

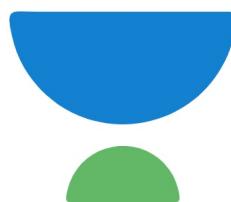


# General Aptitude

## Workbook

**Common to All Branches**

**GATE & ESE**





## General Aptitude

### Workbook

Common to All Branches

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## GATE Syllabus

**Verbal Aptitude :** Basic English grammar: tenses, articles, adjectives, prepositions, conjunctions, verb-noun agreement, and other parts of speech Basic vocabulary: words, idioms, and phrases in context, Reading and comprehension Narrative sequencing.

**Quantitative Aptitude :** Data interpretation: data graphs (bar graphs, pie charts, and other graphs representing data), 2 and 3-dimensional plots, maps, and tables Numerical computation and estimation: ratios, percentages, powers, exponents and logarithms, permutations and combinations, and series Mensuration and geometry Elementary statistics and probability

**Analytical Aptitude :** Logic: deduction and induction, Analogy, Numerical relations and reasoning.

**Spatial Aptitude :** Transformation of shapes: translation, rotation, scaling, mirroring, assembling, and grouping Paper folding, cutting, and patterns in 2 and 3 dimensions.

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# Number System



## **Classroom Questions**

## 1.1 Number of Trailing Zero's (0's)



[GATE 2016 : IISc Bangalore (CE Set – 2)]

## **1.2 Unit Digit Value (UDV)**

- Q.4**  $13^{666} \times 44^{777} \times 616^{333} \times 777^{444} \times 8898^{222}$   
 $\times 999^{555}$

**Q.5**  $1^2 + 2^2 + 3^2 + \dots + 99^2 + 100^2$

**Q.6**  $1^1 + 2^2 + 3^3 + \dots + 9^9 + 10^{10}$

**Q.7** The numeral in the units position of  
 $211^{870} + 146^{127} \times 3^{424}$  is

[GATE 2016 : IISc Bangalore (EE Set - 2)]



[GATE 2017 : IIT Roorkee (CH, CE, Set - 1)]



- Q.10** Find the unit place of

$$\frac{12^{55}}{3^{11}} + \frac{8^{48}}{16^{18}}$$



## 1.3 Divisibility



[GATE 2018 : IIT Guwahati (EC Set – 1)]

- Q.16** Consider the set of integers {1,2,3, ...., 5000}. The number of integers that is divisible by neither 3 nor 4 is :  
(A) 1668                          (B) 2084  
(C) 2500                            (D) 2916

[GATE 2010 :IIT Guwahati (MN)]

## 1.4 Factorization

- Q.17** Find the number of factors, Sum of factors and Product of factors of the following :  
12, 24, 288.

**Q.18** For the given natural number 150,  
(i) Number of distinct prime factors



- Q.19** What is the least natural number by which 5400 should be multiplied so that the resultant product is

  - (i) A perfect square?
  - (ii) A perfect cube?

**Q.20** Find the smallest number  $y$  such that :  
 $y \times 162$  is a perfect cube.

  - (A) 24
  - (B) 27
  - (C) 32
  - (D) 36

[GATE 2017 : IIT Roorkee (EE, CS, Set – 1)]

## 1.5 Concepts of Remainders

- Q.21**  $\frac{(123 \times 1234)}{15}$

**Q.22**  $(1218 \times 1220 \times 1222 \times 1224) \div 9$

**Q.23**  $(1719 \times 1721 \times 1723 \times 1725 \times 1727) \div 18$

**Q.24** The remainder when S is divided by 20  
, where  $S = 1! + 2! + 3! + 4! + 5! + 6! + \dots + 19! + 20!$

**Q.25** The rightmost non-zero digit of the number  $30^{2720}$ .

## 1.6 Miscellaneous



[GATE 2017 : IIT Roorkee (ME Set – 2)]

- Q.27** Given that  $a$  and  $b$  are integers and  $a+a^2b^3$  is odd then, which one of the following statements is correct?

  - (A)  $a$  and  $b$  are both odd
  - (B)  $a$  and  $b$  are both even
  - (C)  $a$  is even and  $b$  is odd
  - (D)  $a$  is odd and  $b$  is even

[GATE 2018 : IIT Guwahati (MF Set – 1)]



[GATE 2018 : IIT Guwahati (MF Set – 1)]

- Q.29** 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.



[GATE 2016 : IISc Bangalore (CE Set - 2)]

- Q.30** When the digits of a three-digit number are reversed, the number decreases by 594. The difference between the digits in the first two places of the number equals the difference between the digits in the last two places. If none of the digits of the number is zero, the number of possible values of the number is .



[GATE 2013 : IIT Bombay (CE)]

- Q.32** 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?

[GATE 2014 : IIT Kharagpur (EC Set – 2, ME Set - 2)]

- Q.33** 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?

[GATE 2014 : IIT Kharagpur (EC Set - 4, ME Set - 4)]

**Direction (34 – 36) :**

Given,  $m = 1! + 2! + 3! + 4! + \dots + 99! + 100!$



## 1.7 Sequence & Series

**Q.38** The sum of the first  $n$  terms in the sequence 8, 88, 888, 8888, ..... is \_\_\_\_\_.

- (A)  $\frac{81}{80}(10^n - 1) + \frac{9}{8}n$   
 (B)  $\frac{81}{80}(10^n - 1) - \frac{9}{8}n$   
 (C)  $\frac{80}{81}(10^n - 1) + \frac{8}{9}n$   
 (D)  $\frac{80}{81}(10^n - 1) - \frac{8}{9}n$

**[GATE 2020 : IIT Delhi (IN, ME-1, MT, PE, PH)]**

**Q.39** The sum of  $n$  terms of the series 4 + 44 + 444 + .... is

- (A)  $\left(\frac{4}{81}\right)[10^{n+1} - 9n - 1]$   
 (B)  $\left(\frac{4}{81}\right)[10^{n-1} - 9n - 1]$   
 (C)  $\left(\frac{4}{81}\right)[10^{n+1} - 9n - 10]$   
 (D)  $\left(\frac{4}{81}\right)[10^n - 9n - 10]$

**[GATE 2011 : IIT Madras (AG, CY, EC, EE, IN, MA, MT, XE, XL)]**

**Q.40** If  $\frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \dots = s$ ,

Find  $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \frac{1}{5^2} - \frac{1}{6^2} \dots$ .

**Q.41** Consider the series  $\frac{1}{2} + \frac{1}{3} - \frac{1}{4} + \frac{1}{8} + \frac{1}{9} - \frac{1}{16} + \frac{1}{32} + \frac{1}{27} - \frac{1}{64} + \dots$

The sum of the infinite series above is :

- (A)  $\infty$  (B)  $\frac{5}{6}$   
 (C)  $\frac{1}{2}$  (D) 0

**[GATE 2010 : IIT Guwahati (TF)]**

**Q.42** What is the value of

- $$1 + \frac{1}{4} + \frac{1}{16} + \frac{1}{64} + \frac{1}{256} + \dots ?$$
- (A) 2 (B)  $\frac{7}{4}$   
 (C)  $\frac{3}{2}$  (D)  $\frac{4}{3}$

**[GATE 2018 : IIT Guwahati (EC)]**

**Q.43** Find the value of  $1+4/6 + 9/36 + 16/216 + 25/1296 + \dots \infty$ .

$$\text{Q.44 } \frac{1}{5 \times 7} + \frac{1}{7 \times 9} + \frac{1}{9 \times 11} \dots \infty = \underline{\hspace{2cm}}$$

**Q.45** Find the sum to  $n$  terms of the series  $10 + 84 + 734 + \dots$

- (A)  $\frac{9(9^n + 1)}{10} + 1$  (B)  $\frac{9(9^n - 1)}{8} + 1$   
 (C)  $\frac{9(9^n - 1)}{8} + n$  (D)  $\frac{9(9^n - 1)}{8} + n^2$

**[GATE 2013 : IIT Bombay (EC, EE, IN)]**

**Q.46** What will be the maximum sum of 44, 42, 40, ....?

- (A) 502 (B) 504  
 (C) 506 (D) 500

**[GATE 2013 : IIT Bombay (CS, ME, PI)]**

**Q.47** 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)  $1 - \left(\frac{1}{51} + \frac{1}{52}\right)$

**[GATE 2018 : IIT Guwahati (CE-1)]**

**Q.48** 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 : IIT Bombay (CS, ME, PI)]**

**Q.49** The value of  $\sqrt{12 + \sqrt{12 + \sqrt{12 + \dots}}}$  is

- (A) 3.464 (B) 3.932  
 (C) 4.000 (D) 4.444

**[GATE 2014 : IIT Kharagpur (CS-2, EE-2)]**

**Q.50** Insert seven numbers between 2 and 34, such that the resulting sequence including 2 and 34 is an arithmetic



value of  $x$  is



[GATE 2021 : IIT Bombay(CS-2,XE,XL)]

- Q.63** If  $\left(z + \frac{1}{z}\right)^2 = 98$ , compute  $\left(z^2 + \frac{1}{z^2}\right)$ .

[GATE 2014 : IIT Kharagpur (CS-1,EE-1)]

- Q.64** What is the average of all multiples of 10 from the 2 to 198?  
(A) 90                          (B) 100  
(C) 110                          (D) 120

[GATE 2014 : IIT Kharagpur (CS-2 ,EE-2)]

- Q.65** For what values of  $K$  given below is  $\frac{(k+2)^2}{k-3}$  an integer?

(A) 4, 8, 18      (B) 4, 10, 16,  
(C) 4, 8, 28      (D) 8, 26, 28

[GATE 2018 : IIT Guwahati (EE)]

## 1.8 LCM & HCF

- Q.66** (i) Find the LCM and HCF of 60, 96 and 144.  
(ii) Find the LCM and HCF of  $\frac{2}{5}$ ,  $\frac{12}{18}$ ,  $\frac{8}{9}$  and  $\frac{6}{7}$ .

**Q.67** The LCM and HCF of two numbers are 360 and 18 respectively.

(i) If one of them is 90, what is the other?  
(ii) If one of them is 180, what is the other?

**Q.68** The LCM and HCF of 36, 60 and x is 1260 and their HCF is 12. What is the difference between the least and the greatest possible value of x?

24 and 36 seconds. How many times do they flash together from 10 am to 11:45 am?

- Q.70** In a singing competition, 30 participants from Andhra Pradesh, 48 from the Karnataka and 60 from Tamilnadu participate. Find the minimum numbers of rooms required to conduct the competition, if, in each room the same numbers of participants belonging to the same state are to be allotted.

- Q.71** Patnaik had some books with him. If he distributes them equally among either 30 or 36 or 45 students, he would be left with 15 books. If he distributes them equally among 25 students, he would be left with no books. Find the minimum of number of books he had.

- Q.72** The unit digit of  $(12345k)^{72}$  is 6. The value of k is:



[MSO]

- Q.73** Sum of the series

$$2^2 + 4^2 + 6^2 + \dots + 20^2 \text{ is}$$

- (A) 1040      (B) 1540  
 (C) 2540      (D) 3080

[ESE-2021 Prelims]

- Q.74** The value of  $\sum_{1}^n \frac{1}{(x+3)(x+4)}$  is

[ESE-2021 Prelims]

## Practice Questions



- Q.3** The digits of a two-digit number differ by 6. The sum of the number and number formed by reversing its digits is 132. Find the number(s).

**Q.4**  $4^{11} + 4^{12} + 4^{13} + 4^{14} + 4^{15}$  is divided by which of the following?





- Q.10** The sum of the two numbers is 528 and their HCF is 33. The number of pairs of numbers satisfying the above condition is

**Q.5** Find the difference between the remainders when  $7^{84}$  is divided by 342 & 344.

- (A) 0 (B) 1  
(C) 3 (D) 5

**Q.6** What will be the value of  $x$  for  $\frac{(100^{17} - 1) + (10^{34} + x)}{9}$ ; the remainder = 0

- (A) 3 (B) 6  
(C) 9 (D) 8

**Q.7** Find the HCF and LCM of the following :

- (i) 2, 4, 8  
(ii) 24, 60, 120  
(iii)  $2/3, 4/5, 7/9$   
(iv) 99!, 999!, 9999!

**Q.8** HCF of 3240, 3600 and a third number is 36 and their LCM is  $2^4 \times 3^5 \times 5^2 \times 7^2$

**Q.9** The sum of the two numbers is 216 and their HCF is 27. The numbers are –

conditions is –

**Q.11** The least number of five digits which is exactly divisible by 12, 15 and 18 is :

**Q.12** The LCM of two numbers is 48. The numbers are in the ratio in the ratio 2 : 3. The sum of the numbers is –

**Q.13** The product of two numbers is 1320 and their HCF is 6. The LCM of the numbers is –

**Q.14** The product of two numbers is 7168 and their HCF is 16. How many pairs of numbers are possible such that the above conditions are satisfied?

- (A) 2 (B) 3  
(C) 4 (D) 6

**Q.15** What are the prime factors of 207090?

- (A) 2, 3, 5 and 11 (B) 2, 3, 5, 7 and 13  
(C) 2, 7, 11 and 13 (D) 2, 3, 5, 7 and 11

**Q.16** The eight-digits number 78p456q3 is divisible by 9 and q - p = 2. Find (p, q)

- (A) (6, 8) (B) (4, 6)  
(C) (5, 7) (D) (7, 9)

### Answer Key

#### Classroom Questions

##### 1.1 Number of Trailing Zero's (0's)

1.	(i) 26, (ii) 7, (iii) 16	2.	24, 37, 62	3.	(C)				
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##### 1.2 Unit Digit Value (UDV)

4.	6	5.	0	6.	7	7.	7	8.	(B)
9.	(A)	10.	0	11.	(C)	12.	(B)		

##### 1.3 Divisibility

13.	7, 3, 5	14.	3	15.	(B)	16.	(C)		
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##### 1.4 Factorization

17.	(a) 6, 28, 1728 (b) 8, 60, $24^4$ (c) 18, 819, $288^9$	18.	(i) 3, (ii) 12, (iii) 372, (iv) $(150)^6$	19.	(i) 6, (ii) 5	20.	(D)		
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##### 1.5 Concepts of Remainders

21.	12	22.	0	23.	9	24.	13	25.	1
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##### 1.6 Miscellaneous

26.	(D)	27.	(D)	28.	(B)	29.	(A)	30.	3
31.	(D)	32.	163	33.	495	34.	3	35.	13
36.	33	37.	(B)						



##### 1.7 Sequence & Series

38.	(D)	39.	(C)	40.	$\frac{s}{2}$	41.	(B)	42.	(D)
43.	$\frac{252}{\dots}$	44.	$\frac{1}{\dots}$	45.	(D)	46.	(C)	47.	(C)

	145		10						
48.	(B)	49.	(C)	50.	(D)	51.	(B)	52.	(B)
53.	(B)	54.	(B)	55.	(C)	56.	(A)	57.	(A)
58.	(C)	59.	(B)	60.	(D)	61.	(D)	62.	(B)
63.	96	64.	(B)	65.	(C)				

### 1.8 LCM & HCF

66.	(i) 1440, 12 (ii) $24, \frac{2}{315}$	67.	(i) 72 (ii) Data inconsistent	68.	1176	69.	18	70.	23
71.	375	72.	(A), (B), (C)	73.	(B)	74.	(C)		

### Practice Questions (SPQ's)

1.	(D)	2.	(C)	3.	93.39	4.	(D)	5.	(A)
6.	(D)	7.	(i) HCF – 2, LCM – 8 (ii) HCF – 12, LCM – 120 (iii) HCF – 1/45, LCM – 28 (iv) HCF – 99!, LCM – 9999!	8.	$2^2 \times 3^5 \times 7^2$	9.	(3,5)(1,7)	10.	4 Pairs
11.	10080	12.	40	13.	220	14.	(A)	15.	(D)
16.	(C)								

□□□



## 2.1 Numbers Arrangement

- Q.1** (i) How many five digit numbers with distinct digits can be formed using the digit 1, 2, 3, 4, 5?  
(ii) How many three digit numbers can be formed using the digits 1, 2, 3, 4, 5 without repetition of digits?  
(iii) How many three-digit odd numbers can be formed using the digits 1, 2, 3, 4, 5, when each digit occurs at most once in any of the numbers?

**Q.2** Using the digits : 0,1,2,3,4 and 5 how many three digit numbers can be formed :  
(i) Repetition allowed.  
(ii) Repetition not allowed.

**Q.3** 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?

[GATE 2015 : IIT Kanpur (CE Set - 2)]



any of them. What is the sum of all such possible five digit numbers?

- (A) 6666660      (B) 6666600  
(C) 6666666      (D) 6666606

[GATE 2014 : IIT Kharagpur (EC Set – 4, ME Set – 4)]

## 2.2 Letters Arrangement

- Q.9** (i) How many words can be formed using all the letters of the word TUSEDAY such that all the vowels are together?

(ii) The number of words that can be formed using all the letters of the word TUESDAY such that on two vowels are together is\_\_\_\_\_.

**Q.10** (i) The number of words that can be formed using all the letters of the word SUCCESS is\_\_\_\_\_.

(ii) In the above problem, the number of words in which all the S's are together is\_\_\_\_\_.

**Q.11** 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

How many such distinct committees can be formed?

- Q.13** An e-mail password must contain three characters. The password has to contain one numeral from 0 to 9, one

upper and one lower case character from the English alphabet. How many distinct passwords are possible?



[GATE 2018 : IIT Guwahati (EE Set – 1)]

- A 9-letter password is formed using the letters A, E, G, I, N, P, S, T and U. If

(i) how many straight lines can be formed?

- (ii) how many triangles can be formed?

**Q.20** The number of diagonals in a regular polygon of 10 vertices is \_\_\_\_\_.

- Q.21** (i) On a  $8 \times 8$  chess board, the number of squares of all sizes is \_\_\_\_\_.

repetition of letters is allowed, how many of these passwords are palindromes?



[GATE 2017 : IIT Roorkee (EE, CS, Set - 1)]



[GATE 2017 : IIT Roorkee (EC, BT, PI Set – 1)]

## 2.3 Dictionary Word

- Q.17** If all the words, not necessarily meaningful, that can be formed by using all the letters of ALERT are arranged as in a dictionary, the 25<sup>th</sup> word is \_\_\_\_\_.

- Q.18** If all the letters of the word 'AGAIN' be arranged as per English dictionary, what is the 50<sup>th</sup> word.

## 2.4 Agenda : Straight Lines, Triangles, Chess Board, Handshake & Gift Exchange

- Q.19** Of 20 points on a plane, 6 are collinear. Except for the triplets formed from among these 6 points, no other triplet of points is collinear. By joining these 20 points






[GATE 2012 : IIT Delhi (AR, GG, TE)]

- Q.30** Five teams have to compete in a league, with every team playing every

(ii) In the above problem the number of rectangles is \_\_\_\_.



[GATE 2016 : IISc Bangalore  
(EE Set - 1, CSE Set - 1)]



## 2.5 Miscellaneous



[GATE 2011 : IIT Madras (AE, MN)]

9

- class. If every student sends a card to every other student then what is the number of students in the class?

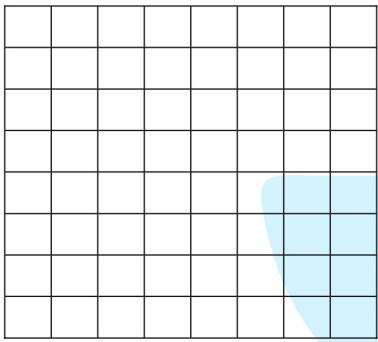
**Q.32** Five different books (P, Q, R, S, T) are to be arranged on a shelf. The books R and S are to be arranged first and second respectively from right side of the shelf. The number of different orders in which P, Q and T may be



(A) 12  
(C) 24

(C) 36  
(D) 48

**Directions Q.11 to Q.13 :** Below is a square grid of  $8 \times 8$ .



(A) 34  
(C) 36

(B) 35  
(D) 33

**Directions :**

**(Q.14 to Q.15)** : There are 10 points in a plane and out of which 4 are collinear.

**Q.14** How different triangles can be made using these 10 points?

(A)  ${}^{10}C_3 - {}^3C_3$       (B)  ${}^9C_3 - {}^2C_2$   
(C)  ${}^{10}C_3 - {}^4C_3$       (B)  ${}^{10}C_3 - {}^5C_3$

**Q.15** How many different lines can be drawn ?

(A)  ${}^{10}C_2 - {}^4C_2$       (B)  ${}^{10}C_2 - {}^4C_2 + 1$   
(A)  ${}^{10}C_3 - {}^4C_3 + 1$       (B) None of these

**Answer Key**

**Classroom Questions**

**2.1 Number Arrangement**

1.	(i) 120, (ii) 60 (iii) 36	2.	(i) 180, (ii) 100	3.	4536	4.	(C)	5.	(i) 24, (ii) 60
6.	(i) 65, (ii) 14 (iii) 80	7.	66660	8.	(B)				

**2.2 Letters Arrangement**

9.	(i) 720, (ii) 1440	10.	(i) 420, (ii) 60	11.	(C)	12.	(D)	13.	(C)
14.	$9^5$	15.	(D)	16.	(A)				

**2.3 Dictionary Word**

17.	EALRT	18.	NAIIG						
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**2.4 Agenda : Straight Lines, Triangles, Chess Board, Handshake and Gift Exchange**

19.	(i) 176 (ii) $20_{C_3} - 6_{C_3}$	20.	35	21.	(i) 204 (ii) 1296	22.	$n_{C_2} - n$	23.	(i) 45, (ii) 35 (iii) 120
24.	(i) 144 (ii) 806	25.	(C)	26.	(C)				

**2.5 Miscellaneous**

27.	2454	28.	(C)	29.	(D)	30.	(B)	31.	31
32.	(A)	33.	(B)						

General Aptitude

11

**Practice Questions**

1.	(i) 50, 75 (ii) 10, 20	2.	(B)	3.	(B)	4.	(A)	5.	(B)
6.	(A)	7.	(A)	8.	(B)	9.	(A)	10.	(C)
11.	(A)	12.	(A)	13.	(C)	14.	(C)	15.	(B)

# 3 Probability



## **Classroom Questions**

- Q.1** An unbiased die is thrown. What is the probability of getting -  
(i) An even number  
(ii) A multiple of 3.  
(iii) An even number or a multiple of 3  
(iv) An even number and a multiple of 3

probability that the selected number is not divisible by 7?

- (A) 13/90                          (B) 12/90  
(C) 78/90                          (D) 77/90

[GATE 2013 : IIT Bombay (CSE, ME)]

- Q.7** Two dice are thrown simultaneously.

- 3.
- Q.2** 2 Dice are thrown simultaneously. Find the probability of getting:
- An even no. as the sum.
  - The sum as a prime no.
  - A total of at least 10.
  - A multiple of 2 on 1 dice and multiple of 3 on the other.
- Q.3** 3 dice are thrown together. Find the probability of getting sum of :
- At least 6
  - At most 6
  - Exactly 6
- Q.4** Find the probability that a leap year selected at random, will have:
- 53 Sun
  - 53 Sun & 53 Mon
  - 52 Sun
  - 52 Sun & 53 Mon
  - 52 Sun & 52 Mon
  - 52 Sun & 53 Tue
  - 52 Sun & 52 Tue.
- Q.5** What is the probability that a no. selected from the nos. 1-100 (both inclusive) is :
- A Prime no.
  - Is a composite no.
  - A perfect square
  - A perfect Integer
  - Multiple of 2
  - Multiple of 4
  - Multiple of 3
- Q.6** 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 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)  $\frac{4}{9}$
- [GATE 2017 : IIT Roorkee (IN, CE Set – 2)]**
- Q.8** 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 probability that the sum of the two numbers equals 16?
- (A) 0.20      (B) 0.25  
 (C) 0.30      (D) 0.33
- [GATE 2015 : IIT Kanpur (EE Set - 1, CSE Set - 1)]**
- Q.9** A couple has 2 children. The probability that both children are boys if the older one is a boy is
- (A)  $\frac{1}{4}$       (B)  $\frac{1}{3}$   
 (C)  $\frac{1}{2}$       (D) 1
- [GATE 2017 : IIT Roorkee (ME Set – 2)]**
- Q.10** 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 : IIT Bombay (EC, EE, IN)]**
- Q.11** One card is drawn from a pack of 52 cards, each of the 52 cards are equally likely to be drawn. Find the probability that the card drawn is :

- 
- (i) An Ace  
 (ii) Red  
 (iii) Either Ace or Red  
 (iv) Ace & Red
- Q.12** 4 persons are to be chosen at random from a group of 3 men, 4 women and 4 children. Find the probability of selecting:
- 1 man, 1 woman and 2 children.
  - 2 Women.
  - At least 2 women.
  - At most 2 women.
- Q.13** The letters of the word ‘SOCIETY’ are placed at random in a row. What is the probability that:

- is the probability that the sum of the total values that turn up is at least 6?
- (A)  $10/21$       (B)  $5/12$   
 (C)  $2/3$       (D)  $1/6$
- Q.20** Four fair six-sided dice are rolled. The probability that the sum of the results being 22 is  $\frac{x}{1296}$ . The value of  $x$  is \_\_\_\_\_?
- Q.21** Suppose we uniformly and randomly select a permutation from the 20! Permutation of 1, 2, 3, 4, - - - - 20. What is the probability that 2 appears at an earlier position than any other even number in the selected



chosen. The probability of the white ball drawn is :

- (A)  $\frac{1}{3}$       (B)  $\frac{1}{4}$   
(C)  $\frac{5}{12}$       (D)  $\frac{7}{12}$

[ESE : 2020]

**Q.27** 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)  $\frac{1}{5}$       (B)  $\frac{7}{30}$   
(C)  $\frac{1}{4}$       (D)  $\frac{4}{15}$

**Q.28** A box contains 15 blue balls and 45 black balls. If 2 balls are selected randomly, without replacement, the probability of an outcome in which the first selected is a blue ball and the second selected is a black ball, is \_\_\_\_?  
(A)  $3/16$       (B)  $45/236$   
(C)  $3/4$       (D)  $1/4$

[ME-2, MT GATE- 2021 IIT - BOMBAY]

**Q.29** There are five bags each containing identical sets of ten distinct chocolates. One chocolate is picked from each bag. The probability that atleast two chocolates are identical is \_\_\_\_.  
(A) 0.8125      (B) 0.6976

stands for tail, the following are the observations from the four trials :

- (1) HTHTHT      (2) TTHHHT  
(3) HTTHHT      (4) HHHT\_ \_

Which statement describing the last two coin tosses of the fourth trial has the higher probability of being correct?

- (A) Two T will occur  
(B) One H and one T will occur  
(C) Two H will occur  
(D) One H will be followed by one T.

[GATE 2018 : IIT Guwahati (ME Set – 2)]

**Q.32** 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)  $\frac{47}{48}$       (B)  $\frac{1}{4}$   
(C)  $\frac{13}{48}$       (D)  $\frac{35}{48}$

[GATE 2015 : IIT Kanpur (EC Set - 2, ME Set - 1)]

**Q.33** The probabilities of the three doctors A, B and C getting success in an operation are 0.5, 0.2 and 0.3 respectively. Find the probability that the operation is not successful.  
(A) 0.78      (B) 0.64  
(C) 0.56      (D) 0.28



**Q.34** A class of twelve children has two more boys than girls. A group of three children are randomly picked from this class to accompany the teacher on a field trip. What is the probability that the group accompanying the teacher contains more girls than boys?  
(A) 0      (B)  $\frac{325}{864}$   
(C)  $\frac{525}{864}$       (D)  $\frac{5}{12}$

[GATE 2018 : IIT Guwahati (EE) (MTA)]

**Q.35** 10% of the population in a town is HIV+. A new diagnostic kit for HIV detection is available this kit correctly identifies HIV+ individuals 95% of the time, and HIV- individuals 89% of the time. A particular patient is tested using this

first is smaller than the number on second

- (A)  $\frac{1}{2}$       (B)  $\frac{7}{18}$   
(C)  $\frac{3}{4}$       (D)  $\frac{2}{12}$

**Q.37** A die is rolled three times. The probability of getting a larger number than the previous number each time is  
(A)  $7/54$       (B)  $5/54$   
(C)  $11/54$       (D)  $6/54$

**Q.38** 2 integers are selected at random from integers 1-11. If the sum is even, find the probability that :  
(i) Both the integers are odd.  
(ii) Both the integers are even.

**Q.39** Four person are chosen at random from

particular patient is tested using this kit and is found to be positive. The probability that the individual is actually positive is \_\_\_\_\_.

[GATE 2014 : IIT Kharagpur (CE Set - 2, IN)]

**Q.36** Two dice are rolled one after the other. The probability that the number on the

a group of 3 men, 2 women and 4 children. The chance that exactly 2 of them are children, is

- (A)  $\frac{2}{9}$       (B)  $\frac{4}{5}$   
 (C)  $\frac{7}{12}$       (D)  $\frac{10}{21}$

## Practice Questions

**Q.1** From a pack of 52 playing cards, three cards are drawn at random. Find the probability of drawing a king, A queen and a jack.

- (A)  $\frac{16}{5525}$       (B)  $\frac{1}{13^3}$   
 (C)  $\frac{1}{14^3}$       (D)  $\frac{1}{15^3}$

**Directions for (Q.2 to Q.5):** A husband and wife appear in an interview for two vacancies in the same post. The probability of husband's selection is  $\frac{1}{7}$  and that of wife's is  $\frac{1}{5}$ .

**Q.2** What is the probability that only one of them will be selected?

- (A)  $\frac{2}{7}$       (B)  $\frac{1}{35}$   
 (C)  $\frac{24}{25}$       (D)  $\frac{11}{35}$

**Q.3** What is the probability that both of them will be selected?

(A)  $\frac{2}{7}$       (B)  $\frac{1}{35}$   
 (C)  $\frac{24}{25}$       (D)  $\frac{11}{35}$

**Q.4** What is the probability that none of them will be selected?

- (A)  $\frac{2}{7}$       (B)  $\frac{1}{35}$   
 (C)  $\frac{24}{25}$       (D)  $\frac{11}{35}$

**Q.5** What is the probability that at least one of them will be selected?

- (A)  $\frac{2}{7}$       (B)  $\frac{1}{35}$   
 (C)  $\frac{24}{25}$       (D)  $\frac{11}{35}$

**Q.6** A man speaks truth in 80% of the cases and another in 90% of the cases. While stating the same fact what is the probability that they contradict?

(A)  $\frac{37}{50}$       (B)  $\frac{13}{50}$   
(C)  $\frac{16}{50}$       (D) None of these

**Q.7** A can solve 90% of the problems given in a books and B solve 70%. What is the probability that atleast one of them will solve a problem selected at random from the book?

- (A)  $\frac{3}{100}$       (B)  $\frac{97}{100}$   
 (C)  $\frac{83}{100}$       (D)  $\frac{17}{100}$

**Q.8** Find the probability that in a random arrangement of the letters of the word DAUGHTER, the letter D occupies the first place.

- (A)  $\frac{1}{2}$

**Q.12** A problem in statistics is given to four students A, B, C and D. Their chances of solving it are  $\frac{1}{3}, \frac{1}{4}, \frac{1}{5}$  and  $\frac{1}{6}$ , respectively. What is 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.13** If A and B are two independent events such that  $P(\bar{A}) = 0.65$ ,  $P(A \cup B) = 0.65$  and  $P(B) = p$ , find the value of  $p$

- (A)  $\frac{7}{13}$       (B)  $\frac{6}{13}$   
(C)  $\frac{37}{65}$       (D) None of these

**Q.14** The probability of raining on day 1 is 0.2

8

(C)  $\frac{3}{8}$ 

4

(D)  $\frac{1}{2}$ 

- Q.9** A bag contains 3 green and 7 white balls. Two balls are drawn from the bag in succession without replacement. What is the probability that both are white?

(A)  $\frac{1}{7}$ (B)  $\frac{5}{11}$ (C)  $\frac{7}{11}$ (D)  $\frac{7}{15}$ 

- Q.10** In a simultaneous throw of two dice, find

$P(A \text{ or } B)$ , if A denotes the event 'a total of 11' and B denotes the event 'an odd number on each die'.

(A)  $\frac{11}{36}$ (B)  $\frac{1}{4}$ (C)  $\frac{5}{18}$ (D)  $\frac{1}{6}$ 

- Q.11** The probabilities that a student will receive an A, B, C or D grade are 0.30, 0.38, 0.22 and 0.01, respectively. What is the probability that the student will receive at least B grade?

(A) 0.38

(B) 0.42

(C) 0.68

(D) None of these

and on day 2 is 0.3. What is the probability of raining on both the days?

(A) 0.2

(B) 0.1

(C) 0.06

(D) 0.25

- Q.15** A bag contains 5 red balls and 8 blue balls. It also contains 4 green and 7 black balls. If a ball is drawn at random, then find the probability that is not green.

(A)  $\frac{5}{6}$ (B)  $\frac{1}{4}$ (C)  $\frac{1}{6}$ (D)  $\frac{7}{4}$ 

- Q.16** The probability that a student is not a swimmer is  $\frac{1}{5}$ . Then the probability that out of the five students, exactly four are swimmers, is

(A)  ${}^5C_4 \left(\frac{4}{5}\right)^2 \left(\frac{1}{5}\right)$ (B)  $\left(\frac{4}{5}\right)^4 \left(\frac{1}{5}\right)$ (C)  ${}^5C_1 \left(\frac{1}{5}\right) \left(\frac{4}{5}\right)^4$ 

(D) None of these

- Q.17** Four different objects 1,2,3,4 are distributed at random in four places marked 1,2,3,4. What is the probability that none of the objects occupy the place corresponding to its number?

(A)  $\frac{17}{24}$ (B)  $\frac{3}{8}$ (C)  $\frac{1}{2}$ (D)  $\frac{5}{8}$ 

- Q.18** A number is chosen at random among the first 120 natural numbers. The probability of the number chosen being a multiple of 5 or 15 is

(A)  $\frac{1}{5}$ (B)  $\frac{1}{6}$ (C)  $\frac{1}{7}$ (D)  $\frac{1}{9}$ 

### Answer Key

#### Classroom Questions

1.	(i) $1/2$ , (ii) $1/3$ (iii) $2/3$ (iv) $1/6$	2.	(i) $1/2$ , (ii) $5/12$ (iii) $1/6$ (iv) $1/6$	3.	(i) $103/108$ (ii) $5/54$ (iii) $5/108$	4.	(i) $2/7$ (ii) $3/7$ (iii) $5/7$ (iv) $1/7$ (v) $4/7$ (vi) $2/7$ (vii) $3/7$	5.	(i) $1/4$ (ii) $74/100$ (iii) $1/10$ (iv) $1/50$ (v) $1/2$ (vi) $1/4$ (vii) $33/100$
6.	(D)	7.	(B)	8.	(A)	9.	(C)	10.	(A)
11.	(i) $1/13$ , (ii) $1/2$ (iii) $7/13$	12.	(i) $72$ , (ii) $126$ (iii) $155$	13.	(i) $720$ (ii) $4320$ (iii) $1440$	14.	(B)	15.	0.25

	(iv) 1/26		(iv) 301		(iv) 576				
16.	(B)	17.	0.142	18.	11/36	19.	(B)	20.	10
21.	(D)	22.	(i) 0.25 (ii) 0	23.	(i) 35/66 (ii) 35/66 (iii) 35/72	24.	(i) 13/33 (ii) 49/143	25.	(C)
26.	(D)	27.	(D)	28.	(B)	29.	(B)	30.	(A)
31.	(B)	32.	(B)	33.	(D)	34.	4/11 (MTA)	35.	0.475
36.	(D)	37.	(B)	38.	(i) 3/5 (ii) 2/5	39.	(D)		

## Practice Questions

<b>1.</b>	<b>(A)</b>	<b>2.</b>	<b>(A)</b>	<b>3.</b>	<b>(B)</b>	<b>4.</b>	<b>(C)</b>	<b>5.</b>	<b>(D)</b>
<b>6.</b>	<b>(B)</b>	<b>7.</b>	<b>(B)</b>	<b>8.</b>	<b>(A)</b>	<b>9.</b>	<b>(D)</b>	<b>10.</b>	<b>(A)</b>
<b>11.</b>	<b>(C)</b>	<b>12.</b>	<b>(B)</b>	<b>13.</b>	<b>(B)</b>	<b>14.</b>	<b>(C)</b>	<b>15.</b>	<b>(A)</b>
<b>16.</b>	<b>(C)</b>	<b>17.</b>	<b>(C)</b>	<b>18.</b>	<b>(A)</b>				

1

# 4 Time and Work

## **Classroom Questions**



[GATE 2019: IIT Madras (EE)]

- Q.3** Two design consultants, P and Q, started working from 8 AM for a client. The client budgeted a total of USD

- B and then C. In how many days work will be completed.

- (A)  $13\frac{1}{2}$  days      (B)  $13\frac{3}{4}$  days  
 (C)  $13\frac{5}{6}$  days      (D)  $13\frac{6}{7}$  days

- Q.6** A can do a piece of work in 25 days and B can do it in 20 days. They work together for 5 days and then A goes away. How many more days will B require to finish the work?

- Q.7** A can do a piece of work in 10 days, B in 12 days and C in 15 days. They all start the work together, but A leaves the work after 2 days and B leaves 3 days before the work is completed. How many days did the work last?

3000 for the consultants. P stopped working when hour hand moved by 210 degrees on the clock.

Q stopped working when the hour hand moved by 240 degrees. P took two tea breaks of 15 minutes each during her shift, but took no lunch break. Q took only one lunch break for 20 minutes, but no tea breaks. The market rate for consultants is USD 200 per hour and breaks are not paid. After paying the consultants, the client shall have USD \_\_\_\_ remaining in the budget.

- (A) 000.00      (B) 300.00  
(C) 166.67      (D) 433.33

**[GATE 2019 : IIT Madras (EC)]**

**Q.4** A can complete a piece of work in 30 days. With the help of B work can be complete in work in 20 days. In how days B can complete the work alone.

- (A) 30 days      (B) 40 days  
(C) 45 days      (D) 60 days

**Q.4** A can complete a piece of work in 10 days, B can complete in 15 days and C can complete it in 20 days A, B and C started the work, starting from A then

**Q8.**

A can complete a piece of work in 15 days B in 20 days and C can complete in 30 days alone. A starts the work and work for 2 days then B joined him and they both work for 1 more days. How many days they all will take to complete the remaining work.

- (A) 4 days      (B) 5 days  
(C) 8 days      (D) 10 days

**Q.9**

A certain number of men can finish a piece of work in 60 days. If they were 8 men more, the work could be finished in 10 days less. Find the original number of men.

**Q.10**

3 men or 5 women can do a job in 12 days. How long will 6 men and 5 women take to finish the job?

**Q.11**

If 12 pumps can raise 1218 tons of water in 11 days of 9 hours each, then how many pumps will raise 2030 tons of water in 12 days of 11 hours each?

- (A) 12 pumps      (B) 15 pumps  
(C) 18 pumps      (D) 14 pumps

**Q.12**

Seven machines take 7 minutes to make 7 identical toys. At the same time rate how many minutes would it take for 100 machines to make 100 toys?

- (A) 1      (B) 7  
(C) 100      (D) 700

**[GATE 2018 : IIT Guwahati (ME Set – 1)]**

**Q.13** 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 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) 42

**[GATE 2016 : IISC Bangalore (CE Set – 2)]**

**Q.14** 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

**[GATE 2017 : IIT Roorkee (EC Set – 2)]**

**Q.15** P, Q, R and S are working on a project

**Q.17** Five men can paint a building in 20 days, 8 Women 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?

- (A) 12 days      (B) 13 days  
(C) 14 days      (D) 15 days

**[ESE 2017]**

**Q.18** 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

- (A) 50      (B) 45  
(C) 35      (D) 30

**[ESE 2017]**

**Q.19** If m students require a total of m pages of stationery in m days, then 100 students will require 100 pages of stationery in

- (A) 100 days      (B)  $m/100$  days  
(C)  $100/m$  days      (D)  $m^2$  days

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 one by Q and R after 7 days from the start of the project?

- (A) 10 : 11      (B) 11:10  
 (C) 20 : 21      (D) 21 : 20

**[GATE 2016 : IISC Bangalore (EC Set – 1, ME Set-1)]**

**Q.16** 5 skilled workers can build a wall in 20 days; 8 semi-skilled 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 semi-skilled and 5 unskilled workers, how long will it take to build the wall?

- (A) 20 days      (B) 18 days  
 (C) 16 days      (D) 15 days

**[GATE 2010 : IIT Guwahati (EC, EE CE, ME, CSE, IN)]**

20

General Aptitude

1, 2 and 3 am, when will the cistern be empty?

- (A) 5 am      (B) 2 pm  
 (C) 5 pm      (D) 4 pm

**Q.24** A cistern has 3 pipes, A to supply and B and C to drain. A can fill it in 10 hours while B and C can empty it in 15 and 20 hours respectively. If the cistern is  $\frac{7}{10}$  full when they are all opened at once, in what time will it be empty?

- (A) 36 hours      (B) 42 hours  
 (C) 48 hours      (D) 52 hours

**Q.25** Two pipes P and Q can fill the tank in 6 hours and 9 hours while 3rd pipe R can empty the tank in 12 hours. Initially P and R open for 4 hours then P is closed and Q is open. After 6 hours R is closed then find the total time to fill the tank (in hours).

**[GATE 2019 : IIT Madras (ME)]**

**Q.26** 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

(C) 100/m days      (D) m days

**[GATE 2019 : IIT Madras GG, TF]**

**Q.20** Two persons A and B can complete a work in 10 and 15 days respectively, working separately. In how many days will the work be completed, if they both work together. If they received Rs. 300 as payment, then what are their respective shares?

**Q.21** A can do a piece of work in 15 days and B in 20 days. They finished the work with the assistance of C in 5 days and got Rs. 45 as their wages. The share of each in wages (in Rs.) is

- (A) 22.5, 12, 10.5      (B) 10.5, 12, 22.5  
 (C) 15, 11.25, 18.75      (D) 12.5, 13 19.5

**Q.22** pipes can fill a reservoir in 15, 20, 30 and 60 hours respectively. The first was opened at 6 am, second at 7 am third at 8 am and fourth at 9 am. When will the reservoir be full?

- (A) 12.30 pm      (B) 1.30 pm  
 (C) 1.00 pm      (D) 12.50 pm

**Q.23** A and B can fill a cistern in 4 and 5 hours respectively and C can empty it in 2 hours. If three pipes be opened at

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

**[GATE 2014 : IIT Kharagpur (EC Set – 2, ME Set – 2)]**

**Q.27** Two machines M1 and M2 are able to execute any of four jobs P, Q, R and S. The machines can perform one job on one object at a time. Jobs P, Q, R and S take 30 minutes, 20 minutes, 60 minutes and 15 minutes each respectively.

There are 10 objects each requiring exactly 1 job, Job P is to be performed on 2 objects, Job Q on 3 objects, Job R on 1 object and Job S on 4 objects.

What is the minimum time needed to complete all the jobs?

- (A) 2 hours      (B) 2.5 hours  
 (C) 3 hours      (D) 3.5 hours

**[GATE 2017 : IIT Roorkee (CE, CH Set – 1)]**

## Practice Questions

- Q.1** 9 Men can complete a piece of work in 35 days. In how many days 7 men will complete that same piece of work?  
 (A) 28 days      (B) 40 days  
 (C) 42 days      (D) 45 days

- Q.2** 7 Men can complete a piece of work in 33 days. In how many days 11 men will complete that same piece of work?  
 (A) 18 days      (B) 21 days  
 (C) 24 days      (D) 27 days

- Q.3** 5 Men can complete a piece of work in 39 days. In how many days 13 men will complete the same piece of work?  
 (A) 10 days      (B) 15 days  
 (C) 20 days      (D) 25 days

- Q.4** A can do a piece of work in 12 days while B alone can do it in 15 days. In how many days the work gets completed if, A and B work together, but alternately.

- (A)  $\frac{5}{2}$  days      (B)  $\frac{7}{2}$  days  
 (C)  $\frac{9}{2}$  days      (D)  $\frac{11}{2}$  days

- Q.8** A can do a piece of work in 10 days, B in 10 days and C in 15 days. They all start the work together, but A leaves the work after 2 days and B leaves 3 days before the work is completed. How many days did the work last?

- Q.9.** A and B can complete a piece of work in 10 days. Working together B and C can complete in 15 days, A and C can complete in 20 days working together. In how many days they A, B & C complete the same piece of work working together.

- (A)  $9\frac{3}{13}$  days      (B)  $11\frac{3}{13}$  days  
 (C)  $7\frac{3}{13}$  days      (D)  $10\frac{3}{13}$  days

- Q.10** A man can finish a work in 6 days, a woman in 10 days and a child in 12 days. The man starts the work and works for  $1/3^{\text{rd}}$  of a day, then the woman works for  $1/3^{\text{rd}}$  of a day and finally the boy works for remaining  $1/3^{\text{rd}}$  of a day. This cycle is repeated till the

- Q.5** A can complete a piece of work in 40 days with the help of B work can be complete 8 days. In how many days B can be complete it alone.

- (A) 10 days      (B) 12 days  
 (C) 15 days      (D) 20 days

- Q.6** A can complete a piece of work in 10 days. B can complete the same work in 15 days, with the help of C they together complete the work in 3 days. In how many days C can complete it alone.

- (A) 4 days      (B) 6 days  
 (C) 8 days      (D) 10 days

- Q.7** A can complete a piece of work in 10 days. B can complete the same work in 15 days and C can complete it in 20 days. A, B, & C starts the work together for 2 days then C leave the group, A & B work for 2 days more then A leave the group. In how many days B will complete the remaining work.

- (C) 40 days      (D) 45 days

- Q.14** 9 Men can finish a piece of work in 21 days working 8 hrs daily than find the number of women to finish the same piece of work working 7 days and 8 hrs. daily. If the efficiency of man is thrice of women.

- (A) 72      (B) 81  
 (C) 90      (D) 99

- Q.15** A certain number of person can finish a piece of work in 100 days. If there 10 men less, they would have taken 10 days more. find the initial number of person in the group.

- (A) 90      (B) 100  
 (C) 110      (D) 120

- Q.16** There is a sufficient food for 150 men for 15 days. After 10 days, 75 men leave the place. For how many days will the rest of the food lasts for the rest of the men.

- (A) 5 days      (B) 10 days  
 (C) 15 days      (D) 20 days

- Q.17** 30 men can make 480 chairs in 15 days. Find the number of chairs made by 10 men in 6 days.

work finishing. Who was working when the work finished?

- (A) Man                                   (B) Woman  
(C) Child                                   (D) None of these

**Q.11** A and B have efficiency 3:4. A can complete a piece of work in 12 days, in how many days B will complete the same piece of work.

- (A) 8 days                               (B) 9 days  
(C) 10 days                              (D) 15 days

**Q.12** A and B can have efficiency 7:3 B can complete a piece of work in 35 days, in how many days they A will complete the same piece of work.

- (A) 12 days                               (B) 15 days  
(C) 20 days                               (D) 21 days

**Q.13** A has efficiency 40% more than B, A can complete a piece of work in 60 days. In how many days A and B will complete the same piece of work, working together.

- (A) 30 days                               (B) 35 days

- (A) 48                                     (B) 56  
(C) 64                                     (D) 72

**Q.18** 23 Men can dig a trench which is 40 m long 20m broad and 10 m high in 15 days. Then find the height of trench which is dug by 69 men in 10 days and the trench is 20 m long and 10 m broad.  
(A) 60 m.                                   (B) 70 m.  
(C) 80 m.                                   (D) 100 m.

**Q.19** Tap A can fill a tank in 36 minutes and tap B can fill a tank in 45 minutes. In how many minutes will be filled when the pipes will be opened simultaneously?

- (A) 28 minutes                           (B) 18 minutes  
(C) 20 minutes                           (D) 24 minutes

**Q.20** Tap A can fill a tank in 10 minutes and tap B in 15 minutes. In how many minutes will be filled when the both pipes open simultaneously where as there is one more pipe C which is working as outlet pipe and can empty the tank in 60 min.

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General Aptitude

**Q.21** Tap A can fill a tank in 20 min. but due to a leak it is filled in 60 min. If leak has to empty a full fill tank, how many minutes required.

- (A) 20 minutes                           (B) 30 minutes  
(C) 40 minutes                           (D) 60 minutes

**Q.22** Tap A can fill a tank in 10 min. tap B in 15 min. but due to a leak tap filled in 30 min. If leak can draw 5 litres water per minute then find the volume of the tank.

- (A) 28 liters                              (B) 32.5 liters  
(C) 35 liters                               (D) 37.5 liters

**Q.23** Two pipes P and Q would fill a cistern in 12 and 16 minutes respectively. Both pipe being opened, find when the first pipe must be off so that the cistern may be just filled in 8 minutes.

- (A) 4 minutes                           (B) 6 minutes  
(C) 8 minutes                           (D) 10 Minutes

**Q.24** Two pipes A and B can fill a tank in 36 min. & 48 min. respectively. If both the pipes are opened simultaneously, after how much time should B be closed so that the tank is full in 27 minutes.

- (A) 8 minutes                           (B) 10 minutes  
(C) 12 minutes                           (D) 15 minutes

**Q.25** There is a leak in the bottom of a cistern. When the cistern was thoroughly repaired it would be filled in 12 min. It now takes 18 min. longer. If the cistern is full, how long would the leak take to empty the cistern.

- (A) 15 minutes                           (B) 20 minutes  
(C) 24 minutes                           (D) 30 minutes

### Answer Key

Classroom Questions									
1.	$6\frac{2}{3}$ days	2.	B	3.	C	4.	D	5.	B
6.	11 days	7.	9 days	8.	B	9.	40 men	10.	4 days
11.	B	12.	B	13.	C	14.	C	15.	C
16.	D	17.	D	18.	D	19.	D	20.	Rs.180

									<b>Rs.120</b>
<b>21.</b>	<b>C</b>	<b>22.</b>	<b>C</b>	<b>23.</b>	<b>C</b>	<b>24.</b>	<b>B</b>	<b>25.</b>	<b>14.5 Hr.</b>
<b>26.</b>	<b>A</b>	<b>27.</b>	<b>A</b>						

### Practice Questions

<b>1.</b>	<b>D</b>	<b>2.</b>	<b>B</b>	<b>3.</b>	<b>B</b>	<b>4.</b>	<b>13/4 days, 675 days</b>	<b>5.</b>	<b>A</b>
<b>6.</b>	<b>B</b>	<b>7.</b>	<b>B</b>	<b>8.</b>	*	<b>9.</b>	<b>A</b>	<b>10.</b>	<b>B</b>
<b>11.</b>	<b>B</b>	<b>12.</b>	<b>B</b>	<b>13.</b>	<b>B</b>	<b>14.</b>	<b>B</b>	<b>15.</b>	<b>C</b>
<b>16.</b>	<b>B</b>	<b>17.</b>	<b>C</b>	<b>18.</b>	<b>C</b>	<b>19.</b>	<b>C</b>	<b>20.</b>	<b>7.5 min</b>
<b>21.</b>	<b>D</b>	<b>22.</b>	<b>D</b>	<b>23.</b>	<b>B</b>	<b>24.</b>	<b>C</b>	<b>25</b>	<b>B</b>

□□□

## 5

## Percentage & Its Applications



### Classroom Questions

- Q.1** In a basket of fruits, 60% are mangoes and remaining 40% are apples. 25% of the apples are green and the rest 75% are red. Of the mangoes, 80% are red and the rest of the mangoes are green. What percentage of the green fruits are mangoes?

- Q.2** In a huge pile of apples and oranges, both ripe and unripe mixed together, 15% are unripe fruits. Of the unripe fruits, 45% are apples. Of the ripe ones, 66% are oranges. If the pile contains a total of 5692000 fruits, how many of them are apples?

(A) 2029198      (B) 2467482  
(C) 2789080      (D) 3577422

**[GATE 2016 : IISc Bangalore  
(EC Set - 1, ME Set - 1)]**

- Q.3** In an exam, a student scored 50% of the maximum marks and yet failed by 12 marks. If he had scored 10% more than what he scored, he would have just managed to get the pass

(A) 100      (B) 110  
(C) 90      (D) 95

**[GATE 2011 : IIT Madras (EC, EE)]**

- Q.6** Three friends, R, S and T shared toffee from a bowl. R took 1/3rd of the toffees, but returned four to the bowl. S took 1/4th 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 : IIT Madras (EC, EE)]**

- Q.7** 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 Rs.50 per unit. The number of units to be produced by the firm such that the profit is maximized is

(A) 5      (B) 10

just managed to get the pass percentage. What are the maximum marks of the paper?

**Q.4**  $(x\% \text{ of } y) + (y\% \text{ of } x)$  is equivalent to

- (A) 2% of  $xy$       (B) 2% of  $\left(\frac{xy}{100}\right)$   
(C)  $xy\% \text{ of } 100$       (D) 100% of  $xy$

**[GATE 2016 : IISc Bangalore (CE Set - 2)]**

**Q.5** There are two candidates P and Q in an election. During the campaign, 40% of the voters promised to vote for P, and rest 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?

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General Aptitude

- (A) 5      (B) 15  
(C) 10      (D) 30

**[GATE 2013 : IIT Bombay (CE)]**

**Q.10** If prices decrease by 25%, by what percentage can consumption increase without affecting the expenditure?

**Q.11** If the area of the circle is increased by 21% then what is the percentage increased in the circumference of the circle?

**Q.12** In the summer, water consumption is known to decrease overall by 25%. A Water Board official states that in the summer household consumption decreases by 20%, while other consumption increases by 70%. Which of the following statements is correct?

- (A) The ratio of household to other consumption is  $8/17$   
(B) The ratio of household to other consumption is  $1/17$   
(C) The ratio of household to other consumption is  $17/8$   
(D) There are errors in the official's statement.

**[GATE 2017 : IIT Roorkee EC, BT, PI Set - 1]**

**Q.13** If the price of petrol increases successively by 20% and then by 10%, what is the net change in percentage

(A) 15%      (B) 25%

**[GATE 2012 : IIT Delhi (ME, CE, CSE)]**

**Q.8** 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  $^{\circ}\text{C}$  on Thursday was

- (A) 40      (B) 43  
(C) 46      (D) 49

**[GATE 2013 : IIT Bombay (EC, EE, IN)]**

**Q.9** A firm is selling its product at Rs. 60 per unit. The total cost of production is Rs. 100 and firm is earning total profit of Rs. 500. Later, the total cost increased by 30%. By what percentage the price should be increased to maintain the same profit level

**Q.16** A man sells an article at a profit of 25%. If he had bought it at 20% less and sold it for Rs. 10.50 less, he would have gained 30%. Find the C.P. of the article.

**Q.17** A fruit seller sold a basket of fruits at 12.5% loss. Had he sold it for Rs. 10 more, he would have made a 10% gain. What is the loss in Rupees incurred by the fruit seller?

- (A) 48      (B) 52  
(C) 60      (D) 108

**[GATE 2018 : IIT Guwahati (CE Set - 1)]**

**Q.18** The price of a wire made of a super alloy material is proportional to the square of its length. The price of 10 m length of wire is Rs. 1600. What would be the total price (in Rs.) of two wires of lengths 4 m and 6 m?

- (A) 768      (B) 832  
(C) 1440      (D) 1600

**[GATE 2018 : IIT Guwahati (CE Set - 1)]**

**Q.19** The ratio of the number of boys and girls who participated in an examination is 4:3. The total percentage of candidates who passed the examination is 80 and the percentage of girls who passed is 90. The percentage of boys who passed is \_\_\_\_\_.

**[GATE 2019 : IIT Madras]**  
(A) 90.00      (B) 80.50

terms?

**Q.14** The length of a rectangle is increased by 10%. What will be the percentage decreased in its breadth so as to have the same area?

**Q.15** A bought a cycle for Rs. 1080 and then sold it to B for a loss of 20%. B spent Rs. 36 on improving the condition of the cycle and then sold it to C for a 20% profit. What amount did C pay for the cycle?

(C) 55.50

(D) 72.50

**Q.20** 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%

**[GATE 2017 : IIT Roorkee (EC, BT, PI Set – 1)]**

**Q.21** Fiscal deficit was 4% of GDP in 2015 and increased to 5% in 2016. If GDP increased by 10% from 2015 to 2016. Then % increase in actual Fiscal deficit?

**[GATE 2019: IIT Madras]**

### Practice Questions

**Q.1** A's income is 70% of B's. B's income is 50% of C's. If C's income is Rs. 1,00,000, what is A's income?

**Q.2** What is 20% of 30% of 40?

**Q.3** If A is 37.5% more than B, by what percent is B less than A?

**Q.4** Since prices of mangoes decreased by 25%, I can purchase 4 mangoes more

General Aptitude

25

 for Rs. 60. What is the original price of one mango?

**Q.5** The length and the breadth of a rectangle are 10 cm and 5 cm respectively. The length is increased by 10% and the breadth is increased by 5%. What is the new area of the rectangle?

**Q.6** The radius of a circle has increased by 20%. By what percentage does  
A. The circumference increase?  
B. The area increase?

**Q.7** If the side of a square is increased by 25%, then its area is increased by how many percent?

**Q.8** Anirudh bought 8 lemons for a rupee, but sells only 6 lemons for a rupee. Find his profit percentage.

**Q.9** Aditya purchases toffees at Rs. 10 per dozen and sells them at Rs. 12 for every 10 toffees. Find the gain or loss percentage.

**Q.10** A boy buys eggs at 10 for Rs. 1.80 and sells them at 11 for Rs. 2. What is his profit or loss percent?

**Q.11** A single discount equivalent to a series discount of 20%, 10% and 5% is ..... .

**Q.12** Paresh sells 40 pencils and gains the selling price of 10 pencils. What is his profit percentage?

**Q.13** Inspite of giving a discount of 10%, a shopkeeper manages to make a profit of 8%. By what percentage does the shopkeeper mark – up his goods?

**Q.14** If a commission of 10% is given on the marked price of an article, the gain is 25%. Find the gain percentage, if the commission is increased to 20%.

**Q.15** The price of a Maruti car rises by 30% while the sale of the car comes down by 20%. What is the percentage change in the total revenue?

(A) - 4%

(B) - 2%

(C) + 4%

(D) + 2%

### Answer Key

#### Classroom Questions

1.	54.54%	2.	A	3.	240	4.	A	5.	A
6.	C	7.	A	8.	C	9.	A	10.	33.33%
11.	10%	12.	D	13.	32%	14.	9.09%	15.	Rs.1080
16.	Rs.55	17.	C	18.	B	19.	D	20.	C
21.	37.5%								

### Practice Questions

Rs.

<b>1.</b>	<b>35000</b>	<b>2.</b>	<b>2.4</b>	<b>3.</b>	<b>27.27%</b>	<b>4.</b>	<b>51%</b>	<b>5.</b>	<b>57.75cm</b>
<b>6.</b>	<b>A. 20% B. 40%</b>	<b>7.</b>	<b>56.25%</b>	<b>8.</b>	<b>33.33%</b>	<b>9.</b>	<b>44%</b>	<b>10.</b>	<b>1.01%</b>
<b>11.</b>	<b>31.6%</b>	<b>12.</b>	<b>33.33%</b>	<b>13.</b>	<b>20%</b>	<b>14.</b>	<b>11.1%</b>	<b>15.</b>	<b>C</b>

□□□

## 6

## SI & CI



### Classroom Questions

- Q.1** If  $R = 10\%$ ,  $n = 4$  years, what is the simple interest charged on a loan of Rs. 2,000?
- Q.2** In the above problem, if the case was one of compound interest, what is the CI?
- Q.3** If an amount is kept at SI, it earns an interest of Rs. 600 in first two years but when kept at CI, it earns an interest of Rs. 660 in the same period. Find the rate of interest and the Principal.
- Q.4** At what simple rate of interest shall a sum of money double itself in 4 years?
- Q.5** For how many years should Rs. 600 be invested at 10% p.a. in S.I., in order to earn the same interest as earned by investing Rs. 800 at 12% p.a. for 5 years in S.I.?
- Q.6** Find the C.I on Rs. 5,000 at 8% p.a. for 2 years, compounding being done annually.
- Q.7** Find amount for Rs. 80,000 at 20% per annum, compounded semi – annually for 2 years.
- Q.8** Find C.I. on Rs. 10,000 at 10% for 9 months compounded quarterly
- Q.9** Industrial consumption of power

### [GATE 2014 : IIT Kharagpur (CE Set - 2 IN)]

- Q.11** Round-trip tickets to a tourist destination are eligible for a discount of 10% on the total fare. In addition, groups of 4 or more get a discount of 5% on the total fare. If the one way single person fare is Rs 100, a group of 5 tourists purchasing round-trip tickets will be charged Rs \_\_\_\_\_

### [GATE 2014 : IIT Kharagpur (EE Set – 1, CSE Set - 1)]

- Q.12** 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 Rs. 50 per USD to Rs. 60 per USD. India's GDP in USD during the period 2012- 2013  
 (A) Increased by 5 %  
 (B) Decreased by 13%  
 (C) Decreased by 20%

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

**[GATE 2014 : IIT Kharagpur]  
(EC Set – 4, ME Set - 4)]**

- Q.10** 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

## General Aptitude

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## Practice Questions

- |  |   |
|--|---|
| <p><b>Q.1</b> What shall be the simple interest to be paid on a principal of Rs. 14,000 borrowed at a rate of 15% for a period of 3 years and 6 months?</p> <p><b>Q.2</b> If a certain sum amounts to Rs. 108 in 2 years Rs. 112 in 3 years, find rate of interest (simple).</p> <p><b>Q.3</b> Prabhat took a certain amount as a loan from a bank at the rate of 8% p.a. S.I. and gave the same amount to Ashish as a loan at the rate of 12% p.a. If at the end of 12 years, he made a profit 12% p.a. If at the end of 12 years, he made a profit of Rs. 320 in the deal, what was the original amount?</p> <p><b>Q.4</b> If a sum of money at simple interest doubles in 6 years, it will become 4 times in</p> <p><b>Q.5</b> The rate of interest on a sum of money is 4% p.a. for the first 2 years, 6% p.a. for the next 3 years and 8% p.a. for the period beyond 5 years. If the simple interest accrued by the sum for a total</p> | <p>period of 8 years is Rs. 1,280 then what is the sum?</p> <p><b>Q.6</b> Vinod Kumar invested Rs. 1,600 for 3 years and Rs. 1,100 for 4 years at the same rate of simple interest. If the total interest from these investments is Rs. 506, find the rate of interest.</p> <p><b>Q.7</b> A man invests an amount of Rs. 15,860 in the names of his three sons A, B, and C in such a way that they get the same interest after 2, 3 and 4 years respectively at S.I. If the rate of interest is 5%, then the ratio of amounts invested in the name of A, B and C is</p> <p><b>Q.8</b> Mr Kuber bought a flat in Swarg Lok Apartments for \$1,000. What would the future value of the flat be after 2 years if the value is compounded semi-annually at 22% per annum?</p> <p><b>Q.9</b> What shall be the amount for a sum of Rs. 1,000 at 10% for 3 years compounded annually?</p> |
|--|---|

Answer Key

Classroom Questions									
1.	Rs.800	2.	Rs.928.2	3.	Rs.1500	4.	25%	5.	8 Years
6.	Rs.832	7.	Rs.11712.8	8.	Rs.769	9.	B	10.	A
11.	Rs.850	12.	D	13.	B				

## Practice Questions

<b>1.</b>	<b>Rs.7350</b>	<b>2.</b>	<b>4%</b>	<b>3.</b>	<b>Rs.666.7</b>	<b>4.</b>	<b>18 years</b>	<b>5.</b>	<b>2.60</b>
<b>6.</b>	<b>5.5%</b>	<b>7.</b>	<b>6 : 4 : 3</b>	<b>8.</b>	<b>1518.07</b>	<b>9.</b>	<b>1331</b>		

7

# Time Speed & Distance



## **Classroom Questions**

90 km/n respectively. what is the average speed in km/h for the entire journey?



[GATE 2018 : IIT Guwahati (IN Set – 1)]

**Q.6** If Arun rides his scooter at a speed of 20 kmph, then he reaches his office 5 minutes late. If he rides at 30kmph then he reaches 5 minutes early. Find the distance between his home and office.



**Q.14** From the time the front of a train enters a platform, it takes 25 sec for the back of the train to leave the platform, while train travelling at a constant speed of 54 km/h. At the same speed, it takes 14 sec to pass a man running at 9 km/h in the same direction as the train. What is the length of the train and that of the platform in meters respectively?

- (A) 210 & 140      (B) 162.5 & 187.5  
 (C) 245 & 130      (D) 175 & 200

[GATE 2018 : IIT Guwahati (ME Set – 1)]

[GATE 2016 : IISc Bangalore (EC Set - 1)]

**Q.15** A train has 320 km to run. After going  $\frac{1}{5}$ th of the distance, the engine breaks down and it can only run the remaining part of the journey at  $\frac{3}{4}$ th of the original speed. If it arrives 2hrs 40minlate, what was its original speed?

- (A) 24 km/hr      (B) 32 km/hr  
(C) 48 km/hr      (D) 64 km/hr

**Q.16** 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 meter and 5 meter per leap respectively, what distance in meters will the tiger have a run before it catches the deer?

[GATE 2015 : IIT Kanpur (EC Set – 2, ME SET – 1)]

**Q.17** If a man cycles at 10 km/h, then he arrives at a certain place at 1:00 pm. If he cycles at 15 km/h, he arrives at the same place at 11:00 am. At what speed must he cycle to get there at noon?



trains (in m/s) is



[GATE 2016 : IISc Bangalore (IN)]

**Q.13** 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?

[GATE 2014 : IIT Kharagpur]  
(EC Set - 1, ME Set - 1)]

**Q.19** Two trains start at the same time from Aligarh and Delhi and proceed towards each other at the rate of 16 km/hr and 21 km/hr respectively. When they meet , it is found that one train has travelled 60 km more than the other. The distance between the two stations is

- (A) 445 km      (B) 444 km  
 (C) 440 km      (D) 450 km

**Q.20** Trucks (10 m long) and cars (5 m long) go on a single lane bridge. There must be a gap of at least 20 m after each truck and a gap of at least 15 m after each car. Trucks and cars travel at a speed of 36 km/h. If cars and trucks go alternately, what is the maximum number of vehicles that can use the bridge in one hour?

- (A) 1440      (B) 200  
(C) 720      (D) 600

[GATE 2017 : IIT Roorkee (EC, BT, PI Set - 1)]

**Q.21** 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



[GATE 2017 : IIT Roorkee (IN, CE Set – 2)]

**Q.22** A boat covers a certain distance downstream in 1 hour, while it comes back in  $1\frac{1}{2}$  hours. If the speed of the stream be 3 kmph, what is the speed of

(C) 13 km/h (D) 14 km/h

- Q.18** 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?

[GATE 2018 : IIT Guwahati (CE Set – 1)]

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General Aptitude

- Q.24** The speed of a boat in still water is 10 km/hr. If it can travel 26 km downstream and 14 km upstream in the same time, the speed of the stream is:  
(A) 2 km/hr (B) 2.5 km/hr  
(C) 3 km/hr (D) 4 km/hr

- Q.25** 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.

[GATE 2014 : IIT Kharagpur  
(EC Set – 3, ME Set – 3)]

### Practice Questions

- Q.1** A bird flying 400 km covers the first 100km at the rate of 100km/hr, the second 100km at 200km/hr, the third 100km at the rate of 300km/hr and the last 100 km at the rate of 400km/hr. Determine the average speed of the bird.

- Q.2** If Tushar goes from Delhi to Noida at a speed of 30 km per hour and comes back at a speed of 70 km per hour, then what is his average speed during the entire journey?

- Q.3** Michael lives 10 km away from where I live. Ahmed lives 5 km away and Susan lives 7 km away from where I live. Arun is farther away than Ahmed but closer than Susan from where I live. From the information provided here, what is one possible distance (in km) at which I live from Arun's place?  
(A) 3.00 (B) 4.99  
(C) 6.02 (D) 7.01

- Q.4** A carriage driving in a fog passed a man who was walking at the rate of 3 kmph in the same direction, if he could see the carriage for 4 minutes and if it was visible to him up to a distance of 100 m then what was the speed of the carriage?  
(A) 3.6 kmph (B) 4.5 kmph  
(C) 3.5 kmph (D) None of these

- Q.5** The distance between two cities A and

the boat in still water?

(A) 12 kmph (B) 13 kmph

(C) 15 kmph (D) None of these

- Q.23** A motorboat, whose speed is 15 km/hr in still water goes 30 km downstream and comes back in a total of 4 hours 30 minutes. The speed of the stream (in km/hr) is:

(A) 4 (B) 5

(C) 6 (D) 10

- Q.25** 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.

[GATE 2014 : IIT Kharagpur  
(EC Set – 3, ME Set – 3)]

it is found that one train has travelled 80km more than the other. Find the distance between the two stations.

- Q.7** In nuts & bolts factory, one machine produces only nuts at the rate of 100 nuts per minute & needs to be cleaned for 5 min after production of every 1000 nuts. Another machine produces only bolts at the rate of 75 bolts per minute & needs to be cleaned for 10 min after production of every 1500 bolts. If both the machines start production at the same time, what is the minimum duration required for producing 9000 pairs of nuts & bolts?

(A) 130 min (B) 135 min

(C) 170 min (D) 180 min

- Q.8** Shyam went from Delhi to Shimla via Chandigarh by car. The distance from Delhi to Chandigarh is  $\frac{3}{4}$  times the distance from Chandigarh to Shimla. The average speed from Delhi to Chandigarh was half as much more as that from Chandigarh to Shimla. If the average speed for entire journey was 49 km/hr, then what was the average speed from Chandigarh to Shimla?

(A) 39.2 km/hr (B) 63 km/hr

(C) 42 km/hr (D) None of these.

- Q.9** A man rows to a place 48 km distant and back in 14 hours. He finds that he can row 4 km with the stream in the

B is 80km. A motorcycle rider starts from A towards B at 7am at a speed of 10 km/hr. Another motorcyclist starts from B towards A at 8am at a speed of 25km/hr. At what time will they cross each other?

- Q.6** Two trains start at the same time from two stations and proceed towards each other at the rate of 20 km/hr and 25km/hr respectively. When they meet,

same time as 3 km against the stream.

The rate of the stream is:

- (A) 1 km/hr                    (B) 1.5 km/hr  
 (C) 1.8 km/hr                (D) 3.5 km/hr

### Answer Key

Classroom Questions									
1.	<b>12.5m/sec</b>	2.	<b>36 kmph</b>	3.	<b>C</b>	4.	<b>C</b>	5.	<b>A</b>
6.	<b>10 km</b>	7.	<b>40 min</b>	8.	<b>55 min</b>	9.	<b>12 km</b>	10.	<b>16 km</b>
11.	<b>14 sec</b>	12.	<b>A</b>	13.	<b>560 m</b>	14.	<b>D</b>	15.	<b>B</b>
16.	<b>800 m</b>	17.	<b>B</b>	18.	<b>22.22 m</b>	19.	<b>D</b>	20.	<b>A</b>
21.	<b>D</b>	22.	<b>C</b>	23.	<b>B</b>	24.	<b>C</b>	25.	<b>4 kmph</b>

### Practice Questions

1.	<b>192 kmph</b>	2.	<b>42 kmph</b>	3.	<b>C</b>	4.	<b>B</b>	5.	<b>10 am</b>
6.	<b>72 km</b>	7.	<b>C</b>	8.	<b>C</b>	9.	<b>A</b>		



**8****Average and Ratio****Classroom Questions**

- Q.1** The avg. weight of 4 students is 64 kg. When Tom joins the group, avg. weight of group increases by 2 kg. Find Tom's weight.  
 (A) 68 kg.                   (B) 70 kg.  
 (C) 72 kg.                   (D) 74 kg.
- Q.2** 6 friends has an average weight of 62 kg. One of the student left the group having weight 52 kg. Find new avg. weight.  
 (A) 62 kg.                   (B) 64 kg.  
 (C) 66 kg.                   (D) 68 kg.
- Q.3** The avg. wt. of 5 students in a class is 65 kg. 2 friends with an avg. wt. of 70 kg. Left the group. Find the new avg. weight.  
 (A) 61 kg.                   (B) 61.67 kg.  
 (C) 62 kg.                   (D) 64 kg.
- Q.4** The avg. weight of 8 students in a class is found to be 53 kg. If one of the student need to be replace by other student. Such that avg. weight of the class may increase by 2 kg. If the wt. of new student is 80 kg. Find the wt. of new student.  
 (A) 62 kg.                   (B) 64 kg.  
 (C) 66 kg.                   (D) 68 kg
- Q.5** The avg. height of 48 students in a class is found to be 152 cm. later it was discovered that the height of one of the student in a class is 126 cm. whereas his actual height is 150 cm. find the new avg. height.  
 (A) 150 cm.                   (B) 152 cm.  
 (C) 152.5 cm.               (D) 154 cm
- Q.7** (A) 68 kg.                   (B) 69 kg.  
 (C) 70 kg.                   (D) 71 kg.
- Q.8** The avg. temp of a town in a week is  $30^{\circ}\text{C}$  and the temp from Monday to Thursday is  $30^{\circ}\text{C}$  and Thursday to Sunday is  $40^{\circ}\text{C}$ . find temp on Thursday (in degree Celsius).  
 (A) 25                       (B) 27  
 (C) 30                       (D) 32
- Q.9** If  $A : B = 2 : 3$ ,  $B : C = 4 : 5$  and  $C : D = 6 : 7$  then  $A : B : C : D$  is.  
 (A) 16 : 22 : 30 : 35   (B) 16 : 24 : 15 : 35  
 (C) 16 : 24 : 30 : 35   (D) 18 : 24 : 30 : 35
- Q.10** Rs.1210 were divided among A, B, C so that  $A : B = 5:4$  and  $B : C = 9:10$ . then C gets  
 (A) Rs.340                   (B) Rs.400  
 (C) Rs.450                   (D) Rs.475
- Q.11** The ratio of the number of boys and girls in a college is 7:8. If the percentage increase in the number of boys and girls be 20% and 10% respectively. What will be the new ratio  
 (A) 8 : 9                   (B) 17 : 18  
 (C) 21 : 22               (D) Cannot be determined
- Q.12** Gold is 19 times as heavy as water and copper is 9 times as heavy as water. In what ratio should these be mixed to get an alloy 15 times as heavy as water  
 (A) 1 : 1                   (B) 2 : 3  
 (C) 1 : 2                   (D) 3 : 2
- Q.13** 85 kg of a mixture contains milk and

**Q.6**

The avg. wt. of 20 students in a class is 70 kg. Later it was discovered that weight of one of the student is 88 kg, it is wrongly spelt as 40 kg. Weight of another student is 40 kg. it is wrongly spell as 68 kg. Find the new avg. weight.

**Q.13**

The electricity bill of a certain establishment is partly fixed and partly varies as the number of units of electricity consumed. When in a certain month 540 units are consumed, the bill is Rs.1800. In another month 620 units are consumed and the bill is Rs. 2040. In year another month 500 units are consumed. The bill for that month would be :

- (A) Rs.1560                    (B) Rs.1680  
 (C) Rs.1840                    (D) Rs.1950

**Q.14**

Zinc and copper are melted together in the ratio 9:11. What is the weight of melted mixture, if 28.8 kg of zinc has been consumed in it?

- (A) 58 kg                        (B) 60 kg  
 (C) 64 kg                        (D) 70 kg

**Q.15**

What is the ratio whose terms differ by 40 and the measure of which is  $\frac{2}{7}$ ?

- (A) 16 : 56                      (B) 14 : 56  
 (C) 15 : 56                      (D) 16 : 72

**Q.16**

In what ratio must rice at Rs. 9.30 per kg be mixed with rice at Rs. 10.80 per kg so that the mixture be worth Rs. 10 per kg?

**Q.17**

In what ratio must tea at Rs. 62 per kg be mixed with tea at Rs. 72 per kg so that the mixture must be worth Rs. 64.50 per kg?

- (A) 3 : 1                        (B) 3 : 2  
 (C) 4 : 3                        (D) 5 : 3

**Q.18**

A merchant has 1000 kg of sugar, part of which he sells at 8% profit and the rest at 18% profit. He gains 14% on the whole. The quantity sold at 18% profit is:

- (A) 400 kg                      (B) 560 kg  
 (C) 600 kg                      (D) 640 kg

**Q.19**

Tea worth Rs. 126 per kg and Rs. 135 per kg are mixed with a third variety in the ratio 1 : 1 : 2. If the mixture is worth Rs. 153 per kg, the price of the third variety

water in the ratio 27 : 7. How much more water is to be added to get a new mixture containing milk and water in the ratio 3 : 1?

- (A) 5 lit.                        (B) 6.5 lit.  
 (C) 7.25 lit.                    (D) 8 lit.

square of its length. The price of 10 m length of wire is Rs. 1600. What would be the total price (in Rs.) of two wires of lengths 4 m and 6 m?

- (A) 768                        (B) 832  
 (C) 1440                        (D) 1600

**[GATE 2018 : IIT Guwahati (CE Set-1, EC Set-1)]**

**Q.21** In what ratio must water be mixed with milk to gain 20% by selling the mixture at cost price?

**Q.22** The milk and water in two vessels A and B are in the ratio 4 : 3 and 2 : 3 respectively. In what ratio, the liquids in both the vessels be mixed to obtain a new mixture in vessel C containing half milk and half water?

**Q.23** Two vessels A and B contain milk and water mixed in the ratio 8 : 5 and 5 : 2 respectively. Find the ratio in which these mixture be mixed to get a new mixture containing  $69\frac{3}{13}\%$  milk, is:

- (A) 2 : 7                        (B) 3 : 5  
 (C) 5 : 2                        (D) 5 : 7

**Q.24** A container contains 40 litres of milk. From this containers 4 litres of milk was taken out and replaced by water. This process was repeated further two times. How much milk is now contained by the container?

- (A) 26.34 litres                (B) 27.36 litres  
 (C) 28 litres                    (D) 29.16 litres

**[GATE 2012 : IIT Delhi]**

**Q.25** 8 litres are drawn from a cask full of wine and is then filled with water. This operation is performed three more times. The ratio of the quantity of wine now left in cask to that of the water is 16 : 65. How much wine did the cask hold originally?

- (A) 18 litres                    (B) 24 litres  
 (C) 32 litres                    (D) 42 litres

**Q.26** A and B start a business with capital of

per kg will be:

- (A) Rs. 169.50      (B) Rs. 170  
(C) Rs. 175.50      (D) Rs. 180

**Q.20** The price of a wire made of a super alloy material is proportional to the

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General Aptitude

**Q.27** A start a business with Rs. 25,000. After 6 months B Joins A with 15,000. Find their profit sharing ratio after 1 year.

- (A) 7 : 3      (B) 5 : 3  
(C) 10 : 3      (D) 10 : 6

**Q.28** A, B and C start a business. A invests 3 times as much as B invest. B invest  $\frac{2}{3}$ rd of what C invests. At the end of the year, they get Rs. 6600 as a profit. Find B's share in the profit.

- (A) 800      (B) 1000  
(C) 1200      (D) 1500

**Q.29** The ratio of age of two students is 3 : 2. One is older to the other by 5 years. What is the age of the Younger Student?

- (A) 2 years      (B) 10 years  
(C)  $2\frac{1}{2}$  years      (D) 15 years

**Q.30** The ratio between Sumits and Prakash's age at present is 2 : 3. Sumit

Rs. 20,000 and Rs. 10,000 respectively. They get the profit after one year in ratio?

- (A) 2 : 1      (B) 3 : 2  
(C) 4 : 3      (D) 1 : 1



is 6 years younger than Prakash. The ratio of Sumit's age to Prakash's age after 6 years will be

- (A) 2 : 3      (B) 1 : 2  
(C) 4 : 3      (D) 3 : 4

**Q.31** The ratio of the ages of two persons is 4 : 7 and the age of one of them is greater than that of the other by 30 years. The sum of their ages (in years) is

- (A) 110      (B) 100  
(C) 70      (D) 40

**Q.32** Four years ago the ratio of the age of A & B was 2 : 3 and after four years it will become 5 : 7. Find their present age.

- (A) 36 yrs & 40 yrs  
(B) 32 yrs & 48 yrs  
(C) 40 yrs & 56 yrs  
(D) 36 yrs & 52 yrs

### Practice Questions

**Q.1** The wt. of 4 students in a class is 48 kg, 52 kg, 60 kg, and 40 kg. Find the avg. weight of class.

- (A) 45 kg.      (B) 50 kg.  
(C) 55 kg.      (D) 60 kg.

**Q.2** The avg. wt. of 37 students in a class is 42 kg. When their teachers join the group, average wt. increases by 1 kg. Find the wt. of teacher.

- (A) 70 kg.      (B) 74 kg.  
(C) 76 kg.      (D) 80 kg.

**Q.3** The avg. wt. of 47 students in a class is 52 kg. When their friend join the group, the avg. wt. increase by half kg.

- (A) 72 kg.      (B) 74 kg.  
(C) 76 kg.      (D) 80 kg.

**Q.4** The avg. wt. of 5 students in a class is 62 kg. One of the student need to be replaced by other student. So that the avg. wt. of the class will increase by 2 kg. If the wt. of replaced student is 60 kg. Then, Find the wt. of new student.

discover that the height of one of the girl is wrongly spelt as 151 cm. whereas her actual height is 112 cm. Find the new avg. height of the class after correction.

- (A) 156 cm.      (B) 157 cm.  
(C) 157.5 cm.      (D) 162 cm.

**Q.6** The avg. temp of a city is  $20^{\circ}\text{C}$  on Monday, Thue Wed, Thu and is  $30^{\circ}\text{C}$  on Thu, Fri, Sat & Sun. the avg. temp of the city of the Whole Week is  $25^{\circ}\text{C}$ . find the temp of the city on Thursday (in degree Celsius).

- (A) 25      (B) 27  
(C) 30      (D) 32

**Q.7** Two numbers are in the ratio 1 : 2. if 7 is added to both, their ratio changes to 3 : 5. the greatest number is :

- (A) 24      (B) 26  
(C) 28      (D) 32

**Q.8** Rs.366 are divided amongst A, B and C so that A may get  $\frac{1}{2}$  as much as B and

(A) 62 kg.

(C) 68 kg.

(D) 70 kg.

- Q.5** The avg. height of 39 girls in a class is found to be 158 cm. It was later

C together, B may get  $\frac{2}{3}$  as much as A

and C together, then the share of A is

- (A) Rs.122                    (B) Rs.129.60  
 (C) Rs.146.60                (D) Rs.183

- Q.9** An amount of Rs.735 was divided between A, B and C. If each of them had received Rs.25 less, their shares would have been in the ratio of 1: 3:2. The money received by C was :  
 (A) Rs.195                    (B) Rs.200  
 (C) Rs.225                    (D) Rs.245

- Q.10** In a college, the ratio of the number of boys to girls is 8: 5. If there are 160 girls, the total number of students in the college is :  
 (A) 100                        (B) 250  
 (C) 260                        (D) 416

- Q.11** The least whole number which when subtracted from both the terms of the ratio 6 : 7 gives a ratio less than 16 : 21 is :  
 (A) 2                            (B) 3  
 (C) 4                            (D) 6

- Q.12** Avg. of 11 observations was 20. If the avg. of 1<sup>st</sup> six of them is 20. And that of last six is 15. Find the 6<sup>th</sup> observation (in degree Celsius).  
 (A) 10                         (B) 15  
 (C) 20                         (D) 25

- Q.13** A and B together have Rs.1210. If  $\frac{4}{15}$  of A amount is equal to  $\frac{2}{5}$  of B's amount.

How much amount does B have?

- (A) Rs.460                    (B) Rs.484  
 (C) Rs.550                    (D) Rs.664

- Q.14** The cost of Type 1 rice is Rs. 15 per kg and Type 2 rice is Rs. 20 per kg. If both Type 1 and Type 2 mixed in the ratio of 2 : 3, then the prices per kg of the mixed variety of rice is:  
 (A) Rs. 18                    (B) Rs. 18.50  
 (C) Rs. 19                    (D) Rs. 19.50

- Q.15** In what ratio must water be mixed with milk costing Rs. 12 per litre to obtain a mixture worth of Rs. 8 per litre?  
 (A) 1 : 2                      (B) 2 : 1  
 (C) 2 : 3                      (D) 3 : 2

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

- Q.17** 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 process is repeated one more time. How much spirit is now left in the container?

- (A) 7.58 litres              (B) 7.84 litres  
 (C) 7 litres                    (D) 7.29 litres

- Q.18** The ratio of the number of boys and girls who participated in an examination is 4:3. The total percentage of candidates who passed the examination is 80 and the percentage of girls who passed is 90. The percentage of boys who passed is

- (A) 90.00                    (B) 80.50  
 (C) 55.50                    (D) 72.50

**[GATE 2019 : IIT Madras]**

- Q.19** A and B start a business with capital of Rs. 2,00,000 and Rs. 1,00,000 respectively. They get Rs. 60,000 as a profit in the end of the year. Find the difference of A's & B's project.

- (A) 10,000                    (B) 15,000  
 (C) 20,000                    (D) 25,000

- Q.20** A and B start a business with Rs. 30,000 & Rs. 20,000 respectively. After 4 month C joins them with the capital of Rs. 10,000 & again after 4 months A takes away half of his capital. Find their profit sharing ratio at the end of the year.

- (A) 12 : 8 : 5                (B) 15 : 10 : 8  
 (C) 15 : 12 : 4              (D) 8 : 6 : 3

- Q.21** The ratio of A's, B,s & C,s capital is 3 : 5 : 2. If the ratio of their time is 1 : 2 : 3, then find their profit sharing ratio.

**Q.16** Two alloys *A* and *B* contain gold and copper in the ratios of 2:3 and 3:7 by

(A) 3 : 10 : 6

(B) 3 : 8 : 6

(C) 2 : 5 : 8

(D) 3 : 5 : 2

**Q.22** The ratio of the age of Ram & Rahim 10 years ago was 1 : 3. The ratio of their age five years hence will be 2 : 3. Then ratio of their present age is

- (A) 1 : 2                          (B) 3 : 5  
 (C) 3 : 4                           (D) 2 : 5

**Q.23** A invest  $\frac{1}{6}$ th of the capital for  $\frac{1}{6}$ th of the times B invest  $\frac{1}{3}$ rd of the capital for  $\frac{1}{3}$ rd of the times and C invest rest of the capital for whole the time. Find profit sharing ratio.  
 (A) 1 : 4 : 8                      (B) 3 : 6 : 14  
 (C) 1 : 4 : 18                    (D) 1 : 6 : 14

**Q.24** Three containers have their volumes in the ratio 3 : 4 : 5. They are full of mixtures of milk and water. The mixtures contains milk and water in the

ratio of (4 : 1), (3 : 1) and (5 : 2) respectively. The contents of all these three containers are poured into a fourth container. The ratio of milk and water in the fourth container is:

- (A) 4 : 1                           (B) 151 : 48  
 (C) 157 : 53                      (D) 5 : 2

**Q.25** At present, the ratio of the age of Maya and chhaya is 6 : 5 and fifteen years from now, the ratio will get changed to 9 : 8. Maya's present age is

- (A) 21 years                        (B) 24 years  
 (C) 30 years                        (D) 40 years

**Q.26** The ratio of the present age of Puneet and Appu is 2 : 3. After 3 years the ratio of their age will be 3 : 4. The present age of Puneet is

- (A) 3 years                           (B) 6 years  
 (C) 9 years                           (D) 4 years

### Answer Key

Classroom Questions									
1.	D	2.	B	3.	B	4.	B	5.	C
6.	D	7.	C	8.	C	9.	B	10.	C
11.	D	12.	A	13.	A	14.	C	15.	A
16.	8:7	17.	A	18.	C	19.	C	20.	B
21.	1:5	22.	7:5	23.	A	24.	D	25.	B
26.	A	27.	C	28.	C	29.	B	30.	D
31.	A	32.	D						

Practice Questions									
1.	B	2.	D	3.	C	4.	D	5.	B
6.	A	7.	C	8.	A	9.	D	10.	D
11.	B	12.	A	13.	B	14.	A	15.	A
16.	B	17.	D	18.	D	19.	C	20.	C
21.	A	22.	B	23.	C	24.	C	25.	C
26.	B								

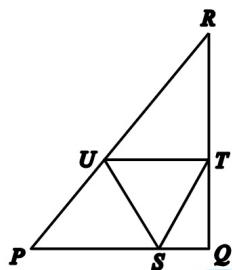
9

# Geometry & Measurement



## **Classroom Questions**

- Q.1** In the given figure 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 \_\_\_\_\_.

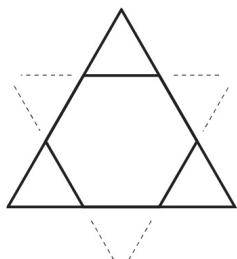


[GATE 2014 : IIT Kharagpur (IN, ME-3, MT,PI)]



[GATE 2018 : IIT Guwahati (CH IN MT)]

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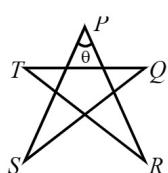


Corners are cut from an equilateral triangle to produce a regular convex hexagon as shown in the figure above. The ratio of the area of the regular convex hexagon to the area of original equilateral triangle is

- (A) 5 : 6                          (B) 3 : 4  
 (C) 4 : 5                          (D) 2 : 3

[GATE 2021 : IIT Bombay (EC)]

- Q.4** Following shape has equal length segments  $PR$ ,  $PS$ ,  $QS$ ,  $TR$  and  $TQ$  are of equal length, what will be the angle  $\theta$ ?






**Q.5** [GATE 2021 : IIT Bombay (IN, CE-1)] 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) 1.12      (B) 0.92



- Q.6** The smallest angle of a triangle is equal to two thirds of the smallest angle of a quadrilateral. The ratio between the angles of the quadrilateral is 3:4:5:6. The largest angle of the triangle is twice its smallest angle. What is the sum, in degrees, of the second largest angle of the triangle and the largest angle of the quadrilateral?

[GATE 2014 : IIT Kharagpur (CE-1, CH, MT)]



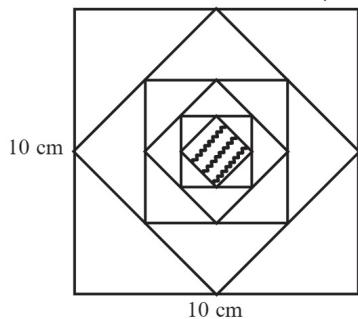
**Q.8** Consider a square sheet of side 1 unit. In the first step, it is cut along the main diagonal to get two triangles. In the next step, one of the cut triangle is revolved about its short edge to form solid cone. The volume of a resulting cone, in a cube units is .

- (A)  $\frac{2\pi}{3}$       (B)  $3\pi$   
(C)  $\frac{\pi}{3}$       (D)  $\frac{3\pi}{2}$

[GATE 2021 : IIT Bombay (EC)]

- In the figure shown above, each inside square is formed by joining the midpoints of the sides of the previous square.

points of the sides of the next larger square. The area of the smallest square (shaded has shown in  $\text{cm}^2$ ) is



- (A) 6.25      (B) 3.125  
(C) 12.50      (D) 1.5625

**[GATE 2021 : IIT Bombay EE]**

**Q.10** We have 2 rectangular sheets of paper, M and N, of Dimension  $6 \text{ cm} \times 1 \text{ cm}$  each. Sheet M is rolled to form an open cylinder by bringing short edges of the sheet together. Sheet N is cut into equal square patches and assembled to form largest possible closed cube. Assuming the ends of the cylinder are closed, ratio of the volume of the cylinder to that of the cube is \_\_\_\_\_.

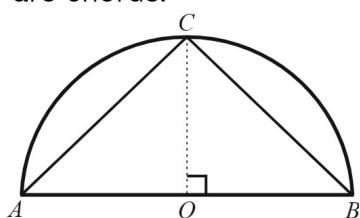
- (A)  $\frac{9}{\pi}$       (B)  $3\pi$   
(C)  $\frac{\pi}{2}$       (D)  $\frac{3}{\pi}$

**[GATE 2021 : IIT Bombay (CS-1)]**

**Q.11** A retaining wall with measurements  $30 \text{ m} \times 12 \text{ m} \times 6 \text{ m}$  was constructed with bricks of dimensions  $8 \text{ cm} \times 6 \text{ cm} \times 6 \text{ cm}$ . If 60% of the wall consists of bricks, the number of bricks used for the construction is \_\_\_\_\_ lakhs.  
(A) 30      (B) 40  
(C) 75      (D) 45

**[GATE 2019 : IIT Madras (CE-2)]**

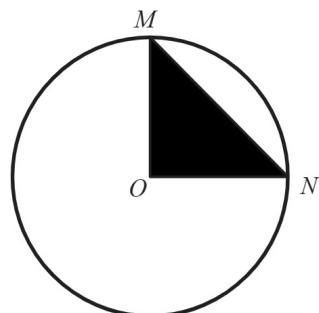
**Q.12** Given a semicircle with  $O$  as the centre, as shown in the figure, the ratio  $\frac{\overline{AC} + \overline{CB}}{\overline{AB}}$  is \_\_\_\_\_. where  $\overline{AC}$ ,  $\overline{CB}$  and  $\overline{AB}$  are chords.



- (A)  $\sqrt{3}$       (B) 3  
(C) 2      (D)  $\sqrt{2}$

**[GATE 2020 : IIT Delhi (EE)]**

**Q.13**

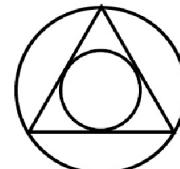


In the above figure,  $O$  is the center of the circle and,  $M$  and  $N$  lie on the circle. The area of the right triangle  $MON$  is  $50 \text{ cm}^2$ . What is the area of the circle in  $\text{cm}^2$ ?

- (A)  $2\pi$       (B)  $50\pi$   
(C)  $100\pi$       (D)  $75\pi$

**[GATE 2021 : IIT Bombay (ME-1)]**

**Q.14**



The ratio of the area of the inscribed circle to the area of the circumscribed circle of an equilateral triangle is \_\_\_\_\_.

- (A)  $1/6$       (B)  $1/8$   
(C)  $1/2$       (D)  $1/4$

**[GATE 2021 : IIT Bombay (ME-2)]**

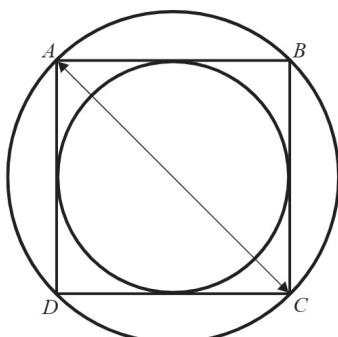
**Q.15** Circle  $A$  is 4 cm in diameter, circle  $B$  is 5 cm in diameter. Circle  $C$  has its circumference equal to the sum of the circumferences of both  $A$  and  $B$  together. What will be the ratio of the area of circle  $C$ , with respect to the area of circle  $A$  and circle  $B$  respectively?

**[ESE 2018]**

- (A) 5.0625 and 1.84  
(B) 3.875 and 1.84  
(C) 5.0625 and 3.24  
(D) 3.875 and 3.24

**Q.16** Consider following diagram :  $AC$  is a diameter of the large circle and  $AB = BC$ .

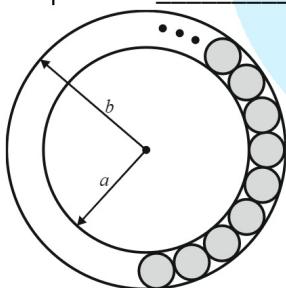
**[ESE 2019]**



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

- Q.17** The figure below shows an annular ring with outer and inner radii as  $b$  and  $a$ , respectively. The annular space has been painted in the form of blue colour circles touching the outer and inner periphery of annular space. If maximum  $n$  number of circles can be painted, then the unpainted area available in annular space is \_\_\_\_\_.



- (A)  $\pi[(b^2 - a^2) - n(b - a)^2]$   
(B)  $\pi[(b^2 - a^2) + n(b - a)^2]$   
(C)  $\pi\left[(b^2 - a^2) - \frac{n}{4}(b - a)^2\right]$   
(D)  $\pi\left[(b^2 - a^2) + \frac{n}{4}(b - a)^2\right]$

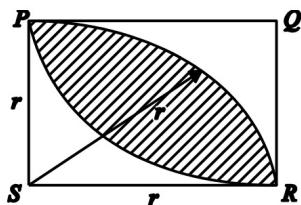
**[GATE 2020 : IIT Delhi (CS, IT)]**

- Q.18** 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)  $0.25x^2$

**[GATE 2016 : IISc Bangalore (CE-2, MT, PI)]**

- Q.19** In the figure  $PQRS$  is a square. the shaded portion is formed by intersection of sectors of circle with radius equal to the side of square and center at  $S$  and  $Q$ .



The probability that any point picked randomly within square falls in shaded area is

- (A)  $\frac{1}{2}$       (B)  $4 - \frac{\pi}{2}$   
(C)  $\frac{\pi}{2} - 1$       (D)  $\frac{\pi}{4}$

**[GATE 2021 : IIT Bombay (CE-2)]**

- Q.20** For a regular polygon having 10 sides, the interior angle between the sides of the polygon, in degree is

- (A) 324      (B) 216  
(C) 144      (D) 396

**[GATE 2021 : IIT Bombay (EE)]**

- Q.21** Arrange the following three-dimensional objects in the descending order of their volumes :

- (i) a cuboid with dimensions 10 cm, 8 cm and 6 cm.  
(ii) a cube of side 8 cm.  
(iii) a cylinder with base radius 7 cm and height 7 cm.  
(iv) a sphere of radius 7 cm.  
(A) (i), (ii), (iii), (iv)  
(B) (ii), (i), (iv), (iii)  
(C) (iii), (ii), (i), (iv)  
(D) (iv), (iii), (ii), (i)

**[GATE 2018 : IIT Guwahati (CH, IN, MT)]**

- Q.22** A rectangle becomes a square when its length and breadth are reduced by 10 m and 5 m respectively. During this process, the rectangle losses 650 m<sup>2</sup> of area. What is the area of the original rectangle in square meters?

- (A) 1125      (B) 2250  
(C) 2924      (D) 4500

**[GATE 2018 : IIT Guwahati (ME-1)]**

- Q.23** The perimeters of a circle, a square and an equilateral triangle are equal. Which one of the following statement is true?

- (A) The circle has the largest area.  
(B) The square has the largest area.  
(C) The equilateral triangle has the largest area



- (D) All the three shapes have the same area

[GATE 2018 : IIT Guwahati (ME-2, PI)]



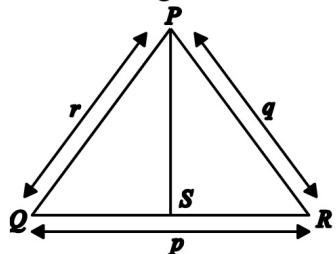
[GATE 2018 : IIT Guwahati (ME-2, PI)]

- Q.25** Suresh wanted to lay a new carpet in his new mansion with an area of  $70 \times 55$  sq.mts. However an area of 550 sq.mts., had to be left out for flower pots. If the cost of carpet is Rs.50 per sq.mts., how much money (in Rs.) will be spent by Suresh for the carpet now?

(A) Rs.1,65,000      (B) Rs.2,75,000  
(C) Rs.1,92,500      (D) Rs.1,27,500

[GATE 2019 : IIT Madras (CE-2)]

- Q.26** 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)  $\frac{(q+r)^2}{qr}$

[GATE 2015 : Kanpur (CS-2, EE-2)]

- Q.27** Consider two rectangular sheets, M and N of identical dimensions of  $6 \times 4$  cm each

**Folding operation (i) :** The sheet is folded into half by joining the short edges of the current shape.

**Folding operation (ii)** : The sheet is folded into half by joining the long edges of the current shape.

Folding operation (i) is carried out on sheet M 3 times.

Folding operation (ii) is carried out on sheet N 3 times.

The ratio of perimeters of the final folded shape of sheet N to the final folded shape of sheet M is.



**Q.28** In an equilateral triangle  $PQR$ , side  $PQ$  is divided in 4 equal parts, side  $QR$  is divided into 6 equal parts and  $PR$  is divided into 8 equal parts. The length of each sub-divided part in cm is an integer. The minimum area of triangle  $PQR$  possible, in  $\text{cm}^2$ , is



**Q.29** Consider a square sheet of side 1 unit. The sheet is first folded along the main diagonal. This is followed by a fold along its line of symmetry. The resulting folded shape is again folded along its line of symmetry. The area of each face of the final folded shape, in square units, equal to \_\_\_\_\_

- (A)  $\frac{1}{8}$       (B)  $\frac{1}{16}$   
(C)  $\frac{1}{4}$       (D)  $\frac{1}{3}$

**[GATE 2021 : IIT Bombay (ME-2)]**

**Q.30** A polygon is convex if, for every pair of points P and Q belonging to the polygon, the line segment PQ lies completely inside or on the polygon.

Which one of the following is NOT a convex polygon?

- (A)   
(B)   
(C)   
(D) 

**Q.31** If  $\theta$  is the angle, in degree, between the longest diagonal of the cube and any one of the edges of the cube, then  $\cos\theta =$

- (A)  $\frac{1}{\sqrt{3}}$       (B)  $\frac{1}{\sqrt{2}}$



- (C)  $\frac{1}{2}$  (D)  $\frac{\sqrt{3}}{2}$

**[GATE 2021 : IIT Bombay (CS-2)]**

- Q.32** A wall, rectangular in shape, has a perimeter of 72 m. If the length of its diagonal is 18 m, what is the area of the wall?

**[ESE 2018]**

- (A) 224 m<sup>2</sup> (B) 486 m<sup>2</sup>  
(C) 572 m<sup>2</sup> (D) 606 m<sup>2</sup>

- Q.33** 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 volume of the room is

**[ESE 2018]**

- (A) 900 m<sup>3</sup> (B) 1000 m<sup>3</sup>  
(C) 1200 m<sup>3</sup> (D) 1500 m<sup>3</sup>

- Q.34** In two concentric circles, a chord length 80 cm of larger circle becomes

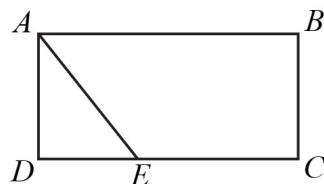
a tangent to the smaller circle whose radius is 9 cm. The radius of the larger circle will be

**[ESE 2019]**

- (A) 13 cm (B) 41 cm  
(C) 52 cm (D) 75 cm

- Q.35** Consider the rectangle ABCD with  $DE = \frac{1}{3}DC$  in the figure :

**[ESE 2020]**



When the area of the triangle ADE is 20 cm<sup>2</sup>, the area of the rectangle ABCD will be

- (A) 60 cm<sup>2</sup> (B) 80 cm<sup>2</sup>  
(C) 100 cm<sup>2</sup> (D) 120 cm<sup>2</sup>

### Practice Questions

- Q.1** If the length of the diagonal AC of a square ABCD is 5.2 cm, then the area of the square is :

- (A) 15.12 sq.cm (B) 13.52 sq.cm  
(C) 12.62 sq.cm (D) 10.00 sq.cm.

- Q.2** The length of the diagonal of a square is 'a' cm. Which of the following represents the area of the square (in sq. cm.) ?

- (A) 2a (B)  $\frac{a}{\sqrt{2}}$   
(C)  $a^2/2$  (D)  $a^2/4$

- Q.3** The diagonal of a square is  $4\sqrt{2}$  cm. The diagonal of another square whose area is double that of the first square is :

- (A)  $8\sqrt{2}$  cm (B) 16 cm  
(C)  $\sqrt{32}$  cm (D) 8 cm

- Q.4** The diagonal of a square A is  $(a+b)$ . The diagonal of a square whose area is twice the area of square A, is

- (A)  $2(a+b)$  (B)  $2(a+b)^2$   
(C)  $\sqrt{2}(a+b)$  (D)  $\sqrt{2}(a-b)$

- Q.5** The difference of the areas of two squares drawn on two line segments of different lengths is 32 sq.cm. Find the

length of the greater line segment if one is longer than the other by 2 cm.

- (A) 7 cm (B) 9 cm  
(C) 11 cm (D) 16 cm

- Q.6** If the diagonals of two squares are in the ratio of 2 : 5, their area will be in the ratio of

- (A)  $\sqrt{2} : \sqrt{5}$  (B) 2 : 5  
(C) 4 : 25 (D) 4 : 5

- Q.7** The perimeter of five squares are 24 cm, 32 cm, 40 cm, 76 cm and 80 cm respectively. The perimeter of another square equal in area to sum of the areas of these squares is:

- (A) 31 cm (B) 62 cm  
(C) 124 cm (D) 961 cm

- Q.8** The ratio of the area of a square to that of the square drawn on its diagonal is:

- (A) 1 : 1 (B) 1 : 2  
(C) 1 : 3 (D) 1 : 4

- Q.9** From four corners of a square sheet of side 4 cm, four pieces, each in the shape of arc of a circle with radius 2 cm, are cut out. The area of the remaining portion is :

- (A)  $(8 - \pi)$  sq.cm. (B)  $(16 - 4\pi)$  sq.cm.  
(C)  $(16 - 8\pi)$  sq.cm. (D)  $(4 - 2\pi)$  sq.cm.

- Q.10** The length of diagonal of a square is  $15\sqrt{2}$  cm. Its area is  
 (A)  $112.5 \text{ cm}^2$       (B)  $450 \text{ cm}^2$   
 (C)  $\frac{225\sqrt{2}}{2} \text{ cm}^2$       (D)  $225 \text{ cm}^2$
- Q.11** A kite in the shape of a square with a diagonal 32 cm attached to an equilateral triangle of the base 8 cm. Approximately how much paper has been used to make it? (Use  $\sqrt{3} = 1.732$ )  
 (A)  $539.712 \text{ cm}^2$       (B)  $538.721 \text{ cm}^2$   
 (C)  $540.712 \text{ cm}^2$       (D)  $539.217 \text{ cm}^2$
- Q.12** The breadth of a rectangular hall is three-fourth of its length. If the area of the floor is 768 sq. m., then the difference between the length and breadth of the hall is:  
 (A) 8 metres      (B) 12 metres  
 (C) 24 metres      (D) 32 metres
- Q.13** The length of a plot is five times its breadth. A playground measuring 245 square metres occupies half of the total area of the plot. What is the length of the plot?  
 (A)  $35\sqrt{2}$  metres      (B)  $175\sqrt{2}$  metres  
 (C) 490 metres      (D)  $5\sqrt{2}$  metres
- Q.14** The length of a rectangular garden is 12 metres and its breadth is 5 metres. Find the length of the diagonal of a square garden having the same area as that of the rectangular garden :  
 (A)  $2\sqrt{30}$  m      (B) 13 m  
 (C) 13 m      (D)  $8\sqrt{15}$  m
- Q.15** A circular wire of diameter 42 cm is folded in the shape of a rectangle whose sides are in the ratio 6 : 5 . Find

- the area enclosed by the rectangle.  
 (Take  $\pi = \frac{22}{7}$ )  
 (A)  $540 \text{ cm}^2$       (B)  $1080 \text{ cm}^2$   
 (C)  $2160 \text{ cm}^2$       (D)  $4320 \text{ cm}^2$
- Q.16** A took 15 sec. to cross a rectangular field diagonally walking at the rate of 52 m/min and B took the same time to cross the same field along its sides walking at the rate of 68 m/min. The area of the field is :  
 (A)  $30 \text{ m}^2$       (B)  $40 \text{ m}^2$   
 (C)  $50 \text{ m}^2$       (D)  $60 \text{ m}^2$

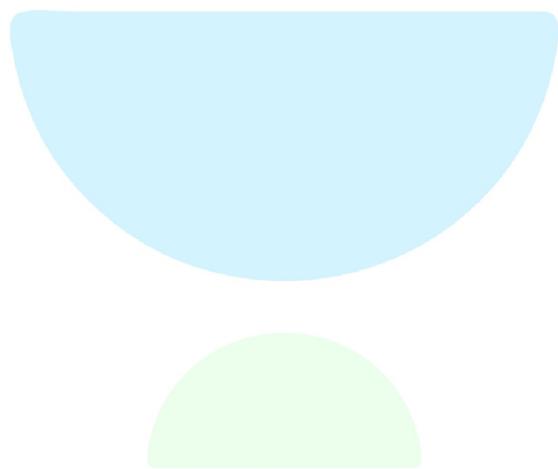
- Q.17** The difference between the length and breadth of a rectangle is 23 m. If its perimeter is 206 m, then its area is  
 (A)  $1520 \text{ m}^2$       (B)  $2420 \text{ m}^2$   
 (C)  $2480 \text{ m}^2$       (D)  $2520 \text{ m}^2$
- Q.18** There is a rectangular tank of length 180 m and breadth 120 m in a circular field. If the area of the land portion of the field is  $40000 \text{ m}^2$ , what is the radius of the field ? (Take  $\pi = \frac{22}{7}$ )  
 (A) 130 m      (B) 135 m  
 (C) 140 m      (D) 145 m
- Q.19** The length of a rectangular hall is 5m more than its breadth. The area of the hall is  $750 \text{ m}^2$ . The length of the hall is :  
 (A) 15 m      (B) 22.5 m  
 (C) 25 m      (D) 30 m
- Q.20** If the length and breadth of a rectangle are in the ratio 3 : 2 and its perimeter is 20 cm, then the area of the rectangle (in  $\text{cm}^2$ ) is :  
 (A) 24      (B) 48  
 (C) 72      (D) 96

### Answer Key

Classroom Questions									
1.	280	2.	C	3.	D	4.	A	5.	B
6.	180	7.	D	8.	C	9.	B	10.	A
11.	D	12.	D	13.	C	14.	D	15.	C
16.	C	17.	C	18.	D	19.	C	20.	C
21.	D	22.	B	23.	A	24.	C	25.	A
26.	B	27.	C	28.	B	29.	A	30.	C
31.	A	32.	B	33.	A	34.	B	35.	D

1.	B	2.	C	3.	D	4.	C	5.	B
6.	C	7.	C	8.	B	9.	B	10.	D
11.	A	12.	A	13.	A	14.	A	15.	B
16.	D	17.	D	18.	C	19.	D	20.	A

□□□



## **Classroom Questions**

- Q.1** Mola taxi offers 3 rides pool, mini, prime. Table given for number of rides for past 4 months mola platform earns 1 \$ per ride. %share of revenue contributed by prime to total revenue of mola for entire duration is

[GATE 2019 : IIT Madras]

Type	Months			
	Jan	Feb	Mar	Apr
Pool	170	320	215	190
Mini	110	220	180	70
Prime	75	180	120	90

- (A) 16.24      (B) 23.97  
(C) 38.74      (D) 25.86

- Q.2** Following table provides figures (in rupees) on annual expenditure of a firm for two years – 2010 and 2011.

<b>Category</b>	<b>2010</b>	<b>2011</b>
Raw material	5200	6240
Power & fuel	7000	9450
Salary & wages	9000	12600
Plant & machinery	20000	25000
Advertising	50000	19500
Research & development	22000	26400

In 2011, which of the following two categories have registered increase by same percentage?

- (A) Raw material and Salary & wages
  - (B) Salary & wages and Advertising
  - (C) Power & fuel and Advertising
  - (D) Raw material and Research & Development

[GATE 2013 : IIT Bombay (CE)]

- Q.3** Following table gives data on tourists from different countries visiting India in the year 2011.

<b>Country</b>	<b>Number of Tourists</b>
USA	2000
England	3500
Germany	1200
Italy	1100
Japan	2400
Australia	2300
France	1000

Which two countries contributed to the one third of the total number of tourists who visited India in 2011?

[GATE 2013 : IIT Bombay (CH)]

- (A) USA and Japan
  - (B) USA and Australia
  - (C) England and France
  - (D) Japan and Australia

- Q.4** 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 :

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

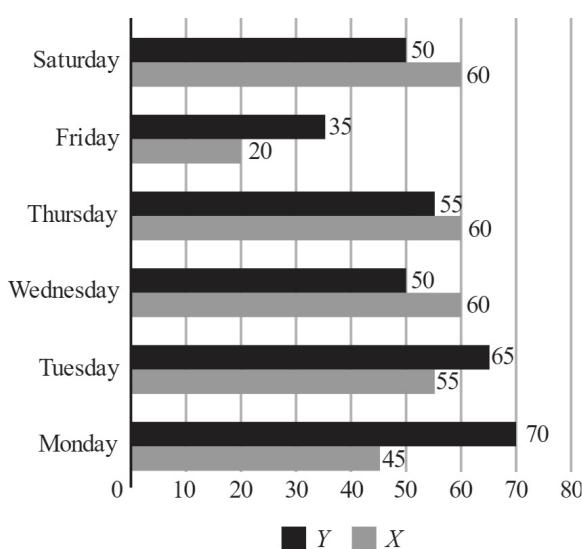
The stretch where the electricity consumption per km is minimum is

[GATE 2014 : IIT Kharagpur, (EC-2, ME-2)]

- (A)  $M$       (B)  $N$   
 (C)  $O$       (D)  $P$



- Q.7** The following graph represents the installed capacity for cement production (in tonnes) and the actual production (in tonnes) of nine cement



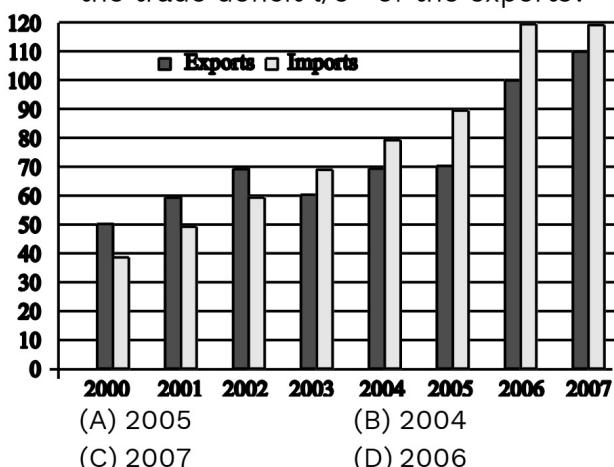
The number of minutes spent by two Students,  $X$  and  $Y$ , exercising every day in a given week are shown in the bar chart above.

The number of days in a given week in which one of the student spent a minimum of 10% more than the other student, on a given day, is

[GATE 2021 : IIT Bombay (EC)]



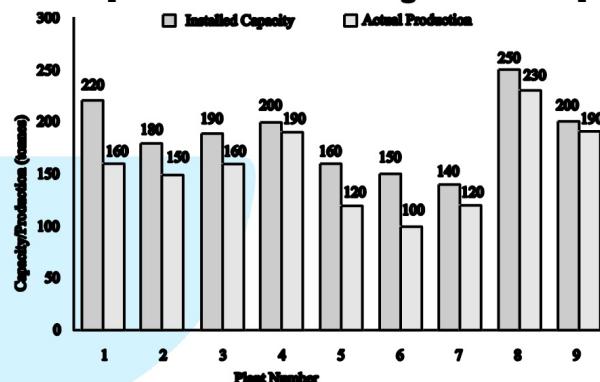
**Q.6** The exports and imports (in crores of Rs.) of a country from 2000 to 2007 are given in the following bar chart. If the trade deficit is defined as excess of imports over exports, in which year is the trade deficit  $\frac{1}{5}$ th of the exports?



[GATE 2014 : IIT Kharagpur (EC Set-1, ME Set-1)]

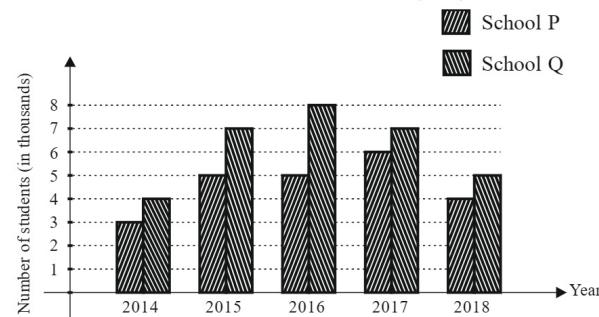
plants of a cement company. Capacity utilization of a plant is defined as ratio of actual production of cement to installed capacity. A plant with installed capacity of at least 200 tonnes is called a large plant and a plant with lesser capacity is called a small plant. The difference between total production of large plants and small plants, in tonnes is \_\_\_\_\_.

[GATE 2016 : IISc Bangalore EE - 2]



**Q.8** The following figure shows the data of students enrolled in 5 years (2014 to 2018) for two schools P and Q. During this period, the ratio of the average number of the students enrolled in school P to the average of the difference of the number of students enrolled in schools P and Q is

[GATE 2020 : IIT Delhi (EC)]



- ) 31 : 23      (B) 23 : 8  
 ) 23 : 31      (D) 8 : 23

**Q.9** The revenue and expenditure of four different companies P, Q, R and S in 2015 are shown in the figure. If the revenue of company O in 2015 was 20%

more than that in 2014 and company Q had earned a profit of 10% on expenditure in 2014, then its expenditure (in million rupees) in 2014 was \_\_\_\_\_.

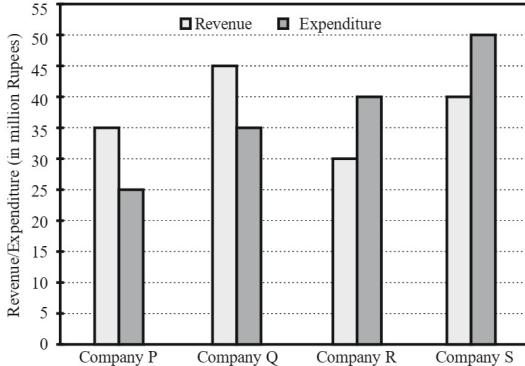
exam for the first time in the year 2<sup>nd</sup>  
and the year 3<sup>rd</sup> respectively are \_\_\_\_\_.

[GATE 2021 : IIT Bombay (EE)]



[GATE 2020 : IIT Delhi (EE)]

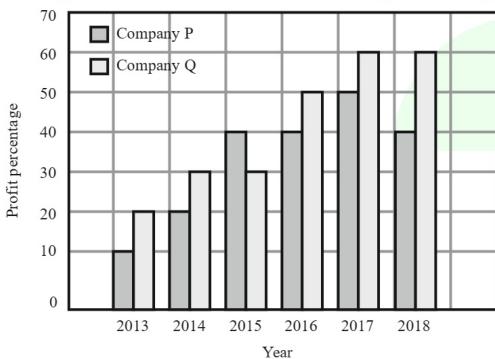
Revenue and Expenditure (in million Rupees) of four companies P, Q, R and S in 2015





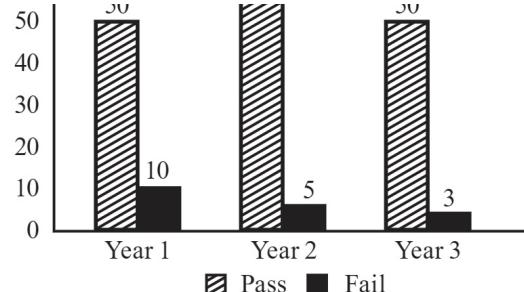

**Q.10** The profit shares of two companies P and Q are shown in the figure. If the two companies have invested a fixed and equal amount every year, then the ratio of the total revenue of company P to the total revenue of company Q, during 2013 – 2018 is \_\_\_\_\_.

[GATE 2020 : IIT Delhi (CH, BT)]



- (A) 15 : 17                          (B) 16 : 17  
(C) 17 : 15                          (D) 17 : 16

**Q.11** The number of student passing or failing in an exam for a particular subject is presented in the bar chart above. Students who pass the in exam cannot appear for the exam again. Students who fails the exam in the first attempt must appear for the exam in the following year. Students always pass the exam in their second attempt. The number of students who took the



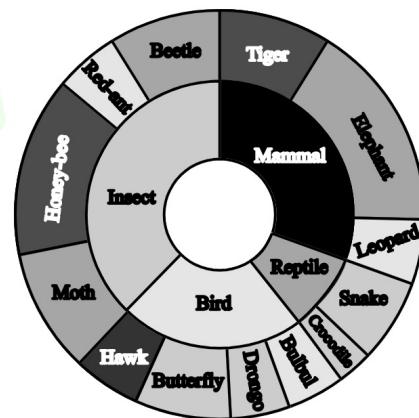
- (A) 53 and 48      (B) 55 and 53  
(C) 55 and 48      (D) 60 and 50

**Q.12** 40% of deaths on city roads may be attributed to drunken driving. The number of degrees needed to represent this as a slice of a pie chart is



[GATE 2017 : IIT Roorkee (EC, BT, PI Set – 1)]

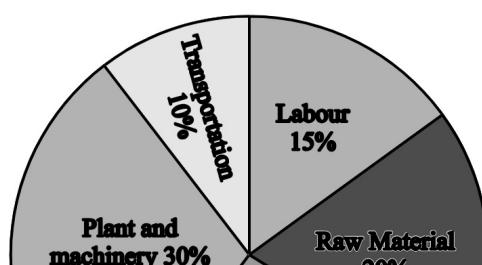
**Q.13** The multi-level hierarchical pie chart shows the population of animals in a reserve forest.



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.

[GATE 2014 : IIT Kharagpur (EC-3, ME-3)]

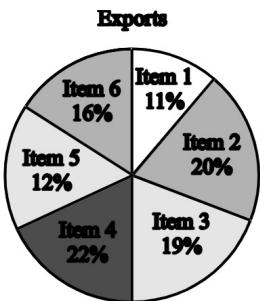


- (A) (i) and (ii) only
  - (B) (i), (ii), (iii) and (iv)
  - (C) (i), (iii) and (iv) only
  - (D) (i), (ii) and (iii) only

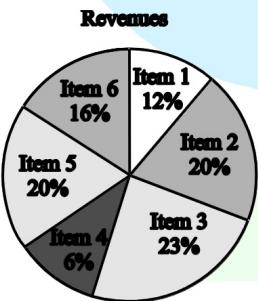
#### **Q.14** The total exports and revenues from

the exports of a country are given in the 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 tons 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 the item 4 per kilogram?

**[GATE 2014 : IIT Kharagpur (CE-2, IN, PI)]**

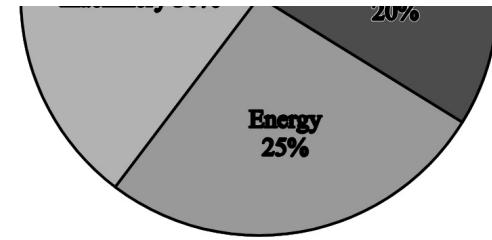


- (A) 1:2  
(B) 2:1  
(C) 1:4  
(D) 4:1



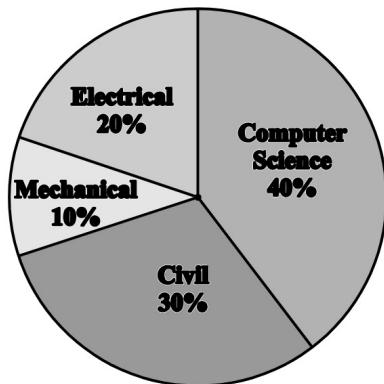
- Q.15** A firm producing air purifiers sold 200 units in 2012. The following pie chart presents the share of raw material, labour, energy plant and machinery, and transportation costs in the total manufacturing cost of the firm in 2012. The expenditure on labour in 2012 is Rs. 450000. In 2013, the raw material expenses increased by 30% and all other expenses increased by 20%. What is the percentage increase in total cost for the company in 2013?

**[GATE 2014 : IIT Kharagpur (EC-4, ME-4)]**



- Q.16** 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 number of female students in the Civil department and the female students in the Mechanical department?

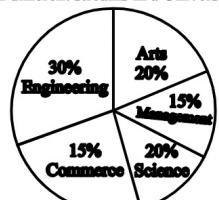
**[GATE 2015 IIT Kanpur (CS-1, EE-1)]**



- Q.17** The two pie-charts given below. Show the data of total students and only girls registered in different streams in a university. If the total number of students registered in the university students is 5000, and the total number of the registered girls is 1500; then the ratio of boys enrolled in Arts to the girls enrolled in the Management is \_\_\_\_\_.

**[GATE 2020 : IIT Delhi (ME-2, PI)]**

Percentage of students enrolled in different streams in a University

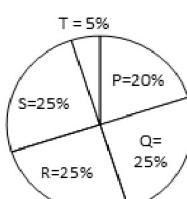


- (A) 2 : 1  
(C) 11 : 8

Percentage of girls enrolled in different streams



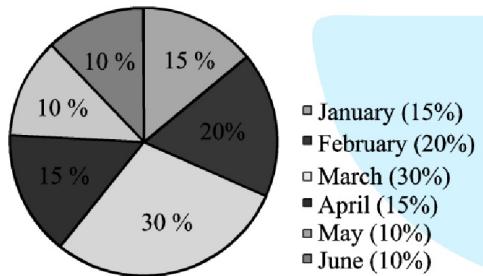
- (B) 9 : 22  
(D) 20 : 21



- Q.20**

**Q.18** The monthly distribution of 9 Watt LED bulbs sold by two firms  $X$  and  $Y$  from January to June 2018 is shown in the pie-chart and the corresponding table. If the total number of LED bulbs sold by two firms during April-June 2018 is 50000, then the number of LED bulbs sold by the firm  $Y$  during April-June 2018 is \_\_\_\_\_.

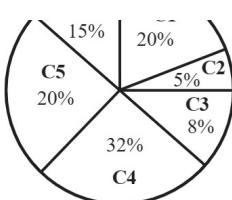
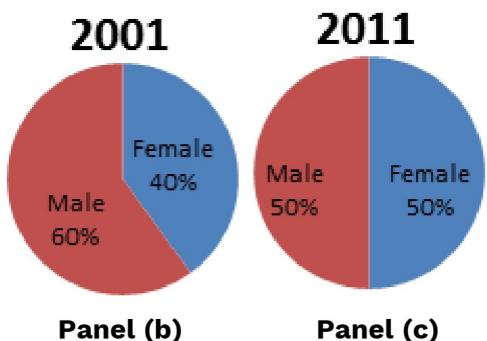
[GATE 2020 : IIT Delhi (CE-2)]



<b>Month</b>	<b>Ratio of LED bulbs sold by two firms (X:Y)</b>
January	7:8
February	2:3
March	2:1
April	3:2
May	1:4
June	9:11

- Q.19** In a company P, Q, R, S, T categories of employees' work. In 2010, total number of employees were 600. From 2010 to 2016 total number of employees increased by 15%. In S category number of employees were increased by 40% however, there is no change in number of employees in P, Q and R categories. Calculate number of T category employees in 2016?

[GATE 2019 : IIT Madras]



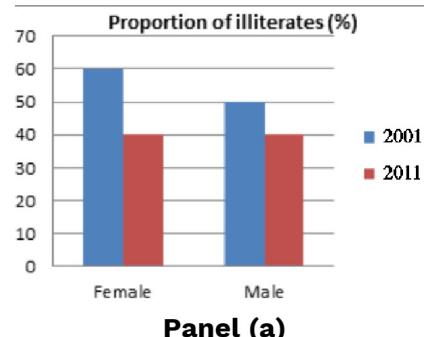
C1	3 : 2
C2	1 : 4
C3	5 : 3
C4	2 : 3
C5	9 : 1
C6	3 : 4

The distribution of employees at the rank of executives, across different companies C1, C2, ...., C6 is presented in the chart given above. The ratio of executives with a management degree to those without a management degree in each of these companies is provided in the table above. The total number of executives across all companies is 10,000. The total number of management degree holders among the executives in companies C2 and C5 together is .

[GATE 2021 : IIT Bombay ME-1]

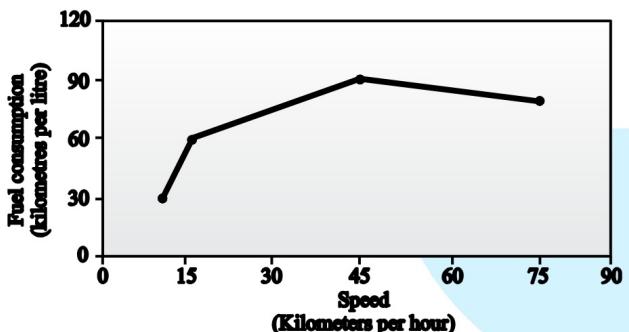


**Q.21** The bar graph in Panel (a) shows the proportion of male and female illiterates in 2001 and 2011. The proportions of males and females in 2001 and 2011 are given in Panel (b) and (c), respectively. The total population did not change during this period. The percentage increase in the total numbers of literates from 2001 to 2011 is \_\_\_\_\_.



- (A) 35.43      (B) 33.43  
 (C) 30.43      (D) 34.33

**Q.22** The fuel consumed by a motorcycle during a journey while traveling at various speeds is indicated in the graph below.



The distances 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 kilometers was least during the lap

**[GATE 2011 : IIT Madras (EC, EE, IN, MT)]**

- (A) P      (B) Q  
 (C) R      (D) S

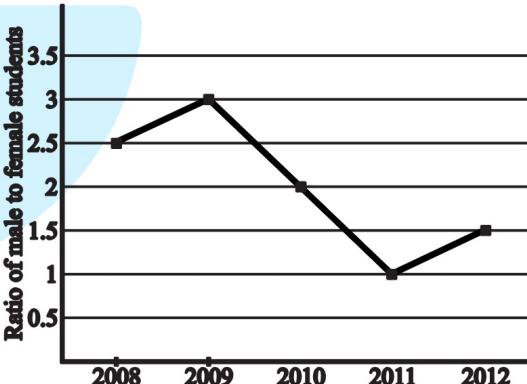
**Q.23** The ratio of male to female students in a college for five years is plotted in the following line graph. If the number of female students doubled in 2009, by what percent did the number of male students increase in 2009?

**[CS-2, EE-2]**

50

**Q.24** 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 in 2011 and 2012 is equal, what is the ratio of male students in 2012 to male students in 2011?

**[GATE 2014 : IIT Kharagpur (CS-3, EE-3)]**



- (A) 1 : 1      (B) 2 : 1  
 (C) 1.5 : 1      (D) 2.5 : 1

**Q.25** The data given in the following table summarizes the monthly budget of an average household

Category	Amount (Rs.)
Food	4000
Clothing	1200
Rent	2000
Savings	1500
Other expenses	1800

The approximate percentage of the monthly budget NOT spent on savings is

- (A) 10%      (B) 14%  
 (C) 81%      (D) 86%

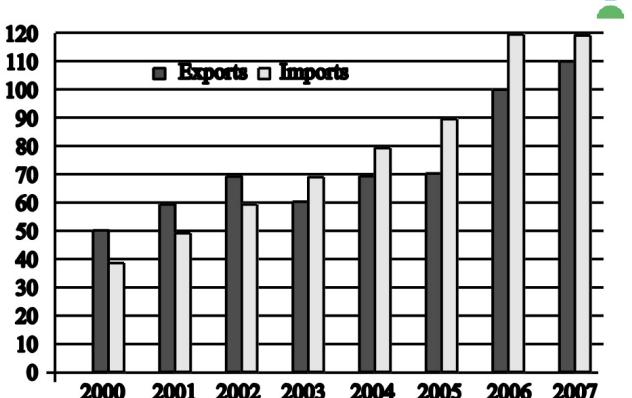
**[GATE 2012 : IIT Delhi (EC, EE)]**  
**Q.26** A shaving set company sells 4 different types of razors, Elegance, Smooth, Soft

General Aptitude

and Executive. Elegance sells at Rs. 48, Smooth at Rs. 63, Soft at Rs. 78 and Executive at Rs. 173 per piece. The table below shows the numbers of each razor sold in each quarter of a year.

Quarter/Product	Elegance	Smooth	Soft	Executive
Q1	27300	20009	17602	9999
Q2	25222	19392	18445	8942
Q3	28976	22429	19544	10234
Q4	21012	18229	16595	10109

Which product contributes the greatest fraction to the revenue of the company



**[GATE 2015 : IIT Kanpur (CE Set – 1, CSE Set**

in that year?

- (A) Elegance                      (B) Executive  
 (C) Smooth                        (D) Soft

**[GATE 2016 : IISc Bangalore  
 (CE Set – 1, CSE Set - 1)]**

- Q.27** The total runs scored by four cricketers P, Q, R, and S in years 2009 and 2010 are given in the following table :

Player	2009	2010
P	802	1008
Q	765	912
R	429	619
S	501	701

The player with the lowest percentage increase in total runs is

- [GATE 2012 : IIT Delhi (AE, AG, MN)]**  
 (A) P                              (B) Q  
 (C) R                              (D) S

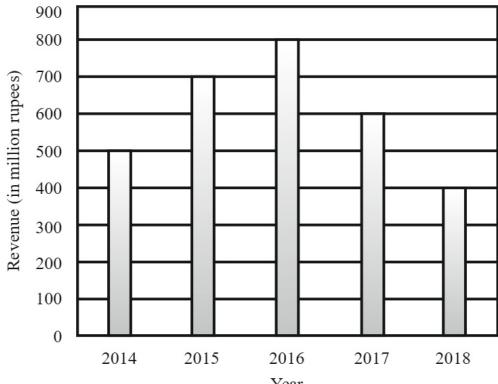
- Q.28** The statistics of runs scored in a series by four batsmen are provided in the following table. Who is the most consistent batsman of these four?

**[GATE 2014 : IIT Kharagpur, (EC-1, ME-1)]**

Batsman	Average	Standard deviation
K	31.2	5.21
L	46.0	6.35
M	54.4	6.22
N	17.9	5.90

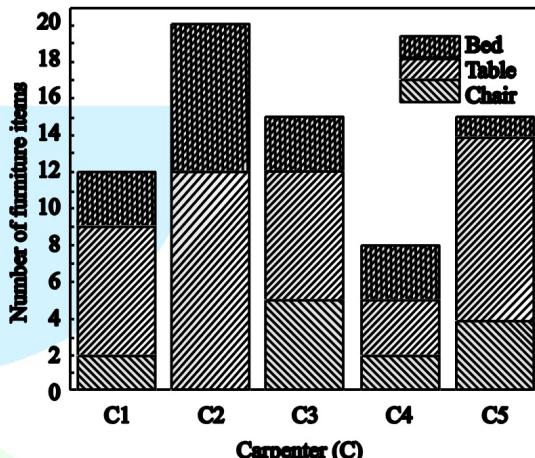
- (A) K                              (B) L  
 (C) M                              (D) N

- Q.29** The exports and imports (in crores of Rs.) of a country from the year 2000 to 2007 are given in the following bar chart. In which year is the combined percentage increase in imports and exports the highest?



- (A) 20% profit                      (B) 20% loss  
 (C) 16.67 % loss                  (D) 16.67% profit

- Q.30** The bar graph below shows the output of five carpenters over one month, each of whom made different items of furniture : chairs, tables, and beds.



Consider the following statements :

- (i) The number of beds made by carpenter C2 is exactly the same as the number of tables made by carpenter C3.  
 (ii) The total number of chairs made by all carpenters is less than total number of tables.

Which one of the following is true?

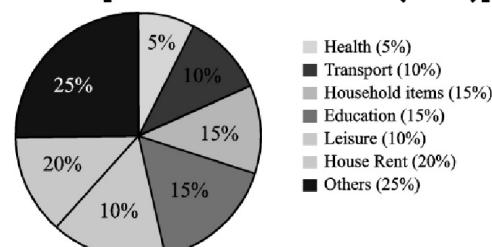
- (A) Only I                              (B) Only II  
 (C) Both I and II                    (D) Neither I Nor II

- [GATE 2017 IIT Roorkee (CE-1, CH)]**  
**Q.31** The total revenue of a company during 2014-2018 is shown in the bar graph. If the total expenditure of the company in each year is 500 million rupees, then the aggregated profit or loss (in percentage) on the total expenditure of the company during 2014-2018 is \_\_\_\_\_.

**[GATE 2020 IIT Delhi (CS, IT)]**

in the pie-chart. The extra money spent on education as compared to transport (in percent) is \_\_\_\_\_.

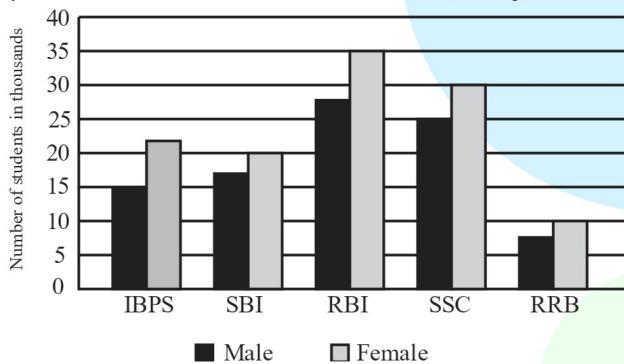
**[GATE 2020 IIT Delhi (CE-1)]**



- (A) 100                              (B) 50  
 (C) 33.3                            (D) 5

**Q.32** The total expenditure of a family, on different activities in a month, is shown

**Directions (Q. 1 - 5) :** Study the following graph carefully to answer these questions. Number of students (Males and Females) in thousands passed out from various exams in a year.



**Q.1** What is the difference between the total number of students passing out from IBPS Exam and the total number of students passing out from RRB Exam?

- (A) 20,500      (B) 21,000  
 (C) 10,500      (D) 10,000  
 (E) None of these

**Q.2** The number of Males passing out from IBPS Exam and SBI Exam together is what percent of the number of females passing out from RBI Exam and SSC Exam together?

- (A) 45      (B) 40  
 (C) 35      (D) 50  
 (E) None of these

**Q.3** The number of Females passed out from RBI Exam is approximately what

percent the total number of Females passed out from all the exams together?

- (A) 40 %      (B) 30 %  
 (C) 50 %      (D) 65 %  
 (E) 80 %

**Q.4** What is the average number of students (Males & Females) passed out from all the exams together?

- (A) 38000      (B) 48000  
 (C) 42000      (D) 51000  
 (E) None of these

**Q.5** What is the respective ratio of the total number of Males to the total number of Females passed out from all the exams together?

- (A) 37:47      (B) 18:25  
 (C) 23:19      (D) 25:18  
 (E) None of these

**Directions (Q.6 - 10) :** Study the following table carefully and answer the questions given below.

Amount invested by six different companies during six different months (in lakhs)

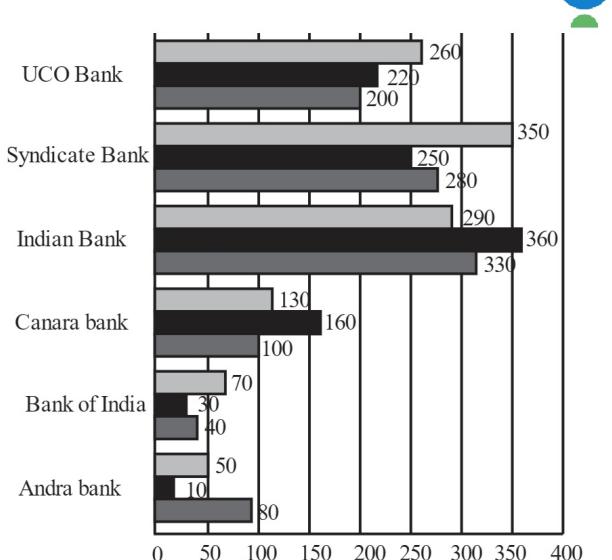
Company → Month↓	A	B	C	D	E	F
January	25	28	50	32	24	35
February	45	40	60	55	28	38
March	52	38	46	72	83	65
April	80	45	70	90	65	76

May	15	20	47	25	13	30
June	62	95	27	80	50	20

**Q.6** What is the difference between the investment made by company A and E together in March and company B and D together in January (in lakh)?

- (A) 75      (B) 65  
 (C) 50      (D) 85  
 (E) None of these

**Q.7** What is the average of investment made by company C in May, D in



February and E in January (in lakhs)?

- (A) 22                    (B) 36  
(C) 42                    (D) 46  
(E) None of these

**Q.8** In which month was the investment made by companies maximum?

- (A) March                (B) April  
(C) May                   (D) June  
(E) Other than given in the options

**Q.9** By what percent approximately is the investment made by company A in June less than that by company D in the same month?

- (A) 23%                  (B) 12%  
(C) 35%                  (D) 42%  
(E) 55%

**Q.10** What was the average investment made by company F during all the months (in lakhs)?

- (A) 34                    (B) 43  
(C) 32                    (D) 44  
(E) 42

**Directions (Q. 11 - 15) :** In the following graph, the number of selected candidates for 6 different banks in three different years 2015, 2016 and 2017 has been shown.

Read the graph carefully and answer the questions.

□ 2017 ■ 2016 ■ 2015

**Q.11** What is the respective ratio between the average number of candidates selected in all banks in 2015 and 2017?  
(A) 113 : 105            (B) 102 : 111  
(C) 113 : 115            (D) 115 : 103  
(E) 103 : 115

**Q.12** The number of candidates recruited for Syndicate Bank in 2016 is approximately what percentage of total candidates recruited in that year?  
(A) 40%                  (B) 25%  
(C) 10%                  (D) 55%  
(E) 65%

**Q.13** The total number of candidates recruited for Andra Bank in all the years is approximately what percent of the total candidates recruited in 2015 in all banks?  
(A) 60%                  (B) 40%  
(C) 25%                  (D) 15%  
(E) 35%

**Q.14** What is the ratio between the number of all candidates selected in 2015 and selected candidates of Canara Bank and UCO Bank in all three years?  
(A) 103 : 107            (B) 101 : 103  
(C) 103 : 112            (D) 107 : 103  
(E) 104 : 109

**Q.15** The number of candidates recruited for Canara Bank and Indian Bank in 2017 is approximately what percent of the candidates recruited for UCO Bank and Andra Bank by the 2017?

- (A) 125%                (B) 110%  
(C) 135%                (D) 140%  
(E) 145%

**Directions (Q.16 - 20):** Study the following table carefully answer the questions given below:

Number of shirts of different prices bought over the years.

Price	Years					
	2011	2012	2013	2014	2015	2016
More than 5,000	50	106	2	30	25	75
4,000-5000	105	1000	40	105	400	375
3,000-3,999	70	100	80	115	200	240
2,000-2,999	300	500	100	216	135	300
1,000-1,999	140	370	200	225	175	470
500-999	200	700	15	400	75	530
Less than	65	135	111	188	25	65

**Q.17** What is the ratio between the number of shirts in price range 4000 - 5000 bought in 2011 and 2015 together and number of shirts in price range 1000 - 1999 bought in 2012 and 2016 together?  
(A) 168 : 101            (B) 103 : 174  
(C) 91 : 159            (D) 101 : 168  
(E) None of these

**Q.18** What is the difference between the number of shirts bought in 2015 and 2016?  
(A) 950                  (B) 1080  
(C) 1020                  (D) 1210  
(E) 1460

**Q.16** In the price range of 1000 - 1999 the number of shirts bought in 2011 and 2016 together is approximately what percent of the number of shirts bought in 2013 and 2015 in the 2000 – 2999 price range?

- (A) 225 %                          (B) 260 %  
(C) 280 %                          (D) 245 %  
(E) 200 %

Q. 19

III WHICH year maximum number of shirts was bought?



# Answer Key

Classroom Questions									
1.	B	2.	D	3.	C	4.	D	5.	D
6.	D	7.	120 tonne	8.	B	9.	A	10.	B
11.	C	12.	B	13.	D	14.	D	15.	Rs.20000
16.	32	17.	D	18.	B	19.	60	20.	C
21.	C	22.	B	23.	140%	24.	C	25.	D
26.	D	27.	B	28.	A	29.	2006	30.	C
31.	A	32.	B						

## Practice Questions

1.	E	2.	D	3.	B	4.	C	5.	A
6.	A	7.	C	8.	B	9.	A	10.	D
11.	E	12.	B	13.	D	14.	A	15.	C
16.	B	17.	D	18.	C	19.	A	20	E



11

# Analytical Aptitude



## **Classroom Questions**

## 11.1 Direction & Distance

**Q.1** Mr. Vivek walks 6 meters North-East, then turns and walks 6 meters South-East, both at 60 degrees to East. He further moves 2 meters South and 4 meters West. What is the straight distance in meters between the point he started from and the point he finally reached?



**Q.5** On a planer field, you travelled 3 units East from a point O. Next you travelled 4 units South to arrive at point P. Then you travelled from P in North-East direction such that you arrive at a point that is 6 units East of point O. Next, you travelled in the North-West direction, so that you arrive at point Q that is 8 units North of point P. The distance of point Q to point O, in same units, should be

(C)  $\sqrt{2}$

(D)  $1/\sqrt{2}$

**[GATE 2015 : IIT-Kanpur (CE-2)]**

**Q.2** Fatima starts from point P, goes North for 3 km and then East for 4 km to reach point Q. She then turns to face point P and goes 15 km in that direction. She then goes North for 6 km. How far is she from point P, and in which direction should she go to reach point P?

- (A) 8 km, East      (B) 12 km, North  
(C) 6 km, East      (D) 10 km, North

**[GATE 2017 IIT-Roorkee (EC-2)]**

**Q.3** 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

- (A) 3 hours      (B) 5 hours  
(C) 7 hours      (D) 21 hours

**[ESE 2019]**

**Q.4** A man walked 3 km towards East, then 5 km towards North-East, then 8 km towards South and finally 5 km towards North-East direction. The distance of his present location from the starting point will be

- (A) 9 km      (B) 11 km  
(C) 15 km      (D) 21 km

**[ESE 2020]**

(A) 6 units

(B) 4 units

(C) 5 units

(D) 3 units

**[GATE 2021 IIT-Bombay [AE, AR, BM, CE-2, MN, PH]]**

**Q.6** I am standing at the center of the circular field from where I go down south to the edge of the circular field, From where I turn to left & walk along with the boundary of the circle covering its three-eighth, from where I turn to my WEST & walk right across to the end of the circle. In which direction I am from Starting Point?

- (A) North-east      (B) North-west  
(C) South-east      (D) South-west

**Q.7** K is to the north of J and I is to the east of N, who is to the east of J and south east of K. M is to the south of I and L is to the north of N.

L is in which direction with respect to M?

- (A) East      (B) North-East  
(C) South-East      (D) NOT

**Q.8** X is 1 km North-East of Y. Y is 1 km South-East 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

**[GATE 2014 : IIT-Kharagpur (CE-2, IN, PI)]**



**Q.9** There are five buildings called V, W, X, Y and Z in a row (not necessarily in that order). V is to the West of W, Z is to the East of X and the West of V, W is to the West of Y. Which is the building in the middle?

- (A) V      (B) W  
(C) X      (D) Y

**[GATE 2017 : IIT-Roorkee(CS-2, EE-2)]**

**Q.10** One day Sonu and Pinky was seating in a park on a bench, Facing each other. At that time sonu's shadow was to the Right of Pinky.

In which direction Pinky was facing?

- (A) East      (B) South  
(C) North      (D) Either B or C

**Q.11** One Evening Sonu and Pinky was seating in a park on a bench, After some time they started jogging. after

**11.2 Clock**

**Q.1** If we move the hour hand of a clock towards clockwise direction by  $85^\circ$  angle which is showing 4 am, then what will be the time in clock.

**Q.2** Find the angle between minute hand & Hour Hand at 04:12.

**Q.3** At what time between 6 am and 7 am will the minute hand and hour hand of a clock make an angle closest to  $60^\circ$ ?

- (A) 6:22 am      (B) 6.27 am  
(C) 6:38 am      (D) 6:45 am

**[GATE 2014 : IIT KHA (CS-2, EE-2)]**

**Q.4** It is quarter past three in your watch. The angle between the hour hand and the minute hand is \_\_\_\_\_.

- (A)  $22.5^\circ$       (B)  $15^\circ$

crossing Each other Sonu's shadow was to the Left of Pinky. In which direction Sonu is facing?

- (A) North (B) South  
(C) Either A or B (D) None of these
- Q.12** One Evening Sejal was seating on a Beach watching sunset and Harry was seeing her. In which Direction harry was Facing?

- (A) North (B) South  
(C) Either A or B (D) None of these

- Q.13** Ms. X came out of a building through its front door to find her shadow due to the morning sun falling to her right side with the building to her back. From this, it can be inferred that building is facing
- (A) North (B) East  
(C) West (D) South

**[GATE 2021 : IIT-Bombay (ME – 1, XH)]**

- Q.14** The front door of Mr. X's house faces East. Mr. X leaves the house, walking 50 m straight from the back door that is situated directly opposite to the front door. He then turns to his right, walks for another 50 m and stops. The direction of the point Mr. X is now located at with respect to the starting point is
- (A) North-West (B) North-East  
(C) South-East (D) West

**[GATE 2021 : IIT-Bombay (ME – 1, MT)]**

(C)  $7.5^\circ$

(D)  $0^\circ$

**[GATE 2020 : IIT Delhi (EC)]**

- Q.5** Find the time between 4 to 5 at which minute hand & hour hand will coincide?

OR

At what time between 4 to 5 distance between minute hand & hour hand will  $0^\circ$ ?

- Q.6** Find the time between 4 to 5 at which minute hand & hour hand will Opposite to each other?

OR

At what time between 4 to 5 distance/Angle between minute hand & hour hand will  $180^\circ$ ?

- Q.7** Find the time between 8 to 9 at which minute hand & hour hand will make straight line?

- Q.8** Find the time between 4 to 5 at which minute hand & hour hand will make Right Angle?

OR

At what time between 4 to 5 distance/Angle between minute hand & hour hand will  $90^\circ$ ?

- Q.9** A watch uniformly gains 5 min per hour. It was set right on 6 am Monday.

What time it will show on 7 pm of same day?



- Q.10** A watch loses 5 min every hour and was set right at 6 am on a Monday. When will it show the correct time again?

- Q.11** A clock gain 1 hour in each 24 hour. If clock shows correct time on Sunday 9 am then what is the correct time, when clock shows 11:00 am Tuesday?

- Q.12** A clock gain 10 minute per hour. At 03:00 am Monday it set right, after few days when it was checked it was showing 03:00 am Wednesday, what is the correct time?

- Q.13** A watch which gains uniformly, was observed to be 5 min slow at 12:00 noon on Monday. It was noticed 10 min fast at 6 pm on the next day. When did the watch show the correct time?

- Q.14** A wall clock gains 5 min per hour while a table clock looses 10 min per hour. They both set right at 10:00 am on Sunday when both of the clock will

and daughter-in-law of M. How is P related to M?

- (A) P is the son-in-law of M.  
(B) P is the grandchild of M.  
(C) P is the daughter-in law of M.  
(D) P is the grandfather of M.

**[GATE 2016 : IISc Bangalore (EC-3, IN)]**

- Q.2** Each of P, Q, R, S, W, X, Y and Z has been married at most once. X and Y married and have two children P and Q, Z is grandfather of the daughter 'S' of P. Further Z and W married and are parents of R. Which one of the following must necessarily be FALSE?

- (A) X is the mother-in-law to R  
(B) P and R are not married to each other  
(C) P is son of X and Y  
(D) Q cannot be married to R

**[GATE 2016 : IIT Roorkee (EC-2)]**

Sunday, when both of the clock will show the same time again?

**Q.15** A wall clock gains 02 min per 12 hour while a table clock loses 02 min per 36 hour.

They both set right at 12:00 am on Monday, when both of the clock will show the same time again?

**Q.16** A faulty wall clock is known to gain 15 minutes every 24 hours. It is synchronized to the correct time at 9 AM on 11th July. What will be the correct time to the nearest minute when the clock shows 2 PM on 15th July of the same year?

- (A) 12:45 PM      (B) 12:58 PM  
(C) 1:00 PM      (D) 2:00 PM

**[GATE 2021 : IIT Guwahati (CE-2)]**

**Q.17** 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

**[GATE 2016 : IISc-Banglore (EC-2, ME-3)]**

### 11.3 Blood Relation

**Q.1** M has a son Q and a daughter R. He has no other children. E is the mother of P

General Aptitude



**Q.6** Pointing to a man in a photograph a woman says, He is the father-in-law of the wife of only grandson of my own father-in-law.

How is woman related to man?

- (A) Son      (B) Wife  
(C) Cousin      (D) Nephew

**Q.7** Pointing towards Neha, Samar said 'I am the only son of her mother's son.'

How is Neha related to Samar?

- (A) Aunt      (B) Niece  
(C) Mother      (D) Cousin

**Q.8** These questions are based on the following information.

'X @ Y' Means 'X is the mother of Y'

'X \$ Y' Means 'X is the husband of Y'

'X # Y' Means 'X is the sister of Y'

'X \* Y' Means 'X is the son of Y'

M \* H @ D \* K, in this what is relation of K with M?

- (A) Mother      (B) Father

**Q.3**

P, Q, R, S and T are related and belong to the same family. P is the brother of S. Q is the wife of P, R and T are the children of the siblings P and S respectively. Which one of the following statements is necessarily FALSE?

- (A) S is the sister-in-law of Q  
(B) S is the aunt of R  
(C) S is the brother of P  
(D) S is the aunt of T

**[GATE 2019 : IIT Madras (CE-1)]**

**Q.4**

M and N had four children (P, Q, R and S) of them, only P and R are married. They had children X and Y respectively. If Y is the legitimate child of W, which one of the following statement is necessarily FALSE?

- (A) W is the wife of P  
(B) W is the wife of R  
(C) M is the grandmother of Y  
(D) R is the father of Y

**[GATE 2019 : IIT Madras (ME-1)]**

**Q.5**

Pointing towards a Man a woman said 'he is the only son of my mother's mother, How is the woman related to the man?

- (A) Mother      (B) Aunt  
(C) Cousin      (D) Niece

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- (A) MCHTX      (B) MXHTC  
(C) XMHCT      (D) XMHTC

**[GATE 2014 : IIT Kharagpur (EC-4, ME-4)]**

**Q.2**

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

- (A) VXDQ      (B) VZDQ  
(C) VZDP      (D) UXDQ

**[GATE 2015 : IIT Kanpur (EC-4, ME-4)]**

**Q.3**

If 'relftaga' means carefree, 'otaga' means careful and 'fertaga' means careless, Which of the following could mean 'aftercare'?

- (A) Zentaga      (B) Tagafer  
(C) Tagazen      (D) Relffer

**[GATE 2016 : IISc Bangalore (CE-1, CS-1)]**

**Q.4**

In a certain code, AMCF is written as EQGJ and NKUF is written as ROYJ.

How will DHLP be written in that code?

- (A) RSTN      (B) TLPH