STUDY VAULT
committed to excellence

Class – X

ENTRANCE TEST CUM SCHOLARSHIP (SAMPLE PAPER-3)

[Time: 3 Hours] [Max Marks: 450]

A.General:

1.This booklet is a Question Paper containing 150 questions.

2.Blank Papers, Clipboards, Log Tables, slide rules, calculators, cellular phones 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 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 Shee t will be submitted after completion of this examination.

B.Question Paper Format and marking scheme:

1.The Question Paper consists of five 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 (1-2) : *Read the following information and answer the questions given below. Mohit lives 2 km to the North of Aasif, who lives 2 km to the north of Rohan. Aayush lives 2 km to the South, who lives 4 km to the East of Aasif.*

1. What is the distance between Mohit and Rohan?

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

2. What is the distance between Aayush and Rohan?

(a) 2 km (b) 8 km (c) 4 km (d) 18 km

Directions (3-4) : *Read the following information carefully and then answer the question based on that. There are five friends named A, B, C, D and E. Everyone likes to play game. The name of games are tennis, hockey, football, baseball and cricket. All are standing in a queue and facing North but not necessarily in the same order.*

- *D doesn't like to play hockey and football but standing in the middle of queue.*
- *E likes to play tennis and standing in the right end.*
- *B is the neighbour of D and A and likes to play football.*
- *A likes baseball and standing in the left end of queue.*

3. Who likes to play cricket?

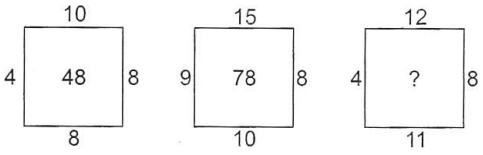
(a) A (b) B (c) C (d) D

4. Who is second to the right of B?

(a) C (b) A (c) D (d) E

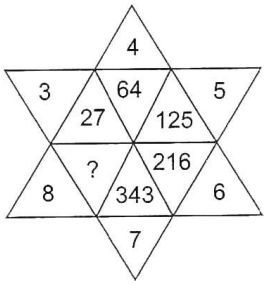
Directions (5-6) : *Insert the missing numerical value in the following questions.*

5.



(a) 88 (b) 100 (c) 32 (d) 132

6.



(a) 640 (b) 512 (c) 16 (d) 24

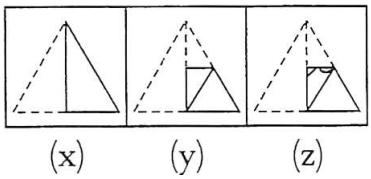
Direction (7) : *Complete the given series by choosing correct alternative.*

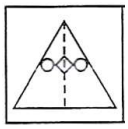
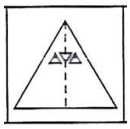
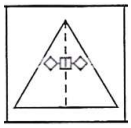
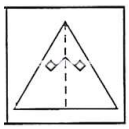
7. 2, 6, 12, 20, 30, 42, (?), 72

(a) 66 (b) 56 (c) 72 (d) 62

Direction (8) : *Select the answer from given alternatives, which would be most suitable when paper is unfolded.*

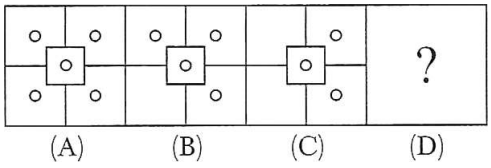
8. Problem Figures.

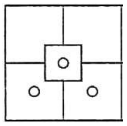
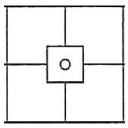
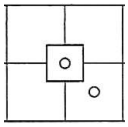
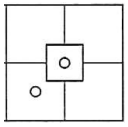


(a)  (b)  (c)  (d) 

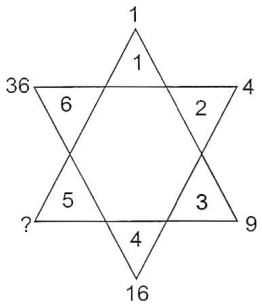
Direction (9) : *Find the correct answer which completes the series.*

9. Problem Figures.



(a)  (b)  (c)  (d) 

10. Find out the missing number in the following figure.



(a) 81 (b) 25 (c) 49 (d) None of these

11. Find out how many 2's in the given series?

24252627282930312120222368626272928210 2

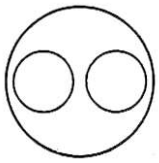
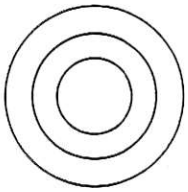
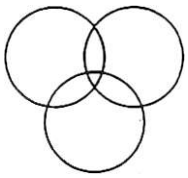
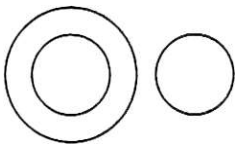
(a) 17 (b) 16 (c) 18 (d) 15

Direction (12) : *Read the information and answer the question given below. If A denotes addition, B denotes division, C denotes minus and D denotes multiplication.*

12. 54 C 10 D 16 B 4 A 8

(a) 22 (b) 8 (c) 9 (d) 12

Directions (13) : *You are to choose from the four Venn-diagrams that best illustrates the relationship among three given classes or groups in the following question.*

(a)  (b)  (c)  (d) 

13. Tennis, Cricket ,Games

14. If $\frac{11y}{10} - \frac{9y}{10} = 1$, then find the value of y.

(a) 18 (b) 16 (c) 4 (d) 5

15. Market price of an article is Rs. 720 and actual price is Rs. 550.80 after two successive discounts. First is 10%, what is the second discount?

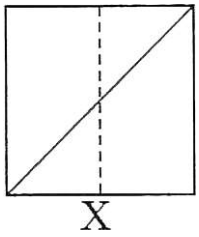
(a) 16% (b) 20% (c) 15% (d) 18%

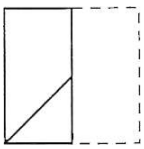
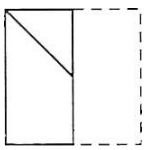
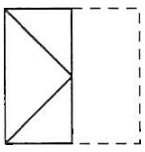
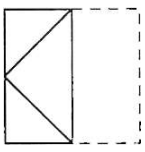
16. Mita is taller than Seema but not as tall as Divya. Seema is taller than Saroj. Divya is not as tall as Reema. Among them who is the tallest?

(a) Reema (b) Saroj (c) Divya (d) Mita

Direction (17) : *Find the correct answer, when a sheet having a certain design is folded along the dotted line.*

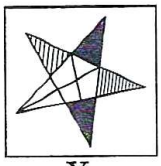
17. Problem Figure



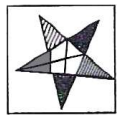
(a)  (b)  (c)  (d) 

Direction (18) : *Find out the figure which is exactly similar with the problem figure.*

18. Problem Figure



X

(a)  (b)  (c)  (d) 

Directions (19-20) : *Each of these questions is based on following information.*

M % N means M is the son of N.

M @ N means M is the sister of N.

M $ N means M is the father of N.

19. Which of the following shows the relation that C is the granddaughter of E?

(a) C % B $ F $ E (b) B $ F $ E % C

(c) C @ B % F % E (d) D % B $ F $ C

20. Which of the following shows the relation that S is the father of Q?

(a) S @ P $ Q (b) Q @ P % S (c) Q $ S @ P (d) None of these

Directions (21-23) : *A code language has been used to write the words in capital letters in English in column I as number letters in column II. Number in column II do not appear in the same order as letters in column I. Decode the language and choose the correct code for the word given in each question from the given alternatives-*

I	II
ANT	307
TEN	237
SUN	345
SET	752

21. Code for 'A' is-

(a) 3 (b) 0 (c) 7 (d) 5

22. Code for word 'NUT' is-

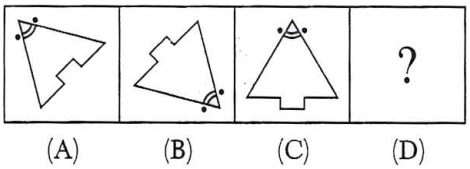
(a) 432 (b) 347 (c) 503 (d) 724

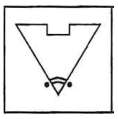
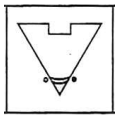
23. Code for letter 'U' is-

(a) 3 (b) 0 (c) 5 (d) 4

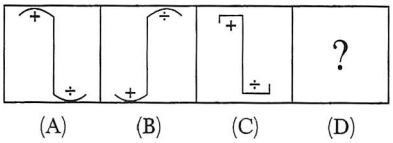
Directions (24-27) : *Find the relationship between C and D as given between A and B in the problem figure.*

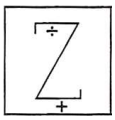
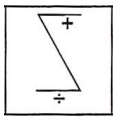
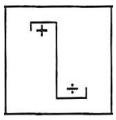
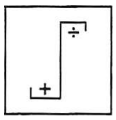
24. Problem Figures



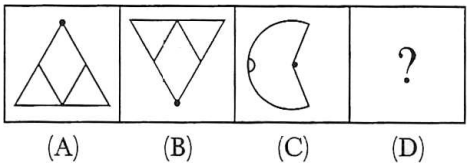
(a) 
(b) 
(c) 
(d) 

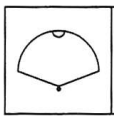
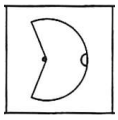
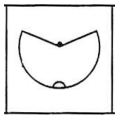
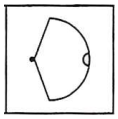
25. Problem Figures



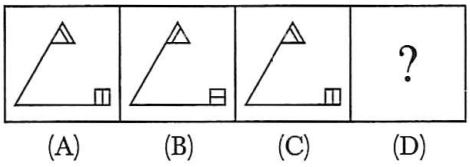
(a) 
(b) 
(c) 
(d) 

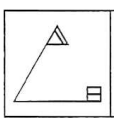
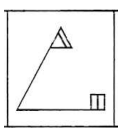
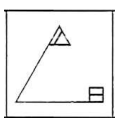
26. Problem Figures



(a) 
(b) 
(c) 
(d) 

27. Problem Figures



(a) 
(b) 
(c) 
(d) 

28. Deepu is facing West. He moves 90° in anti-clockwise direction and 135° in clockwise direction. In which direction Deepu is facing now?

(a) North-East (b) South-East (c) South (d) North-West

29. Pointing to a man in a photograph, a woman said, "He is the only son of my mother-in-law". How is woman related to that man?

(a) Sister (b) Mother-in-law (c) Wife (d) None of these

30. Today is Monday, what will be the day after 308 days?

(a) Sunday (b) Monday (c) Tuesday (d) Thursday

PHYSICS

31. Among identical spheres A and B having charges as –5 C and –16 C

(a) –5C is at higher potential (b) –16C is at higher potential

(c) both are at equal potential (d) it cannot be said

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. In a parallel circuit of bulbs,

(a) same current exists in all the bulbs

(b) voltage across each bulb reamins the same

(c) failure of any bulb leads to a break in the circuit

(d) All the above

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. Three resistors each of 10 Ω are connected in series to a battery of potential difference 150 V. The current flowing through it is _____ A.

(a) 45 (b) 5 (c) 15 (d) 20

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, then :

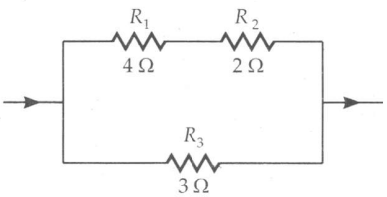
(a) They have equal currents through them

(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

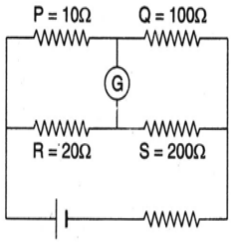
(d) The resistance of the filament in 100 watt bulb is more than the resistance in 40 watt bulb

37. In a part of the circuit shown in the Figure, the rate of heat dissipation in 4 Ω resistor is 100 J/s. Calculate the heat dissipated in the 3 Ω resistor in 10 seconds.



(a) 300 J (b) 4500 J (c) 3000 J (d) 5000 J

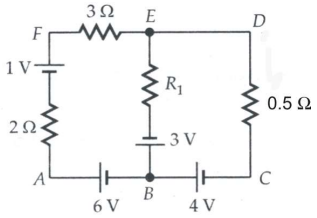
38. Figure below shows a balanced wheatstone's network. Now, it is disturbed by changing P to 15 Ω. Which of the following steps will not bring the bridge to balance again?



(a) Increasing R by 2 Ω (b) Increasing S by 20 Ω

(c) Increasing Q by 10 Ω (d) All of these

39. Use Kirchhoff's rules to determine the potential difference between the points A and D when no current flows in the arm BE of the electric network shown in Figure.



(a) 4 V (b) 6 V (c) 9 V (d) 12 V

40. Kirchhoff's second law is based on law of conservation of:

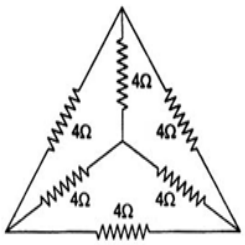
(a) Charge (b) Energy

(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

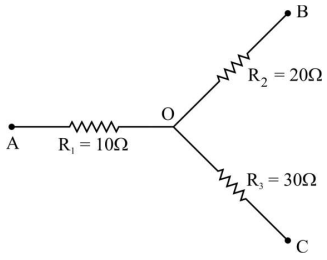
42. Six equal resistances, each of 4 ohm, are connected to form the figure shown. The resistance between any two corners is:



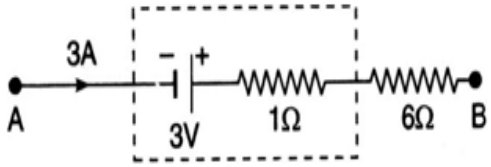
(a) 4 ohm (b) 2 ohm (c) 1 ohm (d) 4/6 ohm

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. Which of these is not a safety measure?

(a) Fuse (b) MCB (c) Heater (d) Earthing

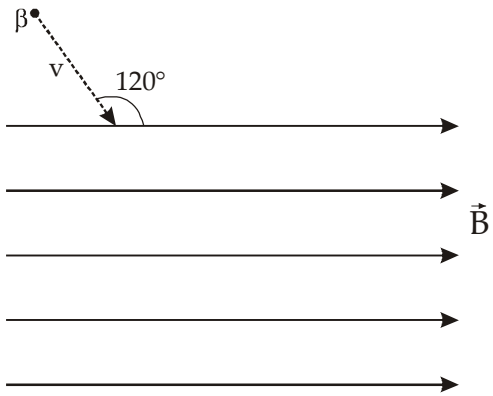
46. Two infinitely long wires carry currents in opposite directions. The magnetic field at a point P lying midway between them is:

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

(a) 2.77×10^{-14} N (b) 1.6×10^{-14} N (c) 5.54×10^{-14} N (d) 2.77×10^{-13} 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) ∞ (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:

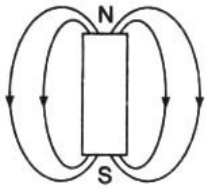
(a) $\frac{r_e}{r_p}=\frac{1}{1}$ (b) $\frac{r_e}{r_p}=\frac{m_p}{m_e}$ (c) $\frac{r_e}{r_p}=\sqrt{\left(\frac{m_p}{m_e}\right)}$ (d) $\frac{r_e}{r_p}=\sqrt{\left(\frac{m_e}{m_p}\right)}$

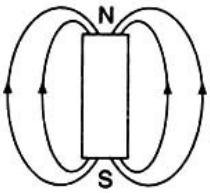
52. A charge (q) passing through a uniform electric field (E) and uniform magnetic field $(\vec{B})$ remains undeflected. Which of the following variations would still let the charge to remain undeflected?

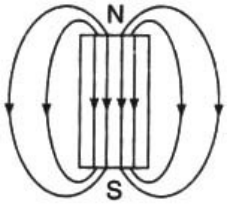
(a) Signs of q and $\vec{B}$ are changed (b) Signs of q and $\vec{E}$ are changed

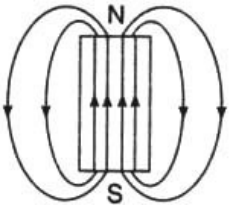
(c) Signs of $\vec{B}$ and $\vec{E}$ are changed (d) None of these

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

(a) 

(b) 

(c) 

(d) 

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:

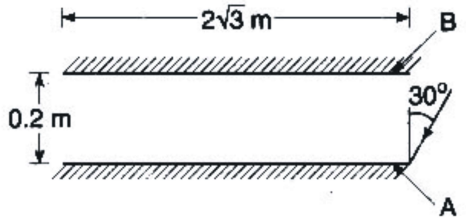
(a) Height of the wall (b) $\frac{2}{3}$rd of the height of the wall

(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 θ about an axis lying in the plane of incidence, then the reflected ray turns through an angle:

(a) θ (b) 2θ (c) θ/2 (d) 3θ

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° 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 μ undergoes refraction into a medium of refractive index μ′. If i and r stand for angle of incidence and refraction respectively, then :

(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 then 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. Which mirror can produce virtual and magnified image?

(a) Concave mirror (b) Convex mirror (c) Plane mirror (d) None of these

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 ampere 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. The order of processes involved in the dressing of an ore is :

(i) grinding and crushing (ii) hand-picking

(iii) Pulverisation

(a) i, ii, iii (b) i, iii, ii (c) ii, iii, i (d) ii, i, iii

72. Which of the following salts is not an alum?

(a) $K_2SO_4.Al_2(SO_4)_3.24H_2O$ (b) $Na_2SO_4.Al_2(SO_4)_3.24H_2O$

(c) $(NH_4)_2SO_4.Al_2(SO_4)_3.24H_2O$ (d) None of these

73. In the following equation:

$Na_2CO_3 + xHCl \rightarrow 2NaCl + CO_2 + H_2O$ the value of x is

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

74. The pair of metals which will produce hydrogen gas on reaction with dilute acid is :

(a) Mg, Cu (b) Mg, Ag (c) Mg, Zn (d) Cu, Zn

75. What is the nature of aqueous ammonia?

(a) Acidic (b) Basic (c) Neutral (d) Amphoteric

76. Gypsum has the formula :

(a) $CaSO_4.\frac{1}{2}H_2O$ (b) $CaSO_4.H_2O$ (c) $CaSO_4.1\frac{1}{2}H_2O$ (d) $CaSO_4.2H_2O$

77. Which of the following substances is used in oxidation of rocket fuel?

(a) Nitric acid (b) Hydrogen peroxide

(c) Ammonium chloride (d) Both (A) and (B)

78. When 0.4 g of NaOH is dissolved in one litre of solution, the pH of solution is:

(a) 12 (b) 2 (c) 6 (d) 10

79. Which of the following is a displacement reaction?

(a) $CaCO_3 \longrightarrow CaO + CO_2$ (b) $CaO + 2HCl \longrightarrow CaCl_2 + H_2O$

(c) $Fe + CuSO_4 \longrightarrow FeSO_4 + Cu$ (d) $NaOH + HCl \longrightarrow NaCl + H_2O$

80. In reaction $SO_2 + 2H_2S \longrightarrow 2H_2O + 3S$, the reducing agent is :

(a) SO_2 (b) H_2S (c) H_2O (d) S

81. Which of the following reactions are exothermic in nature?

(a) Combustion of carbon (b) Bond breaking

(c) Bond formation (d) Both (a) and (c)

82. The most abundant metal in the earth's crust is :

(a) Al (b) Fe (c) O (d) Cu

83. How many atoms are contained in a mole of $Ca(OH)_2$?

(a) $3 \times 6.02 \times 10^{23}$ 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

84. The raw materials required for the manufacture of Na_2CO_3 by Solvay process are:

(a) $CaCl_2$, $(NH_4)_2CO_3$, NH_3 (b) NH_4Cl, NaCl, $Ca(OH)_2$

(c) NaCl, $(NH_4)_2CO_3$, NH_3 (d) NaCl, NH_3, $CaCO_3$, H_2O

85. Among HCl, HBr, HF, and HI the weakest acid in water is:

(a) HCl (b) HF (c) HBr (d) HI

86. Which of the following statements 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.

87. Which of the following statements is incorrect?

(a) Metals like Cu, Ag, Au cannot displace 'H' from acids.

(b) In reactivity series metals are arranged in order of increasing reactivity.

(c) Silver cannot displace 'Cu' from $Cu(NO_3)_2$.

(d) Zinc displaces 'Cu' from $CuSO_4$.

88. In the balanced chemical equation :

$aFe_2O_3 + bH_2 \rightarrow cFe + dH_2O$ a, b, c and d respectively are :

(a) 1123 (b) 1111 (c) 1323 (d) 1223

89. In the reaction :

$2FeCl_3 + SnCl_2 \rightarrow 2FeCl_2 + SnCl_4$

(a) Fe^{+3} is reduced to Fe^{+2} (b) Sn^{+2} is reduced to Sn^{+4}

(c) Sn^{+2} is oxidized to Sn (d) Fe^{+3} gains two electrons

90. Heat of neutralisation is less than 13.7 kcal/mol for the reaction :

(a) $HCl + NaOH \rightarrow NaCl + H_2O$ (b) $H_2SO_4 + 2NaOH \rightarrow Na_2SO_4 + 2H_2O$

(c) $HNO_3 + NaOH \rightarrow NaNO_3 + H_2O$ (d) $CH_3COOH + NaOH \rightarrow CH_3COONa + H_2O$

91. pH of tomato juice is 4, that means it is :

(a) basic (b) acidic (c) neutral (d) none of these

92. Which of the following salts can produce only two types of radicals?

(a) $NaKCO_3$ (b) $CaOCl_2$ (c) NH_4HSO_4 (d) $Na(NH_4)HPO_4$

93. Expanded octet occurs in :

(a) NH_3 (b) PF_5 (c) H_2O (d) O_2

94. When a little sulphur in a spoon is heated, it burns with a blue flame which slowly disappears after some time and we can feel a pungent odour. This pungent odour is due to :

(a) carbon dioxide (b) sulphur dioxide (c) sulphur gas (d) sulphuric acid

95. What process would you employed to extract metal from calamine ore?

(a) Concentration, Roasting, Reduction, Refining

(b) Concentration, Calcination, Reduction, Refining

(c) Concentration, Calcination, Heating, Refining

(d) None of these

96. The process employed for the purification of copper with cuprous oxide as the impurity is :

(a) poling (b) liquation

(c) electrolytic process (d) oxidation

97. Calculate the Ka value of a 0.2 M aqueous solution of propanoic acid, $CH_3CH_2CO_2H$, with a pH of 4.88.

(a) $Ka = 8.69 \times 10^{-10}$ (b) $Ka = 7.69 \times 10^{-10}$ (c) $Ka = 6.97 \times 10^{-10}$ (d) $Ka = 5.69 \times 10^{-10}$

98. Identify the compound that is the final product of Solvay process.

(a) Ammonium carbonate (b) Ammonium bicarbonate

(c) Sodium carbonate (d) Sodium bicarbonate

99. Which of the following gases with a smell of rotten egg is evolved when sulphuric acid is treated with copper sulphide?

(a) Sulphur vapour (b) Sulphur dioxide

(c) Hydrogen sulphide (d) Sulphur trioxide

100. Select the steps required for the extraction of aluminium and sequence them.

(1) froth floatation (2) chemical separation

(3) electrolytic reduction (4) smelting

(5) distillation under low pressure (6) electrolytic refining

(7) Pulverisation (8) conversion of concentrated ore into oxide

(9) crushing and grinding

(a) 9 5 7 2 3 8 6 1 (b) 3 2 1 4 5 6 7 8

(c) 9 7 2 8 3 6 (d) 9 7 2 3 8 6

101. Plaster of Paris is obtained :

(a) by adding water to calcium sulphate.

(b) by adding sulphuric acid to calcium hydroxide.

(c) by heating gypsum to a very high temperature.

(d) by heating gypsum to 373 K.

102. The correct order of acidic strength is :

(a) $CaO < CuO < H_2O < CO_2$ (b) $H_2O < CuO < CaO < CO_2$

(c) $CaO < H_2O < CuO < CO_2$ (d) $H_2O < CO_2 < CaO < CuO$

103. Which of the following turns red litmus blue?

(a) Water (b) Vinegar (c) Lime water (d) Brine

104. Which of the following metals react with NaOH as well as HCl?

(a) Na (b) Ca (c) Al (d) Mg

105. What is pH of 0.01 M monobasic acid solution?

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

106. Which of the following gases is least reactive?

(a) N_2 (b) H_2 (c) Cl_2 (d) O_2

107. Ammonia gas is formed by the combination of nitrogen and hydrogen

$$N_2 + 3H_2 \rightarrow 2NH_3$$

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.

108. 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_3COONa (c) NaBr (d) NH_4Cl

109. 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.

110. Galena is an ore of :

(a) Lead (b) Silver (c) Iron (d) Aluminium

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 $\cos^2 5° + \cos^2 10° + \cos^2 15° + \ldots. + \cos^2 90°$ 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 is 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 α, β, γ 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, ……., 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

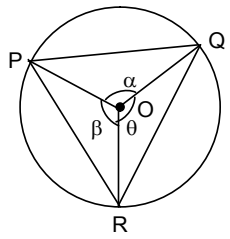
118. If $x^2 = 3x - 1$, then the value of $\frac{x^6+1}{x^3}$ is :

(a) 17 (b) 18 (c) 19 (d) 20

119. $\left(1-\frac{1}{n}\right)\left(1-\frac{1}{n+1}\right)\left(1-\frac{1}{n+2}\right)\cdots\left(1-\frac{1}{2n}\right)$ 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 $\sin\theta + \sin\alpha + \sin\beta$ = ….

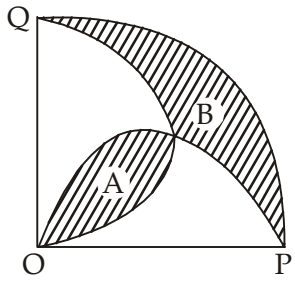


(a) $\frac{9\pi}{10}$ (b) $\frac{3\pi}{5}$ (c) 6π (d) None of these

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 $a \in R$, $b \in R$, $a \neq 0$, 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 $x_1, x_2, ..., x_n$ 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) $\frac{m - x_n + x}{n}$

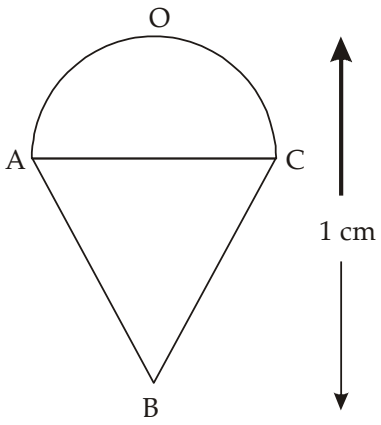
125. On her vacation Deepika visits four cities A, B, C and D in a random order. What is the Probability that she visits A before B ?

(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 an 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. If the roots of a quadratic equation are $\frac{p}{q}, -\frac{q}{p}$, then the equation is :

(a) $qx^2 - (q^2 + p^2)x - pq = 0$ (b) $pqx^2 - (p^2 - q^2)x - pq = 0$
(c) $px^2 - (p^2 + 1)x + p = 0$ (d) $p^2x^2 - (p^2 - q^2)x - pq = 0$

129. The angle of elevation of a cloud from a point 'h' metre above a lake is θ. The angle of depression of its reflection in the lake is 45°. 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) $\frac{1}{2}\left(2017^{4034} - 1\right)$ (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 :

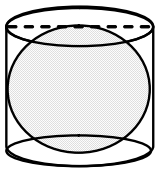
(a) both sets I and II has unique solutions

(b) set I has unique solution and set II has infinitely many solutions

(c) set II has unique solution and set I has infinitely many solutions

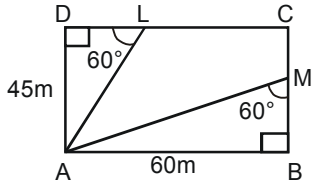
(d) none of the sets I and II has unique solution.

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 $\left[\sqrt{m+\sqrt{m+\sqrt{m}+....}}\right]-\left[\sqrt{m-\sqrt{m-\sqrt{m}-....}}\right]$ is:

(a) 1 (b) 0 (c) – 1 (d) Depends on 'm'

142. The least multiple of 7, which leaves a remainder of 4, when divided by 6, 9, 15 and 18 is:

(a) 273 (b) 196 (c) 182 (d) 364

143. If mean and median 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 ($0° < A < 90°$) 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

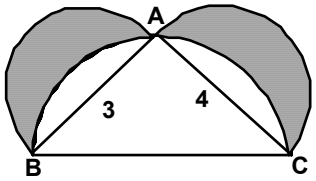
145. A and B can do a piece of work in 12 days ; B and C in 15 days; C and A in 20 days. In how many days can A alone do it ?

(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

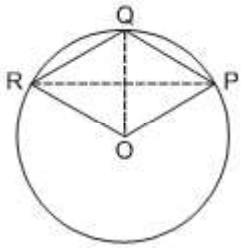
148. The condition that one root of the equation $ax^2 + bx + c = 0$, $a \neq 0$ may be double of the other is

(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) ± 1 (b) ± 2 (c) ± 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^2, then radius of circle is:



(a) 6 cm (b) 2 cm (c) 4 cm (d) 8 cm