generated through export of Item 4 per kilogram?



- (a) 1 : 2      (b) 2 : 1  
 (c) 1 : 4      (d) 4 : 1

[2014 : CE & IN (Online Exam) 2 Marks, Set-II]

Q.37 X is 1 km northeast of Y. Y is 1 km southeast of Z. W is 1 km west of Z. P is 1 km south of W. Q

is 1 km east of P. What is the distance between X and Q in km?

- (A) 1      (b)  $\sqrt{2}$   
 (c)  $\sqrt{3}$       (d) 2

[2014 : CE & IN (Online Exam, 2 Marks, Set-II)]

Q.38 What is the next number in the series?

- 12    35    81    173    ?

[2014 : ME & EC (Online Exam) 1 Mark, Set-I]

Q.39 Fill in the missing number in the series.

- 2    3    6    15    ?    157.5    630

[2014 : ME & EC (Online Exam) 1 Mark, Set-II]

Q.40 Let  $f(x, y) = x^n y^m = P$ . If  $x$  is doubled and  $y$  is halved, the new value of  $f$  is

- (a)  $2^{n-m} P$       (b)  $2^{m-n} P$   
 (c)  $2(n-m)P$       (d)  $2(m-n)P$

[2014 : ME & EC (Online Exam) 1 Mark, Set-IV]

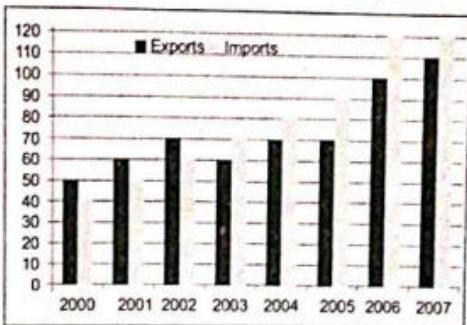
Q.41 In a sequence of 12 consecutive odd numbers, the sum of the first 5 numbers is 425. What is the sum of the last 5 numbers in the sequence?

[2014 : ME & EC (Online Exam) 1 Mark, Set-IV]

Q.42 A train that is 280 metres long, travelling at a uniform speed, crosses a platform in 60 seconds and passes a man standing on the platform in 20 seconds. What is the length of the platform in metres?

[2014 : ME & EC (Online Exam) 2 Marks, Set-I]

Q.43 The exports and imports (in crores of ₹) of a country from 2000 to 2007 are given in the following bar chart. If the trade deficit is defined as excess of imports over exports, in which year is the trade deficit 1/5th of the exports?



- (a) 2005      (b) 2004  
 (c) 2007      (d) 2006

[2014 : ME & EC (Online Exam) 2 Marks, Set-I]

**Q.44** The sum of eight consecutive odd numbers is 656. The average of four consecutive even numbers is 87. What is the sum of the smallest odd number and second largest even number?  
[2014 : ME & EC (Online Exam) 2 Marks, Set-II]

**Q.45** It takes 30 minutes to empty a half-full tank by draining it at a constant rate. It is decided to simultaneously pump water into the half-full tank while draining it. What is the rate at which water has to be pumped in so that it gets fully filled in 10 minutes?

- (a) 4 times the draining rate
- (b) 3 times the draining rate
- (c) 2.5 times the draining rate
- (d) 2 times the draining rate

[2014 : ME & EC (Online Exam) 2 Marks, Set-II]

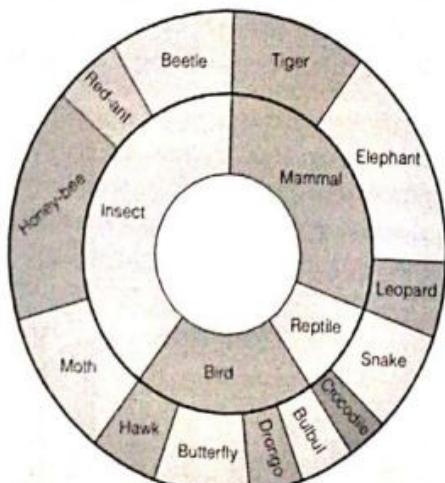
**Q.46** Find the next term in the sequence:

7G, 11K, 13M, \_\_\_\_\_.

- (a) 15Q
- (b) 17Q
- (c) 15P
- (d) 17P

[2014 : ME & EC (Online Exam) 2 Marks, Set-III]

**Q.47** The multi-level hierarchical pie chart shows the population of animals in a reserve forest. The correct conclusions from this information are:



- (i) Butterflies are birds
- (ii) There are more tigers in this forest than red ants
- (iii) All reptiles in this forest are either snakes or crocodiles

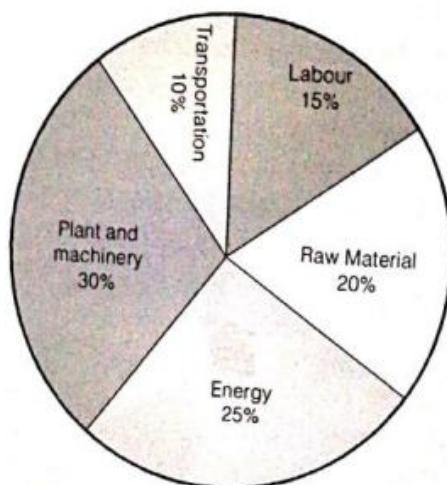
- (iv) Elephants are the largest mammals in this forest
- (a) (i) and (ii) only
- (b) (i), (ii), (iii) and (iv)
- (c) (i), (iii) and (iv) only
- (d) (i), (ii) and (iii) only

[2014 : ME & EC (Online Exam) 2 Marks, Set-III]

**Q.48** A man can row at 8 km per hour in still water. If it takes him thrice as long to row upstream, as to row downstream, then find the stream velocity in km per hour.

[2014 : ME & EC (Online Exam) 2 Marks, Set-III]

**Q.49** A firm producing air purifiers sold 200 units in 2012. The following pie chart presents the share of raw material, labour, energy, plant & machinery, and transportation costs in the total manufacturing cost of the firm in 2012. The expenditure on labour in 2012 is ₹ 4,50,000. In 2013, the raw material expenses increased by 30% and all other expenses increased by 20%. If the company registered a profit of ₹ 10 lakhs in 2012, at what price (in ₹) was each air purifier sold?



[2014 : ME & EC (Online Exam) 2 Marks, Set-III]

**Q.50** If 'KCLFTSB' stands for 'best of luck' and 'SHSWDG' stands for 'good wishes', which of the following indicates 'ace the exam'?

- (a) MCHTX
- (b) MXHTC
- (c) XMHCT
- (d) XMHTC

[2014 : ME & EC (Online Exam) 2 Marks, Set-IV]

Q.51 Industrial consumption of power doubled from 2000-2001 to 2010-2011. Find the annual rate of increase in percent assuming it to be uniform over the years.

- (a) 5.6                  (b) 7.2  
(c) 10.0                  (d) 12.2

[2014 : ME & EC (Online Exam) 2 Marks, Set-IV]

Q.52 If  $\left(z + \frac{1}{z}\right)^2 = 98$ , compute  $\left(z^2 + \frac{1}{z^2}\right)$ .

[2014 : EE & CS, 1 Mark, Set-I]

Q.53 What is the average of all multiples of 10 from 2 to 198?

- (a) 90                  (b) 100  
(c) 110                  (d) 120

[2014 : EE & CS, 1 Mark, Set-II]

Q.54 The value of  $\sqrt{12 + \sqrt{12 + \sqrt{12 + \dots}}}$  is

- (a) 3.464                  (b) 3.932  
(c) 4.000                  (d) 4.444

[2014 : EE & CS, 1 Mark, Set-II]

Q.55 Which number does not belong in the series below?

- 2, 5, 10, 17, 26, 37, 50, 64  
(a) 17                  (b) 37  
(c) 64                  (d) 26

[2014 : EE & CS, 1 Mark, Set-III]

Q.56 When a point inside of a tetrahedron (a solid with four triangular surfaces) is connected by straight lines to corners, how many (new) internal planes are created with these lines? \_\_\_\_\_

[2014 : EE & CS, 2 Marks, Set-I]

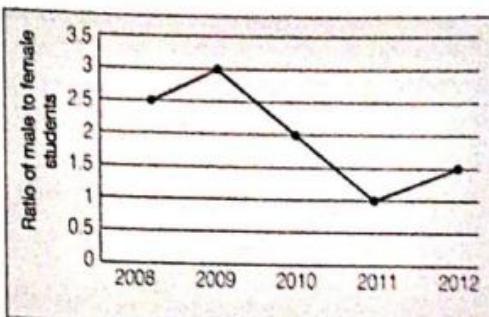
Q.57 If  $x$  is real and  $|x^2 - 2x + 3| = 11$ , then possible values of  $|x^3 + x^2 - x|$  include

- (a) 2, 4                  (b) 2, 14  
(c) 4, 52                  (d) 14, 52

[2014 : EE & CS, 2 Marks, Set-II]

Q.58 The ratio of male to female students in a college for five years is plotted in the following line graph. If the number of female students doubled in 2009, by what percent did the number of male students increase in 2009?

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[2014 : EE & CS, 2 Marks, Set-II]

Q.59 At what time between 6 a.m. and 7 a.m. will the minute hand and hour hand of a clock make an angle closest to  $60^\circ$ ?

- (a) 6:22 a.m.                  (b) 6:27 a.m.  
(c) 6:38 a.m.                  (d) 6:45 a.m.

[2014 : EE & CS, 2 Marks, Set-II]

Q.60 The Gross Domestic Product (GDP) in Rupees grew at 7% during 2012-2013. For international comparison, the GDP is compared in US Dollars (USD) after conversion based on the market exchange rate. During the period 2012-2013 the exchange rate for the USD increased from ₹ 50/ USD to ₹ 60/ USD. India's GDP in USD during the period 2012-2013.

- (a) Increased by 5%  
(b) Decreased by 13%  
(c) Decreased by 20%  
(d) Decreased by 11%

[2014 : EE & CS, 2 Marks, Set-III]

Q.61 Consider the equation:  $(7526)_8 - (Y)_8 = (4364)_8$ , where  $(X)_N$  stands for  $X$  to the base  $N$ . Find  $Y$ .

- (a) 1634                  (b) 1737  
(c) 3142                  (d) 3162

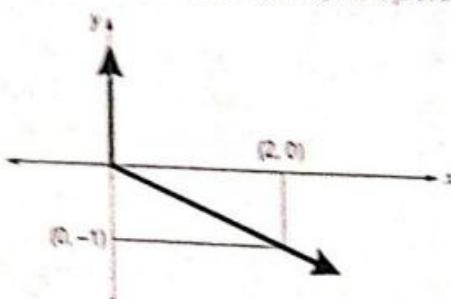
[2014 : EE & CS, 2 Marks, Set-III]

Q.62 If ROAD is written as URDG, then SWAN should be written as:

- (a) VXDQ                  (b) VZDQ  
(c) VZDP                  (d) UXDQ

[2015 : CE (Set-I), CS (Set-II), 1 Mark]

- Q.63** Choose the most appropriate equation for the function drawn as a thick line, in the plot below:



- (a)  $x = y - |y|$    (b)  $x = -(y - |y|)$   
 (c)  $x = y + |y|$    (d)  $x = -(y + |y|)$

[2015 : (CE & CS, 2 Mark, Set-I, Set-II)]

- Q.64** The head of a newly formed government desires to appoint five of the six selected members P, Q, R, S, T and U to portfolios of Home, Power, Defense, Telecom, and Finance. U does not want any portfolio if S gets one of the five. R wants either Home or Finance or no portfolio. Q says that if S gets either Power or Telecom, then she must get the other one. T insists on a portfolio if P gets one. Which is the valid distribution of portfolios?  
 (a) P-Home, Q-Power, R-Defense, S-Telecom, T-Finance  
 (b) R-Home, S-Power, P-Defense, Q-Telecom, T-Finance  
 (c) P-Home, Q-Power, T-Defense, S-Telecom, U-Finance  
 (d) Q-Home, U-Power, T-Defense, R-Telecom, P-Finance

[2015 : (CE & CS, 2 Mark, Set-I, Set-II)]

- Q.65** How many four digit numbers can be formed with the 10 digits 0, 1, 2, ..., 9 if no number can start with 0 and if repetitions are not allowed?

[2015 : CE, 2 Marks, Set-II]

- Q.66** There are 16 teachers who can teach Thermodynamics (TD), 11 who can teach Electrical Sciences (ES), and 5 who can teach both TD and Engineering Mechanics (EM). There are a total of 40 teachers. 6 cannot teach any of the three subjects, i.e. EM, ES or TD. 6 can teach only ES. 4 can teach all

three subjects, i.e. EM, ES and TD. 4 can teach ES and TD. How many can teach both ES and EM but not TD?

- (a) 1   (b) 2  
 (c) 3   (d) 4

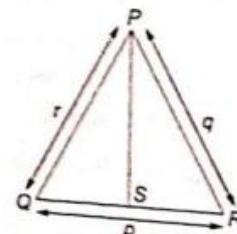
[2015 : CE, 2 Marks, Set-II]

- Q.67** If the list of letters, P, R, S, T, U is an arithmetic sequence, which of the following are also in arithmetic sequence?

1.  $2P, 2R, 2S, 2T, 2U$
  2.  $P-3, R-3, S-3, T-3, U-3$
  3.  $P^2, R^2, S^2, T^2, U^2$
- (a) 1 only   (b) 1 and 2  
 (c) 2 and 3   (d) 1 and 3

[2015 : CS (Set-I) & EE (Set-II), 2 Marks]

- Q.68** In a triangle PQR, PS is the angle bisector of  $\angle QPR$  and  $\angle QPS = 60^\circ$ . What is the length of PS?



- (a)  $\frac{(q+r)}{qr}$    (b)  $\frac{qr}{(q+r)}$   
 (c)  $\sqrt{(q^2+r^2)}$    (d)  $\frac{(q+r)^2}{qr}$

[2015 : CS (Set-I) & EE (Set-II), 2 Marks]

- Q.69** If p, q, r, s are distinct integers such that:  
 $f(p, q, r, s) = \max(p, q, r, s)$   
 $g(p, q, r, s) = \min(p, q, r, s)$

$h(p, q, r, s) = \text{remainder of } (p \times q) / (r \times s) \text{ if } (p \times q) > (r \times s) \text{ or remainder of } (r \times s) / (p \times q) \text{ if } (r \times s) > (p \times q)$

Also a function  $fg(h(p, q, r, s)) = f(p, q, r, s) \times g(p, q, r, s) \times h(p, q, r, s)$ .

Also the same operation are valid with two variable functions of the form  $f(p, q)$ .

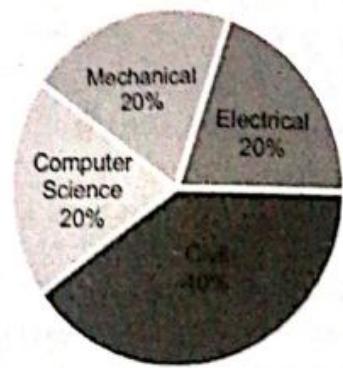
What is the value of  $fg(h(2, 5, 7, 3), 4, 6, 8)$ ?  
 [2015 : CS (Set-I) & EE (Set-II), 2 Marks]

- Q.70** Given Set A = {2, 3, 4, 5} and Set B = {11, 12, 13, 14, 15}, two numbers are randomly selected, one from each set. What is the probability that the sum of the two numbers equals 16?

- (a) 0.20      (b) 0.25  
(c) 0.30      (d) 0.33

[2015 : CS (set-II) & EE (set-I), 1 Mark]

- Q.71** The pie chart below has the breakup of the number of students, from different departments in an engineering college for the year 2012. The proportion of male to female students in each department is 5 : 4. There are 40 males in Electrical Engineering. What is the difference between the numbers of female students in the Civil department and the female students in the Mechanical department?



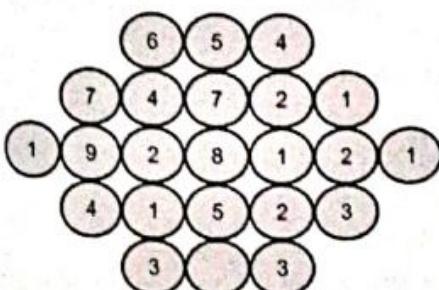
[2015 : CS (set-II) & EE (set-I), 2 Marks]

- Q.72** If  $\log_x(5/7) = -1/3$ , then the value of  $x$  is

- (a) 343/125      (b) 125/343  
(c) -25/49      (d) -49/25

[2015 : EC, 1 Mark, Set-I]

- Q.73** Fill in the missing value



[2015 : EC, 2 Mark, Set-I]

- Q.74** An electric bus has onboard instruments that report the total electricity consumed since the start of the trip as well as the total distance covered. During a single day of operation, the bus travels on stretches M, N, O and P, in that order. The cumulative distance travelled and the corresponding electricity consumption are shown in the Table below:

Stretch	Cumulative distance (km)	Electricity used (kWh)
M	20	12
N	45	25
O	75	45
P	100	57

The stretch where the electricity consumption per km is minimum is

- (a) M      (b) N  
(c) O      (d) P

[2015 : EC (Set-II) & ME (Set-III), 1 Mark]

- Q.75** Ram and Ramesh appeared in an interview for two vacancies in the same department. The probability of Ram's selection is  $1/6$  and that of Ramesh is  $1/8$ . What is the probability that only one of them will be selected?

- (a) 47/48      (b) 1/4  
(c) 13/48      (d) 35/48

[2015 : EC (Set-II) & ME (Set-III), 1 Mark]

- Q.76** Given below are two statements followed by two conclusions. Assuming these statements to be true, decide which one logically follows.

Statements:

- I. All film star are playback singers.  
II. All film directors are film stars.

Conclusions:

- I. All film directors are playback singers.  
II. Some film stars are film directors.  
(a) Only conclusion I follows.  
(b) Only conclusion I nor II follows.  
(c) Neither conclusion I nor II follows.  
(d) Both conclusions I and II follow.

[2015 : EC (Set-II) & ME (Set-III), 2 Mark]

- Q.77** A tiger is 50 leaps of its own behind a deer. The tiger takes 5 leaps per minute to the deer's 4. If the tiger and the deer cover 8 metre and 5 metre per leap respectively, what distance in metres will the tiger have to run before it catches the deer?

[2015 : EC (Set-II) & ME (Set-III), 2 Mark]

- Q.78**  $\log \tan 1^\circ + \log \tan 2^\circ + \dots + \log \tan 89^\circ$  is \_\_\_\_\_.

- (a) 1                          (b)  $\frac{1}{\sqrt{2}}$   
 (c) 0                          (d) -1

[2015 : EC (Set-III) & ME (Set-II), 2 Marks]

- Q.79** From a circular sheet of paper of radius 30 cm, a sector of 10% area is removed. If the remaining part is used to make a conical surface, then the ratio of the radius and height of the cone is \_\_\_\_\_. [2015 : EC (Set-III) & ME (Set-II), 2 Marks]

- Q.80** Five teams have to compete in a league, with every team playing every other team exactly once, before going to the next round. How many matches will have to be held to complete the league round of matches?

- (a) 20                          (b) 10  
 (c) 8                           (d) 5

[2015 : ME (Set-I), IN & PI, 1 Mark]

- Q.81** Tanya is older than Eric.  
 Cliff is older than Tanya.  
 Eric is older than Cliff.

If the first two statements are true, then the third statement is

- (a) True                      (b) False  
 (c) Uncertain                (d) Data insufficient

[2015 : ME (Set-I), IN & PI, 1 Mark]

- Q.82** In the given angle  $Q$  is a right angle,  $PS : QS = 3 : 1$ ,  $RT : QT = 5 : 2$  and  $PU : UR = 1 : 1$ . If area of triangle  $QTS$  is  $20 \text{ cm}^2$ , then the area of triangle  $PQR$  in  $\text{cm}^2$  is \_\_\_\_\_. [2015 : ME (Set-I), IN & PI, 1 Mark]

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- Q.83** Given below are two statements followed by two conclusions. Assuming these statements to be true, decide which one logically follows. Statements:

- I. No manager is a leader.  
 II. All leaders are executives.

Conclusions:

- I. No manager is an executive.  
 II. No executive is a manager.  
 (a) Only conclusion I follows  
 (b) Only conclusion II follows  
 (c) Neither conclusion I nor II follows  
 (d) Both conclusions I and II follow

[2015 : ME (Set-I), IN & PI, 2 Marks]

- Q.84** Right triangle  $PQR$  is to be constructed in the  $xy$ -plane so that the right angle is at  $P$  and line  $PR$  is parallel to the  $x$ -axis. The  $x$  and  $y$  coordinates of  $P$ ,  $Q$ , and  $R$  are to be integers that satisfy the inequalities:

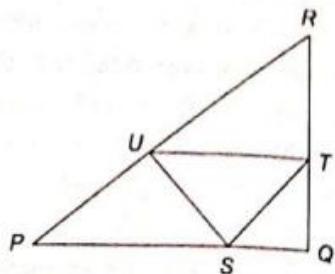
$-4 \leq x \leq 5$  and  $6 \leq y \leq 16$ . How many different triangles could be constructed with these properties?

- (a) 110                      (b) 1100  
 (c) 9900                    (d) 10000

[2015 : ME (Set-I), IN & PI, 2 Marks]

- Q.85** Leela is older than her cousin Pavithra. Pavithra's brother Shiva is older than Leela. When Pavithra and Shiva are visiting Leela, all three like to play chess. Pavithra wins more often than Leela does.

Which one of the following statements must be TRUE based on the above?



[2015 : ME (Set-I), IN & PI, 2 Marks]

- (a) When Shiva plays chess with Leela and Pavithra, he often loses.  
 (b) Leela is the oldest of three.  
 (c) Shiva is better chess player than Pavithra.  
 (d) Pavithra is the youngest of the three.

[2016 : EC & ME (Set-I), 2 Marks]

Q.86 If  $a^{-a} = \frac{1}{r}$  and  $r^{-b} = \frac{1}{s}$  and  $s^{-c} = \frac{1}{q}$ , the value

of  $abc$  is \_\_\_\_\_.

- (a)  $(rqs)^{-1}$       (b) 0  
 (c) 1      (d)  $r+q+s$

[2016 : EC & ME (Set-I), 2 Marks]

Q.87 P, Q, R and S are working on a project. Q can finish the task in 25 days, working alone for 12 hours a day. R can finish the task in 50 days, working alone for 12 hours per day. Q worked 12 hours a day but took sick leave in the beginning for two days. R worked 18 hours a day on all days. What is the ratio of work done by Q and R after 7 days from the start of the projects?

- (a) 10:11      (b) 11:10  
 (c) 20:21      (d) 21:20

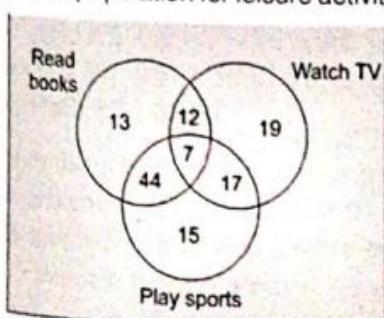
[2016 : EC & ME (Set-I), 2 Marks]

Q.88 Given  $(9 \text{ inches})^{1/2} = (0.25 \text{ yards})^{1/2}$ , which one of the following statements is TRUE?

- (a) 3 inches = 0.5 yards  
 (b) 9 inches = 1.5 yards  
 (c) 9 inches = 0.25 yards  
 (d) 81 inches = 0.0625 yards

[2016 : EC (Set-II) & ME (Set-III), 1 Mark]

Q.89 The Venn diagram shows the preference of the student population for leisure activities.



From the data given, the number of students who like to read books or play sports is \_\_\_\_\_.

- (a) 44      (b) 51  
 (c) 79      (d) 108

[2016 : EC (Set-II) & ME (Set-III), 2 Marks]

Q.90 Two and a quarter hours back, when seen in a mirror, the reflection of a wall clock without number markings seemed to show 1:30. What is the actual current time shown by the clock?  
 (a) 8:15      (b) 11:15  
 (c) 12:15      (d) 12:45

[2016 : EC (Set-II) & ME (Set-III), 2 Marks]

Q.91 Mand N start from the same location. M travels 10 km East and then 10 km North-East. N travels 5 km South and then 4 km South-East. What is the shortest distance (in km) between M and N at the end of their travel?  
 (a) 18.60      (b) 22.50  
 (c) 20.61      (d) 25.00

[2016 : EC (Set-II) & ME (Set-III), 2 Marks]

Q.92 A wire of length 340 mm is to be cut into two parts. One of the parts is to be made into a square and the other into a rectangle where sides are in the ratio of 1:2. What is the length of the side of the square (in mm) such that the combined area of the square and the rectangle is a MINIMUM?

- (a) 30      (b) 40  
 (c) 120      (d) 180

[2016 : EC (Set-II) & ME (Set-III), 2 Marks]

Q.93 The number that least fits this set:

(324, 441, 97 and 64) is \_\_\_\_\_.

- (a) 324      (b) 441  
 (c) 97      (d) 64

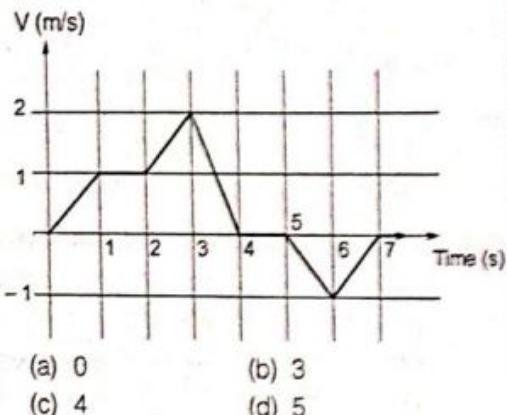
[2016 : EC (Set-III) & IN, 1 Mark]

Q.94 It takes 10s and 15s, respectively, for two trains travelling at different constant speeds to completely pass a telegraph post. The length of the first train is 120 m and that of the second train is 150 m. The magnitude of the difference in the speeds of the two trains (in m/s) is \_\_\_\_\_.

- (a) 2.0      (b) 10.0  
 (c) 12.0      (d) 22.0

[2016 : EC (Set-III) & IN, 1 Mark]

- Q.95** The velocity  $V$  of a vehicle along a straight line is measured in m/s and plotted as shown with respect to time in seconds. At the end of the 7 seconds, how much will the odometer reading increase by (in m)?



- (a) 0      (b) 3      (c) 4      (d) 5

[2016 : EC (Set-III) & IN, 2 Marks]

- Q.96** A flat is shared by four first year undergraduate students. They agreed to allow the oldest of them to enjoy some extra space in the flat. Manu is two months older than Sravan, who is three months younger than Trideep. Pavan is one month older than Sravan. Who should occupy the extra space in the flat?

- (a) Manu      (b) Sravan  
(c) Trideep      (d) Pavan

[2016 : EC (Set-III) & IN, 2 Marks]

- Q.97** A cube is built using 64 cubic blocks of side one unit. After it is built, one cubic block is removed from every corner of the cube. The resulting surface area of the body (in square units) after the removal is \_\_\_\_\_.

- (a) 56      (b) 64  
(c) 72      (d) 96

[2016 : CE & CS (Set-I), 1 Mark]

- Q.98** If  $f(x) = 2x^7 + 3x - 5$ , which of the following is a factor of  $f(x)$ ?

- (a)  $(x^3 + 8)$       (b)  $(x - 1)$   
(c)  $(2x - 5)$       (d)  $(x + 1)$

[2016 : CE & CS (Set-I), 2 Marks]

- Q.99** In a process, the number of cycles to failure decreases exponentially with an increase in load. At a load of 80 units, it takes 100 cycles for failure. When the load is halved, it takes

10000 cycles for failure. The load for which the failure will happen in 5000 cycles is \_\_\_\_\_.

- (a) 40.00      (b) 46.02  
(c) 60.01      (d) 92.02

[2016 : CE & CS (Set-I), 2 Marks]

- Q.100** In a quadratic function, the value of the product of the roots ( $\alpha, \beta$ ) is 4. Find the value of

$$\frac{\alpha^7 + \beta^7}{\alpha^{-7} + \beta^{-7}}$$

- (a)  $4^7$       (b)  $4^7$   
(c)  $2^{17}$       (d)  $4^{17}$

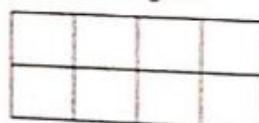
[2016 : EE (Set-I) & CS (Set-II), 1 Marks]

- Q.101** Among 150 faculty members in an institute 55 are connected with each other through Facebook® and 85 are connected through WhatsApp®. 30 faculty members do not have Facebook® or WhatsApp® accounts. The number of faculty members connected only through Facebook® accounts is \_\_\_\_\_.

- (a) 35      (b) 45  
(c) 65      (d) 90

[2016 : EE (Set-I) & CS (Set-II), 2 Marks]

- Q.102** In a  $2 \times 4$  rectangle grid shown below, each cell is a rectangle. How many rectangles can be observed in the grid?



- (a) 21      (b) 27  
(c) 30      (d) 36

[2016 : EE (Set-I) & CS (Set-II), 2 Marks]

- Q.103**  $(x\% \text{ of } y) + (y\% \text{ of } x)$  is equivalent to \_\_\_\_\_.

- (a) 2% of  $xy$       (b) 2% of  $(xy/100)$   
(c)  $xy\% \text{ of } 100$       (d) 100% of  $xy$

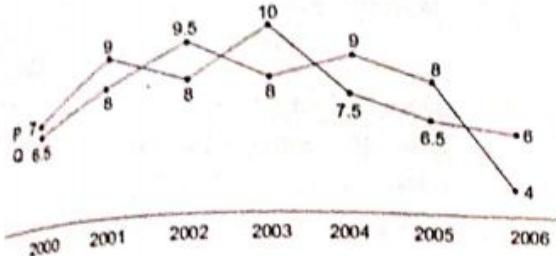
[2016 : CE (Set-II), 1 Mark]

- Q.104** The sum of the digits of a two digit number is 12. If the new number formed by reversing the digits is greater than the original number by 54, find the original number.

- (a) 39      (b) 57  
(c) 66      (d) 93

[2016 : CE (Set-II), 1 Mark]

Q.105 Two finance companies, P and Q declared fixed annual rates of interest on the amounts invested with them. The rates of interest offered by these companies may differ from year to year. Year-wise annual rates of interest offered by these companies are shown by the line graph provided below.



If the amounts invested in the companies, P and Q in 2006 are in the ratio 8 : 9, then the amounts received after one year as interest from companies P and Q would be the ratio

- (a) 2 : 3      (b) 3 : 4  
(c) 6 : 7      (d) 4 : 3

[2016 : CE (Set-II), 2 Marks]

Q.106 A square pyramid has a base perimeter  $x$ , and the slant height is half of the perimeter. What is the lateral surface area of the pyramid?

- (a)  $x^2$       (b)  $0.75x^2$   
(c)  $0.50x^2$       (d)  $0.25x^2$

[2016 : CE (Set-II), 2 Marks]

Q.107 Ananth takes 6 hours and Bharath takes 4 hours to read a book. Both started reading copies of the book at the same time. After how many hours is the number of pages still to be read by Ananth, twice that to be read by Bharath? Assume Ananth and Bharath read all the pages with constant pace.

- (a) 1      (b) 2  
(c) 3      (d) 4

[2016 : CE (Set-II), 2 Marks]

Q.108 Pick the odd one out in the following:

- 13, 23, 33, 43, 53  
(a) 23      (b) 33  
(c) 43      (d) 53

[2016 : EE (Set-II), 1 Mark]

Q.109 If  $|9y - 6| = 3$ , then  $y^2 - 4y/3$  is \_\_\_\_\_.

- (a) 0      (b)  $+1/3$   
(c)  $-1/3$       (d) undefined

[2016 : EE (Set-II), 1 Marks]

Q.110 Shaquille O'Neal is a 60% career free throw shooter, meaning that he successfully makes 60 free throws out of 100 attempts on average. What is the probability that he will successfully make exactly 6 free throws in 10 attempts?

- (a) 0.2508      (b) 0.2816  
(c) 0.2934      (d) 0.6000

[2016 : EE (Set-II), 2 Marks]

Q.111 The numeral in the units position of  $211^{870} + 146^{127} \times 3^{424}$  is \_\_\_\_\_.

[2016 : EE (Set-II), 2 Marks]

Q.112 A window is made up of a square portion and an equilateral triangle portion above it. The base of the triangular portion coincides with the upper side of the square. If the perimeter of the window is 6 m, the area of the window in  $\text{m}^2$  is \_\_\_\_\_.

- (a) 1.43      (b) 2.06  
(c) 2.68      (d) 2.88

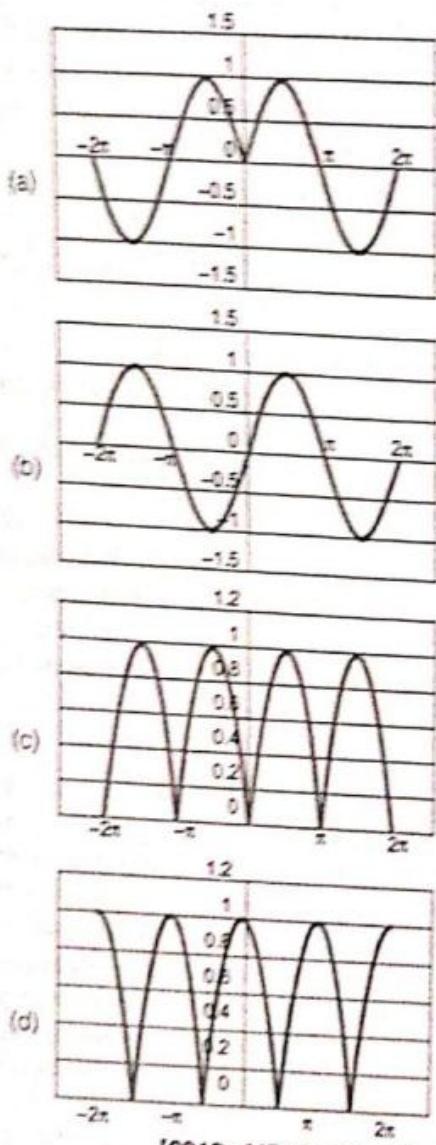
[2016 : ME (Set-II), 1 Mark]

Q.113 Students taking an exam are divided into two groups, P and Q such that each group has the same number of students. The performance of each of the students in a test was evaluated out of 200 marks. It was observed that the mean of group P was 105, while that of group Q was 85. The standard deviation of group P was 25, while that of group Q was 5. Assuming that the marks were distributed on a normal distribution, which of the following statements will have the highest probability of being TRUE?

- (a) No student in group Q scored less marks than any student in group P.  
(b) No student in group P scored less marks than any student in group Q.  
(c) Most students of group Q scored marks in a narrower range than students in group P.  
(d) The median of the marks of group P is 100.

[2016 : ME (Set-II), 2 Marks]

Q.114 Which of the following curves represents the function  $y = \ln(|e^{\frac{|x|}{2}} - 1|)$  for  $|x| < 2\pi$ ? here,  $x$  represents the abscissa and  $y$  represents the ordinate.



[2016 : ME (Set-II), 2 Marks]

Q.115 The following sequence of numbers is arranged in increasing order:  $1, x, x, x, x, y, y, 9, 16, 18$ . Given that the mean and median are equal, and are also equal to twice the mode, the value of  $y$  is

- (a) 5      (b) 6  
(c) 7      (d) 8

[2017 : CE (Set-I), 1 Mark]

Q.116 Consider the following sentences:

All benches are beds. No bed is a bulb. Some bulbs are lamps.

Which of the following can be inferred?

- (i) Some beds are lamps.  
(ii) Some lamps are beds.  
(a) Only (i)      (b) Only (ii)  
(c) Both (i) and (ii)      (d) Neither (i) nor (ii)

[2017 : CE (Set-I), 1 Mark]

Q.117 If the radius of a right circular cone is increased by 50%, its volume increases by

- (a) 75%      (b) 100%  
(c) 125%      (d) 237.5%

[2017 : CE (Set-I), 1 Mark]

Q.118 Students applying for hostel rooms are allotted rooms in order of seniority. Students already staying in a room will move if they get a room in their preferred list. Preferences of lower ranked applicants are ignored during allocation.

Given the data below, which room will Ajit stay in?

Names	Student Seniority	Current room	Room preference list
Amar	1	P	R, S, Q
Akbar	2	None	R, S
Anthony	3	Q	P
Ajit	4	S	Q, P, R

- (a) P      (b) Q  
(c) R      (d) S

[2017 : CE (Set-I), 2 Marks]

Q.119 The last digit of  $(2171)^7 + (2172)^9 + (2173)^{11} + (2174)^{13}$  is

- (a) 2      (b) 4  
(c) 6      (d) 8

[2017 : CE (Set-I), 2 Marks]

Q.120 Two dice are thrown simultaneously. The probability that the product of the numbers appearing on the top faces of the dice is a perfect square is

- (a)  $\frac{1}{9}$       (b)  $\frac{2}{9}$   
(c)  $\frac{1}{3}$       (d)  $\frac{4}{9}$

[2017 : CE (Set-II) & IN, 1 Mark]

Q.121 What is the value of  $x$  when

$$81 \times \left(\frac{16}{25}\right)^{x+2} + \left(\frac{3}{5}\right)^{2x+4} = 144?$$

- (a) 1
- (b) -1
- (c) -2
- (d) Cannot be determined

[2017 : CE (Set-2) & IN, 1 Mark]

Q.122 Budhan covers a distance of 19 km in 2 hours by cycling one fourth of the time and walking the rest. The next day he cycles (at the same speed as before) for half the time and walks the rest (at the same speed as before) and covers 26 km in 2 hours. The speed in km/h at which Budhan walks is

- (a) 1
- (b) 4
- (c) 5
- (d) 6

[2017 : CE (Set-2) & IN, 2 Marks]

Q.123 Find the smallest number  $y$  such that that  $y \times 162$  is a perfect cube.

- (a) 24
- (b) 27
- (c) 32
- (d) 36

[2017 : CS (Set-1), 1 Mark]

Q.124 The expression  $\frac{(x+y)-|x-y|}{2}$  is equal to

- (a) the maximum of  $x$  and  $y$
- (b) the minimum of  $x$  and  $y$
- (c) 1
- (d) none of the above

[2017 : CS (Set-1), 2 Marks]

Q.125 There are 3 red socks, 4 green socks and 3 blue socks. You choose 2 socks. The probability that they are of the same colour is

- (a)  $1/5$
- (b)  $7/30$
- (c)  $1/4$
- (d)  $4/15$

[2017 : CS (Set-2), 1 Mark]

Q.126 500 students are taking one or more courses out of Chemistry, Physics and Mathematics. Registration records indicate course enrolment as follows: Chemistry (329), Physics (186), Mathematics (295), Chemistry and Physics (83), Chemistry and Mathematics



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(217) and Physics and Mathematics (63).

How many students are taking all 3 subjects?

- (a) 37
- (b) 43
- (c) 47
- (d) 53

[2017 : EC (Set-2), 1 Mark]

Q.127 1200 men and 500 women can build a bridge in 2 weeks, 900 men and 250 women will take 3 weeks to build the same bridge. How many men will be needed to build the bridge in one week?

- (a) 3000
- (b) 3300
- (c) 3600
- (d) 3900

[2017 : EC (Set-2), 2 Marks]

Q.128 The number of 3-digit numbers such that the digit 1 is never to the immediate right of 2 is

- (a) 781
- (b) 791
- (c) 881
- (d) 891

[2017 : EC (Set-2), 2 Marks]

Q.129 Rahul, Murali, Srinivas and Arul are seated around a square table. Rahul is sitting to the left of Murali. Srinivas is sitting to the right of Arul. Which of the following pairs are seated opposite each other?

- (a) Rahul and Murali
- (b) Srinivas and Arul
- (c) Srinivas and Murali
- (d) Srinivas and Rahul

[2017 : EE (Set-1), 1 Mark]

Q.130 A test has twenty questions worth 100 marks in total. There are two types of questions. Multiple choice questions are worth 3 marks each and essay questions are worth 11 marks each. How many multiple choice questions does the exam have?

- (a) 12
- (b) 15
- (c) 18
- (d) 19

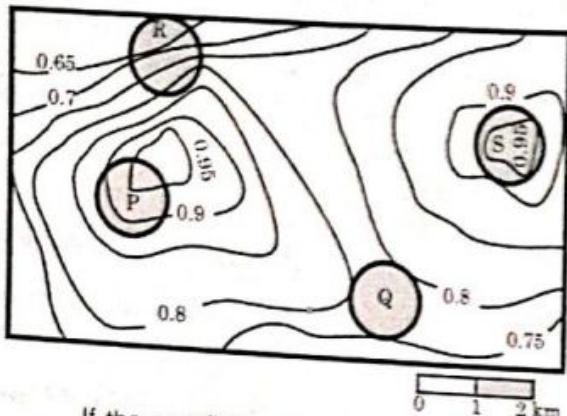
[2017 : EE (Set-2), 1 Mark]

Q.131 The number of roots of  $e^x + 0.5x^2 - 2 = 0$  in the range  $[-5, 5]$  is

- (a) 0
- (b) 1
- (c) 2
- (d) 3

[2017 : EE (Set-2), 2 Marks]

- Q.132** An air pressure contour line joins locations in a region having the same atmospheric pressure. The following is an air pressure contour plot of a geographical region. Contour lines are shown at 0.05 bar intervals in this plot.



If the possibility of a thunderstorm is given by how fast air pressure rises or drops over a region, which of the following regions is most likely to have a thunderstorm?

- (a) P      (b) Q  
(c) R      (d) S

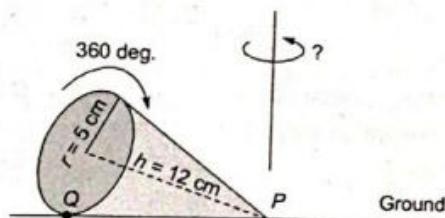
[2017 : EE (Set-2), 2 Marks]

- Q.133** X is a 30 digit number starting with the digit 4 followed by the digit 7. Then the number  $X^3$  will have

- (a) 90 digits      (b) 91 digits  
(c) 92 digits      (d) 93 digits

[2017 : EE (Set-2), 2 Marks]

- Q.134** A right-angled cone (with base radius 5 cm and height 12 cm), as shown in the figure below, is rolled on the ground keeping the point P fixed until the point Q (at the base of the cone, as shown) touches the ground again.



By what angle (in radians) about P does the cone travel?

- (a)  $\frac{5\pi}{12}$       (b)  $\frac{5\pi}{24}$   
(c)  $\frac{24\pi}{5}$       (d)  $\frac{10\pi}{13}$

[2017 : ME (Set-1), 1 Mark]

- Q.135** P, Q and R talk about S's car collection. P states that S has at least 3 cars. Q believes that S has less than 3 cars. R indicates that to his knowledge, S has at least one car. Only one of P, Q and R is right. The number of cars owned by S is

- (a) 0      (b) 1  
(c) 3      (d) Can't be determined

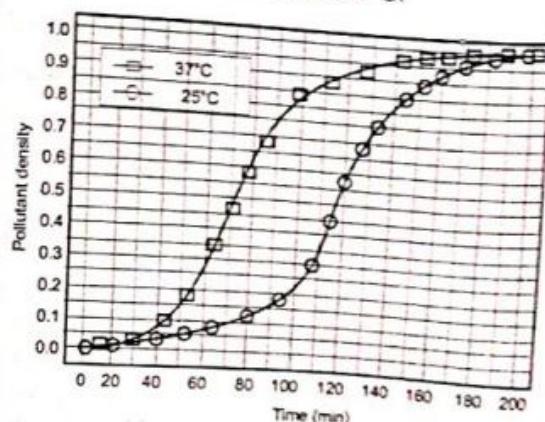
[2017 : ME (Set-1), 1 Mark]

- Q.136** In a company with 100 employees, 45 earn ₹ 20000 per month, 25 earn ₹ 30000, 20 earn ₹ 40000, 8 earn ₹ 60000, and 2 earn ₹ 15000. The median of the salaries is

- (a) ₹ 20000      (b) ₹ 30000  
(c) ₹ 32300      (d) ₹ 40000

[2017 : ME (Set-1), 1 Mark]

- Q.137** The growth of bacteria (*lactobacillus*) in milk leads to curd formation. A minimum bacterial population density of 0.8 (in suitable) is needed to form curd. In the graph below, the population density of *lactobacillus* in 1 litre of milk is plotted as a function of time, at two different temperatures, 25°C and 37°C.



Consider the following statements based on the data shown above:

- i. The growth in bacterial population stops earlier at  $37^{\circ}\text{C}$  as compared to  $25^{\circ}\text{C}$   
 ii. The time taken for curd formation at  $25^{\circ}\text{C}$  is twice the time taken at  $37^{\circ}\text{C}$
- Which one of the following options is correct?  
 (a) only i      (b) only ii  
 (c) both i and ii      (d) neither i nor ii

[2017 : ME (Set-1), 2 Marks]

- Q.138 If  $a$  and  $b$  are integers and  $a - b$  is even, which of the following must always be even?  
 (a)  $ab$       (b)  $a^2 + b^2 + 1$   
 (c)  $a^2 + b + 1$       (d)  $ab - b$

[2017 : ME (Set-2), 1 Mark]

- Q.139 P looks at Q while Q looks at R, P is married, R is not. The number of pairs of people in which a married person is looking at an unmarried person is  
 (a) 0      (b) 1  
 (c) 2      (d) cannot be determined

[2017 : ME (Set-2), 1 Mark]

- Q.140 A couple has 2 children. The probability that both children are boys if the older one is a boy is  
 (a)  $1/4$       (b)  $1/3$   
 (c)  $1/2$       (d) 1

[2017 : ME (Set-2), 1 Mark]

- Q.141 There are 4 women P, Q, R, S and 5 men V, W, X, Y, Z in a group. We are required to form pairs each consisting of one woman and one man. P is not to be paired with Z, and Y must necessarily be paired with someone. In how many ways can 4 such pairs be formed?  
 (a) 74      (b) 76  
 (c) 78      (d) 80

[2017 : ME (Set-2), 2 Marks]

- Q.142 Tower A is 90 m tall and tower B is 140 m tall. They are 100 m apart. A horizontal skywalk connects the floors at 70 m in both the towers. If a taut rope connects the top of tower A to the bottom of tower B, at what distance (in meters) from tower A will the rope intersect the skywalk?

[2018 : CE (Set-1), 1 Mark]

- Q.143 Consider a sequence of numbers  $a_1, a_2, a_3, \dots, a_n$  where  $a_n = \frac{1}{n} - \frac{1}{n+2}$ , for each

integer  $n > 0$ . What is the sum of the first 50 terms?

- (a)  $\left(1 + \frac{1}{2}\right) - \frac{1}{50}$   
 (b)  $\left(1 + \frac{1}{2}\right) + \frac{1}{50}$   
 (c)  $\left(1 + \frac{1}{2}\right) - \left(\frac{1}{51} + \frac{1}{52}\right)$   
 (d)  $1 - \left(\frac{1}{51} + \frac{1}{52}\right)$

[2018 : CE (Set-1), 2 Marks]

- Q.144  $\underbrace{a+a+a+\dots+a}_{n \text{ times}} = a^2 b$  and

$\underbrace{b+b+b+\dots+b}_{m \text{ times}} = ab^2$ , where  $a, b, n$  and

$m$  are natural numbers. What is the value

of  $\left(\underbrace{m+m+m+\dots+m}_{n \text{ times}}\right)\left(\underbrace{n+n+n+\dots+n}_{m \text{ times}}\right)$ ?

- (a)  $2a^2 b^2$       (b)  $a^4 b^4$   
 (c)  $ab(a+b)$       (d)  $a^2 + b^2$

[2018 : CE (Set-2), 1 Mark]

- Q.145 Given that  $\frac{\log P}{y-z} = \frac{\log Q}{z-x} = \frac{\log R}{x-y} = 10$  for

$x \neq y \neq z$ , what is the value of the product  $PQR$ ?

- (a) 0      (b) 1  
 (c)  $xyz$       (d)  $10^{xyz}$

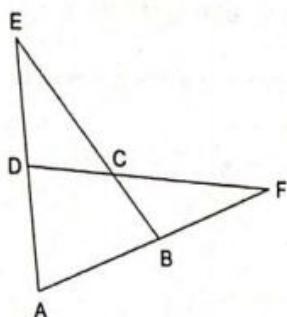
[2018 : CE (Set-2), 2 Marks]

- Q.146 What would be the smallest natural number which when divided either by 20 or by 42 or by 76 leaves a remainder of 7 in each case?

- (a) 3047      (b) 6047  
 (c) 7987      (d) 63847

[2018 : CS, 1 Mark]

- Q.147 In the figure below,  $\angle DEC + \angle BFC$  is equal to \_\_\_\_\_.



- (a)  $\angle BCD - \angle BAD$  (b)  $\angle BAD + \angle BCF$   
(c)  $\angle BAD + \angle BCD$  (d)  $\angle CBA + \angle ADC$

[2018 : CS, 2 Marks]

- Q.148 In a party, 60% of the invited guests are male and 40% are female. If 80% of the invited guests attended the party and if all the invited female guests attended, what would be the ratio of males to females among the attendees in the party?

- (a) 2 : 3      (b) 1 : 1  
(c) 3 : 2      (d) 2 : 1

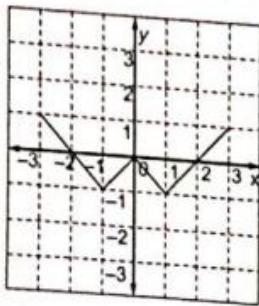
[2018 : CS, 2 Marks]

- Q.149 Two alloys A and B contain gold and copper in the ratios of 2 : 3 and 3 : 7 by mass, respectively. Equal masses of alloys A and B are melted to make an alloy C. The ratio of gold to copper in alloy C is \_\_\_\_\_.

- (a) 5 : 10      (b) 7 : 13  
(c) 6 : 11      (d) 9 : 13

[2018 : EC, 2 Marks]

- Q.150 Which of the following functions describe the graph shown in the below figure.



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- (a)  $y = |x| + 1 - 2$  (b)  $y = |x| - 1 - 1$

- (c)  $y = |x| + 1 - 1$  (d)  $y = |x - 1| - 1$

[2018 : ME (Set-1), 2 Marks]

- Q.151 For integers a, b and c, what would be the minimum and maximum values respectively of  $a + b + c$  if  $\log |a| + \log |b| + \log |c| = 0$

- (a) -3 and 3      (b) -1 and 1  
(c) -1 and 3      (d) 1 and 3

[2018 : ME (Set-1), 2 Marks]

- Q.152 The value of the expression

$$\frac{1}{1+\log_v w} + \frac{1}{1+\log_w u} + \frac{1}{1+\log_u v}$$

- \_\_\_\_\_  
(a) -1      (b) 0  
(c) 1      (d) 3

[2018 : ME (Set-2), 1 Mark]

- Q.153 Forty students watched films, A, B and C over a week. Each student watched either only one film or all three. Thirteen students watched film A, sixteen students watched film B and nineteen students watched film C. How many students watched all three films?  
(a) 0      (b) 2  
(c) 4      (d) 8

[2018 : ME (Set-2), 2 Marks]



1. N  
1  
9

2. C  
1  
9

3. R  
1  
9

4. P  
1  
8

5. P  
1  
9

6. S  
1  
9

7. T  
1  
9

8. C  
1

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2 (b)  $y = |x| - 1 - 1$   
 (d)  $y = |x - 1| - 1$   
 8 : ME (Set-1), 2 Marks  
 nd c, what would be the  
 mum values respectively  
 $|a| + \log |b| + \log |c|$

(b) -1 and 1  
 d) 1 and 3  
 : ME (Set-1), 2 Marks  
 the expression  
 $\frac{1}{u + \frac{1}{1 + \log_{uv} uv}}$  is

0

3

ME (Set-2), 1 Mark  
 films, A, B and C  
 ent watched either  
 Thirteen students  
 students watched  
 nts watched film C.  
 ed all three films?

[Set-2), 2 Marks]



## Part-V. Answer Key for the Work Book

### Part-I. Aptitude

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#### 1. Number System

- |           |         |         |        |        |        |        |        |
|-----------|---------|---------|--------|--------|--------|--------|--------|
| 1. (b)    | 2. (c)  | 3. (a)  | 4. (c) | 5. (a) | 6. (b) | 7. (c) | 8. (3) |
| 9. (2880) | 10. (7) | 11. (b) |        |        |        |        |        |

#### 2. Calendar

- |        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|
| 1. (c) | 2. (b) | 3. (c) | 4. (c) | 5. (d) | 6. (c) | 7. (d) | 8. (a) |
| 9. (1) |        |        |        |        |        |        |        |

#### 3. Ratio, Proportion & Mixtures

- |        |         |        |        |        |        |        |          |
|--------|---------|--------|--------|--------|--------|--------|----------|
| 1. (a) | 2. (c)  | 3. (b) | 4. (a) | 5. (a) | 6. (a) | 7. (b) | 8. (1.4) |
| 9. (b) | 10. (a) |        |        |        |        |        |          |

#### 4. Percentages

- |           |           |        |        |        |        |        |  |
|-----------|-----------|--------|--------|--------|--------|--------|--|
| 1. (a)    | 2. (a)    | 3. (b) | 4. (b) | 5. (a) | 6. (c) | 7. (a) |  |
| 8. (3024) | 9. (9.09) |        |        |        |        |        |  |

#### 5. Profit and Loss

- |        |         |         |         |         |         |        |        |
|--------|---------|---------|---------|---------|---------|--------|--------|
| 1. (b) | 2. (0)  | 3. (c)  | 4. (b)  | 5. (b)  | 6. (28) | 7. (a) | 8. (b) |
| 9. (b) | 10. (c) | 11. (a) | 12. (b) | 13. (b) |         |        |        |

#### 6. Set Theory and Logical Venn Diagram

- |        |         |         |         |         |         |          |         |
|--------|---------|---------|---------|---------|---------|----------|---------|
| 1. (a) | 2. (b)  | 3. (b)  | 4. (a)  | 5. (c)  | 6. (a)  | 7. (550) | 8. (a)  |
| 9. (c) | 10. (c) | 11. (a) | 12. (a) | 13. (d) | 14. (b) | 15. (c)  | 16. (b) |

#### 7. Time, Speed and Distance

- |        |          |        |        |        |        |        |        |
|--------|----------|--------|--------|--------|--------|--------|--------|
| 1. (c) | 2. (d)   | 3. (c) | 4. (b) | 5. (b) | 6. (a) | 7. (a) | 8. (a) |
| 9. (c) | 10. (40) |        |        |        |        |        |        |

#### 8. Clocks

- |        |        |        |        |        |        |  |  |
|--------|--------|--------|--------|--------|--------|--|--|
| 1. (b) | 2. (c) | 3. (a) | 4. (a) | 5. (a) | 6. (a) |  |  |
|        |        |        |        |        |        |  |  |

**9. Time and Work**

1. (a)      2. (b)      3. (a)      4. (b)      5. (a)      6. (a)      7. (b)      8. (b)  
 9. (14)      10. (c)      11. (12)

**10. Simple and Compound Interest**

1. (c)      2. (a)      3. (d)      4. (c)      5. (a)      6. (c)      7. (b)      8. (c)

**11. Permutation, Combination and Probability**

1. (b)      2. (b)      3. (c)      4. (b)      5. (b)      6. (c)      7. (b)  
 8. (4536)      9. (a)      10. (b)

**Part-II. Reasoning****1. Cubes, Dice and Directions**

1. (b)      2. (a)      3. (d)      4. (a)      5. (d)      6. (a)      7. (a)      8. (a)  
 9. (a)      10. (a)      11. (a)      12. (d)      13. (d)      14. (d)      15. (100)

**2. Seating Arrangement**

1. (a)      2. (c)      3. (c)      4. (d)      5. (a)      6. (a)      7. (c)      8. (d)  
 9. (b)      10. (d)

**3. Blood Relations**

1. (c)      2. (c)      3. (c)      4. (b)      5. (b)      6. (d)      7. (b)      8. (d)  
 9. (c)      10. (b)      11. (b)

**4. Number Series, Analogy and Number Oddman Out**

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

**5. Letter Series, Analogy, Letter Oddman Out and Coding-Decoding**

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

**6. Data Interpretation**

- |             |           |         |         |         |         |         |        |
|-------------|-----------|---------|---------|---------|---------|---------|--------|
| 1. (c)      | 2. (d)    | 3. (b)  | 4. (d)  | 5. (b)  | 6. (d)  | 7. (d)  | 8. (a) |
| 9. (c)      | 10. (a)   | 11. (b) | 12. (b) | 13. (b) | 14. (a) | 15. (d) |        |
| 16. (20000) | 17. (140) | 18. (d) | 19. (a) |         |         |         |        |

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**7. Logical Reasoning**

- |        |         |         |        |        |        |        |        |
|--------|---------|---------|--------|--------|--------|--------|--------|
| 1. (b) | 2. (b)  | 3. (a)  | 4. (c) | 5. (d) | 6. (d) | 7. (c) | 8. (d) |
| 9. (c) | 10. (a) | 11. (d) |        |        |        |        |        |

**8. Analytical Ability**

- |         |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|---------|
| 1. (c)  | 2. (b)  | 3. (c)  | 4. (c)  | 5. (c)  | 6. (c)  | 7. (c)  | 8. (b)  |
| 9. (b)  | 10. (c) | 11. (a) | 12. (d) | 13. (a) | 14. (a) | 15. (c) | 16. (d) |
| 17. (a) | 18. (c) |         |         |         |         |         |         |

**Try Yourself**

- |         |         |            |          |              |         |         |
|---------|---------|------------|----------|--------------|---------|---------|
| T1. (b) | T2. (b) | T3. (b)    | T4. (4)  | T5. (48)     | T6. (b) | T7. (c) |
| T8. (c) | T9. (d) | T10. (244) | T11. (c) | T12. (1.732) |         |         |

**Part-III. Previous Years ESE (Pre) Questions (GS, Paper-1)**

- |         |         |         |         |         |         |         |
|---------|---------|---------|---------|---------|---------|---------|
| 1. (d)  | 2. (a)  | 3. (c)  | 4. (d)  | 5. (c)  | 6. (d)  | 7. (d)  |
| 8. (c)  | 9. (a)  | 10. (c) | 11. (d) | 12. (a) | 13. (a) | 14. (a) |
| 15. (c) | 16. (a) | 17. (b) | 18. (b) | 19. (b) | 20. (a) | 21. (b) |
| 22. (c) | 23. (a) | 24. (c) | 25. (b) | 26. (c) |         |         |

**Part-IV. Previous Years GATE Questions**

- |         |           |           |          |         |           |           |
|---------|-----------|-----------|----------|---------|-----------|-----------|
| 1. (d)  | 2. (c)    | 3. (d)    | 4. (b)   | 5. (b)  | 6. (d)    | 7. (a)    |
| 8. (d)  | 9. (a)    | 10. (c)   | 11. (c)  | 12. (b) | 13. (a)   | 14. (b)   |
| 15. (a) | 16. (c)   | 17. (b)   | 18. (c)  | 19. (a) | 20. (a)   | 21. (a)   |
| 22. (d) | 23. (c)   | 24. (d)   | 25. (c)  | 26. (b) | 27. (c)   | 28. (b)   |
| 29. (c) | 30. (a)   | 31. (b)   | 32. (d)  | 33. (b) | 34. (a)   | 35. (a)   |
| 36. (d) | 37. (c)   | 38. (725) | 39. (45) | 40. (a) | 41. (495) | 42. (560) |
| 43. (d) | 44. (163) | 45. (a)   | 46. (b)  | 47. (d) | 48. (4)   |           |

- |              |          |              |          |          |           |          |
|--------------|----------|--------------|----------|----------|-----------|----------|
| 49. (20,000) | 50. (b)  | 51. (b)      | 52. (96) | 53. (b)  | 54. (c)   | 55. (c)  |
| 56. (6)      | 57. (d)  | 58. (140)    | 59. (a)  | 60. (d)  | 61. (c)   | 62. (b)  |
| 63. (b)      | 64. (b)  | 65. (4536)   | 66. (a)  | 67. (b)  | 68. (b)   | 69. (8)  |
| 70. (a)      | 71. (32) | 72. (a)      | 73. (3)  | 74. (d)  | 75. (b)   | 76. (d)  |
| 77. (800)    | 78. (c)  | 79. (2,064)  | 80. (b)  | 81. (b)  | 82. (280) | 83. (c)  |
| 84. (c)      | 85. (d)  | 86. (c)      | 87. (c)  | 88. (c)  | 89. (d)   | 90. (d)  |
| 91. (c)      | 92. (b)  | 93. (c)      | 94. (a)  | 95. (d)  | 96. (c)   | 97. (d)  |
| 98. (b)      | 99. (b)  | 100. (b)     | 101. (a) | 102. (c) | 103. (a)  | 104. (a) |
| 105. (d)     | 106. (d) | 107. (c)     | 108. (b) | 109. (c) | 110. (a)  | 111. (7) |
| 112. (b)     | 113. (c) | 114. (c)     | 115. (d) | 116. (d) | 117. (c)  | 118. (b) |
| 119. (b)     | 120. (b) | 121. (b)     | 122. (d) | 123. (d) | 124. (b)  | 125. (d) |
| 126. (d)     | 127. (c) | 128. (c)     | 129. (c) | 130. (b) | 131. (c)  | 132. (c) |
| 133. (a)     | 134. (d) | 135. (a)     | 136. (b) | 137. (a) | 138. (d)  | 139. (b) |
| 140. (c)     | 141. (c) | 142. (22.22) | 143. (c) | 144. (b) | 145. (b)  | 146. (c) |
| 147. (a)     | 148. (b) | 149. (b)     | 150. (b) | 151. (a) | 152. (c)  | 153. (c) |

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