SAMPLE PAPER

NAME : _____   **Reg. No. :** _____

Time: **2 Hours**   *Max. Marks:* **245**

INSTRUCTIONS

1. The question paper contains **75** questions in four parts (Part A : Mathematics , Part B : Physics , Part C : Chemistry and Part D : Mental Ability) .

   Part A contains 30 questions (20 objective Questions and 10 Integer Type Qustions), Part B contains 15 questions(10 objective Questions and 5 Integer Type Qustions), Part C contains 15 (10 objective Questions and 5 Integer Type Qustions) questions and Part D contains 15 questions (all objective type).

   Each question has four options A, B, C & D, out of which **only one option is correct.**

   Each **objective type** question carries **+3 marks** for correct answer and **-1 mark** for wrong answer.

   Each **Integer type** question carries **+4 marks** for correct answer and **NO NEGTIVE** marking.

   Please ensure that the Question Paper you have received contains all the QUESTIONS and Pages. If you found some mistake like missing questions or pages then contact immediately to the Invigilator.

2. Indicate the correct answer(s) for each question by filling appropriate bubble(s) in your OMR sheet.

3. Use only HB pencil for darkening the bubble(s).

4. Use of Calculator, Log Table, Slide Rule and Mobile is not allowed.

5. For example if only **'B'** choice is correct then, the correct method for filling the bubble is

A	B	C	D
○	●	○	○

   The answer of the question in any other manner (such as putting ⊘ , cross ⊗, or partial shading ◕ etc.) will be treated as wrong.

PART A: MATHEMATICS

SECTION-I (Objective Type) Q.1 to Q.20 has four choices (A), (B), (C), (D) out of which only **ONE** is correct.

1. The radius and height of a cone are each increased by 20%, then the volume of the cone is increased by
(A) 20%   (B) 40%   (C) 60%   (D) 72.8%

2. If $ab = 2$, $bc = 12$ and $ac = 6$ with a, b and c all natural numbers, then the value of $a + b + c$ equals
(A) 8   (B) 10   (C) 20   (D) 9

3. If α, β are zeroes of $x^2 + 5x + 5$, find the value of $\alpha^{-2} + \beta^{-2}$.
(A) 5/3   (B) 3/5   (C) 10   (D) 1

4. The largest number in the following is
(A) $\dfrac{3}{2^3}$ (B) $\dfrac{1}{4}$ (C) $(0.2)^3$ (D) 0.625

5. $1 + 3\tan^2\theta \sec^2\theta + \tan^6\theta$ equals
(A) $\sec^4\theta$ (B) $\sec^6\theta$ (C) $\cos^4\theta$ (D) $\cos^6\theta$

ROUGH WORK

6. The perpendicular from A on side BC of a $\triangle ABC$ intersects BC at D such that DB = 3 CD, in figure then $AB^2 - AC^2$ equals
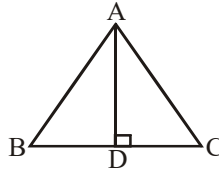

(A) BC^2 　　　　(B) $\dfrac{BC^2}{2}$ 　　　　(C) $\dfrac{BD^2}{2}$ 　　　　(D) BD^2

7. If P (1, 2), Q (4, 6) R (5, 7) and S(a, b) are the vertices of a parallelogram PQRS, then

(A) a = b, b = 4 　　　(B) a = 3, b = 4 　　　(C) a = 2, b = 3 　　　(D) a = 3, b = 5

8. If three positive integer a, b & c are written as $a = x^3y^2z$; $bv = x^2y^3z^2$; $c = x^3y^3z$; xy, z are prime number, then HCF (a, b, c) is equal to

(A) xyz 　　　(B) $x^2y^2z^2$ 　　　(C) xy^2z 　　　(D) x^2y^2z

9. If one of the zeroes of a quadratic polynomial of the form $x^2 + ax + b$ is the negative of the other
(A) has no linear term and constant term is positive
(B) has no linear term and constant term is negative
(C) can have a linear term but constant term is negative
(D) can have a linear term but constant term is positive

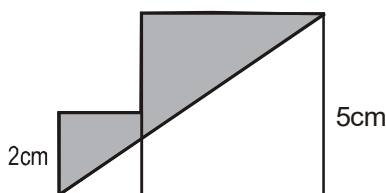**ROUGH WORK**

10. Express the $0.1\bar{2}$ (rational number) in the form of $\frac{p}{q}$, (where p, q $\in$ I)

    (A) $\frac{12}{90}$ (B) $\frac{11}{90}$ (C) $\frac{11}{99}$ (D) $\frac{3}{25}$

11. The number $3^{11} - 3^8$ is divisible by prime numbers:
    (A) 2 and 3 only   (B) 2, 3 and 11 only   (C) 3^{11} only   (D) 2, 3 and 13 only

12. The angles of elevation of the top of a tower from the points P and Q at distance of a and b respectively from the base and in the same straight line with angles are complementary. The height of the tower is :

    (A) ab (B) $\sqrt{ab}$ (C) $\sqrt{\dfrac{a}{b}}$ (D) $\sqrt{\dfrac{b}{a}}$

13. If ABCD is rhombus, then
    (A) $AC^2 + BD^2 = 4AB^2$ (B) $AC^2 + BD^2 = AB^2$
    (C) $AC^2 + BD^2 = 2AB^2$ (D) $2(AC^2 + BD^2) = 3AB^2$

14. Center of a square (point of entersection of digonals of square), with vertices (0, 0), (4, 0), (4, 4), (0, 4) is.
    (A) (1, 1)   (B) (2, 2)   (C) (3, 3)   (D) (4, 4)

15. Find the sum of all the three digit numbers which leave the remainder 2 when divided by 5 :-
    (A) 98910   (B) 68610   (C) 100910   (D) None of these

ROUGH WORK

16. The curved surface area of a cone of height 12 cm and base radius 5 cm is.

(A) 715/7   (B) 1430/7   (C) 1430   (D) 715

17. In an examination, 34% of the students failed in Mathematics and 42% failed in English. If 20% of the students failed in both the subjects, then the percentage of students who passed in both the subject was

(A) 44   (B) 50   (C) 54   (D) 56

18. O is the centre of a circle of diameter 4 cm and OABC is a square, if the shaded area is $\frac{1}{3}$ area of the square, then the side of the square is _____.

(A) $\pi\sqrt{3}$ cm   (B) $\sqrt{3\pi}$ cm

(C) $3\sqrt{\pi}$ cm   (D) 3π cm
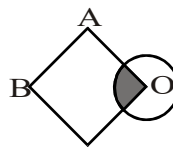
19. Two squares have dimensions as indicated in the drawing. What is the area of the shaded region?

(A) 11.5 sq. cm   (B) 23.5 sq. cm   (C) 5 sq. cm   (D) 17 sq. cm

20. Find the equation of the line which has y-intercept -1 and parallel to $y = 5x - 7$.

(A) $y = -5x + 1$ (B) $y - 5x + 1 = 0$ (C) $y = 5x + 1$ (D) $5y = 5x - 1$

ROUGH WORK

SECTION-II (Integer Type) Q.21 to Q.30 are Integer Type Questions

21. If ΔABC is right angled at A, then value of tan B × tan C is

22. Sum of 30 terms of an arithmetic progression is 0. If the first term is –29, find the sum of the last 3 terms of this arithmetic progression.

23. Find the value of k of which the following system of equations has infinite no. of solutions.
$(k – 1) x + 3y = 7$
$(k + 1) x + 6y = 5k – 1$

24. A three-digit number X has its digits reversed to become Y. The sum of X and Y is 1535. The sum of the digits of X is

25. Two circles of radii 25 cm and 9 cm touch each other externally, then the length of the direct common tangent in cm will be

26. If x = $\sqrt{3 + 2\sqrt{2}}$, then $x^2 + \dfrac{1}{x^2}$ is equal to

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ROUGH WORK

27. John spent Rs. 19.00 at the tuck shop: he bought 2 chocolate bars and 3 packets of chips. The amount he spent on chips was Rs. 3 greater than the amount he spent on chocolate. Jane wants to buy 3 chocolate bars and 3 packets of chips: how much will that cost her (in Rs.)?

28. A child's age, increased by 3, gives a perfect square, and when decreased by 3 the age is the square root of that perfect square, then the age of child is

29. If the number A1234567B is divisible by 45, then the value of A + B equals

30. If α and β are the zeroes of the polynomial $f(x) = x^2 - 3x + k$ such that $\alpha - \beta = 1$, then the value of k equals

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ROUGH WORK

PART B: PHYSICS

SECTION-I (Objective Type) Q.31 to Q.40 has four choices (A), (B), (C), (D) out of which only **ONE** is correct.

31. A negative charge released from a point A moves along the line AB. The potential at A is 15 V, and it varies uniformly along AB. The potential at B :

    (A) may be 10 V   (B) may be 15 V   (C) may be 20 V   (D) must be 15 V

32. If the index finger points towards the north and the middle finger towards the east, by using Flemming's left-hand rule what will be the direction of motion or the force acting on the conductor ?

    (A) South   (B) West   (C) Top   (D) Bottom

33. The radiations that are responsible for the heating effect of solar raditions are

    (A) Visible radiations   (B) X-rays

    (C) Ultra-violet radiations   (D) Infra-red-rediations

34. A deviation in the path of a ray of light can be produced :
    (A) by a glass prism but not by a rectangular glass slab
    (B) by a rectangular glass slab but not by a glass prism
    (C) by a glass prism as well as a rectangular glass slab
    (D) neither by a glass prism nor by a rectangular glass slab

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ROUGH WORK

35. Out of the following :

1. pole   2. focus   3. radius of curvature   4. principal axis

For a spherical mirror, the quantities that do not depend on whether the rays are paraxial or not, are :

(A) all, a, b, c and d (B) only a, b and c (C) only a, c and d (D) only a and d

36. A body falling freely from rest covers 7/16 of the total height in the last second of its fall. The height from which it falls is :

(A) 24.2 m   (B) 38.4 m   (C) 78.4 m   (D) 46.8 m

37. The mass of the sun is 2.0×10^{36} kg and that of the earth is 6.0×10^{24} kg. The distance between the sun and the earth is 1.5×10^{11} m. The gravitational force between the sun and earth is :

(A) 3.56×10^{28} N   (B) 4.56×10^{28} N   (C) 6.56×10^{28} N   (D) 5.56×10^{28} N

38. At the maximum height of a body thrown vertically up :

(A) velocity is not zero but acceleration is zero   (B) acceleration is not zero but velocity is zero

(C) both acceleration and velocity are zero   (D) both acceleration and velocity are not zero

39. An Electrical motor

(A) Converts mechanical energy to electrical energy
(B) Converts mechanical energy to magnetic energy
(C) Converts electrical energy to mechanical energy
(D) Converts electrical energy to magnetic effect

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ROUGH WORK

40.   If KE of a given particle is doubled, its momentum will be :

(A) doubled   (B) tripled

(C) increases by $\sqrt{2}$ times   (D) remains unchanged

ROUGH WORK

SECTION-II (Integer Type) Q.41 to Q.45 are Integer Type Questions

41. How much time in sec will it take to perform 440 J of work at a rate of 11 W ?

42. For the wave shown in the figure, the distance between points A and D is 12 m.
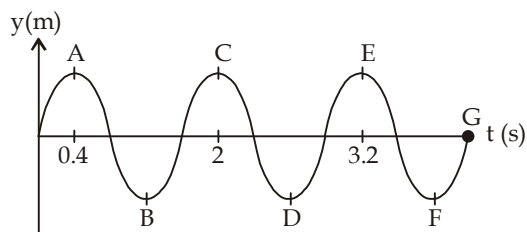
Find the wavelength (in metre) of the wave :

43. If 5×10^{19} electrons are flowing through a wire, find the total amount of charge in Colomb that flows :

44. The frequency of a source of sound is 5 Hz. How many times does it vibrate in 1 minute?

45. Two resistors of 4W and 6W are connected in parallel. The combination is connected across a 6V battery of negligible resistance. If current flowing through the battery is I amp then what will be the value of 2I?

ROUGH WORK

PART C : CHEMISTRY

SECTION-I (Objective Type) Q.46 to Q.55 has four choices (A), (B), (C), (D) out of which only **ONE** is correct.

46. Which of the following reaction will not occur :

    (A)$Mg + H_2SO_4 \longrightarrow MgSO_4 + H_2$

    (B) $Cu + H_2SO_4 \longrightarrow CuSO_4 + H_2$

    (C)$2Al + 6HCl \longrightarrow 2AlCl_3 + 3H_2$

    (D)$Fe + 2HCl \longrightarrow FeCl_2 + H_2$

47. Galvanisation of iron means coating iron with :

    (A)Chromium   (B) Nickel   (C)Zinc   (D) Tin

48 In the reaction, $2H_2S + SO_2 \longrightarrow 3S + 2H_2O$:

    (A)H_2S has been reduced

    (B) SO_2 has been oxidized

    (C)H_2S is the reducing agent

    (D) SO_2 is the reducing agent

49. Chemical formula of washing soda is :

    (A)$Na_2CO_3 . 7H_2O$ (B) $Na_2CO_3 . 5H_2O$ (C)$Na_2CO_3 . 2H_2O$ (D)$Na_2CO_3 . 10H_2O$

50. The important ore of iron is :

    (A)Siderite   (B)Haematite   (C) Pyrites   (D) Bauxite

ROUGH WORK

51. Which of the following indicates the correct order of variation in atomic size ?

    (A) Be > C > F > Ne   (B) Be > C > F < Ne   (C) Be < C < F < Ne   (D) F < Ne < Be < C

52. If element A belongs to group III, and second period of the periodic table, which of the following sets of properties would it exhibit ?

    (A) Liquid, most metallic   (B) Gaseous, moderately metallic

    (C) Solid, nonmetallic   (D) Solid, less metallic

53. Match the following and choose the correct answer :

a. Solid	i.	Super energetic particles
b. Liquid	ii.	No shape nor fixed volume at a given pressure
c. Gas	iii.	Has definite shape
d. Plasma	iv.	Definite shape with less molecular forces than that in solids

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

54. Which of the following correctly represents 360 g of water ?

    (i) 2 moles of H_2O (ii) 20 moles of water

    (iii) 6.022×10^{23} molecules of water   (iv) 1.2044×10^{25} molecules of water

    (A) (i)   (B) (i) and (iv)   (C) (ii) and (iii)   (D) (ii) and (iv)

ROUGH WORK

55. A species 'X' contains 9 protons, 10 electrons and 11 neutrons. It is :

(A) a neutral atom (B) an isotope (C) a cation (D) an anion

ROUGH WORK

SECTION-II (Integer Type) Q.56 to Q.60 are Integer Type Questions

56. Corresponding temperature in the Kelvin scale for 104° F is :

57. what will be the atomicity of NH_3 ?

58. A saturated hydrocarbon has 50 hydrogen atom. The number of carbon atom in the hydrocarbon will be ?

59. An element which is an essential constituent of all organic compound belong to which group of modern periodic table

60. what will be the molecular mass of sulphuric acid ?

ROUGH WORK

PART D: MENTAL ABILITY

Q.61 to Q.75 has four choices (A), (B), (C), (D) out of which only **ONE** is correct.

61. AAZY, DDVU, GGRQ, ?, MMJI, PPFE

    (A) KKMN   (B) MMJN   (C) KKMM   (D) JJNM

62. Arrange the given words in the sequence in which they occur in the dictionary and then choose the correct sequence.

    1. Dissipate   2. Dissuade   3. Disseminate   4. Distract

    5. Dissociate   6. Dissect

    (A) 6 3 1 5 2 4   (B) 1 6 3 2 4 5   (C) 3 6 1 2 5 4   (D) 4 6 3 1 5 2

63. A three centimeter cube has been painted red on all its sides. It is cut into one centimeters cubes. How many cubes will be there with only one side painted red ?

    (A) 4   (B) 6   (C) 1   (D) 9

64. Which one will replace the question mark?

    (A) 3
    (B) 5
    (C) 4
    (D) 6

7	4	5
8	7	6
3	3	?
29	19	31

ROUGH WORK

65. Mohan travels 7 km Eastwards, then he turns right and travels 3 km and further turns right again and travels 11 km. How far is he from the starting point ?

(A) 5   (B) 14   (C) 21   (D) 23

Directions : (Q.66 to 68) Study the figure below and answer the following questions.
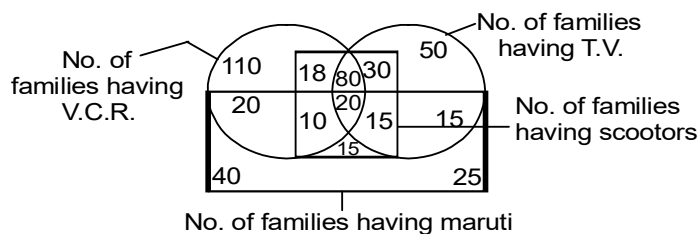
66. Find out the number of families which have all the four things mentioned in the diagram.

(A) 40   (B) 30   (C) 35   (D) 20

67. Find out the number of families which have V.C.R. and T.V. both

(A) 84   (B) 24   (C) 104   (D) 100

68. Find out the number of families which have only one thing, that is, either V.C.R. or T.V. or Scooter or Maruti.

(A) 160   (B) 184   (C) 225   (D) 254

ROUGH WORK

69. Count the number of squares in the given figure.
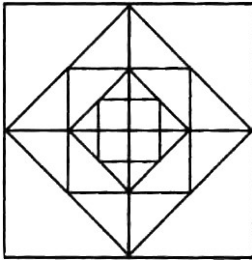
(A) 15 (B) 17 (C) 19 (D) 21

70. Rohan ranked eleventh from the top and twenty-seventh from the bottom among the students who passed the annual examinations is a class. If the number of students who failed in the exams. was 12, how many students did appear for the examinations ?

(A) 48 (B) 49 (C) 50 (D) Can't be determined

Direction (Q.71) : In the following question, choose that set of numbers from the four alternative sets, that is similar to the given set.

71. Given set : (6, 36, 63)
(A) (7,49, 98) (B) (8, 64, 46) (C) (9, 84, 45) (D) (11, 111, 84)

ROUGH WORK

72. Nine carpenters can make nine chairs in nine days, then one carpenter will make three chairs in how many days?

(A) 3   (B) 9   (C) 27   (D) 18

73. In a certain code, **nee po tam** means **boys are studying**, **me tam sam** means **grapes are sour** and **ism po me** means **boys eat grapes**. Which of the following is the code for **sour** in that language ?

(A) ism   (B) tam   (C) me   (D) None of these

74. Twenty four teams are divided into 4 groups of six teams each. Within each group the teams play each other exactly once. The winners of each group then play in the semi-finals. Winners of the semi-finals play in the finals and losers for the 3 place. How many matches are played?

(A) 60   (B) 63   (C) 64   (D) 66

75. Two candles are of different lengths and thicknesses. The short and the long ones can burn respectively for 3.5 hour and 5 hours. After burning for 2 hour, the lengths of the candles become equal in length. What fraction of the long candle's height was the short candle initially ?

(A) $\dfrac{2}{7}$ (B) $\dfrac{5}{7}$ (C) $\dfrac{3}{5}$ (D) $\dfrac{4}{5}$

ROUGH WORK

Answer Key : Sample paper

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13
Ans.	D	D	B	D	B	B	C	D	B	B	D	B	A
Que.	14	15	16	17	18	19	20	21	22	23	24	25	26
Ans.	B	A	B	A	B	A	B	1	81	3	16	30	6
Que.	27	28	29	30	31	32	33	34	35	36	37	38	39
Ans.	23	6	8	2	C	C	D	C	A	C	A	B	C
Que.	40	41	42	43	44	45	46	47	48	49	50	51	52
Ans.	C	40	16	8	300	5	B	C	C	D	B	B	D
Que.	53	54	55	56	57	58	59	60	61	62	63	64	65
Ans.	B	D	D	313	4	24	14	98	D	A	B	B	A
Que.	66	67	68	69	70	71	72	73	74	75			
Ans.	D	D	C	B	B	B	C	D	C	B			