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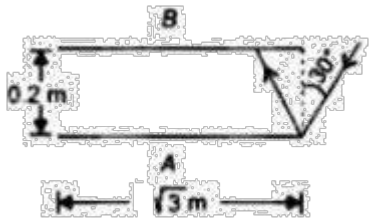
Section – A
Science

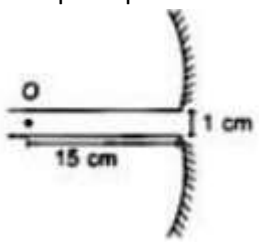
This section contains **30 Multiple Choice Questions**. Each question has four options out of which **ONLY ONE** is correct.

1. Two plane mirrors A and B are aligned parallel to each other as shown in the figure. A light ray is incident at an angle 30^0 at a point just inside one end of A. The plane of incidence coincides with the plane of the figure. The maximum number of times the ray undergoes reflections (including the first one), before it emerges out, is:



(a) 17
(b) 15
(c) 13
(d) 10

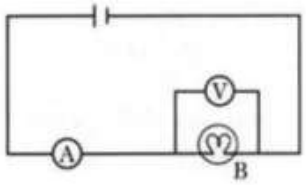
2. A mirror is broken into two parts and these parts are separated by a distance of 1 cm as shown in figure. The focal length of the mirror is 10 cm. The distance between the images (in cm), formed by the two parts of mirror when the object is midway between the two principal axes are



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

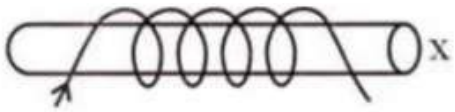
3. A heater coil is cut into two equal parts and now connected in parallel and used in the heater the heat generated now will be:
(a) Doubled
(b) Four times
(c) One fourth
(d) Halved

4. The diagram given below shows a circuit containing a bulb B, a ideal voltmeter V and a ideal ammeter. The voltmeter reading is 5.6 volt and the ammeter reading is 7 ampere. Which of the following options is incorrect for the given circuit diagram?



(a) The resistance of the bulb is 0.6 ohm
(b) The power of the bulb is 39.2 watt
(c) The resistance of the circuit is 0.8 ohm
(d) Potential difference across battery is 5.6V

5. In the given figure a solenoid wound on a core of soft iron. Polarity of end x when the current flows in the direction opposite to that as shown?



(a) North
(b) South
(c) South-north
(d) North-south

6. A body falls freely from a tower and travels a distance of 55 m in its last second. The height of the tower is:
(a) 154 m
(b) 145 m
(c) 180 m
(d) 165 m

7. The radius of the path of a charged particle in a uniform magnetic field is directly proportional to:
(a) Charge of the particle
(b) Momentum of the particle
(c) Energy of the particle
(d) Intensity of field

8. A lens behaves as a converging lens in air and a diverging lens in water. The refractive index of lens must not be
(a) 1.2
(b) 1.3
(c) 1.1
(d) 1.4

9. In a neon gas discharge tube Ne^+ ions moving through a cross-section of the tube each second to the right is 2.9×10^{18} while 1.2 10^{18} electrons move towards left in the same time; the electronic

charge being 1.6 10^{-19} C the net electric current is:

(a) 0.27 A to the right
(b) 0.66 A to the right
(c) 0.66 A to the left
(d) Zero

10. A short sighted person uses a spectacle of power -0.4 D to see very distant objects. How far can he see without using spectacle?
(a) 40 m
(b) 100 m
(c) 2.5 m
(d) 10 m

11. For the given reaction, match column I with column and mark the correct option from the codes given below

$Fe_2O_3 + xCO \rightarrow yFe + xCO_2$

Column I	Column II
(1) Oxidizing agent	(i) 2
(2) Reducing agent	(ii) 3
(3) x	(iii) Fe_2O_3
(4) y	(iv) CO

(a) 1 – (iv); 2 – (iii); 3 – (ii); 4 – (i)
(b) 1 – (iv); 2 – (iii); 3 – (i); 4 – (ii)
(c) 1 – (iii); 2 – (iv); 3 – (ii); 4 – (i)
(d) 1 – (iii); 2 – (iv); 3 – (i); 4 – (ii)

12. Match column I with Column II and mark the correct option from the given codes.

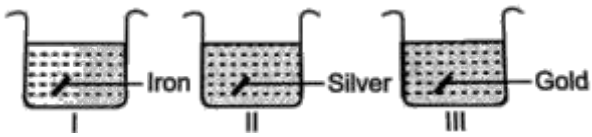
Column I	Column II
(1) $NaHCO_3$	(i) used for disinfecting water
(2) Na_2CO_3	(ii) used in soda –acid fire extinguishers
(3) $CaOCl_2$	(iii) used for removing permanent hardness of water
(4) $CaSO_4.\frac{1}{2}H_2O$	(iv) Used for making toys, materials for decoration

(a) 1 – (iii); 2 – (i), 3 – (iv); 4 – (ii)
(b) 1 – (ii); 2 – (iii), 3 – (i); 4 – (iv)
(c) 1 – (iii); 2 – (ii), 3 – (i); 4 – (iv)
(d) 1 – (i); 2 – (ii), 3 – (iv); 4 – (iii)

13. A water insoluble substance 'X' on reacting with dilute H_2SO_4 released a colorless and odorless gas 'Y'. When this gas was passed through lime water, it initially became milky due to the formation of 'Z' and the milkness disappeared when the gas pass in excess & form 'R'. X, Y, Z & R are respectively
(a) Limestone, Carbonic acid, Carbon dioxide, Calcium bicarbonate
(b) Quick lime, Limestone, Carbon dioxide, Calcium bicarbonate
(c) Limestone, Carbon dioxide, Calcium bicarbonate, Calcium hydroxide
(d) Limestone, Carbon dioxide, Limestone, Calcium bicarbonate

14. In the reaction, CO_3^{2} H_2O HCO_3 OH ,water is a
(a) Bronsted acid
(b) Bronsted base
(c) Conjugate acid
(d) Conjugate base

15. Vishakha took few wire pieces made up of different metals and placed them in blue solution of copper sulphate. What will be the colour of the solutions present in beakers I, II and III after half an hour?



(a) (i) → Green; (II) → Blue; (III) → Green
(b) (i) → Blue; (II) → Green; (III) → Green
(c) (i) → Green; (II) → Blue; (III) → Blue
(d) (i) → Blue; (II) → Blue; (III) → Blue

16. A person adds 1.71 gram of sugar ($C_{12}H_{22}O_{11}$) in order to sweeten his tea. The number of carbon atoms added are
(mol. mass of sugar = 342)
(a) 3.6×10^{22}
(b) 7.2×10^{22}
(c) 0.05
(d) 6.6×10^{22}

17. Oxidation is process which involves:
(a) Addition of oxygen
(b) Removal of hydrogen
(c) Loss of electrons
(d) All are correct

18. For the following reaction

$2Pb\ NO_3\ _{\underline{P}}$ $2PbO_{\underline{Q}}$ $\underline{R}NO_2$ $\underline{Z}O_2$

$\frac{P}{Q}\ \frac{R}{Z}$ *is*

(a) 3
(b) 4
(c) 1
(d) 5

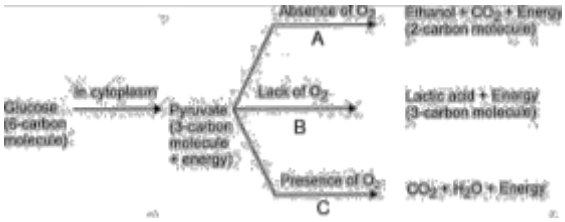
19. The pH number of liquid tells its level of acidity or alkalinity. Some chemicals have different Colours when put into liquids with different levels of acidity. These chemicals are called indicators. The following table shows the colour changes that occur with four different acid-base indicators.

Indicator	Colour of Indicator													
	Acidic						pH						Basic	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
A	red							blue						
B	clear									pink				
C	red					orange								
D	yellow							purple						

Four liquids a, b, c and d were tested with indicators A, B, C and D. The results are recorded Below. Which liquid has the highest pH?

	Colour of indicator			
Liquid	Indicator A	Indicator B	Indicator C	Indicator D
(a)	Blue	clear	orange	purple
(b)	Blue	pink	orange	purple
(c)	Red	clear	red	yellow
(d)	Red	clear	orange	yellow

20. If H^+ ion concentration of a solution is increased 10 times its pH will
    (a) Increases by 1
    (b) Remains unchanged
    (c) Decreases by 1
    (d) Increases by 10
21. Which one of the following statements is correct?
    Statement 1: In aerobic respiration, 38 molecules of ATP are produced by complete oxidation of one gram – mole of glucose.
    Statement 2: In anaerobic respiration only 2 molecules of ATP are formed.
    (a) Statement 1
    (b) Statement 2
    (c) Both the statement are correct
    (d) Both statements are in correct
22. What is the function of blood?
    (a) Transportation of respiratory gases
    (b) Regulation of body temperature.
    (c) Transportation of waste products.
    (d) All the above
23. Which of the following is the correct sequence of the processes taking place in nutrition in animals?
    (a) Ingestion, Assimilation, Digestion, Absorption, Egestion
    (b) Assimilation, Absorption, Ingestion, Digestion, Egestion
    (c) Ingestion, Digestion, Absorption, Assimilation, Egestion
    (d) Ingestion, Digestion, Assimilation, Absorption, Egestion
24. The nephrons and alveoli are common in their
    (a) Structural anatomy
    (b) Functional similarity in elimination of nitrogenous waste
    (c) Functional similarity in elimination of metabolic waste
    (d) Surface area for exchange of material
25. Which metal is associated with haemoglobin?
    (a) Copper
    (b) Iron
    (c) Aluminium
    (d) Potassium
26. The xylem in plants are responsible for
    (a) Transport of food
    (b) Transport of water only
    (c) Transport of water and dissolved minerals in solution form
    (d) Transport of food in glucose form
27. In a monohybrid cross between two heterozygous individuals, percentage of pure homozygous individuals obtained in F1 generation is
    (a) 25%
    (b) 50%
    (c) 75%
    (d) 100%
28. In the below reaction indicates the product of glucose breakdown under different conditions. Identify for the A, B, C respectively where these reactions are taking place



    (a) Mitochondria, Yeast, Muscles cells
    (b) Yeast, Mitochondria, Muscles cells
    (c) Mitochondria, Muscles cells, Yeast
    (d) Muscles cells, Yeast, Mitochondria
29. The genotype for the height of an organism is Tt. What conclusion may be drawn from this?
    (a) The allele for height has at least two different genes
    (b) There are at least two different alleles for the gene for height
    (c) There are two different genes for height, each having a single allele
    (d) There is one allele for height with two different forms.
30. Pure breeding pea plants with green pods are crossed with pure breeding pea plants with yellow pods. All the F1 generation plants have green pods. Plants from the F1 generation are allowed to be interbred. What colour of pods will be observed in F2 generation plants?
    (a) All green

(b) All yellow
(c) 1 green : 1 yellow
(d) 3 green : 1 yellow

Section – B
Mathematics

sss

This section contains **20 Multiple Choice Questions**. Each question has four options out of which **ONLY ONE** is correct.

31. The length, breadth and height of a room are 8 m 25 cm, 6 m 75 cm and 4 m 50 cm respectively, then the longest rod which can measure the three dimensions of the room exactly:
(a) 65 cm
(b) 70 cm
(c) 75 cm
(d) 80 cm

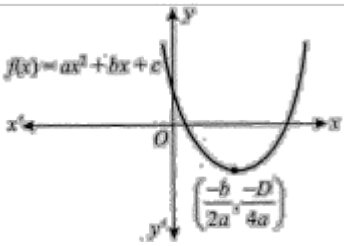
32. The rationalizing factor of $\sqrt[5]{a^2b^3c^4}$ is_____
(a) $\sqrt[5]{a^3b^2c}$
(b) $\sqrt[4]{a^3b^2c}$
(c) $\sqrt[3]{a^3b^2c}$
(a) $\sqrt{a^3b^2c}$

33. If x and y are any positive integers, then $(x^2 - x) + (y^2 - y)$ is always:
(a) Even number
(b) Odd number
(c) Can't say
(d) Both even and odd are possible

34. Find the sum of
$\frac{1}{3\ \ 7} \quad \frac{1}{7\ \ 11} \quad \frac{1}{11\ \ 15} \quad \ldots\ldots \quad \frac{1}{99\ \ 103}$
(a) $\frac{100}{309}$
(b) $\frac{101}{309}$
(c) $\frac{25}{309}$
(d) $\frac{105}{309}$

35. Find the greatest number that will divide 46, 91 and 181 so as to leave the same remainder in each case:
(a) 4
(b) 7
(c) 9
(d) 45

36. In figure shows the graph of the polynomial $f(x) = ax^2 + bx + c$. Then:



(a) $a > 0, b > 0$ and $c > 0$
(b) $a > 0, b < 0$ and $c > 0$
(c) $a > 0, b < 0$ and $c < 0$
(d) $a > 0, b > 0$ and $c < 0$

37. If $p(x) = x^3 + bx^2 + cx + 5$ has one zero $\sqrt{5}\quad 2$ and b and c are rational numbers then find sum of other two zeros.
(a) $\sqrt{5}\quad 7$
(b) $\sqrt{5}\quad 7$
(c) $7\quad \sqrt{5}$
(d) $7\quad \sqrt{5}$

38. If are the zeros of $p(x) = 3x^2 - 5x + b$ then find the polynomial whose zeros are $\frac{1}{\alpha}$ and $\frac{1}{\beta}$:
(a) $k[bx^2 + 5x + 3]$
(b) $k[bx^2 - 5x + 3]$
(c) $k[x^2 - 5x + 9]$
(d) $k[x^2 - x + 1]$

39. If $11^7 + 4^7$ is divided by 15 then the remainder is:
(a) 0
(b) 1

(c) 2
(d) – 2

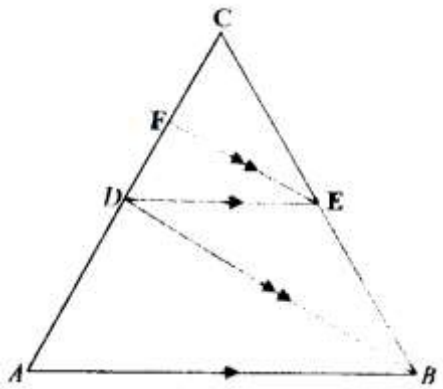
40. If $\sin\theta - \cos\theta = \sqrt{2}\sin(90° - \theta)$, then $\tan\theta$ =
(a) $\sqrt{2} - 1$
(b) $\sqrt{2}$
(c) $1 - \sqrt{2}$
(d) $\sqrt{2} + 1$

41. If $\sin\theta + \sin^2\theta = 1$, then the value of $\cos^2\theta + \cos^4\theta$ is:
(a) 3
(b) 2
(c) 1
(d) 0

42. If $2^{\sin x \cos y}$ $1{,}16^{\sin^2 x \cos^2 y}$ =4then values of sin x and cos y respectively are:
(a) $\frac{1}{2}, \frac{1}{2}$
(b) $\frac{1}{2}, \frac{1}{3}$
(c) 1, - 1
(d) $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$

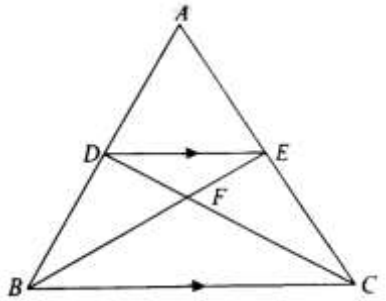
43. If $\text{cosec}\,\theta + \sin\theta = 2$, then the value of $\text{cosec}^{50}\theta + \sin^{50}\theta$ is….
(a) 2
(b) 100
(c) 0
(d) 50

44. In the given figure, AB || DE and BD || EF, then:



(a) $AD^2 = CF \times AC$
(b) $DC^2 = CF \times AC$
(c) $CE^2 = DE \times BF$
(d) $EF^2 = BD.AB$

45. In the given figure DE||BC and AD:DB = 5 :4, find the ratio ar.(ΔCFB):ar. (ΔDEF)



(a) 5 :9
(b) 4 : 9
(c) 25 : 81
(d) 81 : 25

46. The graphs of the equations x – y = 2 and kx + y = 3, where k is a constant, intersect at the point (x, y) in the first quadrant, if and only if k is:
(a) Equal to -1
(b) Greater than – 1
(c) Less than $\frac{3}{2}$
(d) Lying between – 1 and $\frac{3}{2}$

47. Value of $[(0.111)^3 + (0.222)^3 - (0.333)^3 + (0.333)^2(0.222)]^2$
(a) 222
(b) 0
(c) 333
(d) 2

48. $(\sqrt[3]{3}\ \sqrt[3]{2})(\sqrt[3]{9}\ \sqrt[3]{4}\ \sqrt[3]{6})$?
(a) 5
(b) $\sqrt[9]{5}$
(c) $\sqrt[6]{5}$
(d) $\sqrt[3]{5}$

49. If the coordinates of the midpoints of the sides of a triangle are (1, 1), (2, - 3) and (3, 4), then the centroid of the triangle is:
(a) $3, \frac{1}{3}$
(b) $1, \frac{2}{3}$
(c) (3, 1)

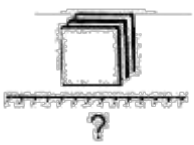
(d) $2,\frac{2}{3}$

50. The condition of points (a, 0), (0, b) and (1, 1) lie on straight line will be:
(a) ab = 1
(b) $\frac{a \quad b}{ab} \quad 1$
(c) a – b = 1
(d) $\frac{ab}{a \quad b} \quad 1$

Section – C
Mental Ability

This section contains **10 Multiple Choice Questions**. Each question has four options out of which **ONLY ONE** is correct.

51. Complete the series.
5,6,10,19,35 ?
(a) 50
(b) 55
(c) 60
(d) 71
52. A letter number series is given with one or more terms missing as shown below. Choose the alternative next in the sequence.
A4X, D9U, G16R, _____
(a) K25P
(b) J25P
(c) J25O
(d) J25C
53. Direction: In a certain code language '782' means 'Flowers are beautiful' '692' means 'Roses are red'628 means 'Roses are 'beautiful'
Which number denotes 'Flowers'?
(a) 8
(b) 7
(c) 2
(d) 6
54. Anmol finds that he is twelfth from the right in a line of boys and fourth from the left, how many boys should be added to the line such that there are 35 boys in the line?
(a) 19
(b) 13
(c) 14
(d) 20
55. Given that
1. A is the mother of B
2. C is the son of A
3. D is the brother of E
4. E is the daughter of B
The grandmother of D is
(a) A
(b) B
(c) C
(d) E
56. Eight members of a group shake hand with one another once. How many hand shakes were done altogether.
(a) 64
(b) 16
(c) 28
(d) 18
57. P,Q,R,S,T,U,V and W are sitting around a round table in the same order, for group discussion at equal distance. Their positions are clockwise. If V sits in the north, then what will be the position of S?
(a) East
(b) South-east
(c) South
(d) South-west
58. Observes the figure below:



First rotate the figure by 90° in clock-wise direction and find out its water reflection from the given alternatives

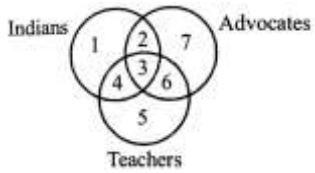
(a) 

(b) 

(c) 

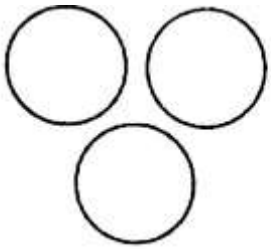
(d) 

59. Which number space indicated Indian teachers who are also advocates?

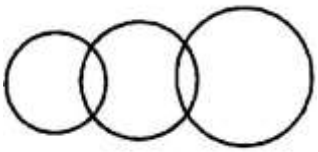


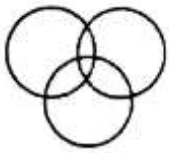
(a) 2
(b) 3
(c) 4
(d) 6

60. Which one of the following diagram represents the correct relationship among
Colour, black and white

(a) 

(b) 

(c) 

(d) 

SPACE FOR ROUGH WORK

SP ACE FOR ROUGH WORK

Answer Key

1	b	21	c	41	c
2	b	22	d	42	a
2	b	23	c	43	a
4	a	24	c	44	b
5	a	25	b	45	c
6	c	26	c	46	d
7	b	27	a	47	b
8	d	28	b	48	a
9	b	29	b	49	d
10	c	30	d	50	b
11	c	31	c	51	c
12	b	32	a	52	c
13	d	33	a	53	b
14	a	34	c	54	d
15	c	35	d	55	a
16	a	36	b	56	c
17	d	37	d	57	d
18	b	38	b	58	b
19	b	39	a	59	b
20	c	40	d	60	b