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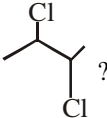
// SAMPLE PAPER - 15 //

// PHYSICS //

01. The area under velocity-time graph for a particle in a given interval of time represents
(1) velocity
(2) acceleration
(3) work done
(4) displacement

02. A cricketer can throw a ball to a maximum horizontal distance of 100 m. With the same speed how much high above the ground can the cricketer throw the same ball?
(1) 50 m
(2) 100 m
(3) 150 m
(4) 200 m

03. A particle is thrown upwards from ground. It experiences a constant air resistance force which can produce a retardation of 2 m/s². The ratio of time of ascent to the time of descent is
(1) 1 : 1
(2) $\sqrt{\dfrac{2}{3}}$
(3) $\dfrac{2}{3}$
(4) $\sqrt{\dfrac{3}{2}}$

04. A particle moves in a circle of radius 5 cm with constant speed and time period 0.2π s. The acceleration of the particle is
(1) 25 m/s²
(2) 36 m/s²
(3) 5 m/s²
(4) 15 m/s²

05. A particle is moving on a circular path of radius r with uniform speed v. What is the displacement of the particle after it has described an angle of 60° ?
(1) $r\sqrt{2}$
(2) $r\sqrt{3}$
(3) r
(4) 2r

06. The capacity of an isolated conducting sphere of radius R is proportional to
(1) R^2
(2) $\dfrac{1}{R^2}$
(3) $\dfrac{1}{R}$
(4) R

07. If a positive charge is shifted from a low potential region to a high potential region, then electric potential energy
(1) decreases
(2) increases
(3) remains same
(4) may increase or decrease

08. A ball released from the top of a tower travels $\dfrac{11}{36}$ of the height of the tower in the last second of its journey. The height of the tower is
(Take g = 10 m s⁻²)
(1) 11 m
(2) 36 m
(3) 47 m
(4) 180 m

09. A projectile is given an initial velocity of $\hat{i}+2\hat{j}$. The Cartesian equation of its path is : (g = 10 m/s²)
(1) $y = 2x - 5x^2$
(2) $y = x - 5x^2$
(3) $4y = 2x - 5x^2$
(4) $y = 2x - 25x^2$

10. A small conducting sphere of radius r is lying concentrically inside a bigger hollow conducting sphere of radius R. The bigger and smaller spheres are charged with Q and q(Q > q) and are insulated from each other. The potential difference between the spheres will be
(1) $\dfrac{1}{4\pi\varepsilon_0}\left(\dfrac{q}{r} - \dfrac{q}{R}\right)$
(2) $\dfrac{1}{4\pi\varepsilon_0}\left(\dfrac{q}{R} - \dfrac{Q}{r}\right)$
(3) $\dfrac{1}{4\pi\varepsilon_0}\left(\dfrac{q}{r} - \dfrac{Q}{R}\right)$
(4) $\dfrac{1}{4\pi\varepsilon_0}\left(\dfrac{Q}{R} + \dfrac{q}{r}\right)$

// CHEMISTRY //

11. Correct order of basic strength of different methyl amines in gaseous state:
(1) $(CH_3)_2NH > CH_3NH_2 > (CH_3)_3N > NH_3$
(2) $(CH_3)_3N > (CH_3)_2NH > CH_3NH_2 > NH_3$
(3) $(CH_3)_2NH > (CH_3)_3N > CH_3NH_2 > NH_3$
(4) $(CH_3)_2NH > CH_3NH_2 > NH_3 > (CH_3)_3N$

12. The C4 – C5 carbon-carbon bond in the following molecule results from the overlap of which orbitals (in the order C4 – C5)?
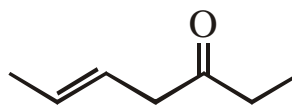
(1) sp-sp²
(2) sp-sp³
(3) sp²-sp²
(4) sp³-sp²

13. Wrong statement about

? (structure: CH with Cl, CH with Cl - 2,3-dichlorobutane type)

(1) It has two chiral centers
(2) It will have one meso-stereoisomer
(3) Out of all possible stereo isomers it will have two optically active stereo isomers.
(4) It will have all chiral stereoisomers its all stereoisomers will be chiral

14. Mole fraction of vapours A above the solution in the mixture of A and B ($\chi_A = 0.4$) will be
($p_A^o = 100$ mm, $p_B^o = 200$ mm)
(1) 0.4   (2) 0.8
(3) 0.25   (4) None of these

15. We have three aqueous solutions of NaCl labelled as A, B and C with concentrations 0.1 M, 0.01 M and 0.001 M, respectively. The value of van't Hoff factor for these solutions will be in the order.........
(1) $i_A < i_B < i_C$ (2) $i_A > i_B > i_C$
(3) $i_A = i_B = i_C$ (4) $i_A < i_B > i_C$

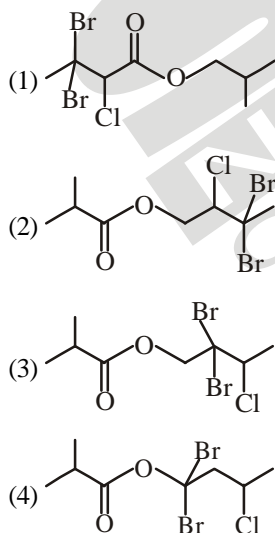16. Determine correct matching between column-I & Column-II

Column-I	Column-II
A. Element Z = 71	p - group 16, period-7
B. Element Z = 116	q - p-block, group-13
C. Element - He	r - s- block
D. Element Z = 49	s - f-block

(1) A-s, B- p, C - r, D - q   (2) A-s, B- q, C - r, D - p
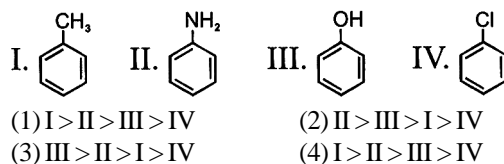(3) A-p, B- q, C - r, D - s   (4) A-p, B- r, C - q, D - s

17. Which of the following is correct structure of 3, 3-dibromo-2-chlorobutyl 2-methyl propanoate?

(1)

(2)

(3)

(4)

18. Which of the following compounds will show geometrical isomerism?
(1) Propene   (2) 2-Methyl-2-butene
(3) 1-Phenylpropene   (4) 2-Butyne

19. Which of the following is not nucleophile-
(1) NH_3 (2) $CH_3-\ddot{O}H$
(3) $OH^{\ominus}$ (4) $NH_4^{\oplus}$

20. Arrange in decreasing order of rate of reactivity.

I. (toluene, CH_3)   II. (aniline, NH_2)   III. (phenol, OH)   IV. (chlorobenzene, Cl)

(1) I > II > III > IV   (2) II > III > I > IV
(3) III > II > I > IV   (4) I > II > III > IV

BOTANY

21. Centrosome undergo duplication during ...(i)... of ...(ii)... and begin to move towards opposite poles of the cell during ...(iii)... stage of ...(iv)...

|	(i)	(ii)	(iii)	(iv)
(1)	S phase	Interphase	Prophase	Mitosis
(2)	S phase	Interphase	Anaphase	Mitosis
(3)	Prophase	Mitosis	Metaphase	Mitosis
(4)	Prophase	Mitosis	Anaphase	Mitosis

22. Meiosis consists of
(1) two cell divisions without any DNA replication
(2) Two cell divisions in which chromosome number is reduced to half
(3) Two cell divisions with only two rounds of chromosome replication
(4) a single cell division with chromosome replication

23. Cell organelle responsible for autolysis is
(1) dictyosome   (2) Lysosome
(3) peroxisome   (4) glyxysome

24. A bivalent of meiosis-I consists of:
(1) Two chromatids and one centromere
(2) Two chromatids and two centromeres
(3) Four chromatids and two centromeres
(4) Four chromatids and four centromeres

25. Select the correct sequence of electron transfer in Z-scheme of light reaction.
(1) e^- Acceptor → ETS (made of cytochrome) → PS II → $NADP^+$ → PS I → e^- Acceptor
(2) PS II → e^- Acceptor → ETS (made of cytochrome) → PS I → e^- Acceptor → $NAPD^+$
(3) ETS (made of cytochrome) → PS I → e^- Acceptro → PS II → e^- Acceptor → $NADP^+$
(4) e^- Acceptor → PS I → PS II → e^- Acceptor → ETS (made of cytochrome) → $NADP^+$

26. Astral rays arise from
(1) Centriole   (2) Cytoplasm
(3) Chromatid   (4) Centromere

27. Read the following statements and find out the incorrect statements.
(a) Water is essential for all physiological activities of the plant and plays a very important role in all living organisms
(b) A mature corn plant absorbs almost five litres of water in a day
(c) A mustard plant absorbs water equal to its own weight in about 3 hours
(d) Water is often the limiting factor for plant growth and productivity in both agricultural and natural environments
(e) A watermelon has over 92 percent water, most herbaceous plants have only about 10 to 20 percent of its fresh weight as dry matter
(1) b, c, e (2) a, b, d
(3) a, c, e (4) b, c, d

28. Study the figure shown below and select the option which gives correct words for all the blanks
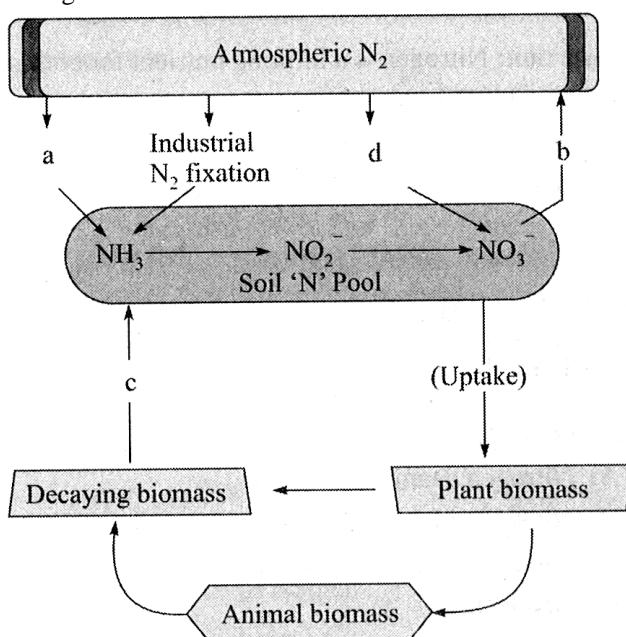
(1) a-Biological N_2 - fixation, b- Denitrification, c-Ammonification, d-Electrical N_2- fixation
(2) a-Ammonification, b- Biological -N_2- fixation, c-Electrical N_2- fixation, d- Denitrification
(3) a-Biological N_2 - fixation, b-Electrical N_2- fixation, c-Denitrification, d-Ammonification
(4) a-Biological N_2 - fixation, b- Ammonification, c-Denitrification, d-Electrical N_2- fixation

29. In a diploid cell, there are 14 chromosomes and the DNA content is 2C after M-phase what would have been the number of chromosomes and amount of DNA at G_1, after S and G_2 phase respectively?
(1) No. of chromosomes–14, 14, 14; Amount of DNA–2C, 4C, 4C
(2) No. of chromosomes–14, 28, 28; Amount of DNA–2C, 2C, 4C
(3) No. of chromosomes–14, 14. 28; Amount of DNA–4C, 4C, 4C
(4) No. of chromosomes–28, 14, 14; Amount of DNA–4C, 2C, 2C

30. Recognise the figure and find out the. correct matching.
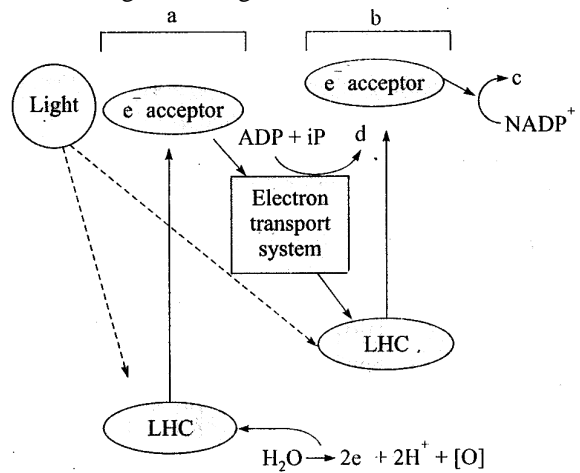
(1) a—PS I, b—PS II, c—ATP, d—NADH
(2) a—PS II, b—PS I, c—NADPH, d—ATP
(3) a—PS I, b—PS II, c—NADPH, d—ATP
(4) a—PS II, b—PS I, c—ATP, d—NADH

ZOOLOGY

31. Which of the following is incorrect about birds ?
(1) Air sacs connected to lungs help in respiration
(2) Hind limb possess scales and are modified for walking, swimming or clasping
(3) Separate sexes, internal fertilization, oviparous and direct development
(4) Endoskeleton consists of feathers, scales, beak and claws

32. Select the total number of hormones secreted by pars distalis from the following
GH, PRL, MSH, FSH, LH, TSH, ACTH, ADH
(1) 4 (2) 5
(3) 6 (4) 8

33. Which of the following hormone regulates the growth of the mammary glands and formation of milk ?
(1) GH
(2) TSH
(3) Prolactin (PRL)
(4) ACTH

34. ANF leads to
(1) Dilation of blood vessels
(2) Decreases blood pressure
(3) Both (1) and (2)
(4) Increases blood pressure

35. The .... of kidney produces peptide hormone called ..... which stimulates erythropoiesis
(1) Podocyte, Erythropoietin
(2) JG cells, Erythropoietin
(3) JG cells, Rennin
(4) JG cells, Renin

36. Life came from outer space, this theory is called
    (1) Spore theory
    (2) Naturalistic theory
    (3) Special creation theory
    (4) Spontaneous generation

37. In a medico legal case of accidental interchange between two babies in hospital, the baby of the blood group A could not be rightly given to a couple with
    (1) Husband of 'B' group and wife of 'O' group
    (2) Husband of 'A' group and wife of 'B' group
    (3) Husband of 'O' group and wife of 'AB' group
    (4) Husband of 'AB' group and wife of 'A' group

38. Inheritance of blood group is a condition of
    1. Codominance   2. Incomplete dominance
    3. Multiple allelism   4. Multiple gene
    5. Dominance
    (1) 1, 2, 3   (2) 2, 4, 5
    (3) 2, 3, 4   (4) 1, 3, 5

39. Which of the following shows convergent evolution?
    (1) Mouse and Marsupial mouse
    (2) Bobcat and Spotted cuscus
    (3) Anteater and Marsupial mole
    (4) Lemur and Tasmanian wolf

40. Class name is 'Cyclostomata' means
    (1) Marine but reproduction takes place in fresh water
    (2) Mouth is circular and suctorial
    (3) Ectoparasite of fishes
    (4) Jaws are absent