

### **A. General Instructions**

1. Attempt ALL the questions. Answers have to be marked on the OMR sheets.
2. Time allowed to attempt this paper is **1 hour**.
3. This question paper contains **3 Sections**.
4. **Section- A** MAT (Mental Ability Test)  
**Section- B** (Mathematics)  
**Section- C** (Science) contains **3 Parts**
  - a) **Part-I** is Physics
  - b) **Part-II** is Chemistry
  - c) **Part-III** is Biology
5. Rough spaces are provided for rough work inside the question paper. No additional sheets will be provided for rough work.
6. Blank Papers, clip boards, log tables, slide rule, calculator, cellular phones, pagers and electronic devices, in any form, are not allowed.

### **B. Filling of OMR Sheet**

1. Ensure matching of OMR sheet with the Question paper before you start marking your answers on OMR sheet.
2. On the OMR sheet, darken the appropriate bubble with black pen for each character of your Enrolment No. and write your Name, Test Centre and other details at the designated places.

### **C. Marking Scheme for All Three Sections.**

- (i) **Section-A (01 to 10)** contains 10 multiple choice questions of **MAT** which have only one correct answer. Each question carries **+4 marks** for correct answer and **-1 mark** for wrong answer.
- (ii) **Section-B (11 to 30)** contains 20 multiple choice questions of **Mathematics** which have only one correct answer. Each question carries **+4 marks** for correct answer and **-1 mark** for wrong answer.
- (iii) **Section-C (31 to 60)** contains 30 multiple choice questions of **Science** which have only one correct answer. Each question carries **+4 marks** for correct answer and **-1 mark** for wrong answer.

**Roll No:**

**Name:**

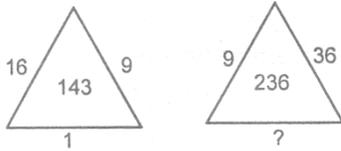
**Batch:**

## Section – A

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

This section contains 25 questions. Each question has 4 choices (A), (B), (C) and (D) for its answer, out of which **ONLY ONE** is correct.

1.

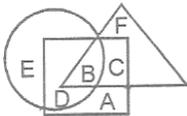


- (A) 38                      (B) 64                      (C) 4                      (D) 16

2.

- Choose a number which is similar to the numbers in the set: 282, 354, 444  
 (A) 453                      (B) 417                      (C) 336                      (D) 255

**Directions: (3 to 5)** In the following diagram, three classes of population are represented by three figures. The triangle represents the school teachers, the square represents the married persons and the circle represents the persons living in joint families.



3. Married persons living in joint families but not working as school teachers are represented by  
 (A) C                      (B) F                      (C) D                      (D) A
4. Persons who live in joint families, are unmarried and do not work as school teachers are represented by  
 (A) C                      (B) B                      (C) E                      (D) D
5. School teachers who are neither married nor do live in joint families are represented by  
 (A) F                      (B) C                      (C) B                      (D) A
6. If a clock shows 04:28 then its mirror image will be?  
 (A) 07:42                      (B) 04:32                      (C) 08:32                      (D) 08:42

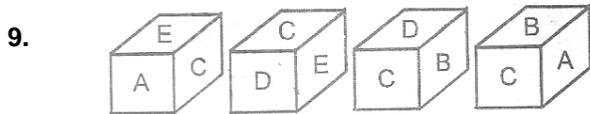
**Directions: (7 to 8)** A cube of side 4 cm is painted black on all of its surfaces and then divided into various smaller cubes of side 1 cm each. The smaller cubes so obtained are separated.

7. How many smaller cubes have two surfaces painted?  
 (A) 4                      (B) 8                      (C) 16                      (D) 24

Space for Rough Work

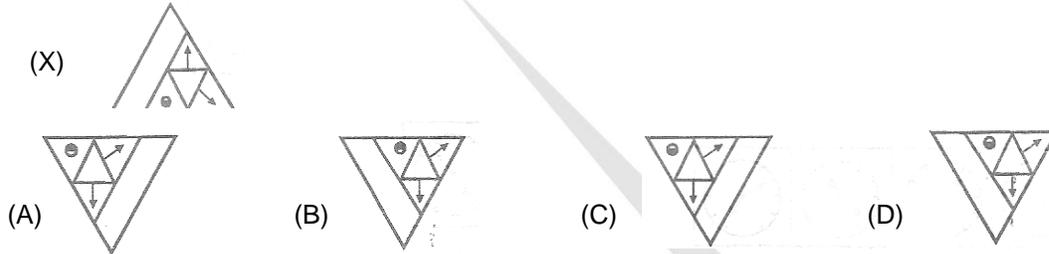
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8. How many smaller cubes have only one surface painted?  
 (A) 8 (B) 16 (C) 24 (D) 32



- Which letter will be opposite to letter D?  
 (A) A (B) B (C) E (D) F

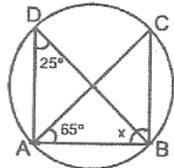
10. Choose the correct water-image from alternatives A, B, C, and D of the Word / figure (X)



## Section-B

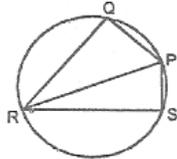
# Mathematics

11. The value of  $x$ , when  $2^{x+4} \cdot 3^{x+1} = 288$   
 (A) 1 (B) -1 (C) 0 (D) 2
12. Simplify  $\frac{1.12 \times (0.0104 - 0.002) + 0.36 \times 0.002}{0.12 \times 0.12}$   
 (A) 11.2 (B) 1.2 (C) 0.02 (D) 0.12
13. What will be the unit digit of  $1^{781} + 2^{781} + 3^{781} + \dots + 9^{781}$ ?  
 (A) 1 (B) 3 (C) 5 (D) 7
14. Find the greatest number less than 100000 which is divisible by 38, 60 and 64  
 (A) 98000 (B) 91200 (C) 76000 (D) 85000
15. Six bells start tolling together and they toll at intervals of 2, 4, 6, 8, 10, 12 sec. respectively, find how many times will they toll together in 30 min?  
 (A) 13 (B) 15 (C) 17 (D) 16
16. A can do a job in 10 days and B is 20 days. They work together, but 4 days before the finish of the job, B leaves. Find the total days to finish the job?  
 (A) 6 (B) 8 (C) 12 (D) 14
17. A thief escaped from police custody. Since he was a sprinter he could run at 40 km/hr. The police realized it after 3 hr. and started chasing him in the same direction at 50 km/hr. The police had a dog which could run at 60 km/hr. The dog could run to the thief and then return to the police and then would turn back towards the thief. It kept on doing so till the police caught the thief. Find the total distance travelled by the dog in the direction of the thief.  
 (A) 720 km (B) 600 km (C) 660 km (D) 360 km
18. In a selection process comprising of written test, group tasks and interview, only 40% of those who appeared for the selection proved qualified in the written test, 80% of those who passed in the written test qualified in group tasks and 65% of those who passed in group tasks qualified for the interview. If the number of those who qualified finally was only 78, what was the total number of candidates who appeared?  
 (A) 375 (B) 150 (C) 120 (D) None of these
19. The salaries of A, B, C are in the ratio 2 : 3 : 5. If the increments of 15%, 10% and 20% are allowed respectively in their salaries, then what will be the new ratio of their salaries?  
 (A) 3 : 3 : 10 (B) 10 : 11 : 20 (C) 23 : 33 : 60 (D) Cannot be determined
20. The number of triangles with any three of the lengths 1, 4, 6 and 8 cms considered is  
 (A) 1 (B) 2 (C) 3 (D) 4
21. Find the value of  $x$  in the given figure.  
 (A)  $85^\circ$   
 (B)  $80^\circ$   
 (C)  $90^\circ$   
 (D)  $75^\circ$



Space for Rough Work

22. In the figure  $\angle QPR = 67^\circ$  &  $\angle SPR = 72^\circ$  and RP is a diameter of the circle, then  $\angle QRS = ?$   
 (A)  $18^\circ$   
 (B)  $23^\circ$   
 (C)  $41^\circ$   
 (D)  $67^\circ$



23. A spherical copper ball of diameter 14 cm is melted and converted into a wire having diameter 14 cm. Find the length of the wire.

- (A)  $\frac{28}{3}$  cm      (B)  $\frac{7}{3}$  cm      (C)  $\frac{14}{3}$  cm      (D)  $\frac{28}{2}$  cm

24. The ratio between the volume of a sphere and the Volume of the circumscribing right cylinders is-

- (A) 2 : 1      (B) 1 : 1      (C) 2 : 3      (D) 3 : 8

25. There are four prime number written in ascending order. The product of the first three is 385 and that of the last three is 1001. The last number is :

- (A) 11      (B) 13      (C) 17      (D) 19

26. The 288th term of the series a,b,b,c,c,c,d,d,d,e,e,e,e,f,f,f,f,.....is :

- (A) u      (B) v      (C) x      (D) w

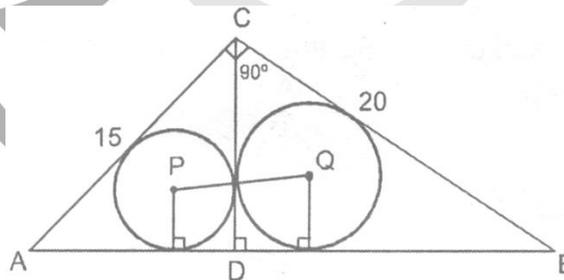
27. A circle of maximum possible area is cut out From a square sheet of area 'A' The area of the Circle is :

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

28. A square, whose side is 2cm, has its corners cut away so as to form an octagon with all sides equal. Then the length of each side of the octagon, in metres, is

- (A)  $\frac{\sqrt{2}}{\sqrt{2}+1}$       (B)  $\frac{2}{\sqrt{2}+1}$       (C)  $\frac{2}{\sqrt{2}-1}$       (D)  $\frac{\sqrt{2}}{\sqrt{2}-1}$

29. In the below figure, ABC is a right-angled triangle. CD is the altitude. Circles are inscribed within the  $\angle ACD$  and  $\angle BCD$ . P and Q are the centers of the circles. The distance PQ is



- (A) 5      (B)  $\sqrt{50}$       (C) 7      (D) 8

30. Diameter of a cylindrical vessel is 60cm. It is filled with water such that a sphere of diameter 30cm is immersed fully into it. Then what is the increase in height of the surface after putting the sphere in the vessel.

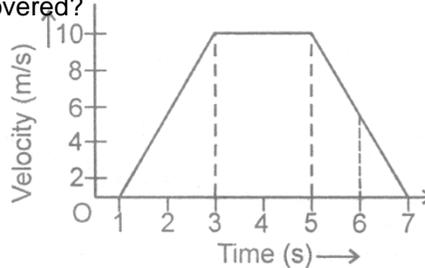
- (A) 2 cm      (B) 3 cm      (C) 4 cm      (D) 5 cm

Space for Rough Work

## Section-C

Part-1  
Physics

31. For the velocity time graph shown in figure the distance covered by the body in the last two seconds of its motion is what fraction of the total distance covered?



- (A) 1/2                      (B) 1/4                      (C) 1/3                      (D) 2/3
32. A person travels along straight road for the first half time with a velocity  $v_1$  and the second half time with a velocity  $v_2$ . The mean velocity  $v$  is given by :
- (A)  $V = \frac{V_1 + V_2}{2}$                       (B)  $\frac{2}{V} = \frac{1}{v_1} + \frac{1}{v_2}$                       (C)  $V = \sqrt{V_1 V_2}$                       (D)  $v = \sqrt{\frac{v_2}{v_1}}$
33. A particle is moving in circular path of radius 35m, then its displacement and distance traveled in metre after completing half revolution will be :  $\left(\pi = \frac{22}{7}\right)$
- (A) 0, 220                      (B) 220, 0                      (C) 70, 110                      (D) 110, 70
34. A wooden block of mass  $m_1$  kg accelerates at  $10 \text{ ms}^{-2}$  when a force of 5 N acts on it. Another block of mass  $m_2$  kg accelerates at  $20 \text{ ms}^{-2}$  when same force acts on it. Find the acceleration if both the blocks are tied together and same force acts on their combination:
- (A)  $1.67 \text{ ms}^{-2}$                       (B)  $4.67 \text{ ms}^{-2}$                       (C)  $6.67 \text{ ms}^{-2}$                       (D) none of these
35. The value of  $g$  on moon is  $1/6$  of the value of  $g$  on earth. A man can jump 1.5 m high of the earth. he can jump on the moon up to a height of:
- (A) 9 m                      (B) 7.5 m                      (C) 6m                      (D) 4.5 m
36. The weight of a block in air is 60 N. When it is immersed completely in water its weight is 52 N. Buoyant force of the block is (in Newton):
- (A) 52                      (B) 60                      (C) 8                      (D) 112

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37. A force of 20 N displaces an object through 2 m and does a work of 20 J. The angle between the force and displacement is:  
 (A)  $30^\circ$  (B)  $60^\circ$  (C)  $90^\circ$  (D)  $0^\circ$
38. Two bodies of masses  $M_A$  and  $M_B$  have equal kinetic energy. The ratio of their momentum is :  
 (A)  $M_B : M_A$  (B)  $M_A : M_B$  (C)  $\sqrt{M_A} : \sqrt{M_B}$  (D)  $M_A^2 : M_B^2$
39. A young son works quickly for two hours and prepares 16 items in a day. His old father works slowly for eight hours and prepares 24 items in a day:  
 (A) son has more power (B) son has more energy  
 (C) both have equal power (D) both have equal energy
40. A force on a particle of 200 g displaces it through a distance of 400 cm in 2 s. If the particle is initially at rest then magnitude of the force will be :  
 (A) 0.1 N (B) 0.2 N (C) 0.3 N (D) 0.4 N

## Part-2

## Chemistry

41. The ratio of number of molecules present in a given mass of oxygen and sulphur trioxide is  
 (a) 2:1  
 (b) 5:2  
 (c) 2:5  
 (d) 1:2
42. Match the entries given in column A with appropriate ones from column B

Column A	Column B
A e/m value varies with the nature of gas	1 Rutherford's atomic model
B Plum pudding model	2 Sun rays
C Mass of the atom is concentrated at the centre of atom	3 Thomson's atomic model
D Continuous spectrum	4 Anode rays

- |     | A | B | C | D |
|-----|---|---|---|---|
| (a) | 2 | 1 | 3 | 4 |
| (b) | 4 | 3 | 1 | 2 |
| (c) | 1 | 2 | 3 | 4 |
| (d) | 4 | 3 | 2 | 1 |
43. The number of atoms in 16 g  $\text{CH}_4$  of is -  
 (a)  $6.023 \times 10^{23}$  (b)  $6.023 \times 10^{21}$  (c)  $3.0125 \times 10^{24}$  (d)  $3.0125 \times 10^{21}$
44. Which of the following is the formula of nitrate ion?  
 (a)  $\text{N}_3^-$  (b)  $\text{NO}_3^-$  (c)  $\text{NO}^+$  (d)  $\text{NO}_2^+$
45. Two elements A (atm. wt. 75) and B (atm wt. 16) combine to yield a compound. The percentage by weight of A in the compound was found to be 75.08. The formula of the compound is -  
 (a) AB (b)  $\text{AB}_2$  (c)  $\text{A}_2\text{B}$  (d)  $\text{A}_2\text{B}_3$
46. When 5 g of Calcium is burnt in 2 g of Oxygen then 7 g of Calcium oxide is produced. What mass of calcium oxide will be produced when 5 g of calcium reacts with 20 g of oxygen?  
 (a) 7 g (b) 2 g (c) 25 g (d) 4 g

Space for Rough Work

47. When a liquid starts boiling, the further heat energy which is supplied -  
(a) is lost to the surrounding as such.  
(b) increasing the temperature of the liquid.  
(c) increases the kinetic energy of the liquid.  
(d) is absorbed as latent heat of vaporisation by the liquid
48. Which of the following is/are application(s) of high compressibility of gases?  
(a) L.P.G. is used as fuel in homes for cooking food.  
(b) Oxygen cylinders are supplied to hospitals.  
(c) C.N.G. is used as fuel in vehicles.  
(d) All of these
49. How much water should be added to 16 ml acetone to make its concentration 48%  
(a) 33.33 (b) 17.33 (c) 20.33 (d) 15.33
50. To separate the various coloured pigments present in a substance which method is used ?  
(a) Sublimation (b) Chromatography (c) Centrifugation (d) Evaporation

### Part-3

## Biology

51. Which of the following will comprise the most appropriate distinction of prokaryotic cells to distinguish them from eukaryotic cells ?  
(A) Lack of DNA and nuclei  
(B) Having dispersed DNA without a bounding nuclear membrane and by their lack of membrane bound organelles like plastids and mitochondria.  
(C) Biochemistry being fundamentally different.  
(D) Lack of ribosomes
52. Cellular macromolecules are  
(A) lipids, water, minerals and sugars  
(B) glycogen, amino acids, minerals and nucleotides  
(C) water, minerals, nucleic acids, amino acids and nucleotides  
(D) sugar's water, minerals, proteins and nucleotides
53. In a cell, number of chromosomes is 44 after first meiosis. The number of chromosomes in its daughter cells after completion of meiosis is  
(A) 44 (B) 22 (C) 11 (D) 66
54. Stages in proper sequence of prophase I are  
(A) Zygotene, Leptotene, Pachytene, Diakinesis and Diplotene  
(B) Leptotene, Zygotene, Pachytene, Diplotene and Diakinesis  
(C) Leptotene, Pachytene, Zygotene, Diakinesis and Diplotene  
(D) Diplotene, Diakinesis, Pachytene, Zygotene and Leptotene

**Space for Rough Work**

55. Match the following and choose the correct option
- |                  |                              |
|------------------|------------------------------|
| a. Osteocytes    | 1. Fluid connective tissue   |
| b. Schwann cells | 2. Skeletal tissue           |
| c. Thrombocyte   | 3. Areolar connective tissue |
| d. Fibroblast    | 4. Nervous tissue            |
- (A) a - 1, b - 3, c - 2, d - 4  
(B) a - 2, b - 4, c - 1, d - 3  
(C) a - 3, b - 2, c - 1, d - 4  
(D) a - 2, b - 4, c - 3, d - 1
56. A nail inserted some years back at 1.5 meter height on a tree trunk shall
- (A) remain where it was  
(B) move upwards  
(C) move downwards  
(D) move laterally
57. Insectivorous plants catch and digest insects for
- (A) obtaining nitrogen  
(B) protecting their leaves  
(C) protecting their fruits  
(D) being heterotrophs of consumer level
58. Many fungi display the phenomenon of heterothallism. What exactly is heterothallism?
- (A) Presence of different types of hyphae acting as male or female  
(B) Production of different kinds of spores  
(C) Presence of a net-like mycelium  
(D) Ability to reproduce both sexually as well as asexually
59. Sponges show
- (A) protoplasmic level of organisation  
(B) cellular level of organisation  
(C) tissue level of organization  
(D) none of the above
60. Excretory organs of arthropods are
- (A) green glands  
(B) green glands and malpighian tubules  
(C) malpighian tubules  
(D) nephridia

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Pinnacle

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Answer Key

1. c	2. a	3. c	4. c	5. a	6. b	7. d	8. c	9. a	10. b
11. a	12. d	13. c	14. b	15. d	16. b	17. c	18. a	19. c	20. a
21. c	22. c	23. a	24. c	25. b	26. c	27. d	28. a	29. b	30. d
31. b	32. a	33. c	34. c	35. a	36. c	37. b	38. c	39. b	40. d
41. d	42. b	43. c	44. b	45. d	46. a	47. d	48. d	49. b	50. b
51. b	52. a	53. a	54. b	55. b	56. a	57. a	58. a	59. b	60. b