Date : 17/11/2019

Bihar

Aakash
Medical | IIT-JEE | Foundations
(Divisions of Aakash Educational Services Limited)

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Answers & Solutions

for

NTSE (Stage-I) 2019-20

INSTRUCTIONS TO CANDIDATES

Read the following instructions carefully before you open the question booklet.

1. Use blue/black ballpoint pen only. There is no negative marking.
2. Part I : MAT : 1 - 100 questions

   Part II : SAT : 1 - 100 questions
3. This test booklet contains 200 questions of one mark each. All the questions are compulsory.
4. Answer each question by darkening the one correct alternative among the four choices on the OMR SHEET with blue/black ballpoint pen.

   Example :

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

   Student must darkening the right oval only after ensuring correct answer on OMR Sheet.
5. 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.
6. Separate sheet has been provided for rough work in this test booklet.
7. Please handover the OMR Sheet to the invigilator before leaving the Examination Hall.
8. Darken completely the ovals of your answer on OMR Sheet in the time limit allotted for that particular paper.
9. Your OMR Sheet will be evaluated through electronic scanning process. Incomplete and incorrect entries may render your OMR Sheet invalid.
10. Use of electronic gadgets, calculator, mobile etc, is strictly prohibited.

PART-I : MENTAL ABILITY TEST (MAT)

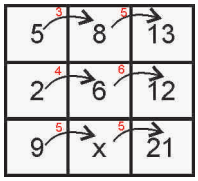
1. What will be the missing alphabet '?' in the figure given below?

(1) L (2) N
(3) A (4) V

E	H	M
B	F	L
I	?	U

Answer (2)

Sol.



9 + 5 = x = 14 = N

2. Which word cannot be formed from the letters of the word FRAGILE ?

(1) LIFE (2) RAIL
(3) EAGLE (4) RACE

Answer (4)

Sol. R A C E
↑
not available in FRAGILE

3. A, B, C and D are four relatives, A is thrice as old as B. Age of C is half the age of D and age of B is more than C. Which of the following statement can be assumed true?

(1) B is older than D
(2) A is older than D
(3) May be A is younger than D
(4) None of these

Answer (2)

Sol. (i) A = 3B

(ii) $C = \frac{D}{2}$

(iii) B > C

Let B = C + λ.

(λ > o)

⇒ A = 3 (C λ)

$\Rightarrow A = 3\left(\frac{D}{2}+\frac{\lambda}{2}\right)$

$\Rightarrow A = \frac{3D}{2}+\frac{3\lambda}{2}$

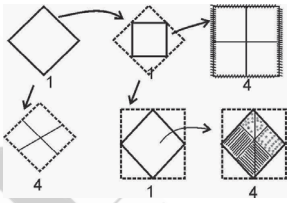
⇒ A > D

4. How many squares are there in the following figure?

(1) 16 (2) 18
(3) 14 (4) 15

Answer (4)

Sol.



1 + 1 + 4 + 4 + 1 + 4 = 15

5. If the third day of a month is Monday, which one of the following will be the fifth day from 21st of this month?

(1) Monday (2) Tuesday
(3) Wednesday (4) Thursday

Answer (3)

Sol.

S		2			
M		3	10	17	24
T					
W					*
Th					
F					
S	1				

6. If first day of the year 2020 is Wednesday, which one of the following will be the last day of this year?

(1) Monday (2) Wednesday
(3) Thursday (4) Friday

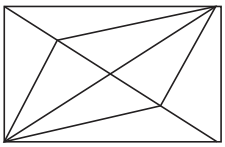
Answer (3)

Sol. 2020 is a leap years. Having 366 days

$$7)366(521 \quad \leftarrow \text{weeks total}$$
$$\underline{35}$$
$$16$$
$$\underline{14}$$
$$2 \quad \leftarrow \text{days left}$$

52nd weeks end on Tuesday. Then after Wd. And then comes last day which will be Thursday.

7. How many triangles are there in the figure given below?



(1) 8 (2) 16
(3) 20 (4) 22

Answer (4)

8. Five persons fire bullets at a target at the interval of 6, 7, 8, 9 and 12 seconds respectively. How many times in an hour they would fire the bullets together at the target?

(1) 6 (2) 7
(3) 8 (4) 9

Answer (3)

Sol. LCM of 6, 7, 8 9 and 12 = 504.

After 504 resounds then will fire the bullets together i.e. after. 8.4 minutes will fire the bullets

Sequence of hitting together

0, 8.4, 16.8, ... a_n

$a_n \le 60$

$0 + (n - 1)\, 8.4 \le 60$

$n - 1 \le \frac{60}{8.4}$

$n \le \frac{60}{8.14} + 1$

$n \le 8.14$

$n = 8$

9. What will be the missing fraction in the given series ?

$\frac{4}{9}, \frac{9}{20}, \ldots\ldots\ldots\ldots, \frac{39}{86}$

(1) $\frac{17}{40}$ (2) $\frac{19}{42}$

(3) $\frac{20}{44}$ (4) $\frac{29}{53}$

Answer (2)

Sol. Numerator is × 2 + 1

Denominator is × 2 + 1

$= \frac{19}{42}$

10. The average age of a six member family is 22 years. If the youngest member of the family is 7 years old, then one hour before the birth of this member, what was the average age of the family?

(1) 18 years (2) 20 years
(3) 16 years (4) 19 years

Answer (4)

Sol. $\frac{22 \times 6 - 7 - 7 \times 5}{5}$

$= \frac{90}{5} = 19\,\text{Year}$

Question 11-13: Certain rules are followed in the given series of alphabets, where some alphabets are missing. Find out the missing alphabet series which is correct form the given alternatives.

11. b__abbc__bbca__bcabb__ab

(1) acaa (2) acba
(3) cabc (4) cacc

Answer (3)

Sol. Not Required.

12. c__bba__cab__ac__ab__ac

(1) abcbc (2) acbcb
(3) babcc (4) bcacb

Answer (2)

Sol. Not Required.

13. a__n__b__ __ ncb__ __ncb

(1) bcabab (2) bacbab
(3) abcbcb (4) abbbcc

Answer (1)

Sol. Not Required.

Question 14-17 : In a T20 cricket match between Team A and Team B, Team A bated first and the opening batsman who took the strike on the first ball faced all the deliveries right from first ball to the last ball. He scored his runs in fours and singles only. In whole innings there was no extras e.g. No ball, Wide ball, Bye, Leg Bye etc. There was no run scored of overthrows. There was not a single dot ball in Team A innings. Team A scored maximum possible run. The opening batsman of Team B who took strike on the first ball managed to face all the deliveries until he go winning runs for his team. The batsman scored his run in sixes and singles only to finish off the match with a win as early as possible. Like Team A in Team B innings too, there was no extras, overthrows and dot ball.

14. What is the maximum possible score of Team A?
(1) 424 (2) 423
(3) 420 (4) 404

Answer (2)

Sol. 21 × 19 + 24 = 399 + 24 = 423

15. How many balls were left in the innings when Team B won?
(1) 36 (2) 37
(3) 38 (4) 39

Answer (3)

Sol. $\frac{423}{31} = 13\frac{20}{31} : -6 \times 6 + 2 = 38$

16. How many runs were required to win the match on the ball on which team B batsman finished off the match with a sixer to win?
(1) 1 (2) 2
(3) 3 (4) 4

Answer (3)

Sol. 31 × 13 + 6 + 6 + 6 = 421

Now run required in last ball = 423 – 421 + 1 = 3

17. How many sixes were scored by the tem B batsman?
(1) 67 (2) 68
(3) 69 (4) 70

Answer (3)

Sol. 13 × 5 + 4 = 69

Questions 18-20: When Ram will be as old as Ram's father is now, Ram will be five times as old as Ram's son is now. But at that time Ram's son will be eight years older than Ram is now. At present, the sum of the ages of Ram's father and Ram is 100 years.

Sol. Let the present age of Ram, and Ram's son is x and y, then the present age of Ram's Father is 100–x

$R_F \longrightarrow R \longrightarrow R_S$
$100 - x \quad x \quad y$

Now Let after a years Ram's age will be equal to present age of Ram's Father and son

$R_F \longrightarrow R \longrightarrow R_S$
$(100 - x + a) \quad (x + a) \quad (y + a)$

Given

$x + a = 100 - x$ —(1)

$x + a = 5y$ —(2)

$y + a - x = 8$ —(3)

Now solve eq. (1), (2) and (3) for a, x and y

a = 30 years

x = 35 years

Y = 13 years

18. How old is Ram's son now?
(1) 8 years (2) 13 years
(3) 16 years (4) 19 years

Answer (2)

19. How old would Ram have been 5 years ago?
(1) 30 years (2) 33 years
(3) 35 years (4) 38 years

Answer (1)

20. After 10 years, how old will Ram's father be?
(1) 56 years
(2) 65 years
(3) 75 years
(4) 66 years

Answer (3)

Questions 21-25 : Read carefully the information given below and answer the questions –

Eight person A, B, C, D, E, F, G and H are seated in a line and all of them are facing North, not necessarily in the same order. Each one of the above person lives in different floor of a eight floor building (e.g. – 1, 2, 3, 4, 5, 6, 7 and 8) not necessarily in the same order.

The person living on the 3rd floor is sitting on the second place towards right of the person living on 2nd floor. C lives on 5th floor, A is sitting on the fourth place towards left of the person living on 8th floor. D is not sitting on either side of H. Neither A nor the person living on 8th floor are sitting on the extreme ends of the line. B is sitting on the third place towards left of F. There is only one person sitting between G who lives on 1st floor and the person living on 8th floor. In between G and the person living on 7th floor there are sitting 2 persons. H is sitting just left of

the person living on 7th floor. Between H and F, who lives on 6th floor there are two persons sitting.

Sol.

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

21. B lives on which floor?
(1) 5th (2) 3rd
(3) 2nd (4) 7th

Answer (3)

22. How many persons are sitting between G and B?
(1) 1 (2) 2
(3) 3 (4) 4

Answer (3)

23. D lives on which floor?
(1) 3rd (2) 4th
(3) 2nd (4) 7th

Answer (2)

24. Who is sitting just left of the person living on 7th floor?
(1) H (2) F
(3) A (4) B

Answer (1)

25. Who is sitting three places towards right of A?
(1) B (2) E
(3) F (4) C

Answer (4)

Question 26-30 : Read carefully the information given below and answer the questions.

Two opposite surfaces of a 16 cm solid cube is coloured red, other two opposite surfaces is coloured green and the remaining surfaces is coloured with blue After this the cube is cut into small cubes of size 4 cm each.

Sol. Total number of small cubes of side length 4 cm is equal to

$$\frac{\text{volume of big cube}}{\text{volume of small cube}} = \frac{16^3}{4^3} = 64$$

$n^3 = 64 \Rightarrow n = 4$

26. How many cubes are there whose three surfaces are coloured blue, green and red?
(1) 6 (2) 8
(3) 10 (4) 12

Answer (2)

Sol. Corner cubes = 8

27. How many cubes are there whose none of the surfaces is coloured?
(1) 0 (2) 8
(3) 16 (4) 24

Answer (2)

Sol. $(n-2)^3 = (4-2)^3 = 8$

28. How many cubes are there whose two surfaces are coloured?
(1) 4 (2) 8
(3) 12 (4) 24

Answer (4)

Sol. $(n-2) \times$ number of edges

29. How many cubes are there whose only one surface is coloured?
(1) 8 (2) 16
(3) 12 (4) 24

Answer (4)

Sol. $(n-2)^2 \times$ number of surface

$= (4-2)^2 \times 6$

$4 \times 6 = 24$

30. How many cubes are there whose three surfaces are coloured?
(1) 4 (2) 6
(3) 8 (4) 16

Answer (3)

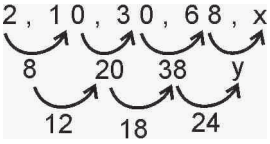
Sol. Cube whose three surfaces coloured will be the corner cubes = 8

Questions 31-40 : In the following questions complete the given number series with the most suitable alternative in place of question (?)

31. 2, 10, 30, 68, ?
(1) 125 (2) 130
(3) 138 (4) 204

Answer (2)

Sol.



y = 38 + 24 = 62

$\Rightarrow$ x = 68 + 62 = 130

32. 392, 252, 150, ?, 36, 12

(1) 80 (2) 84

(3) 132 (4) 148

Answer (1)

Sol. 4 × 3 = 12

9 × 4 = 36

16 × 5 = 80

25 × 6 = 150

36 × 7 = 252

49 × 8 = 392

33. 8, 15, 28, 53, ?

(1) 105 (2) 104

(3) 102 (4) 100

Answer (3)

Sol. 8, 15, 28, 53, x

7 13 25

x–53 = 25 × 2–1 → = 102

1 less than double

34. 12, 36, 132, 348, ?, 1332

(1) 732 (2) 648

(3) 716 (4) 943

Answer (1)

Sol. 12, 36, 132, 348, –1332

24 96 216

4 × 6, 16 × 6, 36 × 6, 64 × 6

Now 64×6=384

So Ans. is 384 + 348 = 732

35. 128, ?, 82, 62, 44, 28

(1) 99 (2) 104

(3) 109 (4) 106

Answer (2)

Sol. 28, 44, 62, 82, x, 128

16 18 20 22 140

x = 82 + 22 = 104

36. 2, 3, 6, 15, 42, ?

(1) 84 (2) 123

(3) 94 (4) 66

Answer (2)

Sol. 2, 3, 6, 15, 42, x

1 3 9 27 m

3^0 3^1 3^2 3^3 3^4

∴ m = 81

∴ x = 42 + 81 = 123

37. 3, 7, 23, 95, ?

(1) 575 (2) 479

(3) 128 (4) 62

Answer (2)

Sol. 3, 7, 23, 95, x

7 = 3 × 2 + 1

27 = 7 × 3 + 2

95 = 23 × 4 + 3

∴ x = 95 × 5 + 4

= 475 + 4

= 479

38. 19, 23, 26, 30, 33, ?

(1) 31 (2) 35

(3) 37 (4) 39

Answer (3)

Sol. 19, 23, 26, 30, 33,

4 3 4 3 4

x = 37

39. 6, 17, 39, 72, ?

(1) 94 (2) 127

(3) 83 (4) 116

Answer (4)

Sol. 6, 17, 39, 72, x

11 22 33 44

X = 72 + 44 = 116

40. 6000, 5940, 5881, ?

(1) 5823 (2) 5746

(3) 5854 (4) 5788

Answer (1)

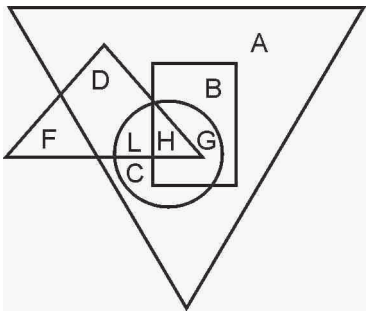
Sol. 6000, 5940, 5881 x

60 59 58

x = 5881 – 58

= 5823

Question 41–45 : Study the following figure and answer the questions



Here-

1. Large triangle ∇ represents artists
2. Small triangle Δ represents scientists
3. Rectangle ▭ represents dancers
4. Circle O represents doctors

41. Which letter represents artists who are doctor and dancer?
(1) H (2) G
(3) D (4) A

Answer (2)

Sol. G lier in ◯, ▭ and ▽ (big)

42. Which letters represents those artists who are neither scientist nor doctor?
(1) A and B (2) A and L
(3) B and G (4) L and H

Answer (1)

43. Which letters represents those artists who are dancer as well as doctor?
(1) A and D (2) G and H
(3) C and A (4) C and D

Answer (2)

44. Which letter represents those artists who are not doctor. Not scientist and not dancer?
(1) D
(2) F
(3) A
(4) G

Answer (3)

45. Which letter represents those scientist who are not artists ?
(1) B
(2) D
(3) L
(4) F

Answer (4)

Question 46-49 : Consider the following statements :

There are six villages A, B, C, D , E & F.

F is 1 km to the west of D.

B is 1 km to the east of E.

A is 2 km to the north of E.

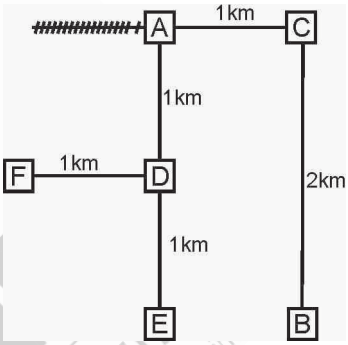
C is 1 km to the east of A.

D is 1 km to the south of A.

46. Which three villagers are in a line?
(1) ACB (2) ADE
(3) CBF (4) EBD

Answer (2)

Sol.



47. If '-' means divisions '÷' means multiplication. '+' means subtraction and '×' means addition, then which of the following equation is correct?
(1) 20 + 8 – 7 ÷ 6 × 4 = 25
(2) 20 – 5 ÷ 4 + 6 × 5 = 15
(3) 20 × 5 – 6 ÷ 7 + 4 = 28
(4) 20 ÷ 4 – 8 × 10 + 6 = 36

Answer (2)

Sol. "_" division
"÷" multiply
"+" Subtract
"×" Sum

(i) 20 × 8 ÷ 7 × 6 + 4
≠ 25

(ii) 20 ÷ 5 × 4 – 6 + 5
= 4 × 4 – 6 + 5
= 16 – 6 + 5
= 21 – 6
= 15

ture

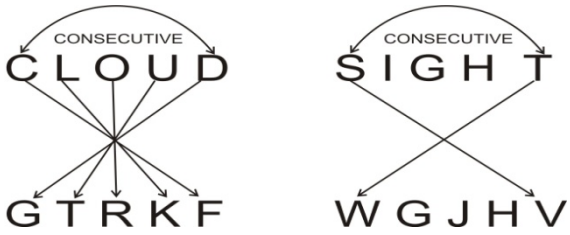
48. In a certain code 'CLOUD' is written as 'GTRKF' then how 'SIGHT' will be written in this code?

(1) WGJHV (2) UGHHT

(3) UHJFW (4) WFJGV

Answer (1)

Sol.



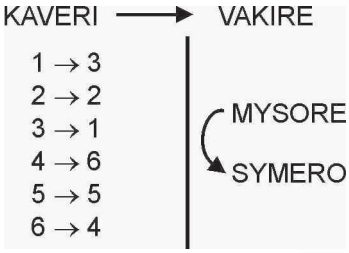
49. In a certain code 'KAVERI' is written as 'VAKIRE', then how MYSORE' will be written in this code?

(1) SYMEOR (2) SYMROE

(3) SYMERO (4) SYMERP

Answer (3)

Sol.



Questions 50-54 : Complete the given analogy.

50. CE : 70 : DE : ?

(1) 90 (2) 60

(3) 120 (4) 210

Answer (1)

Sol. CE : 70 : : DE :

$$\frac{C(E)}{D(E)} = \frac{7(O)}{x(y)}$$

y = o

C = $\Rightarrow$ 7 = 3 × 2 + 1

D = 4 $\Rightarrow$ 4 ×2× + 1 = 9

DE = 90

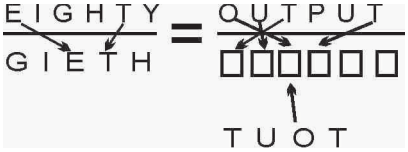
51. EIGHTY : GIEYTH : OUTPUT : ?

(1) UTOPTO (2) UOTUPT

(3) TUOUTP (4) TUOTUP

Answer (4)

Sol.



52. 7384 : 4837 : : 5291 : ?

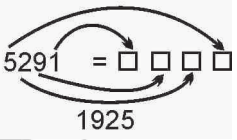
(1) 1924 (2) 1925

(3) 1935 (4) 1915

Answer (2)

Sol. 7 3 8 4 = 4 8 3 7

1 → 4
2 → 3
2 → 3
3 → 2
4 → 1



53. Arrow : Archer : : Pen : ?

(1) Author (2) Student

(3) Purchase (4) Writing

Answer (1)

Sol. Pen → Writer (Student does many other things also)

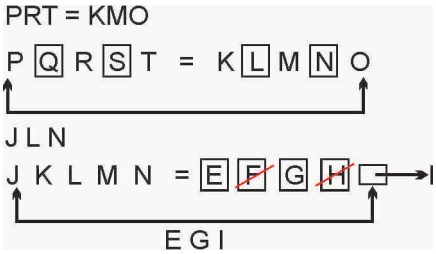
54. PRT : KMO : : JLN : ?

(1) DFI (2) EGI

(3) DFH (4) DGI

Answer (2)

Sol. PRT = KMO



55. If Ramesh, while selling two sarees at the same price, makes a profit of 10% on one saree and suffers a loss of 10% on the other then which of the following is true?

(1) He makes no profit and no loss

(2) He makes a profit of 1%

(3) He suffers a loss of 1%

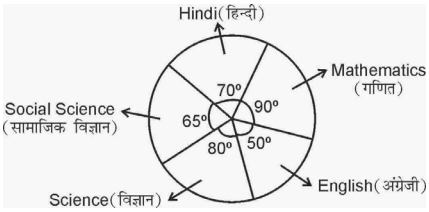
(4) He suffers a loss of 2%

Answer (3)

Sol. If S.P is same and profit % of one article is equal to the loss % of 2nd article say (x) then always will be overall loss and loss % equal to

$$\frac{x^2}{100}\% = \frac{10^2}{100}\%$$
$$= \frac{100}{100} = 1\%$$

Question 56-60 : The given pie-diagram shows the marks scored by a student in different subjects e.g. English, Hindi, Mathematics, Science and Social Science in an examination, Assuming that the total marks for the examination is 540, answer the following questions :



56. The marks scored in Hindi & Mathematics exceed the marks scored in English & Social Science by

(1) 60 (2) 75

(3) 40 (4) 30

Answer (1)

Sol. Hindi : $\frac{70}{360}\times 540 = \frac{7}{36_4}\times \frac{60^{15}}{540} = 105$

Maths : $\frac{90}{360}\times 540 = 135$

English : $\frac{540}{360}\times 55 = \frac{3}{2}\times 55 = \frac{165}{2}$

Science : $80\times\frac{3}{2} = 120$

Social Science : $65\times\frac{3}{2} = \frac{195}{2}$

$(105 + 135) - \left(\frac{165}{2}+\frac{195}{2}\right) = \frac{480}{2}-\frac{360}{2} = 60$

57. The subject in which the student scored 22.2% marks?

(1) Hindi (2) Science

(3) Social Science (4) English

Answer (2)

Sol. $\frac{22.2}{100}\times 360 = 80^{\circ}(\text{approx})$ Which is Science

58. The subject in which the student scored 105 marks is

(1) Mathematics (2) Science

(3) Hindi (4) English

Answer (3)

Sol. Hindi

59. The marks obtained in three subjects English, Science and Social Science is what percentage of the total marks?

(1) 45 (2) $44\frac{4}{9}$

(3) 55 (4) $55\frac{5}{9}$

Answer (4)

Sol. $\frac{55+80+65}{360}\times 100 = \frac{200}{360}\times\frac{5}{100} = \frac{1000}{18} = 55\frac{5}{9}$

60. The marks scored in Mathematics is what percentage of the total marks ?

(1) 20 (2) 30

(3) 35 (4) 25

Answer (4)

Sol. $\frac{90}{360}\times 100 = 25$

61. If you write down all the numbers from 1 to 100, then how many times do you write 3 ?

(1) 11 (2) 18

(3) 20 (4) 21

Answer (3)

Sol. 1, 2, ..., 9 $\longrightarrow$ 1

11, 12, ..., 19 $\longrightarrow$ 1

20, 21, ..., 29 $\longrightarrow$ 10 + 1

40, 49 $\longrightarrow$ 1

|

90, 99. $\longrightarrow$ 1

62. Find out the two sings to be interchanged for making the following equation correct.

5 + 3 × 8 – 12 ÷ 4 = 3

(1) + and – (2) – and ÷

(3) + and x (4) + and ÷

Answer (2)

Sol. 5 + 3 × 8 ÷ 12 – 4

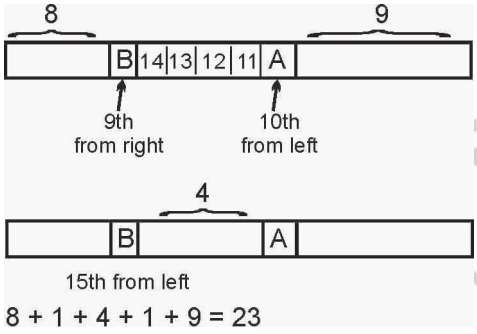
63. In a row of boys, if A who is 10th from the left and B who is 9th from the right interchange there positions, A becomes 15th form the left. How many boys are there in the row ?

(1) 23 (2) 31

(3) 27 (4) 28

Answer (1)

Sol.



8 + 1 + 4 + 1 + 9 = 23

64. P is the brother of Q and R. S is R' S mother. T is P's father. Which of the following statements cannot be trure ?

(1) T is Q's father (2) S is P's mother

(3) P is S's son (4) Q is T's son

Answer (4)

Sol. Not Required.

65. How many 7's immediately preceded by 6 but not immediately followed by 4 are there in the following series?

742764 367535 784376 72406 743

(1) 1 (One) (2) 2 (two)

(3) 4 (four) (4) 6 (six)

Answer (2)

Sol. Not Required.

66. How many prime number are there between 1 to 100?

(1) 17 (2) 18

(3) 19 (4) 21

Answer ( )

Sol. No option is correct.

67. How many digits are there in $6^3 \times 2^{98} \times 5^{99}$?

(1) 100 (2) 101

(3) 102 (4) 103

Answer (3)

Sol. $6^3 \times 5 \times (2\times5)^{98}$

1080×10^{98} have 102 digits

Question 68-70: Complete the following alphabetical series.

68. ADG, GJM, MPS,?

(1) SVW (2) SVY

(3) SUW (4) SWY

Answer (2)

Sol.

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

S V Y

69. BD, HJ, NP, ?, ZB

(1) QS (2) TV

(3) YC (4) TU

Answer (2)

Sol. B ~~C~~ D EFG H ~~I~~ J KLM N ~~O~~ P QRS T ~~U~~ V

TV

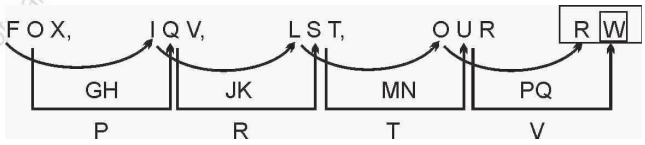
70. FOX, IQV, LST, OUR, ?

(1) RWP (2) RPW

(3) QVS (4) SXU

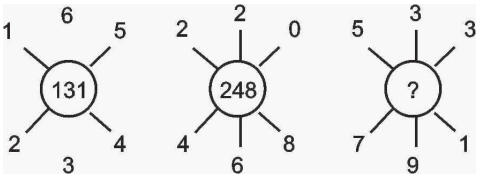
Answer (1)

Sol.



Question 71-75: Find the missing number in the following :

71.

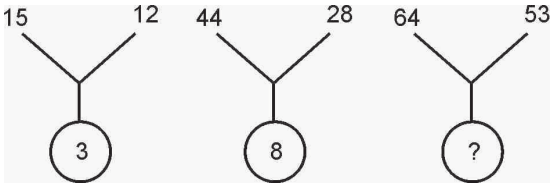


(1) 320 (2) 274

(3) 262 (4) 132

Answer (3)

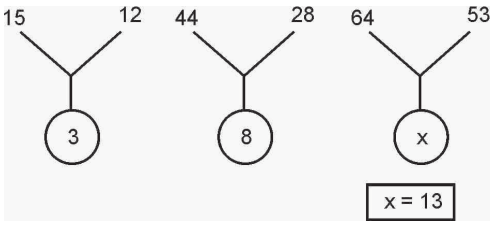
Sol. Check the relation of middle number with the difference of upper and lower number.

72. 

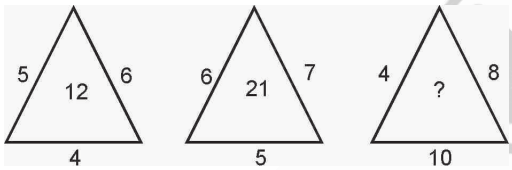
(1) 30 (2) 13

(3) 70 (4) 118

Answer (2)

Sol. 

$\begin{array}{cc} 3)15(& 3)12(\\ 0 & 0 \end{array}$

73. 

(1) 14 (2) 22

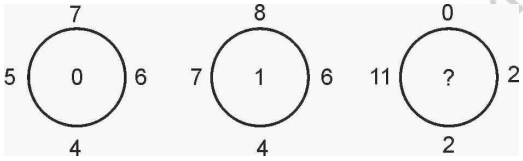
(3) 32 (4) 320

Answer (3)

Sol. $6 \times 5 \times 4 = (120)$

$7 \times 6 \times 5 = (210)$

$8 \times 4 \times 10 = (320)$

74. 

(1) 0 (2) 2

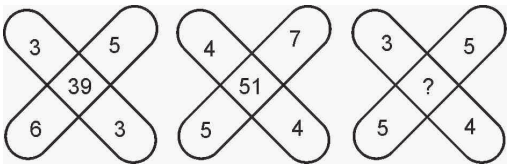
(3) 11 (4) 12

Answer (3)

Sol. (5 + 6) – (7 + 4) = 0

(7 + 6) – (8 + 4) = 1

(11 + 2) – (0 + 2) = 11

75. 

(1) 47 (2) 45

(3) 37 (4) 35

Answer (3)

Sol. $6 \times 5 + 3 \times 3 = 39$

$5 \times 7 + 4 \times 4 = 51$

$5 \times 5 + 4 \times 3 = 37$

76. Arrange the given words in the sequence in which they appear in the dictionary and then choose the correct sequence.

(1) POWER (2) POWDER

(3) POSITION (4) POSTER

(5) POSITIVE

(1) 4,5,3,2,1 (2) 5,3,4,2,1

(3) 3,5,4,2,1 (4) 2,5,1,4,3

Answer (3)

Sol. O comes before V $\Rightarrow$ 3, 5

3, 5, 4, 2, 1

Questions 77 and 78: Arrange the given words in alphabetical order and choose the one that comes last.

77. (1) Vapour (2) Vaccine

(3) Vacuum (4) Valentine

Answer (1)

Sol.

2, 3, 4, 1

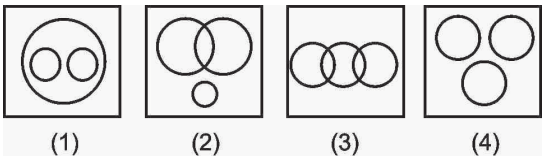
78. (1) Distribute (2) Disturb

(3) Distinct (4) Dishonest

Answer (2)

Sol. 4, 3, 1, 2

79. Which one of the following vein diagrams represents the relation among doctor, nurse and human?



Answer (1)

Sol. 

Doctor can't be nurse or vice-v

$\Rightarrow$ Doctor & nurse one disjoint

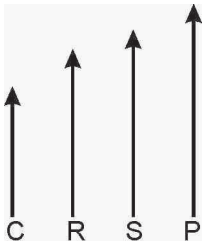
80. If Chandra is smaller in height than Rina, Puja is taller than Sita and Sita is taller than Rina. Who among these is smallest in height?

(1) PUJA (2) RINA

(3) SITA (4) CHANDRA

Answer (4)

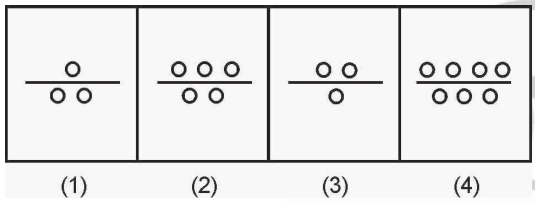
Sol.



Chandra is smallest

Question 81-85 : In each of the following sets of figures, select the one figure that is different from the other figures from the given option.

81.

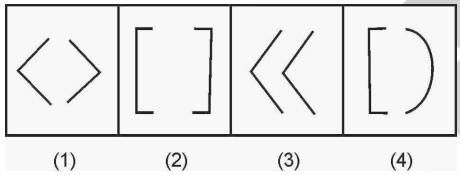


Answer (1)

Sol. In, 2, 3, & 4, no. of circles below the horizontal line is less than above it

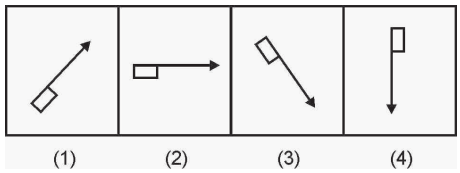
1 is different

82.



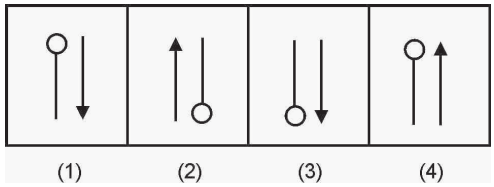
Answer (4)

83.



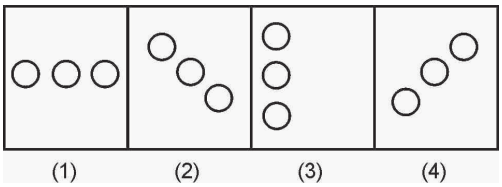
Answer (4)

84.



Answer (2)

85.



Answer (3)

Question 86-88 : In each of the following questions two statements and two conclusions numbered I and II are given. You have to take the given two statements to be true even if they seem to be at variance from commonly known facts. Read the conclusions and then decide which of the given conclusions logically follows from the two given statements.

86. Statements :

(1) All dancers are singers.

(2) All singers are teachers.

Conclusions :

(I) Alll dancers are teachers.

(II) Some singers are dancers.

(1) Only conclusions I is true

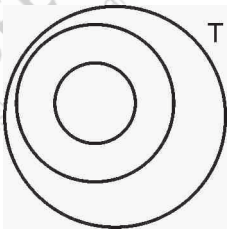
(2) Only conclusions II is true

(3) Both conclusion I and II are true

(4) Neither conclusions I nor conclusion II is true

Answer (3)

Sol.



Both can design follows

87. Statements :

(1) Some fruits are mangoes.

(2) Some fruits are not guavas.

Conclusions :

(I) All fruits are mangoes.

(II) All mangoes are fruits.

(1) Only conclusions I is true

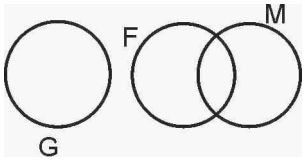
(2) Only conclusions II is true

(3) Both conclusion I and II are true

(4) Neither conclusions I nor conclusion II is true

Answer (4)

Sol.



88. Statements :

(1) No Horse is Dog.

(2) All Dogs are Elephants.

Conclusions :

(I) No Elephant is Horse.

(II) Some Elephants are Dogs.

(1) Only conclusions I is true

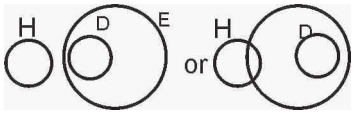
(2) Only conclusions II is true

(3) Both conclusions I and II are true

(4) Neither conclusions I nor conclusion II is true

Answer (2)

Sol.



Only conclusions II follows.

89. In the given question choose the correct mirror image from amongst the four alternative.

PRACTICE

(1) ƎƆITƆAЯЧ (2) ЧЯAƆTIƆƎ

(3) PRACTICE (4) ƎƆITƆAЯ Ч

Answer (1)

Sol. PRACTICE ƎƆIT

90. In the given question choose the correct water image from amongst the four alternative.

MUMBAI

(1) MUMBAI (2) IAƐMUM

(3) MUMBAI (4) MUMBAI

Answer (1)

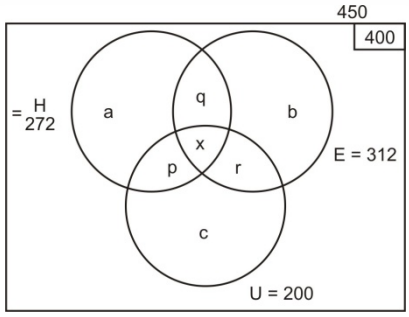
Sol.

MUMBAI

MUMBAI

Questions 91-94 : In a village of 450 people, 272 read Hindi Newspaper, 132 read English Newspaper and 200 read Urdu Newspaper, 55 read only Hindi and Urdu Newspaper, 27 read only Hindi and English Newspaper, and 14 read only Urdu and English Newspaper, 50 read no Newspaper.

Sol.



In the question, take 172 people who read Hindi Newspaper at the place of 272, here a, b, c denotes the number of people who read only Hindi (H), only English (E) and only Urdu (U) respectively.

p, q, r denotes the number of people who read only two kids of newspaper as mentioned and x is the number of people who read all three newspapers.

Now given

H + E + U = 400

Or (a + b + c) + (p + q + r) + x = 400 —(1)

a + p + q + x = 172 —(2)

b + q + r + x = 132 —(3)

c + p + r + x = 200 —(4)

Adding equation (2), (3) and (4)

504 = a + b + c + 2(p + q + r) + 3x

Or (a + b + c) + 2(p + q + r) + 3x = 504 —(5)

Now equation (5) – Eq.(1)

(p + q + r) + 2x = 104 —(6)

Also given

P = 55

Q = 27

R = 14

$\therefore$ p + q + r = 96

Put p + q + r = 96 in equation (6)

96 + 2x = 104

2x = 8

x = 4

91. How many people read only one newspaper?

(1) 250 (2) 300

(3) 325 (4) 275

Answer (2)

Sol. a + b + c = 300

92. How many people read atleast two newspapers?
(1) 96 (2) 98
(3) 102 (4) 100

Answer (4)

Sol. p + q + r + x = 96 + 4 = 100

93. How many people read all the three newspapers?
(1) 4 (2) 6
(3) 8 (4) 10

Answer (1)

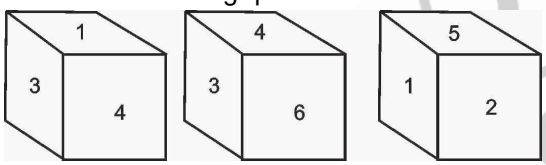
Sol. x = 4

94. How many people read only English newspaper?
(1) 86 (2) 91
(3) 87 (4) 96

Answer (3)

Sol. c = E – (q + x + r)
=132 – (27 + 4 + 14)
= 132 – 45
= 87

Questions 95 and 96 : A dice is thrown 3 times and its 3 positions are given in the picture below. Answer the following questions.



95. Which number is opposite to 4 ?
(1) 1 (2) 3
(3) 5 (4) 6

Answer (3)

96. Which number is opposite to 1 ?
(1) 2 (2) 3
(3) 4 (4) 6

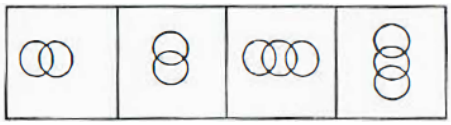
Answer (4)

97. How many 5's are there in the following sequence which are immediately followed by 3 but not immediately preceded by 7 ?
43657536457357353
(1) 0 (2) 1
(3) 2 (4) 3

Answer (2)

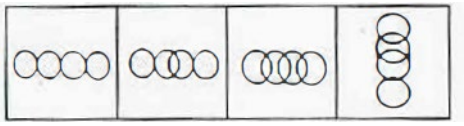
Questions 98-100 : There are two sets of figures. One set contains problem-figures while the other has answer figures. There is a sequence according to which the problem figures are arranged. You have to select an answer figure which can be added in sequence with the problem figures. Choose the correct figure.

98. Problem Figures



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

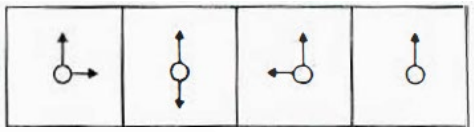
Answer Figures



(1) (2) (3) (4)

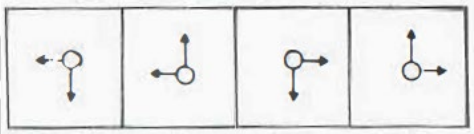
Answer (3)

99. Problem Figures



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

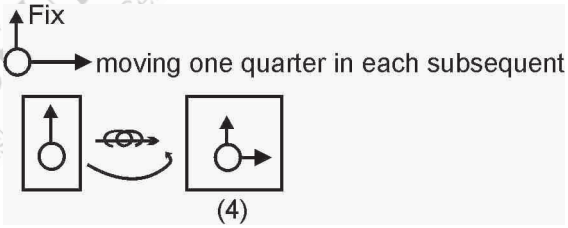
Answer Figures



(1) (2) (3) (4)

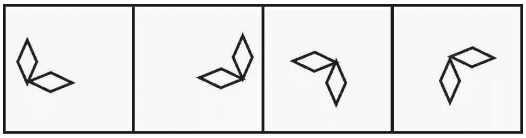
Answer (4)

Sol.



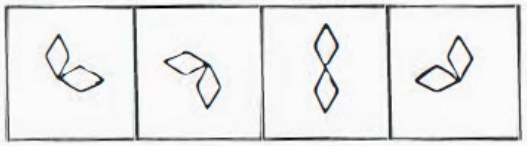
(4)

100. Problem Figures



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

Answer Figures



(1) (2) (3) (4)

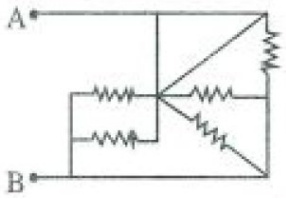
Answer (1)

Sol. <2> or <1>

PART-II : SCHOLASTIC APTITUDE TEST (SAT)

Physics

1. The circuit shown has 5 resistors of equal resistance R. Calculate equivalent resistance across points A and B



(1) $\frac{11}{R}$ (2) $\frac{13R}{12}$

(3) $\frac{R}{5}$ (4) $\frac{15R}{6}$

Answer (3)

Sol. All the Resistors are connected in parallel

$Req = \frac{R}{5}$

2. For an object thrown at 45º to horizontal, the maximum height (H) and horizontal range (R) related as :

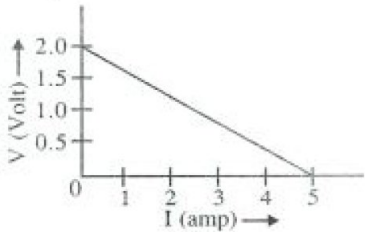
(1) R = 16 H (2) R = 8 H

(3) R = 4 H (4) R = 2 H

Answer (3)

Sol. $R = \frac{U^2 \sin 2\theta}{g}$, $H = \frac{U^2 \sin^2 \theta}{2g}$

3. For a cell, graph is plotted between the potential difference V across the terminals of the cell and current I drawn from the cell (see fig.) The emf and internal resistance of the cell are E and r respectively. Then :



(1) E = 2 V, r = 0.5 Ω (2) E = 2 V, r = 0.4 Ω

(3) E > 2 V, r = 0.5 Ω (4) E > 2 V, r = 0.4 Ω

Answer (2)

Sol. V = E if I = 0

$\Rightarrow$ E = 2.0 V

V = 0 if E – Ir = 0

$\Rightarrow$ 2 – 5r = 0

$\Rightarrow$ r = 0.4. Ω

4. A simple pendulum has a time period T_1 when on the earth's surface and T_2 when taken to a height R above earth's surface, where R is the radius of the earth.

The value of ratio $\frac{T_2}{T_1}$

(1) 1 : 1 (2) $\sqrt{2}$: 1

(3) 4 : 1 (4) 2 : 1

Answer (4)

Sol. $T = 2\pi\sqrt{\frac{l}{g_{eft}}}$

$T_1 = 2\pi\sqrt{\frac{l}{g}}$

$T_2 = 2\pi\sqrt{\frac{4l}{g}}$

5. Under the influence of a uniform magnetic field a charged particle is moving in a circle of radius R with constant speed v. The time period of the motion :

(1) Depends on both R and v

(2) Is independent of both R and v

(3) Depends on R but not on v

(4) Depends on v but not on R

Answer (2)

Sol. Time period = $\frac{2\pi M}{qB}$

6. Two wires A and B have lengths 40 cm and 30 cm respectively. A is bent as a circle of radius r and B into an arc of radius r. A current I_1 is passed through A and I_2 through B. To have same magnetic field at the centre, the ratio of $I_1 : I_2$ is

(1) 3 : 4 (2) 3 : 5

(3) 2 : 3 (4) 4 : 3

Answer (4)

Sol. $\frac{I_1}{I_{21}}=\frac{r_1}{r_2}=\frac{I_1}{I_2}=\frac{40}{30}=\frac{4}{3}$

7. A machine gun fires a bullet of mass 40 gram at a speed of 1200 ms^{-1}. The man holding it can exert a maximum forces of 144 N one the gun. How many bullets can he fire per second at the most?

(1) One (2) Four

(3) Two (4) Three

Answer (2)

Sol. Force= Change in momentum in unit time

$\Rightarrow 144=\frac{40}{1000}\times 1200\times n$

$\Rightarrow n = 4$

8. A concave lens of focal length 30 can placed in contact with a plane mirror acts as a :

(1) Convex mirror of focal length 60 cm

(2) Concave mirror of focal length 15 cm

(3) Convex mirror of focal length 15 cm

(4) Concave mirror of focal length 60 cm

Answer (2)

Sol. The combination will behave as a mirror with focal length given by

$\frac{1}{f}=\frac{-2}{f_L}+\frac{1}{f_m}$

9. A comet orbits the sun in an elliptical orbit. Which of the following is constant throughout its orbit?

(1) Linear speed (2) Angular momentum

(3) Angular speed (4) Potential energy

Answer (2)

10. Rainbow is formed due to a combination of :

(1) Dispersion and total internal reflection

(2) Refraction and absorption

(3) Dispersion and interference

(4) Scattering and dispersion

Answer (1)

Sol. Fact

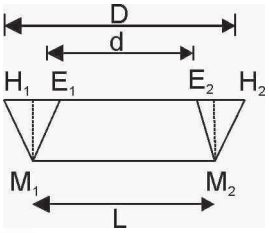
11. A person had D cm wide face and his two eyes are separated by d cm. The minimum width (in cm) of a mirror required for the person to view his complete face is :

(1) $\frac{D+d}{2}$ (2) $\frac{D-d}{4}$

(3) $\frac{D+d}{4}$ (4) $\frac{D-d}{2}$

Answer (1)

Sol.



$L=D+\frac{D-d}{2}$

$\Rightarrow L=\frac{D+d}{2}$

12. The horizontal range of a projectile is added maximum for a given velocity of projection when the angle of projection is :

(1) 30° (2) 60°

(3) 45° (4) 90°

Answer (3)

Sol. $R=\frac{U^2\sin 2\theta}{g}$

13. Parsec is the unit of :

(1) Distance (2) Time

(3) Velocity (4) Angle

Answer (1)

Sol. Fact

Chemistry

14. **Assertion:** During digestion with concentrated H_2SO_4, nitrogen of the organic compound is converted into $(NH_4)_2SO_4$.

Reason: $(NH_4)_2SO_4$ heating with alkali liberates NH_3 gas.

Read the assertion and reason carefully to mark the correct option.

(1) Both assertion and reason are true and the reason is the correct explanation of the assertion

(2) Both assertion and reason are true and the reason is not the correct explanation of the assertion

(3) Assertion is true but the reason is false

(4) Assertion is false but the reason is true

Answer (2)

Sol. Concept

15. The following is the correct decreasing order of the ionic radii-

(1) $K^+ > Ca^{2+} > S^{2-} > Cl^-$

(2) $K^+ > Ca^{2+} > Cl^- > S^{2-}$

(3) $Ca^{2+} > K^+ >> Cl^- > S^{2-}$

(4) $S^{2-} > Cl^- > K^+ > Ca^{2+}$

Answer (4)

Sol. Greater the $\frac{e^-}{p}$ ratio of isoelectronic species larger the atomic /ionic radiio $S^{2-} > Cl^- > K^+ > Ca^{2+}$

16. The high density of water compared to ice is due to -

(1) Hydrogen bond interaction

(2) Dipole – dipole interaction

(3) Dipole – induced dipole interaction

(4) Induced dipole – induced dipole interaction

Answer (1)

Sol. In ice molecule H-bond form between H_2O molecule but it form cage like structure, so it hollow than water.

17. Equal volume of molar hydrochloric acid and sulphuric acid are neutralized by dilute NaOH solution and x kcal and y kcal of heat are liberated. Which of the following is true?

(1) x = y (2) x = y/2

(3) x = 2y (4) None of these

Answer (2)

Sol. Since, one gram equivalent of strong acid on neutralisation with strong base gives –57.1 kJ energy. Since H_2SO_4 has n factor 2. So It releases double amount of energy than HCl, so $x = \frac{y}{2}$

18. Propyne and Propene can be distinguished by -

(1) Conc. H_2SO_4

(2) Br_2 in CCl_4

(3) Dil $KMnO_4$

(4) $AgNO_3$ in ammonia

Answer (4)

Sol. Since propyne react with $AgNO_3$ give white PPT but propane does not.

19. Identify the correct order of boiling points of the following compounds -

(A) $CH_3CH_2CH_2CH_2OH$

(B) $CH_3CH_2CH_2CHO$

(C) $CH_3CH_2CH_2COOH$

(1) (A) > (B) > (C) (2) (C) > (A) > (B)

(3) (A) > (C) > (B) (4) (C) > (B) > (A)

Answer (2)

Sol. Since carboxylic acid molecule is strongly bounded with H- bond than alcohol

B.P of $CH_3CH_2CH_2COOH > CH_3CH_2CH_2CH_2OH > CH_3CH_2CH_2CHO$

20. Excess of KI reacts with $CuSO_4$ solution and then $Na_2S_2O_3$ solution is added to it. Which of the following statements is incorrect?

(1) Cu_2I_2 is formed

(2) CuI_2 is formed

(3) $Na_2S_2O_3$ is oxidised

(4) Evolved I_2 is reduced

Answer (2)

Sol. It is iodometric titrations

$2Cu^{2+}(aq) + 4I^-(aq) \longrightarrow Cu_2I_2(S) + I_2(aq)$

$2Na_2S_2O_3 + I_2 \longrightarrow 2NaI + Na_2S_4O_6$

Here CuI_2 does not form so option (2) is incorrect

21. Which of the following contains maximum number of atoms -

(1) 6.023×10^{21} molecules of CO_2

(2) 22.4 L of CO_2 at STP

(3) 0.44 gm of CO_2

(4) None of these

Answer (2)

Sol. 22.4 L of CO_2 = 1 mole of CO_2 = 3 mole atoms, which contain more number of oxygen atom than other.

22. Elimination of hydrogen bromide from 2-bromobutane results in the formation of -

(1) Predominantly 1-butene

(2) Predominantly 2-butyne

(3) Equimolar mixture of 1-butene and 2-butene

(4) Predominantly 2-butene

Answer (4)

Sol. $CH_3–CH_2–\underset{\underset{Br}{|}}{CH}=CH_2 \rightarrow CH_3–CH_2–CH=CH_2$ (Minor part)

Elimination reaction

CH_3-CH=CH –CH_3(Major part)

23. Of the isomeric hexanes, the isomer which can give two monochlorinated compound is -

(1) 2, 2 – dimethyl butane

(2) 2 – methyl pentane

(3) n – hexane

(4) 2, 3 – dimenthyl butane

Answer (4)

Sol. 2,3 dimethyl butane

$CH_3–\underset{\underset{CH_3}{|}}{CH}–\underset{\underset{CH_3}{|}}{CH}-CH_3$(It has only two different position for monochlorination)

24. Which of the following pair of compounds cannot exist together in a solution?

(1) Na_2CO_3 and $NaHCO_3$

(2) Na_2CO_3 and NaOH

(3) $NaHCO_3$ and NaOH

(4) $NaHCO_3$ and NaCl

Answer (3)

Sol. $NaHCO_3$ is acid salt. It still has acidic hydrogen. So NaOH will react with $NaHCO_3$

$NaOH + NaHCO_3 \longrightarrow Na_2CO_3 + H_2O$

25. If 0.50 moles of $BaCl_2$ is mixed 0.20 mole of Na_3PO_4, the maximum number of moles of $Ba_3(PO)_4$ formed will be -

(1) 0.70

(2) 0.50

(3) 0.20

(4) 0.10

Answer (4)

Sol. $3BaCl_2 + 2Na_3PO_4 \longrightarrow Ba_3(PO_4)_2 + 6NaCl$

0.5mol 0.2 mol

Na_3PO_4 is limiting reagent.

2 mol Na_3PO_4 = 1 mole $Ba_3(PO_4)_2$

0.2 Na_3PO_4 = 0.1 mole $Ba_3(PO_4)_2$

26. During electrolytic production of aluminium, the carbon anodes are replaced from time to time because

(1) The carbon anodes get decayed

(2) The carbon prevents atmospheric oxygen from coming in contact with aluminium

(3) Oxygen liberated at the carbon anode reacts with anode to form CO_2

(4) Carbon converts Al_2O_3 to Al

Answer (3)

Sol. O_2 React with carbon at Anode.

Biology

27. A plant cell, an animal cell and bacterial cell share the following structure features -

(1) Cell membrane, Endoplasmic reticulum and Vacuole

(2) Cell wall, Plasma membrane, Mitochondria

(3) Cell wall, Nucleus and Cytoplasm

(4) Plasma membrane, Cytoplasm, Ribosome

Answer (4)

28. The average temperature of earth is fairly stable as compared to the moon. This is because of -

(1) Biosphere (2) Lithosphere

(3) Atmosphere (4) None of the above

Answer (3)

29. Which of the following statement is true about the "Law of Segregation?

(1) Law of Segregation is the law of purity of genes.

(2) Alleles separates from each other during gametes to genesis

(3) Segregation of factors is due to segregation of chromosomes during Meiosis

(4) All of the above

Answer (4)

30. Most fishes do not sink in water due to the presence of-

(I) Swim bladder (II) Air bladder

(III) Air sacs (IV) Air in spongy bones

(1) I & II are correct

(2) II & III are correct

(3) III & IV are correct

(4) I, II & III are correct

Answer (2)

31. In most mammals testis are situated outside of the abdominal cavity, because
(1) More number of sperms are produced in scrotal sac.
(2) Longevity of sperm is enhanced.
(3) Sperm in scrotal sac required lesser temperature for efficient fertilization.
(4) Sperm in scrotal sac and bigger.

Answer (3)

32. The gene for the genetic disease "Haemophilia" is present on the 'X' chromosome. If a haemophilic male marries a normal female, what would be the probability of their son being haemophilic.
(1) 50% (2) 100%
(3) Nil (4) 3 : 1

Answer (3)

33. Population are said to be sympatric when-
(1) Two populations are physically isolated by a natural barrier.
(2) They live together and freely interbreed to produce sterile offsprings.
(3) Two populations share the same area/environment but do not interbreed
(4) Two population are isolated, but occasionally come together to interbreed.

Answer (3)

34. Pollen grain of a plant (2n = 28) are cultured to produce callus tissues by tissue culture methods. What would be the chromosome number in the cells of callus?
(1) 28 (2) 21
(3) 14 (4) 56

Answer (3)

35. Cells vary in their size. Arrange the following cells in an ascending order of their size and select the correct option among the following.
(I) Mycoplasma (II) Ostrich egg
(III) Human RBC (IV) Bacteria
(1) I, IV,III, II (2) I, II,III, IV
(3) II, I,III, IV (4) III, I,II, IV

Answer (1)

36. Many elements are found in living organisms either free or in the form of compounds. One of the following is not found in living organism.
(1) Magnesium (2) Iron
(3) Sodium (4) Silicon

Answer (4)

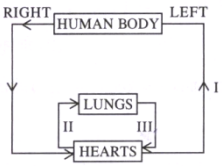
37. During Photosynthesis one CO_2 molecule is fixed through Calvin Cycle. This process requires-
(1) One ATP and Two $NADPH_2$
(2) Two ATP and Two $NADPH_2$
(3) Three ATP and Two $NADPH_2$
(4) Two ADP and One $NADPH_2$

Answer (3)

38. A piece of DNA contains a total of 1200 nucleotides out of which 200 are adenine bases. How many cytosine bases are present in this segment of DNA?
(1) 200 (2) 400
(3) 600 (4) 100

Answer (2)

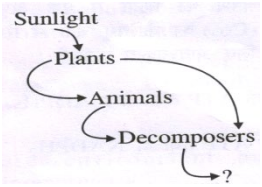
39. Figure below reflects the blood circulation system in the human body.



Which of the path contains oxygenated blood.
(1) I & II only (2) II & III only
(3) I & III only (4) I, II & III all

Answer (3)

40. The following diagram shows a simple version of energy flow though food web.



What happens to energy having the decomposers?
(1) It is used by the decomposers itself.
(2) It is reflected from the surface of earth.
(3) It is lost as heat
(4) It is used in natural Biocomposting

Answer (4)

Mathematics

41. The unit digit in the expression $55^{725}+ 73^{5810} + 22^{853}$ is

(1) 0 (2) 4

(3) 5 (4) 6

Answer (4)

Sol. $(55)^{725}$ unit digit = 5

$(73)^{5810}$ unit digit = 9

$(22)^{853}$ unit digit = 2

Unit digit in the expression $55^{725} + 735^{810} + 22^{853}$ is $\underline{6}$

42. The value of $\frac{3}{4}+\frac{5}{36}+\frac{7}{144}+.....+\frac{17}{5184}+\frac{19}{8100}$ is

(1) 0.95 (2) 0.98

(3) 0.99 (4) 1

Answer (3)

Sol. $\frac{3}{1\times4}+\frac{5}{4\times9}+\frac{7}{9\times16}+.....+\frac{17}{64\times81}+\frac{19}{81\times100}$

$=1-\frac{1}{4}+\frac{1}{4}-\frac{1}{9}+\frac{1}{9}-\frac{1}{16}+.....+\frac{1}{64}-\frac{1}{81}+\frac{1}{81}-\frac{1}{100}$

$=1-\frac{1}{100}$

$=\frac{99}{100}$

$=0.99$

43. For real y, the number of solutions of the equation $\sqrt{y+3}+\sqrt{y}=1$ is

(1) 0 (2) 1

(3) 2 (4) 4

Answer (1)

Sol. $\sqrt{y+3}+\sqrt{y}=1,\ y\geq,0,\ y\geq,-3$

$\sqrt{y+3}=1-\sqrt{y}$

Squaring both side

$y+3=1+y-2\sqrt{y}$

$2=-2\sqrt{y}$

$\sqrt{y}=-1$ (Not Possible)

So number of solution is 0.

44. The polynomial, $f(x) = (x - 1)^2 + (x - 2)^2 + (x - 3)^2 + (x - 4)^2$ has minimum value, when x=.....

(1) 40 (2) 20

(3) 10 (4) 2.5

Answer (4)

Sol. $f(x)=(x-1)^2+(x-2)^2+(x-3)^2+(x-1)^2$

$=4\left(x-\frac{5}{2}\right)^2+5$

$f(x)$ is minimum at $x=\frac{5}{2}=2.5$

45. If the roots of the equation $x^2 + 2px + q = 0$ and $x^2 + 2qx + p = 0$ differ by a constant and $p \neq q$ then the value of p + q is

(1) –1 (2) 1

(3) 2 (4) None of these

Answer (1)

Sol. $x^2+2px+q=0$

Let Roots are $\alpha \text{ and } \beta$

$\alpha+\beta=-2p$

$\alpha\beta=q$

$x^2+2qx+p=0$

Let roots are

$\alpha+K, \beta+K$

$\alpha+\beta+2K=-2q$

$-2p+2K=-2q$

$K=p-q$

$(\alpha+K)(\beta+K)=p$

$\alpha\beta+(\alpha+\beta)K+K^2=p$

$q+-2pK+K^2=p$

$q-2p(p-q)+(p-q)^2-p=0$

$(p-q)(p-q-2p)-(p-q)=0$

$\Rightarrow p+q=-1$

46. if $\sin\theta+\sin^2\theta=1$, then

$\cos^{12}\theta+3\cos^{10}\theta+3\cos^8\theta+\cos^6\theta=.....$

(1) $\sin\theta$ (2) $\cos\theta$

(3) 0 (4) 1

Answer (4)

Sol.

$\sin\theta + \sin^2 = 1$

$\sin\theta = 1 - \sin^2\theta = \cos^2\theta$

$\cos^{12}\theta + 3\cos^{10}\theta + 3\cos^8\theta + \cos^6\theta$

$= \left(\cos^4\theta + \cos^2\theta\right)^3$

$= \left(\sin^2\theta + \cos^2\theta\right)^3$

$= 1^3 = 1$

47. From a bag containing 100 tickets numbered 1, 2, 3, ..., 100 one ticket is drawn. If the number on this ticket is x, then the probability that $x + \frac{1}{x} > 2$ is .....

(1) 0 (2) 0.99

(3) 1 (4) None of these

Answer (2)

Sol.

$n(s) = [1,2,3.....100] = 100$

$\because x + \frac{1}{x} > 2$

$x^2 + 1 > 2x$

$x^2 - 2x + 1 > 0$

$(x-1)^2 > 0$

$x = [2,3,.....100]$

$n(E) = [2,3,4.....100] = 99$

$P(E) = \frac{99}{100} = 0.99$

48. For which value of k the system of equations 3x + y = 1 and (2k – 1)x + (k – 1)y = (2k + 1) has no solution

(1) –2 (2) +2

(3) –3 (4) +3

Answer (2)

Sol.

$3x + y = 1,\ (2K-1)x + (K-1)y = (2K+1)$

$\frac{2K-1}{3} = \frac{K-1}{1} \neq \frac{2K+1}{1}$

$\frac{2K-1}{3} = \frac{K-1}{1}$

$2K - 1 = 3K - 3$

$K = 2$

49. If the vertices of a triangle are (1,2), (4, -6) and (3,5) then

(1) Triangle is right angled

(2) The area of triangle is 12.5 sq. units

(3) The points do not form a triangle

(4) None of these

Answer (2)

Sol. Area $= \frac{1}{2}\left|1(-6-5) + 4(5-2) + 3(2+6)\right|$

$= \frac{1}{2}\left|-11 + 12 + 24\right|$

$= \frac{1}{2} \times 25 = 12.5$ sq. unit

50. In a ΔABC, D is the mid-point of BC and E is the foot of the perpendicular drawn from A on BC. If ED = x , AD = p, AE = h and BC = a, then

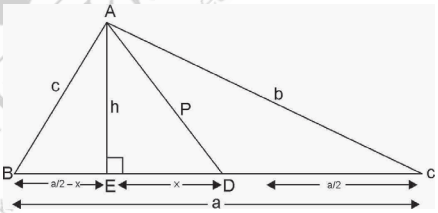
$2b^2+2c^2-a^2=$.....

(1) p^2 (2) $2p^2$

(3) $4p^2$ (4) None of these

Answer (3)

Sol.



ΔAED

$P^2 = h^2 + x^2$ —(1)

ΔABE

$c^2 = h^2 + \left(a/2 - x\right)^2$ —(2)

ΔAEC

$b^2 = h^2 + \left(a/2 + x\right)^2$ —(3)

Adding (2) & (3)

$b^2 + c^2 = 2h^2 + a^2/2 + 2x^2$

$2b^2 + 2c^2 - a^2 = 4\left(h^2 + x^2\right)$

$2b^2 + 2c^2 - a^2 = 4p^2$ [from (1)]

51. Two circles of radii r_1 cm and r_2 cm ($r_1 > r_2$) touches each other internally. The sum of their areas is πA^2 cm^2 and the distance between their centres is d cm, then,

(1) A > d (2) A < d

(3) $A\sqrt{2}$ > d (4) A > $\sqrt{2}d$

Answer (1)

Sol. $\because \pi A^2 = \pi r_1^2 + \pi r_2 2$

$A^2 = r_1^2 + r_2^2 - (1)$

$\because r_1 - r_2 = d$

$A^2 = (r_1 - r_2)^2 + 2r_1r_2$

$= d^2 + 2r_1r_2$

$\because A^2 > d^2$

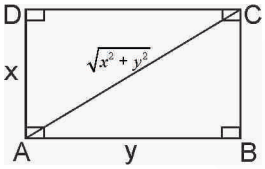
$A > d$

52. ABCD is a rectangle such that AC + AB = 5AD and AC – AD = 8, then the area of rectangle ABCD is

(1) 36 sq. units (2) 50 sq. units

(3) 60 sq. units (4) Cannot be found

Answer (3)



Sol. $AC + AB = 5AD$

$\sqrt{x^2 + y^2} + y = 5x$ —(1)

$AC - AD = 8$

$\sqrt{x^2 + y^2} - x = 8$ —(2)

Solving 1 & 2

We Get $y = 12, x = 5$

Area $= 12 \times 5 = 60$ *Sq.Unit*

53. A triangular field, having grass, has sides 20 m, 34 m, and 42 m respectively. Three horses are tied to each of the vertices with a rope of length 7m, each. The horses start grazing the field. The area of the portion of the field that is ungrazed by the horses is .....m^2.

(1) 250 (2) 255

(3) 258 (4) 259

Answer (4)

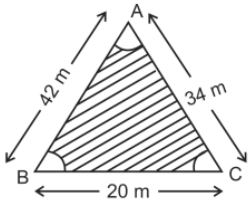
Sol. Area grazed by horses

$$\left(\frac{\pi \times 7 \times 7}{360^\circ} \times A + \frac{\pi \times 7 \times 7}{360^\circ} B + \frac{\pi \times 7 \times 7}{360^\circ} \times C\right)$$

$$= \frac{\pi \times 7 \times 7}{360^\circ}(A + B + C)$$

$$= \frac{\frac{22}{7} \times 7 \times 7}{360^\circ} 180$$

$= 77$ m^2



Area of ΔABC

$= \sqrt{48(48-20)(48-34)(48-42)}$

$= \sqrt{48 \times 28 \times 14 \times 6}$

$= 336$ m^2

Area ungrazed by horses

$= 336 - 77$

$= 259$ m^2

54. A cube of side 12 cm, is painted blue on all the faces and then cut into smaller cubes each of side 3 cm. The total number of smaller cubes having none of their faces painted blue will be

(1) 8 (2) 12

(3) 16 (4) 24

Answer (1)

Sol. Total number of smaller cubes having none of their faces painted blue is 8

55. The ratio of the roots of the equation $ax^2 + bx + c = 0$ is same as the ratio of the roots of the equation $px^2 + qx + r = 0$. If D_1 and D_2 are the discriminates of $ax^2 + bx + c = 0$ and $px^2 + qx + r = 0$ respectively then $D_1 : D_2$=

(1) $\frac{a^2}{p^2}$

(2) $\frac{b^2}{q^2}$

(3) $\frac{c^2}{r^2}$

(4) None of these

Answer (2)

Sol. Let α,β *and* Υ,δ are roots of Eq.

$ax^2+bx^2+c=0$ and $Px^2+qx+r=0$

respectively, Given $\frac{\alpha}{\beta}=\frac{\Upsilon}{\delta}$

Applying componendo & dividendo

$$\frac{\alpha+\beta}{\alpha-\beta}=\frac{\Upsilon+\delta}{\Upsilon-\delta}$$

$$\Rightarrow \frac{(\alpha+\beta)^2}{(\alpha-\beta)^2}=\frac{(\Upsilon+\delta)^2}{(\Upsilon-\delta)^2}$$

$$\Rightarrow \frac{(\alpha+\beta)^2}{(\alpha+\beta)^2-4\alpha\beta}=\frac{(\Upsilon+\delta)^2}{(\Upsilon+\delta)^2-4\Upsilon\delta}$$

$$\Rightarrow \frac{\frac{b^2}{a^2}}{\frac{b^2}{a^2}-\frac{4c}{a}}=\frac{\frac{q^2}{p^2}}{\frac{q^2}{p^2}-4.\frac{r}{p}}$$

$$\Rightarrow \frac{b^2}{b^2-4ac}=\frac{q^2}{q^2-4pr}$$

$$\Rightarrow \frac{b^2}{D_1}=\frac{q^2}{D_2}$$

$$\Rightarrow \frac{b^2}{q^2}=\frac{D_1}{D_2}$$

56. A conical shaped container, whose radius of base is r cm and height is h cm, is full of water. A sphere of radius R is completely immersed in the container in such a way that the surface of sphere touches the base of the cone and its surfaces. The portion of water which comes out of the cone is .....

(1) $\frac{R^2}{r^2h}$

(2) $\frac{r^2}{R^2h}$

(3) $\frac{4R^2}{r^2h}$

(4) $\frac{4R^2}{R^2h}$

Answer ()

NO One is correct

All option are wrong

Sol. Radius of sphere = R

$\Delta ABC\approx\Delta ODC$

$$\frac{AB}{OD}=\frac{AC}{OD}$$

$$\frac{r}{R}=\frac{\sqrt{r^2+h^2}}{h-R}$$

$$r(h-R)=R\left(\sqrt{r^2+h^2}\right)$$

$$r^2\left(r^2+h^2-2hR\right)=R^2\left(r^2+h^2\right)$$

$$r^2h^2+r^2R^2-2hRr^2=R^2r^2+R^2h^2$$

$$r^2h^2-2hRr^2=R^2h^2$$

$$r^2h-2Rr^2=R^2h$$

$$h\left(r^2-R^2\right)=2Rr^2$$

$$h=\frac{2Rr^2}{r^2-R^2}$$

Portion of water which comes out of the cone

$$=\frac{1}{3}\pi r^2h-\frac{4}{3}\pi R^3$$

$$=\frac{1}{3}\pi.\left(r^2h-R^3\right)$$

Answer will terms of multiple of π

(No option is correct)

57. The arithmetic mean of 10 observations is 12.45. If each reading is increased by 5 then the resulting mean is increased by

(1) 5

(2) 29

(3) 0.5

(4) 50

Answer (1)

Sol. $\bar{x}=\frac{x_1+x_2+....+x_{10}}{10}=12.45$

$$\bar{x}_N=\frac{(x_1+5)+(x_2+5)+....+(x_{10}+5)}{10}$$

$$=\frac{x_1+x_2+....+x_{10}}{10}+\frac{50}{10}$$

$$\bar{x}_N=\bar{x}+5$$

New mean increased by 5

58. 20 women can do a job in 20 days. After each day one woman is replaced by a man or a boy alternatively, starting with a man. A man is twice efficient and a boy is half efficient as a woman. The job gets completed on.....day.

(1) 16th (2) 18th

(3) 20th (4) 24th

Answer (2)

Sol. Job gets on completed on 18th day

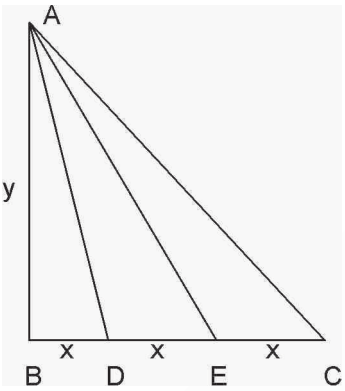
59. In ΔABC, $\angle B = 90°$ and points D and E divide BC into three equal parts. If $3AC^2 + 5AB^2 = p\,AE^2$ then p = ...

(1) 2 (2) 4

(3) 6 (4) 8

Answer ()

Sol.



All above Answer is wrong

$AE^2 = y^2 + 4x^2$

$AC^2 = y^2 + (3x)^2$

$= y^2 + 9x^2$

$3AC^2 + 5AB^2 = 3y^2 + 27x^2 + 5y^2$

$= 8y^2 + 27x^2$

$= 8y^2 + 32x^2 - 5x^2$

$= 8\left(y^2 + 4x^2\right) - 5x^2$

$= 8AE^2 - 5x^2$

$\because 3AC^2 + 5AB^2 = 8AE^2\text{-}5BD^2$

No option is correct

60. The mode of observations 7,12,8,5,6,4,9,10,8,9,7,6,5,9 is

(1) 7 (2) 8

(3) 9 (4) 12

Answer (3)

Sol. 9 comes maximum times so mode = 9

History

61. Mazzini, the founder of young Italy, conducted the slogan

(I) God (II) The Revolutionaries

(III) People (IV) Italy

(1) I, II and III (2) I, II, and IV

(2) I, III and IV (4) II, III and IV

Answer (4)

62. The credit for Unification of Italy goes to

(I) Cavour (II) Mazzini

(III) Markham (IV) Garibaldi

(1) I, II and IV (2) I, II, and III

(3) I, III and IV (4) II, III and IV

Answer (1)

63. Which of the following statements relating to Russian Revolution are correct?

(I) The rule of Czar Nicholas II was oppressive

(II) Czar was under the influence of his minister Plehve

(III) The minorities sided with the Czar

(IV) Russian Revolution occurred only in March 1917

(1) I and III (2) I and IV

(3) I and II (4) II and III

Answer (2)

64. Lenin finally stressed upon

(I) Nationalisation of industries

(II) Collective farms

(III) Controlled Capitalism

(IV) War Communism

(1) I, II and IV (2) I, III, and IV

(3) III and IV (4) II and III

Answer (4)

65. Which one of these constitutes Indo China?

(I) Vietnam (II) Philippines

(III) Laos (IV) Kambodia

(1) I, II and III (2) I, III, and IV

(3) II, III and IV (4) III and IV

Answer (1)

66. Triple Entente 1907 comprised of

(I) Britain (II) Russia
(III) Italy (IV) France
(1) I, II and IV (2) I, III and IV
(3) I, II and III (4) II, III and IV

Answer (1)

67. Triple Alliance, 1882 comprised of

(I) Germany (II) Austria
(III) Italy (IV) Turkey
(1) I, II and III (2) I, III and IV
(3) II, III and IV (4) I, II and IV

Answer (1)

68. Hind Swaraj was written by which writer?

(1) Vallabh Bhai Patel
(2) M.K. Gandhi
(3) Raja Gopalachari
(4) Tej Bahadur Sapru

Answer (2)

69. Mahatma Gandhi determined to stop which movement after chauri Chaura incident?

(1) Champaran Satyagrah
(2) Khilafat Movement
(3) Non Co-operation Movement
(4) Civil Disobedience Movement

Answer (3)

70. Lahore Conference of Indian National Congress in 1929 declared independence under the Presidentship of which Leader?

(1) Moti Lal Nehru
(2) Jawahar Lal Nehru
(3) Subhash Chandra Bose
(4) Lala Lajpat Rai

Answer (2)

71. Henry Patulo, an officer of East Indian Company was of the view

(1) Indians do not prepare cloth
(2) Indians should be banned to prepare cloth
(3) Indian cloth is the best in the world
(4) Indian cloth is not better than that of England

Answer (3)

72. Printing Press was introduced to India for the first time in the 16th Century by which missionary?

(1) French (2) Dutch
(3) British (4) Portuguese

Answer (4)

Geography

73. Identify the crop which is cultivated in the tropical highlands of India and grows well particularly on the laterite soils of Karnataka and Tamilnadu.

(1) Groundnut (2) Cotton
(3) Coffee (4) None of these

Answer (3)

74. Agricultural forestry is mainly practised in which state of India?

(1) Jharkhand (2) Haryana
(3) Rajasthan (4) Uttrakhand

Answer (2)

75. Which of the following is the most recent mountain ranges?

(1) Eastern Ghat (2) Western Ghat
(3) Satpura Series (4) Shillong Series

Answer (3)

76. Shimoga mines is famous for

(1) Iron ore (2) Gold
(3) Manganese (4) Petroleum

Answer (2)

77. The headquarter of newly formed Southern Coastal Railway Zone of India is located at :

(1) Visakhapatnam (2) Kakinada
(3) Hyderabad (4) Masulipatanam

Answer (1)

78. Arrange the given mountain ranges from North to South in direction.

(I) Karakoram (II) Ladakh
(III) Zaskar (IV) Pir Panjal
(1) I, II, III, IV
(2) II, I, IV, III
(3) II, III, I, IV
(4) IV, III, II, I

Answer (1)

79. Which of the following pairs is not correctly matched?
(I) Himalaya Mountain – Tertiary Fold Mountain
(II) Deccan Trap – Volcanic Eruption
(III) Western Ghats – Paleozoic Fold Mountain
(IV) Aravali Mountain – Pre-Cambrian Relict Mountain
(1) Only I (2) I& IV
(3) Only III (4) Only IV

Answer (3)

80. A person wants to visit the National Parks of Kanha. Kaziranga and Dudwa located in different states of India. In which of the following states he is not required to move in this connection?
(1) Madhya Pradesh (2) Uttarakhand
(3) Assam (4) Uttar Pradesh

Answer (2)

81. Which of the following is the correct descending order of soils of India according to their coverage area?
(1) Alluvial, Red, Laterite, Black
(2) Black, Alluvial, Red, Laterite
(3) Alluvial, Black, Red, Laterite
(4) Alluvial, Laterite, Black, Red

Answer (3)

82. Match List-I (Tribes) with List-II (States) and select the correct answer using the code given below :

List-I (Tribes)	**List-II (State)**
A. Bodo	I. Nagaland
B. Naga	II. Andaman Islands
C. Jarawa	III. Assam
D. Mina	IV. Rajasthan

(1) A-IV, B-II, C-III, D-I
(2) A-II, B-III, C-IV, D-I
(3) A-III, B-I, C-II, D-IV
(4) A-II, B-III, C-I, D-IV

Answer (3)

83. Which of the following rivers meet Ganga from South direction in Bihar?
(A) Kosi (B) Son
(C) Gandak (D) Ghaghra
(1) A and B (2) B and C
(3) Only D (4) Only B

Answer (4)

84. Match List-I (Hydroelectric Plant) with List-II (River) and select the correct answer using the codes given below :

List-I (Hydroelectric Plant)	List-II (River)
A. Bhakra	I. Beas
B. Pong	II. Periyar
C. Salal	III. Satlej
D. Idukki	IV. Chenab

(1) A-I, B-II, C-III, D-IV (2) A-IV, B-III, C-II, D-I
(3) A-III, B-I, C-IV, D-II (4) A-III, B-II, C-IV, D-I

Answer (3)

Civics

85. Which one of the following is correct regarding power-sharing?
(1) It leads to conflict among different social groups.
(2) It ensures the stability of the country.
(3) It undermines the unity of the nation.
(4) It creates hurdle in decision making process.

Answer (2)

86. Which one of the following is the best example of coming together federation?
(1) The USA (2) India
(3) Spain (4) Belgium

Answer (1)

87. Which of the following countries has community government?
(1) Spain (2) Sri Lanka
(3) Belgium (4) France

Answer (3)

88. Which among the following is not the basis of social divisions in india?
(1) Language (2) Health
(3) Region (4) Caste

Answer (2)

89. The administrative head of Municipal Corporation is called
(1) Mayor
(2) Deputy-Mayor
(3) Municipal Commissioner
(4) Sarpanch

Answer (3)

90. In democracy, power is finally concentrated in the hands of
(1) Bureaucrats
(2) Parliament
(3) Electorate
(4) Council of Ministers

Answer (3)

91. Which of the following is considered life-line of democracy ?
(1) Government (2) Constitution
(3) Political Parties (4) Judiciary

Answer (2)

92. In which country the political parties came into existence first ?
(1) Britain (2) India
(3) France (4) The USA

Answer (1)

Economics

93. Which of the following statements are not true?
I. Employment in the service sector has not increased to the same extent as production.
II. Workers in the tertiary sector produce goods.
III. The activities in Primary, Secondary and Tertiary sectors are not interdependent.
IV. Most of the workers in the unorganised sector enjoy job security.
V. A large proportion of labourers in India are working in unorganised sector.
(1) I and III (2) III. IV and V
(3) I, II and V (4) II, III and IV

Answer (4)

94. Which of the following is not a function of the central bank in an economy ?
(1) Dealing with foreign exchange.
(2) Controlling monetary policy.
(3) Controlling government spending.
(4) Acting as a banker's bank.

Answer (3)

95. If saving exceed investment then-
(1) National income rises
(2) National income falls
(3) National income is not affected
(4) None of the above

Answer (2)

96. Which indicators are used in the Human Development Index (HDI) ?
I. Standard of living
II. Education
III. Life expectancy rate
IV. Condition of environment
(1) Only I, II and IV
(2) Only I, II and III
(3) Only I and II
(4) All of the above

Answer (2)

97. Which of the following statements are not true ?
I. COPRA applies only to goods.
II. India is one of the many countries in the world which has exclusive courts for consumer redressal.
III. When a consumer feels that he has been exploited, he must file a case in the District Consumer Court.
IV. It is worthwhile to move to consumer courts only if the damages incurred are of high value.
V. Hallmark is the certification maintained for standardisation of jewellery.
VI. The consumer redressal process is very simple and quick.
VII. A consumer has the right to get compensation depending on the degree of the damage.
(1) Only II,III, IV, V and VII
(2) Only I and VI
(3) Only I, II, V and VII
(4) All of the above

Answer (2)

98. Which of the following statements are true about globalisation?

I. Developed countries have always been more benefited from globalisation.

II. Globalisation has led to improvement in living condition of workers in the developing countries.

III. Globalisation is the process of rapid integration or interconnection between countries.

IV. Indian cement industries have been hit hard by globalisation.

V. To achieve the goal of fair globalisation, major roles can be played by MNCs.

(1) Only I, II, III and V

(2) Only I, II, III and IV

(3) Only III, IV and V

(4) Only I, II and III

Answer (1)

99. In a SHG (self help group) most of the decisions regarding saving and loan activities are taken by-

(1) Bank

(2) Members

(3) State Government

(4) Chairperson of SHG

Answer (2)

100. We can obtain per capita income of a country by calculating-

(1) Total income of a person.

(2) By dividing the national income by the total population of a country.

(3) The total value of all goods and services.

(4) Total exports of the country.

Answer (2)

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