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SAMPLE PAPER - 89

Time : 1 : 15 Hr. **Question : 60**

PHYSICS

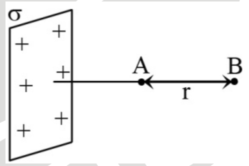
01. A charged particle of mass m and charge q is released from rest in uniform electric field E. Neglecting the effect of gravity, the kinetic energy of the charged particle after t second is

(1) $\frac{Eq^2M}{2t^2}$ (2) $\frac{2E^2t^2}{mq}$ (3) $\frac{E^2q^2t^2}{2m}$ (4) $\frac{Eqm}{t}$

02. Two point charges of +2 micro-coulombs and +6 micro-coulombs repel each other with a force of 12 newtons. If a charge of –2 micro-coulombs is given to each of these charges, what will be the force now:

(1) zero (2) 4 N (attractive)
(3) 8 N (repulsive) (4) 4 N (repulsive)

03. An infinite sheet has surface charge density σ. The distance between two points is r. The potential difference $(V_A - V_B)$ between these points is



(1) $\frac{\sigma r}{2\varepsilon_0}$ (2) $\frac{\sigma r}{3\varepsilon_0}$ (3) $\frac{\sigma}{\varepsilon_0 r}$ (4) $\frac{\sigma}{2\varepsilon_0 r}$

04. In 1 g of a solid, there are 5×10^{21} atoms. If one electron is removed from everyone of 0.1% atoms of the solid, the charge gained by the solid is (given that electronic charge is 1.6×10^{-19} C) :

(1) +0.08 C (2) +0.8 C (3) –0.08 C (4) –0.8 C

05. Two concentric spheres kept in air have radii R and r. They have similar charge and equal surface charge density σ. The electrical potential at their common centre is (ε_0 = permittivity of free space)

(1) $\frac{\sigma(R+r)}{\varepsilon_0}$ (2) $\frac{\sigma(R-r)}{\varepsilon_0}$

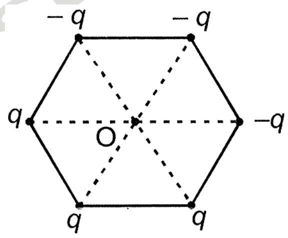
(3) $\frac{\sigma(R+r)}{2\varepsilon_0}$ (4) $\frac{\sigma(R+r)}{4\varepsilon_0}$

06. In a regular polygon of n sides, each corner is at a distance r from the centre. Identical charges of magnitude Q are placed at (n - 1) corners. The field at the centre is ($k = 9\times10^9$ N-m^2/C^2) :

(1) $k\frac{Q}{r^2}$ (2) $(n-1)k\frac{Q}{r^2}$

(3) $\frac{n}{(n-1)}k\frac{Q}{r^2}$ (4) $\frac{(n-1)}{n}k\frac{Q}{r^2}$

07. Six point charges are placed at the vertices of a hexagon of side 1 m as shown in figure. Net electric field at the centre of the hexagon is



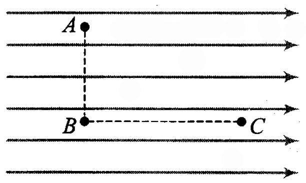
(1) Zero (2) $\frac{6q}{4\pi\varepsilon_0}$ (3) $\frac{q}{\pi\varepsilon_0}$ (4) $\frac{q}{4\pi\varepsilon_0}$

08. A uniform electric field exists in x–y plane. The potential of point A(+2 m, 2 m), B(–2 m, 2 m) and C (2m, 4m) are 4 V, 16 V and 12 V respectively. The electric field is

(1) $(4\hat{i}+5\hat{j})\frac{V}{m}$ (2) $(3\hat{i}+4\hat{j})\frac{V}{m}$

(3) $-(3\hat{i}+4\hat{j})\frac{V}{m}$ (4) $(3\hat{i}-4\hat{j})\frac{V}{m}$

09. Figure shows three points A, B and C in a region of uniform electric field $\vec{E}$. The line AB is perpendicular and BC is parallel to the field lines. Then which of the following holds good. Where V_A, V_B and V_C represent the electric potential at points A, B and C respectively.



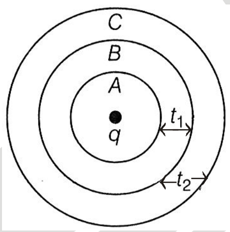
(1) $V_A = V_B = V_C$ (2) $V_A = V_B > V_C$
(3) $V_A = V_B < V_C$ (4) $V_A > V_B = V_C$

10. At a point in space, the electric field points towards north. In the region surrounding this point, the rate of change of potential will be zero along
(1) north (2) south
(3) north-south (4) east-west

11. The electric field due to an electric dipole at a distance r from its centre in axial position is E. If the dipole is rotated through an angle of 90° about its perpendicular axis, the electric field at the same point will be
(1) E (2) E/4 (3) E / 2 (4) 2E

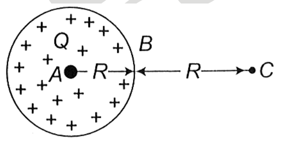
12. Consider a uniform electric field in the $\hat{z}$ direction. The potential is a constant
(1) for any x for a given z.
(2) for any y for a given z.
(3) on the x-y plane for a given z.
(4) All of the above

13. Figure shows three spherical and equipotential surfaces A, B and C round a point charge q. The potential difference $V_A - V_B = V_B - V_C$. If t_1 and t_2 be the distances between them, then



(1) $t_1 = t_1$ (2) $t_1 > t_2$ (3) $t_1 < t_2$ (4) $t_1 \leq t_2$

14. Find the ratio of electric work done in bringing a charge q from A to B (W_{AB}) and that from B to C (W_{BC}) in a sphere of charge Q distributed uniformly throughout its volume



(1) 1 (2) 1.5
(3) 0.75 (4) None of these

15. An electric dipole is placed at the origin O and is directed along the x-axis. At a point P, far away from the dipole, the electric field is parallel to y-axis. OP makes an angle θ with the x-axis then
(1) $\tan\theta = \sqrt{3}$ (2) $\tan\theta = \sqrt{2}$
(3) $\theta = 45^\circ$ (4) $\tan\theta = \frac{1}{\sqrt{2}}$

CHEMISTRY

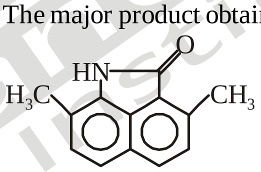
16. Which one of the following arrangement represents the correct order of electron gain enthalpy (with negative sign) of the given atomic species?
(1) S < O < Cl < F (2) Cl < F < S < O
(3) F < Cl < O < S (4) O < S < F < Cl

17. The element having greatest difference between its first and second ionization energies, is :
(1) Ca (2) K
(3) Ba (4) Sc

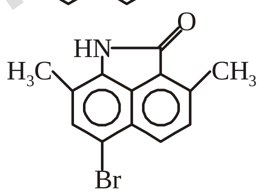
18. The correct order of the first ionization enthalpies is:
(1) K < Li < Be < Mg (2) Cl > I > Br > F
(3) Li < Be < C < N (4) B < C < N < O

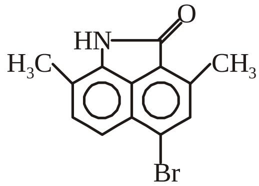
19. The size of the iso-electronic species
(1) $C^{-4} > N^{-3} > O^{2-} > Na^{+} > Mg^{++}$
(2) $C^{-4} > N^{-3} > O^{2-} > Mg^{++} > Na^{+}$
(3) $O^{2-} > N^{-3} > C^{-4} > Na^{+} > Mg^{++}$
(4) $N^{-3} > C^{-4} > O^{2-} > Na^{+} > Mg^{++}$

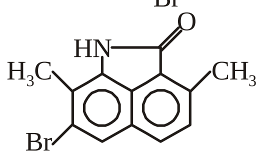
20. The major product obtained when Br_2/Fe is treated with

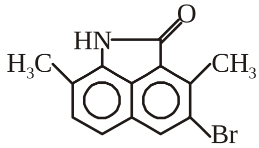


is

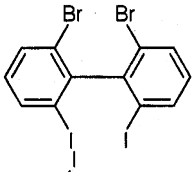
(1) 

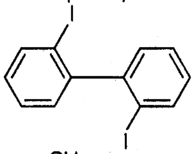
(2) 

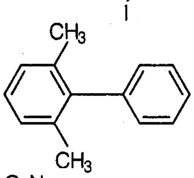
(3) 

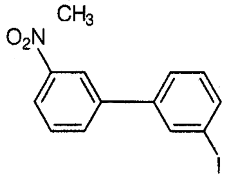
(4) 

21. Which of the following biphenyls is optically active?

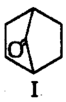
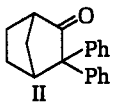
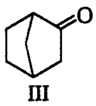
(1) 

(2) 

(3) 

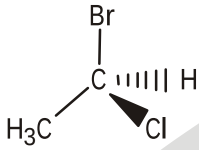
(4) 

22. Which among the given molecules can exhibit tautomerism?

 I  II  III

(1) III only (2) Both I and III
(3) Both I and II (4) Both II and III

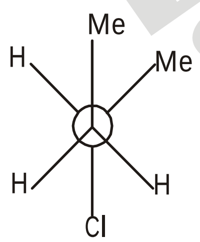
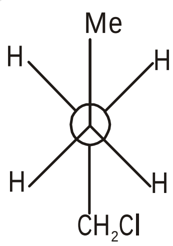
23. The absolute configuration of the compound

 is :

(1) R (2) S (3) E (4) Z

24. The number of structural isomers possible from the molecular formula C_3H_9N is:
(1) 2 (2) 3
(3) 4 (4) 5

25. The pair of structures represents :-

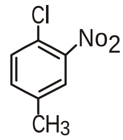
 

(1) Enantiomers (2) Position isomers
(3) Conformers (4) None

26. Which of the following compounds will exhibit cis-trans (geometrical) isomerism?
(1) 1-Butanol (2) 2-Butene
(3) 2-Butanol (4) 2-Butyne

27. $CH_3 - O - CH_2 - CH_2 - CH_3$;
(A)
$CH_3 - CH_2 - O - CH_2 - CH_3$
(B)
Relations between (A) and (B) is:
(1) chain isomers (2) positional isomers
(3) functional isomers (4) metamers

28. The IUPAC name of



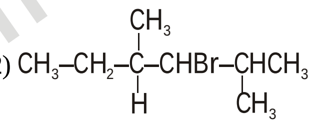
(1) 1-Chloro-2-nitro-4-methyl benzene
(2) 1-Chloro-4-methyl-2-nitrobenzene
(3) 2-Chloro-1-nitro-5-methyl benzene
(4) m-Nitro-p-chlorotoluene

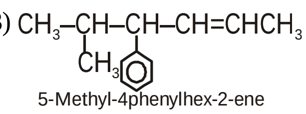
29. Which is the correct IUPAC name of this compound?

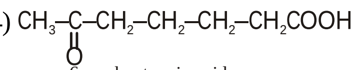
(1) 3-Ethyl-3-penty1-1,4-pentadiene
(2) 6-Ethyl-3-(1-inethylbuly1)-4,6-octadien-1-yne
(3) 6-Ethyl-2-methyl-5-octen-3-yne
(4) 1-(1-Methylcyclopropyl)-2-(2-methylcyclopropyl) cyclopropene

30. Which nomenclature is not according to IUPAC system?

(1) $Br-CH_2-CH=CHNH_2$
1-Bromoprop-2-enamine

(2) 
3-Bromo-2,4-dimethylhexane

(3) 
5-Methyl-4phenylhex-2-ene

(4) 
6-oxoheptanoic acid

BOTANY

31. Select the incorrect pair
(1) Cell wall - Structural support
(2) Central vacuole - Storage
(3) Amyloplast - Starch storage
(4) Plasmodesmata - Protection

32. .... is the single membrane bound organelle
(1) Sphaerosome (2) Lysosome
(3) Glyxysome (4) All of these

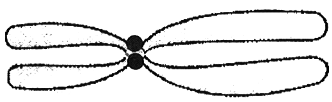
33. Cell organelle responsible for autolysis is
(1) dictyosome (2) lysosome
(3) peroxisome (4) glyoxysome

34. Arrangement of microtubules in a flagellum and a centriole is respectively
(1) 9 + 2 and 9 + 1 (2) 9 + 1 and 9 + 0
(3) 9 + 0 and 9 + 2 (4) 9 + 2 and 9 + 0

35. The best material for the study of structure of cell membrane is
(1) RBC of human (2) liver cell
(3) kidney cell (4) muscle cell

36. Which of the following is correct for the origin of lysosome (L) ?
(1) ER $\rightarrow$ Golgi bodies $\rightarrow$ L
(2) Golgi bodies $\rightarrow$ ER $\rightarrow$ L
(3) Nucleus $\rightarrow$ Golgi bodies $\rightarrow$ L
(4) Mitochondria $\rightarrow$ ER $\rightarrow$ L

37. Which of the following is correct regarding the given figure?



(1) No.of centromere-2, No.of kinetochore -1, No.of arms-4
(2) No.of centromere-1,No.of kinetochore - 2, No.of arms-4
(3) No.of centromere-2,No.of kinetochore - 2, No.of arms-4
(4) No.of centromere-1,No.of kinetochore -2, No. of arms-2

38. .... is directly connected to the outer nuclear membrane
(1) Mitochondria (2) Golgi body
(3) ER (4) Chloroplast

39. ....are the microbodies, which take part in glyoxylate pathway, bounded by a single membrane and are usually present in germinating fatty seeds
(1) Glyoxysomes (2) Peroxisomes
(3) Sphaerosomes (4) Lysosomes

40. In chloroplasts, chlorophyll is present in the
(1) outer membrane (2) inner membrane
(3) thylakoids (4) stroma

41. Which of the following options is true for a secretory cell?
(1) Golgi apparatus is absent.
(2) Rough endoplasmic reticulum (RER) is easily observed in the cell.
(3) Only smooth endoplasmic reticulum (SER) is present.
(4) Secretory granules are formed in nucleus.

42. What is a tonoplast?
(1) Outer membrane of mitochondria.
(2) Inner membrane of chloroplast.
(3) Membrane boundary of the vacuole of plant cells.
(4) Cell membrane of a plant cell.

43. A common characteristic feature of plant sieve tube cells and most of mammalian erythrocytes is:
(1) Absence of mitochondria
(2) Presence of cell wall
(3) Presence of haemoglobin
(4) Absence of nucleus

44. The stain used to visualize mitochondria is :
(1) Fast green (2) Safranin
(3) Acetocarmine (4) Janus green

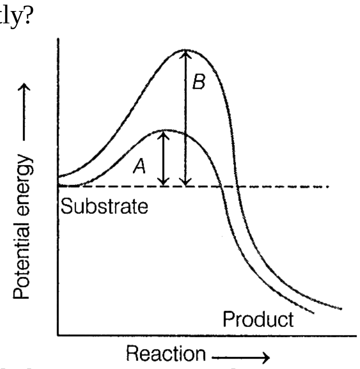
45. Who proposed the fluid mosaic model of plasma membrane?
(1) Camillo Golgi
(2) Schleiden and Schwann
(3) Singer and Nicolson (4) Robert Brown

ZOOLOGY

46. Inulin is polymer of
(1) Fructose (2) glucose
(3) sucrose (4) xylose

47. Pick the odd statement out
(1) Removal of CO_2 from amino acids converts an amino acid into an amine
(2) All the biomolecules have a turnover
(3) Metabolic pathways are termed as transformation reactions
(4) Metabolic pathways always follow a linear route

48. Which of the following describes the given graph correctly?

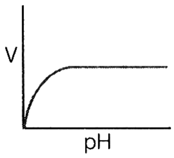


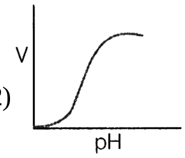
(1) Endothermic reaction with energy - A in the presence of enzyme and B in the absence of enzyme
(2) Exothermic reaction with energy- A in the presence of enzyme and B in the absence of enzyme
(3) Endothermic reaction with energy - A in the absence of enzyme and B in the presence of enzyme
(4) Exothermic reaction with energy -A in the absence of enzyme and B in the presence of enzyme

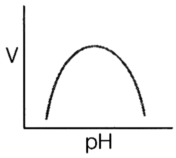
49. Those nucleic acids, which behave like enzymes are known as
(1) ribozymes (2) pepzymes
(3) ribose (4) Both (1) and (2)

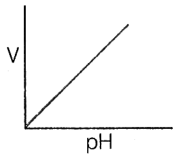
50. Choose the correct option.
(1) $E + S \longrightarrow ES \longrightarrow E + P \longrightarrow EP$
(2) $E + S \rightleftharpoons ES \longrightarrow E - P \longrightarrow E + P$
(3) $E + S \longrightarrow ES \rightleftharpoons E - P \longrightarrow E + P$
(4) $E + S \rightleftharpoons ES \rightleftharpoons E - P \rightleftharpoons E + P$

51. Choose the correct graph, showing the effect of pH on the velocity (V) of a typical enzymatic reaction?

(1) 

(2) 

(3) 

(4) 

52. Enzymes that catalyse the removal of groups from substrates by mechanism other than hydrolysis.
(1) lyases (2) ligases
(3) hydrolases (4) dehydrognases

53. Transition state structure of the substrate formed during an enzymatic reaction is
(1) transient, but stable
(2) permanent, but unstable
(3) transient and unstable
(4) permanent and stable

54. Michaelis Menten constant (K_m) is equal to
(1) the rate of enzymatic activity
(2) the rate of reaction
(3) substrate concentration at which the reaction attains half of its maximum velocity
(4) substrate concentration at which the rate of reaction is maximum

55. Non-protein constituents bound to enzyme, which make enzymes catalytically more active
(1) cofactors
(2) co-ions
(3) inhibitor
(4) both (1) and (2)

56. The cofactors that associate with the apoenzyme only during course of catalysis are called as
(1) Cofactors
(2) coenzymes
(3) metal ions
(4) prosthetic group

57. Zinc is a cofactor for which enzyme?
(1) Trypsine (2) Peroxidase
(3) Carboxy peptidase (4) Apoenzyme

58. Match the following columns.

	Column-I		Column-II
A.	Tyrosine	1.	Enzyme
B.	Oxytocin	2.	Alkaloids
C.	Renin	3.	Hormone
D.	Morphine	4.	Amino acid

(1) A-1, B-2, C-3, D-4 (2) A-4, B-3, C-1, D-2
(3) A-3, B-4, C-1, D-2 (4) A-1, B-3, C-2, D-4

59. Match the following columns.

	Column –I		Column-II
A.	Dethydrogenases	1.	Interconversion of optical, geometrical positional isomers
B.	Ligases	2.	Group transfer
C.	Isomerases	3.	Oxidoreduction between two substrates
D.	Hydrolases	4.	Linking together of two bonds
E.	Transferases	5.	Hydrolysis of bonds

(1) A-5, B-4, C-1, D-2, E-3
(2) A-4, B-3, C-5, D-2, E-1
(3) A-5, B-4, C-2, D-3, E-1
(4) A-3, B-4, C-1, D-5, E-2

60. Which of the following statements is/are incorrect?
I. Left end of a polysaccharide is called non-reducing end, while right end is called reducing end.
II. Starch and glycogen are branched molecules.
III. Starch and glycogen are the reserve food materials of plants and animals, respectively.
IV. Starch can hold iodine molecules in its helical secondary structure,but cellulose being non-helical, cannot hold iodine.
(1) I and II
(2) All statements are incorrect
(3) Only IV
(4) None of the above