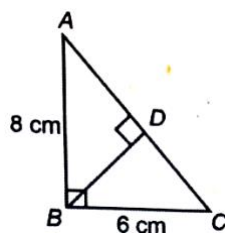

MATHEMATICS

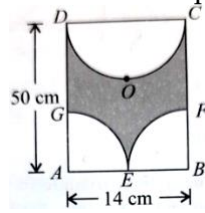
1. If $x^4 + x^3 + 8x^2 + ax + b$ is divisible by $x^2 + 1$ then the value of $a + b$ is
(A) 5 (B) 7 (C) 8 (D) 11
2. If one root of the quadratic equation $x^2 + px + 12 = 0$ is 4 and the equation $x^2 + px + q = 0$ has equal roots, then the value of q is
(A) $\frac{4}{49}$ (B) $\frac{49}{4}$ (C) 4 (D) 49
3. If one root of the equation $ax^2 + bx + c = 0$ is three times the other then $b^2:ac$ equals to
(A) 3:1 (B) 3:16 (C) 16:3 (D) 4:3
4. If $x^4 + \frac{1}{x^4} = 47$ then the value of $x^3 + \frac{1}{x^3}$ is
(A) 7 (B) 6 (C) 12 (D) 18
5. If α and β are roots of the quadratic equation $px^2 + 4x + 4 = 0$ and $\alpha^2 + \beta^2 = 24$. Then value of p is
(A) 1 (B) -1 (C) 2 (D) $\frac{3}{2}$
6. If α, β, γ are the zeros of the polynomial $f(x) = 2x^3 + 5x^2 - 6x - 3$ then $\frac{1}{\alpha} + \frac{1}{\beta} + \frac{1}{\gamma}$ equals to
(A) $\frac{5}{2}$ (B) 3 (C) -2 (D) 2
7. A passenger train takes 3 hours less for a journey of 360 km if its speed is increased by 10 km/hr from its usual speed. The usual speed of the train is
(A) 40 km/hr (B) 10 km/hr (C) 30 km/hr (D) 36 km/hr
8. Each edge of a cube is increased by 50%. The percentage of increase in the surface area of the cube is
(A) 125 (B) 50 (C) 100 (D) 150
9. In a right angled triangle ABC , BD is perpendicular to hypotenuse AC . If $BC = 6\text{ cm}$ and $AB = 8\text{ cm}$ then CD is equal to



- (A) 7.2 cm (B) 3.6 cm (C) 6 cm (D) 5 cm
10. The value of $\sqrt{28 + 3\sqrt{28 + 3\sqrt{28 + \dots}}}$ is
(A) 25 (B) 28 (C) 7 (D) 4

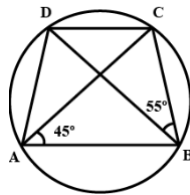
11. In a circle of radius 20 cm, two parallel chords lie on the opposite side of the centre. If distance between them is 28 cm and length of one chord is 24 cm, then the length of the other chord is
 (A) 28 cm (B) 24 cm (C) 32 cm (D) 36 cm
12. If $\tan x = \frac{1}{3}$ then $3 \sin x \cos x$ equals to
 (A) 1 (B) 9 (C) $\frac{1}{10}$ (D) $\frac{9}{10}$
13. If $x = a \sec \theta$ and $y = b \tan \theta$ then $b^2 x^2 - a^2 y^2$ equals to
 (A) $a^2 b^2$ (B) ab (C) $a^4 b^4$ (D) $a^2 + b^2$
14. The value of $\sin 48^\circ \sec 42^\circ + \cos 48^\circ \operatorname{cosec} 42^\circ$ is
 (A) 0 (B) 1 (C) 2 (D) none of these
15. If the angles of elevation of two towers from the middle point of the line joining their feet are 60° and 30° then the ratio of their heights is
 (A) 2:1 (B) $1:\sqrt{2}$ (C) $\sqrt{3}:1$ (D) 3:1
16. The value of k for which the points (10, 14), (-3, 3) and (k, -8) are collinear is
 (A) 16 (B) 18 (C) -16 (D) -18
17. A number is selected at random from first 50 natural numbers. The probability that selected number is a multiple of 3 or 4 is
 (A) $\frac{12}{25}$ (B) $\frac{14}{25}$ (C) $\frac{14}{50}$ (D) $\frac{8}{20}$
18. Let y co-ordinate of a point A is half of its x-co-ordinate. If A is equidistant from B (2,-5) and C (-3,6), then co-ordinates of A is
 (A) (10, 5) (B) (8, 4) (C) (6, 3) (D) (16, 8)
19. If (-2, 1) is the centroid of the triangle having its vertices at (x, 2), (10, -2), (-8, y) then x, y satisfy the relation
 (A) $3x + 8y = 0$ (B) $3x - 8y = 0$ (C) $8x + 3y = 0$ (D) $8x = 3y$
20. A right circular cylinder having diameter 12 cm and height 15 cm is full of ice-cream. The ice-cream is to be filled in cones of height 6 cm and diameter 6 cm having a hemi spherical shape on the top. The number of such cones which can be filled with ice-cream is
 (A) 12 (B) 10 (C) 15 (D) 18

21. In the given figure, E is the midpoint of AB, AGE and BEF are quadrants and DOC is a semi circle, then area of the shaded portion is



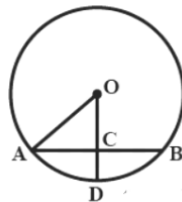
- (A) 154 cm^2 (B) 416 cm^2 (C) 284 cm^2 (D) 546 cm^2

22. ABCD is a cyclic quadrilateral in which AC and BD are its diagonals. If $\angle DBC = 55^\circ$ and $\angle BAC = 45^\circ$ then $\angle BCD$ is equal to



- (A) 100° (B) 35° (C) 45° (D) 80°

23. In the given figure, if $OA = 5 \text{ cm}$, $AB = 8 \text{ cm}$ and OD is perpendicular to AB , then CD is equal to



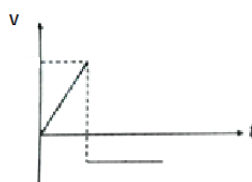
- (A) 2 cm (B) 3 cm (C) 4 cm (D) 2.5 cm

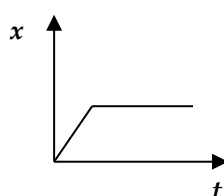
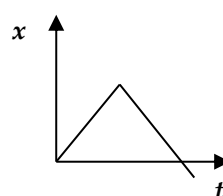
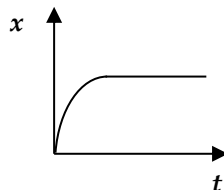
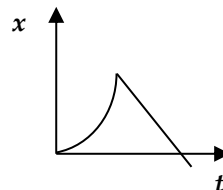
24. If $\sin\alpha + \sin\beta + \sin\gamma = 3$ then $\cos^2\alpha + \cos^2\beta + \cos^2\gamma$ equals to
 (A) 0 (B) 1 (C) 2 (D) 3

25. A number x is chosen at random from the numbers $-4, -3, -2, -1, 0, 1, 2, 3, 4$. Then the probability that $|x| < 3$ is
 (A) $5/7$ (B) $5/9$ (C) $3/7$ (D) $7/9$

PHYSICS

26. A wooden block of mass m_1 kg accelerates at 10 ms^{-2} when a force of 5 N acts on it. Another block of mass m_2 kg accelerates at 20 ms^{-2} when same force acts on it. Find the acceleration if both the blocks are tied together and same force acts on their combination:
 (A) 1.67 m/s^2 (B) 4.67 m/s^2 (C) 6.67 m/s^2 (D) 5.57 m/s^2
27. The velocity- time graph for a particle moving along X-axis is shown in the figure. The corresponding displacement-time graph is correctly shown by

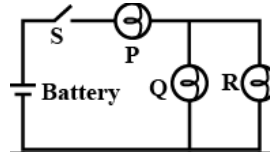


- (A) 
- (B) 
- (C) 
- (D) 

28. If momentum of a body is increased by 20%, then its the kinetic energy increases by
 (A) 48 % (B) 40 % (C) 44 % (D) 35 %
29. We have two wires A and B of same mass and same material. The diameter of the wire A is half of that of B. If the resistance of wire A is 24Ω then, the resistance of wire B will be
 (A) 12Ω (B) 3Ω (C) 1.5Ω (D) none of these
30. Two resistors of resistances R_1 and R_2 having $R_1 > R_2$ are connected in parallel. For equivalent resistance R, the correct statement is
 (A) $R > R_1 + R_2$ (B) $R < R_1 + R_2$
 (C) $R_2 < R < (R_1 + R_2)$ (D) $R < R_1$
31. A ball is released freely from the top of a building of height 80m. How long will it take to come down? Take $g = 10 \text{ m/s}^2$
 (A) 6 s (B) 8 s (C) 4 s (D) 2 s

32. A bulb is rated at 200 V- 100 W. Five such bulbs burn for 4 hours. What is the electrical energy consumed when they are connected to 200 V
 (A) 2units(B) 0.4 units (C) 0.1 units (D) 1 units

33. Three identical bulbs P, Q and R are connected to a battery as shown in the figure. When the circuit is closed by means of the switch S, which one of the following is true?



- (A) R will be bright, but Q and P dim
 (B) P, Q and R all will be equally bright
 (C) Q and R will immediately burn out
 (D) P will be bright, but Q and R dim
34. Two parallel wires carry current in opposite directions.
 (A) The wires attract each other
 (B) The wires repel each other
 (C) The wires experience neither attraction nor repulsion.
 (D) The force of attraction or repulsion do not depend on current direction
35. An alpha particle projected west is deflected towards north by a magnetic field. The direction of magnetic field is
 (A) towards south (B) towards east (C) downward (D) upward
36. In the following two statements are given. Choose the correct option by the directions given below:

Statement I: A soft iron bar placed inside a solenoid carrying current is magnetized.
Statement II: Magnetic field inside a long solenoid carrying current is non- uniform.

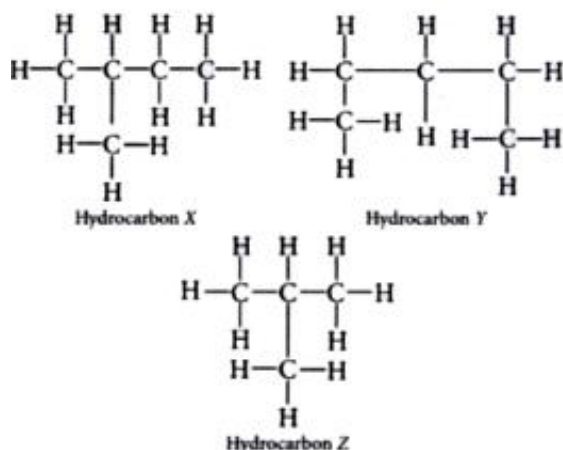
- (A) Statement I is correct and Statement II is correct explanation of the Statement I.
 (B) Statement I is correct and Statement II is not the correct explanation of the Statement I.
 (C) Statement I is true but Statement II is not true
 (D) Statement I is not true but Statement II is true
37. An object is situated at a distance of $f/2$ from a convex lens of focal length f . The image distance is
 (A) $-f$ (B) $-2f/3$ (C) $-2f$ (D) $-f/2$

38. White light is incident on an equilateral prism. In the position of minimum deviation, which of the following is true?
- (i) Angle of incidence is equal to angle of emergence.
(ii) The ray inside the prism is parallel to its base.
(iii) The angle of refraction inside the prism is equal to the angle of prism.
(iv) The dispersion of all colours is same.
- (A) i and ii (B) ii and iii (C) iii and iv (D) all of above
39. An object is placed at a distance of 40 cm on the principal axis of a concave mirror of radius of curvature 30 cm. By how much does the image move if the object is shifted towards the mirror through 15 cm?
- (A) 37.5 cm (B) 13.5 cm (C) 24 cm (D) 20 cm
40. One cannot see through fog, because
- (A) fog absorbs the light
(B) light suffers total reflection at droplets
(C) refractive index of fog is infinity
(D) light is scattered by droplets

CHEMISTRY

41. Haemoglobin contains 0.33% of iron by weight. The molecular weight of haemoglobin is approximately 67200 gm. The number of iron atoms (At. Weight of Fe = 56 u) present in one molecule of haemoglobin is
- (A) 6 (B) 1 (C) 4 (D) 2
42. Which of the following are isoelectronic species?
- I) $\overset{+}{C}H_3$ II) $\overset{-}{N}H_2$, III) $\overset{+}{N}H_4$ IV) $\overset{-}{C}H_3$
- (A) I, II, III (B) II, III, IV (C) I, II, IV (D) I, II
43. A dilute solution of sodium carbonate was added to two test tubes - one containing dil HCl (A) and the other containing dilute NaOH (B). The correct observation was:
- (A) A brown coloured gas liberated in test tube A
(B) A brown coloured gas liberated in test tube B
(C) A colourless gas liberated in test tube A
(D) A colourless gas liberated in test tube B

44. The structures of three hydrocarbons X, Y, Z are shown below



Which of the statements about X, Y, Z are correct?

- I. X and Y are isomers
- II. X and Y have the same percent of composition by mass
- III. Y is the isomer of alkane having formula C_5H_{12}
- IV. Z has the same boiling point as n-butane

- (A) I, II, III
- (C) I, IV

- (B) II, IV
- (D) I, III, IV

45. Hydrogen ion concentrations of three acids A, B and C are 10^{-5} mole/L, 10^{-3} mole/L and 10^{-2} mole/L respectively. Arrange these acids in order of their decreasing acidic strength.

- (A) $C > B > A$
- (C) $C > A > B$

- (B) $A = B = C$
- (D) $A > B > C$

46. Aluminum is very reactive metal but still it reacts slowly with dilute acid due to

- (A) its ability to form metallic bond
- (B) the formation of protective layer of oxide over its surface
- (C) its oxidising nature
- (D) its higher valency state

47. In which of the following reactions, H_2O_2 acts as a reducing agent?

- (A) $2KI + H_2O_2 \rightarrow 2KOH + I_2$
- (B) $2FeSO_4 + H_2SO_4 + H_2O_2 \rightarrow Fe_2(SO_4)_3 + 2H_2O$
- (C) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$
- (D) $Ag_2O + H_2O_2 \rightarrow 2Ag + H_2O + O_2$

48. Match column-I with column-II

<u>Column-I</u> (Compound)	<u>Column-II</u> (Examples)
(a) covalent	(i) SiO_2
(b) molecular	(ii) CaO
(c) ionic	(iii) CCl_4
(d) metallic	(iv) Bronze

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

49. Which one of the following contains maximum number of molecules?

- (A) 1 g CO_2 (B) 1 g N_2 (C) 1 g H_2 (D) 1 g CH_4

50. Ethene when treated with Br_2 in presence of CCl_4 , which of the following compound is formed?

- (A) 1- Bromo-2-chloroethane (B) 1, 2 – dibromoethane
(C) both A and B (D) 1, 1, 2 – tribromoethane

51. Which of the following pair of metals are extracted by means of electrolytic reduction of their molten state?

- (A) Zn and Mg (B) Mg and Mn (C) Fe and Al (D) Mg and Al

52. The IUPAC name of $\text{CH}_2 = \text{CH} - \text{CH}(\text{CH}_3)_2$ is

- (A) 1 – isopropylethylene (B) 1, 1 – dimethyl-2-Propane
(C) 3 – methylbut – 1- ene (D) 2 – Vinylpropane

53. Which of the following statements is true for fullerence?

- (A) It is a non crystalline form of carbon
(B) It was discovered by Buckminster fuller
(C) All the fullerenes have even number of atoms
(D) all of these

54. The equation, $\text{Cu} + x\text{HNO}_3 \rightarrow \text{Cu}(\text{NO}_3)_2 + y\text{NO}_2 + 2\text{H}_2\text{O}$. The values of x and y are

- (A) 3 and 5 (B) 8 and 6 (C) 4 and 2 (D) 7 and 1

55. Mineral acids are stronger acids than carboxylic acids because

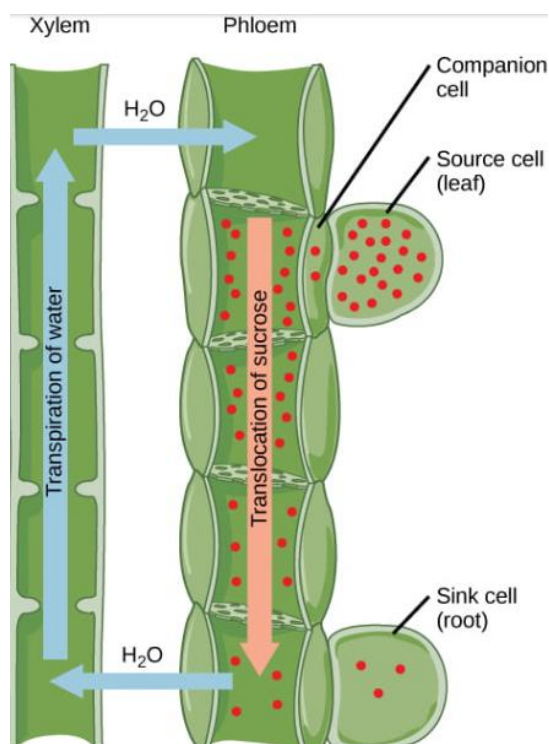
- (i) Mineral acids are partially ionized
(ii) Mineral acids are completely ionized
(iii) Carboxylic acids are partially ionized
(iv) Carboxylic acids are completely ionized.

Select the correct option from the following.

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

BIOLOGY

56. A biology teacher placed a Hen's egg in three different solutions.
Solution- A- Pure water
Solution- B- Saturated salt solution
Solution- C- Hydrochloric Acid
The sequence of treatment and the ensuing probable effect on the egg are listed below.
- (i) A- B- C--- Remains unchanged
 - (ii) B- C- A--- Swells
 - (iii) C- A- B--- Shrinks
 - (iv) B- A- C---- Loses salt
- Based on the above sequence to treatment which of the following options will be correct?
- (A) i and ii (B) ii and iv (C) iii and iv (D) ii and iii
57. The Pancreatic ducts that connect to small intestine get blocked in an Individual. How it affect the process of digestion?
- (A) Proteins and carbohydrates can be converted into amino acids.
 - (B) Complete digestion of proteins, carbohydrates and fats occur.
 - (C) Both carbohydrates proteins cannot be converted into glucose and amino acids respectively.
 - (D) Complete digestion of carbohydrates, proteins and fats will not occur.
58. Which type of transport occurs for sucrose from source cells into phloem tissue cells? Why water entered into the phloem tissue after that? What should be the pressure generated at 'a' and 'b'? Find out the correct answer from the given options.

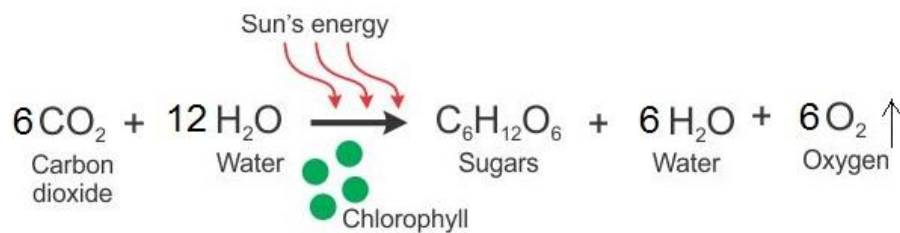


- (A) Active Transport. Osmotic pressure rises
 a- High pressure b- Low pressure
 (B) Passive Transport. Osmotic pressure rises
 a- High pressure b- Low pressure
 (C) Active Transport. Osmotic pressure rises
 a- Low pressure b- High pressure
 (D) Passive Transport. Wall pressure rises
 a- High pressure b- Low pressure

59. The inner membrane of mitochondria is deeply folded. Find out what is the reason behind it from the given statements:-

- (A) It accommodates more transporter proteins than outer membrane.
 (B) It accommodates more ATP on it.
 (C) It increases surface area to produce more ATP.
 (D) It increases surface area to produce more proteins.

60. How many molecules of water are required during photosynthesis for reduction of CO₂ into 6 molecules of glucose? And how many CO₂ are getting reduced into 6 molecules of glucose?



- (A) 24 H₂O and 15 CO₂ (B) 72 H₂O and 36 CO₂
 (C) 96 H₂O and 45 CO₂ (D) 120 H₂O and 60 CO₂

61. Match the following and choose the correct option with respect to human beings.

Name of the structure	Cause or Function
(A) Placenta	(I) No formation of gamete
(B) Ovary	(II) Reserve food material
(C) Female gamete of human	(III) Formation of gamete
(D) Testes located within the abdominal cavity	(IV) Removal of excretory wastes

- (A) A- IV, B-III, C- II, D- I (B) A- IV, B-III, C- I, D- II
 (C) A- III, B-IV, C- I, D- II (D) A- III, B-IV, C-II, D- I

62. In a family, all the sons and daughters has blood group AB. But the mother has blood group B and father has blood group A. What would be the possible genotypes of parents?

- (A) Father- I^A I^A Mother- I^B I^B
 (B) Father- I^A I^B Mother- I^A I^B
 (C) Father- I^A I^O Mother- I^A I^O

(D) Father- I^A I^O Mother- I^B I^O

63. Match column A and B

Column-A

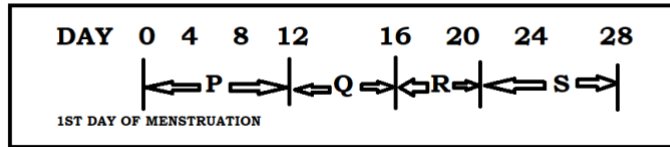
- (i) *Leishmania*
- (ii) *Bryophyllum*
- (iii) *Rhizopus*
- (iv) *Hydra*
- (v) *Spirogyra*

Column -B

- 1. Sporangia
- 2. Fission
- 3. Fragmentation
- 4. grafting
- 5. Leaf buds
- 6. Regeneration

- (A) i-6, ii-5, iii-2, iv-3, v-1
- (B) i-6, ii-3, iii-5, iv-2, v-1
- (C) i-3, ii-4, iii-2, iv-1, v-6
- (D) i-2, ii-5, iii-1, iv-6, v-3

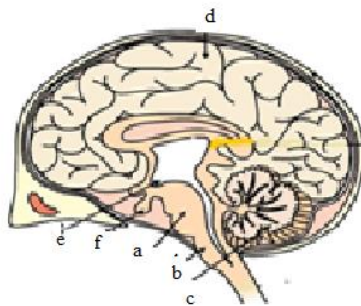
64. P, Q, R and S are stages of menstrual cycle. At which stage can fertilisation take place?



- (A) P
- (B) Q
- (C) R
- (D) S

65. The image below shows the sagittal section of human brain. Choose the correct statements from the following regarding the activities they control.

- (I) a- Walking in a straight line
- (II) b- Blood pressure
- (III) c- Riding a bicycle
- (IV) d- Thinking and memory
- (V) e- Vomiting
- (VI) f- secretes growth hormone



- (A) I, II, III
- (B) II, III, IV, VI
- (C) II, III, IV, V, VI
- (D) I, III, IV, VI

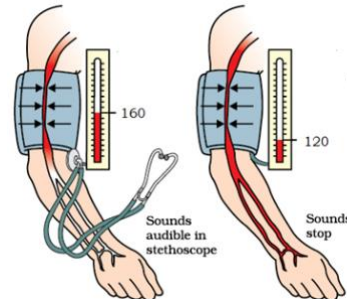
66. Which of the following statement/ statements is/are correct?

- (i) Gibberellins cause wilting of leaves.
- (ii) Cytokinin is present in greater concentration in fruits and seeds
- (iii) Auxin stimulates the cells to grow longer on the side of shoot which is away from light

- (iv) Gibberellin like auxin helps in growth of the stem.
- (v) Abscisic acid promotes growth of the shoot and root.

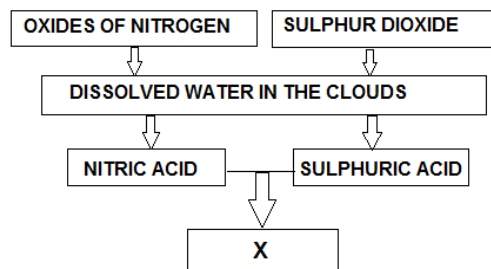
- (A) i, ii, v (B) i, iii, iv, v (C) i, ii, iii, iv (D) ii, iii, iv

67. Study the image given below and choose the correct option from the following-



- (A) The person has normal systolic and diastolic blood pressure.
- (B) The person is suffering from hypotension and needs treatment immediately.
- (C) The person has a high systolic pressure and a normal diastolic pressure.
- (D) The person is suffering from hypertension that results in increased resistance to blood flow.

68. Which of the following statement is correct regarding X in the following flow chart?



- (A) X causes the entry of UV radiation to earth's atmosphere.
- (B) X reduces visibility by appearing as a haze in the air.
- (C) X causes corrosion of steel structures and make fresh water resources acidic.
- (D) X causes algal bloom that reduces oxygen concentration in fresh water

69. In a plant, smooth seeds (S) are dominant over wrinkled seeds (s) and green seeds (G) are dominant over orange seeds (g). A plant homozygous for smooth and green seeds is crossed with a plant having wrinkled and orange seeds. The F1 offspring are self-crossed to produce F2 generation. If a total of 144 offspring are produced, how many plants are expected to be having wrinkled and green seeds in F2 generation, According to a typical Mendelian cross?

- (A) 9 (B) 18 (C) 27 (D) 81

70. A person who is on long hunger strike and surviving only on water will have

- (A) less urea in his urine (B) More sodium in his urine
- (C) less amino acids in his urine (D) more glucose in his blood