PHYSICS

1. A piece of copper and another of germanium are cooled from room temperature to 80 K. The resistance of

(1) each of them increases

(2) each of them decreases

(3) copper increases and that of germanium decreases

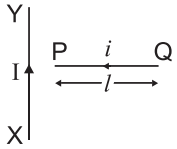
(4) copper decreases and that of germanium increases

2. A body starts performing uniform circular motion such that it covers 100 rounds per min. Then the minimum time after which its average velocity will be zero is

(1) 0.5 s (2) 0.6 s

(3) 0.7 s (4) 0.8 s

3. A wire PQ carrying a current '*i*' is placed perpendicular to a long wire XY carrying a current I. The direction of force on PQ will be



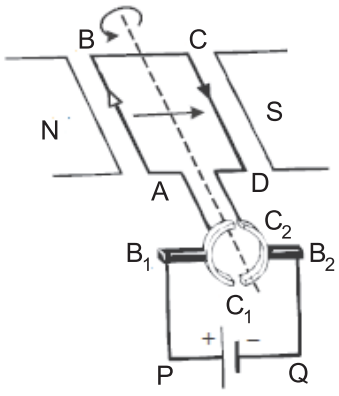
(1) towards right

(2) towards left

(3) upwards

(4) downwards

A rotating device is shown in figure, answer the following questions (Q.4 and Q.5).



4. The device shown in figure is

(1) A dc motor (2) An ac motor

(3) An ac generator (4) A dc generator

5. In the given figure the direction of force acting on arm AB is

(1) Inwards (into the paper)

(2) Outwards (out of paper)

(3) Leftwards

(4) No force will act on arm AB

6. An object is placed in front of a concave mirror of radius of curvature 15 cm, at a distance of 10 cm, the position and nature of the image formed is

(1) + 30 cm, virtual and erect

(2) + 30 cm, real and inverted

(3) –30 cm, virtual and erect

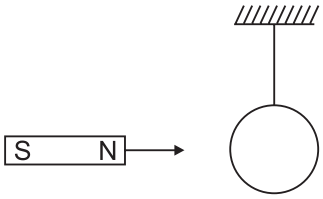
(4) –30 cm, real and inverted

7. An electric lamp whose resistance is 10 ohm, and a conductor of 2 ohm resistance are connected in series with a 6 V battery. The total current through the circuit and the potential difference across the electric lamp are

(1) 3.6 A, 6 V (2) 0.5 A, 5 V

(3) 2.0 A, 0.2 V (4) 0.3 A, 3 V

8. A copper ring is suspended by a thread in a vertical plane. If one end of a magnet is brought horizontally towards the ring as shown, the ring will



(1) move towards the magnet

(2) not change its position

(3) move away from the magnet

(4) first move towards and then move away from the magnet

9. What is meant by one cycle of a.c.?

(1) Going from zero to + maximum

(2) Going from + maximum to zero

(3) Going from zero to – maximum and – maximum to zero

(4) All the three mentioned above combined together in same order

10. If the temperature is increased, what will be the effect on the resistance of a conductor?

(1) Does not change (2) Decreases

(3) Increases (4) Cannot say

11. A ball of mass 50 g is thrown upwards. It rises to a maximum height of 100 m. At what height its kinetic energy will be reduced to 70%?

(1) 30 m (2) 40 m

(3) 60 m (4) 70 m

12. Match the terms in Column I with those of Column II:

	Column – I		**Column – II**
i.	Electric fuse	A	Chemical effect
ii.	Relay	B	Electric discharge
iii.	CFL	C	Magnetic effect
iv.	Button cell	D	Heating effect

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

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

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

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

13. The far point of a myopic person is 40 cm. To see the distant objects clearly, the focal length and the power of the lens used should be:

(1) –40 cm, –2.5 D

(2) –25 cm, –4.0 D

(3) 40 cm, –2.5 D

(4) –40 cm, +2.5 D

14. Several electric bulbs designed to be used on a 220 V electric supply are rated 20 W each. How many lamps can be connected in parallel with each other across the two wires of 220 V line if the maximum allowable current is 5 A?

(1) 50 (2) 110

(3) 55 (4) 60

15. Voice of which of the following is likely to have maximum frequency?

(1) Man

(2) Cow

(3) Bird

(4) Dog

CHEMISTRY

16. When sodium bisulphite reacts with hydrochloric acid, the products formed are

(1) NaCl, H_2O and SO_2

(2) Na_2SO_4 and NaCl

(3) NaCl and H_2S

(4) No reaction takes place

17. How many moles of ferric alum $(NH_4)_2SO_4 \cdot Fe_2(SO_4)_3 \cdot 24H_2O$ can be made from the sample of Fe containing 0.0056 g of it?

[Atomic mass of Fe = 56 u]

(1) 10^{-4} mol (2) 0.5×10^{-4} mol

(3) 0.33×10^{-4} mol (4) 2×10^{-4} mol

18. 500 mL solution of hydrochloric acid is made by dissolving 3.65 gram HCl in distilled water. What is the molarity of chloride ions in the solution?

(1) 0.01 M (2) 0.02 M

(3) 0.2 M (4) 0.1 M

19. Which of the following statements is incorrect?

(1) The conjugate base of $H_2PO_4^-$ is HPO_4^{2-}.

(2) The pH of 1 M HCl is 0.

(3) H_3PO_3 is a tribasic acid.

(4) The concentration of H^+ ions in pure water is 10^{-7} mol L^{-1} at 298 K.

20. 5.85 g of NaCl was treated with concentrated H_2SO_4 and the gas evolved was passed into a solution of silver nitrate. The white precipitate obtained was filtered, dried and weighed. Assuming complete reaction, how many grams of precipitate was obtained?

[Atomic mass of Ag = 108 u, Na = 23 u and Cl = 35.5 u]

(1) 10.8g (2) 14.35g

(3) 35.5g (4) 3.65g

21. The number of atoms in 8g oxygen molecules are

(1) 6.022×10^{23} (2) 3.011×10^{23}

(3) 1.51×10^{23} (4) 12.044×10^{23}

22. Bromine atom is available in two isotopes, $^{79}_{35}Br$ (49.7%) and $^{81}_{35}Br$ (50.3%), the average atomic mass of bromine atom is

(1) 79.016 (2) 80.076

(3) 80.006 (4) 81.016

23. Choose the correct from the following:

(i) Salt of a strong acid and a strong base are neutral with pH value of 7.

(ii) Salt of a strong acid and a weak base are basic with pH value more than 7.

(iii) Salt of a weak acid and a strong base are acidic with pH value less than 7.

(1) (i) and (ii) are correct

(2) (ii) and (iii) are correct

(3) only (i) is correct

(4) (i) and (iii) are correct

24. Which out of following hydrocarbons undergo addition reactions?

C_2H_6, C_3H_8, C_3H_6, C_2H_2 and CH_4

(1) C_2H_6 and C_3H_8 (2) C_3H_6 and C_2H_2

(3) CH_4 and C_2H_6 (4) C_3H_8 and C_2H_2

25. Match the following:

(i) Vinegar	P. Tartaric acid
(ii) Orange	Q. Oxalic acid
(iii) Tamarind	R. Acetic acid
(iv) Tomato	S. Citric acid

(1) (i)-Q, (ii)-R, (iii)-P, (iv)-S

(2) (i)-R, (ii)-Q, (iii)-P, (iv)-S

(3) (i)-R, (ii)-S, (iii)-P, (iv)-Q

(4) (i)-S, (ii)-Q, (iii)-R, (iv)-P

26. Food cans are coated with tin and not with zinc because

(1) Zinc is costlier than tin

(2) Zinc has a higher melting point than tin

(3) Zinc is more reactive than tin

(4) Zinc is less reactive than tin

27. The pH of solution formed by mixing of 40 ml of 0.10 M HCl and 10 ml of 0.45 M of NaOH is

(1) 10 (2) 12

(3) 8 (4) 6

28. Two metals which will displace hydrogen and two metals which will not displace hydrogen from dilute acids, respectively are

(1) potassium, calcium, aluminium and zinc

(2) sodium, calcium, zinc and iron

(3) zinc, iron, copper and mercury

(4) copper, mercury, silver and gold

29. For a reaction $A + 2B \rightarrow C$, the amount of C formed by starting the reaction with 5 moles of A and 8 moles of B is

(1) 5 moles (2) 8 moles

(3) 16 moles (4) 4 moles

30. Arrange the following atoms in the order of increasing atomic radius:

F, Cl, C, O

(1) F, Cl, O, C (2) C, O, F, Cl

(3) O, C, F, Cl (4) F, O, C, Cl

31. a, b, c are three real numbers such that $a + b + c = 7$, $a^2 + b^2 + c^2 = 35$ and $a^3 + b^3 + c^3 = 151$. Find the value of abc.

(1) 12

(2) 14

(3) –15

(4) –13

32. Value of $(a - c)[(a - b)^2 + (b - c)^2 - (a - b)(b - c)] + (c - a)^3$ is equal to

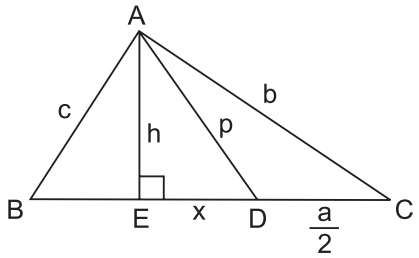
(1) $3(a - b)(b - c)(c - a)$

(2) $(a - b)(b - c)(c - a)$

(3) $(a - b)^3 (b - c)^3 (c - a)^3$

(4) $3(a - b)^3 (b - c)^3 (c - a)^3$

33. In the given figure, D is the midpoint of side BC and if BC = a, AC = b, AB = c, ED = x, AD = p and AE = h.



If $b^2 - p^2 - ax = \frac{a^2}{k}$ then k is

(1) 2 (2) 4

(3) 8 (4) 16

34. If $\Delta ABC \sim \Delta DEF$ such that BC = 2.1 cm and EF = 2.8 cm. If the area of triangle DEF is 16 cm^2, then the area of triangle ABC (in sq. cm) is

(1) 9 (2) 12

(3) 8 (4) 13

35. If $\sin\theta_1 + \sin\theta_2 + \sin\theta_3 = 3$, then $\cos\theta_1 + \cos\theta_2 + \cos\theta_3$ is equal to

(1) 0 (2) 1

(3) 2 (4) 3

36. A circular wire of radius 7 cm is cut and bent again into an arc of a circle of radius 12 cm. The angle subtended by the arc at the centre is

(1) 50° (2) 60°

(3) 100° (4) 210°

37. The value of k for which the system of equation $kx - y = 2$, $6x - 2y = 3$ has unique solution is

(1) not equal to one

(2) equal to three

(3) not equal to zero

(4) not equal to three

38. A conical vessel of radius 6 cm and height 8 cm is completely filled with water. A metal sphere is now lowered into the water. The size of the sphere is such that when it touches the inner surface, it just gets immersed. The fraction of water that overflows from the conical vessel is

(1) $\frac{3}{8}$ (2) $\frac{5}{8}$

(3) $\frac{7}{8}$ (4) $\frac{5}{16}$

39. $\left\{\frac{3\cos 43^\circ}{\sin 47^\circ}\right\}^2 \frac{\cos 37^\circ . \operatorname{cosec} 53^\circ}{\tan 5^\circ . \tan 25^\circ . \tan 45^\circ . \tan 65^\circ . \tan 85^\circ} = ?$

(1) 7

(2) 0

(3) 1

(4) 8

40. The length 'L' of a tangent, drawn from a point 'A' to a circle is $\frac{4}{3}$ of the radius '*r*'. The shortest distance from A to the circle is

(1) $\frac{1}{2}r$ (2) r

(3) $\frac{1}{2}L$ (4) $\frac{2}{3}L$

41. On solving following rational number $6.8^2 - 3.4^2 + 2.1^3/0.5^3 + 1.7320$, answer will be

(1) 18.1694 (2) 15.1694

(3) 31.1694 (4) 22.1694

42. If α, β are zeroes of the quadratic polynomial $p(x) = kx^2 + 4x + 4$ such that $\alpha^2 + \beta^2 = 24$, find the value of k.

(1) $k = 3/4$ or $k = -2$ (2) $k = 2/3$ or $k = -1$

(3) $k = 3/2$ or $k = -1$ (4) $k = 2/3$ or $k = -2$

43. How many terms of an AP must be taken for their sum to be equal to 120 if its third term is 9 and the difference between the seventh and second term is 20?

(1) 6 (2) 7

(3) 8 (4) 9

44. If $\tan(\pi \cos\theta) = \cot(\pi \sin\theta)$, then the value(s) of $\cos\left(\theta - \frac{\pi}{4}\right)$ is/are

(1) $\frac{1}{2}$ (2) $\frac{1}{\sqrt{2}}$

(3) $\pm\frac{1}{2\sqrt{2}}$ (4) $\pm\frac{3}{2\sqrt{2}}$

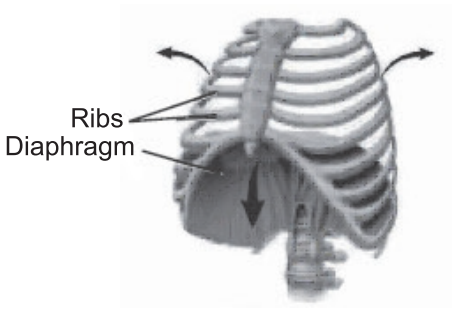
45. Two dice are thrown simultaneously. What is the probability of getting two numbers whose product is even?

(1) $\frac{1}{2}$ (2) $\frac{3}{4}$

(3) $\frac{3}{8}$ (4) $\frac{5}{16}$

BIOLOGY

46. Which process is taking place in this diagram?



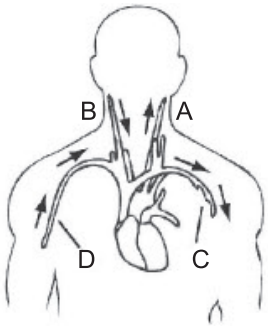
(1) Inhalation; the diaphragm is contracting.

(2) Exhalation; the diaphragm is relaxing.

(3) Inhalation; the chest cavity is reduced.

(4) Exhalation; the rib cage is expanding.

47. Two arteries and two veins are labelled in the diagram.Which two are veins?



(1) A and B

(2) B and C

(3) B and D

(4) C and D

48. Nucleus is peripheral in plant cell due to presence of

(1) Central large vacuole

(2) Mitochondria

(3) Plasma membrane

(4) Ribosome

49. Glucose $\xrightarrow{\text{(i)}}$ Pyruvate $\xrightarrow{\text{(ii)}}$ Lactic acid + Energy

The given reactions take place, respectively, in

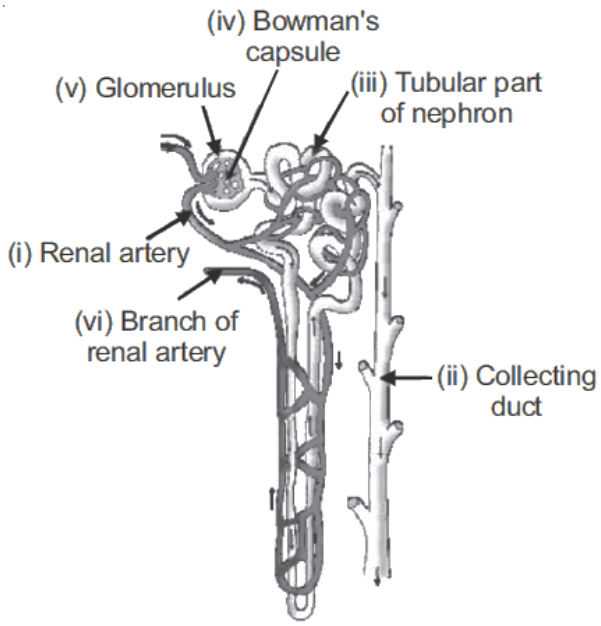
(1) (i) Chloroplast (ii) Subsidiary cells

(2) (i) Mitochondria (ii) Chloroplast

(3) (i) Cytoplasm (ii) Chloroplast

(4) (i) Cytoplasm (ii) Muscle cells

50. In the following diagram, which labellings are correct?



(1) (i), (ii) & (iv)
(2) (ii), (v) & (vi)
(3) (iv), (v) & (vi)
(4) (i), (ii) & (iii)

51. In which part of the alimentary canal digestion of starch begins?

(1) Stomach (2) Large intestine
(3) Liver (4) Buccal cavity

52. Normally in a healthy adult the daily initial filtrate in the kidneys is

(1) 18 L (2) 1.8 L
(3) 180 L (4) 9 L

53. Sperm formation requires_____ temperature as in the normal body temperature.

(1) same (2) high
(3) low (4) not sure

54. An example of homologous organs is

(1) Our arm and a dog's fore-leg
(2) Our teeth and an elephant's tusks
(3) Potato and runners of grass
(4) All of the above

55. The experiment conducted by Stanley L. Miller and Harold C. Urey in 1953 to show how organic molecules arise in nature, they assembled an atmosphere consisted of

(1) ammonia, methane and oxygen
(2) ammonia, hydrogen sulphide and oxygen
(3) ammonia, hydrogen sulphide and methane
(4) methane, hydrogen sulphide and oxygen

56. The oxygenated blood is carried from lungs to left auricle by

(1) vena cava (2) pulmonary vein
(3) pulmonary artery (4) aorta

57. Neurons that interpret and receive information and stimulate motor neurons are

(1) sensory neurons (2) motor neurons
(3) interneurons (4) rotator neurons

58. Multiple fission occurs in this organism.

(1) Paramecium (2) Plasmodium
(3) Amoeba (4) All the above

59. Which of the organisms given below, has very simple 'eyes' that are just eye-spots which detect light?

(1) Hydra
(2) Planaria
(3) Tapeworm
(4) Earthworm

60. Which one of the following is an artificial ecosystem?

(1) Pond
(2) Crop field
(3) Lakem
(4) Forest

END OF THE EXAM