



# School Integrated Program

Class – X

## ENTRANCE TEST CUM SCHOLARSHIP (SAMPLE PAPER-2)

[Time: 3 Hours]

[Max Marks: 450]

### A. General:

1. This booklet is your Question Paper containing 150 questions.
2. Blank Papers, Clipboards, Log Tables, slide rules, calculators, cellular phones, pagers and electronic gadgets in any form are not allowed to be carried inside the examination hall.
3. The answer sheet, a machine-readable optical mark recognition sheet (OMR Sheet), is provided separately.
4. DO NOT TAMPER WITH / MULTIPLE THE OMR OR THE BOOKLET.
5. Please fill your roll number correctly in the OMR sheet (answer sheet).
6. Both Question Paper and OMR Answer Sheet will be submitted after completion of this examination.

### B. Question Paper Format:

1. The Question Paper consists of four parts (Part I: MAT, Part II: Physics, Part III: Chemistry, Part IV: Mathematics).
2. Each Question carries +3 marks for correct answer and -1 mark for incorrect answer.

## MAT

Directions : (Q. Nos. 1-2), select the missing letters/word/numbers from the given alternatives.

- 2, 3, 6, 7, 14, 15, ?  
(a) 16 (b) 30 (c) 31 (d) 32
- 3120, ?, 122, 23, 4  
(a) 4888 (b) 621 (c) 610 (d) 732
- If B becomes A and P becomes O, what will K become in the English alphabet?  
(a) L (b) J (c) H (d) N
- From the given details, estimate the number of people affected by Tuberculosis in particular locality in the year 1994.  
1994                      1995                      1996                      1997                      1998  
?                              92                              113                      141                      176  
(a) 99 (b) 85 (c) 71 (d) 78
- Nithya is Sam's sister. Mogan is Sam's Father. Selvan is Rajan's Son. Rajan is Mogan's brother. How is Nithya related to Selvan?  
(a) Daughter (b) Sister (c) Cousin (d) Wife
- In a certain code language, GRAPE is written as 27354 and FOUR is written 1687. How is GROUP written in that code?  
(a) 27384 (b) 27684 (c) 27685 (d) 27658
- Two squads of soldiers A and B, facing East and West respectively received the following commands - Left turn, About turn, Right turn, Left turn. Which directions would the squads A and B face at the end?  
(a) East, West (b) West, East (c) North, South (d) South, North
- Find out a set of numbers amongst the alternatives given which is most unlike the set given.  
3, 7, 100  
(a) 11, 12, 365 (b) 13, 17, 900 (c) 1, 2, 9 (d) 6, 7, 169
- If A denotes +, B denotes -, C denotes  $\times$  and D denotes  $\div$ , then which of the following statements is true?  
(a)  $9C9B9D9A9 = 17$  (b)  $3A3B3C3A3D3 = 4$  (c)  $8B6D2A4C3 = 15$  (d)  $8A8B8C8 = -48$
- Anand, David, Karim and Mano are fans of games. Each has a different favourite game among hockey, chess, cricket and football. David does not watch cricket and hockey matches. Anand does not like hockey, chess and cricket. Mano does not watch cricket. Which is the favourite game of Karim?  
(a) Chess (b) Cricket (c) Football (d) Hockey

Directions: (Q. Nos. 11-15) Read the following information carefully and answer the questions.

At a party A, B, C, D and E are sitting in a circle. The group comprises a professor, an industrialist and a businessman. The businessman is sitting in between the industrialist and his wife D. A, the professor is married to E, who is the sister of B. The industrialist is seated to the right of C. Both the ladies are unemployed.

11. What is A to B?  
 (a) Brother (b) Uncle  
 (c) Brother-in-law (d) Cannot be determined
12. A is sitting to the right of  
 (a) the industrialist (b) his wife  
 (c) D (d) Cannot be determined
13. Who is the industrialist?  
 (a) D (b) A  
 (c) B (d) Cannot be determined
14. Who is unmarried in the group?  
 (a) Professor (b) Industrialist  
 (c) Businessman (d) Cannot be determined
15. Who among them must be graduate ?  
 (a) B (b) A  
 (c) C (d) None of these

Directions: (Q. Nos. 16-17) Study the number series given below and answer the questions that follow.

7 8 9 7 6 5 3 4 2 8 9 7 2 4 5 9 2 9 7 6 4 7

16. How many 7's are preceded by 9 and followed by 6 ?  
 (a) Two (b) Three (c) Four (d) Five
17. Which figures have equal frequency ?  
 (a) 253 (b) 245 (c) 375 (d) 865

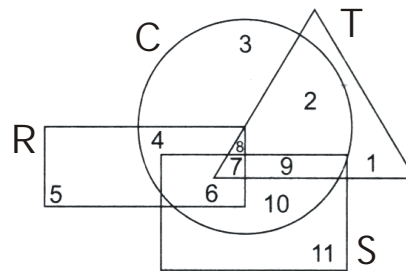
Directions: (Q. Nos. 18-23) Read the following information carefully and answer the questions.

Asha and Charu are good in Mathematics and Athletics. Deepa and Asha are good in Athletics and Studies, Charu and Beena are good in General Knowledge and Mathematics. Deepa, Beena and Ela are good in Studies and General Knowledge. Ela and Deepa are good in Studies and Art.

18. Who is good in Studies, General Knowledge, Athletics and Art?  
 (a) Asha (b) Beena (c) Charu (d) Deepa
19. Who is good in Studies, General Knowledge and Mathematics?  
 (a) Asha (b) Beena (c) Charu (d) Ela
20. Who is good in Studies, Mathematics and Athletics?  
 (a) Asha (b) Beena (c) Charu (d) Deepa
21. Who is good in Athletics General Knowledge and Mathematics?  
 (a) Asha (b) Beena (c) Charu (d) Deepa
22. Who is good in Studies, General Knowledge and Art but not in Athletics ?  
 (a) Asha (b) Beena (c) Charu (d) Ela
23. Who is not good in only one area?  
 (a) Deepa (b) Asha (c) Charu (d) Beena

24. If 25th December of 2008 is Thursday, what will be the day on 1st January of 2010?  
 (a) Friday (b) Saturday (c) Sunday (d) Monday
25. Film actor-director Raj Kapoor died on 2nd June 1988. What day of week was it?  
 (a) Monday (b) Wednesday (c) Thursday (d) Saturday
26. Find the day of the week on August 15, 1947?  
 (a) Tuesday (b) Wednesday (c) Thursday (d) Friday
27. The reflex angle between the hands of a clock at 10 : 25 is  
 (a)  $180^\circ$  (b)  $192\frac{1}{2}^\circ$  (c)  $195^\circ$  (d)  $197\frac{1}{2}^\circ$
28. A watch which gains 5 seconds in 3 min was set right at 7 a.m. In the afternoon of the same day, when the watch indicated quarter past 4 O'clock, the true time is  
 (a)  $59\frac{7}{12}$  min past 3 (b) 4 pm  
 (c)  $58\frac{7}{11}$  min past 3 (d) None of these

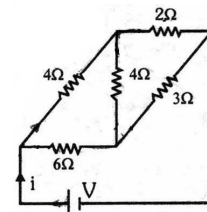
Directions: (Q. Nos. 29-30) In the following figure, rectangle, square, circle and triangle represent the regions of wheat, gram, maize and rice cultivation respectively. On the basis of the figure, answer the following questions.



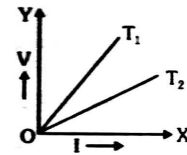
29. Which of the area is cultivated for wheat and maize only ?  
 (a) 8 (b) 6 (c) 5 (d) 4
30. Which of the area is cultivated for maize only?  
 (a) 10 (b) 2 (c) 3 (d) 4

## PHYSICS

31. A cylindrical copper rod has resistance R. It is stretched to twice its original length. Its new resistance is  
 (a) R (b) 2R (c) 4R (d) 8R
32. For the network shown in the figure the value of the current i is  
 (a)  $\frac{9V}{35}$  (b)  $\frac{18V}{5}$   
 (c)  $\frac{5V}{9}$  (d)  $\frac{5V}{18}$
33. A technician has two resistance coils. By using them separately, in series or in parallel, he is able to obtain resistances of 3, 4, 12 and 16 (not in the same order). What is the resistance of the two coils?  
 (a) 4  $\Omega$ , 12  $\Omega$  (b) 7  $\Omega$ , 9  $\Omega$  (c) 5  $\Omega$ , 11  $\Omega$  (d) 6  $\Omega$ , 10  $\Omega$



34. For a metallic conductor, current versus voltage graph is drawn at two different temperatures  $T_1$  and  $T_2$ . From the graph it follows

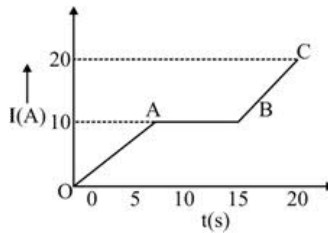


- (a)  $T_1 = T_2$                       (b)  $T_1 > T_2$   
 (c)  $T_1 < T_2$                       (d) None of these

35. If 15 joule of work has to be done against an existing electric field to take a charge of 0.01 C from A to B. Then the potential difference ( $V_B - V_A$ ) is

- (a) 1500 volt                      (b) 150 volt                      (c) 0.15 volt                      (d) 0.0015 volt

36. From graph, calculate the amount of charge flowing through conductor in interval  $t = 10$  s to  $t = 15$  s.

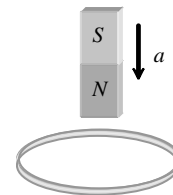


- (a) 50 Coulomb                      (b) 100 Coulomb  
 (c) 150 Coulomb                      (d) 200 Coulomb

37. If the charge on an electron is  $1.6 \times 10^{-19}$  coulombs, how many electron should pass through a conductor in 1 second to constitute 1 ampere current?

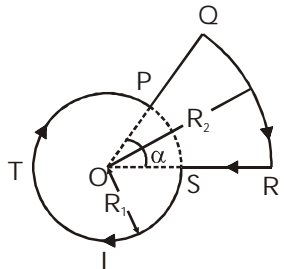
- (a)  $12.50 \times 10^{18}$  electrons                      (b)  $2.5 \times 10^{19}$  electrons  
 (c)  $6.25 \times 10^{18}$  electrons                      (d)  $1.6 \times 10^{18}$  electrons

38. A metallic ring is attached with the wall of a room. When the north pole of a magnet is brought near to it, the induced current in the ring will be



- (a) First clockwise then anticlockwise                      (b) In clockwise direction  
 (c) In anticlockwise direction                      (d) First anticlockwise then clockwise

39. The current-loop PQRSTP formed by two circular segments of radii  $R_1$  and  $R_2$  carries a current of I ampere. Find the magnetic field at the common centre O. what will be the field if angle  $\alpha = 90^\circ$ ?

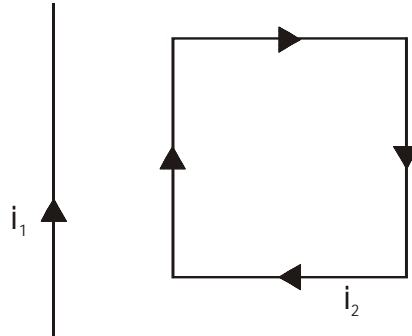


- (a)  $\frac{\mu_0 I}{8} \left( \frac{3}{R_1} + \frac{1}{R_2} \right)$                       (b)  $\frac{\mu_0 I}{8} \left( \frac{3}{R_2} + \frac{1}{R_1} \right)$                       (c)  $\frac{\mu_0 I}{4} \left( \frac{3}{R_1} + \frac{1}{R_2} \right)$                       (d)  $\frac{\mu_0 I}{16} \left( \frac{1}{R_1} + \frac{2}{R_2} \right)$

40. The fact that magnetic field is produced around a wire carrying a current, was first discovered in 1802 by:

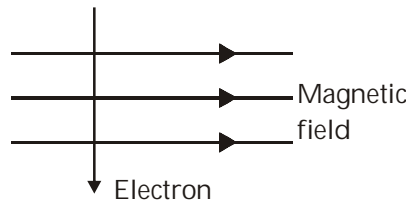
- (a) Faraday                      (b) Oersted                      (c) Maxwell                      (d) Romagnosi

41. Consider the situation shown in figure. The straight wire is fixed but the loop can move under magnetic force. The loop will



- (a) remain stationary.                      (b) move towards the wire.  
 (c) move away from the wire.                      (d) rotate about the wire.

42. An electron enters a magnetic field at right angles to it as shown in figure. The direction of force acting on the electron will be



- (a) To the right                      (b) To the left                      (c) Out of the page                      (d) Into the page

43. Two parallel conductors carrying current in the opposite directions

- (a) Repel each other  
 (b) Attract each other  
 (c) Sometimes attract and sometimes repel each other  
 (d) None of these

44. When a piece of iron is placed in a changing magnetic field, it gets heated due to flow of

- (a) Eddy current                      (b) Faraday's current                      (c) Fleming's current                      (d) None of these

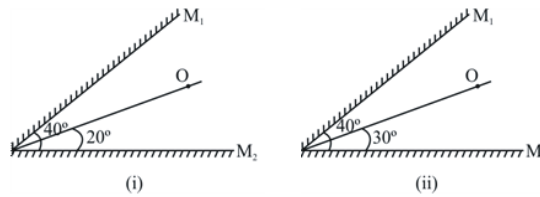
45. Analyse the given statements and choose the correct option.

Statement-I : It is more difficult to push a magnet into a coil with more loops.

Statement-II : This is because emf induced in loop resists the motion of the magnet

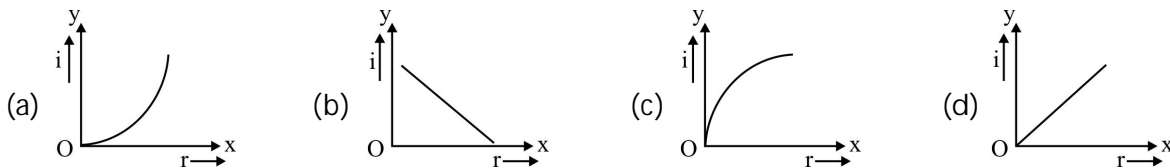
- (a) Both statement-I and statement-II are correct and statement-II is correct explanation of statement-I.  
 (b) Both statement-I and statement-II are true but statement-II is not the correct explanation of statement-I.  
 (c) Statement-I is true but statement-II is false.  
 (d) Statement-I is false but statement-II is true.

46. A loop of wire is rotated about an axis normal to a uniform magnetic field. The direction of the induced current reverses once after every  
 (a) one-fourth rotation (b) half rotation (c) one rotation (d) two rotations
47. In an AC generator, maximum number of lines of force pass through the coil when the angle between the plane of coil and lines of force is \_\_\_\_\_.  
 (a)  $0^\circ$  (b)  $60^\circ$  (c)  $30^\circ$  (d)  $90^\circ$
48. Which of these materials can not be used to make solar cells ?  
 (a) Magnesium (b) High purity silicon (c) Gallium Arsenide (d) Selenium
49. The vast amount of sea weeds present in oceans may provide an endless source of  
 (a) Nuclear energy (b) Methane  
 (c) Ocean thermal energy (d) None of these
50. Find number of images formed according to given case–

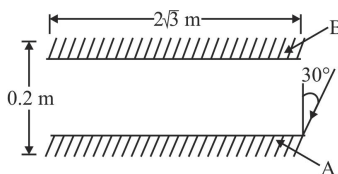


- (a) 8, 9 (b) 9, 8 (c) 9, 9 (d) 8, 8

51. Which of the following correctly represents graphical relation between angle of incidence (i) and angle of reflection (r)?



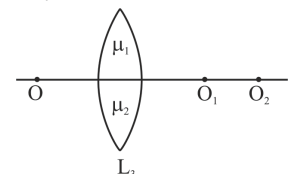
52. If we want to see our full image then the minimum size of the plane mirror:  
 (a) should be twice of our height (b) should be of our height  
 (c) should be half of our height (d) depends upon our distance from mirror
53. Two plane mirrors A and B are aligned parallel to each other, as shown in the figure. A light ray is incident at an angle of  $30^\circ$  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



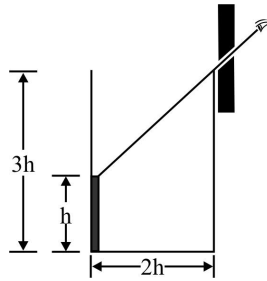
- (a) 31 (b) 33 (c) 32 (d) 34

54. Consider three converging lenses  $L_1$ ,  $L_2$  and  $L_3$  having identical geometrical construction. The index of refraction of  $L_1$  and  $L_2$  are  $\mu_1$  and  $\mu_2$  respectively. The upper half of the lens  $L_3$  has a refractive index  $\mu_1$  and the lower half has  $\mu_2$  (figure). A point object O is imaged at  $O_1$  by the lens  $L_1$  and  $O_2$  by the lens  $L_2$  placed in same position. If  $L_3$  is placed at the same place,

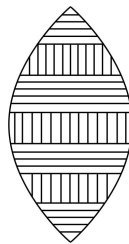
- (a) there will be an image at  $O_1$  only.  
 (b) there will be an image  $O_2$  only.  
 (c) the image will form at both  $O_1$  and  $O_2$   
 (d) the only image will form away from  $O_2$ .



55. An observer can see through a pin-hole the top end of a thin rod of height  $h$ , placed as shown in the figure. The beaker height is  $3h$  and its radius  $h$ . When the beaker is filled with a liquid up to a height  $2h$ , he can see the lower end of the rod. Then the refractive index of the liquid is



- (a)  $5/2$                       (b)  $\sqrt{5/2}$                       (c)  $\sqrt{3/2}$                       (d)  $3/2$
56. A layered lens as shown in the figure is made of two types of transparent materials indicated by different shades. A point object is placed on its axis. The object will form:

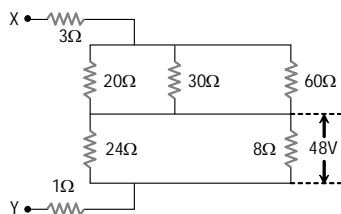


- (a) 1 images                      (b) 2 images                      (c) 3 image                      (d) 9 images
57. When the eye is focused on an object very far away, the focal length of the eye-lens is
- (a) maximum                      (b) minimum  
(c) equal to that of the crystalline lens                      (d) half its maximum focal length

58. (1) The product of a volt and a coulomb is a joule.  
(2) The product of a volt and an ampere is a joule/second.  
(3) The product of volt and watt is horse power.  
(4) Watt-hour can be measured in terms of electron volt.

State if :

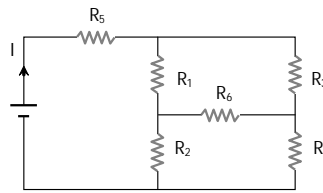
- (a) All four are correct                      (b) (1), (2) and (4) are correct  
(c) (1) and (3) are correct                      (d) (3) and (4) are correct
59. A heating coil can heat the water of a vessel from  $20^\circ\text{C}$  to  $60^\circ\text{C}$  in 30 minutes using a voltage source. Two such heating coils are put in series with same voltage source and then used to heat the same amount of water through the same temperature range. The time taken now will be (neglecting thermal capacity of the coils)
- (a) 60 minutes                      (b) 30 minutes                      (c) 15 minutes                      (d) 7.5 minutes
60. The potential difference across  $8\ \Omega$  resistance is 48 volt as shown in the figure. The value of potential difference across X and Y points will be



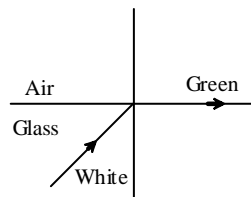
- (a) 160 volt                      (b) 128 volt                      (c) 80 volt                      (d) 62 volt



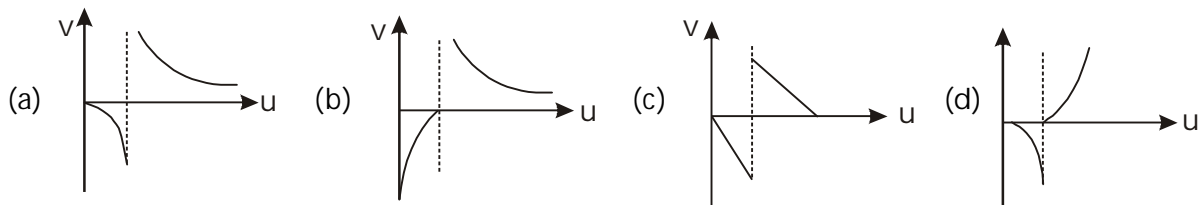
61. In the given circuit, it is observed that the current  $I$  is independent of the value of the resistance  $R_6$ . Then the resistance values must satisfy



- (a)  $R_1 R_2 R_5 = R_3 R_4 R_6$                       (b)  $\frac{1}{R_5} + \frac{1}{R_6} = \frac{1}{R_1 + R_2} + \frac{1}{R_3 + R_4}$
- (c)  $R_1 R_4 = R_2 R_3$                       (d)  $R_1 R_3 = R_2 R_4 = R_5 R_6$
62. A diver in a swimming pool wants to signal his distress to a person lying on the edge of the pool by flashing his water proof flash light
- (a) He must direct the beam vertically upwards  
 (b) He has to direct the beam horizontally  
 (c) He has to direct the beam at an angle to the vertical which is slightly less than the critical angle of incidence for total internal reflection  
 (d) He has to direct the beam at an angle to the vertical which is slightly more than the critical angle of incidence for the total internal reflection
63. White light is incident on the interface of glass and air as shown in the figure. If green light is just totally internally reflected then the emerging ray in air contains



- (a) Yellow, orange, red                      (b) Violet, indigo, blue  
 (c) All colours                      (d) All colours except green
64. As the position of an object ( $u$ ) reflected from a concave mirror is varied, the position of the image ( $v$ ) also varies. By letting the  $u$  changes from 0 to  $+\infty$  the graph between  $v$  versus  $u$  will be



65. A balloon of volume ' $v$ ' and density ' $d$ ' is moving in upward direction in air. If the density of air is ' $D$ ' then the effective upward acceleration of the body is \_\_\_\_\_.
- (a)  $\frac{g(D - d)}{d}$                       (b)  $g\left(\frac{d - D}{d}\right)$                       (c)  $g\left(\frac{d - D}{D}\right)$                       (d)  $g\left(\frac{D - d}{D}\right)$

66. Which one of the following statements is true
- (a) An object situated at the principle focus of a concave lens will have its image formed at infinity  
 (b) Concave mirror can give diminished virtual image  
 (c) Given a point source of light, a convex mirror can produce a parallel beam of light  
 (d) The virtual image formed in a plane mirror can be photographed

67. Match List I with List II and select the correct answer using the codes given below the lists :  
List I (Position of the object)

- (I) An object is placed at focus before a convex mirror
- (II) An object is placed at centre of curvature before a concave mirror
- (III) An object is placed at focus before a concave mirror
- (IV) An object is placed at centre of curvature before a convex mirror

List II (Magnification)

- (A) Magnification is  $-\infty$
- (B) Magnification is 0.5
- (C) Magnification is +1
- (D) Magnification is -1
- (E) Magnification is 0.33

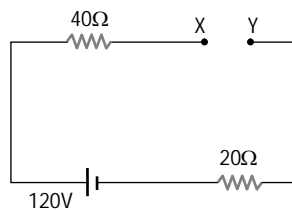
Codes :

- (a) I-B, II-D, III-A, IV-E
- (b) I-A, II-D, III-C, IV-B
- (c) I-C, II-B, III-A, IV-E
- (d) I-B, II-E, III-D, IV-C

68. The refractive index of a certain glass is 1.5 for light whose wavelength in vacuum is  $6000 \text{ \AA}$ . The wavelength of this light when it passes through glass is

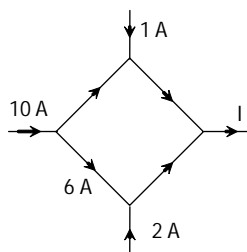
- (a)  $4000 \text{ \AA}$
- (b)  $6000 \text{ \AA}$
- (c)  $9000 \text{ \AA}$
- (d)  $15000 \text{ \AA}$

69. In the circuit shown, potential difference between X and Y will be



- (a) Zero
- (b) 20 V
- (c) 60 V
- (d) 120 V

70. The figure shows a network of currents. The magnitude of currents is shown here. The current I will be



- (a) 3 A
- (b) 9 A
- (c) 13 A
- (d) 19 A

## CHEMISTRY

71. Which of the following is not a redox reaction?  
(a)  $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$  (b)  $\text{Fe} + \text{CuSO}_4 \rightarrow \text{FeSO}_4 + \text{Cu}$   
(c)  $\text{FeO} + \text{CO} \rightarrow \text{Fe} + \text{CO}_2$  (d)  $\text{CuS} + \text{CuO} \rightarrow \text{Cu} + \text{SO}_2$
72.  $\text{BCl}_3$  is a  
(a) Lewis acid (b) Arrhenius acid (c) Bronsted acid (d) Dibasic acid
73. Which of the following turns red litmus blue?  
(a) Water (b) Vinegar (c) Lime water (d) Brine
74. Which of the following is an organic acid?  
(a) Sulphuric acid (b) Nitric acid (c) Hydrochloric acid (d) Acetic acid
75. Which of the following is also known as Vitamin C  
(a) Ascorbic acid (b) Oxalic acid (c) Citric acid (d) Formic acid
76. Which of the following acids when mixed with nitric acid form aqua regia?  
(a) Hydrochloric acid (b) Perchloric acid (c) Sulphuric acid (d) Phosphoric acid
77. "King of acids" is  
(a) Sulphuric acid (b) Nitric acid (c) Hydrochloric acid (d) Phosphoric acid
78. Which of following metals is stored in kerosene?  
(a) Na (b) Ca (c) Al (d) Mg
79. Which of the following metals reacts with NaOH as well as HCl?  
(a) Na (b) Ca (c) Al (d) Mg
80. Metals generally form basic oxides. Which of the following metals form amphoteric oxide?  
(a) Na (b) Zn (c) Mg (d) Ca
81. Oxidation number of Cr in  $\text{CrO}_5$  is  
(a) -5 (b) +5 (c) +10 (d) +6
82. What is pH is 0.1 M HCl solution?  
(a) 1.0 (b) 0.1 (c) 1.01 (d) 0.01
83. Hydrogen gas is not produced when metals react with \_\_\_\_\_acid.  
(a) nitric (b) sulphuric (c) hydrochloric (d) phosphoric
84.  $\text{H}_3\text{PO}_3$  is a \_\_\_\_\_ acid.  
(a) monobasic (b) dibasic (c) tribasic (d) non protic
85. What is pH of 0.01 M monobasic acid solution?  
(a) 2 (b) 1 (c) 3 (d) 4
86. What is colour of phenolphthalein in alkali solution?  
(a) Red (b) Pink (c) Yellow (C) Colourless
87. Which of the following gases is least reactive?  
(a)  $\text{N}_2$  (b)  $\text{H}_2$  (c)  $\text{Cl}_2$  (d)  $\text{O}_2$

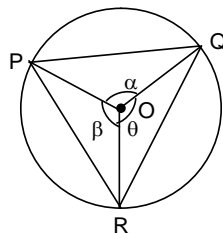
88. What is pH of 0.01 M NaOH solution?  
 (a) 12 (b) 11 (c) 10 (d) 2
89. SO<sub>2</sub> reacts with Cl<sub>2</sub> in the presence of sun light to form  
 (a) Sulphuryl chloride (b) Sulphonyl chloride (c) Sulphur dioxide (d) None of these
90. Which of the following pairs will give displacement reactions?  
 (a) NaCl solution and copper metal. (b) MgCl<sub>2</sub> solution and aluminium metal.  
 (c) FeSO<sub>4</sub> solution and silver metal. (d) AgNO<sub>3</sub> solution and copper metal.
91. Which of the following salts on dissolving in water, will give a solution with pH less than 7 at 298 K?  
 (a) KCN (b) CH<sub>3</sub>COONa (c) NaBr (d) NH<sub>4</sub>Cl
92. In the reaction PbO + C → Pb + CO  
 (a) PbO is reduced (b) C acts as a oxidising agent  
 (c) CO acts as a reducing agent (d) this reaction does not represent redox reaction
93. Ammonia gas is formed by the combination of nitrogen and hydrogen  

$$\text{N}_2 + 3\text{H}_2 \rightarrow 2\text{NH}_3$$
 which of the following statements is not correct about above equation?  
 (a) nitrogen and hydrogen are reactants  
 (b) one molecule of nitrogen combine with 3 molecules of hydrogen and forms two molecules of ammonia  
 (c) one volume of nitrogen and three volume of hydrogen combine and give 2 volume of ammonia gas  
 (d) reactants and products are not gaseous
94. Which of the following statements is/are true?  
 (a) The total mass of the substance remains same in a chemical change  
 (b) A chemical change is permanent and irreversible or reversible  
 (c) A physical change is temporary and reversible  
 (d) All of these
95. What is conjugate base of H<sub>2</sub>SO<sub>4</sub>?  
 (a) HSO<sub>4</sub><sup>-</sup> (b) SO<sub>4</sub><sup>2-</sup> (c) H<sub>3</sub>SO<sub>4</sub><sup>+</sup> (d) SO<sub>4</sub><sup>-</sup>
96. pH + pOH =  
 (a) 14 (b) 7 (c) 6 (d) 0
97. Galena is an ore of  
 (a) Lead (b) Silver (c) Iron (d) Aluminium
98. Which of the following metals is used as catalyst?  
 (a) Na (b) Rb (c) Cs (d) Ni
99. Which of the following gas turns lime water milky?  
 (a) SO<sub>2</sub> (b) NO<sub>2</sub> (c) PH<sub>3</sub> (d) NH<sub>3</sub>
100. \_\_A\_\_ Is called "Phosgene" while \_\_B\_\_ is phosphene gas.  
 (a) A = COCl<sub>2</sub>, B = PH<sub>3</sub> (b) A = CF<sub>2</sub>Cl<sub>2</sub>, B = NH<sub>3</sub>  
 (c) A = CCl<sub>4</sub>, B = PH<sub>3</sub> (d) A = NH<sub>3</sub>, B = PH<sub>3</sub>

101. Which one of the following reactions is an example of thermal decomposition?
- (a)  $\text{CaCO}_3 (\text{s}) \rightarrow \text{CaO} (\text{s}) + \text{CO}_2 (\text{g})$       (b)  $2\text{HOCl} (\text{aq}) \rightarrow \text{O}_2 (\text{g}) + \text{HCl} (\text{g})$   
(c)  $2\text{AgCl} (\text{l}) \rightarrow 2\text{Ag} (\text{s}) + \text{Cl}_2 (\text{g})$       (d)  $2\text{H}_2\text{O} (\text{l}) \rightarrow 2\text{H}_2 (\text{g}) + \text{O}_2 (\text{g})$
102. Which of the following metals can be extracted using zone refining ?
- (a) Si                                      (b) Mg                                      (c) Na                                      (d) Sc
103. Calculate the  $K_a$  value of a 0.2 M aqueous solution of propionic acid,  $\text{CH}_3\text{CH}_2\text{CO}_2\text{H}$ , with a pH of 4.88
- (a)  $K_a = 8.69 \times 10^{-10}$       (b)  $K_a = 7.69 \times 10^{-10}$       (c)  $K_a = 6.97 \times 10^{-10}$       (d)  $K_a = 5.69 \times 10^{-10}$
104. Which of the following statements is incorrect regarding bleaching powder?
- (a) It is a yellowish white powder which gives strong smell of chlorine.  
(b) It is soluble in water leaving behind a small residue of lime.  
(c) When exposed to air, bleaching powder deteriorates giving off chlorine  
(d) When it is treated with excess dilute acid, oxygen gas is produced.
105. Which of the following substances act as Antichlor ?
- (a) Sodium thiosulphate                                      (b) Sodium bicarbonate  
(c) Sodium sulphite    (d) Sodium chloride
106. Match the column A with column B.
- | Column A            | Column B  |
|---------------------|---|
| (I) Washing Soda    | P $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ |
| (II) Glauber's salt | Q $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ |
| (III) Blue Vitriol  | R $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$           |
| (IV) Epsom Salt     | S $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$           |
- (a) I  $\rightarrow$  Q, II  $\rightarrow$  P, III  $\rightarrow$  S, IV  $\rightarrow$  R      (b) I  $\rightarrow$  P, II  $\rightarrow$  Q, III  $\rightarrow$  R, IV  $\rightarrow$  S  
(c) I  $\rightarrow$  R, II  $\rightarrow$  S, III  $\rightarrow$  P, IV  $\rightarrow$  Q      (d) I  $\rightarrow$  S, II  $\rightarrow$  R, III  $\rightarrow$  Q, IV  $\rightarrow$  P
107. A solution of hydrazine,  $\text{N}_2\text{H}_4$ , has a concentration of 0.25 M. What is the pH and the percentage ionization of the hydrazine? ( $K_b = 9.6 \times 10^{-7}$ )
- (a) 10.69, 0.20%      (b) 12.9, 2.0%      (c) 11.69, 0.40%      (d) 12.5, 0.90%
108. A solution of HCl has pH of 2.50. How many grams of HCl are there in 250 mL of this solution ?
- (a)  $9.1 \times 10^{-5}$  g      (b)  $2.9 \times 10^{-2}$  g      (c)  $9.4 \times 10^{-3}$  g      (d)  $4.8 \times 10^{-3}$  g
109. In the cyanide extraction process of silver from argentite ore, the oxidizing and reducing agents used are.
- (a)  $\text{O}_2$  and CO      (b)  $\text{O}_2$  and Zn dust      (c)  $\text{HNO}_3$  and Zn dust      (d)  $\text{HNO}_3$  and CO
110. In blast furnace iron oxide is reduced by
- (a) Silica                                      (b) CO                                      (c) Carbon                                      (d) Lime stone

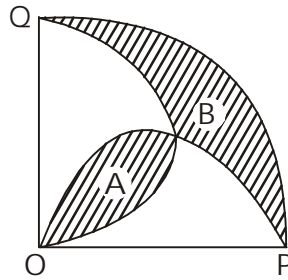
# MATHEMATICS

111. If  $a, b,$  and  $c$  are the solutions of the equation  $x^3 - 3x^2 - 4x + 5 = 0$ , find the value of  $\frac{1}{ab} + \frac{1}{bc} + \frac{1}{ca}$
- (a)  $-3/4$                       (b)  $3/5$                       (c)  $-4/5$                       (d)  $-3/5$
112. The value of  $\cos^2 5^\circ + \cos^2 10^\circ + \cos^2 15^\circ + \dots + \cos^2 90^\circ$  is:
- (a) 0                              (b)  $8\frac{1}{2}$                       (c) 10                              (d)  $2\frac{1}{2}$
113. In a number of two digits, unit's digit is twice the tens digit. If 36 be added to the number, the digits are reversed. The number is :
- (a) 36                              (b) 63                              (c) 48                              (d) 84
114. If  $x = p \sec \theta$  and  $y = q \tan \theta$  then :
- (a)  $x^2 - y^2 = p^2q^2$                       (b)  $x^2q^2 - y^2p^2 = pq$
- (c)  $x^2q^2 - y^2p^2 = \frac{1}{p^2q^2}$                       (d)  $x^2q^2 - y^2p^2 = p^2q^2$
115. If  $f(x) = 2x^4 - 13x^2 + ax + b$  is divisible by  $x^2 - 3x + 2$  then  $(a, b) =$
- (a)  $(-9, -2)$                       (b)  $(6, 4)$                       (c)  $(9, 2)$                       (d)  $(2, 9)$
116. If  $\alpha, \beta, \gamma$  are roots of  $x^3 + 4x + 1 = 0$  then the equation whose roots are  $\alpha^2 / (\beta + \gamma), \beta^2 / (\gamma + \alpha)$  and  $\gamma^2 / (\alpha + \beta)$  can be
- (a)  $x^3 - 4x - 1 = 0$                       (b)  $x^3 - 4x + 1 = 0$                       (c)  $x^3 + 4x - 1 = 0$                       (d)  $x^3 + 4x + 1 = 0$
117. The probability of choosing randomly a number  $c$  from the set  $\{1, 2, 3, \dots, 9\}$  such that quadratic equation  $x^2 + 4x + c = 0$  has real roots is
- (a)  $1/9$                               (b)  $2/9$                               (c)  $3/9$                               (d)  $4/9$
118. If  $x^2 = 3x - 1$ , then the value of  $\frac{x^6 + 1}{x^3}$  is
- (a) 17                              (b) 18                              (c) 19                              (d) 20
119.  $\left(1 - \frac{1}{n}\right)\left(1 - \frac{1}{n+1}\right)\left(1 - \frac{1}{n+2}\right) \dots \left(1 - \frac{1}{2n}\right)$  is
- (a)  $\frac{1}{2n}(n-1)$                       (b)  $\frac{1}{2n}$                               (c)  $\frac{1}{n}$                               (d)  $\frac{2n}{n-1}$
120. In the figure, area of circle is 50sq. cm and the area of triangle is 15 sq. cm, then  $\sin \theta + \sin \alpha + \sin \beta = \dots$

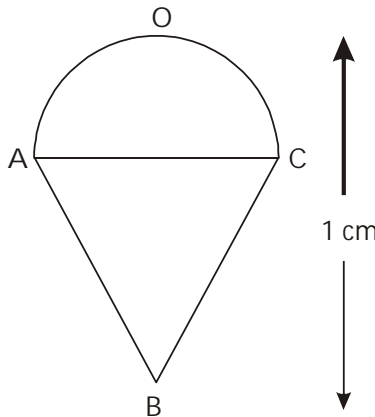


- (a)  $\frac{9\pi}{10}$                               (b)  $\frac{3\pi}{5}$                               (c)  $6\pi$                               (d) none of these

121. When  $2^{256}$  is divided by 17 the remainder would be :  
 (a) 10 (b) 16 (c) 14 (d) None of these
122. OPQ is a quadrant of a circle with centre O and semicircles are drawn on it, as shown in figure then A : B =

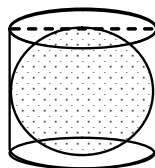


- (a) 1 : 2 (b) 2 : 1 (c) 3 : 2 (d) 1 : 1
123. If  $a \in \mathbb{R}$ ,  $b \in \mathbb{R}$ ,  $a \neq 0$  then the equation  $x^2 - abx - a^2 = 0$  has :  
 (a) one positive root and one negative root (b) both positive root  
 (c) both roots negative (d) non real roots
124. Mean of  $n$  numbers  $x_1, x_2, \dots, x_n$  is  $m$ . If  $x_n$  is replaced by  $x$ , then the new mean is  
 (a)  $m - x_n + x$  (b)  $\frac{mn - x_n + x}{n}$  (c)  $\frac{(n-1)m + x}{n}$  (d)  $\frac{m - x_n + x}{n}$
125. On her vacation Deepika visits four cities A, B, C and D in a random order. What is the Probability that she visits A before B ?  
 (a)  $\frac{3}{4}$  (b)  $\frac{1}{2}$  (c)  $\frac{5}{24}$  (d)  $\frac{1}{4}$
126. If  $\sin x + \cos x - \sqrt{2} \sin x = 0$ , then value of  $\tan^2 x + \cot^2 x$  is  
 (a) 8 (b) 6 (c) 1 (d)  $\frac{1}{2}$
- 127.** ABC is an equilateral triangle. With side AC as diameter a semicircle is drawn as shown in the figure. If OB = 1 cm, then what is length of side of equilateral triangle. (Given, O is the farthest point from B on the semicircle)



- (a)  $\frac{\sqrt{3} + 1}{2}$  (b)  $\frac{\sqrt{3} - 1}{2}$  (c)  $\sqrt{3} + 1$  (d)  $\sqrt{3} - 1$

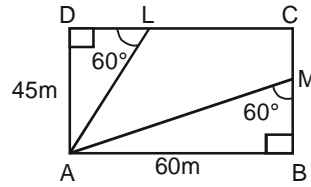
128.  $P(x)$  is a polynomial of degree 4 with leading coefficient 1, such that  $P(1) = 1$ ,  $P(2) = 2$ ,  $P(3)$ ,  $P(4) = 4$ , then  $P(5) =$   
 (a) 5 (b) -5 (c) 0 (d) none of these
129. The angle of elevation of a cloud from a point  $h$  metre above a lake is  $\theta$ . The angle of depression of its reflection in the lake is  $45^\circ$ . The height of the cloud is  
 (a)  $h\left(\frac{1+\tan\theta}{1-\tan\theta}\right)$  (b)  $h\left(\frac{1-\tan\theta}{1+\tan\theta}\right)$  (c)  $h\left(\frac{\tan\theta}{1+\tan\theta}\right)$  (d) none of these
130.  $p, q, r, s$  are four positive integers such that the product  $p.q.r.s$  is odd. If  $x = p^n + q^n$  and  $y = q^n + r^n + s^n$ , then  $(-1)^x + (-1)^y =$  \_\_\_\_\_ (where  $n$  is natural number)  
 (a) 0 (b) -2 (c) 2 (d) can't be determined
131. L.C.M. of  $2017^{2017} - 1$ , and  $2017^{2017} + 1$  is .....  
 (a)  $2017^{4034} + 1$  (b)  $(2017)^{4034} - 1$  (c)  $\frac{1}{2}(2017^{4034} - 1)$  (d)  $\frac{4034^{4034} - 1}{2}$
132.  $\sqrt{-\sqrt{3} + \sqrt{3 + 8\sqrt{7 + 4\sqrt{3}}}}$  =  
 (a) 1 (b) 3 (c) 2 (d) 0
133. If  $\sin x + \sin^2 x = 1$ , then the value  $\cos^2 x + \cos^4 x$  is  
 (a) 1 (b) 2 (c) 0 (d) -1
134. If the polynomial  $ax^3 + bx - c$  is exactly divisible by  $x^2 + bx + c$ , then  $\frac{ac}{b} + ab$  can be  
 (a) -1 (b) 3 (c) 1 (d) 0
135. If  $7^{1/3} + 49^{1/3}$  is a root of cubic equation, then the product of all the roots of that equation is  
 (a) 7 (b) 49 (c) -49 (d) 56
136. The minimum value of  $2x^2 - 3x + 5$  is  
 (a)  $\frac{31}{8}$  (b)  $\frac{29}{8}$  (c)  $\frac{31}{16}$  (d)  $\frac{29}{16}$
137. Consider the following two sets of equations  
 I.  $2x - y = 0$  and  $6x - 3y = 0$   
 II.  $3x - 4y = 0$  and  $12x - 20y = 0$ , then  
 (a) both sets I and II has unique solutions  
 (b) set I has unique solution and set II has infinitely many solution  
 (c) set II has unique solution and set I has infinitely many solutions  
 (d) none of the sets I and II has unique solution.
138. In the figure a right circular cylinder just encloses a sphere of radius  $r$ . Find curved surface area of the cylinder



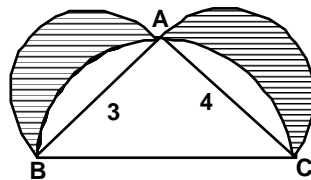
- (a)  $2\pi r^2$  (b)  $6\pi r^2$  (c)  $4\pi r^2$  (d) None of these



139. In the given figure, ABCD is a rectangle, segments AL and AM are drawn as shown. Then the length of (AL + AM) is



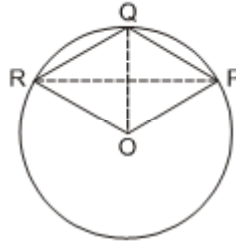
- (a)  $40\sqrt{3}$  m                      (b)  $60\sqrt{3}$  m                      (c)  $70\sqrt{3}$  m                      (d)  $30\sqrt{3}$  m
140. The LCM of two numbers is 630 and their HCF is 9. If the sum of the numbers is 153, their difference is:
- (a) 63                                      (b) 27                                      (c) 81                                      (d) 18
141. If  $m$  is any positive integer, then value of  $\left[ \sqrt{m + \sqrt{m + \sqrt{m + \dots}}} \right] - \left[ \sqrt{m - \sqrt{m - \sqrt{m - \dots}}} \right]$  is:
- (a) 1                                      (b) 0                                      (c) -1                                      (d) Depends on 'm'
142. The least multiple of 7, which leaves a remainder of 4, when divide by 6, 9, 15 and 18 is:
- (a) 273                                      (b) 196                                      (c) 182                                      (d) 364
143. If mean and meadian of a data are 30, 25 respectively then its mode will be :
- (a) 5                                      (b) 10                                      (c) 15                                      (d) 25
144. If  $A$  and  $B$  are complementary angles ( $0^\circ < A < 90^\circ$ ) and  $\sin A = \frac{1}{2}$ , then the value of  $(\cos A \sin B - \sin A \cos B)$  is
- (a) 0                                      (b) 1                                      (c)  $\frac{1}{2}$                                       (d) 2
145. A and B can do a piece of work in 12 days ; B and C in 15 days; C and A in 20 days. In how many days can A alone do it ?
- (a)  $15\frac{2}{3}$                                       (b) 24                                      (c) 30                                      (d) 40
146. The number of solid spheres, each of diameter 6cm, that could be moulded to form a solid metal cylinder of height 45cm and diameter 4cm, is
- (a) 13                                      (b) 4                                      (c) 5                                      (d) 6
147. In the figure, ABC is a right-angled triangle, right angled at A. Semicircles are drawn on AB, AC and BC as diameters (as shown in the figure). Find the area of the shaded region.



- (a) 6 sq. units                      (b) 8 sq. units                      (c) 7 sq. units                      (d) 9 sq. units
148. The condition that one root of the equation  $ax^2 + bx + c = 0$ ,  $a \neq 0$  may be double of the other is
- (a)  $b^2 = 9ac$                       (b)  $2b^2 = 9ac$                       (c)  $2b^2 = ac$                       (d)  $b^2 = ac$

149. If the zeros of the polynomial  $f(x) = x^3 - 6x^2 + x + 10$  are  $a - b$ ,  $a$ ,  $a + b$  then the value of  $b =$   
(a)  $\pm 1$                       (b)  $\pm 2$                       (c)  $\pm 3$                       (d) None of these

150. In the given figure, OPQR is a rhombus three of whose vertices are on the circle with centre O.  
If the area of the rhombus is  $32\sqrt{3}$  cm<sup>2</sup> then radius of circle is:



(a) 6 cm

(b) 2 cm

(c) 4 cm

(d) 8 cm