LRDAV

APTITUDE TEST FOR ADMISSION INTO XI SCIENCE (2026-27)

ROLL NO. | | | | | | | | | |

Time: 3 Hours **SET A**

(9.00 am – 12.00 noon)

Guidelines to the Candidates:

- This Booklet contains printed 16 pages and 1 blank page for rough work. Any defect found should be brought to the notice of the invigilator immediately.
- Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.
- This test is of three hours' duration.
- The question paper consists of 100 multiple choice questions comprising of Mathematics (40), General Science (40) and Aptitude (20) carrying maximum of 400 marks.
- There are four choices in every question as (A), (B), (C) and (D). Only one is correct. Each question carries 4 marks.
- -1 will be awarded for each wrong answer/multiple answer.
- No mark will be awarded for any overwriting/scratching answer.
- No candidate shall leave his/her seat during examination.
- Do not tear/remove any page of the Booklet.
- Calculation, if any, may be done at the blank page of this booklet provided at the end for rough work. No calculator is allowed.
- After finishing the test, the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

APTITUDE TEST

1. 35 , 58 , 87 , 118 , 155 , 196 , 239 , ?
   (A) 284
   (B) 286
   (C) 288
   (D) 292

2. B2 , C3 , E5 , H7 , ?
   (A) L9
   (B) K11
   (C) L12
   (D) L11
3. 141 , 191 , 1251 , 1491 , _____ , 11691
   (A) 11211
   (B) 11311
   (C) 1811
   (D) 1191
4. In a certain code language BAD is written as 7, and SAP is written as 9 , then how BAN will be written in that code language ?
   (A) 8
   (B) 11
   (C) 18
   (D) 17
5. In a certain code language if FAKE is written as 1234, KITE is written as 1526 the which of the following can be the code of TEN ?
   (A) 247
   (B) 186
   (C) 235
   (D) 539
6. E is the daughter of P who is the husband of the only daughter-in-law of K . How is E related to K ?
   (A) Daughter
   (B) Granddaughter
   (C) Grandmother
   (D) mother
7. Find the missing number if a certain rule is followed either row-wise or column wise
   (A) 49
   (B) 54
   (C) 60
   (D) 32

24	36	30
34	54	43
19	?	29

8. A man walks 10km East. Then he turns right and walks 10km. Then he turns left and walks 14km and finally he turns left and walks 20km . Now he is in which direction and how far from the starting point?
   (A) 26km,N-E
   (B) 10km, S-W
   (C) 34km,N-E
   (D) 26km,S-W

9. Which number will be at the top if 5 will be at the bottom ? The given two positions are of the same dice whose each surface bears a number among 1, 2, 3, 4, 5 and 6.



(i) (ii)

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

10. A cube is painted green on five of it's outer surfaces and one surface left unpainted. Then it is cut into 64 number of smaller cubes of each side 1cm . Then how many smaller cubes have no side painted?
    (A) 16
    (B) 8
    (C) 12
    (D) 20
11. In a row maximum 30 children can sit . Prem is 13rd from left and Rosy is 19th from right . If there are 5 children between Prem and Rosy , then how many children are there in the row ?
    (A) 37
    (B) 27
    (C) 29
    (D) 25
12. If X was born on 6th December 1983 and Y on 4th February 1984, then when Y will be half in age compared to X ?
    (A) 4th April 1984
    (B) 5th April 1984
    (C) 6th May 1984
    (D) 18th May 1984
13. A printer numbers the pages of a book starting with 1 and uses 3193 digits in all. How many pages does the book have ?
    (A) 1075
    (B) 1120
    (C) 1595
    (D) 1145
14. Arun was asked how many gifts he had in his bag . He replied that there were all dolls but six ; all cars but six and all books but six . How many gifts did he have ?
    (A) 6
    (B) 9
    (C) 18
    (D) 27
15. A clock with only dots marking 3, 6, 9, and 12 positions has been upside down in front of a mirror. A person reads the time in the reflection as 6 : 10 The real time is
    (A) 06 : 5
    (B) 12 : 40
    (C) 11 : 20
    (D) 6 :10

16. The bus for Chennai leaves every 30 minutes from a bus depot. The enquiry clerk told a Passenger that the bus for Chennai left 10 minutes ago, and the next bus will leave at 10 : 30 a.m. What was the time when enquiry clerk told this?

(A) 10 : 20 a.m.

(B) 10 : 10 a.m.

(C) 10 : 00 a.m.

(D) 09 : 50 a.m.

17. Sonu's brother Monu 536 days older to him while his sister Tonu 75 weeks older to Monu. If Tonu was born on Wednesday, on which day was Sonu born?

(A) Saturday

(B) Sunday

(C) Friday

(D) Monday

18. Which of the following can not be the last day of any century ?

(A) Monday

(B) Sunday

(C) Tuesday

(D) Friday

19. 24 : 126 :: 48 : ?

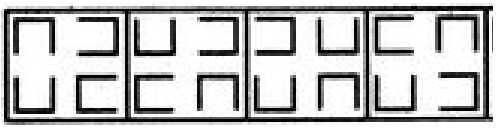
(A) 344

(B) 317

(C) 286

(D) 276

20. Find out the figure which is different from others.



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

MATHEMATICS

21. The area of triangle formed by the line $\frac{x}{a}+\frac{y}{b}=1$,with the coordinate axes is

(A) ab

(B) $2ab$

(C) $\frac{1}{2}ab$

(D) $\frac{1}{4}ab$

22. If a, b, c are real numbers such that $a + \frac{1}{b} = \frac{7}{3}, b + \frac{1}{c} = 4$, $c + \frac{1}{a} = 1$, then value of abc is:

(A) 0
(B) 4
(C) **1**
(D) 2

23. Four congruent triangles are cut off from the corners of a rectangle with dimensions 11 ´ 13. The resulting octagon has eight equal edges. Then the length of octagon is:

(A) 3
(B) 4
(C) 2
(D) **5**

24. Two circles of radii 20 cm and 37 cm intersect in A and B. If O_1 and O_2 are their centers and AB = 24 cm then the distance O_1O_2 is equal to

(A) 44 cm
(B) **51 cm**
(C) 40.5 cm
(D) 45 cm

25. P & Q were brother and sister. They can do a work in 6 and 12 days respectively. They started to make house but brother left after 3 days. Sister became alone so She married with her best friend R and completed remaining work together in 2 days. In how many days R alone can finish the work?

(A) 42
(B) 24
(C) 14
(D) 34

26. A pack has 52 cards. What is probability that a card will either black or king if picked randomly?

(A) $\frac{15}{26}$
(B) $\frac{7}{13}$
(C) $\frac{4}{3}$
(D) $\frac{11}{13}$

27. The mean of 1, 7, 5, 3, 4 and 4 is m. The numbers 3, 2, 4, 2, 3, 3 and p have mean $m - 1$ and median q. Find $p + q$

(A) 7
(B) 11
(C) 4
(D) 6

28. The median of the observations 11, 12, 14, $(x - 2)$, $(x + 4)$, $(x + 9)$, 32, 38, 47 arranged in ascending order is 24. Then the mean is

(A) 5
(B) 25

(C) 20
(D) 18

29. The numbers 6, 8, 10, 12, 13 and x are arranged in an ascending order. If the mean of the observation is equal to the median, find the value of x.
(A) 16
(B) 17
(C) 13
(D) 19

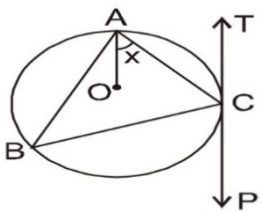
30. The number of real solutions to equation
$x^3 + (x + 1)^3 = (x + 3)^3 - (x + 2)^3$ is
(A) 0
(B) 1
(C) 2
(D) 3

31. Two triangles are similar but not congruent and lengths of side of the first are 6cm, 11cm and 12cm. The sides of second are integral lengths and one of them is congruent to the side of first. The perimeter of second Δ is
(A) 52
(B) 29
(C) **58**
(D) 56

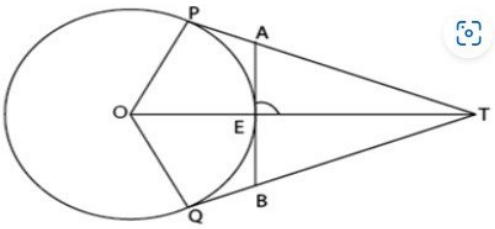
32. From a square metal plate, a circle of maximum size is cut out; again, from this circular plate a square of maximum size is cut. Then the ratio of metal wasted to metal of the original square is
(A) 1 : 1
(B) 1 : 3
(C) 2 : 1
(D) **1 : 2**

33. If p and q are roots of $x^2 - 2x + A = 0$ and r, s are the roots of $x^2 - 18x + B = 0$. If p, q, r, s are the terms of an increasing A.P. then value of A + B = ?
(A) **74**
(B) 70
(C) 68
(D) 72

34. In the adjoining figure, PT is tangent at point C of the circle O is the circumcentre of ΔABC. If ∠ ACP = 118° then measure of ∠x is
(A) **28°**
(B) 32°
(C) 42°
(D) 38°



35. 37.8 litres of milk contain 20% of water. What amount of water should be added so that amount of water will be 25%?
    (A) 1.6 litre
    (B) 0.4 litre
    (C) 2.52 litre
    (D) 2.0 litre
36. If 1/(b + c), 1/(c + a), 1/(a + b) are in AP then
    (A) a, b, c are in AP
    (B) a^2, b^2, c^2 are in AP
    (C) 1/1, 1/b, 1/c are in AP
    (D) None of these
37. If the point $(2, 3)$ is equidistant from the points $(a + b, b - a)$ and $(a - b, a + b)$, then
    (A) 2a = 3b
    (B) a + b=1
    (C) 3a = 2b
    (D) b−a=1
38. In the above figure-, O is the centre of a circle of radius 5 cm, T is a point such that OT = 13cm and OT intersects the circle at E, if AB is the tangent to the circle at E, then the length of AB is



    (A) $\frac{10}{3}$ cm
    (B) 12cm
    (C) 17cm
    (D) $\frac{20}{3}$ **cm**
39. If $a + b + c = 6$, $a^2 + b^2 + c^2 = 14$ and $a^3 + b^3 + c^3 = 36$ then value of abc is
    (A) 3
    (B) 6
    (C) 9
    (D) 12
40. If the incenter of equilateral triangle lies inside the triangle and its radius is $3cm$ then the sides of triangle is
    (A) $3\sqrt{3}cm$
    (B) $6\sqrt{3}cm$
    (C) $9\sqrt{3}cm$
    (D) $6cm$
41. The value of $(\sin\theta + \operatorname{cosec}\theta)^2 + (\cos\theta + \sec\theta)^2 - (tan^2\theta + cot^2\theta)$ is
    (A) 4
    (B) 1
    (C) 0
    (D) 7

42. The number of chord that can be drawn through 21 points on a circle is

(A) **210**

(B) 1

(C) 240

(D) 7

43. If $\sin 17^\circ = \frac{x}{y}$, then the value of $(\sec 17^\circ - \sin 73^\circ)$ is

(A) $\frac{y^2}{x\sqrt{y^2-x^2}}$

(B) $\frac{x^2}{y\sqrt{y^2-x^2}}$

(C) $\frac{x^2}{y\sqrt{x^2-y^2}}$

(D) $\frac{y^2}{x\sqrt{x^2-y^2}}$

44. An interior angle of a regular polygon is 5 times its exterior angles. Then the of number sides of the polygon is

(A) 14

(B)16

(C) 12

(D) 18

45. A conical cup is filled with ice cream. The ice cream forms a hemispherical shape on its open top. The height of the hemispherical part is 7 cm. The radius of the hemispherical parts is equals to the height of the cone. Then the volume of the ice-cream is

(A)1078 cm^3

(B) 1708 cm^3

(C) 7108 cm^3

(D) 7180 cm^3

46. A is the centre of circle whose radius is 8 and B is the centre of a circle whose diameter is 8. If these two circles touch externally, then the area of the circle with diameter AB is

(A) 36π

(B)64 π

(C) 144 π

(D) 256 π

47. Two chords of lengths a meter and b meter subtend angles 60° and 90° at the center of the circle respectively. Which of the following is true?

(A) $b = \sqrt{2}a$

(B) $a = \sqrt{2}b$

(C) $b = 2a$

(D) $2b = a$

48. Value of $\sec^2 x - \frac{\sin^2 x - 2\sin^4 x}{2\cos^4 x - \cos^2 x}$

(A) 1

(B) 2
(C) -1
(D) 0

49. If $x = a(\sin\theta + \cos\theta)$, $y = b(\sin\theta - \cos\theta)$ then the value of $\frac{x^2}{a^2} + \frac{y^2}{b^2}$ is

(A) 0
(B) 1
(C) 2
(D) -2

50. If origin is the centroid of a triangle whose vertices are P(a, b), Q(b, c) and R(c, a), then the value of $a^3 + b^3 + c^3$ is

(A) 0
(B) $3abc$
(C) abc
(D) $a^2 + b^2 + c^2$

Question no 51, 52, 53 and 54 are **assertion-reason based questions** in which a statement of Assertion (A) is followed by a statement of Reason(R). Choose the correct answer out of the following choices.

(A) Both A and R are true and R is correct explanation of A.

(B) Both A and R are true and R is not correct explanation of A

(C) A is true but R is false.

(D) A is false but R is true.

51. **Assertion (A) -** If c is a variable, then the centroid of the triangle having vertices at P $(1, a)$, Q(c, b) and R$(c^2, 1)$will never lie on $y - axis$.

Reason(R)- If x-coordinate of point is not zero, it does not lie on y-axis

52. **Assertion (A)-** If a die is thrown, the events of getting prime and a composite number are mutually exclusive and exhaustive.

Reason(R)- Two events A and B are said to be mutually exclusive and exhaustive if $A \cup B = S$(sample space) and $A \cap B = \phi$

53. **Assertion (A)-** The perimeter of a rhombus whose one diagonal is 16cm long and area is 240 cm^2 is 68cm.

Reason(R)- The perimeter 'P' of the rhombus whose one of its diagonals 'd_1' and area 'A' is

$$P = 4 \times \sqrt{\left(\frac{d_1}{2}\right)^2 + \left(\frac{A}{d_1}\right)^2}$$

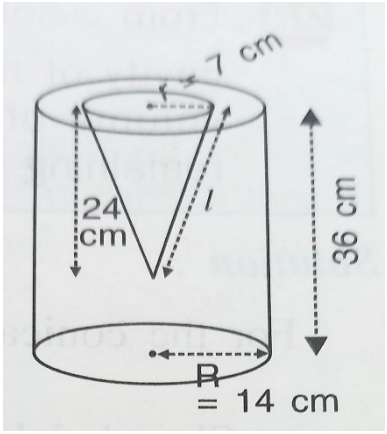
54. **Assertion (A)-** The length of the minute hand of a clock is 7 cm. Then the area swept by the minute hand in 5 minute is $\frac{77}{6} cm^2$.

Reason(R)- The length of an arc of a sector of angle at the centre is 'θ'and radius 'r' is given by

$$l = \frac{\theta}{360^o} \times 2\pi r$$

Q. No. 55, 56 and 57 are based on case study:

CASE STUDY: -1



An engineering firm, "Apex Machining Solutions," has been contracted to design a unique component for a specialized petrochemical filtration system. This component needs to serve a dual purpose: maximize internal fluid flow capacity while maintaining a specific external surface area for heat exchange within a containment unit.

The design calls for a primary solid block made of a specific alloy, which is modelled as a perfect solid cylinder with a height of 36 cm and a radius of 14 cm. To facilitate the necessary fluid dynamics, a conical cavity is precisely drilled out from the centre of the top face, extending downward into the solid block. This cavity has a radius of 7 cm and a height of 24 cm.

Based on the above information answer the following questions:

55. The volume of the remaining solid is

(A) 20944 cm^3

(B) 29044 cm^3

(C) 28044 cm^3

(D) 29404 cm^3

56. Total surface area of remaining solid is

(A) 4696 cm^2

(B)4796 cm^2

(C)4496 cm^2

(D)4966 cm^2

57. If the cost of painting the solid is 2000 rupees per meter square, then the total cost is

(A)993.2

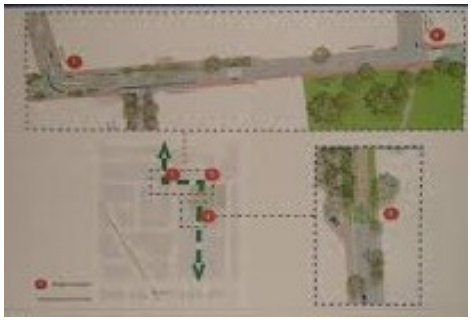
(B)899.2

(C)939.2

(D)959.2

Q. No. 58, 59 and 60 are based on

CASE STUDY: -2



"Aqua Flow Solutions," a local water utility company, is upgrading the water supply infrastructure for the residential sector of Sector 4. Their current main distribution line is a cylindrical pipe with a consistent internal diameter of 7 cm. Engineers have recorded the water velocity in this main line during peak hours at a steady 5 meters per second.

As part of the upgrade, Aqua Flow needs to determine the efficiency of the current system and prepare to supply water to a newly constructed community storage facility. This facility includes a large, empty rectangular reserve tank with dimensions of 4 meters x 3 meters x 2.31 meters.

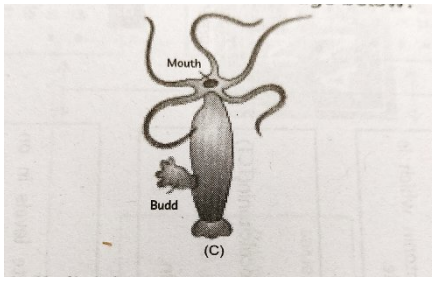
58. The volume, in litres, of water discharged by the pipe in one minute is
    (A) 1155
    (B)1515
    (C)1551
    (D) 1245
59. The time , in minutes, the pipe would take to fill an empty rectangular tank $4m \times 3m \times 2.31m$ is
    (A) 20 minutes
    (B) 24 minutes
    (C) 12 minutes
    (D) 18 minutes
60. After 18 minutes, the percent of height of water level in the empty rectangular tank $4m \times 3m \times 2.31m$ is
    (A) 100%
    (B) 50%
    (C) 75%
    (D) 40%

GENERAL SCIENCE

61. Macrophages and leucocytes exhibit
    (A) Ciliary movement
    (B) Flagellar movement
    (C) Amoeboid movement
    (D) Gliding movements
62. Why can't insulin be given orally to diabetic patients?
    (A) Because of structural variation.
    (B) It's bioavailability will be increased.
    (C) Human body will elicit strong immune response.
    (D) It will be digested in gastrointestinal tract.

63. An area in the brain which is associated with strong emotions is :
    (A) Cerebral cortex
    (B) Cerebellum
    (C) Lymbic system
    (D) Medulla
64. In human body, during respiration gaseous exchange takes place in:
    (A) Trachea and larynx
    (B) Alveoli of lungs
    (C) Alveoli and throat
    (D) Throat and larynx

65. The urine of a man suffering from Diabetes insipidus is
    (A) Sweet smelling and watery
    (B) Sweet smelling and thick
    (C) Tasteless and watery
    (D) Tasteless and thick.
66. What is the common method of reproduction found in the organism given below?



    (A) Fragmentation.
    (B) Cell division
    (C) Budding.
    (D) Sexual reproduction
67. Arteries are
    (A) Thin walled and blood flows under diminished pressure.
    (B) Thick walled and blood flows under high pressure.
    (C) Thin walled and blood flows under high pressure
    (D) Thick walled and blood flows under diminished pressure
68. A green stemmed rose plant denoted by GG and brown stemmed rose plant denoted by gg are allowed to undergo a cross with each other. What will be the percentage of brown stemmed plants in F2 progeny if F1 plants are self pollinated?
    (A) 50.
    (B) 75
    (C) 100
    (D) 25
69. The protocol agreed upon in 1987 organized by the UNEP is related to:
    (A) Food security.
    (B) Ozone layer depletion
    (C) Global warming.
    (D) Sustainable development
70. Yeasts respire using sugar. Identify the conditions required and the products formed from the options given below.
    (A) It respires under anaerobic condition and produces lactic acid.
    (B) It respires under aerobic condition and produces alcohol.

(C) It respires under anaerobic condition and produce alcohol.
(D) It respires under aerobic condition and produces lactic acid.

71. **Assertion -A** - In humans, the gametes, the gametes contributed by the male determines, whether the child will be male or female.
Reason - R- Sex in human is a polygenic trait depending upon a cumulative effect of some genes present on X chromosome and some on Y chromosome.
(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is not correct explanation of A.
(C) A is true and R is false.
(D) A is false and R is true

Q. No. 72, 73 and 74 are based on case study:

Ram was peeling off the pencil with blade and suddenly, it pierced his finger. The bleeding started and it lasts for 3 to 5 minutes. Ram was surprised how did it Stop automatically without taking any initiative for the same.

72. Which formed element is responsible for clotting of blood?
(A) Thrombocytes
(B) Erythrocytes
(C) Leucocytes
(D) Lymphocytes

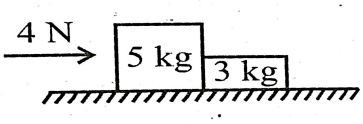
73. What is serum?
(A) Blood without clotting factor
(B) Blood with clotting factor
(C) Blood without RBC
(D) Blood without WBC

74. Which vitamin and mineral helped Ram in blood clotting process?
(A) Vitamin D and calcium
(B) Vitamin K and calcium
(C) Vitamin K and magnesium
(D) Vitamin D and magnesium

75. A ball is dropped downwards, after 1 sec another ball is dropped downwards from the same point. What is the distance between them after 3 sec?
(A) 25 m
(B) 20m
(C) 50 m
(D) 9.8 m

76. A fire fighter drops from a window into a net. If the window is 34 m above net, the speed with which firefighter hits the net.
(A) 18 m/sec
(B) 20 m/sec
(C) 12 m/sec
(D) 26 m/sec

77. Two blocks of masses 5 kg and 3 kg are placed in contact on a horizontal frictionless surface as shown in the figure. A force of 4 N is applied on mass 5 kg. The acceleration of the mass 3 kg will be,



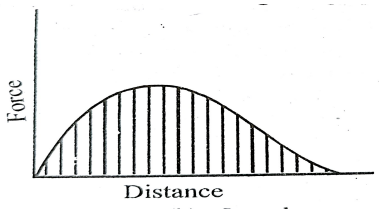
(A) 0.8 m/s^2
(B) 1.33 m/s^2
(C) 2 m/s^2
(D) 0.5 m/s^2

78. A man weighing 80 kg stands on a weighing scale in a lift which is moving upwards with uniform acceleration of 5 m/s^2. What would be the reading on the scale? (g = 10 m/s^2)
(A) 1200 N
(B) Zero
(C) 400 N
(D) 800 N

79. The radius of earth is about 6400 km and that of Mars is about 3200 km. The mass of earth is about 10 times the mass of mars. An object weighs 200 N on earth's surface. Then its weight on the surface of Mars will be
(A) 8N
(B) 20N
(C) 40N
(D) 80N

80. Light travelling from a transparent medium to air undergoes total internal reflection at an angle of incidence of 45°. Then refractive index of the medium may be,
(A) 1.5
(B) 1.3
(C) 1.1
(D) $\frac{1}{\sqrt{2}}$

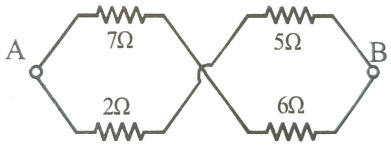
81. Which one of the physical quantities is represented by the shaded area in the given graph?



(A) Torque
(B) Impulse
(C) Power
(D) Work done

82. Two plane inclined mirrors from 5 images by multiple reflection. The angle of inclination is
(A) 90°
(B) 60°
(C) 45°
(D) 30°

83. An object 20cm tall is placed on the principal axis of a convex lens. Its 30cm tall image is formed on the screen placed at a distance of 10cm from the lens. What will be the value of its focal length?
    (A) 4 cm
    (B) 4.5 cm
    (C) 6 cm
    (D) 5 cm
84. An AC generator is connected to an electric appliance. In 10 revolutions of the armature, the current in the appliance changes direction
    (a) 5 times
    (b) 10 times
    (c) 20 times
    (d) 40 times
85. The equivalent resistance between points A and B is



    (A) 4 Ω
    (B) 4.5 Ω
    (C) 2 Ω
    (D) 20Ω
86. Masses of 3 wires of same metal are in the ratio 1:2:3 and their lengths are in the ratio 3:2:1. The electrical resistances are in ratio
    (A) 1:4:9
    (B) 9:4:1
    (C) 1:2:3
    (D) 27:6:1
87. **Assertion(A):** The strength of the magnetic field produced at the center of a current carrying circular coil increases on increasing the number of turns of the circular coil.
    Reason (R): Magnetic field strength is directly proportional to the number of turns of the circular coil.
    (A) Both A and R are true and R is the correct explanation of A.
    (B) Both A and R are true but R is not the correct explanation of A.
    (C) A is true but R is false.
    (D) A is false but R is true
88. The substance not responsible for the hardness of water is
    (A) Sodium nitrate
    (B) Calcium hydrogen carbonate
    (C) Calcium carbonate
    (D) Magnesium carbonate
89. Tertiary butane gets oxidised with oxidising agents like alkaline $KMnO_4$ to
    (A) Ter-butyl alcohol
    (B) Secondary-propyl alcohol
    (C) Isobutane
    (D) All of above
90. Which of the following can be used for the denaturation of ethyl alcohol?
    (A) Methyl alcohol

(B) Pyridines
(C) Copper sulphate
(D) All of above

91. An element X on exposure to moist air turns reddish-brown and a new compound Y is formed. The substance X and Y are
(A) X = Fe, Y = Fe_2O_3
(B) X = Ag, Y = Ag_2S
(C) X = Cu, Y = CuO
(D) X = Al, Y = Al_2O_3

92. The P^H of a solution of HCl is 4. This shows that the molarity of the solution is
(A) 4.0M
(B) 0.4M
(C) 0.0001M
(D) 0.001M

93. Which of the following does not form an acidic salt?
(A) Phosphoric acid
(B) Carbonic acid
(C) Hydrochloric acid
(D) Sulphuric acid

94. The function of quick lime in soda lime mixture is to
(A) Absorb moisture present in soda lime
(B) Increase the efficiency of soda lime
(C) Increase the pH of soda lime
(D) Take part in reaction with NaOH

95. An element with atomic number will form a basic oxide_____
(A) 7
(B) 17
(C) 14
(D) 11

96. The isotope used to remove the brain tumours and treatment of cancer is
(A) U-235
(B) Na-24
(C) Iodine
(D) Co-60

97. Which of the following is a wrong Combination?
(A) 6.022 X 10^{23} molecules of oxygen = 32g of oxygen
(B) 6.022 X 10^{23} ions of sodium = 23g of sodium ions
(C) 6.022 X 10^{23} atoms of C = 24g of carbon
(D) 6.022 X 10^{23} atoms of H = 1g of hydrogen atoms

98. Assertion(A): Cooking time in a pressure cooker is reduced.
Reason(R): The boiling point of water inside the pressure cooker is reduced.
(A) Both Assertion and Reason are true and Reason is the correct explanation of assertion.
(B) Both Assertion and Reason are true and Reason is not the correct explanation of assertion.
(C) Assertion is true, but reason is false.
(D) Assertion is false, but reason is true.

99. Insulin contains 3.4% sulphur. The minimum molecular weight of insulin is:

(A) 941.176
(B) 944
(C) 945.27
(D) None

100. An element reacts with oxygen to give a compound with a high melting point. The compound is soluble in water. The element is likely to be
(A) calcium
(B) carbon
(C) iron
(D) silicon

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Space for Rough Work

LR DAV APTITUDE TEST - 2024

FOR ADMISSION INTO CLASS XI SCIENCE (SESSION 2024-25)

Guidelines to the Candidates:

- This Booklet contains printed 14 pages and 1 blank page for rough work. Any defect found should be brought to the notice of the invigilator immediately.
- Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.
- This test is of three hours' duration.
- There are four choices in every question as (a), (b), (c) and (d). Only one is correct. Each question carries 4 marks.
- The test consists of 100 multiple choice questions comprising of Mathematics (40), General Science (40) and Aptitude (20) carrying maximum of 400 marks.
- -1 will be awarded for each wrong answer/multiple answer.
- No mark will be awarded for any overwriting/scratching answer.
- No candidate shall leave his/her seat during examination.
- Do not tear remove any page of the Booklet.
- Calculation, if any, may be done at the blank pages of this booklet provided at the end for rough work. No calculator is allowed.
- After finishing the test, the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

MATHEMATICS

1. 150 litres of milk contain 20% of water. The amount of water to be added so that amount of water will be 25%, is

   (a) 20 litres (b) **10 litres** (c) 15 litres (d) 30 litres

2.

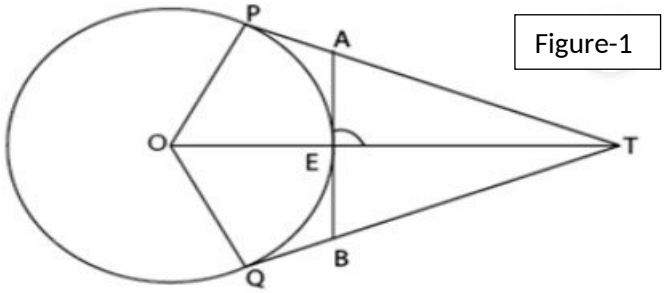


Figure-1

In the above figure-1, O is the centre of a circle of radius 5 cm, T is a point

such that OT = 13cm and OT intersects the circle at E, if AB is the tangent to the circle at E, then the length of AB is

(a) $\frac{10}{3}$ cm (b) 12cm (c) 17cm (d) $\mathbf{\frac{20}{3}}$ **cm**

3. Three horses are tethered with 7 meter long ropes at the three corners of a triangular field having sides 20 m, 34 m and 42 m. The area of the plot which can be grazed by the horses is

(a) $80m^2$ (b) $100m^2$ **(c) $77m^2$** (d) $30m^2$

4. If the point (2, 3) is equidistant from the points (a + b, b−a) and (a−b, a +b), then

(a) 2a = 3b (b) a + b=1 **(c) 3a = 2b** (d) b−a=1

5. The area of in-circle of an equilateral triangle of side 42cm is

(a) $22\sqrt{3}cm^2$ (b) 213 cm^2 (c) 924 cm^2 **(d) 462 cm^2**

6. Asha has only ₹1 and ₹2 coins with her. If the total number of coins that she has, is 50 and the amount of money with her is ₹75, then the number of ₹1 and ₹2 coins are, respectively

(a) 35 and 15
(b) 15 and 35
(c) 35 and 20
(d) 25 and 25

7. The value of k, for which the system of equations x + (k + 1)y = 5 and (k + 1) x + 9y = 8k – 1 has infinitely many solutions, is

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

8. If among three numbers the mean of first two numbers is 2, mean of last two numbers is 3 and mean of first and last number is 4, then the mean of these three numbers is

(a) 3 (b) 3.5 (c) 9 (d) 4.5

9. Let the rational number p/q be closest to but not equal to 22/7 among all rational numbers with denominator less than 100.The value of $p - 3q$ is

(a)12 **(b)14** (c) 21 (d) 22

10. The largest number which divides 31 and 99, leaving remainders 5 and 8 respectively, is

(a)13 (b)65 (c) 875 (d) 1750

11. If $\sin\gamma + \sin^2\gamma = 1$,then $\cos^2\gamma + \cos^4\gamma = ?$

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

12. In the quadratic equation $ax^2 + b x + c = 0$, If one root is four times the other, which of the following relation is correct?

(a) $3b^2 = 24ac$ **(b) $4b^2 = 25ac$** (c) $5b^2 = 24ac$ (d) $3b^2 = 25ac$

13. If 3 is the least prime factor of m and 5 is the least prime factor of n, then the least prime factor of (m + n) is

(a) 11 (b) 1 (c) 15 **(d) 2**

14. If two dice are rolled together, then the probability that both of them shows either a prime or a composite number is

(a) $\frac{13}{18}$ **(b) $\mathbf{\frac{25}{36}}$** (c) $\frac{2}{3}$ (d) $\frac{11}{36}$

15. The number of positive real values of x such that $x^{x\sqrt{x}} = (x\sqrt{x})^x$, is

(a) 1 (b) 4 **(c) 2** (d) infinite

16. If a, b, c, d, e are in A.P., then the value of (a – 4b + 6c – 4d + e) is
(a) 0 (b) 1 (c) –1. (d) 2

17. The number of rows in a lecture hall equals the number of seats in a row. If the number of rows is doubled and the number of seats in every row is reduced by 10, the number of seats is increased by 300. If x denotes the number of rows in the lecture hall, then the values of x is

(a)10 (b) 15 (c) 20 **(d) 30**

18. If (0, 0) ,(a,1) and (10, 5) are colinear then the value of 'a' is
(a) 1 (b) – 1 **(c) 2** (d) – 2

19. If α and β are the roots of the equation $x^2 - 2x + 4 = 0$, then the value of $(\alpha^3 + \beta^3)$ is
(a) 16 **(b) – 16** (c) 8 (d) – 8

20. A vessel is in the form of an inverted cone. Its height is 8 cm and radius of its top, which is open, is 5cm.It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5cm are dropped into the vessel, one fourth of the water flows out. Then the number of lead shots dropped in the vessel are
(a) 500 (b) 300 (c)200 **(d)100**

21. The value of $sin^2 5° + sin^2 10° + sin^2 15° + ... + sin^2 90°$ is equal to:
(a) 8 (b) 8.5 **(c) 9.5** (d)9

22. In a ΔABC, the internal bisectors of ∠B and ∠C meet at P and the external bisectors of ∠B and ∠C meet at Q. Then ∠BPC + ∠BQC = ?
(a) 60° (b) 45° (c) 90° **(d) 180°**

23. If the difference of mode and median of a data is 24, then the difference of median and mean is
(a) **12** (b) 24 (c) 8 (d)36

24. If r and s are roots of $x^2 + px + q = 0$, then what is the value of $\frac{1}{r^2} + \frac{1}{s^2}$?

(a) $p^2 - 4q$ (b) $\frac{p^2-4q}{2}$ (c) $\frac{p^2-4q}{q^2}$ **(d)** $\boldsymbol{\frac{p^2-2q}{q^2}}$

25. The sum of n terms of two A. P are in the ratio (5n+4):(9n+6), then the ratio of their 18th terms is
(a) $\frac{47}{84}$ **(b)** $\boldsymbol{\frac{179}{321}}$ (c) $\frac{89}{159}$ (d) $\frac{2}{3}$

26. The maximum volume of a cone that can be carved out of a solid hemisphere of radius r is
(a) $3\pi r^2$ **(b)** $\boldsymbol{\frac{\pi r^3}{3}}$ (c) $\frac{\pi r^2}{3}$ (d) $3\pi r^3$

27. The sum of the length, breadth and height of a cuboid is $6\sqrt{3}$ cm and the length of its diagonal is $2\sqrt{3}$ cm. The total surface area of the cuboid is
(a) $48cm^2$ (b) $72cm^2$ **(c)** $\boldsymbol{96cm^2}$ (d) $108cm^2$

28. If 1/(b + c), 1/(c + a), 1/(a + b) are in AP then
(a) a, b, c are in AP
(b) a², b², c² are in AP

(c) 1/1, 1/b, 1/c are in AP

(d) None of these

29. If a cone is cut into two parts by a horizontal plane passing through the mid-point of its axis, then the volume of the upper part and the cone is

(a) **1:8** (b)1:5 (c)1:7 (d)1:6

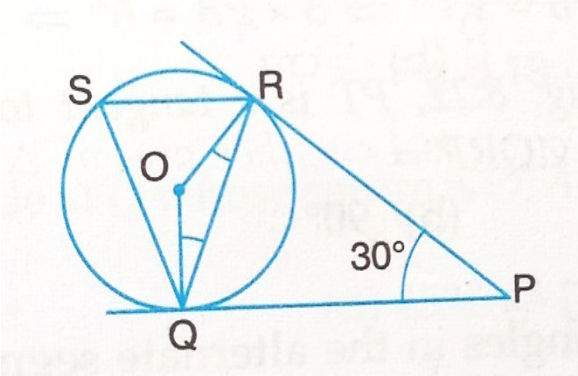
30. If 35 is removed from the data:30, 34, 35, 36, 37, 38, 39, 40, then the median increases by

(a) 2 (b)1.5 (c)1 **(d) 0.5**

31. Two numbers 'a' and 'b' are selected successively without replacement in that order from the integers 1 to 10. The probability that $\frac{a}{b}$ is an integer, is

(a) $\frac{17}{45}$ (b) $\frac{1}{5}$ **(c)** $\frac{17}{90}$ (d) $\frac{8}{45}$

32. In the following figure, O is the centre of the circle. The value of the angle ∠RSQ is



(a) 60° **(b) 75°** (c) 150° (d) 45

Question no **33, 34, 35 and 36** are **assertion-reason based questions** in which a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.

(b) Both A and R are true and R is not the correct explanation of A

(c) A is true but R is false.

(d) A is false but R is true.

33. **Assertion (A):** Both HCF and LCM of two natural numbers *a* & *b* can be 25 and 815 respectively.
Reason(R): LCM of two natural numbers is always divisible by their HCF.

34. **Assertion (A):** If three vertices of a parallelogram taken in order are $(-1, -6)$, $(2, -5)$ and $(7, 2)$, then its fourth vertex is (4,1).
Reason(R): Diagonals of a parallelogram bisect each other.

35. **Assertion (A):** If the total surface area and volume of a cube are numerically equal to 216, then the length of its edge is 6cm.
Reason(R): Volume and total surface area of a cube are always equal.

36. **Assertion(A):** D and E are points on the sides AB and AC respectively of a ΔABC such that AD = $(7x - 4)$cm, AE=$(5x - 2)$cm, DB = $(3x + 4)$cm and EC=$3x$ cm.If DE $\parallel$ BC, then the value of x is 5cm.
Reason(R): If a line divides any two sides of a triangle in the same ratio then it is parallel to the third side.

CASE BASED QUESTION

(From Question No. 37 – 40 are case based questions based on the following paragraph. Choose the correct option based on this)

A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height.



37. The angle of elevation if they are standing at a distance of 42m away from the monument is

(a) 30° (b) 45° (c) 60° (d) 0°

38. They want to see the tower at an angle of 60°. So, they want to know the distance where they should stand and hence find the distance.
(Use $\sqrt{3} = 1.732$)

(a) 25.24 m(approx.)

(b) 20.12 m(approx.)

(c) 42 m(approx.)

(d) 24.25m(approx.)

39. If the altitude of the Sun is at 60°, then the height of the vertical tower that will cast a shadow of length 20 m is

(a) $20\sqrt{3}$ m (b) $20/\sqrt{3}$ m (c) $15/\sqrt{3}$ m (d) $15\sqrt{3}$ m

40. The ratio of the length its shadow and the tower is $1:\sqrt{3}$. The angle of elevation of the Sun is

(a) 30° (b) 45° (c) 60° (d) 90°

GENERAL SCIENCE

41. An electric bulb is marked 100 W,230V. If the supply drops to 115 V , what is the heat energy produced by the bulb in 20 min? Calculate the current flowing through it.

(a) 50 kJ and $\frac{5}{23}$A

(b) 35 kJ and $\frac{2}{11}$A

(c) 30 kJ and $\frac{5}{23}$ A

(d) 40 kJ and $\frac{2}{11}A$

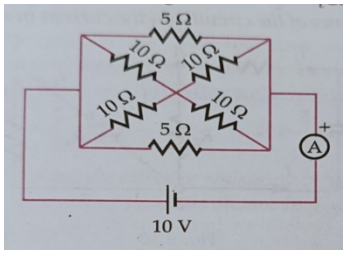
42. Calculate the amount of current flowing through the circuit.

(a)5 A

(b) 4A

(c) 2.5A

(d)8A



43. A cylindrical wire P has resistance 10Ω. A second wire Q has length and diameter half that of P. If the material of both the wires is same, then resistance of wire Q is

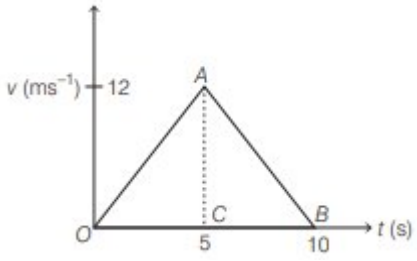
(a) 10Ω (b) 20Ω (c) 5Ω (d) 5 2 Ω

44. Ten one-rupee coins are put on top of each other on a table. Each coin has mass m. The reaction of the 6thcoin (counted from the bottom) on the 7th coin is

(a)4mg (b)6mg

(c)7mg (d)3mg

45. The speed-time graph of a particle moving along a fixed direction is as shown in the figure. The distance traversed by the particle between t = 0 s to t = 10 s is



(a) 20 m (c) 40 m
(b) 60 m (d) 80 m

46. A small magnet is placed perpendicular to a uniform magnetic field.The force acting on the magnet will result in
(a) Rotational motion
(b) Translational motion
(c) No motion at all
(d) Translational and rotational motion both

47. A glass slab is placed in the path of a beam of convergent light ,then the point of convergence of light
(a) Moves towards the glass slab
(b) Moves away from the glass slab
(c) Remains at the same point
(d) Undergoes a lateral shift

48. A virtual, erect and magnifiede image of an object is to be produced with a concave mirror of focal length 12 cm. Which of the following object distance should be chosen for this purpose?
(a) 10 cm
(b) 14 cm
(c) 18 cm
(d) 24 cm

49. A stone is projected vertically up to reach maximum height h. The ratio of its kinetic energy to its potential energy at a height 4 /5 h, will be
(a) 5 : 4 (b) 4 : 5
(c) 1 : 4 (d) 4 : 1

50. A spherical mirror forms an erect image four times the size of the object. If the distance between the object and the image is 100 cm, the nature and the focal length of the mirror are
(a) concave, (80/3) cm
(b) convex, (80/3) cm
(c) concave, 20 cm
(d) convex, 20 cm

51. A hockey player is moving northward and suddenly turns westward with the same speed to avoid an opponent. The force that acts on the player is
(a) frictional force along westward
(b) muscle force along southward
(c) frictional force along south-west
(d) muscle force along south-west

52. An observer standing at the sea coast observes 54 waves reaching the coast per minute. If the wavelength of the waves is 10 m, find the velocity.
(a) 54 m/s
(b) 10 m/s
(c) 9 m/s

(d) 5.4 m/s

53. A metal salt MX when exposed to light splits up to form metal M and a gas X_2. Metal M is used in making ornaments whereas gas X_2 is used in making bleaching powder. What could be the metal M and the gas X_2 respectively?

(a) Gold, oxygen (b) gold, chlorine (c) silver, oxygen (d) silver, chlorine

54. Among the following reactions, which is a redox reaction?

(a) $CaCO_3$ (s) → CaO (s) + CO_2 (g)

(b) Mg (s) + CuO (s) → MgO (s) + Cu(s)

(c) NaOH (aq) + HCl (aq) → NaCl (aq) + H_2O (l)

(d) KBr (aq) + $AgNO_3$ (aq) → KNO_3 (aq) + AgBr (s)

55. Match the acids given in column (I) with their correct source given in column (II) and choose the correct option.

Column (I)	**Column (II)**
(A) Lactic acid	(i) Lemon
(B) Citric acid	(ii) Tomato
(C) Acetic acid	(iii) Vinegar
(D) Oxalic acid	(iv) Curd

(a) A – ii, B – iii, C – iv, D – i (c) A – iv, B – i, C – ii, D – iii

(b) A – iv, B – i, C – iii, D – ii (d) A – ii, B – iii, C – i, D – iv

56. Which of the following should be the correct order of decreasing value of 2nd ionisation potential of $_6C$, $_7N$, $_8O$ and $_9F$?

(a) F > O > N > C (b) O > F > N > C (c) O > F > C > N (d) F > N > O > C

57. Which of the following compounds have highest electronegativity?

(a) Ethane (b) ethene (c) ethyne (d) equal in all

58. Match column I with column II and select the correct answer from the codes given below the columns:

Column (I)	Column (II)
(A) Radioactive	(i) Pt
(B) Lightest metal	(ii) I_2
(C) Noble metal	(iii) Li
(D) Liquid non-metal	(iv) U
(E) Solid volatile non-metal	(v) Br_2
	(vi) H

	A	B	C	D	E
(a)	iv	iii	i	v	ii
(b)	iv	vi	i	v	ii
(c)	i	iii	iv	v	ii
(d)	i	vi	iv	v	ii

59. Riva took a thin strip of filter paper. She did an experiment by putting a small drop of green ink on the baseline drawn 3 c.m. above one of the shortest edges of filter paper and inserting the paper into a jar containing water so that the drop of ink on the paper is just above the water level. She found that the position of blue color pigment is higher than that of yellow. What type of experiment was performed by Riva and which color is more soluble in water?
(a) Paper chromatography, yellow
(b) Paper chromatography, blue
(c) Column chromatography, green
(d) Column chromatography, yellow

60. Carbon and hydrogen combine in the ratio of 4:1 by mass to form ethane. What mass of hydrogen gas would be required to react completely with 36 g of carbon?
(a) 6 g (b) 9 g (c) 12 g (d) 3 g

61. Stomata are epidermal outgrowths present on epidermal surfaces of leaf and young stem. The stomata are restricted to ----- in monocot leaves.
(a) Lower epidermis
(b) Upper epidermis
(c) Mesophyll zone
(d) Both lower and upper epidermis.

62. Enzymes enhance the rate of metabolic processes by:
(a) Lowering of the activation energy.
(b) Increasing the activation energy.
(c) With out changing the activation energy.
(d) Either lowering or increasing the activation energy.

63. Myogenic muscles are the:
(a) Specialised muscles in the mammalian gut.
(b) Specialised muscles in the mammalian heart.
(c) Specialised muscles in the mammalian pancreas.
(d) Specialised muscles in the mammalian kidney.

64. The given characteristic features represent in which phylum?
1) Their body is porous.
2) Spongocoel is lined by choanocytes or collar cells.
3) They have cellular level of organisation.
4) Water transport or water canal system is present.

Select the correct option:

(a) Echinodermata
(b) Ctenophora
(c) Porifera
(d) Platyhelminthes

65. Haemoglobin is responsible for transport of oxygen in blood. It represents which level of structure of protein arrangement?
(a) Primary structure
(b) Secondary structure
(c) Tertiary structure

(d) Quarternary structure.

66. Which of the following is incorrect with respect to significance of meiotic division?

(a) New recombination of genes.

(b) Number of chromosomes become half.

(c) Number of chromosomes remain same.

(d)Formation of spores and gametes.

67. On selfing a plant of genotype RrTt, 400 plants were raised. How many of them will be of genotype RrTt?
(a) 50
(b) 100
(c) 200
(d) 300

68. Choose the chromosome in a human that possesses the least number of genes.
(a) 21st chromosome
(b) Autosome
(c) X- chromosome
(d) Y- chromosome

69. Darwin judged the fitness of individuals by:
(a) Ability to defend itself.
(b) Strategy to obtain food.
(c) Number of offsprings produced.
(d) Dominance over other individuals.

70. The diagnostic test that confirms typhoid in humans is :
(a) ELISA
(b) Widal
(c) MRI
(d) Amniocentesis

71. The organ in humans that undergo degeneration with increase in age and related to immune system is:
(a) Spleen
(b) Pancreas
(c) Liver
(d) Thymus

72. Regeneration of damaged growing grass following grazing is largely due to:
(a) Lateral meristem
(b) Intercalary meristem
(c) Apical meristem
(d) Secondary metabolites

73. Choose the wrong statements for the specialized connective tissue:
1) All of the cartilages in vertebrate embryos are replaced by bones in adults.

2) Cartilage is present in the tip of nose, outer ear joints, between adjacent bones of the vertebral column, limbs and hands in adults.

3) Osteocytes are bone cells and present in the spaces called lacunae.

4) Bone marrow is present in all bones and it is a site of production of blood cells.

5) Blood is a fluid connective tissue.

(a) 1,2 and 5
(b) 1,3 and 5
(c) 1 and 4
(d) 4 and 5

For question numbers 74,75 and 76, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A & R are true and R is the correct explanation of A.
(b) Both A & R are true but R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

74. **Assertion:** As we go up the surface of the earth, we feel light weighed than on the surface of the earth.
Reason: The acceleration due to gravity decreases on going up above the surface of the earth.

75. **Assertion**: Sodium are obtained by the electrolysis of its molten chloride, i.e., NaCl.

Reason: Na is deposited at the anode and Cl_2 is deposited at the cathode.

76. **Assertion** : Iodine is necessary for normal rete of hormone synthesis.

Reason : Deficiency of iodine cause diseases.

CASE BASED QUESTIONS:

Acid and base undergo neutralisation reaction to form salt which is an ionic compound. Salt is composed of related number of cations, those coming from base and anions, those coming from acid. Thus, salt is electrically neutral. They may be simple salts such as NaCl, KCl; acid salts like $NH_4)_2SO_4$; basic salts like CH_3COONa; double salt like $K_2SO_4.Al_2(SO_4)_3$.

77. Which one of the following salts does not contain water of crystallisation?
(a) Green vitriol (b) Blue vitriol (c) gypsum (d) baking soda

78. Potassium sulphate is a salt of
(a) Strong acid and weak base
(b) Strong base and weak acid
(c) Strong acid and strong base
(d) Weak acid and weak base

79. What will be the product when Al_2O_3 reacts with NaOH?
(a) Aluminium hydroxide and sodium oxide

(b) Sodium aluminate and water
(c) Aluminium hydride and sodium oxide
(d) Sodium aluminate and hydrogen gas

80. What happens when a solution of an acid is mixed with a solution of a base in a test tube?
(i) Temperature of the solution decreases
(ii) Temperature of the solution increases
(iii) Temperature of the solution remains the same
(iv) Salt formation takes place

(a) (i) & (iv) (b) (i) & (iii) (c) (ii) only (d) (ii) & (iv)

APTITUDE TEST

81. Solve the following analogy.
Horse: Stable: Pig: ------
(a) Den
(b) Byre
(c) Sty
(d) Hive

82. Find the odd one.
(a) 256
(b) 576
(c) 1331
(d) 441

Direction (Q 83 -86): Here you have to assume the given statements to be true even if they differ from generally known facts. Study all the conclusions and then decide which of the conclusions logically follows.

GIVE ANSWER AS
a) If both I and II follow
b) If only conclusion II follows
c) If either I OR II follows
d) If neither I nor II follows

83. Statements: Some rooms are stones.
All stones are radios.
Conclusions: I. some rooms are radios.
II. some stones are rooms.

84. Statements: All roads are poles.
No pole is house.
Conclusions: I. some roads are houses.
II. Some houses are poles.

85. Statements: All birds are trees.
Some trees are hens.
Conclusion: I. some birds are hens.
II. Some hens are trees.

86. Statement: All tables are chalks.
All chalks are chairs.
Conclusions: I) All chairs are tables.
II)All tables are chairs.

87. If A is the father of B and B is the father of C, then how is C related to A?
(a) .Grandson
(b) Granddaughter

(c) C. Grandfather
(d) Can't be determined.

88. What day of the week was on 13th April,1723?
(a) MONDAY
(b) TUESDAY
(c) WEDNESDAY
(d) FRIDAY

89. Solve the following analogy.
AZCX: BYDW: HQJO: --------
(a) GREP
(b) IPKM
(c) IPKN
(d) GRJP

90. Sam ranked 9th from the top and 38th from the bottom in a class. How many students are there in the class?
(a) 46
(b) 47
(c) 45
(d).48

91. If 34 is related to 12, in the same way 59 is related to-----.
(a) 38
(b) 45
(c) 26
(d) 14

92. How many meaningful English word can be formed with the letter ESRO using each letter once in each word?
(a) None
(b) One
(c) Two
(d) Three

93. If you write down all the numbers from 1 to 100, then how many times do you write 3?
(a) 19
(b) 11
(c) 21
(d) 20

94. A shepherd has 17 sheep. All but nine died. How many was he left with?
(a) None
(b) 8
(c) 9
(d) 17

95. Nitin ranks 18th in the class of 49 students. What is his rank from the last?
(a) 18
(b) 31
(c) 19
(d) 32

96. In a cricket match there are three types of tickets say A, B and C each costing ₹1000, ₹ 500 and ₹ 200 respectively. The ratio of the ticket sold of category A, B and C is 3 : 2 : 5. If the total collection from selling the tickets is ₹ 2.5 crore. Find the total number of tickets sold.
(a) 50000
(b) 40000
(c) 45000
(d) 60000

97. The ratio of ages of two boys is 5 : 6. After two years the ratio will be 7 : 8. The ratio of their age after 12 years will be :
(a) 22 : 24
(b) 15 : 16
(c) 17 : 18
(d) 11 : 12

98. In a school, the ratio of boys to girls is 4 : 3 and the ratio of girls to teachers is 8 : 1. The ratio of students to teachers is
(a) 56 : 3
(b) 55 : 1

(c) 49 : 3
(d) 56 : 1

99. There is a ratio of 5 : 4 between two numbers. If 40 per cent of the first is 12, then 50% of the second number is :
(a) 18
(b) 12
(c) 42
(d) 20

100. The average age of boys in the class is twice the number of girls in the class. The ratio of boys and girls in the class of 50 is 4 : 1. The sum of the ages (in years) of the boys in the class is :
(a) 2000
(b) 2500
(c) 800
(d) 400

APTITUDE TEST FOR ADMISSION INTO +2 SCIENCE (2023-24)

Guidelines to the Candidates:

1. This Booklet contains printed 17 pages and 1 blank page for rough work. Any defect found should be brought to the notice of the invigilator immediately.

2. Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.

3. This test is of three hours' duration.

4. There are four choices in every question as (a), (b), (c) and (d). Only one is correct. Each question carries 4 marks.

5. (i) The test consists of 100 multiple choice questions comprising Mathematics (40), Physics (14), Chemistry (13), Biology (13) and mental ability (20) currying maximum of 400 marks.

(ii) -1 will be awarded for each wrong answer/multiple answer. (ii)No mark will be awarded for any overwriting/'scratching answer.

6. Each candidate must show his/her Admit Card to the invigilator whenever required.

7. No candidate shall leave his/her seat during examination.

8. Do not tear remove any page of the Booklet. 9. Calculation, if any, may be done at the blank pages of this booklet provided at the end for rough work. No calculator is allowed.

10. After finishing the test, the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

MATHEMATICS

1. From a rectangular piece of card board of length 34cm and 28cm , four equal square pieces of area 9cm^2 are cut off from each corner and then flapped to make an open cuboidal box, then the lateral surface area of the box will be
   a) 900cm^2
   b) 300cm^2
   c) 372cm^2
   d) 496cm^2
2. The number of lines that can be drawn through 21 points on a circle is
   (a) 210 (b)1 (c) 240 (d) 7

3. Sum of n terms of the series $\sqrt{2} + \sqrt{8} + \sqrt{18} + \sqrt{32} +$ ------- is
   (a) $\frac{n(n+1)}{2}$ (b) 2n(n+1) (c) $\frac{n(n+1)}{\sqrt{2}}$ (d)1

4. If α, β are the roots of the equations $x^2 - 2x - 1 = 0$, then what is the value of $\alpha^2\beta^{-2} + \alpha^{-2}\beta^2$?
   $(a) - 2$ (b) 0 (c) 30 (d) 34

5. If α, β are the roots of the equation $lx^2 - mx + m = 0, l \neq m, l \neq 0$, then which one of the following statements is correct?
   (a) $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} - \sqrt{\frac{m}{l}} = 0$
   (b) $\sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} + \sqrt{\frac{m}{l}} = 0$
   (c) $\sqrt{\frac{\alpha+\beta}{\alpha\beta}} - \sqrt{\frac{m}{l}} = 0$
   (d) $\sqrt{\frac{m}{l}} - \sqrt{\frac{\alpha}{\beta}} + \sqrt{\frac{\beta}{\alpha}} = 0$

6. 60 litres mixture of milk and water contain 10% of water. What amount of water should be added so that amount of water will be 20% in the mixture ?
   (a) 6.5 litre (b) 7.5 litre (c) 2.5 litre (d) 2.0 litre

7. The least number that is divisible by all the numbers from 1 to 10(both inclusive) is :

(a)5040 (b) 504 (c) 2520 (d) 2720

8. What is the first degree expression to be subtracted from $(x^6 + 8x^4 + 2x^3 + 16\,x^2 + 4x + 5)$ in order to make it a perfect square?

   $(a) - 4x - 4$ (b) $4x + 4$ (c) $4x - 4$ (d) $-4x + 4$

9. A hollow cone is cut by a plane parallel to the base and upper portion is removed. If the curved surface area of the remainder is $\frac{8}{9}$ of the curved surface area of the whole cone. What is the ratio of the line segments into which the cone's altitude is divided by the plane?

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

10. Find the number, if eight times of it is added to its square, the sum so obtained is − 16 ?

    $(a) - 4$ (b) 5 (c) 3 (d) 2

11. A number 'x' is selected from the numbers 1, 2, 3 and then second number 'y' is selected from the numbers 1, 4, 9. What is the probability that the product 'xy' of the two number is less than 9?

    $(a)\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{5}{9}$ (d) $\frac{4}{9}$

12. If $4^x - 4^{x-1} = 24$, then $(2x)^x = ?$

    (a) $5\sqrt{5}$ (b) $\sqrt{5}$ (c) $25\sqrt{5}$ (d) 125

13. If A:B:C = 2:3:4 then $\frac{A}{B}:\frac{B}{C}:\frac{C}{A} = ?$

    (a) 8:9:16 (b) 8:9:12 (c) 8:9:24 (d) 4:9:12

14. How many significant figure are there in 0.0030050?

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

15. If $\sqrt{5}$ and $-\sqrt{5}$ are the two zeroes of the polynomial $(x^3 + 3x^2 - 5x - 15)$, then what is its third zero ?

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

16. If a and b can take the values 1, 2, 3 or 4. Then the number of the equations of the form $ax^2 + bx + 1 = 0$ having real roots is ___ ?

(a) 10 (b) 12 (c) 6 (d) 7

17. The mean of n observations is $\bar{x}$. If the first observation is increased by 1, second by 2, the third by 3 and so on, then the new mean is :

(a) $\bar{x} + (2n + 1)$ (b) $\bar{x} + \frac{n+1}{2}$ (c) $\bar{x} + (n + 1)$ (d) $\bar{x} - \frac{n+1}{2}$

18. What value should come in the place of question mark (?) in the following question?

$0.5\overline{27} - 0.3\overline{25} + 0.2\overline{24} = ?$

(a) $\frac{432}{990}$ (b) $\frac{422}{990}$ (c) $\frac{412}{990}$ (d) $\frac{402}{990}$

19. The length of the tangent drawn from a point 8 cm away from the centre of a circle of radius 6 cm is

(a) $2\sqrt{7}$ cm (b) $\sqrt{7}$ cm (c) 10 cm (d) 5 cm

20. If the sum of n terms of an A.P. is $3n^2 + 5n$, then which of its term is 164?

(a) 25th (b) 26th (c) 27th (d) 28th

21. Diagonals of a trapezium PQRS intersect each other at the point O, PQ || RS and PQ = 3RS. Then what is the ratio of the areas of △POQ and △ROS?

(a) 2:3 (b) 3:2 (c) 1:9 (d) 9:1

22. The rain water from a roof of dimensions (22m ×20m) drains into a cylindrical vessel having diameter of base 2m and height 3.5m. If the rain water collected from the roof just fill the cylindrical vessel , then find the rainfall in cm?

(a) 5 cm (b) 2 cm (c) 2.5cm (d) 3 cm

23. At t minutes past 2 p.m., the time needed by the minute hand of a clock to show 3 p.m. was found to be 3 minutes less than $\frac{t^2}{4}$ minutes. Find 't' ?

(a) 18mins (b) 16mins (c) 12mins (d) 14mins

24. If an isosceles triangle ABC in which AB=AC= 6 cm is inscribed in a circle of radius 9 cm, then what is the area of the triangle?

(a) 8 cm^2 (b) $8\sqrt{2}cm^2$ (c) $4\sqrt{2}cm^2$ (d) 4 cm^2

25. The value of $\frac{2}{\sqrt{5}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{2}}-\frac{3}{\sqrt{5}+\sqrt{2}}$ is

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

26. In a ΔABC, the internal bisectors of $\angle B$ and $\angle C$ meet at P and the external bisectors of $\angle B$ and $\angle C$ meet at Q. Then $\angle BPC + \angle BQC = ?$

(a) $60°$ (b) $45°$ (c) $90°$ (d) $180°$

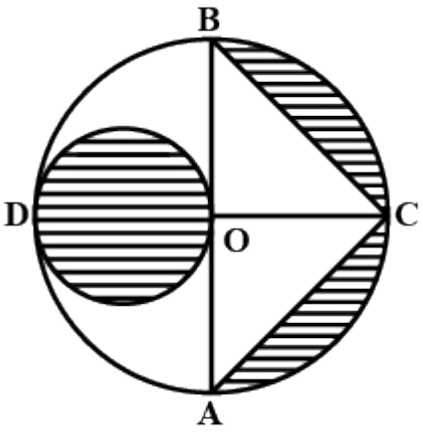
27. The sum of the radius of the base and height of a solid cylinder is 37 m. If the total surface area of the solid cylinder is 1628 m^2 . Then what is the volume of the cylinder?

(a) $4620m^2$ (b) $4260m^2$ (c) $6620m^2$ (d) $6420m^2$

28. The angle of elevation of the top of a tower 30 m high from the foot of another tower in the same plane is $60°$ and the angle of elevation of the top of the second tower from the foot of the first tower is $30°$. Then what is the height of the other tower?

(a) 20 m (b) $10\sqrt{3}$ m (c) 10 m (d) $\frac{10}{\sqrt{3}}$ m

29. In the given figure, AB and CD are two diameters of a circle (with centre O) perpendicular to each other and OD is the diameter of the smaller circle. If OA=7cm, then what is the area of the shaded region.



(a) $49cm^2$ (b) 77 cm^2 (c) 66.5 cm^2 (d) 68.5 cm^2

30. If the pair of equations $2x + 3y = 5$ and $5x + \frac{15}{2}y = k$ represent two coincident lines, then the value of k is

(a) -5 (b) $-\frac{25}{2}$ (c) $\frac{25}{2}$ (d) $-\frac{5}{2}$

Question no 3**1,32,33,34 and 35** are **assertion-reason based questions** in which a statement of Assertion (A) is followed by a statement of Reason(R). Choose the correct answer out of the following choices.

(a) Both A and R are true and R is correct explanation of A.

(b) Both A and R are true and R is not correct explanation of A

(c) A is true but R is false.

(d) A is false but R is true.

31. Assertion(A): D and E are points on the sides AB and AC respectively of a ΔABC such that DE || BC then the value of x is 11, when AD=4cm, AE=8 cm and EC=$(3x-19)$ cm.
Reason(R): If a line divides any two sides of a triangle in the same ratio then it is parallel to the third side.

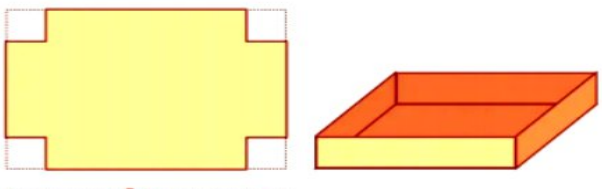
32. Assertion(A): If the least prime factor of a composite number 'a' is 3 and the least prime factor of another composite number 'b' is 7 then least prime factor of 'a+b' is 2.
Reason(R): 'a' is an odd number and 'b' is also an odd number so 'a+b' is an even number whose least prime factor is 2.

33. Assertion(A): The point $(-1,6)$ divides the line segment joining the points $(-3,10)$ and $(6, -8)$ in the ratio 2:7 internally.
Reason(R): Three points A,B and C are collinear if AB+BC=AC.

34. Assertion(A): If the median of the given data
$26,29,42,53,x,x+2,70,75,82,93$ is 65 then the value of x is 64.
Reason(R): When the number of observation(n) is odd the median is the value of the $\left(n+\frac{1}{2}\right)^{th}$ observation.

35. Assertion(A): The value of k for which the system of equations $kx-y=2$, $6x-2y=3$ has a unique solution is 3.
Reason(R): The system of linear equations $a_1x+b_1y+c_1=0$ and $a_2x+b_2y+c_2=0$ has a unique solution if $\frac{a_1}{a_2}\neq\frac{b_1}{b_2}$.

CASE-BASED QUESTION



From a rectangular piece of card board of length 34cm and 28cm , four equal square pieces of area $9cm^2$ are cut off from each corner and then flapped to make an open cuboidal box

Based on the above information answer the following questions:

36. The perimeter of each square to be cut off is
    (a) 9cm (b) 3cm (c) 31cm (d)12cm
37. The lateral surface area of the open box will be
    (a) $900cm^2$ (b)$300cm^2$ (c)$372cm^2$ (d)$496cm^2$

38. The total surface area of the open box will be
    (a)$300cm^2$ (b)$1848cm^2$ (c)$1532cm^2$ (d)$496cm^2$

39. The volume of the open box will be
    (a)$300cm^3$ (b)$1848cm^3$ (c)$1532cm^3$ (d)$496cm^3$

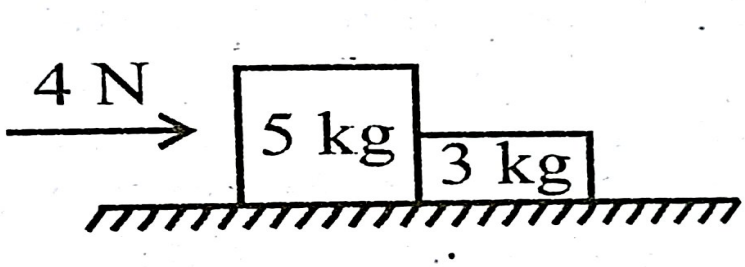
40. The exact area of the card board needed without wastage, If all the cut pieces are joined together to form a closed cubical box is
    (a)$18cm^2$ (b)$36cm^2$ (c)$9cm^2$ (d)$81cm^2$

GENERAL SCIENCE

41. A ball is dropped downwards; after 1 sec another ball is dropped downwards from the same point. What is the distance between them after 3 sec?
    (a)25 m
    (b)20m
    (c) 50 m
    (d) 9.8 m
42. A girl riding a bicycle along a straight road with a speed of 5 m/sec throws a stone of mass 0.5 kg which has a speed of 15 m/sec with respect to the ground along her direction of motion. The mass of girl and bicycle is 50 kg. What is the change in speed of the bicycle?
    (a)2 m/sec
    (b)0.1 m/sec
    (c)0.5 m/sec
    (d)5.2 m/sec
43. A fire fighter drops from a window into a net. If the window is 34 m above net, the speed with which firefighter hits the net.

(a)18 m/sec
(b)20 m/sec
(c)12 m/sec
(d)26 m/sec

44. Two blocks of masses 5 kg and 3 kg are placed in contact on a horizontal frictionless surface as shown in the figure. A force of 4 N is applied on mass 5 kg. The acceleration of the mass 3 kg will be,



(a) 0.8 m/s^2
(b) 1.33 m/s^2
(c) 2 m/s^2
(d) 0.5 m/s^2

45. A man weighing 80 kg stands on a weighing scale in a lift which is moving upwards with uniform acceleration of 5 m/s^2. What would be the reading on the scale? (g = 10 m/s^2)
(a) 1200 N
(b) Zero
(c) 400 N
(d) 800 N

46. If the earth stops rotating about its axis, the acceleration due to gravity will remain unchanged at

(a) equator
(b) Latitude 45°
(c) Latitude 60°
(d) Poles

47. The radius of earth is about 6400 km and that of Mars is about 3200 km. The mass of earth is about 10 times the mass of mars. An object weighs 200 N on earth's surface. Then its weight on the surface of Mars will be

(a) 8N

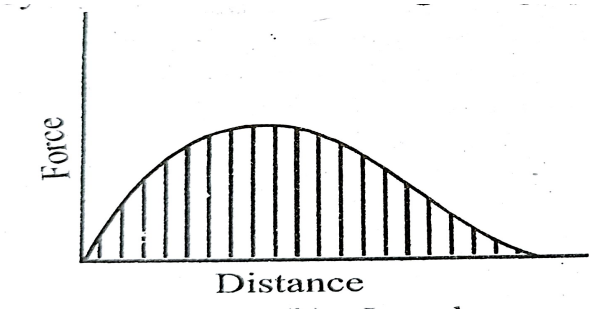
(b) 20N
(c) 40N
(d) 80N

48. Light travelling from a transparent medium to air undergoes total internal reflection at an angle of incidence of 45°. Then refractive index of the medium may be,

(a) 1.5
(b) 1.3
(c) 1.1
(d) $\frac{1}{\sqrt{2}}$

49. A ball of relative density 0.8 fall into water from a height of 2 m. The depth to which the ball will sink is
(a) 8m
(b) 2m
(c) 6m
(d) 4 m

50. Which one of the physical quantities is represented by the shaded area in the given graph?



(a) Torque
(b) Impulse
(c) Power
(d) Work done

51. Two plane inclined mirrors from 5 images by multiple reflection. The angle of inclination is
(a) 90°
(b) 60°
(c) 45°
(d) 30°

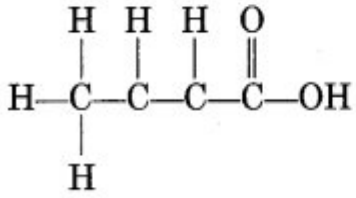
52. Which one of the following does not increase while moving down the group of the periodic table?

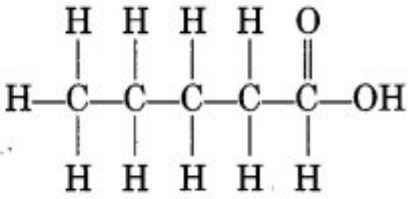
a) Atomic radius
b) Metallic character
c) Valency
d) Number of shells in an element.

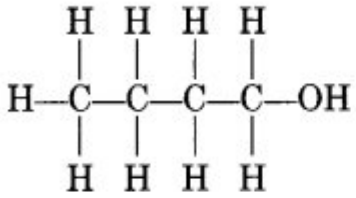
53. What would be observed on immersing an iron nail in $CuSO_4$ solution for few minutes ?

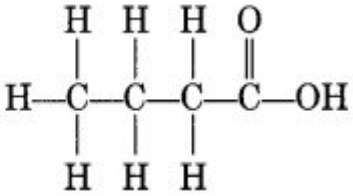
a) no reaction takes place
b) the colour of solution fades away
c) the surface of iron nails acquire a black coating
d) the colour of solution changes to green

54. The correct structural formula of butanoic acid is

(a)


(b)


(c)


(d)


55. Which of the following does not form an acidic salt?

a. Phosphoric acid
b. Carbonic acid
c. Hydrochloric acid
d. Sulphuric acid

56. Arrange Li, O, C, Be, F in the order of their increasing non-metallic character.

a) F < O < C < Be < Li
b) Li < Be < C < O < F
c) F < O < C < Be < Li
d) F < O < Be < C < Li

57. Soaps are ester of which type of acids?

a) Formic acid
b) Fatty acid
c) Inorganic acid
d) Acetic acid

58. What happens when dilute Sulphuric acid is added to Zn granules?

a) Hydrogen gas and Zinc sulphate are produced.
b) Chlorine gas and Zinc hydroxide are produced.
c) No reaction takes place.
d) Zinc salt and water are produced.

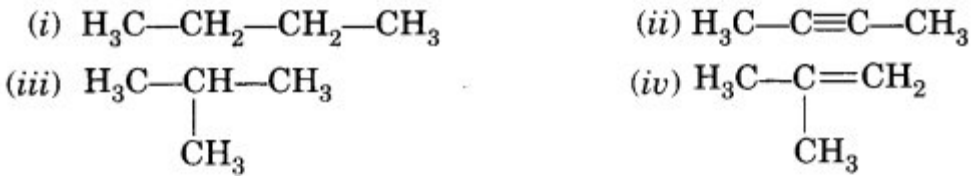
59. The amount of energy released when one or more electrons is added to the neutral atom is,

a) electron gain energy
b) ionisation energy
c) electronegativity
d) atomicity

60. Which one of the following elements exhibit maximum number of valence electrons?

a) Na
b) Al
c) Si
d) P

61. Which among the following are unsaturated hydrocarbons?

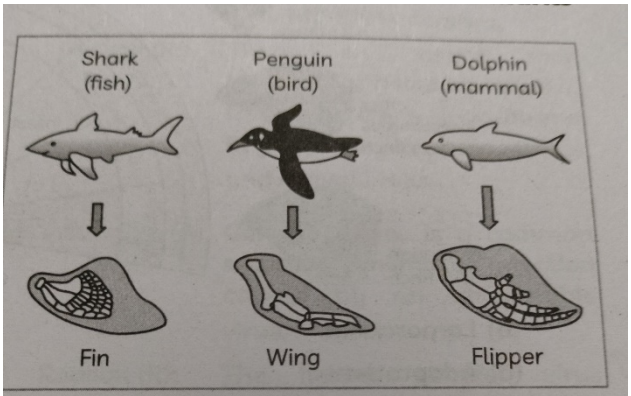


a) (i)and (iii)
b) (ii) and (iii)
c) (ii) and (iv)
d) (iii) and (iv)

62. Ethanoic acid is also known as which of these?

a) Citric acid
b) Nitric acid
c) Acetic acid
d) Formic acid

63. The following figure represents ------ structures and these are said to be the result of ------- evolution.



(a) Analogous; convergent
(b) Analogous; divergent
(c) Homologous; convergent
(d) Homologous; divergent 1

64. The main barrier that prevents the entry of microorganisms into our body is:

a. Antibodies

b. Macrophages

c. Monocytes

d. Skin

65. Self-pollination is fully assured in which of the following conditions?

a. The flower is bisexual.

b. The style is longer than the filament.

c. The flower is cleistogamous.

d. The time of anther and pistil maturity is different.

66. In human body, during respiration gaseous exchange takes place in:

a. Trachea and larynx

b. Alveoli of lungs

c. Alveoli and throat

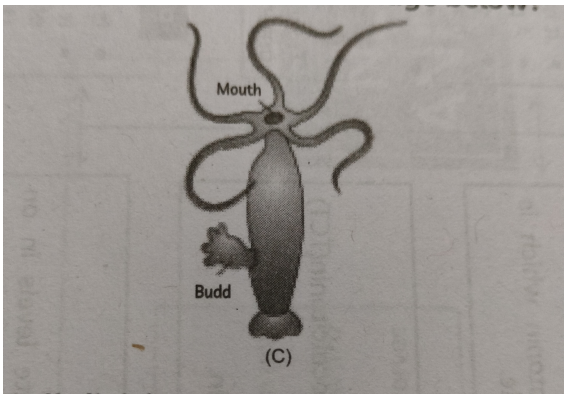
d. Throat and larynx

67. Blood from superior vena cava flows into:

a. Right ventricle. b. Left ventricle

c. Right atrium. d. Left atrium.

68. What is the common method of reproduction found in the organism given below?



a. Fragmentation. b. Cell division

c. Budding. d. Sexual reproduction

69. Identify the mode of reproduction in which parental identity is lost:

a. Budding b. Fission. c. Spore formation. d. Vegetative propagation.

70. A green stemmed rose plant denoted by GG and brown stemmed rose plant denoted by gg are allowed to undergo a cross with each other. What will be the percentage of brown stemmed plants in F_2 progeny if F_1 plants are self pollinated?

a. 50. b. 75. c. 100. d. 25.

Question no 7**1,72,73,74 and 5** are **assertion-reason based questions** in which a statement of Assertion (A) is followed by a statement of Reason(R). Choose the correct answer out of the following choices.

(a) Both A and R are true and R is correct explanation of A.

(b) Both A and R are true and R is not correct explanation of A

(c) A is true but R is false.

(d) A is false but R is true.

71. Assertion(A): All isotopes of a given element show the same type of chemical behaviour.

Reason(R): The chemical properties of an atom are controlled by the number of electrons in an atom.

72. Assertion(A): Nitrogen shows a valency of 3 and 5

    Reason(R): Nitrogen able to form maximum 5 covalent bonds.

73. Assertion(A): The value of 'g' is greater at the equator than at the pole.

    Reason (R): Radius is more at the equator than at the pole.

74. Assertion (A): A resistor of resistance 'R' is connected to an ideal battery. If the value of R is decreased, the power dissipated in the circuit will increase.

    Reason(R) : the power dissipated in the circuit is inversely proportional to the resistance of the circuit, when voltage remains constant.

75. Assertion (A): Two balls of different masses are thrown vertically upward with same speed. They will pass through their point of projection in the downward direction with same speed.

    Reason (R): The maximum height and downward velocity attained at the point of projection are independent of the mass of the ball.

CASE BASED QUESTION.

The use of blood in forensic analysis is a method for identifying individuals suspected of committing crimes. Karl Landsteiner in Germany in the early twentieth century showed that there are difference in blood between individuals. Humans have distinctly different blood groups like A, B, AB, O. Once doctors differentiated blood into distinct types, they could use that information for safety blood transfusion. Additionally, scientists use blood typing to determine paternity.

76. Select the universal donor blood group.

    a. O positive. b. AB positive. c. AB negative. d. O negative.

77. Which blood group has no antibodies in its plasma?

    a. A. b. AB. c. O. d. None of these.

78. Parents with AB and O blood group have the probability of AB blood group child:

    a. 25%. b. 50%. c. 0%. d. 75%

79. A pregnant woman with O negative blood group may have second child with which disease?

a. Anaemia. b. Jaundice. c. Pneumonia. d. Jaundice and anaemia

80. ABO blood grouping is based on which factor?

a. Two surface antigens on RBC.

b. Two surface antibodies on RBC.

c. Two surface antigens in plasma.

d. Two surface antibodies in plasma.

MENTAL ABILITY TEST

81. A boy walked 931m to the north, then he turns to his left and walks 31 m. After that, he moves 931m to his left and finally he turns to the right and moves 23 m. How far is he from the starting point?
A) 31m B)54m C)93m D)99m

82. The given options show four time instances. In which of these cases, the hour hand and minute hand will be closest to each other when this time is seen on a clock?
A) 4:00 B)10:00 C) 6:30 D)2:15

83. What is the missing number in the given series?
50,30,40,75,170, ?
A)360 B)450 C)320 D)295

84. In a certain code language " ACTIVATE" is coded as "BCUIWAUE". How is "CATALYST" coded in that language?

A) ADYMYUAT B)ADMYUATT

C)DAUAMYTT D)DUAAMYTT

85. In a row, Rohan is 10th from left and Mukesh is 13th from right and there are four persons in between Rohan and Mukesh, then the maximum and minimum number of persons in the row?
A)27,18 B)27,17 C)30,15 D)30,19

86. Kamal remembers that her brother Dinu's birthday falls after 20th May but before 28th May, while Garima remembers that Dinu's birthday falls before 22nd may but after 12th MAY. On what date Dinu's birthday falls?

A)22nd May B)21ST May C)Can't be determine D)None of these

87. If Thursday falls 2 days after tomorrow, then what day of the week was it in three days Before yesterday?

A)Monday B)Tuesday C)Wednesday D)Thursday

88. Select one of the following four option that will make the second pair analogous to the firs
pair given as:
KABADDI : 7 :: BASKETBALL : ?
A)5 B)6 C)8 D)9

89. A woman said to a man, "The daughter of your only sister is the sister of my husband". What
is the relation of man's sister to the woman?
A)Mother B)Mother-in-law C)Data inadequate d)None of these.

90. A list of meaningful words are given in the option. In which case ,the word formed has at
least a pair of consecutive alphabets?
A)CLEAR B)FORCE C)CRANE D)BLUSH

91. Satis read a book on Sunday.Sudha read that book one day prior to Anil but 4days after Satis.On which day did Anil read the book?

A)Friday B)Thursday C)Tuesday D)Saturday

Direction:(92-95) Solve the following analogy-

92. Pressure : Pascal :: Resistance : ---------- ?
A)Joule B)Watt C)Ohm D)Volt

93. Thailand : Baht :: Myanmar : ----------?
A)Peso B)Kyat C)Dinar D)Rial

94. Rabbit : Leap :: Duck : ----------?
A)Fly B)Swoop C)Flit D)Waddle

95. Cattle:Herd ::Fish : ----------?
A)Flock B)Colony C)Shoal D)Gang

Directions(Q96-100)

Study the following information carefully and answer the given questions.

Eight friends A, B, C, D, E, F, G, H are sitting around a circle facing the centre sits third to the left of F.E is an immediate neighbour of both B and H. Only one person sits between A and H.C and G are immediate neighbour of each other. Neither C nor G is an immediate neighbour of B. Only one person sits between C and D.

96. Who amongst the following is an immediate neighbour of both A and H?

A)F B)B C)G D)D

97. F is related to D, in the certain way based on the seating arrangement .C is related to E in the same way. To whom amongst the following is H related to ,following the same pattern?

A)C B)A C)F D)G

98. Which of the following represents the correct position of A?

A) second to the left of H

B) Immediate left of C

C)Exactly between F AND E

D) second to the right of E

99. What is the position of D w.r.t the position of G?

A)3rd to the left

B)2nd to the right

C) immediate right

D) fourth to the left

100. Which of the following is true w.r.t the given seating arrangement?

A) Only two people sit between D and B.

B) A is an immediate neighbour of B.

C) C sits third to the left of H.

D) None is true.

****

MATHEMATICS

1. If one root of the equation $4x^2 - 2x + (\lambda - 4) = 0$ be the reciprocal of the other , then $\lambda =$ _____.
   a)8 b) -8 c)4 d)-4

2. If the expression $px^3 + x^2 - 2x - q$ is divisible by $x - 1$ and $x + 1$, then the values of p and q are respectively .
   (a) 2,-1 (b) -2,1
   (c) -2 ,-1 (d) 2 ,1

3. If the difference in the roots of the equation $x^2 - px + q = 0$ is unity , then which one of them is correct?
   (a)$p^2 + 4q = 1$ (b)$p^2 - 4q = 1$
   (c) $p^2 + 4q = -1$(d) $p^2 - 4q = -1$

4. If the sum of p terms of an A.P. is q and the sum of q terms is p , then the sum of p+q terms will be ___.
   a) 0 b) p -q c) p+q d) –(p+q)

5. The sum of first n odd natural numbers is _____.
   a)2n - 1 b) 2n +1
   c) n^2 d) n^2 -1

6. What is the value of $sin^2 15^0 + sin^2 20^0 + sin^2 25^0 + \cdots + sin^2 75^0$.
   (a)$5\frac{1}{2}$ (b) $6\frac{1}{2}$
   (c) $7\frac{1}{2}$ (d) $8\frac{1}{2}$

7. If the ratio of corresponding sides of two similar triangles is 2:3, then the ratio of their corresponding altitude is :
   (a) 3:2 (b) 16:81
   (c) 4:9 (d) 2:3

8. If the radii of two concentric circles are 6cm and 10cm , then length of chord of the larger circle which is tangent to the other is:
   (a) 8cm (b) 10cm
   (c) 12cm (d)16 cm

9. Determine the ratio in which the line $2x + 3y - 30 = 0$ divides the join of A(3,4) and B(7,8) .
   (a) 2:3 (b)3:1
   (c) 3:2 (d) 1:3

10. The sum of the squares of two numbers is 685 and the difference between the squares of the same two numbers is 37 . Find the numbers .
    (a)17,18 (b)18 ,19
    (c)19, 20 (d)21,21

11. Age of Gokul is twice that of Sita. Before 5 years age of Gokul was 3 times that of Sita . What is the present age of Sita?
    (a)10 Yrs (b) 12 Yrs
    (c)15 Yrs (d)20 Yrs

12. One side of a triangular plot of land is 3 times the altitude drawn to that side. If the cost of watering the field at Rs 96 per hector is Rs 3600 then what is the length of the side and the altitude drawn on it?
    (a)1524m, 508m (b)1530m ,510m
    (c)1500m ,500m (d)1515m ,505m

13. A piece of wire , when bent to form the greatest circle, its diameter becomes 28cm. If the same piece of wire is bent to form the greatest possible square , what will be its area in sq.cm .
    (a)844 (b)484
    (c)488 (d)884

14. The value of : $\tan 15^0 . \tan 25^0 . \tan 60^0 . \tan 65^0 . \tan 75^0$ is
    (a)$\sqrt{3}$ (b)1 (c) $\frac{\sqrt{3}}{2}$ (d) $\frac{1}{\sqrt{3}}$

15. If 3 chairs and 1 table cost Rs800 and 5 chairs and 3 tables cost Rs 2000 then the cost of 4 chairs and 1 table is
    (a)Rs 900 (b)Rs 850
    (c)Rs 800 (d)Rs1000

16. If $a^x = b, b^y = c$ and $c^z = a$, then the value of $x^2y^2z^2$ is ...
    (a) $a^2b^2c^2$ (b) 1
    (c) 4 (d) $\frac{1}{a^2b^2c^2}$

17. If the roots of the equation $\alpha x^2 + \beta x + \gamma = 0$ are 1 and 2 , then one of the roots of the equation $\beta x^2 + \alpha x + \gamma = 0$ is
    (a)1 (b)0 (c)-2 (d)2

18. If the radius of a cylinder is decreased by 50% and height increased by 50% to form a new cylinder , then the volume will be decreased by :
(a)50% (b)55%
(c)62.5% (d)63%

19. If the volume and surface area of a sphere are numerically the same , then its radius is:
(a)4 (b)3 (c)2 (d)1

20. If the line segment joining (2,3) and (-1,2) is divided internally in the ratio 3:4 by the line x+2y=k, then the value of 'k' is
(a)$\frac{41}{7}$ (b)$\frac{36}{7}$ (c)$\frac{31}{7}$ (d)$\frac{5}{7}$

21. If the points (1,1) ,(-1,-1) and $(-\sqrt{3}, k)$ are the vertices of an equilateral triangle then the value of 'k' is
(a)1 (b)$\sqrt{3}$
(c) -1 (d)$-\sqrt{2}$

22. What is the solution of $3.5^{2x-1} - 2.5^{x-1} = 0.2$?
(a) x=5 (b)x=1
(c)x=-1 (d) x=0

23. If $a + b = 3, ab = 2$ and $a > b$, then what is the value of $2^{a^3-b^3}$?
(a)32 (b) 64
(c)128 (d)256

24. If $f(x) = \cos x + \sin x$, then what is the maximum value of f(x) ?
(a)1 (b)$\sqrt{2}$
(c)$\sqrt{3}$ (d)2

25. The ratio of the height of a pillar and its shadow cast on the ground during a day is $1:\sqrt{3}$. What is the elevation of the sun at that time?
(a)15^0 (b)30^0
(c) 45^0 (d)60^0

26. If A(-1,1) and B(3,-1) are the end points of one side AB of square ABCD ,then how many units will be the length of one of its diagonals?
(a)10 (b) $\sqrt{10}$
(c) 40 (d) $\sqrt{40}$

27. If the product of five consecutive integers is equal to one of them , then which greatest possible integer is likely to be contained in them?
(a)1 (b)4
(c)6 (d)10

28. How many integers occur between 10 and 200 which are divisible by 7 .
(a) 27 (b)25 (c)23 (d)21

29. What should be subtracted from each one of 21 ,38,55 and 106 so that the results of subtraction will be proportional ?
(a)4 (b)$4\frac{1}{2}$
(c) 6 (d) $6\frac{1}{2}$

30. The arithmetic mean and mode of a data are 24 and 12 respectively ,then its median is _____.
a) 25 b) 18 c) 20 d) 22

31. Mean of a certain number of observations is $\bar{x}$. If each observations is divided by m ($m \neq 0$) and increased by n, then the mean of new observation is _____.
a) $\frac{\bar{x}}{m} + n$ b) $\frac{\bar{x}}{n} + m$
c) $\bar{x} + \frac{n}{m}$ d) $\bar{x} + \frac{m}{n}$

32. $2(\sin^6\theta + \cos^6\theta) - 3(\sin^4\theta + \cos^4\theta)$ in equal to
a) 0 b) 1
c) -1 d) None of these

33. If $a\cos\theta - b\sin\theta = c$, then $a\sin\theta + b\cos\theta =$ _____.
a) $\pm\sqrt{a^2 + b^2 + c^2}$
b) $\pm\sqrt{a^2 + b^2 - c^2}$
c) $\pm\sqrt{c^2 - a^2 - b^2}$
d) None of these.

34. Two poles are 'a' metres apart and the height of one is double of the other .If from the middle point of the line joining their feet an observer finds the angular elevations of their tops to be complimentary, then the height of the smaller pole is_____.

a) $\sqrt{2}$ a metres b) $\frac{a}{2\sqrt{2}}$ metres

c) $\frac{a}{\sqrt{2}}$ metres d) 2a metres

35. In the formula $\bar{x} = a + h(\frac{1}{N}\sum f_i u_i)$, for finding the mean of grouped frequency distribution then u_i=_____.

a) $\frac{x_i+a}{h}$ b) $h(x_i - a)$

c) $\frac{x_i-a}{h}$ d) $\frac{a-x_i}{h}$

36. If 3 coins are tossed simultaneously, then the probability of getting at least two heads is _____.

a)$\frac{1}{4}$ b) $\frac{3}{8}$ c) $\frac{1}{2}$ d) $\frac{3}{4}$

37. A number is selected from first 50 natural numbers. The probability that it is a multiple of 3 or 5 is _____.

a) $\frac{13}{25}$ b) $\frac{21}{50}$ c) $\frac{12}{25}$ d) $\frac{23}{50}$

38. A number 'x' is chosen at random from the numbers -3, -2, -1, 0, 1, 2, 3. The probability that $|x| < 2$ is _____.

a) $\frac{5}{7}$ b) $\frac{2}{7}$ c) $\frac{3}{7}$ d) $\frac{1}{7}$

39. If $am \neq bl$, then the system of equations $ax + by = c$ and $lx + my = n$

a)has a unique solution

b) has no solution

c) has infinitely many solution

d) may or may not have a solution

40. If x =a , y = b is the solution of the systems of equations x - y = 2 and x + y = 4, then the values of a and b are respectively _____.

a) 3 & 1 b) 3 & 5

c) 5 & 3 d) -1 & -3

GENERAL SCIENCE

41. Commercial electric motors do not use

(a) an electromagnet to rotate the armature

(b) effectively large number of turns of conducting wire in the current carrying coil

(c) a permanent magnet to rotate the armature

(d) a soft iron core on which the coil is wound

42. A positively charged particle projected towards west is deflected towards north by a magnetic field then the direction of magnetic field is:

(a) Towards South

(b) Torwards East

(c) Downward

(d) Upward

43. Phenomenon of electromagnetic induction is:

(a) Process of charging a body

(b) Process of generating magnetic field due to a current passing through a coil

(c) Producing induced current in a coil due to relative motion between a magnet and the coil

(d) Process of rotating a coil of an electric motor

44. A ray of light travels from rarer to a dense medium. Which of the quantities does not change?

(a) Speed (b) Wavelength

(c) Frequency (d) Amplitude

45. When 10^{19} electrons are removed from a neutral metal plate the electric charge on it is

(a) -1.6 C (b)+1.6C

(c) 10^{+19} C (d)10^{-19}C

46. The amount of charge flowing in 2 min in a wire of resistance 10 Ω when a potential difference of 20 V is applied between its ends is

(a)120 C (b)240C

(c)20 C (d)4 C

47. The laws of reflection hold good for

(a) plane mirror only

(b) concave mirror only

(c) convex mirror only

(d) all mirrors irrespective of their shape

48. A child is standing in front of a magic mirror. She finds the image of her head bigger, the middle portion of her body of the same size and that of the

legs smaller. The following is the order of combinations for the magic mirror from the top.
(a) Plane, convex and concave
(b) Convex, concave and plane
(c) Concave, plane and convex
(d) Convex, plane and concave

49. An object is placed 40cm from a concave mirror of focal length 20cm. The image formed is
(a) real, inverted and same in size
(b) real, inverted and smaller in size
(c) Virtual, erect and larger in size
(d) virtual, erect and smaller in size

50. The absolute refractive index of a medium is 1.5 .Then what would be the velocity of light in this medium ?
(a) 2 x 10^8 m/s (b) 1.5 x 10^8 m/s
(c) 3.5 x 10^8 m/s(d) 2.5 x 10^8 m/s

51. Two lenses of power +4 and -6 dioptres are placed in contact with each other . The focal length of the combination will be :
(a) 0.5 meter (b) -0.1 meter
(c) -0.5 meter (d) 0.1 meter

52. Two electric bulbs with ratings (100 W ,250V) and (50 W, 250V) are connected in series across a 250 V source .Calculate the output power ,
(a) 150 W (b) 33.33 W
(c) 50 W (d) 250 W

53. A long straight wire carries 5A current . Find the magnetic field induction produced at a radial distance of 5 cm from its axis .(μ_0= 4π x 10^{-7} N/A^2)
(a) 0.1 x 10^{-4} Tesla
(b) 0.3 x 10^{-5} Tesla
(c) 0.2 x 10^{-4} Tesla
(d) 0.5x10^{-4} Tesla

54. In the electrolysis of molten $PbCl_2$
(a)Pb is deposited at cathode and oxygen gas liberated at anode
(b)Hydrogen is liberated at cathode and oxygen gas liberated at anode.
(c)Pb is deposited at cathode and chlorine gas liberated at anode
(d)Pb is deposited at cathode and hydrogen gas liberated at anode

55. Choose the correct option :
(a)$CuSO_4$ solution can be stored in a Zn container.
(b)$AgNO_3$ solution can be stored in a Cu container.
(c)$CuSO_4$ solution can be stored in a Fe container.
(d)$ZnSO_4$ solution can be stored in a Cu container.

56. Which one of the following will turn red litmus blue
a) Vinegar
b) Baking soda solution
c) Lemon juice
d) soft drinks

57. Oxidation number of F in OF_2 is
(a)-2 (b)+2
(c)-1 (d)+1

58. The alloy containing a non –metal is:
a)Brass b)Bronze
c)Steel d)White metal

59. Which of the following is an acid ?
a)NaOH b)NH_4NO_3
c)Mg$(OH)_2$ d)B$(OH)_3$

60. Which one of the following is functional group of acetone ?
a)Carboxylic acid b)Aldehyde
c)Ketone d)Alcohol

61. Which of the following has the formula KO_2?
a)Potassium suboxide
b)Potassium peroxide
c)Potassium superoxide
d)Kalium oxide

62. In order to prepare hard water from pure water which of the following salt may be added ?
a)$CaCl_2$ b) $MgCl_2$
c)) $MgSO_4$ d) All of these

63. Among the following which one is free from unsaturation ?
a)hexane b)hexane
c)hexyne d)benzene

64. The adsorption of hydrogen by platinum is known as :

a)Reduction b)Hydrogenation
c)Occlusion d)Dehydrogenation

65. Which of the following substance sublimes on heating ?
a)Sodium Chloride
b)Washing Soda
c)Ammonium Chloride
d)Caustic Potash

66. Which of the following is used to make parachute rope ?
a)Polyester b)Nylon
c)Rayon d)Acrylic

67. The chief function of a gene is-

a) To determine the character of a cell.
b) To regulate cellular respiration.
c) To assist in carbon assimilation
d) To synthesize proteins.

68. A typical genotypic monohybrid ratio is—
a) 9:3:3:1 b)3:1
c)1:2:1 d)9:7

69. A triploid structure (3n) is the –
a) Zygote
b) Pollen tube
c) Megaspore
d) Endosperm

70. Photosynthesis and respiration are—
a) Complementary processes
b) Reverse processes
c) Identical processes
d) Opposite processes

71. Ecology is the study of –
a) The physical structure of organisms.
b) The inter relationships of organisms and their surroundings.
c) The inheritance of characteristics among organisms.
d) The naming and classification of organisms.

72. Which of the following organ secretes a hormone when the blood sugar rises?
a)Liver b)Pancreas
c)salivary gland d)gastric gland

73. Which of the following organism has 4 chamberedheart?
a)Fish b) Frog
c)Crocodiles d)Snakes

74. In which organism cell division is the mode of reproduction?
a)Plasmodium b)Hydra
c)herbaceous plant d)penicillium

75. Which method of the following is a natural mode of contraception?
a)Barrier method
b)Surgical method
c)Withdrawl method
d)hormonalmethod

76. The cross used to ascertain whether the plant is homozygous or heterozygous is—
a) linkage cross
b) reciprocal cross
c) back cross
d) monohybrid cross.

77. Seeds are called products of sexual reproduction because they—
a) Give rise to new plants.
b) Are formed by fusion of gametes.
c) Are formed by fusion of pollen tubes.
d) Can survive for longer periods.

78. The flexibility in leaves is due to a tissue called
a) chlorenchyma b) parenchyma
c)sclerenchyma d) collenchymas

79. Genes regulate the expression of trait by making specific
a)Protein b)Polysaccharide
c)Lipids d)Nucleic acids

80. Salivation is controlled by one of the following part of brain:
a)Cerebral hemisphere
b) Medulla Oblongata
c) Cerebellum
d) Pons region

MENTAL ABILITY TEST

81. Elated is to despondent as enlightened is to
a. aware b.ignorant
c.miserable d.tolerant

82. Reptile is to lizard as flower is to

a) petal b) stem
c)daisy d) alligator

83. Which word does NOT belong with the others?
a)peninsula b)island
c)bay. d)cape

84. In a class of 90 ,where girls are twice that of boys ,Shridar ranked fourteenth from the top ,if there are 10 girls ahead of Shridar ,how many boys are after him in rank?
a)23 b)26 c)25 d)22

85. Raji is 5 ranks ahead of Raj in a class of 46 students.If Raj's rank is twelveth from the last, what is Raji's rank from the start**?**
a)29 b)31
c)28 d)30

86. Complete analogous pair:
Influenza : Virus : : Typhoid : ?
a)Bacillus b)Parasite
c)Protozoa d)Bacteria

87. Complete analogous pair:
Paw : Cat : : Hoof : ?
a)Horse b)Lion
c)Lamb d)Elephant

88. P, Q, R, S, T, U are having different toffees. P have more toffees than only S and T both but less than Q. R has more toffees than U but less than Q. Who among them have least number of toffees?
(a) R (b) S (c) T (d) Either (b) or (c)

89. Among P, Q, R, S, T and U; R is shorter than only P and U. S is shorter than T and Q. If each of them is of different heights, who among them will be the shortest?
(a) U (b) P (c) S (d) R

90. Adarsh is eleventh from the left end and Naveen is 20th from the right end in a row. If they interchange their positions, Adarsh becomes fifteenth from the left end. How many persons are there in the row?
(a) 36 (b) 35 (c) 33 (d) 34

91. A is 25th from the right end and B is 25th from the left end of a row . If they interchange their position then A becomes 25th from the left end . How many persons are sitting in the row?
(a) 51 (b) 50 (c) 49 (d) CND

92. Ram is 11th to the left of Shyam, who is 15th from the left end and Harsh is 20th from the right end of a row, then what is the position of Ram from the right end of the row?
(a) 51 (b) 50 (c) 49 (d) CND

Directions (93-95): Study the following information carefully and answer the given questions.

Amongst five friends, A, B, C, D, E, each got different marks in the examination. A scored more than B but less than C. C scored 65 marks. D scored less marks than only E. The one who scored the minimum marks scored 60 marks and the one who scored the highest, scored 80 marks.

93. Who scored the second highest marks?
(a) B b) E (c) D (d) C

94. Who is the most likely to have scored 62 marks?
(a) B (b) A (c) D (d) E

95. Who scored the lowest marks?
(a) B (b) E (c) D (d) none of these

Directions (96-100): Choose the correct alternative in the following questions:

96. Giant: Dwarf: :Genius: ?
(a) Wicked (b) Gentle
(c) Idiot (d) Tiny

97. Botany: Plants: : Entomology: ?
(a) Snakes (b) Insects
(c) Birds (d) Germs

98. Menu: Food: :Catalogue: ?
(a)Rack (b) Newspaper
(c) Library (d)Cotton

99. Pulp: Paper: :Hemp: ?
(a)Basket (b) Yarn
(c) Rope (d) Cotton

100. Mango: Fruit: : :Potato: ?
(a) Root (b) Fruit
(c) Stem (d) Flower

LRDAV

APTITUDE TEST FOR ADMISSION INTO +2 SCIENCE (2021-22)

ID NO. | | | | | | |

Time: 3 Hours

(9.30 am – 12.30 am)

SET **A**

Guidelines to the Candidates:

1. This Booklet contains printed 11 pages and 1 blank page for rough work. Any defect found should be brought to the notice of the invigilator immediately.
2. Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.
3. This test is of three hours duration.
4. There are four choices in every question as (a), (b), (c) and (d). Only one is correct. Each question carries 4 marks.
5. (i) The test consists of 100 multiple choice questions comprising Mathematics (40), Physics (13), Chemistry (13), Biology (14) and mental ability(20) carrying maximum of 400 marks.
   (ii) -1 will be awarded for each wrong answer/multiple answer.
   (iii)No mark will be awarded for any overwriting/scratching answer.
6. Each candidate must show his/her Admit Card to the invigilator whenever required.
7. No candidate shall leave his/her seat during examination.
8. Do not tear/remove any page of the Booklet.
9. Calculation, if any, may be done at the blank pages of this booklet provided at the end for rough work. No calculator is allowed.
10. After finishing the test, the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

FASCIMILE STAMP

MATHEMATICS

1. A village has a circular wall around it, and the wall has four gates pointing north, south, east and west. A tree stands outside the village ,16 m north of north gate, and it can be just seen appearing on the horizon from a point 48 m east of the south gate .The diameter (in meters)of the wall that surrounds the village is
   a) 24
   b) 44
   c) 48
   d) 22
2. Suppose a,b are integers and a+b is a root of $x^2 + ax + b = 0$.The maximum possible value of $b^2$is
   a) 81
   b) 111
   c) 123
   d) 41
3. In a triangle ABC ,right angled at A, the altitude through A and the internal bisector of angle A have lengths 3 and 4 respectively. The length of median through A is
   a) 22
   b) 21
   c) 41
   d) 24
4. From a square with sides of length 5, triangular pieces from the four corners are removed to form a regular octagon. The area removed to the nearest integer is
   a) 5
   b) 4
   c) 6
   d) 2
5. Let the rational number p/q be closest to but not equal to 22/7 among all rational numbers with denominator less than 100.The value of $p - 3q$ is
   a) 12
   b) 14
   c) 22
   d) 21
6. If three points (0,0) , (3 , $\sqrt{3}$) and (3,p) form an equilateral triangle , then p=
   (a) 2 (b) -4 (c) -3 (d) none of these
7. If P(2,4) , Q(0,3) , R(3,6) and S(5,y) are vertices of a parallelogram PQRS , then value of y is
   (a) 7 (b)5 (c) -7 (d) -8

8. In Δ ABC, XY II BC, cuts AB at X and AC at Y. If BY bisects $\angle XYC$, then
   (a) BC=CY (b) BC=BY (c) BC≠CY (d) BC≠BY
9. If $\cos\theta=\frac{2}{3}$, then $2\sec^2\theta + 2\tan^2\theta$ -7=
   (a) 1 (b)0 (c) 3 (d) 4
10. $9sec^2A - 9tan^2A =$
   (a) 1 (b)8 (c)9 (d)0
11. If perimeter of a semi-circular protractor is 108cm, then its diameter is
   (a) 36 cm (b)24cm (c)42cm (d)48cm
12. The area of incircle of an equilateral triangle of side 42cm is
   (a) $22\sqrt{3}cm^2$ (b) 213 cm^2 (c) 924 cm^2 (d) 462 cm^2
13. If perimeter of a circle is equal to that of a square, then ratio of their areas is
   (a) 22:7 (b) 14:11 (c)7:22 (d)11:14
14. Volumes of two spheres are in the ratio 64:27. The ratio of their surface areas is
   (a) 1:2 (b) 2:3 (c) 9:16 (d) 16:9
15. The probability of throwing a number greater than 2 with a fair dice is
   (a) $\frac{3}{5}$ (b) $\frac{2}{5}$ (c) $\frac{2}{3}$ (d) $\frac{1}{3}$
16. What is the probability that a leap year has 52 Mondays?
   (a) $\frac{5}{7}$ (b) $\frac{6}{7}$ (c) $\frac{2}{7}$ (d) $\frac{4}{7}$
17. If $\sin\theta+\cos\theta=\sqrt{2}$, then $\tan\theta+\cot\theta$ =
   (a) 1 (b) -1 (c) -2 (d) 2
18. The point on X-axis which is equidistant from the points (-1,0) and (5,0) is
   (a) (0,2) (b) (2,0) (c) (3,0) (d) (0,3)
19. The area of a triangle formed by the line $\frac{x}{a}+\frac{y}{b}=1$ with the coordinate axes is
   (a) ab (b) 2ab (c) $\frac{1}{2}$ab (d) $\frac{1}{4}$ab
20. If the difference of mode and median of a data is 24, then the difference of median and mean is
   (a) 12 (b) 24 (c) 8 (d)36
21. The mean of n observations is $\bar{x}$. If the first observation is increased by 1, second by 2, the third by 3, and so on, then the new mean is
   (a) $\bar{x}$+ (2n+1) (b) $\bar{x}$ + $\frac{n+1}{2}$ (c) $\bar{x}$ + (n+1) (d) $\bar{x}-\frac{n+1}{2}$
22. The sum of n terms of two A P 's are in the ratio 5n+4:9n+6. Then, the ratio of their 18th term is
   (a) $\frac{179}{321}$ (b)$\frac{178}{321}$ (c)$\frac{175}{321}$ (d)$\frac{176}{321}$
23. If two tangents inclined at an angle of 60^0, are drawn to a circle of radius 3cm, then length of each tangent is equal to
   (a) $\frac{3\sqrt{3}}{2}$ cm (b)6cm (c)3cm (d) $3\sqrt{3}$cm

24. The perpendicular bisector of the line segment joining the points A(1,5) and B(4,6) cuts the y-axis at

(a) (0,13) (b) (0,-13) (c) (0,12) (d) (13,0)

25. If the three sides of a triangle are a, $\sqrt{3}$a and $\sqrt{2}$a, then the measure of the angle opposite to the longest side is

(a) 45^0 (b) 30^0 (c) 60^0 (d) 90^0

26. The value of θ for $\cos^4\theta - \sin^4\theta = \frac{1}{2}$ ($0 < \theta < 90^0$) is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

27. The shadow of a tower standing on a level ground is x meters long when the sun's altitude is 30^0, while it is y metres long when the sun's altitude is 60^0. If the height of the tower is $45\frac{\sqrt{3}}{2}$ m then the value of x − y is

(a) 45m (b) $45\sqrt{3}$ m (c) $\frac{45}{\sqrt{3}}$ m (d) $45\frac{\sqrt{3}}{2}$ m

28. The ratio in which the line segment joining the points A(-12,2) and B(8,3) is divided by the y-axis is

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

29. Pair of linear equations

$7x - 3y = 4$

$3x + \frac{k}{7}y = 4$ is consistent only when

(a) k= 9 (b)k= - 9 (c) $k \neq -9$ (d) $k \neq 7$.

30. If α, β be the zeros of the quadratic polynomial $5x+2x^2 + 1$, then value of $\alpha + \beta + \alpha\beta$ is

(a) -2 (b)-1 (c)1 (d) none of these

31. The largest number which divides 70 and 125 , leaving remainders 5 and 8 respectively is

(a) 13 (b)65 (c)875 (d) 1750

32. If $\sin\theta - \cos\theta = 0$, then the value of $\sin^4\theta + \cos^4\theta$ is

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

33. The area of a circle is $220cm^2$. The area of a square inscribed in it is

(a) $49cm^2$ (b)$70cm^2$ (c)$140cm^2$ (d) $150cm^2$

34. The area of the largest triangle that can be inscribed in a semi-circle of radius r is

(a) 2r (b)r^2 (c) r (d) $\sqrt{r}$

35. A kite with sides x cm, x cm, y cm , and y cm is inscribed in a circle. The area of the kite is

(a) xy cm^2 (b) $\frac{1}{2}$xy cm^2 (c) 2xy cm^2 (d) x^2y^2 cm^2

36. If the point (1,1) is equidistant from the points (a+b, b-a) and (a-b, a+b), then

(a) a+b=0 (b) a+b=1 (c)a=b (d) b-a=1

37. A train is moving in a circular curve of radius 1500m at the rate of 66km per hour. Through what angle does it turn in 10 seconds?

(a) 10^0 (b) 15^0 (c)7^0 (d) 17^0

38. In a right triangle ABC , right angled at B, BC= 12cm and AB= 5cm. The radius of the circle inscribed in the triangle (in cm) is

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

39. A circle passes through the points A(2,-9) , B(5,-8) and C(2,1). The centre of the circle is

(a) (2,-4) (b) (-3,4) (c) (3, -16/3) (d) none of these

40. A card is drawn from a well shuffled pack of 52 cards. Find the probability that the card drawn is 5 of heart or of diamond.

(a)1/26 (b)7/26 (c) 1/52 (d) 7/52

GENERAL SCIENCE

41. Mendel's second law is the law of
    a. Segregation
    b. Dominance
    c. Independent Assortment
    d. Polygenic inheritance
42. If haemoglobin is replaced by haemocyanin, the blood will carry
    a. Less oxygen
    b. More oxygen
    c. No oxygen
    d. Same amount of oxygen
43. The intermediate host of Trypanosoma is
    a. Sand fly
    b. Fruit fly
    c. Mosquito
    d. Tsetse fly
44. Which type of connective tissue lacks fibres?
    a. Cartilage
    b. Bone
    c. Areolar tissue
    d. Blood
45. An individual having two identical factors of a character is called
    a. Heterozygote
    b. Homozygote
    c. Hybrid
    d. None of the above
46. Which among the following sexually transmitted disease is not caused by bacteria?
    a. Syphilis
    b. Gonorrhoea
    c. Warts
    d. Chlamydia

47. Which among the following cell organelle does not contain DNA?
    a. Mitochondria
    b. Lysosome
    c. Chloroplast
    d. Nucleus
48. Which among the following has specialised tissue for conduction of water?
    a. Thallophyta
    b. Bryophyta
    c. Pteridophyta
    d. Gymnosperms

    a. (i) and (ii) b. (ii) and (iii) c. (iii) and (iv) d. (i) and (iv)

49. Plant trap _____ % of energy provided by the sun.
    a. 10%
    b. 2%
    c. 50%
    d. 1%
50. The number of chromosomes in both parents and offspring of a particular species remains constant because:
    a. Chromosome get doubled after zygote formation
    b. Chromosome get doubled after gamete formation
    c. Chromosome get halved during gamete formation
    d. Chromosome get halved after gamete formation
51. Respiratory organ in case of Periplanta Americana is
    a. Skin
    b. Book lungs
    c. Trachea
    d. Gills
52. The first step of photosynthesis is
    a. Ionisation of water
    b. ATP synthesis
    c. Excitation of chlorophyll by light
    d. Production of assimilatory power
53. Which among of the following is exclusively marine?
    a. Porifera
    b. Echinodermata
    c. Mollusca
    d. Pisces
54. The breakdown of pyruvate into carbon dioxide, energy and water takes place in
    a. Mitochondria
    b. Cytoplasm
    c. Endoplasmic reticulum
    d. Ribosome

55. Malachite is an ore of which metal?
a. Iron b. Copper c. Mercury d. Zinc

56. Metals occur in the native state because of their:
a. High electro negativity c. Low reactivity
b. Low density d. All of these

57. The by-product in the manufacture of soap is:
a. Isoprene b. Glycerol c. Butene d. Ethylene glycol

58. The molecular formula of second member of homologous series of ketone is:
a. C_4H_8O b. C_3H_6O c. $C_6H_{12}O_6$ d. $C_5H_{10}O$

59. Identify the reducing agent in the following reactions:
$Pb_3O_4 + 8HCl \rightarrow 3PbCl_2 + Cl_2 + 4H_2O$
a. Pb_3O_4 b. HCl c. $PbCl_2$ d. Cl_2

60. Which of the following salts does not contain any water of crystallisation?
a. Blue vitriol c. Washing soda
b. Baking soda d. Gypsum

61. While cooking, if the bottom of the vessel is getting blackened on the outside, it means that:
a. The food is not cooked completely
b. The fuel is not burning completely
c. The fuel is wet
d. The fuel is burning completely.

62. Identify the functional group in the following compound: $Br\text{-}CH_2\text{-}CH_2\text{-}CHO$
a. Aldehyde c. Bromine
b. Alcohol d. Both bromine and aldehyde.

63. Identify the wrong sequence of the elements in a group:
a. Ca, Sr, Ba c. N, P, As
b. Cu, Au, Ag d. Cl, Br, I

64. When a zinc strip is dipped in the blue solution of copper sulphate for some time, the colour of the solution changes to:
a. Pink b. Green c. Colourless d. Remains blue

65. While preparing CO_2 in the laboratory, on which of the following substances HCl is poured?
a. Pieces of zinc c. Crystals of copper sulphate
b. Pieces of marble d. Ammonium chloride

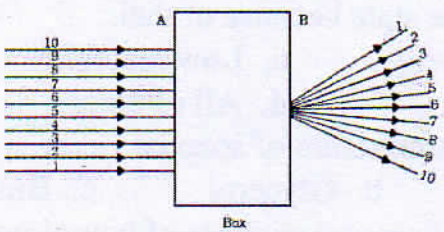
66. A compound X on strong heating in a boiling tube produces reddish brown fumes and a yellow residue. Further the compound X produces a white precipitate with NaOH solution. Identify X.
a. Copper nitrate c. Lead chloride
b. Lead nitrate d. Zinc sulphate

67. The no. of structural isomers of the compound having molecular formula C_4H_9Br is:
a. 3 b. 5 c. 4 d. 2

68. The laws of reflection hold good for-
a. plane mirror only
b. concave mirror only
c. convex mirror only
d. all mirrors irrespective of their shape

69. A beam of light is incident through the holes on side A and emerges out of the holes on the other face of the box as shown in the Figure. Which of the following could be inside the box?

a. Concave lens
b. Rectangular glass slab
c. Prism
d. Convex lens



70. A child is standing in front of a magic mirror. She finds the image of her head of the same size, the middle portion of her body is bigger and that of the legs smaller. The following is the order of combinations for the magic mirror from the top.

a. Plane, convex and concave
b. Convex, concave and plane
c. Concave, plane and convex
d. Plane, concave and convex

71. In an electrical circuit three incandescent bulbs A, B and C of rating40 W, 60 W and 100 W respectively are connected in parallel to an electric source. Which of the following is likely to happen regarding their brightness?

a. Brightness of all the bulbs will be the same
b. Brightness of bulb A will be the maximum
c. Brightness of bulb B will be more than that of A
d. Brightness of bulb C will be less than that of B

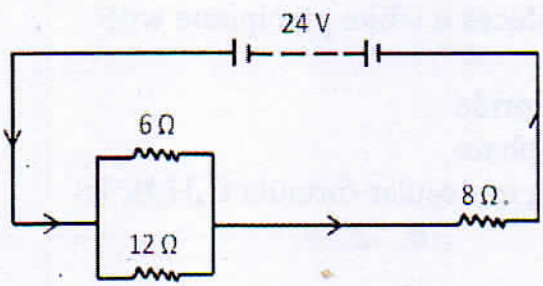
72. What is the minimum resistance which can be made using five resistors each of 5 Ω?

a. 1/5 Ω
b. 10 Ω
c. 5 Ω
d. 1 Ω

73. A charge of 1.6×10^{-3} C is moved between two points and 3.2 Joule of work is done. What is the potential difference between the two points?

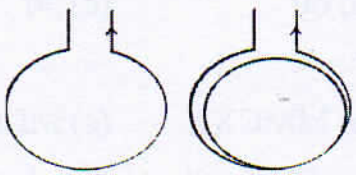
a. 2000V
b. 1500V
c. 1800V
d. 2200V

74. The amount of current flowing through the 6Ω resistor is-



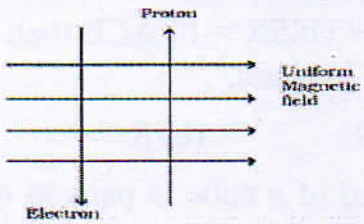
a. 5A
b. 1.65A
c. 1.3A
d. None of the above.

75. A certain length of wire carries a steady current. It is bent to form a circular coil of one turn. The same length is now bent more sharply to give a double loop of smaller radius, as shown in fig. The magnetic field at the centre caused by the same current is



a. a quarter of its first value
b. unaltered
c. four times its first value
d. one half its first value

76. A uniform magnetic field exists in the plane of paper pointing from left to right as shown in Figure. In the field an electron and a proton move as shown. The electron and the proton will experience



a. forces both pointing into the plane of paper
b. forces both pointing out of the plane of paper
c. forces pointing into the plane of paper and out of the plane of paper, respectively
d. force pointing opposite and along the direction of the uniform magnetic field respectively

77. A body has speed V, 2V and 3V in first 1/3 of distance S, seconds 1/3 of S and third 1/3 of S respectively. Its average speed will be

(a) V (b) 2V

(c) $\frac{18}{11}V$ (d) $\frac{11}{18}V$

78. Which of the following is a correct relation

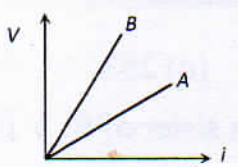
(a) ${}_a\mu_r = {}_a\mu_w \times {}_r\mu_\omega$ (b) ${}_a\mu_r \times {}_r\mu_w = {}_w\mu_a$

(c) ${}_a\mu_r \times {}_r\mu_a = 0$ (d) ${}_a\mu_r / {}_w\mu_r = {}_a\mu_w$

79. Suppose that the force of earth's gravity suddenly disappears, choose the correct answer out of the following statements

(a) The weight of the body will become zero but mass remains the same
(b) The mass of the body will become zero but the weight remains the same
(c) Both the mass and weight will be doubled
(d) Mass and weight will remain the same

80. V-i graphs for parallel and series combination of two identical resistors are as shown in figure. Which graph represents parallel combination



(a) A (b) B

(c) A and B both (d) Neither A nor B

MENTAL ABILITY TEST(MAT)

81.Find out the next number in the following series 6,20,36,48,50,__ ?

(a) 54 (b) 60 (c) 36 (d) 38

82.Find out the odd one

(a) MMXIV (b) MMCXX (c) MDCIV (d) MLVXC

83.If 9th August 2016 was Friday, then what day it was on 9th August 1616?

(a) Friday (b) Thursday (c) Sunday (d) Tuesday

84.If USA + USSR = PEACE then P+E+A+C+E = ? All the letters represent distinct non negative integers.

(a) 20 (b) 8 (c) 10 (d) 12

85.Each face of a cube is painted either Blue or Green. In how many different ways can the cube be painted?

(a) 8 (b) 10 (c) 9 (d) 6

86.By making at least how many cuts can a cube be cut into 210 smaller pieces without putting the pieces one above another?

(a) 15 (b) 18 (c) 12 (d) 13

87.If 1 Δ 2 = 6, 3 Δ 2 = 12 then 4 Δ 5 = ?

(a) 20 (b) 24 (c) 25 (d) 30

88.If BED = 33; DID = 34 then DEED = ?

(a) 18 (b) 36 (c) 54 (d) 72

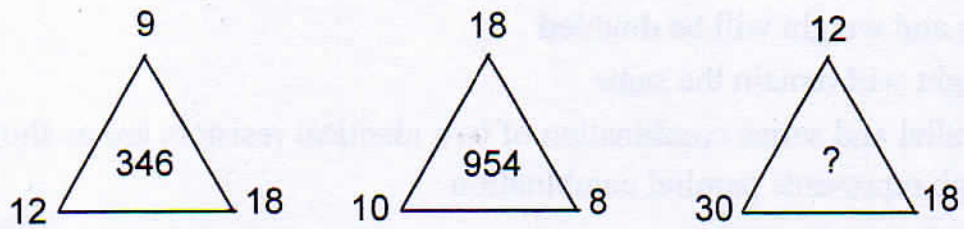
89.In a row of 30 children A is 15th from the left end and B is 20th from the right end. Then how many children in between them?

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

90.Joy's house is in west direction. He moves 12m then turns right and covers 5m, then turns left and covers 12m and again turns right and covers 5m to reach at the shop. Now in which direction and how far he will go to reach at the house?

(a) 34m, N – W (b) 34M, West (c) 26m, NW (d) 26M – SE

91.



(a) 523 (b) 325 (c) 564 (d) 253

92.T is daughter of Q. P is father of R. U is husband of Q. R is sister of S. V is father of U. Q is mother of R. How Q related to T?

(a) Father (b) Sister (c) Mother-in-law (d) Mother

93.If 24+35=28
15+42=24
84+57=48

Then 69+37=?

(a) 106 (b) 62 (c) 56 (d) 50

94.If B>D; E<A, E≥ B and D≤ C then which of the following is definitely true?

(a) A≥ B (b) B≤ C (c) D<A (d) E=C

95.Find out the conclusions which logically follows from the given statements disregarding commonly known facts.

Statements : Some doors are books.
Some books are papers.
No chair is door.

Conclusions : I) some chairs are not books

II) some books are not chairs

III) some doors are papers

(a) only I follow (b) only II follow
(c) both I and II follow (d) All follow

96.20 members of a group shake hands with one another once. How many handshakes will be there?

(a) 40 (b) 220 (c) 200 (d) 190

97.The remainder when 7^{10} is divided by 51 is

(a) 7 (b) 33 (c) 19 (d) 32

98. A printer number the pages of a book from 1 to 3189 digits in all. How many pages does the book have?

(a) 1075 (b) 1074 (c) 1073 (d) 1090

99.A clock which gains uniformly was 5mt slow at 8am, Sunday and 5mt 48 sec fast at 8pm, following Sunday. When the clock shows correct time?

(a) wed, 7:20pm (b) wed, 6pm (c) Thu, 7pm (d) Thu,5pm

100. The question has a main statement followed by four statements A,B,C,D. Choose the ordered pair of statements, where the first statement implies the second and the two statements are logically consistent with main statement.
You can not catch the fish unless it is summer.

(A) This is summer (B) You can catch fish
(C) This is not summer (D) You can't catch fish

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

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Space for Rough

LRDAV

APTITUDE TEST FOR ADMISSION INTO +2 SCIENCE (2022-23)

ID NO. | | | | | | | | | |

SET **A**

Time: 3 Hours

(2.00 pm – 5.00 pm)

Guidelines to the Candidates:

1. This Booklet contains printed 17 pages and 1 blank page for rough work. Any defect found should be brought to the notice of the invigilator immediately.
2. Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.
3. This test is of three hours duration.
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FASCIMILE STAMP

GENERAL SCIENCE

1. Match the following columns:

i.	Cytoskeleton	A. Hair-like outgrowth
ii.	Flagella	B. Proximal region of centriole
iii.	Hub	C. Bristle-like structures
iv.	Fimbriae	D. Filamentous protein structure

   a. i- C, ii – D, iii – A, iv - B
   b. i – D, ii – C, iii- B, iv – A
   c. i – D, ii – A, iii – B, iv – C
   d. i - D, ii – A, iii- C, iv – B

2. Pancreas produces
   a. Three digestive enzymes and hormone
   b. Three types of digestive enzymes and two hormones
   c. Two digestive enzymes and one hormone
   d. Three digestive enzymes and no hormone
3. Which enzymes are likely to act on the baked potatoes eaten by a man, starting from the mouth and as it moves down the alimentary canal?
   a. Pancreatic amylase →salivary amylase→ lipases → nucleases
   b. Disaccharides like maltase→ lipases → nucleases
   c. Salivary amylase→ pancreatic amylase →disaccharides
   d. Salivary maltase →carboxypeptidase→ trypsinogen
4. Which one of the following functions as a cytoplasmic framework for the cell?
   a. Golgi apparatus
   b. Endoplasmic reticulum
   c. Lysosomes
   d. Ribosomes
5. Which of the following depicts the correct pathway of transport of sperms?
   a. Rete testis→efferent ductules→epididymis →vas deferens
   b. Rete testis→ epididymis →efferent ductules →vas deferens
   c. Rete testis →vas deferens →efferent ductules → epididymis
   d. Efferent ductules →rete testis →vas deferens → epididymis
6. Which one of the following traits of garden pea studied by Mendel was a recessive feature?
   a. Axial flower position
   b. Green seed colour
   c. Green pod colour
   d. Violet flower colour

7. Syphilis is caused by _____ and transmitted by _____
    a. Virus, sexual contact
    b. Bacteria, handshakes
    c. Virus, physical contact
    d. Bacteria, sexual contact
8. A tall true breeding garden pea plant is crossed with a dwarf true breeding garden pea plant. When the F1 plants were selfed the resulting genotypes were in the ratio of:
    a. 3 : 1 : : Tall : Dwarf
    b. 3 : 1 : : Dwarf : Tall
    c. 1 : 2 : 1 : : Tall heterozygous : Tall homozygous : Dwarf
    d. 1 : 2 : 1 : : Tall homozygous : Tall heterozygous : Dwarf
9. Which of the following statements is not correct?
    a. Pollen germination and pollen tube growth are regulated by chemical components of pollen interacting with those of the pistil.
    b. Some reptiles have also been reported as pollinators in some plant species
    c. Pollen grains of many species can germinate on the stigma of the flower, but only one pollen tube of the same species grows into the style
    d. Insects that consume pollen or nectar without bringing about pollination are called pollen / nectar robbers
10. The first step for initiation of photosynthesis will be
    a. Photolysis of water
    b. Excitement of chlorophyll molecules due to absorption of light
    c. ATP formation
    d. Glucose formation
11. Which of the following is the most stable ecosystem?
    a. Mountain
    b. Ocean
    c. Forest
    d. Desert
12. If 20 J of energy is trapped at producer level, then how much energy will be available to peacock as food in the following chain?

    Plant →Mice →Snake →Peacock

    a. 0.02 J
    b. 0.002 J
    c. 0.2 J
    d. 0.0002 J

13. A satellite of the earth is revolving in a circular orbit with a uniform speed v. If the gravitational force suddenly disappears, the satellite will
    (a) Continue to move with velocity v along the original orbit
    (b) Move with a velocity v, tangentially to the original orbit
    (c) Fall down with increasing velocity
    (d) Ultimately come to rest somewhere on the original orbit

14. The value of 'g' at a particular point is $9.8\,m/s^2$. Suppose the earth suddenly shrinks uniformly to half its present size without losing any mass. The value of 'g' at the same point (assuming that the distance of the point from the centre of earth does not shrink) will now be

    (a) $4.9\,m/\sec^2$ (b) $3.1\,m/\sec^2$
    (c) $9.8\,m/\sec^2$ (d) $19.6\,m/\sec^2$

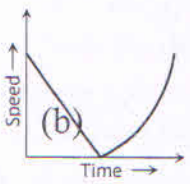
15. Two solids A and B float in water. It is observed that A floats with half its volume immersed and B floats with 2/3 of its volume immersed. Compare the densities of A and B

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

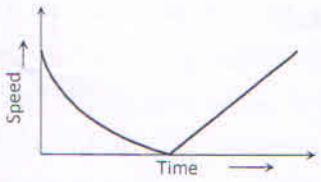
16. A car travels the first half of a distance between two places at a speed of 30 km/hr and the second half of the distance at 50 km/hr. The average speed of the car for the whole journey is
    (a) 42.5 km/hr (b) 40.0 km/hr
    (c) 37.5 km/hr (d) 35.0 km/hr

17. A ball is thrown vertically upwards. Which of the following plots represents the speed-time graph of the ball during its height if the air resistance is not ignored

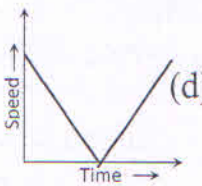
(a)



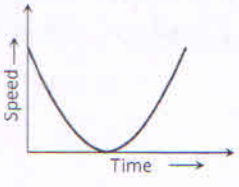
(b)



(c)



(d)



18. The resistivity of alloys $= R_{alloy}$; the resistivity of constituent metals R_{metal} . Then, usually

(a) $R_{alloy} = R_{metal}$

(b) $R_{alloy} < R_{metal}$

(c) There is no simple relation between R_{alloy} and R_{metal}

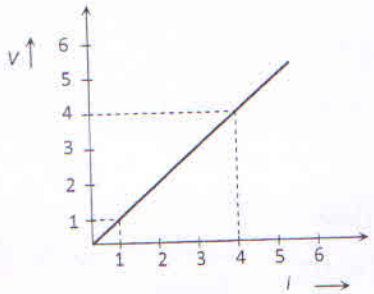
(d) $R_{alloy} > R_{metal}$

19. Masses of three wires of copper are in the ratio of 1 : 3 : 5 and their lengths are in the ratio of 5 : 3 : 1. The ratio of their electrical resistances are

(a) 1 : 3 : 5 (b) 5 : 3 : 1

(c) 1 : 15 : 125 (d) 125 : 15 : 1

20. Variation of current and voltage in a conductor has been shown in the diagram below. The resistance of the conductor is.



(a) 4 *ohm* (b) 2 *ohm*

(c) 3 *ohm* (d) 1 *ohm*

21. Field at the centre of a circular coil of radius r, through which a current I flows is

(a) Directly proportional to r

(b) Inversely proportional to I

(c) Directly proportional to I

(d) Directly proportional to I^2

22. The direction of magnetic lines of forces close to a straight conductor carrying current will be

(a) Along the length of the conductor

(b) Radially outward

(c) Circular in a plane perpendicular to the conductor

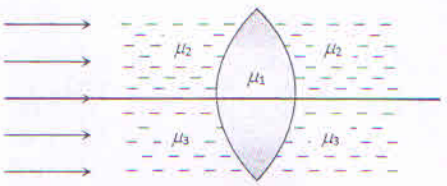
(d) Helical

23. In a current carrying long solenoid, the field produced does not depend upon(a)Number of turns per unit length
(b)Current flowing
(c)Radius of the solenoid
(d)All of the above three

24. A ray of light is incident normally on a plane mirror. The angle of reflection will be
(a) $0°$ (b) $90°$
(c)Will not be reflected (d) None of the above

25. A cut diamond sparkles because of its
(a) Hardness
(bHigh refractive index
(c)Emission of light by the diamond
(d) Absorption of light by the diamond

26. A double convex lens, lens made of a material of refractive index μ_1, is placed inside two liquids or refractive indices μ_2 and μ_3, as shown. $\mu_2 > \mu_1 > \mu_3$. A wide, parallel beam of light is incident on the lens from the left. The lens will give rise to



(a)A single convergent beam
(b)Two different convergent beams
(c)Two different divergent beams
(d)A convergent and a divergent beam

27. Which of the following is(are) exothermic process(es)?
i. Condensation of water vapour
ii. Dilution of sulphuric acid
iii. Sublimation of dry ice
iv. Evaporation of water
a. (i) and (iii) b. (ii) only c. (iii) and (iv) d. (i) and (ii)

28. Lead (II) oxide is heated with coke to produce lead and carbon dioxide. Which of the following statements are incorrect about the given reaction?
i. Lead is getting reduced.
ii. Carbon dioxide is getting oxidised.
iii. Carbon is getting oxidised.
iv. Lead oxide is getting reduced.

a. (i) and (iii)
b. (ii) and (iii)
c. (i) and (ii)
d. (iii) and iv)

29. Which of the following is not isoelectronic with O^{2-} ?
a. N^{3-} b. Na^{+} c. F^{-} d. Cl^{-}

30. The mass of a proton is:
a. 1.008 amu
b. 1.6×10^{-27} kg
c. 1.6×10^{-24} gm
d. All of these.

31. Substance P has the following properties:
i. Melts at $60^{0}C$
ii. Boils at $85^{0}C$
iii. Insoluble in water

Which method of separation would you use to obtain pure P from a mixture of P and water?

a. Paper chromatography
b. Fractional distillation
c. Crystallisation
d. Filtration

32. Malachite is an ore of which metal?
a. Iron b. Copper c. Mercury d. Zinc

33. The number of hydrogen atoms in 2,2-dimethyl propane is:
a. 12 b. 10 c. 14 d. 8

34. The atomic number of the element which can form an acidic oxide is:
a. 5 b. 16 c. 12 d. 19

35. Which of the following compounds contains an aldehydes group?
a. C_3H_8O b. $C_3H_6O_2$ c. C_3H_6O d. C_3H_7Cl

36. Which of the following is not correctly matched?
a. Emulsion – face cream
b. Foam – mist
c. Aerosol – smoke
d. Solid sol – gem stone

37. The total number of electrons present in 32g of methane gas is:
a. 6.022×10^{24}
b. 1.2044×10^{25}
c. 12.044×10^{23}
d. 60.22×10^{23}

38. The molecular formula P_2O_5 means that:

i. The ratio of the mass of P to the mass of O in the molecule is 2:5.
ii. The ratio of the mass of P to the mass of O in the molecule is 5:2.
iii. A molecule contains 2 atoms of P and 5 atoms of O.
iv. The ratio of the volume of P to the volume of O in the molecule is 2:5.

a. (i) and (iii)
b. (ii) and (iii)
c. (iii) and (iv)
d. (ii) and (iv)

39. Which of the following electronic configurations is wrong?

a. Li = 2,1
b. P = 2,8,5
c. S = 2,6,8
d. Mg = 2,8,2

40. Which of the following pairs of metals is extracted by means of electrolytic reduction of their molten salts?

a. Zn and Mg
b. Al and Fe
c. Mg and Mn
d. Al and Mg

MATHEMATICS

41. The mean of n observations is $\bar{x}$. If the first observation is increased by 1, second by 2, the third by 3, and so on, then the new mean is

(a) $\bar{x} + (2n+1)$ (b) $\bar{x} + \frac{n+1}{2}$ (c) $\bar{x} + (n+1)$ (d) $\bar{x} - \frac{n+1}{2}$

42. The sum of n terms of two A P 's are in the ratio 5n+9:9n+6. Then, the ratio of there 18th term is

(a) $\frac{179}{321}$ (b) $\frac{178}{321}$ (c) $\frac{175}{321}$ (d) $\frac{176}{321}$

43. If two tangents inclined at an angle of 60^0, are drawn to a circle of radius 3cm, then length of each tangent is equal to

(a) $\frac{3\sqrt{3}}{2}$ cm (b)6cm (c)3cm (d) $3\sqrt{3}$ cm

44. The perpendicular bisector of the line segment joining the points A(1,5) and B(4,6) cuts the y-axis at

(a) (0,13) (b) (0,-13) (c) (0,12) (d) (13,0)

45. If the three sides of a triangle are a, $\sqrt{3}$a and $\sqrt{2}$a, then the measure of the angle opposite to the longest side is

(a) 45^0 (b) 30^0 (c) 60^0 (d) 90^0

46. A fast train takes 2 hours less for a journey of 300km in comparison to a slow train whose speed is 5km/hr less than that of the fast train. The speed of the fast train is equal to

(a) 30km/hr (b) 25km/hr (c) 40km/hr (d) 45km/hr

47. The pair of linear equations $7x - 3y = 4$, $3x + \frac{k}{7}y = 4$ is consistent only when

(a) K= 9 (b)k= - 9 (c) k≠ −9 (d) $k \neq 7$.

48. If α, β be the zeros of the quadratic polynomial $5x+2x^2 + 1$, then value of $\alpha + \beta + \alpha\beta$ is

(a) −2 (b)−1 (c)1 (d) none of these

49. The largest number which divides 70 and 125, leaving remainders5 and 8 respectively is

(a) 13 (b)65 (c)875 (d) 1750

50. If $\sin\theta - cos\theta = 0, then\ the\ value\ of\ sin^4\ \theta + cos^4\theta$ is

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

51. The area of a circle is $220cm^2$. The area of a square inscribed in it is

(a) $49cm^2$ (b)$70cm^2$ (c)$140cm^2$ (d) $150cm^2$

52. The area of the largest triangle that can be inscribed in a semi-circle of radius r is

(a) 2r (b)r^2 (c) r (d) $\sqrt{r}$

53. If HCF of 65 and 117 is expressible in the form of 65m-117, then value of m is

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

54. If sum of the squares of the zeros of the polynomials $6x^2+x+k$ is $\frac{25}{36}$ Then value of k is

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

55. In an AP $t_{18} - t_{14} = 32$, then its common difference is

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

56. $\sin(45^0+A) - \cos(45^0 + A)$ is equal to

(a) 2cosA (b) 2sinA (c)0 (d) 1

57. The co-ordinates of the circumcentre of the triangle formed by the points O(0,0),P(x,0),Q(0,y) are

(a) (x,y) (b) $(\frac{x}{2}, \frac{y}{2})$ (c)$(\frac{x}{2}, \frac{y}{2})$ (d) (y,x)

58. A bag contains 5 red balls and some blue balls. If probability of drawing a blue ball from the bag is four times that of red ball, then
(a) number of blue balls in the bag is
(b) (a)18 (b)20 (c) 24 (d) 16

59. The abscissa of the point of intersection of less than type ogive and more than type ogive gives
(a) (a) mean (b) mode (c)median (d)none of these

60. Volumes of two spheres are in the ratio of 64:27, there surface area is
(a) (a) 3:4 (b)4:3 (c) 9:16 (d) 16:9

61. The HCF of two numbers is 21 and their sum is 105, then the LCM of the numbers
a) 189 or 147
b) 126 or 84
c) 84 or 145
d) 84 or 105

62. If the eight-digit number 2575d568 is divisible by 54 and 87, the value of the digit 'd' is
a) 4
b) 7
c) 0
d) 8

63. A test has 50 questions. A student scores 1 mark for a correct answer, $-\frac{1}{3}$ for a wrong answer and $-\frac{1}{6}$ for not attempting a question. If the net score of a student is 32, the number of questions answered wrongly by that student cannot be less than
a) 6
b) 12
c) 3
d) 9

64. The number of real solutions of $(x^2 - 7x + 11)^{x^2-11x+30} = 1$ is
a) 4
b) 5
c) 6
d) No solution

65. Out of a group of swans ,7/2 times the square root of the number of swans are playing on the shore of the tank. Remaining two are quarrelling in water. The total number of swans and the number of swans playing on the shore of the tank are

a) 14,16
b) 16,12
c) 14,12
d) 16,14

66. If $\frac{1}{p+q}, \frac{1}{q+r}, \frac{1}{r+p}$ are in A.P, then

a) p,q,rare in A.P
b) q^2, p^2, r^2 *are in A. P*
c) p^2, q^2, r^2 *are in A. P*
d) q,p,r are in A.P

67. If $9, a, b, -6$ are in arithmetic progression, then $a + b$ is

a) 1
b) 5
c) 15
d) 3

68. If $x + \frac{1}{x} = 3$, *then the value of* $x^6 + \frac{1}{x^6}$ *is*

a) 927
b) 114
c) 364
d) 322

69. For the equation $3x^2 + px + 3 = 0$, if one of the roots is the square of the other, then the value of p is

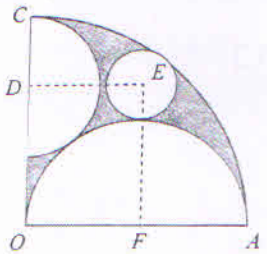
a) $-\frac{1}{3}$
b) -1
c) -6
d) $\frac{2}{3}$

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

a) The triangle is right-angled
b) The area of the triangle is 12.5 sq. unit
c) The points do not form a triangle
d) None of these

71. Point on x-axis which is equidistant from the points (0,0) and (2,0) is
    a) (0,1)
    b) (1,1)
    c) (1,0)
    d) (0,2)

72. In a quadrant of radius 6a, two semi-circles with centres D and F are cut out as shown in the figure. If a circle with centre E is cut out as shown in the figure, then area (in sq. units) of the remaining part of the quadrant is



    a) $\frac{5}{2}\pi a^2$
    b) $\frac{1}{2}\pi a^2$
    c) $\frac{3}{2}\pi a^2$
    d) πa^2

73. If circumference of the base of a cylinder is 132 cm and its height is 10 cm, the volume of the cylinder will be
    a) 13860 cm^3
    b) 36450 cm^3
    c) 36540 cm^3
    d) 34560 cm^3

74. A card is drawn at random from a pack of 52 cards. The probability of getting a red card or an ace is
    a) $\frac{1}{3}$
    b) $\frac{1}{2}$
    c) $\frac{15}{26}$
    d) $\frac{7}{13}$

75. If the arithmetic mean of 9 observations is 100 and that of 6 observations is 80,then the combine mean of all the 15 observations will be
    a) 100
    b) 80
    c) 90
    d) 92

76. The value of $\frac{sin^4\theta - cos^4\theta}{1-sin^2\theta}$ is

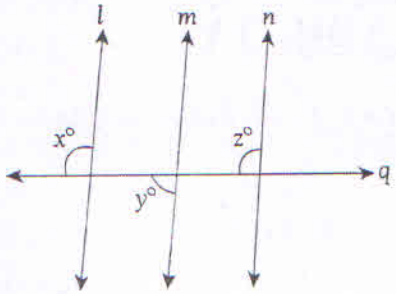
a) $1 - cot^2\theta$

b) $1 - tan^2\theta$

c) $tan^2\theta - 1$

d) $cot^2\theta - 1$

77. In the figure given below, if $l \parallel m \parallel n$ *and* $x = 125^\circ$,then the value of $(z^\circ - y^\circ)$ is



a) 70°

b) 80°

c) 85°

d) 180°

78. BD and CE are the bisectors of $\angle B$ *and* $\angle C$ of an isosceles triangle ABC with AB=AC. Which of the following is true?

a) BD=AC

b) BD=CE

c) $\angle B = \angle A$

d) $\angle C = \angle A$

79. The proportion of the angles of a quadrilateral is 2:5:7:4. What type of quadrilateral is it?

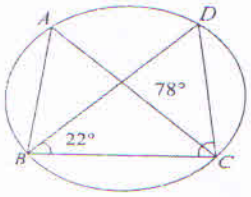
a) Parallelogram

b) Rhombus

c) Cyclic Quadrilateral

d) Trapezium

80. In the given figure, $\angle DBC = 22^\circ$ and $\angle DCB = 78^\circ$, then, $\angle BAC$ is equal to



a) 90°
b) 80°
c) 78°
d) 22°

MENTAL ABILITY

Directions (Q.81 to Q82) : Find the missing term(s) inthe following patterns.

81. 93, 155, 217, 279, ?
(a) 341
(b) 433
(c) 413
(d) 373

82. ZA, XC, UF, ?
(a) QJ (b) KP
(c) IR (d) LO

83. If the ratio of two quantities A and B is 6 : 9 anda mixture of these two are prepared, thenpercentage of A in the mixture is
(a) 32 1/3 %
(b) 40%
(c) 52 1/3 %
(d) 60%

84. If Nitin finds that he is twelfth from the right in a lineof boys and fourth from the left, how many boyshould be added to the line such that there are 28boys in the line?
(a) 12 (b) 13
(c) 14 (d) 20

(Q.85 to Q.89) : A solid cube of each side 12 cm, has been painted red, blue and black on pairs of opposite faces. It is then cut into cubical blocks of each side 2cm. On the basis of given information answer the following questions.

85. How many small cubes are painted on at least three surfaces?
(a) 8 (b) 48
(c) 16 (d) 24

86. How many small cubes are painted on exactly one surface?
(a) 48 (b) 120
(c) 64 (d) 9

87. How many small cubes are not painted on anysurface?
(a) 96 (b) 48
(c) 64 (d) 80

88. How many small cubes are painted on at least twosurfaces?
(a) 96 (b) 48
(c) 64 (d) 56

89. How many small cubes are painted on twosurfaces?
(a) 96 (b) 48
(c) 64 (d) 120

90. Veer wants to go to the University. He starts fromhis home which is in the East and comes to acrossing. The road to the left ends in a theatre,straight ahead is the hospital. In which direction isthe University?
(a) North (b) South
(c) East (d) West

91. Starting from a point P, Minal walked 20 meters towards South. He turned left and walked30 meters. He then turned left and walked20 meters. He again turned left and walked40 meters and reached a point Q. How far and inwhich direction is the point Q from the point P?
(a) 20 metresWest (b) 10 metres East
(c) 10 metres West (d) 10 metres North

92. Pointing to a photograph, a woman says, "Thisman's son's sister is my mother-in-law." How is thewoman's husband related to the man in thephotograph?
(a) Grandson (b) Son
(c) Son-in-law (d) Nephew

Directions (Q.93 to Q.95) : Read both the givenconclusions and then decide which of the givenconclusions logically follows from the given statements disregarding commonly known facts.

93. Statements: All Tall are Short. All the Short areThin.

Conclusions:Some Tall are Thin.No Thin is Short.

(a) Only conclusion (I) follows

(b) Only conclusion (II) follows

(c) Neither conclusion (I) nor (II) follows

(d) Both conclusions (I) and (II) are follow

94. Statements: Some Bats are Balls. No Ball isStamp.

Conclusions:No Ball is Bat.Some Bats are not Stamps.

(a) Only conclusion (I) follows

(b) Only conclusion (II) follows

(c) Neither conclusion (I) nor (II) follows

(d) Both conclusions (I) and (II) are follow

95. Statements: Some Soldiers are Terrorist. SomeTerrorist are Male.

Conclusions:No Soldier is male.Some Soldiers are male.

(a) Only conclusion (I) follows

(b) Only conclusion (II) follows

(c) Either conclusion (I) or (II) follows

(d) Both conclusions (I) and (II) are follow

96. At what time between 5 pm and 6 pm, hands ofthe clock are inclined at 45°?

(a) 19 1/11minutes past 5

(b) 10 10/11 minutes past 5

(c) 10 20/11 minutes past 5

(d) 15 minutes past 5

97. Which year will have the same calendar as 2019?

(a) 2023 (b) 2022

(c) 2028 (d) 2030

98. On 11th Nov. 1989, it was Saturday. What was the day of the week on 11th Nov, 2012?

(a) Thursday (b) Friday

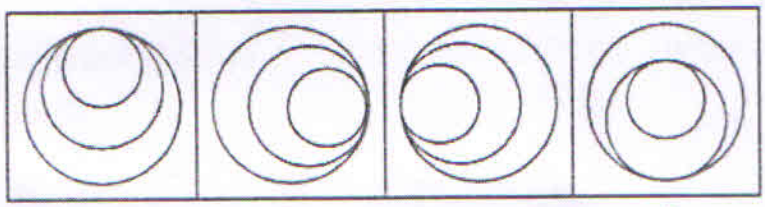
(c) Sunday (d) Wednesday

99. How many times do the hands of a clock are at right angle to each other in a day?

(a) 11 (b) 22

(c) 44 (d) 33

100. Find the odd one out.



a. b. c. d.

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Space for Rough Work

LR DAV APTITUDE TEST (2023)

Roll No. | | | | | | | | | |

Set (A)

Time : 3 Hours

Guidelines to the Candidates:

1. This Booklet contains printed 14 pages and 2 blank pages for rough work. Any defect found should be brought to the notice of the invigilator immediately.
2. Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.
3. This test is of three hours' duration.
4. There are four choices in every question as (a), (b), (c) and (d). Only one is correct. Each question carries 4 marks.
5. (i) The test consists of 100 multiple choice questions comprising Mathematics (40), General Science (40) and mental ability (20) carrying maximum of 400 marks.

   (ii) -1 will be awarded for each wrong answer/multiple answer.

   (iii)No mark will be awarded for any overwriting/'scratching answer.
6. Each candidate must show his/her Admit Card to the invigilator whenever required.
7. No candidate shall leave his/her seat during examination.
8. Do not tear or remove any page of the Booklet.
9. For rough work the blank page at the end of the question booklet may be used. No calculator is allowed.
10. After finishing the test, the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

MATHEMATICS

1. If one root of $(k-1)x^2+kx+1$ is -3 , then value of k is

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

2. The area of a triangle formed by the lines x=3 , y=4 and x=y is

(a) $\frac{1}{2}$ sq. unit (b) 1 sq. unit (c) 2 sq. units (d) none of these

3. If the equation $(a^2+b^2)x^2-2(ac+bd)x+c^2+d^2=0$ has equal roots , then

(a) ab=cd (b) ad=bc (c) $ad=\sqrt{bc}$ (d) $ab=\sqrt{cd}$

4. If sum of the roots of the equation $x^2-(k+6)x+2(2k-1)=0$ is equal to half of their product , then k=

(a) 6 (b)7 (c) 1 (d) 5

5. If sum of n terms of an A.P. is $3n^2+5n$, then which of its term is 164?

(a) 26th (b) 27th (c) 28th (d) none of these

6. If three points (0,0) , $(3 , \sqrt{3})$ and (3,p) form an equilateral triangle , then p=

(a) 2 (b) -4 (c) -3 (d) none of these

7. If P(2,4) , Q(0,3) , R(3,6) and S(5,y) are vertices of a parallelogram PQRS , then value of y is

(a) 7 (b)5 (c) -7 (d) -8

8. In Δ ABC, XY II BC, cuts AB at X and AC at Y. If BY bisects $\angle XYC$, then

(a) BC=CY (b) BC=BY (c) BC≠CY (d) BC≠BY

9. If Cos $\theta=\frac{2}{3}$, then $2Sec^2\theta+2\,tan^2\theta$ -7=

(a) 1 (b)0 (c) 3 (d) 4

10. $9Sec^2A-9Tan^2A=$

(a) 1 (b)8 (c)9 (d)0

11. If perimeter of a semi-circular protractor is 108cm, then its diameter is

(a) 36 cm (b)24cm (c)42cm (d)48cm

12. The area of incircle of an equilateral triangle of side 42cm is

(a) $22\sqrt{3}cm^2$ (b) 213 cm^2 (c) 924 cm^2 (d) 462 cm^2

13. If perimeter of a circle is equal to that of a square, then ratio of their areas is

(a) 22:7 (b) 14:11 (c)7:22 (d)11:14

14. Volumes of two spheres are in the ratio 64:27. The ratio of their surface areas is

(a) 1:2 (b) 2:3 (c) 9:16 (d) 16:9

15. The probability of throwing a number greater than 2 with a fair dice is

(a) $\frac{3}{5}$ (b) $\frac{2}{5}$ (c) $\frac{2}{3}$ (d) $\frac{1}{3}$

16. What is the probability that a leap year has 52 Mondays?

(a) $\frac{5}{7}$ (b) $\frac{6}{7}$ (c) $\frac{2}{7}$ (d) $\frac{4}{7}$

17. If $\sin\theta+\cos\theta=\sqrt{2}$, then $\tan\theta+\cot\theta$ =

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

18. The point on X-axis which is equidistant from the points (-1,0) and (5,0) is

(a) (0,2) (b) (2,0) (c) (3,0) (d) (0,3)

19. The area of a triangle formed by the line $\frac{x}{a}+\frac{y}{b}=1$ with the coordinate axes is

(a) ab (b) 2ab (c) $\frac{1}{2}$ab (d) $\frac{1}{4}$ab

20. If two tangents are inclined at an angle of 60° are drawn to a circle of radius 3cm , then length of each tangent is

(a) $\frac{3\sqrt{3}}{2}$ cm (b) 6cm (c) 3cm (d)$\sqrt{3}$

21. The mean of n observations is $\bar{x}$. If the first observation is increased by 1, second by 2, the third by 3, and so on, then the new mean is

(a) $\bar{x}$+ (2n+1) (b) $\bar{x}+\frac{n+1}{2}$ (c) $\bar{x}$+ (n+1) (d) $\bar{x}-\frac{n+1}{2}$

22. The sum of n terms of two AP' s arein the ratio 5n+9:9n+6. Then, the ratio of their 18th term is

(a) $\frac{179}{321}$ (b)$\frac{178}{321}$ (c)$\frac{175}{321}$ (d)$\frac{176}{321}$

23. If two tangents inclined atan angleof 60^0, are drawn to a circle of radius 3cm, then length of each tangent is equal to

(a) $\frac{3\sqrt{3}}{2}$ cm (b)6cm (c)3cm (d) $3\sqrt{3}$ c

24. The perpendicular bisector of the line segment joining the pointsA (1,5) and B (4,6) cuts the y- axis at

(a) (0,13) (b) (0, -13) (c) (0,12) (d) (13,0)

25. If the three sides of a triangle are a,$\sqrt{3}$a and $\sqrt{2}$a, then the measure of the angle opposite to the longest side is

(a) 45^0 (b) 30^0 (c) 60^0(d)90^0

26. The value of θ for $\cos^4\theta-\sin^4\theta=\frac{1}{2}$ ($0<\theta<90^0$) is

(a) $\frac{\pi}{2}$ (b) $\frac{\pi}{3}$ (c) $\frac{\pi}{4}$ (d) $\frac{\pi}{6}$

27. The shadow of a tower standing on a level ground is x meters long when the sun's altitude is 30^0, while it is y metres long when the sun's altitude is 60^0. If the height of the tower is $45\frac{\sqrt{3}}{2}$ m, then the value of $x - y$ is

(a) 45m (b) $45\sqrt{3}$ m (c) $\frac{45}{\sqrt{3}}$ m (d) $45\frac{\sqrt{3}}{2}$ m

28. The ratio in which the line segment joining the points A(-12,2) and B(8,3) is divided by the y-axis is

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

29. The pair of linear equations $7x - 3y = 4$ and $3x + \frac{k}{7}y = 4$ is consistent only when

(a) K= 9 (b) k= - 9 (c) $k \neq -9$ (d) $k \neq 7$.

30. If α, β be the zeros of the quadratic polynomial $5x+2x^2 + 1$, then value of $\alpha + \beta + \alpha\beta$ is

(a) -2 (b) -1 (c) 1 (d) none of these

DIRECTIONS:

In the question number 31 to 35, a statement of **assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

31. **Assertion (A)** : Common difference of the AP having sum of n terms as $an^2 + bn$ is 2a.

Reason (R) : If sum of n terms of an AP is denoted by S_n, then its nth term is $S_n - S_{n-1}$.

32. **Assertion (A)**: $\sqrt{2} + \sqrt{3}$ is an irrational number.

Reason (R): Sum of two irrational numbers is irrational.

33. **Assertion (A)**: A die is thrown once. Then the probability of getting a number greater than 6 is 1.

Reason (R) : Probability of an impossible event = 0.

34. **Assertion (A):** A parallelogram circumscribing a circle is a rhombus.

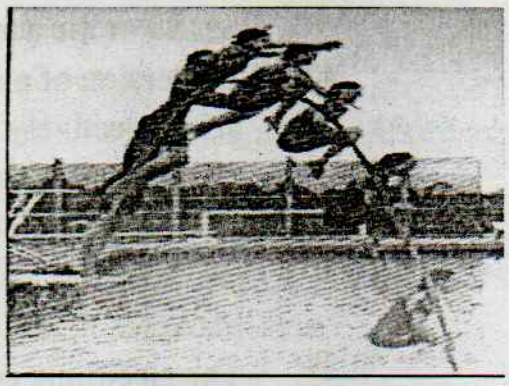
Reason (R) : If two tangents are drawn to a circle from an external point, then they subtend equal angles at the centre.

35. **Assertion (A):** If the median and mode of a distribution are 21.2 and 21.4 respectively, then its mean is 21.1.

Reason (R) : Mean , median and mode are related by the relation mode = 2median − 3 mean.

CASE BASED QUESTION

The Figure given alongside shows the path of a diver, when she takes a jump from the diving board. Clearly it is a parabola.



Annie was standing on a diving board, 48 feet above the water level. She took a dive into the pool. Her height (in feet) above the water level at anytime 't' in seconds is given by the polynomial h(t) such that

$h(t) = -16t^2 + 8t + k.$

36. What is the value of k ?

(a) 0 (b) - 48 (c) 48 (d) 48/-16

37. At what time will she touch the water in the pool?

(a) 30 seconds (b) 2 seconds (c) 1.5 seconds (d) 0.5 seconds

38. Rita's height (in feet) above the water level is givenby another polynomial P(t) with zeroes -1 and 2. Then p(t) is given by -

(a) $t^2 + t - 2$

(b) $t^2 + 2t - 1$

(c) $24t^2 - 24t + 48$

(d) $-24t^2 + 24t + 48$

39. A polynomial q(t) with sum of zeroes as 1 and the product as -6 is modelling Anu's height in feet above the water at any time t (in seconds). Then q(t) is given by

(a) $t^2 + t + 6$

(b) $t^2 + t - 6$

(c) $-8t^2 + 8t + 48$

(d) $8t^2 - 8t + 48$

40. The zeroes of the polynomial $r(t) = -12t^2 + (k-3)t + 48$ are negative of each other. Then k is

(a) 3 (b) 0 (c) -1.5 (d) -3

GENERAL SCIENCE

41. Which one will help to accelerate the process of evaporation of a liquid kept in an open china dish?
(a) Keeping the dish in open
(b) Blowing air into the liquid
(c) Keeping the dish under a running fan
(d) All of the above

42. Dispersion of a solid in a liquid, a liquid in a gas and a liquid in a liquid are respectively known as:
(a) Aerosol, emulsion, sol
(b) Sol, aerosol, emulsion
(c) Emulsion, sol, aerosol
(d) Aerosol, sol, emulsion

43. The electronic configuration of Cl^- is:
(a) 2, 8, 7
(b) 2, 8, 8
(c) 2, 8, 6
(d) 2, 8, 8, 1

44. Which of the following has the highest no. of atoms?
(a) 100 g of Na
(b) 100 g of Al
(c) 100 g of C
(d) 100 g of O

45. Select the one that when used would be considered as best condition for liquification of a gas.
(a) Increase the temperature
(b) Decrease the pressure
(c) Increase the pressure and decrease the temperature
(d) Decrease the pressure and increase the temperature.

46. Identify the reducing agent in the following reactions:
$Pb_3O_4 + 8HCl \rightarrow 3PbCl_2 + Cl_2 + 4H_2O$
(a) Pb_3O_4
(b) HCl
(c) $PbCl_2$
(d) Cl_2

47. Which of the following salts does not contain any water of crystallisation?
(a) Blue vitriol
(b) Washing soda
(c) Baking soda
(d) Gypsum

48. While cooking, if the bottom of the vessel is getting blackened on the outside, it means that:
(a) The food is not cooked completely
(b) The fuel is not burning completely
(c) The fuel is wet
(d) The fuel is burning completely.

49. Identify the functional group in the following compound: $Br\text{-}CH_2\text{-}CH_2\text{-}CHO$
(a) Aldehyde
(b) Alcohol
(c) Bromine
(d) Both bromine and aldehyde.

50. Identify the wrong sequence of the elements in a group:
(a) Ca, Sr, Ba
(b) Cu, Au, Ag
(c) N, P, As
(d) Cl, Br, I

51. When a zinc strip is dipped in the blue solution of copper sulphate for some time, the colour of the solution changes to:
(a) Pink
(b) Green
(c) Colourless
(d) Remains blue

52. While preparing CO_2 in the laboratory, on which of the following substances HCl is poured?
(a) Pieces of zinc
(b) Pieces of marble
(c) Crystals of copper sulphate
(d) Ammonium chloride

53. Crypts of Lieberkühn are present in
(a) pancreas and secrete pancreatic juice
(b) stomach and secrete dilute HCl
(c) small intestine and secrete digestive enzymes
(d) stomach and secrete trypsin

54. Which one of the following pairs matches a hormone with a disease resulting from its deficiency?
(a) Relaxin- gigantism
(b) Prolactin- cretinism
(c) Parathyroid hormone- tetany
(d) Insulin-diabetes insipidus

55. Prokaryotic genome consists of
(a) DNA with histones
(b) DNA without histones
(c) DNA or histones
(d) Histones only

56. The major component of the cell wall in bacterial prokaryotes is a polymer named
(a) Cellulose
(b) Chitin
(c) Xylan
(d) Peptidoglycan

57. Afferent nerve fibre carries impulses from
(a) Effector to central nervous system
(b) Receptors to central nervous system
(c) central nervous system to muscles
(d) central nervous system to receptors

58. Lining of intestine in man is
(a) Ciliated
(b) Keratinized
(c) Brush bordered
(d) Nonkeratinized

59. Pectin of cell wall is
(a) excretory product
(b) waste product
(c) secretory product
(d) all of these

60. A phylum that includes exclusively marine animals is

(a) Porifera

(b) Coelenterata

(c) Protozoa

(d) Echinodermata

61. A Mendelian experiment consisted of breeding tall pea plants bearing violet flowers with short pea plants bearing white flowers. The progeny of all bore violet flowers but almost half of them were short. This suggests that the genetic make-up of the tall parent can be depicted as

(a) TTVV

(b) TTvv

(c) TtVV

(d) TtVv

62. Which of the following option shows the transport of oxygen to the cell correctly?

(a) Lungs- pulmonary vein – right atrium – right ventricle – aorta – body cells

(b) Lungs- pulmonary vein – left atrium – left ventricle – aorta – body cells

(c) Lungs- pulmonary artery– left atrium – left ventricle – vena cava – body cells

(d) Lungs- pulmonary artery– right atrium – right ventricle – vena cava – body cells

63. A body of mass m is moving in a circle of radius r with a constant speed v. The force on the body is $\frac{mv^2}{r}$ and is directed towards the centre. What is the work done by this force in moving the body over half the circumference of the circle

(a) $\frac{mv^2}{\pi r^2}$ (b) Zero

(c) $\frac{mv^2}{r^2}$ (d) $\frac{\pi r^2}{mv^2}$

64. If the unit of force and length each be increased by four times, then the unit of energy is increased by

(a) 16 times (b) 8 times

(c) 2 times (d) 4 times

65. A man pushes a wall and fails to displace it. He does

(a) Negative work

(b) Positive but not maximum work

(c) No work at all

(d) Maximum work

66. The same retarding force is applied to stop a train. The train stops after 80 m. If the speed is doubled, then the distance will be

(a) The same (b) Doubled

(c) Halved (d) Four times

67. Two identical solid copper spheres of radius R placed in contact with each other. The gravitational attraction between them is proportional to

(a) R^2 (b) R^{-2}

(c) R^4 (d) R^{-4}

68. If the earth rotates faster than its present speed, the weight of an object will

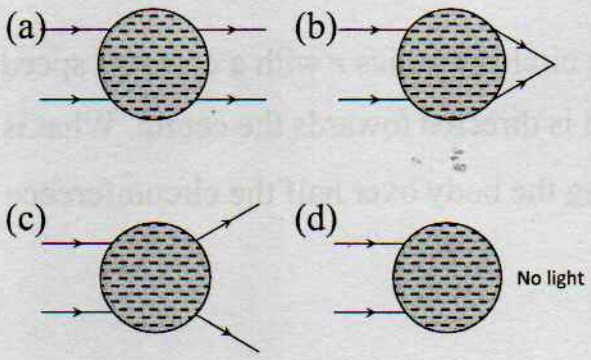
(a) Increase at the equator but remain unchanged at the poles

(b) Decrease at the equator but remain unchanged at the poles

(c) Remain unchanged at the equator but decrease at the poles

(d) Remain unchanged at the equator but increase at the poles

69. A water drop in air refracts the light ray as



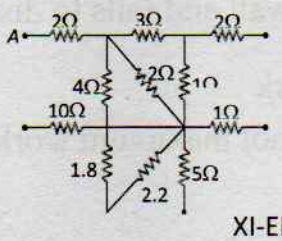
70. A thin rod of 5 cm length is kept along the axis of a concave mirror of 10 cm focal length such that its image is real and magnified and one end touches the rod. Its magnification will be

(a) 1 (b) 2

(c) 3 (d) 4

71. What is the equivalent resistance between the points A and B of the network

(a) $\frac{57}{7}\Omega$



(b) $8\ \Omega$

(c) $6\ \Omega$

(d) $\frac{57}{5}\Omega$

DIRECTIONS:

In the question number 72 to 76, a statement of **Assertion (A)** is followed by a statement of **Reason (R)**. Choose the correct option

(a) Both assertion (A) and reason (R) are true and reason (R) is the correct explanation of assertion (A)

(b) Both assertion (A) and reason (R) are true and reason (R) is not the correct explanation of assertion (A)

(c) Assertion (A) is true but reason (R) is false.

(d) Assertion (A) is false but reason (R) is true.

72. **Assertion(A)** : Stimulus is interpreted by the brain and not by the sense organs.

Reason(R) : Sense organs act as transducers, transforming the stimulus energy into impulse energy.

73. **Assertion(A)**: Electronegativity of Fluorine is greater than that of oxygen.

Reason(R): The electronegativity of the elements increases along a period since metallic character increases.

74. **Assertion (A)** : A person working on a horizontal road with a load on his head does no work

Reason (R) : No work is said to be done, if directions of force and displacement of load are perpendicular to each other.

75. **Assertion (A):**The work done during a round trip is always zero.

Reason (R):No force is required to move a body in its round trip.

76. **Assertion (A)**: Critical angle of light passing from glass to air is minimum for violet colour.

Reason (R) :The wavelength of blue light is greater than the light of other colours.

CASE BASED QUESTION

Human digestive system consists of main organs buccal cavity, oesophagus, stomach, small intestine and large intestine leading into rectum and anus. Salivary glands, liver, pancreas act as accessory organs. Various others glands like crypts of Lieberkühn, Bruner's glands also play an important role. Enzymes secreted from various glands helps in the

process of digestion. Intestinal juice contains enterokinase also called as activator enzyme.

77. In which of the following, proteins are absent?
    (a) pancreatic juice
    (b) saliva
    (c) bile
    (d) intestinal juice
78. During prolonged fasting the sequence of organic compounds used by body is
    (a) carbohydrates, fats, proteins
    (b) fats, carbohydrates, proteins
    (c) carbohydrates, proteins, lipids
    (d) protein, lipids, carbohydrates
79. Brunner's glands are found in
    (a) stomach
    (b) ileum
    (c) colon
    (d) duodenum
80. Pepsin acts in
    (a) basic medium
    (b) acidic medium
    (c) neutral medium
    (d) all types of media

Mental Ability

81. Kamal remembers that her brother Dinu's birthday falls after 20th May but before 28th May,while Garima remembers that Dinu's birthday falls before 22nd may but after 12th MAY on what date Dinu's birthday falls?

    a)22nd May b)21ST May c)Can't be determine d)None of these

82. What is the missing number in the given series?
    50,30,40,75,170, ?
    a)360 b)450 c)320 d)295
83. In a certain code language " ACTIVATE" is coded as "BCUIWAUE". How is "CATALYST" coded in that language?

    a) ADYMYUAT b)ADMYUATT c)DAUAMYTT d)DUAAMYTT

84. The given options show four time instances. In which of these cases, the hour hand and minute hand will be closest to each other when this time is seen on a clock?

    a) 4:00 b)10:00 c) 6:30 d)2:15

85. A boy walked 931m to the north, then he turns to his left and walks 31 m. After that, he moves 931m to his left and finally he turns to the right and moves 23 m. How far is he from the starting point?

a)31m b)54m c)93m d)99m

86. If L stands for +, M stands for -, N stands for ×, P stands for ÷, then What is the value of 14N10L42P2M8 ?

a)150 b)143 c)153 d)160

87. Select one of the following four option that will make the second pair analogous to the first pair given as:

KABADDI : 7 :: BASKETBALL : ?

a)5 b)6 c)8 d)9

88. Find out the conclusions which logically follows from the given statements disregarding commonly known facts.

statements: some dogs are cats
All cats are pigs.

Conclusions: I) some cats are dogs.
II) some dogs are pigs.

a) only conclusion I follows
b) only conclusion II follows
c) either conclusion I OR II follows
d) both conclusion I and II follows.

89. Find out the conclusions which logically follows from the given statements disregarding commonly known facts.

Statements: All stones are water.
Some water are clean.

Conclusions:I) some water are stones.
II) all clean are water.

a) only conclusion I follows
b) only conclusion II follows
c) either conclusion I OR II follows
d) both conclusion I and II follows.

90. A list of meaningful words are given in the option. In which case ,the word formed has atleast a pair of consecutive alphabets?

a) CLEAR b)FORCE c)CRANE d) BLUSH

91. A woman said to a man, "The daughter of your only sister is the sister of my husband".What is the relation of man's sister to the woman?

a)Mother b)Mother-in-law c)Data inadequate d)None of these.

92. If Thurseday falls 2 days after tomorrow, then what day of the week was it in three days before yesterday?
a)Monday b)Tuesday c)Wednesday d)Thursday

93. Thailand : Baht :: Myanmar : ----------?
a)Peso b)Kyat c)Dinar d)Rial

94. Rabbit : Leap :: Duck : ----------?
a)Fly b)Swoop c)Flit d)Waddle

95. Mohan and Sujit are ranked seventh and eleventh respectively from the top in a class of 31 students. What will be their respective ranks from the bottom in the class ?
a) 20th and 24th b) 24th and 20th
c) 25th and 21st d) 26th and 22nd

96. Vishal is elder than Akash but younger than Shivansh,Yaksh is younger than Deepak but elder than Akash. If Shivansh is younger than Deepak, then who is eldest?
a)Akash b)Vishal c)Shivansh d)Deepak

Directions(97-98):A big cube is painted with red color. Then it is cut into some small cubes in such a way that the length of small cube is (1/7)th of the length of big cube. now answer the following questions.

97. How many small cubes are there in all?
a)342 b)343 c)340 d)431

98. How many small cubes do not have any of the faces painted?
a)120 b)115 c)124 d)125

Direction(99-100):Read the following information carefully. And answer the following questions.

D,E,F,H,I are seated in a circle facing toward the center. A,B,C are also seated in the same circle but two of them are not facing the center. F is sitting 2nd to the left of C. E is 3rd to the right of A. B is 3rd to the left of D, who is immediate neighbour of H and I. C is second to the right of D and third to the right of B.

99. If H is sitting on the immediate right of E then what is possible position of H with respect to C?
a)Immediate right b)3rd to the right c)3rd to the left d) 2nd to the left

100. Which of the following pair facing outside?
a) AE b) CE c) CB d) HI

***

SPACE FOR ROUGH WORK

LRDAV

APTITUDE TEST FOR ADMISSION INTO +2 SCIENCE (2024-25)

ROLL NO.

Time: 3 Hours

(9.00 am – 12.00 noon)

SET **C**

Guidelines to the Candidates:

- This Booklet contains printed 15 pages and 1 blank page for rough work. Any defect found should be brought to the notice of the invigilator immediately.
- Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.
- This test is of three hours duration.
- The question paper consists of 100 multiple choice questions comprising of Mathematics (40), General Science (40) and Aptitude (20) carrying maximum of 400 marks.
- There are four choices in every question as (a), (b), (c) and (d). Only one is correct. Each question carries 4 marks.
- -1 will be awarded for each wrong answer/multiple answer.
- No mark will be awarded for any overwriting/scratching answer.
- No candidate shall leave his/her seat during examination.
- Do not tear/remove any page of the Booklet.
- Calculation, if any, may be done at the blank page of this booklet provided at the end for rough work. No calculator is allowed.
- After finishing the test, the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

APTITUDE TEST

1. Solve the following analogy.

Horse: Stable: Pig: ------

(a) Den (c) Sty

(b) Byre (d) Hive

2. Find the odd one.

(a) 256 (c) 1331

(b) 576 (d) 441

Direction (Q3 - 6): Here you have to assume the given statements to be true even if they differ from generally known facts. Study all the conclusions and then decide which of the conclusions logically follows.

Give answer as

a) If both I and II follow

b) If only conclusion II follows

c) If either I OR II follows

d) If neither I nor II follows

3. Statements: Some rooms are stones.
All stones are radios.
Conclusions: I. some rooms are radios.
II. some stones are rooms.

4. Statements: All roads are poles.
No pole is house.
Conclusions: I. some roads are houses.
II. Some houses are poles.

5. Statements: All birds are trees.
Some trees are hens.
Conclusion: I. some birds are hens.
II. Some hens are trees.

6. Statement: All tables are chalks.
All chalks are chairs.
Conclusions: I) All chairs are tables.
II)All tables are chairs.

7. If A is the father of B and B is the father of C, then how is C related to A?

(a) Grandson

(b) Grand daughter

(c) Grandfather

(d) Can't be determined.

8. What day of the week was on 13th April, 1723?

(a) MONDAY

(b) TUESDAY

(c) WEDNESDAY

(d) FRIDAY

9. Solve the following analogy.

AZCX: BYDW: HQJO: --------

(a) GREP (c) IPKN

(b) IPKM (d) GRJP

10. Sam ranked 9th from the top and 38th from the bottom in a class. How many students are there in the class?

(a) 46 (c) 45

(b) 47 (d).48

11. If 34 is related to 12, in the same way 59 is related to-----.

(a) 38 (c) 26

(b) 45 (d) 14

12. How many meaningful English words can be formed with the letter ESRO using each letter once in each word?

(a) None (c) Two

(b) One (d) Three

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

(a) 19 (c) 21

(b) 11 (d) 20

14. A shepherd has 17 sheep. All but nine died. How many was he left with?

(a) None (c) 9

(b) 8 (d) 17

15. Nitin ranks 18th in the class of 49 students. What is his rank from the last?

(a) 18 (c) 19

(b) 31 (d) 32

16. In a cricket match there are three types of tickets say A, B and C each costing Rs.1000, Rs. 500 and Rs. 200 respectively. The ratio of the ticket sold of category A, B and C I 3 : 2 : 5. If the total collection from selling the tickets is Rs. 2.5 crore. Find the total number of tickets sold.

(a) 50000

(b) 40000

(c) 45000

(d) 60000

17. The ratio of ages of two boys is 5 : 6. After two years the ratio will be 7 : 8. The ratio of their age after 12 years will be :

(a) 22 : 24

(b) 15 : 16

(c) 17 : 18

(d) 11 : 12

18. In a school, the ratio of boys to girls is 4 : 3 and the ratio of girls to teachers is 8 : 1. The ratio of students to teachers is

(a) 56 : 3

(b) 55 : 1

(c) 49 : 3

(d) 56 : 1

19. There is a ratio of 5 : 4 between two numbers. If 40 per cent of the first is 12, then 50% of the second number is :

(a) 18

(b) 12

(c) 42

(d) 20

20. The average age of boys in the class is twice the number of girls in the class. The ratio of boys and girls in the class of 50 is 4 : 1. The sum of the ages (in years) of the boys in the class is :

(a) 2000

(b) 2500

(c) 800

(d) 400

GENERAL SCIENCE

21. An electric bulb is marked 100 W,230V. If the supply drops to 115 V , what is the heat energy produced by the bulb in 20 min? Calculate the current flowing through it.

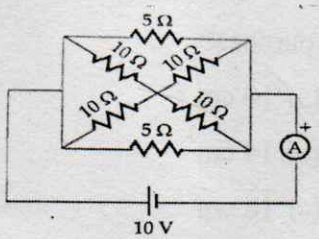
(a) 50 kJ and $\frac{5}{23}$A

(b) 35 kJ and $\frac{2}{11}$A

(c) 30 kJ and $\frac{5}{23}$ A

(d) 40 kJ and $\frac{2}{11}A$

22. Calculate the amount of current flowing through the circuit.



(a)5 A

(b) 4A

(c) 2.5A

(d)8A

23. A cylindrical wire P has resistance 10Ω. A second wire Q has length and diameter half that of P. If the material of both the wires is same, then resistance of wire Q is

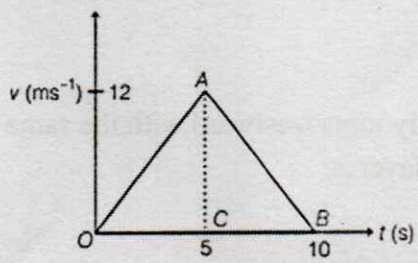
(a) 10Ω (b) 20Ω (c) 5Ω (d) 5 2 Ω

24. Ten one-rupee coins are put on top of each other on a table. Each coin has mass m. The reaction of the 6thcoin (counted from the bottom) on the 7th coin is

(a) 4mg (b) 6mg

(c) 7mg (d) 3mg

25. The speed-time graph of a particle moving along a fixed direction is as shown in the figure. The distance traversed by the particle between t = 0 s to t = 10 s is



(a) 20 m (c) 40 m

(b) 60 m (d) 80 m

26. A small magnet is placed perpendicular to a uniform magnetic field.The force acting on the magnet will result in

(a) Rotational motion

(b) Translational motion

(c) No motion at all

(d) Translational and rotational motion both

27. A glass slab is placed in the path of a beam of convergent light ,then the point of convergence of light

(a) Moves towards the glass slab

(b) Moves away from the glass slab

(c) Remains at the same point

(d) Undergoes a lateral shift

28. A virtual, erect and magnifiede image of an object is to be produced with a concave mirror of focal length 12 cm. Which of the following object distance should be chosen for this purpose?

(a) 10 cm

(b) 14 cm

(c) 18 cm

(d) 24 cm

29. A stone is projected vertically up to reach maximum height h. The ratio of its kinetic energy to its potential energy at a height 4 /5 h, will be

(a) 5 : 4 (b) 4 : 5

(c) 1 : 4 (d) 4 : 1

30. A spherical mirror forms an erect image four times the size of the object. If the distance between the object and the image is 100 cm, the nature and the focal length of the mirror are

(a) Concave, (80/3) cm

(b) Convex, (80/3) cm

(c) Concave, 20 cm

(d) Convex, 20 cm

31. A hockey player is moving northward and suddenly turns westward with the same speed to avoid an opponent. The force that acts on the player is

(a) Frictional force along westward

(b) Muscle force along southward

(c) Frictional force along south-west

(d) Muscle force along south-west

32. An observer standing at the sea coast observes 54 waves reaching the coast per minute. If the wavelength of the waves is 10 m, find the velocity.

(a) 54 m/s

(b) 10 m/s

(c) 9 m/s

(d) 5.4 m/s

33. A metal salt MX when exposed to light splits up to form metal M and a gas X_2. Metal M is used in making ornaments whereas gas X_2 is used in making bleaching powder. What could be the metal M and the gas X_2 respectively?

(a) Gold, oxygen (b) gold, chlorine (c) silver, oxygen (d) silver, chlorine

34. Among the following reactions, which is a redox reaction?

(a) $CaCO_3$ (s) $\longrightarrow$ CaO (s) + CO_2 (g)

(b) Mg (s) + CuO (s) $\longrightarrow$ MgO (s) + Cu(s)

(c) NaOH (aq) + HCl (aq) $\longrightarrow$ NaCl (aq) + H_2O (l)

(d) KBr (aq) + $AgNO_3$ (aq) $\longrightarrow$ KNO_3 (aq) + AgBr (s)

35. Match the acids given in column (I) with their correct source given in column (II) and choose the correct option.

Column (I)	**Column (II)**
(A) Lactic acid	(i) Lemon
(B) Citric acid	(ii) Tomato
(C) Acetic acid	(iii) Vinegar
(D) Oxalic acid	(iv) Curd

(a) A – ii, B – iii, C – iv, D – i (c) A – iv, B – i, C – ii, D – iii

(b) A – iv, B – i, C – iii, D – ii (d) A – ii, B – iii, C – i, D – iv

36. Which of the following should be the correct order of decreasing value of 2nd ionisation potential of $_6C$, $_7N$, $_8O$ and $_9F$?

(a) F > O > N > C (b) O > F > N > C (c) O > F > C > N (d) F > N > O > C

37. Which of the following compounds have highest electronegativity?

(a) Ethane (b) ethene (c) ethyne (d) equal in all

38. Match column I with column II and select the correct answer from the codes given below the columns:

Column (I)	Column (II)
(A) Radioactive	(i) Pt
(B) Lightest metal	(ii) I_2
(C) Noble metal	(iii) Li
(D) Liquid non-metal	(iv) U
(E) Solid volatile non-metal	(v) Br_2
	(vi) H

	A	B	C	D	E
(a)	iv	iii	i	v	ii
(b)	iv	vi	i	v	ii
(c)	i	iii	iv	v	ii
(d)	i	vi	iv	v	ii

39. Riva took a thin strip of filter paper. She did an experiment by putting a small drop of green ink on the baseline drawn 3 c.m. above one of the shortest edges of filter paper and inserting the paper into a jar containing water so that the drop of ink on the paper is just above the water level. She found that the position of blue color pigment is higher than that of yellow. What type of experiment was performed by Riva and which color is more soluble in water?
    (a) Paper chromatography, yellow
    (b) Paper chromatography, blue
    (c) Column chromatography, green
    (d) Column chromatography, yellow

40. Carbon and hydrogen combine in the ratio of 4:1 by mass to form ethane. What mass of hydrogen gas would be required to react completely with 36 g of carbon?
    (a) 6 g (b) 9 g (c) 12 g (d) 3 g

41. Stomata are epidermal outgrowths present on epidermal surfaces of leaf and young stem. The stomata are restricted to ----- in monocot leaves.
    (a) Lower epidermis
    (b) Upper epidermis
    (c) Mesophyll zone
    (d) Both lower and upper epidermis.

42. Enzymes enhance the rate of metabolic processes by:
    (a) Lowering of the activation energy.
    (b) Increasing the activation energy.
    (c) Without changing the activation energy.
    (d) Either lowering or increasing the activation energy.

43. Myogenic muscles are the:
    (a) Specialized muscles in the mammalian gut.
    (b) Specialized muscles in the mammalian heart.
    (c) Specialized muscles in the mammalian pancreas.
    (d) Specialized muscles in the mammalian kidney.

44. The given characteristic features represent in which phylum?
    1) Their body is porous.
    2) Spongocoel is lined by choanocytes or collar cells.
    3) They have cellular level of organisation.
    4) Water transport or water canal system is present.

    Select the correct option:

    (a) Echinodermata
    (b) Ctenophora
    (c) Porifera
    (d) Platyhelminthes

45. Haemoglobin is responsible for transport of oxygen in blood. It represents which level of structure of protein arrangement?
(a) Primary structure
(b) Secondary structure
(c) Tertiary structure
(d) Quarternary structure.

46. Which of the following is incorrect with respect to significance of meiotic division?
(a) New recombination of genes.
(b) Number of chromosomes become half.
(c) Number of chromosomes remain same.
(d) Formation of spores and gametes.

47. On selfing a plant of genotype RrTt, 400 plants were raised. How many of them will be of genotype RrTt?
(a) 50
(b) 100
(c) 200
(d) 300

48. Choose the chromosome in a human that possesses the least number of genes.
(a) 21st chromosome
(b) Autosome
(c) X- chromosome
(d) Y- chromosome

49. Darwin judged the fitness of individuals by:
(a) Ability to defend itself.
(b) Strategy to obtain food.
(c) Number of offsprings produced.
(d) Dominance over other individuals.

50. The diagnostic test that confirms typhoid in humans is :
(a) ELISA
(b) Widal
(c) MRI
(d) Amniocentesis

51. The organ in humans that undergo degeneration with increase in age and related to immune system is:
(a) Spleen
(b) Pancreas
(c) Liver
(d) Thymus

52. Regeneration of damaged growing grass following grazing is largely due to:

(a) Lateral meristem
(b) Intercalary meristem
(c) Apical meristem
(d) Secondary metabolites

53. Choose the wrong statements for the specialized connective tissue:

1) All of the cartilages in vertebrate embryos are replaced by bones in adults.

2) Cartilage is present in the tip of nose, outer ear joints, between adjacent bones of the vertebral column, limbs and hands in adults.

3) Osteocytes are bone cells and present in the spaces called lacunae.

4) Bone marrow is present in all bones and it is a site of production of blood cells.

5) Blood is a fluid connective tissue.

(a) 1,2 and 5
(b) 1,3 and 5
(c) 1 and 4
(d) 4 and 5

For question numbers 54,55 and 56, two statements are given – one labelled Assertion (A) and the other labelled Reason (R). Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below.

(a) Both A & R are true and R is the correct explanation of A.
(b) Both A & R are true but R is NOT the correct explanation of A.
(c) A is true but R is false.
(d) A is false and R is also false.

54. Assertion: As we go up the surface of the earth, we feel light weighed than on the surface of the earth.

Reason: The acceleration due to gravity decreases on going up above the surface of the earth.

55. Assertion: Sodium are obtained by the electrolysis of its molten chloride, i.e., NaCl.

Reason: Na is deposited at the anode and Cl_2 is deposited at the cathode.

56. Assertion : Iodine is necessary for normal rete of hormone synthesis.

Reason : Deficiency of iodine cause diseases.

Read the following paragraph and answer the questions : (57 to 60)

Acid and base undergo neutralisation reaction to form salt which is an ionic compound. Salt is composed of related number of cations, those coming from base and anions, those coming from acid. Thus, salt is electrically neutral. They may be simple salts such as NaCl, KCl; acid salts like $NH_4)_2SO_4$; basic salts like CH_3COONa; double salt like $K_2SO_4.Al_2(SO_4)_3$.

57. Which one of the following salts does not contain water of crystallisation?

(a) Green vitriol (b) Blue vitriol (c) gypsum (d) baking soda

58. Potassium sulphate is a salt of

(a) Strong acid and weak base
(b) Strong base and weak acid
(c) Strong acid and strong base
(d) Weak acid and weak base

59. What will be the product when Al_2O_3 reacts with NaOH?

(a) Aluminium hydroxide and sodium oxide
(b) Sodium aluminate and water
(c) Aluminium hydride and sodium oxide
(d) Sodium aluminate and hydrogen gas

60. What happens when a solution of an acid is mixed with a solution of a base in a test tube?

(ii) Temperature of the solution decreases
(iii) Temperature of the solution increases
(iv) Temperature of the solution remains the same
(v) Salt formation takes place

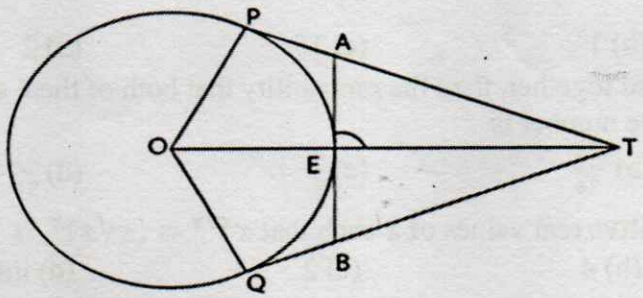
(a) (i) & (iv) (b) (i) & (iii) (c) (ii) only (d) (ii) & (iv)

MATHEMATICS

61. 150 litres of milk contain 20% of water. The amount of water to be added so that amount of water will be 25%, is

(a) 20 litres (b) 10 litres (c) 15 litres (d) 30 litres

62.



In the above figure, O is the centre of a circle of radius 5 cm, T is a point such that OT = 13cm and OT intersects the circle at E, if AB is the tangent to the circle at E, then the length of AB is

(a) $\frac{10}{3}$ cm (b) 12cm (c) 17cm (d) $\frac{20}{3}$ cm

63. Three horses are tethered with 7 meter long ropes at the three corners of a triangular field having sides 20 m, 34 m and 42 m. The area of the plot which can be grazed by the horses is
(a) $80m^2$ (b) $100m^2$ (c) $77m^2$ (d) $30m^2$

64. If the point (2, 3) is equidistant from the points (a + b, b−a) and (a−b, a +b), then
(a) 2a = 3b (b) a + b=1 (c) 3a = 2b (d) b−a=1

65. The area of in-circle of an equilateral triangle of side 42cm is
(a) $22\sqrt{3}cm^2$ (b) 213 cm^2 (c) 924 cm^2 (d) 462 cm^2

66. Asha has only Rs.1 and Rs.2 coins with her. If the total number of coins that she has, is 50 and the amount of money with her is Rs.75, then the number of Rs.1 and Rs.2 coins are, respectively
(a) 35 and 15
(b) 15 and 35
(c) 35 and 20
(d) 25 and 25

67. The value of k, for which the system of equations x + (k + 1)y = 5 and (k + 1) x + 9y = 8k – 1 has infinitely many solutions, is
(a) 2 (b)3 (c) 4 (d)5

68. If among three numbers the mean of first two numbers is 2, mean of last two numbers is 3 and mean of first and last number is 4, then the mean of these three numbers is
(a) 3 (b) 3.5 (c) 9 (d) 4.5

69. Let the rational number p/q be closest to but not equal to 22/7 among all rational numbers with denominator less than 100.The value of $p - 3q$ is
(a)12 (b)14 (c) 21 (d) 22

70. The largest number which divides 31 and 99, leaving remainders 5 and 8 respectively, is
(a) 13 (b)65 (c) 875 (d) 1750

71. If $\sin\gamma + \sin^2\gamma = 1$, then $\cos^2\gamma + \cos^4\gamma = ?$
(a) 0 (b) -1 (c) 1 (d) 2

72. In the quadratic equation $ax^2 + b\,x + c = 0$, If one root is four times the other, which of the following relation is correct?
(a) $3b^2 = 24ac$ (b) $4b^2 = 25ac$ (c) $5b^2 = 24ac$ (d) $3b^2 = 25ac$

73. If 3 is the least prime factor of m and 5 is the least prime factor of n, then the least prime factor of (m + n) is
(a) 11 (b) 1 (c) 15 (d) 2

74. If two dice are rolled together, then the probability that both of them shows either a prime or a composite number is
(a) $\frac{13}{18}$ (b) $\frac{25}{36}$ (c) $\frac{2}{3}$ (d) $\frac{11}{36}$

75. The number of positive real values of x such that $x^{x\sqrt{x}} = (x\sqrt{x})^x$, is
(a) 1 (b) 4 (c) 2 (d) infinite

76. If a, b, c, d, e are in A.P., then the value of (a – 4b + 6c – 4d + e) is
(a) 0 (b) 1 (c) –1. (d) 2

77. The number of rows in a lecture hall equals the number of seats in a row. If the number of rows is doubled and the number of seats in every row is reduced by 10, the number of

seats is increased by 300. If x denotes the number of rows in the lecture hall, then the values of x is

(a)10 (b) 15 (c) 20 (d) 30

78. If $(0, 0), (a, 1)$ and $(10, 5)$ are colinear then the value of 'a' is

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

79. If α and β are the roots of the equation $x^2 - 2x + 4 = 0$, then the value of $(\alpha^3 + \beta^3)$ is

(a) 16 (b) -16 (c) 8 (d) -8

80. A vessel is in the form of an inverted cone. Its height is 8 cm and radius of its top, which is open, is 5cm.It is filled with water up to the brim. When lead shots, each of which is a sphere of radius 0.5cm are dropped into the vessel, one fourth of the water flows out. Then the number of lead shots dropped in the vessel are

(a) 500 (b) 300 (c)200 (d)100

81. The value of $sin^2 5° + sin^2 10° + sin^2 15° + \cdots + sin^2 90°$ is equal to:

(a) 8 (b) 8.5 (c) 9.5 (d)9

82. In a ΔABC, the internal bisectors of $\angle B$ and $\angle C$ meet at P and the external bisectors of $\angle B$ and $\angle C$ meet at Q. Then $\angle BPC + \angle BQC =$?

(a) $60°$ (b) $45°$ (c) $90°$ (d) $180°$

83. If the difference of mode and median of a data is 24, then the difference of median and mean is

(a) 12 (b) 24 (c) 8 (d)36

84. If r and s are roots of $x^2 + px + q = 0$, then what is the value of $\frac{1}{r^2} + \frac{1}{s^2}$?

(a) $p^2 - 4q$ (b) $\frac{p^2-4q}{2}$ (c) $\frac{p^2-4q}{q^2}$ (d) $\frac{p^2-2q}{q^2}$

85. The sum of n terms of two A. P are in the ratio (5n+4):(9n+6), then the ratio of their 18th terms is

(a) $\frac{47}{84}$ (b) $\frac{179}{321}$ (c) $\frac{89}{159}$ (d) $\frac{2}{3}$

86. The maximum volume of a cone that can be carved out of a solid hemisphere of radius r is

(a) $3\pi r^2$ (b) $\frac{\pi r^3}{3}$ (c) $\frac{\pi r^2}{3}$ (d) $3\pi r^3$

87. The sum of the length, breadth and height of a cuboid is $6\sqrt{3}$ cm and the length of its diagonal is $2\sqrt{3}$ cm. The total surface area of the cuboid is

(a) $48cm^2$ (b) $72cm^2$ (c) $96cm^2$ (d) $108cm^2$

88. If 1/(b + c), 1/(c + a), 1/(a + b) are in AP then

(a) a, b, c are in AP

(b) a^2, b^2, c^2 are in AP

(c) 1/1, 1/b, 1/c are in AP

(d) None of these

89. If a cone is cut into two parts by a horizontal plane passing through the mid-point of its axis, then the volume of the upper part and the cone is

(a) 1:8 (b)1:5 (c)1:7 (d)1:6

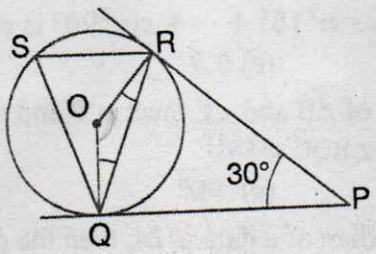
90. If 35 is removed from the data:30, 34, 35, 36, 37, 38, 39, 40, then the median increases by

(a) 2 (b)1.5 (c)1 (d) 0.5

91. Two numbers 'a' and 'b' are selected successively without replacement in that order from the integers 1 to 10. The probability that $\frac{a}{b}$ is an integer, is

(a) $\frac{17}{45}$ (b) $\frac{1}{5}$ (c) $\frac{17}{90}$ (d) $\frac{8}{45}$

92. In the following figure, O is the centre of the circle. The value of the angle $\angle RSQ$ is



(a) 60° (b) 75° (c) 150° (d) 45

Question no 93, 94, 95 and 96 are assertion-reason based questions in which a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct answer out of the following choices.

(a) Both A and R are true and R is the correct explanation of A.
(b) Both A and R are true and R is not the correct explanation of A
(c) A is true but R is false.
(d) A is false but R is true.

93. Assertion (A): Both HCF and LCM of two natural numbers $\boldsymbol{a}$ & $\boldsymbol{b}$ can be 25 and 815 respectively.
Reason(R): LCM of two natural numbers is always divisible by their HCF.

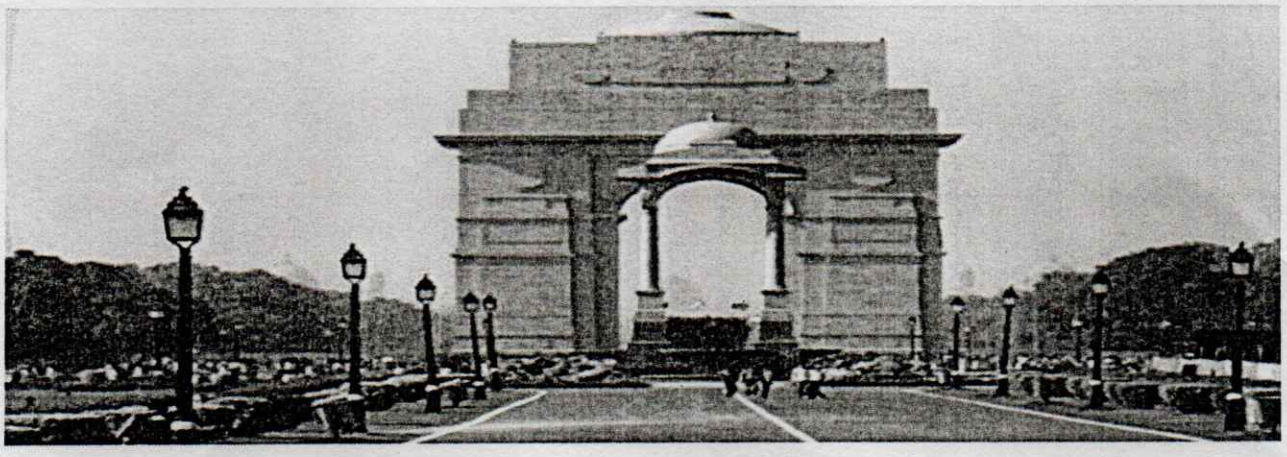
94. Assertion (A): If three vertices of a parallelogram taken in order are $(-1, -6)$, $(2, -5)$ and $(7, 2)$, then its fourth vertex is (4,1).
Reason(R): Diagonals of a parallelogram bisect each other.

95. Assertion (A): If the total surface area and volume of a cube are numerically equal to 216, then the length of its edge is 6cm.
Reason(R): Volume and total surface area of a cube are always equal.

96. Assertion(A): D and E are points on the sides AB and AC respectively of a ΔABC such that AD = $(7x - 4)$cm, AE=$(5x - 2)$cm, DB = $(3x + 4)$cm and EC=$3x$ cm.If DE $\parallel$ BC, then the value of x is 5cm.
Reason(R): If a line divides any two sides of a triangle in the same ratio then it is parallel to the third side.

Read the following paragraph and answer the questions : (97 to 100)

A group of students of class X visited India Gate on an education trip. The teacher and students had interest in history as well. The teacher narrated that India Gate, official name Delhi Memorial, originally called All-India War Memorial, monumental sandstone arch in New Delhi, dedicated to the troops of British India who died in wars fought between 1914 and 1919. The teacher also said that India Gate, which is located at the eastern end of the Rajpath (formerly called the Kingsway), is about 138 feet (42 metres) in height.



97. The angle of elevation if they are standing at a distance of 42m away from the monument is

(a) 30° (b) 45° (c) 60° (d) 0°

98. They want to see the tower at an angle of 60°. So, they want to know the distance where they should stand and hence find the distance.
(Use $\sqrt{3} = 1.732$)

(a) 25.24 m(approx.)

(b) 20.12 m(approx.)

(c) 42 m(approx.)

(d) 24.25m(approx.)

99. If the altitude of the Sun is at 60°, then the height of the vertical tower that will cast a shadow of length 20 m is

(a) $20\sqrt{3}$ m (b) $20/\sqrt{3}$ m (c) $15/\sqrt{3}$ m (d) $15\sqrt{3}$ m

100. The ratio of the length its shadow and the tower is $1:\sqrt{3}$. The angle of elevation of the Sun is

(a) 30° (b) 45° (c) 60° (d) 90°

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Space for Rough Work

LRDAV

APTITUDE TEST FOR ADMISSION INTO CLASS XI SCIENCE (2025-26)

ROLL NO. | | | | | | | | |

Time: 3 Hours

(9.00 am – 12.00 noon)

SET **B**

Guidelines to the Candidates:

- This Booklet contains printed 15 pages and 1 blank page for rough work. Any defect found should be brought to the notice of the invigilator immediately.
- Fill in the particulars in the OMR Sheet given to you separately as per the directions given therein.
- This test is of three hours duration.
- The question paper consists of 100 multiple choice questions comprising of Mathematics (40), General Science (40) and Aptitude (20) carrying maximum of 400 marks.
- There are four choices in every question as (A), (B), (C) and (D). Only one is correct. Each question carries 4 marks.
- -1 will be awarded for each wrong answer/multiple answer.
- No mark will be awarded for any overwriting/scratching answer.
- No candidate shall leave his/her seat during examination.
- Do not tear/remove any page of the Booklet.
- Calculation, if any, may be done at the blank page of this booklet provided at the end for rough work. No calculator is allowed.
- After finishing the test, the booklet with the OMR sheet is to be handed over to the invigilator before leaving the room.

MATHEMATICS

1. A piece of wire 20 cm long is bent into the form of an arc of a circle subtending an angle of 60^0 at its centre. The radius of the circle is

   (A) $\frac{60}{\pi}$ (B) $\frac{30}{\pi}$ (C) $\frac{20}{\pi}$ (D) $\frac{40}{\pi}$

2. The area of the largest triangle that can be inscribed in a semi-circle of radius 'r' units is

   (A) $\sqrt{2}r^2$ sq. units (B) $\frac{1}{2}r^2$ sq. units
   (C) $2\,r^2$ sq. units (D) r^2 sq. units

3. If volumes of two spheres are in the ratio 64 : 27, then the ratio of their surface areas is

   (A) 3 : 4 (B) 4 : 3
   (C) 16 : 9 (D) 9 : 16

4. If the mean of first 'n' natural numbers is $\frac{5n}{9}$, then the value of 'n' is

   (A) 5 (B) 4
   (C) 9 (D) none of these

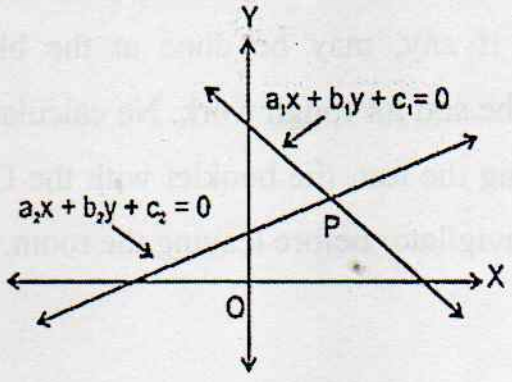
5. If the difference of mode and median of a data is 24, then the difference of median and mean is

   (A) 8 (B) 12
   (C) 24 (D) 36

6. In a single throw of a pair of dice, the probability of getting 'the sum a perfect square' is

   (A) $\frac{1}{18}$ (B) $\frac{7}{36}$
   (C) $\frac{1}{6}$ (D) $\frac{2}{9}$

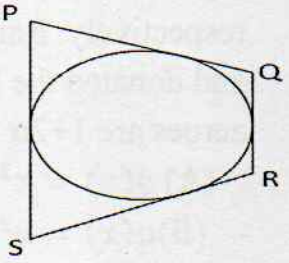
7. If the given figure shows a pair of linear equations in two variables, then which of the following statements is true?



(A) $\frac{a_1}{a_2} = \frac{b_1}{b_2} \neq \frac{c_1}{c_2}$ (B) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2} = \frac{c_1}{c_2}$

(C) $\frac{a_1}{a_2} \neq \frac{b_1}{b_2}$ (D) $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$

8. A quadrilateral PQRS is drawn to circumscribe a circle. If PQ = 12 cm, PS = 15 cm and RS = 14 cm, then the length of QR is



(A) 15 cm
(B) 14 cm
(C) 12 cm
(D) 11 cm

9. The circumference of a circle exceeds the diameter by 16.8 cm. The radius of the circle is

(A) 3.29cm (B) 3.79 cm (C) 3.92 cm (D) 3.73 cm

10. In a circle of radius 10.5 cm, the length of the minor arc is $\frac{1}{5}$ times the length of the major arc. Then the area of the sector corresponding to the major arc is

(A) 288.75 cm^2 (B) 45π cm^2 (C) 271.85 cm^2 (D) 299.6 cm^2

11. The value of $\frac{sin\theta - 2sin^3\theta}{2cos^3\theta - cos\theta}$ is

(A) $cot\theta$ (B) $tan\theta$ (C) $sec\theta$ (D) $cosec\theta$

12. The reminder when 1! + 2! + 3! + 4! +---------- +100! is divided by 12 is

(A) 5 (B) 7 (C) 9 (D)11

13. Let $a + b + c = 1, ab + bc + ca = \frac{1}{3}, a, b, c$ are real, then the value of $\frac{a}{b} + \frac{b}{c} + \frac{c}{a}$ is equal to

(A)1 (B) 2 (C) 3 (D) none of these

14. Gold is 19 times as heavy as water and cupper 9 times. The ratio should these metals be remixed so that the mixture may be 15 times as heavy as water, is

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

15. A farmer sold two cows at the price Rs2000 each, there by gained 30% in one and lost 30% in other. The net profit /loss is

(A) 9% gain (B) 9% loss (C) no gain or loss (D) 6% loss

16. Due to corona in China many workers migrated to their country. Mr. Mehbooba Rehman from Jaipur decides to help them with food packets and clothes. The number of food packets and clothes denoted by them can be represented by the zeroes α and β of the polynomial $p(x) = x^2 - x - 2$ respectively. Ramiz who is a student of Rehman also got inspired by him and donated the food packets and clothes in the form of a polynomial whose zeroes are $1+2\alpha$ and $1+2\beta$ is $q(x)$, Then:

(A) $q(x) = x^2 - 4x + 5$

(B) $q(x) = x^2 - 4x - 5$

(C) $q(x) = x^2 + 4x - 5$

(D) $q(x) = x^2 + x - 2$

17. If $\sec^2\theta + \tan^2\theta = \frac{5}{3}$, then the value of $\tan 2\theta$ is

(A) $2\sqrt{3}$ (B) $\sqrt{3}$ (C) $\frac{1}{\sqrt{3}}$ (D) Can't be determined.

18. The 9th term of an Arithmetic progression is 0. Which term is double of its 19th term?

(A) 20 (B) 38 (C) 18 (D) 29

19. If a, b, c are positive real numbers such that $a + \frac{1}{b} = \frac{7}{3}, b + \frac{1}{c} = 4, c + \frac{1}{a} = 1$, then value of abc is:

(A) 0 (B) 4 (C) 1 (D) 2

20. If p(x) is a polynomial satisfying $p(x + \frac{5}{2}) = p(x)$ for all real values of x. If P(3) = 2006, then the value of P(8) is:

(A) 2005 (B) 2009 (C) 2011 (D) 2006

21. If $\sin\alpha = \frac{3}{5}$ and $\cos\beta = \frac{3}{5}$, $0 < \alpha, \beta < \frac{\pi}{2}$ then

(A) $\alpha = \beta$ (B) $\alpha > \beta$ (C) $\alpha < \beta$ (D) none of these

22. Two spherical balls lie on the ground touching each other. The point of contact is 10 units above the ground. If one ball has a radius of 8 units then radius of other ball is:

(A) $\frac{40}{3}$ units (B) 8 units (C) 4 units (D) $\frac{20}{3}$ units

23. The number of real solutions to equation $x^3 + (x + 1)^3 = (x + 3)^3 - (x + 2)^3$ is

(A) 0 (B) 1 (C) 2 (D) 3

24. If m is any positive integer, then value of $\left[\sqrt{m+\sqrt{m+\sqrt{m+\cdots}}}\right] - \left[\sqrt{m-\sqrt{m-\sqrt{m-\cdots}}}\right]$ is

(A) 1 (B) 0 (C) – 1 (D) can't be determined

25. Two triangles are similar but not congruent and lengths of side of the first are 6cm, 11cm and 12cm. The sides of second are integral lengths and one of them is congruent to the side of first. The perimeter of second triangle is

(A) 52 (B) 29 (C) 58 (D) 56

26. Two circles of radii 20 cm and 37 cm intersect in A and B. If O_1 and O_2 are their centers and AB = 24 cm then the distance O_1O_2 is equal to

(A) 44 cm (B) 51 cm (C) 40.5 cm (D) 45 cm

27. The last digit of the sum $(2002^{2005} + 2003^{2006} + 2007^{2007})$ is

(A) 5 (B) 2 (C) 9 (D) 4

28. Sum of n terms of the series $\sqrt{2} + \sqrt{8} + \sqrt{18} + \sqrt{32} +$ ------- is

(A) $\frac{n(n+1)}{2}$ (B) 2n(n+1) (C) $\frac{n(n+1)}{\sqrt{2}}$ (D)1

29. The number of lines that can be drawn through 21 points on a circle is

(A) 210 (B)1 (C) 240 (D) 7

30. The value of $cos^2 5° + cos^2 10° + cos^2 15° + \ldots. + cos^2 90°$ is:

(A) 0 (B) $8\frac{1}{2}$ (C) 10 (D) $2\frac{1}{2}$

Question no 31 TO 35 are assertion-reason based questions in which a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct answer out of the following choices.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is not the correct explanation of A
(C) A is true but R is false.
(D) A is false but R is true

31. Assertion (A): $x^2 + 4x + 5$ has two real zeroes.
Reason(R): A quadratic polynomial can have at most two zeroes.

32. Assertion (A): Ratio in which the line $3x + 4y = 7$ divides the line segment joining the points $(1, 2)$ and $(-2, 1)$ internally, is 3:5.
Reason(R): The coordinate of the point P (x, y) which divides the line segment joining the points A (x_1, y_1) and B (x_2, y_2) in the ratio m:n internally is $\left(\frac{mx_2 - nx_1}{m-n}, \frac{my_2 - ny_1}{m-n}\right)$

33. Assertion(A): If the image of the point P under the reflection in the Y-axis is $(-3, 2)$, then the coordinates of the point P is (3, 2)
Reason(R): If the image of the point P(x, y) under the reflection in the Y-axis is $(-x, y)$

34. Assertion(A): The probability that a non-leap year selected at random will have 53 Sundays is $\frac{1}{7}$
Reason(R): Probability of an event is the ratio of number of favorable outcomes to the number of total outcomes

35. Assertion(A): D and E are points on the sides AB and AC respectively of a ΔABC such that DE ∥ BC then the value of x is $\frac{91}{11}$, when AD=4cm AE=8 cm, DB=8 and EC= $(3x - 19)$ cm.
Reason(R): If a line divides any two sides of a triangle in the same ratio then it is not parallel to the third side.

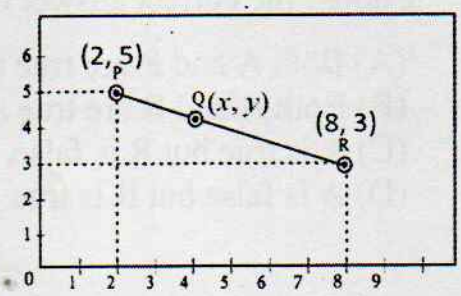
CASE-STUDY BASED QUESTIONS

Question No. 36 – 38 based on case-based question I and Question No. 39 – 40 based on case-based question - II.

CASE BASED QUESTION - I.

A group of class X students goes to picnic during vacation. There were three different slides and three friends are Ajay, Ram and Shyam are sliding on a slider whose positions are represented by the points P, Q and R respectively.
Based on the above information, answer the following question no. 36, no. 37, no. 38.





36. The distance of Ajay from vertical axis is

(A) 2 (B) 5 (C) $\sqrt{29}$ (D) 3

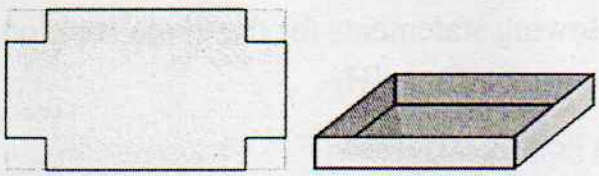
37. If Ram is at exactly in the middle of Ajay and Shyam, then the coordinates of his position is

(A) $(4,5)$ (B) $(3,1)$ (C)$(5,3)$ (D) $(5,4)$

38. The coordinate of point on x-axis which is at equal distance from P and R is

(A) $\left(0,\frac{11}{3}\right)$ (B) $(11,3)$ (C) $\left(\frac{11}{3},0\right)$ (D) $\left(\frac{3}{11},0\right)$

CASED BASED QUESTION - II



From a rectangular piece of card board of length 34cm and 28cm , four equal square pieces of area $9cm^2$ are cut off from each corner and then flapped to make an open cuboidal box.

Based on the above information answer the following question no. 39 and no. 40:

39.The total surface area of the open box will be

(A) $916cm^2$ (B)$1848cm^2$ (C) $1532cm^2$ (D) $496cm^2$

40.The volume of the open box will be

(A)$300cm^3$ (B)$1848cm^3$ (C)$1532cm^3$ (D)$496cm^3$

GENERAL SCIENCE

41.Which of the following does not form an acidic salt?

(A) Phosphoric acid
(B) Carbonic acid
(C) Hydrochloric acid
(D) Sulphuric acid

42. A compound X on electrolysis in aqueous solution will form compound Y which is a strong base along with two gases a and b. B is used in manufacture of bleaching powder. Identify X, Y, A and B.

(A) NaCl, NaOH, O_2, Cl_2

(B) NaCl, NaOH, H_2, Cl_2

(C) KNO_3, KCl, O_2, Cl_2

(D) KNO_3, KCl, H_2, Cl_2

43. Which of the following is treated with chlorine to form bleaching powder?

(A) $CaSO_4$

(B) $Ca(OH)_2$

(C) $CaCO_3$

(D) $CaCl_2$

44. Which of the following statements for the given reaction is correct?

$3Fe + 4H_2O$ ----> $Fe_3O_4 + 4H_2$

i) iron metal is getting oxidised

ii) water getting reduced

iii) water is acting as reducing agent

iv) water is acting as an oxidising agent

(A) i,ii and iii

(B) i, ii and iv

(C) iii and iv

(D) ii and iv

45. On heating ferrous sulphate crystal one would get,

(A) No solid residue

(B) Clear solution

(C) Smell of burning sulphur

(D) both a and c

46. Which of the following S block elements does not react with water?

(A) K

(B) Na

(C) Ca

(D) Be

47. Which one of the following metals do not react with hot water as well as cold water?

(A) Na
(B) Ca
(C) Mg
(D) Fe

48. $Cu + HNO_3$ ——-> $Cu(NO_3)_3 + H_2$

$H2 + HNO_3$ ——-> $H_2O + NO_2$

What can be inferred from the chemical equation?

(A) Copper causes the oxidation of HNO_3 to form NO_2
(B) Hydrogen gas gets oxidised by HNO_3 to form water.
(C) Hydrogen gas reacts with oxygen in the air to form water.
(D) Nitrate reacts with hydrogen to form NO_2 and H_2O.

49. An element reacts with oxygen to form an oxide. The oxide formed terms the red litmus into blue. What is the nature of the element?

(A) Metal
(B) Non metal
(C) Both a and b
(D) None of these

50. The metallic lustre exhibited by sodium is explained by:

(A) diffusion of sodium ions
(B) oscillation of loose electrons
(C) excitation of free protons
(D) existence of body centered cubic lattice

51. Addition reactions are undergone by,

(A) Saturated hydrocarbon
(B) Unsaturated hydrocarbon
(C) Only alkene
(D) Only alkyne

52. The difference in formula and molecular masses between methanol and ethanol is,

(A) CH_3 and 16u
(B) CH_4 and 18u
(C) CH_2 and 14u
(D) C_2H_4 and 28u

53. Different cells have different sizes. Arrange the following cells in an ascending order of their size. Choose the correct option among the followings :

I. Mycoplasma. II. Ostrich eggs. III. Human RBC. IV. Bacteria

(A) I, IV, III, II. (B) I ,II, III, IV

(C) II ,I, III, IV. (D) III, II, I, IV

54. Sweetest sugar is :

(A) Fructose. (B) Glucose. (C) Lactose. (D) Mannose

55. Blood contains haemoglobin to carry oxygen as oxyhaemoglobin. How many polypeptide chains are there in one haemoglobin molecule?

(A) 2 alpha and 2 beta.

(B) 4 alpha.

(C) 4 beta.

(D) 1alpha and 3 beta.

56. A phyllum common to both unicellular animals and plants is :

(A) Monera. (B) Protista. (C) Fungi. (D) Plantae.

57. Agar, carrageen are the phycocolloids obtained from:

(A) Blue green algae.

(B) Red algae.

(C) Green algae.

(D) Brown algae.

58. Oxygen is produced during photosynthesis is common in all except:

(A) Nostoc (B) Chara. (C) Euglena. (D) Green sulphur bacteria.

59. The flowers that can be divided into two equal vertical halves by more than one plane of division is called as:

(A) Actinomorphic. (B) Zygomorphic.

(C) Heteromorphic. (D) Heterocyclic

60. Study dealing with the determination of the age of plant by counting the annual rings is called:

(A) Botanochronology. (B) Bio chronology

(C) Cryptogamochronology. (D) Dendrochronology

61. Select the characteristics common to both humans and adult frogs from the followings:

(A) Four chambered heart. (B) Internal fertilization

(C) Nucleated RBCs. (D) Ureotelic mode of excretion

62. A car accelerated from initial position and then returned at initial point, then

(A) Velocity is zero but speed increases

(B) Speed is zero but velocity increases

(C) Both speed and velocity increase

(D) Both speed and velocity decrease

63. A car, moving with a speed of 50 km/hr, can be stopped by brakes after at least 6m. If the same car is moving at a speed of 100 km/hr, the minimum stopping distance is

(A) 6m (B) 12m (C) 18m (D) 24m

64. A body freely falling from the rest has a velocity 'v' after it falls through a height 'h'. The distance it has to fall down for its velocity to become double, is

(A) $2h$ (B) $4h$ (C) $6h$ (D) $8h$

65. Where will it be profitable to purchase 1 kg sugar (by spring balance)

(A) At poles (B) At equator

(C) At 45° latitude (D) At 40°latitude

66. Which of the following has the maximum momentum?

(A) A 100 kg vehicle moving at 0.02 m s^{-1}

(B) A 4 g weight moving at 10000 cm s^{-1}

(C) A 200 g weight moving with kinetic energy 10^{-6} J

(D) A 20 g weight after falling 1 kilometre

67. Convex mirror of focal length 10 *cm* is placed in water. The refractive index of water is 4/3. What will be the focal length of the mirror in water

(A) 10 *cm* (B) 40/3 *cm* (C) 30/4 *cm* (D) None of these

68. Velocity of light in glass whose refractive index with respect to air is 1.5 is $2 \times 10^8\ m/s$ and in certain liquid the velocity of light found to be $2.50 \times 10^8\ m/s$. The refractive index of the liquid with respect to air is

(A) 0.64 (B) 0.80 (C) 1.20 (D) 1.44

69. A person suffering from 'presbyopia' should use
(A) A concave lens
(B) A convex lens
(C) A bifocal lens whose lower portion is convex
(D) A bifocal lens whose upper portion is convex

70. A box of mass 1 kg is pulled on a horizontal plane of length 1 m by a force of 8 N then it is raised vertically to a height of $2m$, the net work done is
(A) 28 J (B) 8 J (C) 18 J (D) None of above

71. Two masses of 1g and 9g are moving with equal kinetic energies. The ratio of the magnitudes of their respective linear momenta is
(A) 1 : 9 (B) 9 : 1 (C) 1 : 3 (D) 3 : 1

72. An aluminium rod of length 3.14 m is of square cross-section 3.14 × 3.14 mm^2. What should be the radius of 1 m long another rod of same material to have equal resistance?
(A) 2 mm (B) 4 mm (C) 1 mm (D) 6 mm

73. A vertical wire carrying a current in the upward direction is placed in a horizontal magnetic field directed towards north. The wire will experience a force directed towards
(A) North (B) South (C) East (D) West

Question no 74 TO 76 are Assertion-Reason based questions in which a statement of Assertion (A) is followed by a statement of Reason (R).

Choose the correct answer out of the following choices.

(A) Both A and R are true and R is the correct explanation of A.
(B) Both A and R are true and R is not the correct explanation of A
(C) A is true but R is false.
(D) A is false but R is true

74. Assertion (A) : The connecting wires are made of copper.
Reason (R): Copper has very high electrical conductivity.

75. Assertion (A): Simple goitre is associated with inadequate dietary intake.
Reason (R): TSH level in a goitre patient is high.

76. Assertion (A): carbon forms large number of compounds.
Reason (R): Carbon has small size and it is tetravalent.

CASE BASED QUESTIONS:

Gregor Johan Mendel conducted breeding experiments on garden pea plant. He selected this plant because of some special qualities. He observed seven pairs of contrasting characters in pea plant. He conducted

his breeding experiment in three steps, namely, selection of parents, production of first generation by hybridization, and raising the second and subsequent generations by self-pollination of hybrids.

Based on the understanding of the above paragraph answer the following questions:

77. According to Mendel which one is the unit of heredity?
(A) Gene. (B) Factor. (C) Chromosome. (D)All of these.

78. Identify the genotype of the parents selected by Mendel for hybridization.
(A) Homozygous.
(B) Heterozygous.
(C) Either homozygous or heterozygous.
(D) Cannot be predicted.

79. In Mendel's hybridization experiment the phenotype of the first generation resembles one parent. It can be explained by:
(A) Law of paired factors
(B) Law of dominance
(C)Law of segregation
(D)Law of independent assortment.

80. The phenotypic ratio of second generation in dihybrid cross is:
(A) 3: 1. (B) 9: 3: 3: 1. (C) 12: 3: 3: 1. (D) 1: 3

APTITUDE

81. I was facing west. I turned 45 degree in the anti-clockwise direction, then 180 degree in the clockwise direction. Finally, I turned 90 degree in the anti-clockwise direction. Which direction am I facing now?
(A) South West (B)South (C)North (D)North West

82. In a coding pattern the word" LOT" is written as 111314161921, then the word "SIP" can be written as 18208101517, Then how will "GO" be written in that language?

(A) 681416 (B) 561495 (C) 450384 (D)571594

83. Select one of the following four option that will make the second pair analogous to the first pair given as:

BIOLOGY : ZHPMPJC :: CHEMISTRY : ----------

(A) ZSUJTFNID (B) ZUSJTNDIF (C)ZSUTJNFID (D) ZUSTNFJID.

84. In three of the option the 2nd number is related to the 1st number in a similar logical way. Which is the odd one out?

(A)99-9801 (B)91-8281 (C)81-6561 (D) 69-4231

85. The given options show four time instances. In which of these cases, the hour hand and minute hand will be farthest from each other when this time is seen on a clock.

(A)6:00 (B)2:30 (C)4:30 (D)7:30 .

Directions(Q 86- 88):In the question below are given two statements followed by two conclusions. you have to take the two statements to be true even if they seem to be at variance from commonly known facts and decide which of the conclusion(s) logically follows from the given statements.
Give answer

(A) if only conclusion I follows
(B) if only conclusion II follows
(C) if either conclusion I OR II follows
(D) if both conclusion I and II follows.

86. Statements: No dogs are cats
All cats are pigs.
Conclusions: I) some cats are dogs.
II) some pigs are not dogs

87. Statements: some players are singers.
some singers are tall.
Conclusions: I) some players are tall.
II) No players are tall.

88. Statements: All stones are water.
Some water are clean.
Conclusions: I) some water are stones.
II) all clean are water.

89. If 34 is related to 12,in the same way 59 is related to-----.
(A) 38 (B) 45 (C) 26 (D) 14

90. How many meaningful English word can be formed with the letter ESRO using each letter once in each word?
(A)None (B) One (C) Two (D) Three

Directions (Q11-Q 14):
A big cube is painted with red color. Then it is cut into some small cubes in such a way that the length of small cube is (1/7) th of the length of big cube. Now answer the following questions.

91.How many small cubes are there in all?

(A)342 (B)343 (C)340 (D)431

92.How many small cubes do not have any of the faces painted?

(A)120 (B)115 (C)124 (D)125

93.How many small cubes have only one face painted?

(A)151 (B)140 (C)150 (D)155

94.How many small cubes have only two faces painted?

(A)60 (B)40 (C)50 (D)70

95.In a queue of boys, Sandeep is 10th from left and Lalit is 5th from right.The places of Sandeep and Lalit are interchanged. If the new position of Sandeep is 15 th from left, then the new position of Lalit from right is-

(A)10TH (B)11TH (C)12TH (D)13TH

96.In a cricket team, Dhoni is taller than Virat but not as tall as Raina, Rohit is shorter than Dhoni but taller than Shikhar. Who among them is the shortest?

(A)Dhoni (B)Virat (C) Shikhar (D)Can't be determined

97.Kamal remembers that his brother Dinu's birthday falls after 20th May but before 28th May while Greshma remembers that Dinu's birthday falls before 22nd May but after 12th May. On what date Dinu's birthday falls?

(A)22nd May (B)21st May (C)Can't be determined (D)None of these

98.At sunrise Amit and Deepak are having a conversation standing in front of each other. The shadow of Deepak is formed towards the right hand of Amit. What direction is Deepak facing?

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

99.Gopal said, pointing to Gobind, "His father is my father's only son". How is Gopal related to Gobind ?

(A)Grandfather (B)Grandson (C)Father (D)Son

100. If A=1 and AND=56, then CAT=?

(A)60 (B)65 (C)75 (D)55

Space for Rough Work