

# School Integrated Program

Class – X

## ENTRANCE TEST CUM SCHOLARSHIP (SAMPLE PAPER-1)

[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. 1 - 3):** In the following questions, four options (numbers/number, pairs/letter groups) are given. Three of them are alike in a certain way and one is different. Find the odd one out from the alternatives.

1. (a) 242 (b) 80 (c) 25 (d) 728
2. (a) EBD (b) IFH (c) QMO (d) YVX
3. (a) BDGK (b) JLOS (c) HJMQ (d) MORU

**Directions (Q. 4 - 8):** In the following questions, numbers are written in a sequence. Find the missing number, to replace the question mark, from the given alternatives.

4. KM1, IP3, GS6, EV11, ?  
(a) BX18 (b) BY16 (c) CY18 (d) CZ18
5. 23, 48, 99, 203, 413, ?  
(a) 826 (b) 837 (c) 835 (d) 833
6. 5, 9, 16, 29, 54, 103, ?  
(a) 94 (b) 102 (c) 103 (d) 200
7. 4, 5, 7, 10, 11, 13, 16, ?  
(a) 48 (b) 38 (c) 20 (d) 14
8. 47, 53, 59, ?, 67, 71  
(a) 61 (b) 63 (c) 64 (d) 65

**Directions (Q. 9 & 10):** Find out the wrong number in the series:

9. 2, 3, 4, 6, 12, 12, 48, 24, 250  
(a) 4 (b) 6 (c) 24 (d) 250
10. 3, 11, 31, 68, 131, 223  
(a) 131 (b) 68 (c) 223 (d) 31
11. If the word TRIPPLE is coded as DMOQHSS, how the word VICTORY will be coded?  
(a) UJBUNSX (b) WHDSPQZ (c) XSNUBJU (d) ZXPSDHW
12. If the word GRANDEUR is coded as NARGRUED, which word will be coded as SERPEVRE?  
(a) PERSERVE (b) PRESEVER (c) PERSEVER (d) PRESERVE

**Directions (Q. 13 - 17):** Study the information given below and answer the questions that follow:

(i) P, Q, R, S, T and U are six students procuring their Master's degree in six different subjects- English, History, Chemistry, Physics, Hindi and Mathematics.

(ii) Two of them stay in a hostel, two stay as Paying Guest (PG) and the remaining two stay at home.

(iii) R does not stay as PG and studies Chemistry.

(iv) The students studying Hindi and History do not stay as Paying Guest (PG).

(v) T studies Mathematics and S studies Physics.

(vi) U and S stay in a hostel. T stays as Paying Guest (PG) and Q stays at home.

13. Who studies English?  
(a) R (b) P (c) S (d) T

14. Which of the following combinations of subject and place of stay is not correct?  
 (a) English-Hostel (b) Chemistry-Home  
 (c) Mathematics-Paying Guest (d) Physics-Hostel
15. Which of the following pairs of students stay one each at hostel and at home?  
 (a) QR (b) SR (c) PQ (d) PS
16. Which subject does Q study?  
 (a) History (b) Hindi (c) History or Hindi (d) None of these
17. Which of the following pairs of students stay at home?  
 (a) PQ (b) QR (c) RS (d) ST
18.  $A + B$  means A is Father of B  
 $A - B$  means A is Wife of B  
 $A \times B$  means A is brother of B  
 $A \div B$  means A is Daughter of B  
 If  $P + R \div Q$ , Which of the following is true?  
 (a) P is the Brother of Q (b) P is the Son of Q  
 (c) P is the Husband of Q (d) P is the father of Q

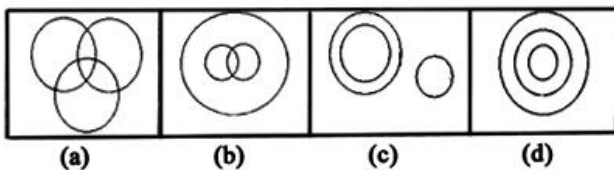
**Directions (Q. 19 & 20): Study the information given below and answer the questions that follow:**

**On a playground, Dinesh, Kunal, Nitin, Atul and Prashant are standing as described below facing the North.**

- (i) Kunal is 40 metre to the right of Atul.**  
**(ii) Dinesh is 60 metre to the South of Kunal.**  
**(iii) Nitin is 25 metre to the West of Atul.**  
**(iv) Prashant is 90 metre to the North of Dinesh.**

19. Who is to the North-East of the person who is to the left of Kunal?  
 (a) Dinesh (b) Nitin (c) Atul (d) Prashant
20. If a boy walks from Nitin, meets Atul followed by Kunal, Dinesh and then Prashant, how many metres has he walked if he has travelled the straight distance all through?  
 (a) 155 m (b) 185 m (c) 215 m (d) 245 m
21. In a row of girls, Kashish is fifth from the left and Mona is sixth from the right. When they interchange their places among themselves, Kashish becomes thirteenth from the left. Then what will be Mona's position from the right?  
 (a) Fourth (b) Eighth (c) Fourteenth (d) Fifteenth
22. Reaching the place of meeting 15 minutes before 8.30 am, Anuj found himself half an hour earlier than the man who was 40 minutes late. What was the scheduled time of meeting?  
 (a) 8.00 am (b) 8.05 am (c) 8.15 am (d) 8.10 am

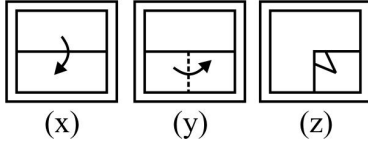
**Directions (Q. 23 - 26): In each of the following questions, patterns of circles are used to represent the relationship among different items. Each circle represents an item. Which of the patterns represent the best relationship among the items given in the following question?**



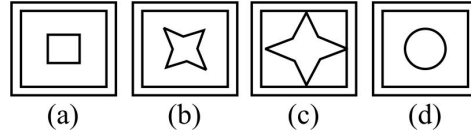
23. Human beings, Teachers, Educated
24. Antisocial Elements, Pickpockets, Black mailers
25. Boys, Students, Players
26. Instrumentalists, Musicians, Violinists

**Directions (Q. 27 & 28):** In following questions, three figures (x), (y) and (z) showing a sequence of folding a paper are given. The figure depicts the cut made on the folded paper. Select the answer from the alternatives, which would most closely resemble the third figure, when it is unfolded.

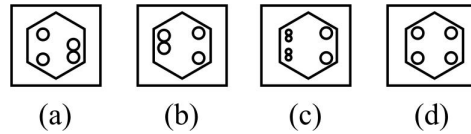
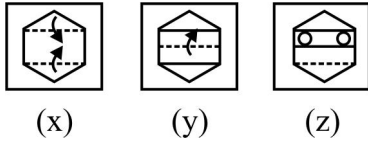
27. **Problem Figures**



**Answer Figures**



28.



**Directions (Q. 29 - 30):** Study the information given below and answer the questions that follow:

A wooden cube is painted Blue on all four lateral sides and Green on two opposite sides i.e. top and bottom. It is then cut at equal distances at right angles, two times on each dimension.

29. How many cubes will have only one face painted in Blue?  
 (a) 1                                      (b) 2                                      (c) 3                                      (d) 4
30. How many cubes will have only one face painted in Green?  
 (a) 1                                      (b) 2                                      (c) 3                                      (d) 4

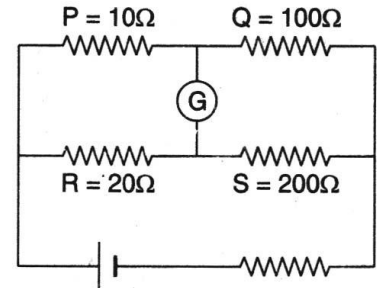
## PHYSICS

31. n equal resistors are first connected in series and then connected in parallel. What is the ratio of the maximum to the minimum resistance?  
 (a) n                                      (b)  $1/n^2$                                       (c)  $n^2$                                       (d)  $1/n$
32. Two resistances  $R_1$  and  $R_2$  consume power at the rate of 25 W and 100 W respectively when connected in series and parallel across the same 120V line. Then the ratio of power consumed by  $R_1$  to that consumed by  $R_2$  when connected across a 120 V line separately will be:  
 (a) 1 : 1                                      (b) 1 : 2                                      (c) 2 : 1                                      (d) 1 : 4
33. The masses of the three wires of copper are in the ratio of 1 : 3 : 5 and their length are in the ratio of 5 : 3 : 1. The ratio of their electrical resistances is:  
 (a) 1 : 3 : 5                                      (b) 5 : 3 : 1                                      (c) 1 : 25 : 125                                      (d) 125 : 15 : 1
34. Two resistances are joined in parallel whose resultant is  $6/5$  ohm. One of the resistance wires is broken and the effective resistance becomes 2 ohm. Then the resistance in ohm of the wire that got broken was:  
 (a)  $3/5$                                       (b) 2                                      (c)  $6/5$                                       (d) 3
35. In a neon gas discharge tube  $2.9 \times 10^{18}$  ions move to the right through a cross-section of the tube each second, while  $1.2 \times 10^{18}$  electrons move to the left in this time. The electronic charge is  $1.6 \times 10^{-19}$  coulomb. Then the net electric current in the tube is:  
 (a) 1 amp to the right                                      (b) 0.66 amp. to the right  
 (c) 0.66 amp. to the left                                      (d) Zero

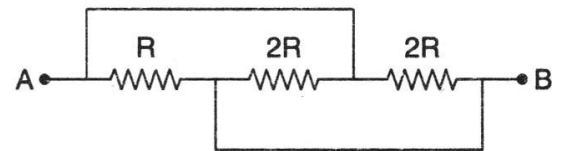
36. Two electric bulbs, one of 200 volt –40 watt and the other of 200 volt–100 watt are connected in a house wiring circuit:
- (a) They have equal currents through them
  - (b) The resistance of the filaments in both the bulbs is same
  - (c) The resistance of the filament in 40 watt bulb is more than the resistance in 100 watt bulb
  - (d) The resistance of the filament in 100 watt bulb is more than the resistance in 40 watt bulb

37. Electric bulbs rated 50 watt and 100 volt and glowing at full power, are used in parallel with a battery of e.m.f 120 volt and internal resistance 10 ohm. The maximum number of bulbs that can be connected in the circuit when glowing at full power is:
- (a) 8
  - (b) 6
  - (c) 4
  - (d) 2

38. Figure below shows a balanced wheatstone's network. Now, it is disturbed by changing P to 15 Ω. Which of the following steps will not bring the bridge to balance again?
- (a) Increasing R by 2 Ω
  - (b) Increasing S by 20 Ω
  - (c) Increasing Q by 10 Ω
  - (d) All of these

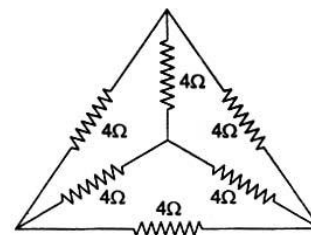


39. The equivalent resistance between points A and B in the circuit shown is:
- (a) 5R
  - (b) 2R
  - (c)  $\frac{R}{2}$
  - (d)  $\frac{6R}{5}$

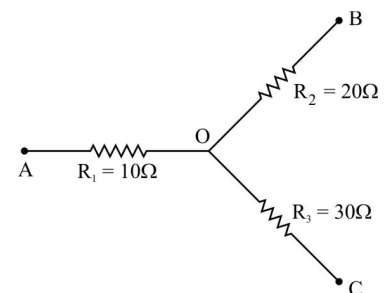


40. Kirchhoff's second law is based on law of conservation of:
- (a) Charge
  - (b) Energy
  - (c) Momentum
  - (d) Sum of mass and energy
41. A cell supplies a current of 0.9 A through a 2Ω resistor and a current of 0.3 A through a 7 Ω resistor. The internal resistance of the cell is:
- (a) 1.0 Ω
  - (b) 0.5 Ω
  - (c) 2.0 Ω
  - (d) 1.2 Ω

42. Six equal resistances, each of 4 ohms, are connected to form the figure shown. The resistance between any two corners is:
- (a) 4 ohm
  - (b) 2 ohm
  - (c) 1 ohm
  - (d) 4/6 ohm

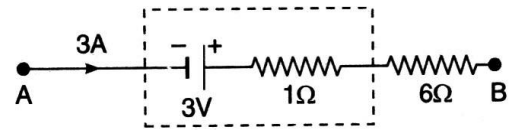


43. In the circuit shown below  $R_1 = 10\Omega$ ,  $R_2 = 20\Omega$ ,  $R_3 = 30\Omega$  and the potentials of points A, B and C are 10V, 6V and 5V respectively. The current through resistance  $R_1$  is:
- (a) 0.1 A
  - (b) 0.2 A
  - (c) 0.3 A
  - (d) 0.4 A



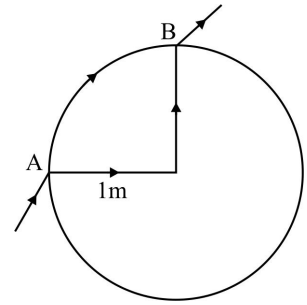
44. Fig represents a part of closed circuit. The potential difference between A and B i.e.  $V_A - V_B$  is:

- (a) 24 V (b) 0 V  
(c) 6 V (d) 18 V



45. The wire used in the arrangement shown in Fig. has a resistance of  $r$  ohm per metre. The equivalent resistance between points A and B is:

- (a)  $(6/11)r$  (b)  $2\pi r/(\pi + 1)$   
(c)  $6\pi r/(16 + 3\pi)$  (d)  $3\pi r/(10 + 3\pi)$

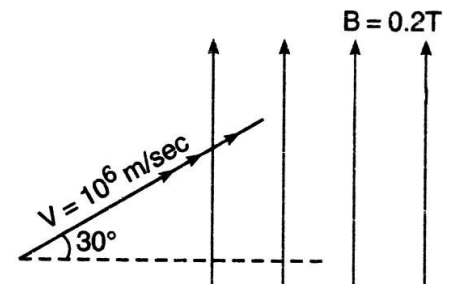


46. Two infinitely long wires carry currents in opposite directions. The field at a point P lying midway between them is:

- (a) Twice the field due to each wire alone (b) Half of the field due to each wire alone  
(c) Square of the field due to each wire alone (d) Zero

47. A  $\beta$ -particle moving with a speed of  $10^6 \text{ ms}^{-1}$  enters into the region of a uniform magnetic field of 0.2 T as shown in Fig. The force experienced by the  $\beta$ -particle is:

- (a)  $2.77 \times 10^{-14} \text{ N}$  (b)  $1.6 \times 10^{-14} \text{ N}$   
(c)  $5.54 \times 10^{-14} \text{ N}$  (d)  $2.77 \times 10^{-13} \text{ N}$

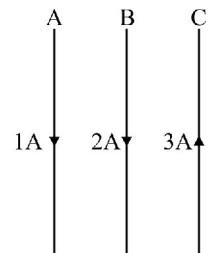


48. A proton enters in a magnetic field of strength B (Tesla) with speed  $v$ , parallel to the direction of magnetic lines of force. The force on the proton is:

- (a)  $evB$  (b) Zero (c)  $\infty$  (d)  $evB/2$

49. Three infinite straight wires A, B and C carry currents as shown in Fig. The resultant force on wire B is directed:

- (a) Towards A  
(b) Towards C  
(c) Zero  
(d) Perpendicular to the plane of the page



50. A strong magnetic field is applied on a stationary electron, then:

- (a) The electron moves in the direction of the field  
(b) The electron moves in an opposite direction  
(c) The electron remains stationary  
(d) The electron starts spinning

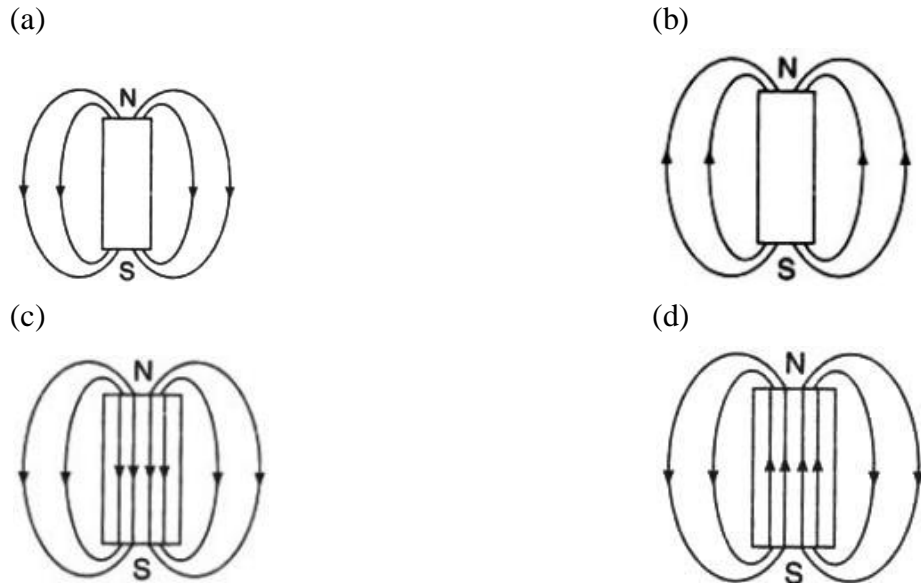
51. Electron and proton of equal momentum enter a uniform magnetic field normal to the lines of force. If the radii of curvature of circular paths be  $r_e$  and  $r_p$  respectively, then:

- (a)  $\frac{r_e}{r_p} = \frac{1}{1}$  (b)  $\frac{r_e}{r_p} = \frac{m_p}{m_e}$  (c)  $\frac{r_e}{r_p} = \sqrt{\left(\frac{m_p}{m_e}\right)}$  (d)  $\frac{r_e}{r_p} = \sqrt{\left(\frac{m_e}{m_p}\right)}$

52. A charge ( $q$ ) passing through a uniform electric field ( $\vec{E}$ ) and uniform magnetic field ( $\vec{B}$ ) remains undeflected. Which of the following variations would still let the charge to remain undeflected?

- (a) Signs of  $q$  and  $\vec{B}$  are changed  
 (b) Signs of  $q$  and  $\vec{E}$  are changed  
 (c) Signs of  $\vec{B}$  and  $\vec{E}$  are changed  
 (d) None of these

53. The magnetic field lines due to a bar magnet are correctly shown in:



54. A person standing in front of a mirror finds his image thinner but with normal height. This implies that the mirror, is:

- (a) Convex and spherical  
 (b) Concave and spherical  
 (c) Convex and cylindrical with axis vertical  
 (d) Convex and cylindrical with axis horizontal

55. A person standing in the centre of a room, looks into a plane mirror fixed on the wall. Then the minimum length of the plane mirror for him to see the full length image of the wall behind him, is equal to:

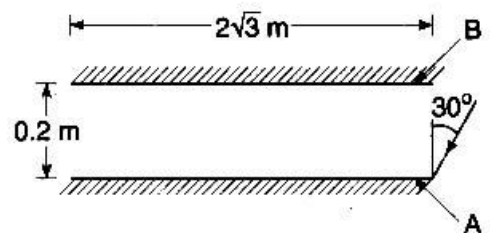
- (a) Height of the wall  
 (b)  $\frac{2}{3}$ rd of the height of the wall  
 (c)  $\frac{1}{3}$ rd of the height of the wall  
 (d) Half of the height of the wall

56. With a fixed incident ray, if a plane mirror is rotated through an angle  $\theta$  about an axis lying in the plane of incidence, then the reflected ray turns through an angle:

- (a)  $\theta$   
 (b)  $2\theta$   
 (c)  $\theta/2$   
 (d)  $3\theta$

57. 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 on 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) 28  
 (b) 31  
 (c) 32  
 (d) 34



58. When light passes from one medium to another, the characteristic, that remains constant, is:  
 (a) Velocity (b) Wavelength (c) Amplitude (d) Frequency
59. Light starting from a medium of refractive index  $\mu$  undergoes refraction into a medium of index  $\mu'$ . If  $i$  and  $r$  stand for angle of incidence and refraction respectively:  
 (a)  $\frac{\sin i}{\sin r} = \frac{\mu}{\mu'}$  (b)  $\frac{\sin i}{\sin r} = \frac{\mu'}{\mu}$  (c)  $\frac{\cos i}{\cos r} = \frac{\mu'}{\mu}$  (d)  $\frac{\sin i}{\cos r} = \frac{1}{\mu\mu'}$
60. A substance is behaving as convex lens in air and concave in water, then its refractive index is:  
 (a) Smaller than air (b) Greater than both air and water  
 (c) Greater than air but less than water (d) Almost equal to water
61. Loss of the ability of eye to focus on near and far object with advancing age is called:  
 (a) Presbyopia (b) Astigmatism (c) Hypermetropia (d) Myopia
62. A person suffering from hypermetropia uses:  
 (a) Convex lens (b) Concave lens (c) Cylindrical lens (d) Bifocal lens
63. For normal vision, the eye is focussed on an object at:  
 (a) Infinite distance (b) 25 cm away (c) 25 mm away (d) 25 meters away
64. When object at different distance are seen by the eye which of the following remains constant?  
 (a) The focal length of the eye lens (b) The object distance from the eye lens  
 (c) The radii of curvature of the eye lens (d) The image distance from the eye lens
65. A convex lens of focal length 0.1 m is illuminated with a parallel beam of white light. Then the image obtained at a distance of 0.1 m from the lens is:  
 (a) White (b) Red coloured (c) Violet (d) Yellow
66. Two masses  $m_A$  and  $m_B$  moving with velocities  $v_A$  and  $v_B$  in opposite directions collide elastically. After that the masses  $m_A$  and  $m_B$  move with velocity  $v_B$  and  $v_A$  respectively. The ratio  $\frac{m_A}{m_B}$  is:  
 (a) 1 (b)  $\frac{v_A}{v_B}$  (c)  $\frac{m_A + m_B}{m_A}$  (d)  $\frac{v_A - v_B}{v_A + v_B}$
67. A book looks red when seen through a piece of red glass, then the cover must be of:  
 (a) Red (b) White (c) Green (d) Red or White
68. Magnetic lines of force:  
 (a) Cannot intersect at all (b) Intersect within the magnet  
 (c) Intersect only at south and north poles (d) Intersect at neutral points only
69. Which of the following is most suitable for the core of the electromagnets?  
 (a) Air (b) Soft iron (c) Steel (d) Cu-Ni alloy
70. Two thin long parallel wires separated by a distance  $b$  are carrying a current  $i$  amp. each. The magnitude of the force per unit length exerted by one wire on the other is:  
 (a)  $\mu_0(i^2 / b^2)$  (b)  $\mu_0 i^2 / 2\pi b$  (c)  $\mu_0 i / 2\pi b$  (d)  $\mu_0 i / 4\pi b$



# CHEMISTRY

71.  $\text{Cu}_2\text{S} + 2\text{Cu}_2\text{O} \longrightarrow 6\text{Cu} + \text{SO}_2$   
In which process of metallurgy of copper above equation is involved?  
(a) Roasting (b) Reduction (c) Bessemerisation (d) Purification
72. Which substance is used as a leaching agent in concentration of bauxite?  
(a)  $\text{H}_2\text{O}$  (b)  $\text{KOH}$  (c)  $\text{NaOH}$  (d)  $\text{CaO}$
73. In the thermite process the role of aluminium is as:  
(a) An oxidant (b) A reductant (c) A flux (d) A gangue
74. Which of the following salts is not an alum?  
(a)  $\text{K}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$  (b)  $\text{Na}_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$   
(c)  $(\text{NH}_4)_2\text{SO}_4 \cdot \text{Al}_2(\text{SO}_4)_3 \cdot 24\text{H}_2\text{O}$  (d) None of these
75. The pair of metals which will produce hydrogen gas in reaction with acid is:  
(a)  $\text{Mg}$ ,  $\text{Cu}$  (b)  $\text{Mg}$ ,  $\text{Ag}$  (c)  $\text{Mg}$ ,  $\text{Zn}$  (d)  $\text{Cu}$ ,  $\text{Zn}$
76. What is the nature of aqueous ammonia?  
(a) Acidic (b) Basic (c) Neutral (d) Amphoteric
77. The conjugate base of  $\text{HPO}_4^{2-}$  is:  
(a)  $\text{PO}_4^{3-}$  (b)  $\text{H}_2\text{PO}_4$  (c)  $\text{H}_3\text{PO}_4$  (d)  $\text{H}_4\text{PO}_3$
78. The pH of 0.001 M solution of  $\text{HCl}$  is:  
(a) 1.0 (b) 3.0 (c) 4.0 (d) 5.0
79. When 0.4 g of  $\text{NaOH}$  is dissolved in one litre of solution, the pH of solution is:  
(a) 12 (b) 2 (c) 6 (d) 10
80. Copper is refined by:  
(a) Liquefaction (b) Distillation  
(c) Zone-refining method (d) Electrolytic refining
81. Which of the following oxides will turn moist blue litmus red?  
(a)  $\text{CO}$  (b)  $\text{NO}$  (c)  $\text{N}_2\text{O}$  (d)  $\text{P}_2\text{O}_5$
82. Which of the following acids is used in lead storage batteries?  
(a) Nitric acid (b) Hydrochloric acid (c) Sulphuric acid (d) None of these
83. Which of the following oxide of nitrogen is ionic?  
(a)  $\text{NO}$  (b)  $\text{N}_2\text{O}_3$  (c)  $\text{N}_2\text{O}_5$  (d)  $\text{NO}_2$
84. Hydrogen peroxide is a:  
(a) Oxidising agent (b) Reducing agent (c) Both (a) and (b) (d) None of these
85. Which of the following substance is used in oxidation of rocket fuel?  
(a) Nitric acid (b) Hydrogen peroxide  
(c) Ammonium chloride (d) Both (A) and (B)
86. P-P-P bond angle in white phosphorus is:  
(a)  $45^\circ$  (b)  $60^\circ$  (c)  $90^\circ$  (d)  $120^\circ$

87. Which of the following is a displacement reaction?
- (a)  $\text{CaCO}_3 \longrightarrow 2\text{H}_2\text{O}$  (b)  $\text{CaO} + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O}$   
(c)  $\text{Fe} + \text{CuSO}_4 \longrightarrow \text{FeSO}_4 + \text{Cu}$  (d)  $\text{NaOH} + \text{HCl} \longrightarrow \text{NaCl} + \text{H}_2\text{O}$
88. Which of the following is not a decomposition reaction?
- (a)  $\text{CaCO}_3 \longrightarrow \text{CaO} + \text{CO}_2$  (b)  $\text{CaO} + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O}$   
(c) Digestion of food in the body (d)  $2\text{HCl} \longrightarrow \text{H}_2 + \text{Cl}_2$
89. Which of the following is a redox reaction?
- (a)  $\text{CaCO}_3 \longrightarrow \text{CaO} + \text{CO}_2$  (b)  $\text{H}_2 + \text{Cl}_2 \longrightarrow 2\text{HCl}$   
(c)  $\text{CaO} + 2\text{HCl} \longrightarrow \text{CaCl}_2 + \text{H}_2\text{O}$  (d)  $\text{NaOH} + \text{HCl} \longrightarrow \text{NaCl} + \text{H}_2\text{O}$
90. Which statement is correct about the following reaction?
- $\text{ZnO} + \text{CO} \longrightarrow \text{Zn} + \text{CO}_2$
- (a) ZnO is being oxidized (b) CO is being reduced  
(c) CO<sub>2</sub> is being oxidized (d) ZnO is being reduced
91. When iron nails are added to an aqueous solution of copper sulphate, a chemical change occurs, which of the following is not true about this reaction?
- (a) Blue colour of the solution fades.  
(b) Iron nails become brownish in colour.  
(c) It is a displacement reaction.  
(d) Iron nails dissolves completely.
92. In reaction  $\text{SO}_2 + 2\text{H}_2\text{S} \longrightarrow 2\text{H}_2\text{O} + 3\text{S}$  the reducing agent is:
- (a) SO<sub>2</sub> (b) H<sub>2</sub>S (c) H<sub>2</sub>O (d) S
93. Which of the following metal can we cut with the knife?
- (a) Gold (b) Potassium (c) Iron (d) All of these
94. Cinnabar is an ore of:
- (a) Mercury (b) Copper (c) Calcium (d) Lead
95. In the reaction  $\text{M} + \text{O}_2 \rightarrow \text{MO}_2$  (super oxide) the metal is:
- (a) Li (b) Na (c) K (d) All of the these
96. Which of the following metals is less reactive than hydrogen?
- (a) Cu (b) Ba (c) Mg (d) All of the above
97. The most abundant metal in the earth crust is:
- (a) Al (b) Fe (c) O (d) Cu
98. Which of the following is the sulphide ore of copper?
- (a) Azurite (b) Copper glance (c) Cuprite (d) Malachite
99. Which metal is used in thermite process?
- (a) C (b) Co (c) Al (d) a & b

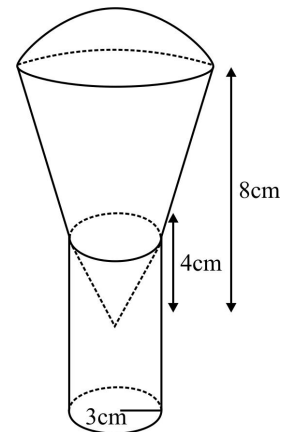
100. Which metal is higher in the activity series?  
 (a) K (b) Ca (c) Fe (d) Pt
101. How many atoms are contained in a mole of  $\text{Ca(OH)}_2$ ?  
 (a)  $30 \times 6.02 \times 10^{23}$  atoms/mol (b)  $5 \times 6.02 \times 10^{23}$  atoms/mol  
 (c)  $6 \times 6.02 \times 10^{23}$  atoms/mol (d) None of these
102. The raw materials required for the manufacture of  $\text{Na}_2\text{CO}_3$  by Solvay process are:  
 (a)  $\text{CaCl}_2$ ,  $(\text{NH}_4)_2\text{CO}_3$ ,  $\text{NH}_3$  (b)  $\text{NH}_4\text{Cl}$ ,  $\text{NaCl}$ ,  $\text{Ca(OH)}_2$   
 (c)  $\text{NaCl}$ ,  $(\text{NH}_4)_2\text{CO}_3$ ,  $\text{NH}_3$  (d)  $\text{NaCl}$ ,  $\text{NH}_3$ ,  $\text{CaCO}_3$ ,  $\text{H}_2\text{O}$
103. Products of the reaction  $\text{Ca(OH)}_2 + 2\text{NH}_4\text{Cl}$ , are:  
 (a)  $\text{CaCl}_2 + 2\text{NH}_3 + 2\text{H}_2\text{O}$  (b)  $\text{CaCl}_2 + \text{NH}_4\text{OH} + \text{H}_2$   
 (c)  $\text{CaO} + 2\text{NH}_3 + 2\text{H}_2\text{O}$  (d)  $\text{CaO} + \text{NH}_4\text{OH} + \text{H}_2$
104. Among  $\text{HCl}$ ,  $\text{HBr}$ ,  $\text{HF}$ , and  $\text{HI}$  the weakest acid in water is:  
 (a)  $\text{HCl}$  (b)  $\text{HF}$  (c)  $\text{HBr}$  (d)  $\text{HI}$
105. Which electrolyte is used in electrolysis during purification of copper metal?  
 (a)  $\text{Cu(OH)}_2$  (b)  $\text{CuSO}_4$  (c)  $\text{CuCO}_3$  (d)  $\text{CuO}$
106. Which of the following substance is used in preparation of silver mirror?  
 (a)  $\text{AgBr}$  (b)  $\text{AgNO}_3$  (c)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  (d)  $\text{AgCl}$
107. What is the nature of aqueous ammonia?  
 (a) Acidic (b) Basic (c) Neutral (d) Amphoteric
108. Red phosphorus is less reactive than yellow phosphorus because:  
 (a) Its colour is red (b) It is highly polymerised  
 (c) Its is tetratomic (d) It is hard
109. Which of the following statement about graphite is incorrect?  
 (a) Graphite is a good conductor of electricity.  
 (b) Graphite has a high melting point.  
 (c) Graphite is the hardest substance.  
 (d) Graphite is lustrous.
110. Which oxide is neutral among the following?  
 (a)  $\text{CO}$  &  $\text{NO}$  (b)  $\text{NH}_4\text{Cl}$  (c)  $\text{HCl}$  (d)  $\text{HNO}_3$

## MATHEMATICS

111. A person who has a certain amount with him goes to market. He can buy 50 oranges or 40 mangoes. He retains 10% of the amount for taxi fares and buys 20 mangoes and of the balance he purchases oranges. Find the number of oranges he can purchase.  
 (a) 36 (b) 40 (c) 15 (d) 20
112. If  $\alpha$  and  $\beta$  are the angles in the first Quadrant  $\tan \alpha = \frac{1}{7}$ ,  $\sin \beta = \frac{1}{\sqrt{10}}$  then the value of  $\alpha + 2\beta$  is:  
 (a)  $0^\circ$  (b)  $45^\circ$  (c)  $60^\circ$  (d)  $90^\circ$

113. Let  $x = 0.123456789101112 \dots\dots 998999$  where the digits are obtained by writing the integers from 1 to 999 in order. Then the 2014<sup>th</sup> digit to right of the decimal point is:  
 (a) 7 (b) 6 (c) 5 (d) 9
114. If  $x, y$  are real numbers such that  $3^{\frac{x}{y}+1} - 3^{\frac{x}{y}-1} = 24$ , then the value of  $(x + y)/(x - y)$  is:  
 (a) 0 (b) 1 (c) 2 (d) 3
115. Consider the equation:  $\frac{11x^2 + 33x + 15}{22x^2 + 33x - 8} = \frac{x + 3}{2x + 3}$ . The number of roots of this equation:  
 (a) 4 (b) 3 (c) 2 (d) 1
116. If  $x^2 - 20x + 91 \leq 0$ , then which of the following can never be the value of  $x^3 - 3x^2 + 3x - 1$ ?  
 (a) 125 (b) 729 (c) 512 (d) 216
117. If  $x^2 + y^2 = 0.1$  and  $|x - y| = 0.2$ , then  $|x| + |y|$  is equal to:  
 (a) 0.3 (b) 0.4 (c) 0.2 (d) 0.6
118. If  $aabb$  is a four digit number and also a perfect square then the value of  $a + b$  is:  
 (a) 10 (b) 11 (c) 12 (d) 13
119. What is the remainder when  $30^{40}$  is divided by 17?  
 (a) 4 (b) 1 (c) 6 (d) 2

**Directions (Q. 120 & 121): Refer to the following data to answer the questions that follow. The figure shows a special kind of beaker. It is composed of a conical frustum, a hemisphere and cylinder. The upper portion of it is a hemisphere of the radius 6 cm. The height of the cylinder is 5 cm and the dimensions of the other parts are as shown in the figure.**



120. The volume of the fluid that the beaker can hold (in  $\text{cm}^3$ ) is:  
 (a) 273 (b)  $273\pi$   
 (c)  $297\pi$  (d)  $318\pi$
121. The total surface area of the beaker which is only open at the end of the cylinder (in  $\text{cm}^2$ ) is:  
 (a)  $138\pi$  (b)  $169\pi$  (c)  $147\pi$  (d)  $219\pi$
122. The number of solutions of the equation  $2x + y = 40$  where both  $x$  and  $y$  are positive integers and  $x \leq y$  is:  
 (a) 10 (b) 13 (c) 15 (d) 20
123. If  $\alpha$  is a root, repeated twice, of the quadratic equation  $(a - d)x^2 + ax + (a + d) = 0$  then  $\frac{d^2}{a^2}$  has the value equal to:  
 (a)  $\sin^2 90^\circ$  (b)  $\cos^2 60^\circ$  (c)  $\sin^2 45^\circ$  (d)  $\cos^2 30^\circ$
124. If  $\alpha$  and  $\beta$  are the roots of the equation  $x^2 - a(x + 1) - b = 0$ , then find  $(\alpha + 1)(\beta + 1)$ .  
 (a)  $b$  (b)  $-b$  (c)  $1 - b$  (d)  $b - 1$
125. Find the quadratic equation whose roots are half of the reciprocal of the roots of the equation  $ax^2 + bx + c = 0$ .  
 (a)  $4ax^2 + 2bx + c = 0$  (b)  $4cx^2 + 2bx + a = 0$   
 (c)  $2cx^2 + bx + a = 0$  (d)  $2ax^2 + bx + c = 0$

126. The set of all real values of  $p$  for which the equation  $x + 1 = \sqrt{px}$  has exactly one root, is:  
 (a)  $\{0\}$  (b)  $\{4\}$  (c)  $\{0, 4\}$  (d)  $\{0, 2\}$
127. If the roots of the equation  $px^2 + qx + r = 0$  are in the ratio  $l : m$  then:  
 (a)  $(l + m)^2 pq = l mr^2$  (b)  $(l + m)^2 pr = l mq$   
 (c)  $(l + m)^2 pr = l mq^2$  (d) none of these
128. If the roots of the equation  $(a^2 + b^2)x^2 - 2(ac + bd)x + (c^2 + d^2) = 0$  are equal, then:  
 (a)  $\frac{a}{d} = \frac{b}{c}$  (b)  $\frac{a^2 + b^2}{c^2} = \frac{b^2 + c^2}{d^2}$  (c)  $\frac{a}{b} = \frac{c}{d}$  (d) none of these
129. Find the solution of the equation  $\left(\frac{2x-1}{x+1}\right) - 15\left(\frac{x+1}{2x-1}\right) = -2, x \neq -1, x \neq 1/2$ .  
 (a) 6 (b)  $-4$  (c)  $4/7$  (d) 1
130. The roots of the equation  $x^2 + Ax + B = 0$  are 5 and 4. The roots of  $x^2 + Cx + D = 0$  are 2 and 9. Which of the following is a root of  $x^2 + Ax + D = 0$ ?  
 (a) 3 & 9 (b) 6 & 3 (c) 6 & 9 (d) 3 & 3
131. In the diagram the circle contains the vertices A, B, C of triangle ABC.  $\angle ABC = 30^\circ$  and the length of AC is 5. Find the diameter of the circle.
- 
- (a)  $5\sqrt{3}$  (b) 8  
 (c) 10 (d)  $5\sqrt{5}$
132.  $6(\sin^6 \theta + \cos^6 \theta) - 9(\sin^4 \theta + \cos^4 \theta)$  is equal to:  
 (a)  $-1$  (b) 1 (c)  $-3$  (d) 3
133. The value of  $\cos 15^\circ$  is:  
 (a)  $\frac{\sqrt{3}+1}{2\sqrt{2}}$  (b)  $\frac{\sqrt{3}-1}{2\sqrt{2}}$  (c)  $\frac{\sqrt{3}}{2\sqrt{2}}$  (d) none of these
134. Amol was asked to calculate the arithmetic mean of 10 positive integers, each of which had 2 digits. By mistake, he interchanged the 2 digits, say  $a$  and  $b$ , in one of these 10 integers. As a result, his answer for the arithmetic mean was 1.8 more than what it should have been. Find the value of  $(b - a)$ .  
 (a) 3 (b) 2 (c) 4 (d) none of these
135. A cube of maximum possible volume is cut off from a solid sphere of diameter "d", then find the volume of the remaining material of the sphere.  
 (a)  $\frac{d^3}{3}\left(\pi - \frac{d}{2}\right)$  (b)  $\frac{d^3}{3}\left(\frac{\pi}{2} - \frac{1}{\sqrt{3}}\right)$  (c)  $\frac{d^2}{4}(\sqrt{2} - \pi)$  (d) none of these
136. A rectangle has a perimeter of 26. How many combinations of integral valued length are possible?  
 (a) 4 (b) 8 (c) 7 (d) 12
137. If  $(x + y) = 13$  and  $xy = 36$ , then the value of  $(x^3 + y^3)$  is:  
 (a) 369 (b) 936 (c) 793 (d) none of these
138. The roots  $x^3 - 11x^2 - x + 2 = 0$  are  $a, b$  and  $c$ . What is the value of  $(a^2bc + ab^2c + abc^2)$ ?  
 (a)  $-11$  (b)  $-22$  (c)  $-33$  (d)  $-44$

139. Ram and Mohan are friends. Each has some money. If Ram gives Rs. 30 to Mohan, then Mohan will have twice the money left with Ram. But, if Mohan gives Rs. 10 to Ram, then Ram will have thrice as much as is left with Mohan. How much money does Ram has?

- (a) Rs. 62                      (b) Rs.6                      (c) Rs.170                      (d) Rs. 43

140. The sum of the ages of a father and his son is 45 years. Five years ago, the product of their ages was 34. Find the age of son.

- (a) 6                      (b) 7                      (c) 9                      (d) 11

**Direction (Q. 141 - 144): Four dice are thrown simultaneously. Find the probability that:**

141. All of them show the same face.

- (a)  $\frac{1}{216}$                       (b)  $\frac{15}{16}$                       (c)  $\frac{15}{36}$                       (d)  $\frac{1}{2}$

142. All of them show different face.

- (a)  $\frac{3}{28}$                       (b)  $\frac{5}{18}$                       (c)  $\frac{15}{36}$                       (d)  $\frac{11}{36}$

143. Two of them show the same face and remaining two show the different faces.

- (a)  $\frac{4}{9}$                       (b)  $\frac{5}{9}$                       (c)  $\frac{11}{18}$                       (d)  $\frac{7}{9}$

144. At least two of them show the same face.

- (a)  $\frac{37}{72}$                       (b)  $\frac{11}{36}$                       (c)  $\frac{47}{72}$                       (d)  $\frac{25}{36}$

145. From a circular sheet of paper with a radius 20 cm, four circles of radius 5 cm each are cut out. What is the ratio of the uncut portion to the cut out portion?

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

146. If  $\tan x - \tan^2 x = 1$ , then find the value of  $(\tan^4 x - 2\tan^3 x - \tan^2 x + 2\tan x + 1)$ .

- (a) 1                      (b) 2                      (c) 3                      (d) none of these

147. If  $\alpha \neq \beta$  and  $\alpha^2 = 5\alpha - 3$  and  $\beta^2 = 5\beta - 3$  then the equation whose roots are  $\frac{\alpha}{\beta}$  and  $\frac{\beta}{\alpha}$  is:

- (a)  $3x^2 - 19x + 3 = 0$                       (b)  $2x^2 - 3x - 6 = 0$   
(c)  $4x^2 - 49x + 118 = 0$                       (d) none of these

148. If -5 is a root of the quadratic equation  $2x^2 + px - 15 = 0$  and the quadratic equation  $p(x^2 + x) + k = 0$  has equal roots then  $k = ?$

- (a)  $\frac{7}{4}$                       (b)  $-\frac{7}{4}$                       (c)  $\frac{4}{7}$                       (d)  $-\frac{4}{7}$

149. The two consecutive positive odd integers are such that sum of their squares is 290. Find the greater of them.

- (a) 11                      (b) 13                      (c) 9                      (d) 15

150. The mean of n observations is  $\bar{x}$ . If the first item is increased by 1, second by 2 and so on, then find the new mean.

- (a)  $\bar{x} + n$                       (b)  $\bar{x} + \frac{n}{2}$                       (c)  $\bar{x} + \frac{n+1}{2}$                       (d) none of these