



# Aakash

## Medical | IIT-JEE | Foundations

(Divisions of Aakash Educational Services Pvt. Ltd.)

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Time : 3 Hours

# Answers & Solutions

Max. Marks : 200

*for*

## NTSE (Stage-I) 2017-18

### INSTRUCTIONS TO CANDIDATES

- Use blue/black ball point pen only. There is no negative marking.
- This test booklet contains 200 questions of one mark each. All the questions are compulsory.
- Part-I : MAT : 1 - 50 questions  
Part-II : SAT : 1 - 100 questions  
Part-III : Language : 1 - 50 questions
- Answer each question by darkening the one correct alternative among the four choices on the OMR Sheet with blue/black ball point pen.

Example :

Q. No.	Alternatives
Correct way :	1    ①   ②   ●   ④
Q. No.	Alternatives
Wrong way :	1    ⊗   ⊕   ③   ④

Student must darkening the right oval only after ensuring correct answer on OMR Sheet.

- Disparity in mentioning (SC, ST & PH) in application form and OMR Sheet can make your candidature invalid.
- Students are not allowed to scratch/ alter/ change out an answer once marked on OMR Sheet, by using white fluid/ eraser/ blade/ tearing/ wearing or in any other form.
- Separate Sheet has been provided for rough work in this test booklet.
- Please handover the OMR Sheet to the invigilator before leaving the Examination Hall.  
\*Take all your question booklets with you.
- Darken completely the ovals of your answers on OMR Sheet in the time limit allotted for that particular paper.
- Your OMR Sheet will be evaluated through electronic scanning process. Incomplete and incorrect entries may render your OMR Sheet invalid.
- Use of electronic gadgets, calculator, mobile etc., is strictly prohibited.

**PART-I : MENTAL ABILITY TEST (MAT)**

1. Identify the missing number in the following sequence 5, 7, 24, 18, 100, 51, ?, 150

- (1) 404
- (2) 102
- (3) 376
- (4) 89

**Answer (1)**

**Sol.**  $5 \times 4 + 4 = 24$

$$24 \times 4 + 4 = 100$$

$$100 \times 4 + 4 = 404$$

2. If  $\frac{79}{43} = 8$  and  $\frac{67}{14} = 5$  then  $\frac{59}{14} = \underline{\hspace{2cm}}$

- (1) 66
- (2) 14
- (3) 29
- (4) 23

**Answer (3)**

3. If  $A \rightarrow 3, H \rightarrow 73, N \rightarrow 211, Q \rightarrow 307$ , then find the number that represent  $K$

- (1) 158
- (2) 133
- (3) 183
- (4) 91

**Answer (2)**

**Sol.** (Position)<sup>2</sup> + (Position) + 1

$$A \rightarrow 1^2 + 1 + 1 = 3$$

$$K \rightarrow 11^2 + 11 + 1 = 133$$

4. Facing north I start my journey and make turning towards the right(R) and left(L) in the sequence given below.

Which sequence will finally lead me to face a direction other the north?

- (1) L, L, R, L, R, R
- (2) R, L, R, L, R, L
- (3) R, R, L, L, R, R
- (4) L, L, L, R, R, R

**Answer (3)**

**Sol.** He will face towards south by R, R, L, L, R, R

5. If the day before yesterday was Monday, what day will three days after the day after tomorrow be?

- (1) Monday
- (2) Sunday
- (3) Tuesday
- (4) Saturday

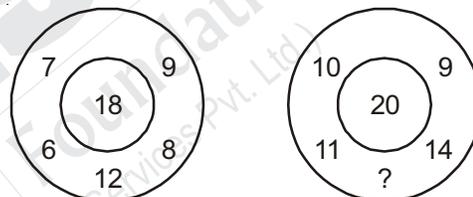
**Answer (3)**

**Sol.** Day before yesterday  $\rightarrow$  Monday

Means today is wednesday

So, three days after day after tomorrow will be Tuesday.

6. Find the missing number in the second figure on the basis of the number arranged in the first figure.



- (1) 22
- (2) 12
- (3) 20
- (4) 16

**Answer (4)**

**Sol.** Difference between number.

$$\begin{array}{cccccc}
 7 & - & 9 & - & 8 & - & 12 & - & 6 & - & 7 & & 10 & - & 9 & - & 14 & - & 16 & - & 11 & - & 10 \\
 \downarrow & & \downarrow \\
 2 & & 1 & & 4 & & 6 & & 1 & & & & 1 & & 5 & & 2 & & 5 & & 1 & & & 
 \end{array}$$

$$2 + 1 + 4 + 6 + 1 = 14 \quad 1 + 5 + 2 + 5 + 1 = 14$$

7. How many three digit numbrers can be formed without using the digit 1, 3, 4, 7 ?

- (1) 180
- (2) 162
- (3) 125
- (4) 156

**Answer (1)**

**Sol.** In first place we can not take zero because we have to make three digit number.

$$5 \times 6 \times 6 = 180$$



14. Which letter will replace the question marks?

D, F, H, I, J, L, ?

- (1) N (2) M  
(3) O (4) P

**Answer (2)**

**Sol.** According to difference between them.

Option 2 is correct.

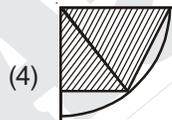
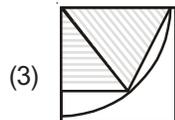
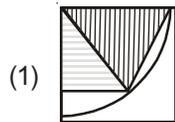
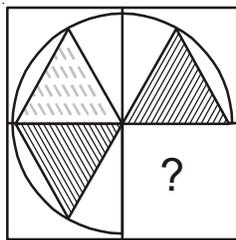
15. In a bus there are 7 vacant seats. In how many ways can 4 passengers sit on them?

- (1) 28 (2) 280  
(3) 140 (4) 840

**Answer (4)**

**Sol.**  $7 \times 6 \times 5 \times 4 = 840$

16. Problem figure



**Answer (3)**

**Sol.** Option 3 is correct.

17. If your grandfather's birthday is on Republic day of India at 00.01 hours then the day is

- (1) Friday (2) Thursday  
(3) Monday (4) Tuesday

**Answer (2)**

**Sol.** 26 Jan, 1950 is Thursday.

18. What is the minimum number of square tiles for paving the floor of the room 5m 44cm long and 3m 74cm broad?

- (1) 176 (2) 200  
(3) 96 (4) 324

**Answer (1)**

**Sol.** Size of tiles 34 cm.

Total 176 tiles.

**Directions : (Q.No.: 19 to 20)**

Find from the alternative the number which will replace the question marks (?)

19.

30	20	625
16	12	126
18	?	237
20	14	221

- (1) 8 (2) 15  
(3) 10 (4) 22

**Answer (3)**

**Sol.**  $(30^2 - 20^2) + \{30 + 20\}/2$

Similarly, option 3 is correct.

20.

20 G	8 H	12 O
8 S	7 G	20 G
10 Q	?	2 Y

- (1) 3 C (2) 3 X  
(3) 6 U (4) 6 F

**Answer (4)**

**Sol.** There alphabetical no. from reverse side in first and third column and in second column is it ascending.

21. An auditorium can accommodate 80 adults or 168 children. If 60 adults are inside the auditorium, how many children can be admitted?

- (1) 20 (2) 42  
(3) 108 (4) 56

**Answer (2)**

**Sol.**  $\frac{168}{80} \times 60 = 42$

22. Three men and three women are to be seated around a circular table for a meeting. Among them Mr. P does not want any lady neighbor and Mrs. Q does not want any man to sit next to her. Under given conditions how many arrangements are possible?

- (1) 3 (2) 8  
(3) 6 (4) 4

**Answer (4)**

**Sol.**  $2! \times 2! = 4$

23. Find the letter to be placed in place of question marks (?) in the given figure

A	C	V	R
N	I	H	?
N	D	Z	G
L	O	C	R

- (1) W (2) P  
 (3) X (4) S

**Answer (3)**

**Sol.** By observation in blocks third and fourth  $45 + 54 = 99$ .

24. Find the odd one out of the following

TC65, OF95, KQ182, MT265, UD89

- (1) KQ182 (2) TC65  
 (3) MT265 (4) UD89

**Answer (1)**

**Sol.** (No. of 1st alphabate × no. of 2nd alphabate) + 5

25. With what operation should the symbol \$ and & be replaced so that following expression is valid?

$$54 - 27 \$ 9 - 3 \& 42 + 111 = 36$$

- (1) ÷ and + (2) ÷ and ×  
 (3) + and ÷ (4) × and ÷

**Answer (2)**

**Sol.** As obvious

26. Which of the following alternative will fit in place of R?

649, 256, 498, 8110, R

- (1) 147 (2) 189  
 (3) 165 (4) 179

**Answer (3)**

**Sol.**  $4^2 \times 5$

27. In shipping yard there are 20 ships that are docked. Each ship contains fish and weight 120 tonnes each. If weight of first 5 ships is 18 tonnes each, weight of another 5 ships is 25 tonnes each and remaining ships weighs 35 tonnes each, then what is the total weight of the fishes in tonnes?

- (1) 2505 (2) 1965  
 (3) 3785 (4) 1835

**Answer (4)**

**Sol.**  $120 \times 20 - (5 \times 18 + 5 \times 25 + 10 \times 35) = 1835$

28. Which two years will have the same calendars?

- (1) 1915-1921 (2) 1947-1954  
 (3) 2005-2009 (4) 2000-2012

**Answer (2)**

**Sol.** Both have same number of odd days

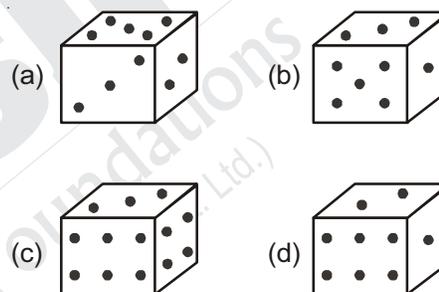
29. In a class Vinay ranks 7<sup>th</sup> from the top, Deepa ranks 7<sup>th</sup> ahead of Meera and ranks 3<sup>rd</sup> behind Vinay, Sudha who is 4<sup>th</sup> from the bottom 32<sup>nd</sup> behind Meera. How many students are there in a class?

- (1) 50 (2) 51  
 (3) 52 (4) 53

**Answer (3)**

**Sol.**  $3 + 32 + 10 + 7 = 52$  students

30. The total number of dots on opposite faces of a cubical block is always 7, find the figure which is correct?



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

**Answer (2)**

**Sol.**  $6 + 1 = 7, 3 + 4 = 7, 5 + 2 = 7$

**Directions : (Q.No. 31 to 33)**

The codes for left column are given in the right column. Find out the codes for letters and answer the questions.

PROBLEM	grcatsd
ROMAN	cftxs
LAME	fgat
BOLD	gcdz

31. What is the code of letter L ?

- (1) t (2) c  
 (3) a (4) g

**Answer (4)**

**Sol.** E – a

L – g

M – t

Similarly N – x

32. What is the code for letter N ?

- (1) x (2) g  
(3) t (4) c

**Answer (1)**

**Sol.** Similar coding

33. What is the code of the word "MODE" ?

- (1) ctaz (2) tcza  
(3) ftcz (4) tfzc

**Answer (2)**

**Sol.** Similar coding

34. One right is fixed and second right rotates on the circumference of the other without sliding How many revolutions will it take to reach diametrically opposite points of the ring?

- (1) 2 (2) 4  
(3) 1 (4) 0.5

**Answer (4)**

**Sol.** Similar coding

**Directions : (Q.No.: 35 to 37)**

In the following questions, one of the rules below has been to set of numbers. Identify the correct rule applied.

- I. Subtract thrice a number from its square
- II. Subtract cube of a number from its square
- III. Add half of a number to its square
- IV. Subtract square of a number from its cube

35. 0.5, 0.75, 0.84375

- (1) IV (2) I  
(3) II (4) III

**Answer (No option matching)**

36. 9, 54, 2754

- (1) IV (2) I  
(3) III (4) II

**Answer (2)**

37.  $x, x^3 - x^2, [(x^3 - x^2)^3 - (x^3 - x^2)^2]$

- (1) I (2) II  
(3) III (4) IV

**Answer (4)**

38. In how many ways can you distribute 20 tennis balls into two boxes so that they are not empty?

- (1) 20 (2) 10  
(3) 19 (4) 11

**Answer (3)**

**Sol.**  ${}^{19}C_1$

39. In a certain code, "CERTAIN" is coded as "XVIGZRM", "SEQUENCE" is coded as "HVJFVMXV". How would "REQUIRED" be coded?

- (1) IVJFRIVW  
(2) FJIVWVIR  
(3) WVJRIFVI  
(4) VJIFWTRY

**Answer (1)**

**Sol.** As per coding

40. A solid metallic sphere of diameter 12 cm is melted and moulded into two identical wires of length 3 cm. What is the area of the cross section of the wire?

- (1) 36 (2)  $48\pi$   
(3)  $72\pi$  (4) 60

**Answer (2)**

**Sol.**  $\frac{4}{3}\pi \times 6^3 = A \times 3$

**Directions : (Q.No.: 41 to 44)**

The numbers in the first two figures are according to some order. Choose the correct answer from the alternatives and write at the place of question marks (?) for third figure

41.

112	
84	14

105	
336	21

96	
?	16

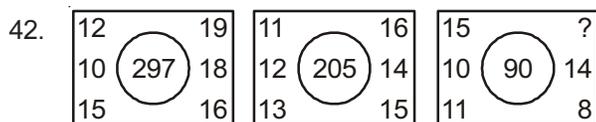
- (1) 160 (2) 144  
(3) 176 (4) 1258

**Answer (1)**

**Sol.**  $14^2 = 196$

$112 + 84 = 196$

So,  $96 + 160 = 256, \quad 16 \times 16 = 256$



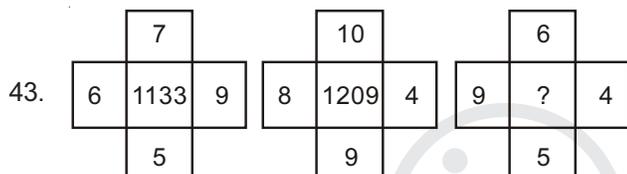
- (1) 6 (2) 44  
(3) 10 (4) 23

**Answer (3)**

**Sol.**  $12 \times 16 + 15 \times 19 - 10 \times 18 = 297$

$$15 \times 8 + 11 \times x - 10 \times 14 = 90$$

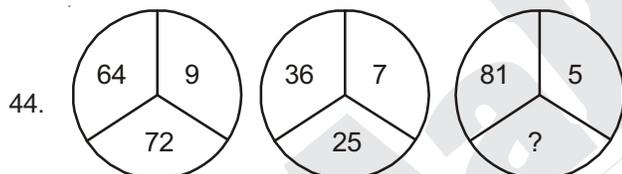
$$\Rightarrow x = 10$$



- (1) 456 (2) 784  
(3) 248 (4) 386

**Answer (4)**

**Sol.**  $7^3 + 5^3 + 6^2 + 5^2 = 1133$  similarly 386



- (1) 12 (2) 45  
(3) 42 (4) 14

**Answer (4)**

**Sol.**  $6 + 4 - 1 = 9$  and  $7 + 2 = 9$

$$3 + 6 - 2 = 7 \text{ and } 2 + 5 = 7$$

$$8 + 1 - 4 = 5 \text{ and } 1 + 4 = 5$$

Similarly option 4 is correct.

45. Suman enters all the natural numbers from 1 to p such that  $p < 100$  in the first column in the ascending order. She then enters the same number in the second column in the descending order. Then she cancels the rows in which one number is the factor of other. If she cancels 8 rows then find the number of rows initially taken.

- (1) 99 (2) 91  
(3) 80 (4) 54

**Answer (1)**

**Sol.** Total 99 rows taken.

In each of these questions one statement is followed by two assumptions (I) and (II). If any assumptions.

If assumption (I) is strong then mark A

If assumption (II) is strong then mark B

If both assumption are strong mark C

If both assumption are strong mark D

46. Statement : If you are a graphic artist, we have a challenging job for you

I. You are graphic artist

II. We need a graphic designer

(1) C (2) A

(3) D (4) B

**Answer (4)**

**Sol.** As per interpretation

47. Statement : The successful man has ability to judge himself correctly

I. To judge others is of no use to the successful man.

II. The successful man cannot make a wrong judgment.

(1) B (2) D

(3) A (4) C

**Answer (2)**

**Sol.** As per interpretation

48. If 925426 is coded as 642259, what will be the code for 769118?

(1) 867119 (2) 896711

(3) 811697 (4) 891716

**Answer (3)**

**Sol.** As per interpretation

49. The remainder when  $2^{99}$  divided by 33 is \_\_\_\_\_

(1) 29 (2) 23

(3) 31 (4) 17

**Answer (4)**

**Sol.**  $(2^5)^{19} \times 2^4$

50. A clock is set to show correct time at 4.00 am. What is the correct timing if the clock gain 12 minutes a day and shows 4.30 pm day after tomorrow?

(1) 5.00 pm (2) 4.00 pm

(3) 5.30 pm (4) 6.00 pm

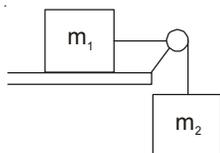
**Answer (2)**

**Sol.** Clock gains 30 minutes in 60.5 hrs.

**PART-II : SCHOLASTIC APTITUDE TEST (SAT)**

(For question no. 1 to 13, Answers are rounded off to the nearest number)

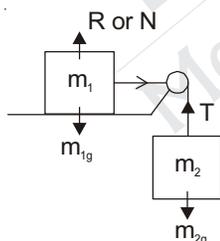
1. What are the forces acting on the blocks  $m_1$  resting on smooth surface and block  $m_2$  over a frictionless pulley?



- (1) The weight of  $m_1$  block acting on the surface, frictional force towards left tension  $T$  towards right and on  $m_2$ , it's weight downwards and tension  $T$  upwards.
- (2) The weight of  $m_1$  block acting on the surface, the normal reaction of the surface on the block  $N$ , tension  $T_1$  towards right and on  $m_2$ , it's weight downwards and tension  $T_2$  upwards.
- (3)  $m_1$  block acting on the surface, the normal reaction of the surface on the block  $N$ , tension  $T$  towards right and on  $m_2$ , it's weight downwards and tension  $T$  upwards.
- (4) The weight of  $m_1$  block acting on the surface, frictional force towards left tension  $T$  towards left and on  $m_2$ , it's weight downwards and tension  $T$  upwards.

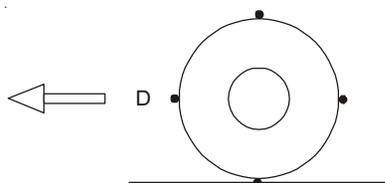
**Answer (3)**

**Sol.** Weight of block  $m_1$  is downward, Normal Reaction by the surface is in upward direction. Tension  $T$  is on right side.



For block  $m_2$  weight downward and Tension  $T$  is upward.

2. A wheel is rolling without slipping as shown in the figure:



Which of the following statement/s are true?

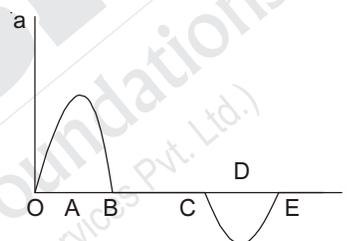
- (1) The translational velocity is the same at all points A, B, C & D.
- (2) The tangential velocity is the same at all points A, B, C & D.
- (3) The tangential velocity is the same at all points A, B, D & zero at point C.
- (4) The translational velocity is the same at all points A, B, D & zero at point C.

**Answer (4)**

**Sol.** Translational velocity is the same at all points A, B, D but at C it will be zero.

Tangential velocity can not be same, because of direction will change.

3. The following graph is acceleration against time. Which of the following statement is true?



- (1) Between O & A  $a > 0$  & increasing; Between A & B  $a < 0$  & decreasing  
Between C & D  $a < 0$  & decreasing; Between D & E  $a < 0$  & increasing
- (2) Between O & A  $a > 0$  increasing; Between A & B  $a > 0$  & decreasing  
Between C & D  $a < 0$  & decreasing; Between D & E  $a < 0$  & increasing
- (3) Between O & A  $a > 0$  & increasing; Between A & B  $a > 0$  & decreasing  
Between C & D  $a < 0$  & increasing; Between D & E  $a < 0$  & decreasing
- (4) Between O & A  $a > 0$  & increasing; Between A & B  $a > 0$  & decreasing  
Between C & D  $a > 0$  & decreasing; Between D & E  $a > 0$  & increasing

**Answer (2)**

**Sol.** OA  $\rightarrow$  acc. +ve increasing  
AB  $\rightarrow$  acc. +ve decreasing  
CD  $\rightarrow$  acc. -ve decreasing  
DE  $\rightarrow$  acc. -ve increasing

4. A car moving at 60 km/h comes to a stop in 4.0s. What was its average deceleration?
- (1) 2.4 m/s<sup>2</sup>                      (2) 15 m/s<sup>2</sup>  
(3) 4.2 m/s<sup>2</sup>                      (4) 41 m/s<sup>2</sup>

**Answer (3)**

**Sol.**  $u = 60 \text{ km/h}$

$$\text{Average retardation} = \frac{\text{total change in velocity}}{\text{total time}}$$

$$V = 0$$

$$t = 4\text{s}$$

$$= \frac{V - u}{t} = \frac{0 - 60 \text{ km/h}}{4\text{s}}$$

$$= \frac{-\left(60 \frac{\text{km}}{\text{h}} \times \frac{5}{18}\right) \text{ m/s}}{4\text{s}}$$

$$= \frac{50}{12} = 4.1666 \text{ m/s}^2 = 4.2 \text{ m/s}^2$$

5. A 1500-kg car accelerates from 0 to 25 m/s in 7.0. What is the average power delivered by the engine (1 hp = 746 W)?
- (1) 60 hp                              (2) 70 hp  
(3) 80 hp                              (4) 90 hp

**Answer (4)**

**Sol.**  $m = 1500 \text{ kg}$

$$u = 0 \text{ m/s}$$

$$V = 25 \text{ m/s}$$

$$t = 7.0 \text{ s}$$

$$\text{Average power} = \frac{\text{Total work}}{\text{total time}}$$

$$W = \Delta K = K_f - K_i$$

$$= \frac{1}{2}mv^2 - \frac{1}{2}mu^2$$

$$= \frac{1}{2}m(v^2 - u^2)$$

$$= \frac{1}{2} \times 1500 \text{ kg} (25^2 - 0^2)$$

$$= 468750 \text{ J}$$

$$P = \frac{W}{t} = \frac{468750 \text{ J}}{7.5} = 66964.28 \text{ J/s or W}$$

$$1\text{W} = \frac{1}{746} \text{ hp}$$

$$\text{so, } 66964.28 \times \frac{1}{746} = 89.7644 \text{ hp}$$

$$\approx 90 \text{ hp}$$

6. In a car the acceleration and deceleration of car can be changed by:
- (1) The accelerator alone  
(2) The break alone  
(3) Using both breaks & accelerator  
(4) Using breaks, accelerator and steering

**Answer (3)**

**Sol.** By using accelerator we can increasing speed means. According will be there.

After that if we maintain acceleration by accelerator we want break to decreasing speed suddenly.

7. The angular speed of the hour hand of a clock (in radians per second) is
- (1)  $\pi/7200$                               (2)  $\pi/3600$   
(3)  $\pi/1800$                               (4)  $\pi/60$

**Answer (None of these)**

**Sol.** The angular speed of hour hand of clock (in rad/s).

$$\omega = \frac{\theta}{t}$$

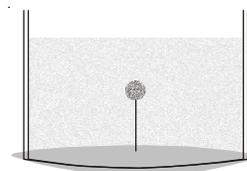
hr hand cover's 360° in 12 hr's.

$$360^\circ - 360 \times \frac{\pi}{180} = 2\pi \text{ radian}$$

$$\omega = \frac{360 \times \frac{\pi}{180}}{12 \times 3600}$$

$$= \frac{2\pi}{12 \times 3600} = \frac{\pi}{21600} \text{ rad/s}$$

8. A piece of cork (density = 0.33 g/cm<sup>3</sup>) with a mass of 10 g is held in place under water by a string, as shown in the figure below. What is the tension, T, in the string?



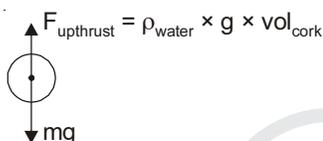
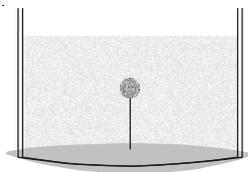
- (1) 0.10 N                              (2) 0.20 N  
(3) 100 N                              (4) 200 N

**Answer (2)**

**Sol.** Cork  $\rho = 0.33 \text{g/cm}^3$

$$\text{Volume of cork} = \frac{m}{\rho} = \frac{10\text{g}}{0.33\text{g/cm}^3}$$

In water



Force acting on cork

(1) Weight of cork (downward)

$$= mg = \frac{10\text{kg}}{1000} \times 10\text{m/s}^2$$

$$= \frac{1}{10}\text{N}$$

(2) Upthrust (upward)

$$= \rho_{\text{water}} g V_{\text{cork}}$$

$$= 1000 \frac{\text{kg}}{\text{m}^3} \times 10 \frac{\text{m}}{\text{s}^2} \times \frac{10}{0.33} \times 10^{-6} \text{m}^3$$

$$= \frac{10^{-1}}{0.33} = \frac{1}{3.3} = \frac{3}{10}\text{N}$$

$$\text{Net force upward} = \frac{3}{10} - \frac{1}{10} = \frac{2}{10}\text{N}$$

$$= 0.2\text{N}$$

9. A 2.0-kg metal object with a temperature of  $90^\circ\text{C}$  is submerged in 1.0 kg of water at  $20^\circ\text{C}$ . The water-metal system reaches equilibrium at  $32^\circ\text{C}$ . What is the specific heat of the metal? (Specific heat of water is  $4.187 \text{kJ/kg K}$ ).

- (1)  $0.840 \text{kJ/kg K}$
- (2)  $0.129 \text{kJ/kg K}$
- (3)  $0.512 \text{kJ/kg K}$
- (4)  $0.433 \text{kJ/kg K}$

**Answer (4)**

**Sol.**  $m = 2 \text{kg}$  object.

$$T_{\text{object}} = 90^\circ\text{C} + (\text{submerged in}) \rightarrow \text{finally} \\ 1 \text{kg water reaches to } 32^\circ\text{C} \\ T_{\text{water}} = 20^\circ\text{C}$$

Heat loss by object = heat gain by water

$$m_{\text{object}} \times C_{\text{object}} \times (90 - T) = m_{\text{water}} \times C_{\text{water}} \times (T - 20)$$

$$2 \text{kg} \times C_{\text{object}} \times (90 - 32) = 1 \text{kg} \times 4.187 \times 10^3 \text{J/KgK} (32 - 20)\text{K}$$

$$C_{\text{object}} = \frac{4.187 \times 10^3 \times 12\text{J}}{116\text{kgK}} = 0.433 \text{kJ/kgK}$$

10. A  $\text{Ca}^{2+}$  ion is placed in an electric field of  $800 \text{N/C}$ . Which of the following statement/s is/are true? ( $q = 1.60 \times 10^{-19} \text{Coulomb}$ )

- (1) The ion is doubly charged it will experience the force  $2.56 \times 10^{-16} \text{N}$  in the direction of electric field.
- (2) The ion is singly charged it will experience the force  $2.56 \times 10^{-16} \text{N}$  perpendicular to the direction of electric field.
- (3) The ion is singly charged it will experience the force  $1.28 \times 10^{-16} \text{N}$  in the direction of electric field.
- (4) The ion is singly charged it will experience the force  $1.28 \times 10^{-16} \text{N}$  perpendicular to the direction of electric field.

**Answer (1)**

**Sol.**  $\text{Ca}^{2+}$  ion.

Placed in electric field.

$$E = 800 \text{N/C}$$

$$q = 1.6 \times 10^{-19} \text{C}$$

$$F = \frac{F}{q} \text{ (two protons it has)}$$

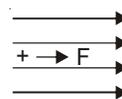
$$800 \text{N/C} = \frac{F}{2 \times q}$$

$$F = 800 \frac{\text{N}}{\text{C}} \times 2 \times 1.6 \times 10^{-19} \text{C}$$

$$= 2560 \times 10^{-19} \text{N}$$

$$= 2.560 \times 10^{-16} \text{N}$$

and it is positively charged



and force in the same direction of field.

11. A positive charge is released and moves along an electric field line. This charge moves to a position of
- (1) lower potential and higher potential energy.
  - (2) lower potential and lower potential energy.
  - (3) higher potential and lower potential energy.
  - (4) higher potential and higher potential energy.

**Answer (2)**

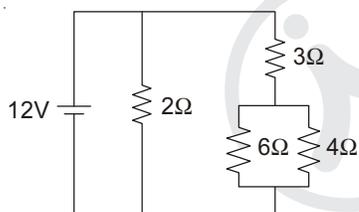
**Sol.** In the direction of electric field line.

Potential energy decreases.

and positive charge moves from higher potential to lower potential.

So, lower potential, lower potential energy.

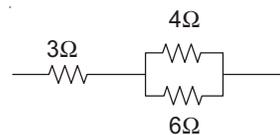
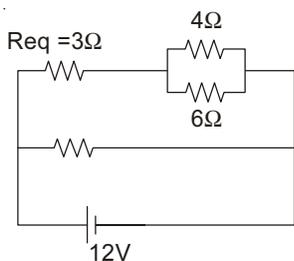
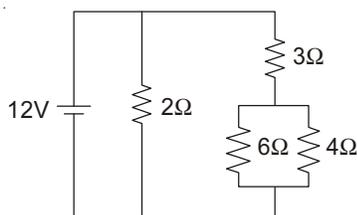
12. From the following circuit which of the statement/s are true?



- (a) The voltage across 2Ω is 12V
  - (b) The current supplied by the battery depends only upon 2Ω.
  - (c) Maximum current is through 2Ω
  - (d) The current supplied by the battery depends on all resistance
- (1) Statements (a) (c) & (d) are true.
  - (2) Statements (a) (b) & (c) are true.
  - (3) Statements (b) (c) & (d) are true.
  - (4) Statements (a) (b) & (d) are true.

**Answer (1)**

**Sol.**



$$R_{eq} = \left[ 3 + \frac{4 \times 6}{4 + 6} \right]$$

$$R_{eq} = 3 + \frac{4 \times 6}{10} = \frac{15 + 12}{5} = \frac{27}{5} \Omega$$

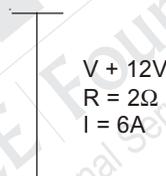
Then, it is in parallel comb. with 2Ω.

$$\frac{\frac{27}{5} \times 2}{\frac{27}{5} + 2} = \frac{54}{37}$$

$$R_{eq} = \frac{54}{37} \Omega$$

$$I = \frac{V}{R_{eq}} = \frac{12V}{54/37 \Omega} = \frac{12 \times 37}{54} = 8.22A$$

In 2Ω current,



$V + IR$

$$I = \frac{V}{R} = \frac{12}{2} = 6A \text{ by } 2\Omega \text{ wire.}$$

So, a, c, d are correct.

13. A converging lens has focal length 20 cm. An object placed 50 cm from the lens will have an image at location \_\_\_\_\_ and lateral magnification \_\_\_\_\_.

$$(1) \frac{2}{3} \times 10^2 \text{ cm}, \frac{-2}{3}$$

$$(2) \frac{1}{3} \times 10^2 \text{ cm}, \frac{-2}{3}$$

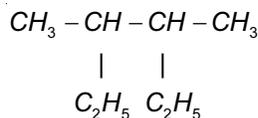
$$(3) \frac{2}{3} \times 10^2 \text{ cm}, \frac{-1}{3}$$

$$(4) \frac{1}{3} \times 10^2 \text{ cm}, \frac{1}{3}$$

**Answer (2)**



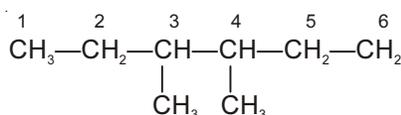
21. The IUPAC name of the structural formula



- (1) 2, 3 – Diethyl butane  
 (2) 2 – Ethyl – 3 – methyl pentane  
 (3) Heptane  
 (4) 3, 4 – Dimethyl hexane

**Answer (4)**

**Sol.**



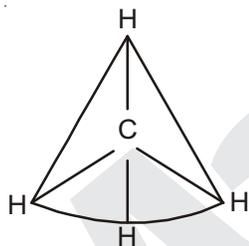
3, 4-Dimethyl hexane

22. The shape of  $\text{CH}_4$  is \_\_\_\_\_

- (1) Linear (2) Trigonal planar  
 (3) Tetrahedral (4) Pyramidal

**Answer (3)**

**Sol.** Tetrahedral



23. Identify 'X' in the following reaction.



- (1) Fe (2) FeO  
 (3)  $\text{Fe}_3\text{O}_4$  (4)  $\text{O}_2$

**Answer (1)**

**Sol.**  $\text{Fe}_2\text{O}_3 + 2\text{Al} \rightarrow 2\text{Fe} + \text{Al}_2\text{O}_3$

$\rightarrow$  X is Fe

24. The chemical formula for rust is \_\_\_\_\_

- (1) FeO (2)  $\text{Fe}_2\text{O}_3$   
 (3)  $\text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$  (4)  $\text{Fe}_3\text{O}_4$

**Answer (3)**

**Sol.**  $\text{Fe} + \text{Moist air} \rightarrow \text{Fe}_2\text{O}_3 \cdot n\text{H}_2\text{O}$

Ferric oxide

(or)

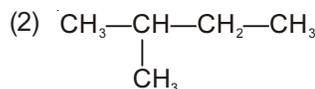
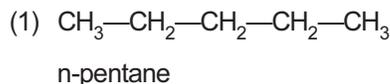
Iron(III) oxide (hydrated)

25. The total number of structural isomers for pentane are \_\_\_\_\_

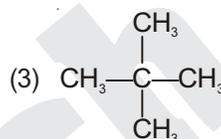
- (1) 2 (2) 3  
 (3) 4 (4) 5

**Answer (2)**

**Sol.** Structural isomers of pentane



2-Methyl butane (or) Isopentane



Neopentane (or) 2,2-Dimethyl propane

So, structural isomer's of pentane is 3.

26. Hydrogen gas is not evolved when a metal reacts with nitric acid because \_\_\_\_\_

- (1) Nitric acid is a strong oxidizing agent  
 (2) Nitric acid is a strong reducing agent  
 (3) Metal does not react with nitric acid  
 (4) Nitric acid is unstable

**Answer (1)**

**Sol.**  $\text{HNO}_3$  is a strong oxidising agent. It oxides produced to water

27. Kidney stones are mainly formed by which of the following compound?

- (1) Sodium chloride (2) Silicates  
 (3) Calcium bicarbonate (4) Calcium Oxalate

**Answer (4)**

**Sol.** Calcium is most abundant mineral found in our body. Excessive dose of spinach, potato chips, beans accumulate the oxalate in body & cause stone.

28. Who discovered the Polio vaccine?

- (1) Louis Pasteur (2) Jonas Salk  
 (3) Konrad Zuse (4) Eli Whitney

**Answer (2)**

29. Exchange of genetic material takes place in

- (1) vegetative reproduction
- (2) asexual reproduction
- (3) sexual reproduction
- (4) budding

**Answer (3)**

**Sol.** In sexual reproduction two parent involved. So after gamete formation, they fuses in female reproductive system. Zygote formation after fusion include the exchange of genetic material.

30. Which of the following is an abiotic component?

- (1) animals
- (2) plants
- (3) micro-organisms
- (4) soil

**Answer (4)**

**Sol.** Abiotic means non-living component.

31. Salivary glands secrete which of these enzymes?

- |             |             |
|-------------|-------------|
| (1) Amylase | (2) Lipase  |
| (3) Pepsin  | (4) Trypsin |

**Answer (1)**

**Sol. ??**

32. In our country vast tracts of forests are cleared and a single species of plants is cultivated. This practice promotes \_\_\_\_\_

- (1) biodiversity in that area
- (2) growth of natural forest
- (3) monoculture in that area
- (4) preserve the natural ecosystem in the area

**Answer (3)**

**Sol. ??**

33. Which of the following is a group of invertebrate animals?

- (1) mammals
- (2) pisces
- (3) reptiles
- (4) arthropods

**Answer (4)**

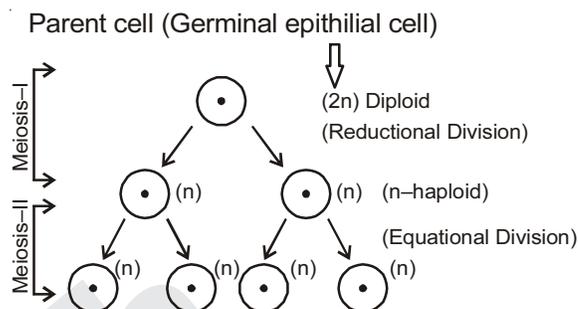
**Sol.** Vertebral column is absent in invertebrates. So, arthropods are invertebrates.

34. The number of daughter cells formed at the end of meiosis from a cell \_\_\_\_\_

- |                     |                     |
|---------------------|---------------------|
| (1) 2 haploid cells | (2) 2 diploid cells |
| (3) 4 haploid cells | (4) 4 diploid cells |

**Answer (3)**

**Sol.**



35. Breakdown of pyruvate to yield  $\text{CO}_2$ ,  $\text{H}_2\text{O}$  and energy takes place in

- |                 |                   |
|-----------------|-------------------|
| (1) cytoplasm   | (2) mitochondrion |
| (3) chloroplast | (4) nucleus       |

**Answer (2)**

**Sol. ??**

36. Which among the following is not a component of respiratory system in humans?

- |                  |             |
|------------------|-------------|
| (1) pharynx      | (2) larynx  |
| (3) hypothalamus | (4) trachea |

**Answer (3)**

**Sol.** Hypothalamus is a link between endocrine and nervous system.

37. How many of the following are involved in Nitrogen fixation?

Nostoc, Anabaena, Rhizobium, Azotobacter

- |       |       |
|-------|-------|
| (1) 1 | (2) 2 |
| (3) 3 | (4) 4 |

**Answer (4)**

**Sol. ??**

38. The primary source of synthesis of carbohydrates in plants is

- |                               |              |
|-------------------------------|--------------|
| (1) atmospheric $\text{CO}_2$ | (2) lipids   |
| (3) fats                      | (4) proteins |

**Answer (1)**

39. Insectivorous plants digest the bodies of insects by secreting which type of enzymes?
- (1) carbohydrases
  - (2) esterases
  - (3) proteolytic enzymes
  - (4) none of these

**Answer (3)**

**Sol.** Insectivorous plants need nitrogen for their growth so they get nitrogen from insects.

40. Which one among the following vitamins is necessary for blood clotting?
- (1) Vitamin – A
  - (2) Vitamin – D
  - (3) Vitamin – K
  - (4) Vitamin – C

**Answer (3)**

41. Where did Gandhiji start the Satyagraha movement against the indigo plantation system?

- (1) Champaran
- (2) Poindar
- (3) Chilka
- (4) Assam

**Answer (1)**

42. The Quasi military wings of the youth called 'Storm troopers' was raised by \_\_\_\_\_

- (1) France
- (2) Italy
- (3) Germany
- (4) Turkey

**Answer (3)**

43. What was the name given to mass killings of the Jews under Hitler's regime?

- (1) Special task
- (2) Special Treatment or Final solution
- (3) Final stage
- (4) Special Task or Final Stage

**Answer (2)**

44. Across India, from Mizoram to Kerala many forest thrived because \_\_\_\_\_

- (1) Government restricted cutting of trees
- (2) Villages protected forest as sacred groves
- (3) Local residents restricted cutting of forests
- (4) Forest with dangerous animals survived as no one dared to enter these forests

**Answer (1)**

45. In which state of India are the Gujjar Bakarwals found?

- (1) Rajasthan
- (2) Maharashtra
- (3) Gujarat
- (4) Jammu and Kashmir

**Answer (4)**

46. The first Indian community to start playing the cricket game was the small community of \_\_\_\_\_.

- (1) Jews
- (2) Muslims
- (3) Buddhist
- (4) Zorastrians

**Answer (4)**

47. The Youth League of the Nazis was founded in \_\_\_\_\_.

- (1) 1921
- (2) 1922
- (3) 1923
- (4) 1924

**Answer (2)**

48. The first Railway line in India was laid in 1853 by \_\_\_\_\_.

- (1) Lord Dalhousie
- (2) Lord Wellesley
- (3) Lord Mountbatten
- (4) Lord Hasting

**Answer (1)**

49. Who was the founder of 'Abhinav Bharat'?

- (1) Senapati Bapat
- (2) Lala Lajpat Rai
- (3) Prafulla Chaki
- (4) Vinayak Damodar Sawarkar

**Answer (4)**

50. Who was the "Father of Goa's Freedom Movement"?

- (1) Purushottam Kakodkar
- (2) P.P. Shirodkar
- (3) Dr. T.B. Chunha
- (4) Luis de Menezes Braganca

**Answer (3)**

51. The Habsburgs were rulers of \_\_\_\_\_.

- (1) Austria-Hungary
- (2) Dutch Republic
- (3) Germany
- (4) Switzerland

**Answer (1)**

52. The great lady freedom fighter unfurl Indian flag at Stuttgart in Germany for the first time is \_\_\_\_\_.

- (1) Pritilata Wadedar
- (2) Madam Bhikaji Cama
- (3) Kalpana Dutta
- (4) Suniti Chaudhari

**Answer (2)**

53. Which one of the following phenomenon happens when the sun shines vertically over the tropic of Capricorn.

- (1) High Pressure develops over North-Western India due to low temperature
- (2) Low Pressure develops over North-Western India due to high temperature
- (3) No changes in temperature and pressure occur in North-Western India
- (4) 'Loo' blows in the North-Western India.

**Answer (2)**

54. When you travel in certain parts of India, you will notice red soil. What is the main reason for the colour?

- (1) Abundance of Magnesium
- (2) Accumulated humus
- (3) Presence of ferric oxides
- (4) Abundance of phosphates

**Answer (3)**

55. Which one of the following ports is the deepest landlocked port on the East coast of India?

- (1) Vishakhapatnam
- (2) Chennai
- (3) Paradip
- (4) Kolkata

**Answer (1)**

56. Consider the following statements.

- (a) Infant mortality rate takes into account death of infant within a month after birth.
- (b) Infant mortality rate is the number of infant death in a particular year per 100 live births during that year.

Which of the following statement is/are correct?

- (1) Only (a)
- (2) Only (b)
- (3) Both (a) and (b)
- (4) Neither (a) nor (b)

**Answer (4)**

57. Which of the following is not correctly matched?

- (1) Arctic circle  $66.5^{\circ}\text{N}$
- (2) Tropic of Cancer  $23.5^{\circ}\text{S}$
- (3) Prime Meridian  $0^{\circ}$
- (4) International date line  $180^{\circ}$

**Answer (2)**

58. Which one among the following cities never get the vertical rays of the sun all through the year?

- (1) Hyderabad
- (2) Mumbai
- (3) Delhi
- (4) Kolkata

**Answer (3)**

59. With reference to the river Luni, which one of the following statements is correct?

- (1) It flows into Gulf of Khambhat
- (2) It flows into Gulf of Kutch
- (3) It flows into Pakistan and merges with a tributary of Indus
- (4) It is lost in the marshy land of the Rann of Kutch

**Answer (4)**

60. Which one of the following is the correct sequence of the given Indian cities in the order of their normal annual rainfall?

- (1) Kochi-Kolkata-Delhi-Patna
- (2) Kochi-Kolkata-Patna-Delhi
- (3) Kolkata-Kochi-Patna-Delhi
- (4) Kolkata-Kochi-Delhi-Patna

**Answer (3)**

61. The teak is a large tree of the \_\_\_\_\_

- (1) Deciduous forest
- (2) Coniferous forest
- (3) Tidal forest
- (4) Tropical rain forest

**Answer (1)**

62. Hanging valleys are carved out by the action of \_\_\_\_\_

- (1) Wind
- (2) Rivers
- (3) Glaciers
- (4) Ocean waves

**Answer (3)**

63. Transhumance refers to

- (1) Shifting agriculture
- (2) Plantation farming
- (3) Economy solely depending on animals
- (4) Seasonal migration of people with their cattle

**Answer (4)**

64. Which of the following statements is not correct?

- (1) In developing countries most of the people depend on Primary industries
- (2) Tertiary occupation develop well in rural areas
- (3) Development of secondary and tertiary industries is necessary for raising standard of living
- (4) Shifting cultivation is highly wasteful practice

**Answer (2)**

65. Who summons and prorogues the session of Parliament?

- (1) Prime Minister
- (2) President
- (3) Speaker
- (4) Vice-President

**Answer (3)**

66. A device available to the common masses to seek the Courts interventions in public matters is \_\_\_\_\_.
- (1) Public Interest Litigation
  - (2) Certiorari
  - (3) Quo Warranto
  - (4) Habeas Corpus

**Answer (1)**

67. Goa became 25<sup>th</sup> state of Indian Union in \_\_\_\_\_.
- (1) 1986
  - (2) 1987
  - (3) 1984
  - (4) 1988

**Answer (2)**

68. Who among the following UN Secretary General said "The US war on Iraq was illegal".
- (1) Kofi Annan
  - (2) Kurt Waldheim
  - (3) Dag Hammarskjöld
  - (4) Trygve Lie

**Answer (1)**

69. Who is the Ex-Officio Chairman of Rajya Sabha?
- (1) Prime Minister
  - (2) Governor
  - (3) President
  - (4) Vice-President

**Answer (4)**

70. A democratic government is responsible to \_\_\_\_\_.
- (1) The President
  - (2) The Prime Minister
  - (3) Chief Justice of India
  - (4) The people

**Answer (4)**

71. The constitution of India has created both in the case of Union government and state government in following funds.
- (1) Consolidated Fund of India
  - (2) Public Account Fund
  - (3) India Fund
  - (4) Only (1) and (2)

**Answer (1)**

72. Cultural and Educational rights include:
- (1) Right of minorities to establish and administer their educational institutions
  - (2) Right of minorities to promote their language
  - (3) Right against discrimination for admission to educational institution on the ground of religion, race or caste
  - (4) All the above

**Answer (4)**

73. Indian consumer protection Act was passed in the year \_\_\_\_\_.
- (1) 1966
  - (2) 1976
  - (3) 1986
  - (4) 1996

**Answer (3)**

74. Per capita income =  $\frac{\text{G.D.P.}}{\text{population}}$
- (1) G.D.P.
  - (2) N.I.
  - (3) N.D.P.
  - (4) A.G.P.

**Answer (2)**

75. Which of the following is at present at largest power using sector of the Indian economy?
- (1) Agriculture
  - (2) Domestic consumers and street lighting
  - (3) Industry
  - (4) Transport and communication, including railways

**Answer (3)**

76. Which of the following day is observed as the World Consumer Day?
- (1) 05<sup>th</sup> March
  - (2) 15<sup>th</sup> March
  - (3) 20<sup>th</sup> March
  - (4) 25<sup>th</sup> March

**Answer (2)**

77. The common method used to measure poverty is \_\_\_\_\_.
- (1) Income
  - (2) Saving
  - (3) Investment
  - (4) Profit

**Answer (1)**

78. Which of the following is exclusively concerned with the credit needs of all types of agriculture and rural development in India?
- (1) I.B.R.D.
  - (2) R.B.I.
  - (3) N.A.B.A.R.D.
  - (4) S.B.I.

**Answer (3)**

79. Public goods are those which \_\_\_\_\_.
- (1) Are bought by members of the public as distinct from the Government
  - (2) Are produced by a public company as distinct from a nationalized industry
  - (3) Are cheap but not of good quality
  - (4) Are consumed collectively by the community

**Answer (1)**

80. Which of the following is not a function of money?

- (1) It is a medium of exchange
- (2) It increases purchasing power
- (3) It is a standard measure of value
- (4) It is a hedge against inflation

**Answer (4)**

81. The length of diagonals of three cubes A, B and C are given as  $\sqrt{108}$  cm,  $\sqrt{192}$  cm and  $\sqrt{300}$  cm respectively. A person desires to form a new cube by melting these cubes. What can be the length of the largest rod that can be placed in the new cube formed?

- (1)  $11\sqrt{2}$
- (2)  $12\sqrt{3}$
- (3)  $13\sqrt{5}$
- (4)  $14\sqrt{6}$

**Answer (2)**

**Sol.**  $\sqrt{3}l_1 = \sqrt{108} \Rightarrow l_1 = 6; V_1 = l_1^3 = 216$

$$\sqrt{3}l_2 = \sqrt{192} \Rightarrow l_2 = 8; V_2 = l_2^3 = 512$$

$$\sqrt{3}l_3 = \sqrt{300} \Rightarrow l_3 = 10; V_3 = l_3^3 = 1000$$

$$V_{\text{Total}} = 1728 = 3L^3$$

$$\Rightarrow L = 12 \text{ cm}$$

$$\text{Diagonal} = \sqrt{3}L = 12\sqrt{3} \text{ cm}$$

82. In how many 144 can be expressed as a product of two different factors?

- (1) 10
- (2) 9
- (3) 8
- (4) 7

**Answer (1)**

**Sol.**  $XY = 144 = 2^4 \times 3^2$

$$\text{Total number of factors} = (4 + 1)(2 + 1) = 15$$

$$\text{Factors repeated} = 5$$

$$\text{Factors required} = 15 - 5 = 10$$

83. If both  $5^2$  and  $3^3$  are factors of  $n \times 6^2 \times 7^3$ , then what is the smallest possible value of n?

- (1) 75
- (2) 65
- (3) 55
- (4) 45

**Answer (1)**

**Sol.** If  $5^2$  and  $3^3$  are factors, then number be  $5^2 \times 3^2 \times \dots$

$$5^2 \times 3^2 \text{ be present in } n \times 3^2 \times 2^2 \times 7^3$$

$$\text{factor missing } 5^2 \times 3 = 25 \times 3 = 75$$

84. Three fair dice are rolled, what is the probability that the three numbers that come up form the sides of a triangle?

- (1)  $\frac{1}{6}$
- (2)  $\frac{35}{216}$
- (3)  $\frac{37}{72}$
- (4)  $\frac{31}{36}$

**Answer (2)**

**Sol.** To have the numbers as sides of triangle, sum of two sides be greater than third side.

Number of equilateral triangles

i.e., all three dices have same figure = 6

number of isosceles triangle = 15

i.e., two dices have same figure and

third one is different but sum of two is greater than the figure of third dice.

Number of scalene triangle = total number of triangle number of combination on dice whose total of two dice is less than the third dice.

$$= {}^6C_3 - [4 + 2] = 14$$

Total triangles possible = 6 + 15 + 14 = 35

$$\text{Hence probability} = \frac{35}{216}$$

85. If LCM of first 40 natural numbers is x, LCM of first 50 natural numbers is  $kx$  and LCM of first  $\frac{(k-27)}{1000}$ .

Natural numbers is  $akx$  then the value of a is

- (1) 59
- (2) 53
- (3) 47
- (4) 61

**Answer (2)**

**Sol.** With CORRECTION as  $\left(\frac{k-27}{10000}\right)$  and solving.

LCM of first 40 naturals = x

LCM of first 50 naturals =  $x \times 41 \times 43 \times 47 \times 7 = kx$

Hence,  $k = 580027$

Therefore  $(k - 27)/10000 = 58$

Hence,  $a = 53$

86. The product of  $\left(a^{\frac{1}{6}} + a^{-\frac{1}{6}}\right), \left(a^{\frac{1}{6}} - a^{-\frac{1}{6}}\right), \left(a^{\frac{1}{8}} + a^{-\frac{1}{8}}\right)$

and  $\left(a^{\frac{1}{4}} + a^{-\frac{1}{4}}\right)$  is \_\_\_\_\_.

(1)  $\left(\frac{a^2 + 1}{a}\right)$

(2)  $\left(\frac{a^2 - 1}{a}\right)$

(3)  $\sqrt{\frac{a^4 - 1}{a^2}}$

(4)  $\sqrt{\frac{(a-1)^2}{a}}$

**Answer (4)**

**Sol.** With CORRECTION as

$$\left(a^{\frac{1}{16}} + a^{-\frac{1}{16}}\right), \left(a^{\frac{1}{16}} - a^{-\frac{1}{16}}\right), \left(a^{\frac{1}{8}} - a^{-\frac{1}{8}}\right) \text{ and } \left(a^{\frac{1}{4}} + a^{-\frac{1}{4}}\right)$$

And solving  $\left(a^{\frac{1}{16}} + a^{-\frac{1}{16}}\right) \times \left(a^{\frac{1}{16}} - a^{-\frac{1}{16}}\right) \times \left(a^{\frac{1}{8}} - a^{-\frac{1}{8}}\right)$

$\times \left(a^{\frac{1}{4}} + a^{-\frac{1}{4}}\right)$

$= \left(a^{\frac{1}{8}} - a^{-\frac{1}{8}}\right) \left(a^{\frac{1}{8}} + a^{-\frac{1}{8}}\right) \left(a^{\frac{1}{4}} + a^{-\frac{1}{4}}\right)$

$= \left(a^{\frac{1}{4}} - a^{-\frac{1}{4}}\right) \left(a^{\frac{1}{4}} + a^{-\frac{1}{4}}\right) = \left(a^{\frac{1}{2}} - a^{-\frac{1}{2}}\right)$

$= \sqrt{\frac{(a-1)^2}{a}}$

87. Preeti, Isha and Shruti divided some number of chocolates among themselves in the ratio 14:40:27. Since Isha was not happy with the division, they revised the division to 19:55:37. How many chocolates did Shruti get more from the division?

(1) 19

(2) 27

(3) 0

(4) 37

**Answer (3)**

**Sol.** Case-I :  $14x + 40x + 27x = y$  (number of chocolates)

$8x = y$

$x = \frac{y}{81}$

Number of chocolates with Shruti =  $27 = 27 \times \frac{y}{81} = \frac{y}{3}$

Case-II  $19a + 55a + 37a = y$  (number of chocolates being same)

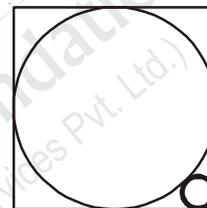
$111a = y$

$a = \frac{y}{111}$

Number of chocolates Shruti now has  $37 \times \frac{y}{111} = \frac{y}{3}$

Hence no changes.

88. In the given figure a bigger circle is inscribed in a square with perimeter 4 units. A smaller circle intersects the bigger circle at one point and the square at two points. What is the radius of the smaller circle?



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

(2)  $\frac{\sqrt{2}-1}{1+2\sqrt{2}}$

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

(4)  $\frac{3-2\sqrt{2}}{1+6\sqrt{2}}$

**Answer (1)**

**Sol.** In  $\triangle O, CB \angle O, CB = 90^\circ$

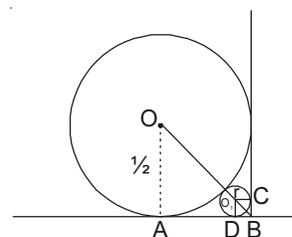
$OC = CB = r$

$\therefore O, B = r \sec 45^\circ$

$O, B = \sqrt{2}r$

$OB = OO_1 + O_1B$

$= \left(\frac{1}{2} + r + \sqrt{2}r\right)$





94. If the quadratic equation  $x^2 + px + 48 = 0$  has two distinct integer roots then the number of possible values of  $p$  are \_\_\_\_\_.
- (1) 5 (2) 10  
(3) 12 (4) 14

**Answer (1)**

**Sol.** Product of root = 48

Factors of 48  
 =  $6 \times 8, 4 \times 12, 3 \times 16, 48 \times 1, 24 \times 2$   
 =  $6 \times -8, -4 \times -12, -3 \times -16, -48 \times -1, -24 \times -2$

95. Three pipes are attached one after another such that if one pipe is rotated other two also get rotated. If the radius of the pipe is five-fourth of immediate right and right most rotates at the speed of 100 revolution per minute, then the number of revolutions made by the left most pipe per minute will be \_\_\_\_\_.
- (1) 36 (2) 60  
(3) 64 (4) 24

**Answer (3)**

**Sol.**  $100 \times \left(\frac{4}{5}\right)^2$

[As revolution is inversely proportional to radius]

=  $100 \times \frac{16}{25}$   
 = 64

96. If  $\tan \theta + \cot \theta = 3$  then  $\frac{\sin^2 \theta - \cos^2 \theta}{\sin \theta \cos \theta}$
- (1)  $\sqrt{3}$  (2) 4  
(3) 7 (4)  $\sqrt{5}$

**Answer (4)**

**Sol.**  $\tan \theta + \frac{1}{\tan \theta} = 3$

or  $x + \frac{1}{x} = 3$

$\frac{\sin^2 \theta - \cos^2 \theta}{\sin \theta \cos \theta} = \tan \theta - \frac{1}{\tan \theta}$   
 =  $x - \frac{1}{x}$

$\left(x - \frac{1}{x}\right)^2 = \left(x + \frac{1}{x}\right)^2 - 4x \cdot \frac{1}{x}$

Solving,  $x - \frac{1}{x} = \sqrt{5}$

97. A train meets an accident after moving 30 km. Its speed then comes to four-fifth of the original one. Consequently runs 45 minutes late. If the accident takes place 18 km farther away it would have been 36 minutes. The distance between the two stations is \_\_\_\_\_.

- (1) 150 (2) 200  
(3) 240 (4) 120

**Answer (1)**

**Sol.** Let distance between two stations be  $x$  km

original speed to  $y$  km/hr

time at regular speed  $t$ /hr

$\frac{30}{y} + \frac{x-30}{\frac{4}{5}y} = t + \frac{3}{4}$  ... (i)

$\frac{48}{y} + \frac{x-48}{\frac{4}{5}y} = t + \frac{3}{5}$  ... (ii)

Solving (i) and (ii)  $x = 120$  km

98. If the number with base 6 is 15111 then number with base 8 is \_\_\_\_\_.
- (1) 6014 (2) 7125  
(3) 4563 (4) 2164

**Answer (3)**

**Sol.**  $(15111)_6 = [6^5 \times 1 + 6^4 \times 5 + 6^3 \times 1 + 6^2 \times 1 + 6^0 \times 1] = (2419)_{10}$   
 $(2419)_{10} = (4 \times 8^3 + 5 \times 8^2 + 6 \times 8^1 + 3 \times 8^0)$   
 =  $(4563)_8$

99. The total cost price of two items is Rs. 10200 and their selling prices are equal. If one of the item is sold at loss of 12% and another at a loss of 18%, then the cost price of an item which is sold at a loss of 18% is \_\_\_\_\_.
- (1) Rs. 4920 (2) Rs. 5280  
(3) Rs. 6400 (4) Rs. 300

**Answer (2)**

**Sol.** Let one be  $x$  other be  $(10200 - x)$

$x - \frac{12}{100}x = (10200 - x) - \frac{18}{100}(10200 - x)$

Solving  $x = \text{Rs. } 4920$

Hence required answer = Rs. 5280.

100. The slope of a line  $3x - 5y = 8$  is \_\_\_\_\_.

- (1) 0.6 (2)  $-1\frac{2}{3}$   
(3)  $2\frac{2}{3}$  (4) -1.6

**Answer (1)**

**Sol.**  $Y = \frac{3}{5}x - \frac{8}{5}$  Slope =  $\frac{3}{5} = 0.6$

## PART-III : LANGUAGE TEST

Q.1–5. Read the following passage and answer the questions given below :

Santosh was rather looking forward to his first journey by the tube, as the underground railway in London is called. He had heard a great deal about it from his friends who had already been to England. They had all advised him not to travel alone the first time. But Santosh is the kind of person who never listens to anyone's advice. It is not surprising therefore that his first journey by the Tube was not a great success.

Santosh entered the station shortly after five o'clock in the afternoon. This is a bad time to travel in London, both by bus and train, because crowds of people go home from work at this hour. He had to join a long queue of people who were waiting for tickets. When at last his turn came he had some difficulty in making the man at the counter understand the name of the station he wanted to go. The people in the queue behind him began to grumble impatiently at the delay.

Complete the following statements by selecting the most appropriate alternative :

- All Santosh's friends advised him to \_\_\_\_\_ .  
 (1) Travel always by bus  
 (2) Never to travel by the Tube  
 (3) Travel alone by the Tube  
 (4) Never travel alone by the Tube

**Answer (4)**

- The "Tube" is the name given to \_\_\_\_\_ .  
 (1) The railway in London  
 (2) The underground sewage system in London.  
 (3) The underground railway system in London.  
 (4) The railway bridge in London.

**Answer (3)**

- He knew about the Tube because  
 (1) He had travelled many times before.  
 (2) His parents had been telling him about it.  
 (3) His friends who had visited London had told him about it  
 (4) He had read a lot about it in magazines

**Answer (3)**

- Santosh had difficulty in buying the ticket because \_\_\_\_\_ .  
 (1) The clerk had no change  
 (2) He could not pronounce the name of the station properly.  
 (3) He did not know where to stand.  
 (4) He did not know the name of the place

**Answer (2)**

- When Santosh entered the booking place it was \_\_\_\_\_ .  
 (1) Early morning                      (2) Late night  
 (3) Late afternoon                      (4) Late evening

**Answer (3)**

Q.6–10. Read the following passage and answer the questions given below :

Smitha had not been to this part of the library before. She walked around the room almost on tiptoe, afraid of disturbing the industrious readers with her heavy shoes. The shelves were filled with thick volumes: dictionaries in many languages, encyclopedias, atlases, biographies and other works of reference. She found nothing that was likely to interest her until she came to a small section on photography which was one of her hobbies. The books in this section were on a high shelf out of her reach, so she had to fetch a small ladder in order to get one down. Unfortunately as she was climbing down the ladder the book she had chosen slipped from her grasp and fell to the floor with a loud noise. Twenty pairs of eyes looked up at her simultaneously annoyed by this unaccustomed disturbance. Smitha felt herself going red as she picked up her book and nervously placed it on a nearby table.

Choose the appropriate answer from the alternatives given below :

- The books were out of her reach because \_\_\_\_\_ .  
 (1) They were too thick.  
 (2) They were expensive.  
 (3) They were on a high shelf.  
 (4) They were with the other readers.

**Answer (3)**

7. "Twenty pairs of eyes looked up at her simultaneously". Here the underlined word means \_\_\_\_\_.
- (1) At the same time.
  - (2) From different directions.
  - (3) They were on a high shelf.
  - (4) Threateningly

**Answer (1)**

8. In order not to disturb the others smitha \_\_\_\_\_.
- (1) Took the longer route.
  - (2) Did not take any book.
  - (3) Walked on her tiptoes.
  - (4) Walked without shoes.

**Answer (3)**

9. Smitha had to make use of a \_\_\_\_\_ to get her book.
- (1) A small stick                      (2) A small stool.
  - (3) A small plank.                      (4) A small ladder.

**Answer (4)**

10. Smitha dropped the book because \_\_\_\_\_
- (1) She wanted everybody to look at her.
  - (2) She was nervous.
  - (3) She was angry since she had to fetch it.
  - (4) She did not like the book.

**Answer (2)**

- Q. 11–15. Read the passage and answer the questions given below :

Sandesh told the inspector his name and address.

"You are not married, are you?" asked the inspector.

"I'm a widower" said Sandesh. I've lived alone ever since my wife died three years ago. This year, as usual, I went to spend my holidays by the sea. I decided to come back early because of the bad weather. On my way back I stopped at the Sun hotel to have dinner....."

The inspector nodded and waited for Sandesh to continue.

"It was raining pretty hard when I came out of the restaurant. I dashed towards the car park where I had left my car. I had just unlocked the door and was about to get in when a man stepped out of the shadows and asked me for a lift. Before I had time to reply he hit me hard on my head. After that I can remember nothing until I woke up in hospital".

Choose the most suitable alternative from those given below each statement :

11. Do you think Sandesh is \_\_\_\_\_.
- (1) At a bus stop ?
  - (2) In a car park ?
  - (3) At the excise station ?
  - (4) At the police station ?

**Answer (4)**

12. A person becomes a widower when his \_\_\_\_\_.
- (1) Mother dies                      (2) Wife dies
  - (3) Both parents die.                      (4) Only child dies.

**Answer (2)**

13. Dinner is the meal that is taken in the \_\_\_\_\_.
- (1) Morning                      (2) Afternoon.
  - (3) Evening                      (4) Anytime

**Answer (3)**

14. Sandesh had to dash to the car park because \_\_\_\_\_.
- (1) He saw a man opening his car.
  - (2) It was dark.
  - (3) It was raining.
  - (4) He was in a hurry

**Answer (3)**

15. The phrase "out of the shadows" means \_\_\_\_\_.
- (1) From the darkness
  - (2) From the sunlight.
  - (3) From under the car.
  - (4) From inside the car.

**Answer (1)**

- Q. 16–17. The first and the last sentence (S) of a certain paragraph are given below followed by the three missing sentences in random order under X, Y and Z. Select from the alternatives given below in what correct order they should be.

16. S–1 When I had finished my coffee I went to a bookstall.

S–2

S–3

S–4

S–5 I made myself comfortable in a quiet corner and began reading.

X–These would help me pass the time.

Y–Then I went into one of the waiting rooms.

Z–There I bought a couple of magazines.

Choose the correct alternative from below.

- (1) XYZ                      (2) YXZ
- (3) XZY                      (4) ZXY

**Answer (4)**

17. S-2 Vasant passed the time by examining the manager's office in some details.

S-2

S-3

S-4

S-5 The shelves were empty except for a dozen or so reference books.

X- To Vasant's left there was a book case which covered the greater part of the wall.

Y- Close to the window there were three chairs arranged around a long table.

Z - On his right there was a large window heavily curtained.

Choose the correct alternative from below :

(1) YZX (2) XZY

(3) ZYX (4) ZXY

**Answer (3)**

Q.18-19. The second sentence is missing in the following two sequences. Name the most appropriate one from those given below:

18. A. Heat flows from a body at a higher temperature to a body at a lower temperature.

B. ....

C. These are conduction, convection and radiation.

(1) There are many principles of this behaviour.

(2) There are other ways of conducting heat.

(3) There are three ways in which heat can flow from one object to another.

(4) There are different situations where this is found.

**Answer (3)**

19. A. When we do not treat people equally or with respect we are indulging in discrimination.

B. ....

C. Discrimination usually takes place when we treat someone differently or make a distinction.

(1) It happens when we or organizations incite people.

(2) It happens when people or organizations act on their prejudices.

(3) It happens when certain groups can't get along with others.

(4) It happens when people are busy with their lives.

**Answer (2)**

Q20-27. Here are some idiomatic phrases. Choose the alternative closest in meaning to each of the given idiomatic phrases

20. It caught my eye

(1) My eye started hurting

(2) Something went into my eye.

(3) My eye was jaundiced.

(4) It attracted my attention.

**Answer (4)**

21. One should never lose heart.

(1) Get a heart attack (2) Be discouraged.

(3) Donate your heart. (4) Have mercy on others.

**Answer (2)**

22. She went red in the face

(1) She felt embarrassed

(2) She felt sick.

(3) She felt tired.

(4) She felt sad.

**Answer (1)**

23. They laid the red carpet for him.

(1) They blocked his path

(2) They gave him a special welcome.

(3) They allowed him to sleep.

(4) They made fun of him.

**Answer (2)**

24. There was a big hue and cry over his disappearance.

(1) There was loud weeping.

(2) There was inquiry

(3) There were angry protests.

(4) There were complaints.

**Answer (3)**

25. He almost jumped out of his skin.

(1) He was doing yoga.

(2) Suddenly he was frightened.

(3) He underwent an operation.

(4) He was cool and calm.

**Answer (2)**

26. I could not stomach the slight

(1) I could not digest the food

(2) I could not make myself full

(3) I could not bear the insult

(4) I could bear the weight.

**Answer (3)**

27. She had poise beyond her years
- (1) She was rich and powerful
  - (2) She was old but good looking
  - (3) She was calm and confident
  - (4) She was attractive but short

**Answer (2)**

28–32 Fill in the blanks by selecting the correct form of the words given below each question :

28. He wrote the sentence but certain words were wrongly \_\_\_\_\_.
- (1) Spelled
  - (2) Spell
  - (3) Spelling
  - (4) Spelt

**Answer (4)**

29. The river \_\_\_\_\_ flows close to the city is flooded.
- (1) Whose
  - (2) Which
  - (3) Who
  - (4) When

**Answer (2)**

30. The bird flew \_\_\_\_\_ my head.
- (1) above
  - (2) on
  - (3) over
  - (4) through

**Answer (3)**

31. The task is \_\_\_\_\_ than it appears
- (1) more hard
  - (2) as hard
  - (3) hars
  - (4) harder

**Answer (4)**

32. We will not reach in time for the flight \_\_\_\_\_ we take a taxi.
- (1) unless
  - (2) untill
  - (3) if
  - (4) in case

**Answer (1)**

33–42 In the following passage there are certain blanks that have been numbered. Fill each of these blanks by selecting the correct alternative from those given below :

After lunch the two boys set off (33) the beach (34) lay beyond the headland. It was like discovering a new world. They (35) innumerable caves, half expecting in (36) to come across smugglers there. They looked for fish and (37) sea creatures in the small pools among the rocks. (38) examined all the objects which had been washed up by the (39) and lay upon the beach. In this way the afternoon passed off (40) and the sun was already beginning to set (41) they reluctantly decided to (42) their way homewards.

33. (1) with
- (2) by
- (3) along
- (4) on

**Answer (3)**

34. (1) who
- (2) which
- (3) whichever
- (4) whose

**Answer (2)**

35. (1) were exploring
- (2) would explor
- (3) explored
- (4) will explor

**Answer (3)**

36. (1) every
- (2) some
- (3) any
- (4) each

**Answer (2)**

37. (1) other
- (2) many
- (3) none
- (4) any

**Answer (1)**

38. (1) We
- (2) You
- (3) He
- (4) They

**Answer (4)**

39. (1) Waves
- (2) Fish
- (3) Tide
- (4) Boats

**Answer (1)**

40. (1) Slowly
- (2) Quickly
- (3) Lazily
- (4) Uneventfully

**Answer (2)**

41. (1) As
- (2) When
- (3) Because
- (4) Since

**Answer (2)**

42. (1) Go
- (2) Make
- (3) Come
- (4) Return

**Answer (1)**

43–46 Out of the given alternatives, choose the word which best fits each of the following descriptions :

43. A word which means 'walking slowly through the water'
- (1) swimming
  - (2) crossing
  - (3) wading
  - (4) floating

**Answer (3)**

44. A word which means 'hardworking'
- (1) active
  - (2\*) industrious
  - (3) smart
  - (4) quick

**Answer (2)**

45. A word which means 'oral examination'

- (1) Discussion                      (2) debate
- (3) Dialogue                        (4) interview

**Answer (4)**

46. A word which means 'writing about the life of a person'

- (1) Biography                        (2) Autobiography
- (3) Story                              (4) Biodata

**Answer (2)**

47-50 Complete each of below given sentences by choosing the correct alternative from those given below :

47. We have to \_\_\_\_\_ to the hanging times.

- (1) adopt                              (2) adapt
- (3) adept                              (4) add

**Answer (2)**

48. The winner was paid rich \_\_\_\_\_ by the Chief Guest.

- (1) complicates
- (2) complements
- (3) completions
- (4) compliments

**Answer (4)**

49. Let us introduce a new \_\_\_\_\_ in our service.

- (1) rite                                      (2) right
- (3) write                                 (4) ride

**Answer (1)**

50. Money is the \_\_\_\_\_ cause of all evil.

- (1) rout
- (2) root
- (3) route
- (4) rude

**Answer (2)**

