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ACADEMIC SESSION 2024-26

Name : _____ Application No.:

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Resonance Nashik Talent Search Exam

SAMPLE PAPER

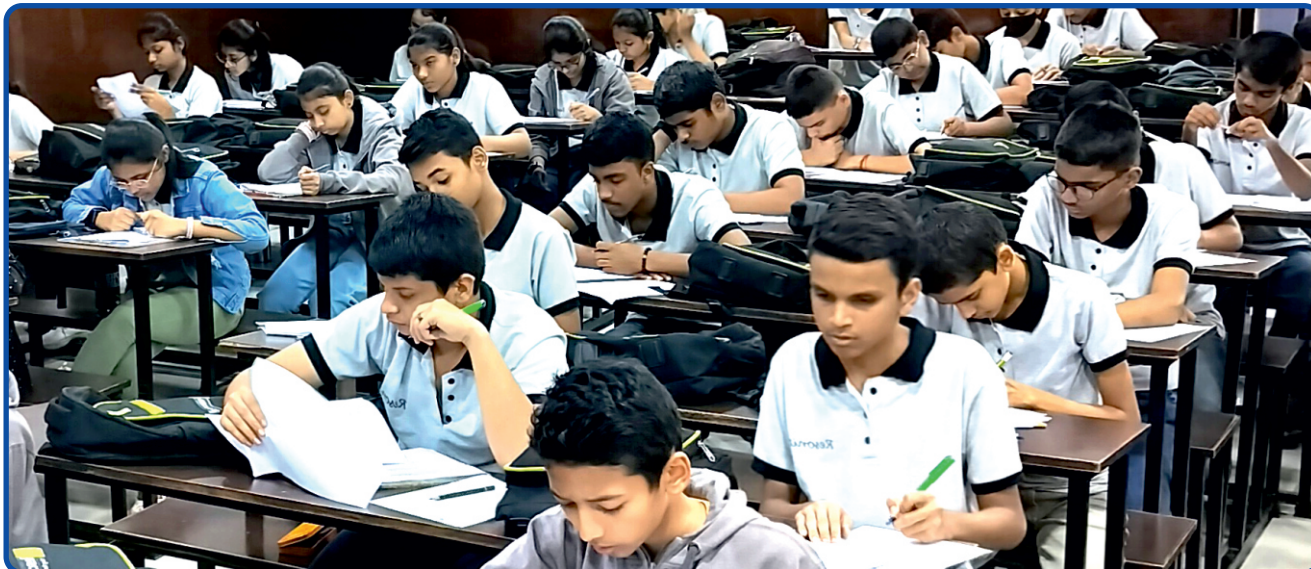
For Students of Class 10th Std.

Exam Date : 29th Oct 2023

Duration : 90 Min.

Max. Marks : 210

Pattern : Single Option Correct (+3, -1) Total No. of Questions 70 (Physics : 15, Chemistry : 15, Mathematics : 25, Biology : 15)



PHYSICS : Ray optics : Reflection, plane and spherical mirror. Refraction , Lenses & prism. **Current electricity :** Ohm's law, Resistivity, Combination of resistor, Ammeter, Voltmeter, heating effect of current. **Kinematics :** Motion on straight line, displacement and distance , average velocity. Acceleration. graphs for rectilinear motion. Motion under gravity. **Heat :** Temperature, its various units and their relationship. Specific heat capacity. Latent heat of fusion and vaporization, principle of calorimetry

CHEMISTRY : Matter, Mole concept, Periodic classification, Acid base and salt, Metal and non metals (Metallurgy), Carbon and its compounds, Chemical reaction and equations, Atoms and molecules

MATHEMATICS : Real numbers, Polynomials, Linear equations, Quadratic Equations, Trigonometry, Arithmetic Progression, Geometry (Triangles & Circles)

BIOLOGY : Animal Diversity / Classification, Plant Diversity / Classification, Reproduction (Plant & Animal), Heredity / Genetics, Tissue (Plant & Animal), Transport in plants, Co-ordination in human being (Nervous system & Endocrine system)

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JEE 2023 RESULTS @ NASHIK

CITY RANK 1



AIR 166

ABHISHEK GUPTA
IIT-Delhi
Computer Science(Dual)

CITY RANK 2

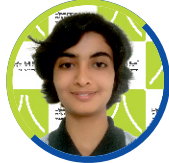


AIR 536

ARYA JOSHI
IIT-BOMBAY
Engineering Physics



KAUSHAL MORANKAR
IIT - Hyderabad
Computer Science(B.Tech)



TANISHA HASE
IIT - BOMBAY
Electrical Engineering(Dual)



OJAS PATHAK
IIT - BOMBAY
Chemical Engineering (B.Tech)



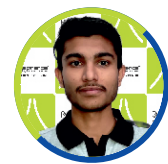
SHIVAM SHANKAR
IIT - BOMBAY
Engineering Physics



ASHISH MORE
IIT - GUWAHATI
Energy Engineering



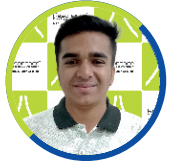
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IIT - Delhi
Production & Industrial Eng.



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Geophysical Technology



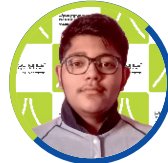
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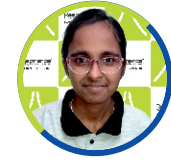
NEEL KOTKAR
IIT - KHARAGPUR
Applied Geology 4 Yrs. B.Sc.



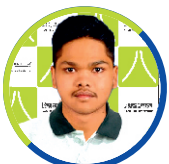
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PAWAN BHATKAR
IIT - DHANBAD
Mathematic & Computing



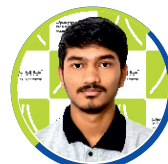
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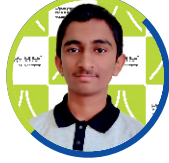
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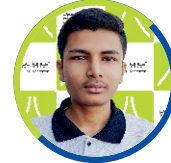
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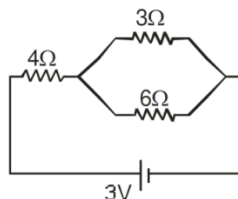
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Data Science & Engineering



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NIT - NAGPUR
Metallurgical Engineering

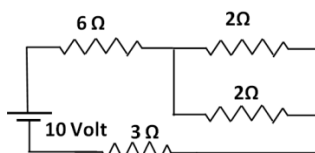
Section-I(Physics)

1. Find current supplied by the 3 Volt cell in the circuit



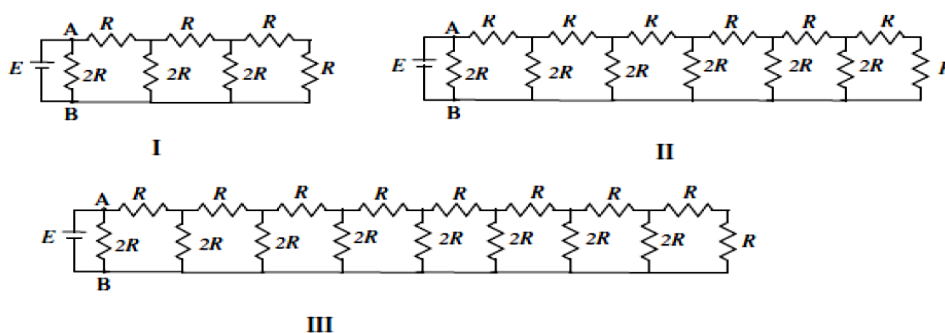
- (A) 1 A (B) 3 A (C) 0.5 A (D) 4/3 A

2. For the circuit shown in fig find power developed in 3 Ω resistor



- (A) 100/3 W (B) 30 W (C) 3W (D)5W

3. Three different circuits (I, II and III) are constructed using identical batteries and resistors of R and 2R ohm. What can be said about current *i* in arm AB of each circuit?

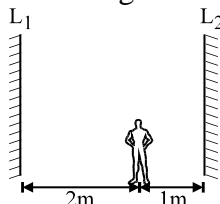


- (A) $I > II > III$ (B) $III > II > I$ (C) $I = II = III$ (D) $I = II > III$

4. An object of height 2cm is placed perpendicular to principle axis at distance 30 cm from pole of a convex lens($f=20$ cm) then its image will be

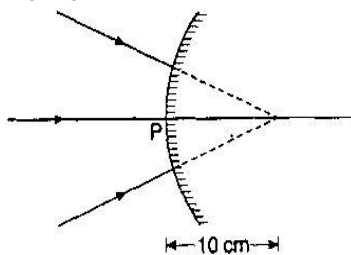
- (A) real and of height 4 cm (B) real and of height 1 cm
(C) Virtual and of height 4 cm (D) Virtual and of height 1 cm

5. Two mirrors labeled L_1 for left mirror and L_2 for right mirror in the figure are parallel to each other and 3.0 m apart. A person standing 1.0 m from the right mirror (L_2) looks into this mirror and sees a series of images. The second nearest image seen in the right mirror is situated at a distance:

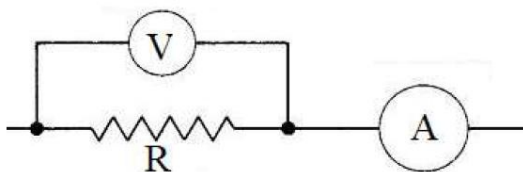


- (A) 2.0 m from the person (B) 4.0 m from the person
(C) 6.0 m from the person (D) 8.0 m from the person

6. A convergent beam of light is incident on a convex mirror of radius of curvature 60 cm as shown in fig. The image formed by the convex mirror is

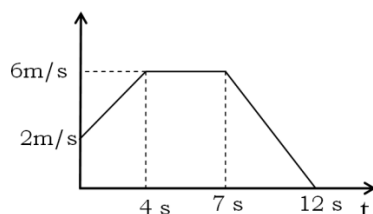


- (A) Virtual and 15 cm behind the mirror (B) Real and 15 cm in front of the mirror
 (C) Virtual and 7.5 cm behind the mirror (D) Real and 7.5 cm in front of the mirror
7. A beaker contain 2kg water at 20°C and another beaker contains 3 kg water at 80°C . if the two are mixed together then what will be temperature of mixture.
- (A) 50° (B) 40° (C) 56° (D) 65°
8. A car starts moving with acceleration 2 m/s^2 for 10 sec then move with constant velocity find displacement in 1st 20 sec
- (A) 500m (B) 400m (C)300 m (D)350 m
9. When a ball is thrown up vertically with velocity V_0 , it reaches a maximum height of ' h '. If one wishes to triple the maximum height then the ball should be thrown with velocity
- (A) $2V_0$ (B) $3 V_0$ (C) $\sqrt{3} V_0$ (D) V_0
10. A particle is moving on a straight line with constant acceleration, it moves 21 m in 5th sec while 33 m in 8th sec the how much distance it will cover in 10th sec.
- (A) 41 m (B) 39m (C) 37 m (D) 35 m
11. Temperature of a body is 37°C then its temperature in Kelvin will be
- (A) 300 (B) 340 (C) 310 (D)350
12. There is a regular bus service between Nashik and Pune (180 km apart) at every hour from both the cities. First bus leaves (both Pune and Nashik at 4 am while last bus at 11 pm. These buses run at average 45 km/ hr. Taxis also run on the same route at 60 km/hr with regular interval of 30 min. First taxi leaves (both Pune and Nashik) at 4 am while last Taxi at 10 pm. Following statements are based upon the number of taxies or buses crossed (not overtaken) only during travelling i.e excluding instances of arrival and departure. Consider following statements
- I. Taxies left at 8 pm crosses 10 taxis II. Last taxis crosses 5 buses III. Last bus crosses 4 taxies
- (A) Only I &II are correct (B) Only II &III are correct
 (C) Only I &III are correct (D) All are correct
13. Refer the circuit below. The voltmeter reads 117 V and ammeter reads 0.13A. If the resistance of voltmeter and ammeter are $9\text{ k}\Omega$ and 0.015Ω respectively, the value of R is ____.



- (A) $2\text{ k}\Omega$ (B) $1.5\text{ k}\Omega$ (C) $1\text{ k}\Omega$ (D) $1.1\text{ k}\Omega$

14. Velocity vs time graph is given below, In which time interval particle acceleration is zero



- (A) $t=0$ to 4 sec (B) $t=7$ to 12 sec (C) $t=4$ to 7 sec (D) none
15. A light ray incident from air to water plane interface then the ray will
- (A) bends toward normal (B) bends away from normal
(C) go along normal (D) go in same direction as incident

Section-II (Chemistry)

16. The molecular formula of some organic compounds are given below, which of the following contains a ketone group?
(A) $C_3H_6O_2$ (B) C_3H_4O (C) C_3H_6O (D) C_3H_7O
17. If the pH of an aqueous solution is 5. The hydroxyl ion concentration in the solution would be ___
(A) 9.5M (B) -8.5M (C) $10^{-9}M$ (D) $1 \times 10^9 M$
18. Which of the following represents the electronic configuration of d-block elements?
(A) $(n-1)d^{1-10} ns^2 np^4$ (B) $(n-1)s^2 nd^{1-10}$ (C) $(n-1)d^{1-10} ns^{0-2}$ (D) $(n-1)p^4 ns^2$
19. Which of the following contains one mole molecules of the substance ?
(A) 16g oxygen (B) 7g nitrogen (C) 2g hydrogen (D) 36g water
20. The IUPAC name of neopentyl chloride is
(A) 1-chloropentane (B) 2,2- dimethyl-4-chlorobutane
(C) 1-chloro-2,2-dimethyl propane (D) 2-methyl-3-chloro propane
21. In which of the following compounds oxygen has highest oxidation state and in which it has lowest oxidation state?
 $OF_2, H_2O_2, KO_2, O_2F_2$
(A) Highest = KO_2 , lowest = H_2O_2 (B) Highest = OF_2 , lowest = K_2O_2
(C) Highest = OF_2 , lowest = KO_2 (D) Highest = KO_2 , lowest = H_2O_2
22. Which of the following contains the same number of atoms as 13.5 grams of aluminium?
(A) 20g of calcium (B) 10g of magnesium
(C) 20g of potassium (D) 10 g of sodium
23. Any two members in a homologous series differ in molecular mass by ___
(A) 8 (B) 14 (C) 24 (D) 12
24. The total number of protons in 10 g of calcium carbonate is ($N_0 = 6.023 \times 10^{23}$)
(A) 1.5057×10^{24} (B) 2.0478×10^{24} (C) 3.0115×10^{24} (D) 4.0956×10^{24}
25. Which of the elements have the greatest electronegativity?
(A) Bromine (B) Nitrogen (C) Oxygen (D) Sulphur

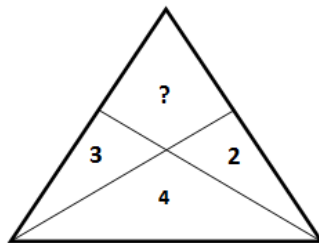
26. Sol and gel are examples of ____
 (A) Solid - solid colloids
 (B) Sol is solid in liquid colloid, gel is liquid in solid colloid
 (C) Sol is solid in solid colloid, gel is solid in liquid colloid
 (D) Sol is liquid in solid colloid, gel is solid in liquid colloid
27. In a compound C, H and N atoms are present in 9 : 1 : 3.5 by weight. Molecular weight of compound is 108. Molecular formula of compound is
 (A) C₂H₆N₂ (B) C₃H₄N (C) C₆H₈N₂ (D) C₉H₁₂N₃
28. The value of σ and π bonds present in 4-methyl, pent-4-en-1-yne respectively are
 (A) 15,4 (B) 13,5 (C) 13,3 (D) 12,4
29. The pair of atoms having the same number of neutrons is
 (A) $^{12}_6\text{C}, ^{24}_{12}\text{Mg}$ (B) $^{23}_{11}\text{Na}, ^{19}_9\text{F}$ (C) $^{23}_{11}\text{Na}, ^{24}_{12}\text{Mg}$ (D) $^{23}_{11}\text{Na}, ^{39}_{19}\text{K}$
30. The amount of CaCO₃ which will precipitate if 50 ml of 1.0M Na₂CO₃ and 50 ml of 0.2 M CaCl₂ are mixed is
 (A) 5.0 g (B) 2.0g (C) 1.0 g (D) 0.5 g

Section-III (Math)

31. If positive number a,b,c satisfy $abc = 1$, solve Equation in x

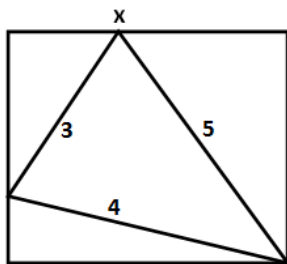
$$\frac{2ax}{ab+a+1} + \frac{2bx}{bc+b+1} + \frac{2cx}{ac+c+1} = 1$$

 (A) 1 (B) $\frac{1}{2}$ (C) 2 (D) 3
32. Two non negative integers 'x' and 'y' are such that $2x + y = 5$. The sum of maximum and minimum values of $(x + y)$ is.
 (A) 2 (B) 5 (C) 18 (D) 8
33. If $a + b = 1, a^2 + b^2 = 2$ then $a^{11} + b^{11} = ?$
 (A) $\frac{989}{32}$ (B) $\frac{989}{31}$ (C) $\frac{989}{33}$ (D) 3
34. The area of region represented by (?) if 2,3,4, represent the area of respected region



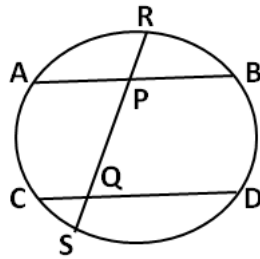
- (A) 6.8 (B) 7.8 (C) 4.8 (D) 9.8

35. A triangle is drawn inside a square with sides 4,3 and 5. If X is the length of the side of square find X

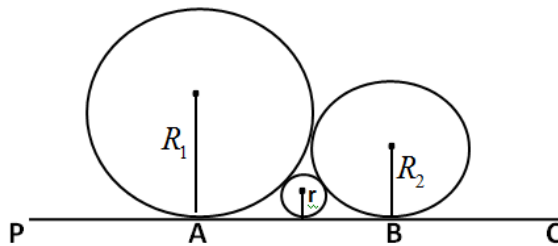


- (A) $\frac{16}{\sqrt{17}}$ (B) $\frac{15}{\sqrt{17}}$ (C) $\sqrt{18}$ (D) $\sqrt{17}$
36. The greater between $\sqrt{19} - \sqrt{14}$ & $\sqrt{12} - \sqrt{7}$
 (A) $\sqrt{19} - \sqrt{14}$ (B) $\sqrt{12} - \sqrt{7}$ (C) Both are equal (D) Can't say.
37. If $\cos A + \cos^2 A = 1$ then the value of $\sin^2 A + \sin^4 A$ is
 (A) 1 (B) $\frac{1}{2}$ (C) 2 (D) 3
38. If $(2x+1) > 5$ and $(x-1) < 9$ then which of the following could not be value of x .
 (A) 1 (B) 4 (C) 7 (D) 8
39. If $x + \frac{1}{x} = \sqrt{2}$. find value of $x^{2021} + \frac{1}{x^{2021}}$
 (A) $\sqrt{2}$ (B) $\sqrt{3}$ (C) $-\sqrt{2}$ (D) $-\sqrt{3}$
40. The first term of an A.P is 5, the last term is 45 and the sum is 400. Then the fourth term of A.P is
 (A) 13 (B) 11 (C) 15 (D) 14
41. Find the unit digit in $132^{74} - (3498)^{49}$
 (A) 6 (B) 0 (C) 4 (D) 2
42. The simplified value of $\sqrt{8+2(2+\sqrt{5})(2+\sqrt{7})}$
 (A) $\sqrt{2} + \sqrt{5} + \sqrt{7}$ (B) $2 + \sqrt{5} + \sqrt{7}$ (C) $\sqrt{2} + \sqrt{5} + 7$ (D) $2 + \sqrt{5} + 3\sqrt{7}$
43. If $x^2 - x - 1 = 0$, then the value of $x^3 - 2x + 1$ is
 (A) 0 (B) 2 (C) $\frac{1+\sqrt{5}}{2}$ (D) $\frac{1-\sqrt{5}}{2}$
44. If $\tan 2\theta = \cot(\theta + 6^\circ)$, where 2θ and $(\theta + 6^\circ)$ are acute angles. Find the value of θ .
 (A) 26° (B) 27° (C) 28° (D) None of these.

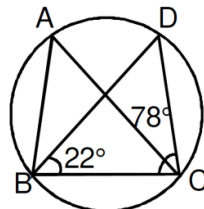
45. If $AP = 12, PB = 20, CQ = 10, DQ = 24, PQ = 14, RS = ?$



- (A) 33 (B) 35 (C) 34 (D) 30
46. If α, β are roots of the equation $x^2 - 5x + 6 = 0$ then the equation whose roots are $(\alpha + 3)$ and $(\beta + 3)$ is
- (A) $2x^2 - 11x + 30 = 0$ (B) $-x^2 + 11x = 0$ (C) $2x^2 - 22x + 60 = 0$ (D) $x^2 + 8x - 9 = 0$
47. The sum of those integers from 1 to 100 which are not divisible by 3 or 5 is =
- (A) 2489 (B) 4735 (C) 2317 (D) 2632
48. The figure shown three circles which are touching one another and $P-A-B-C$ is straight line if $R_1 = 9, R_2 = 4$ then find $r = ?$



- (A) $\frac{25}{36}$ (B) $\frac{36}{25}$ (C) $\frac{24}{35}$ (D) $\frac{35}{24}$
49. The sum of the roots of equation $2^{333x-2} + 2^{111x+1} = 2^{222x+2} + 1$ is =
- (A) 111 (B) $\frac{111}{2}$ (C) $\frac{2}{111}$ (D) $\frac{3}{112}$
50. In the given fig, $\angle DBC = 22^\circ$ and $\angle DCB = 78^\circ$, then $\angle BAC$ is equal to



- (A) 30° (B) 44° (C) 80° (D) 54°
51. Given that the real number s & t satisfying $19s^2 + 99s + 1 = 0$ $t^2 + 99t + 19 = 0$ and $st \neq 1$. then value $\frac{st + 4s + 1}{t}$
- (A) 4 (B) -5 (C) 5 (D) -4

52. Let α and β be roots of $x^2 - 3x - 2 = 0$ with $\alpha > \beta$. If $a_n = \alpha^n - \beta^n$ for $n \geq 1$. then $\frac{a_{20} - 2a_{18}}{3a_{19}}$ is.
- (A) 1 (B) -1 (C) 0 (D) 3
53. The value of $\frac{x^4 - 6x^3 - 2x^2 + 18x + 23}{x^2 - 8x + 15}$ when $x = \sqrt{19 - 8\sqrt{3}}$
- (A) 10 (B) 5 (C) 20 (D) 15
54. The value of $\sin^2 5^\circ + \sin^2 10^\circ + \sin^2 15^\circ + \dots + \sin^2 85^\circ + \sin^2 90^\circ$
- (A) 7 (B) 8 (C) $9\frac{1}{2}$ (D) 10
55. The sum of all the two digit natural number which on division by 6 leaves remainder 3
- (A) 655 (B) 855 (C) 755 (D) 555

Section-IV (Biology)

56. What is the similarity between gymnosperms and angiosperms?
- (A) Phloem of both have companion cells.
 (B) Endosperm is formed before fertilization in both.
 (C) Origin of ovule and seed is similar in both.
 (D) Both have leaves, stem and roots.
57. Identify the examples of simple tissues
- (A) Epithelial Tissue (B) Blood
 (C) Meristematic Tissue (D) Both A and C
58. In phylum echinodermata, the adult echinoderms are _____ A _____ but larvae are _____ B _____.
- (A) A – radially symmetrical; B – bilaterally symmetrical
 (B) A – bilaterally symmetrical; B – radially symmetrical
 (C) A – bilaterally symmetrical; B – asymmetrical
 (D) A – metamerically segmented; B – asymmetrical
59. A squirrel was eating a fruit on the ground. Suddenly it was attacked by a dog. The squirrel rushed to the tree immediately and saved itself from the dangerous attack. What immediate changes are most likely to have taken place in the body of the squirrel?
- (a) Blood flows to the stomach for rapid digestion.
 (b) Adrenalin was secreted in the blood by the adrenal glands.
 (c) Heart beat becomes faster and pumps more blood so that muscles get more oxygen.
 (d) Adrenocorticotrophic hormone is secreted in the blood and blood flows more towards the vital organs.
- Select the correct combination of options given below.
- (A) a and b (B) a and c (C) b and c (D) c and d
60. "Girdling" is the process of removal of outer tissues around the branch or trunk of a woody plant. Girdling can be shallow (i.e., only bark is removed) or deep (i.e., bark along with xylem is removed). Which one of the following will result if a grapes-bearing branch of a plant is girdled?
- (A) If the girdling is shallow, it will not have any effect on the plant.
 (B) If the girdling is deep, the leaves on the branch will become turgid as transpiration will halt.
 (C) If the girdling is deep, the plant will die.
 (D) If the girdling is shallow, the fruits on the branch will be sweeter.

61. In reflex action the reflex arc is formed by
 (A) Brain → Spinal cord → Muscles (B) Receptor → Spinal cord → Muscles
 (C) Muscle → Receptor → Brain (D) Muscles → Spinal cord → Receptor
62. Cleistogamous flowers are
 (A) Wind pollinated (B) Self-pollinated (C) Cross-pollinated (D) Insect pollinated
63. Oxytocin hormone is produced by
 (A) Pituitary gland (B) Adrenal gland (C) Hypothalamus (D) Thyroid gland
64. When a tall plant with round seeds was hybridized with a dwarf plant with wrinkled seeds; all offspring in F1 generation were tall plants that produced round seeds. As per Mendel's law of independent assortment, what percent of offspring will produce wrinkled seeds if F1 is crossed with tall plant producing wrinkled seeds?
 (A) 10 (B) 20 (C) 50 (D) 100
65. Testes descend into scrotum in mammals for
 (A) Spermatogenesis (B) Development of visceral organs
 (C) Fertilization (D) Development of sex organs
66. Which one of the following is the correct matching of the events occurring during menstrual cycle ?
 (A) Menstruation : Breakdown of myometrium and ovum not fertilised
 (B) Ovulation : LH and FSH attain peak level and sharp fall in the secretion of progesterone
 (C) Proliferative phase : Rapid regeneration of myometrium and maturation of Graafian follicle
 (D) Secretory phase : Development of corpus luteum and increased secretion of progesterone
67. Given below are three statements about bryophytes:
 (i) Bryophytes are lower plants with plant body differentiated into root, stem and leaves.
 (ii) Bryophytes are devoid of xylem and phloem.
 (iii) Bryophytes required water for completion of their life cycle.
 Which of the above statement/s is/are true with respect to bryophytes?
 (A) ii only (B) i and ii (C) i and iii (D) ii and iii
68. Which of the following statement is incorrect regarding cuboidal epithelium ?
 (A) It is an epithelial tissue.
 (B) It is composed of a single layer of cube-like cells.
 (C) They are found in the walls of blood vessels and air sacs of lungs.
 (D) Secretion and absorption are the main functions of these tissue.
69. The gene for hemophilia is present on X chromosome. If a hemophilic male marries a normal female, the probability of their son being hemophilic is:
 (A) Nil (B) 25% (C) 50% (D) 100%
70. An injury in accident has disturbed regulation of body temperature, water balance and hunger. The part of brain affected is :
 (A) Cerebellum (B) Cerebrum (C) Medulla oblongata (D) Hypothalamus

Answer key: Physics

1.C 2.C 3.C 4.A 5.C 6.B 7.C 8.C 9.C 10.A 11.C 12.B 13.C
14.C 15.A

Answer key: Chemistry

16.C 17.C 18.C 19.C 20.C 21.C 22.A 23.B 24.C 25.C 26.B 27.C 28.C
29.C 30.C

Answer key: Maths

31.B 32.D 33.A 34.B 35.A 36.B 37.A 38.A 39.C 40.A 41.A 42.B 43.B
44.C 45.C 46.C 47.D 48.B 49.C 50.C 51.B 52.A 53.B 54.C 55.B

Answer key: Biology

56.D 57.D 58.A 59.C 60.D 61.B 62.B 63.A 64.C 65.A
66.D 67.D 68.C 69.A 70.D

