SAMPLE PAPER - 44

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

PHYSICS

01. The value of $\left(\vec{A}+\vec{B}\right)\times\left(\vec{A}-\vec{B}\right)$ is :
(1) 0
(2) $A^2 - B^2$
(3) $\vec{B}\times\vec{A}$
(4) $2\left(\vec{B}\times\vec{A}\right)$

02. The ceiling of a hall is 40 m high. For maximum horizontal distance, the angle at which the ball may be thrown with a speed of $56\ ms^{-1}$ without hitting the ceiling of the hall is
(1) 25°   (2) 30°   (3) 45°   (4) 60°

03. Time taken by the projectile to reach from A to B is t. Then the distance AB is equal to:
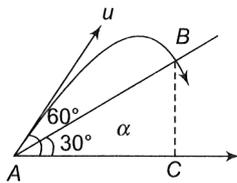
(1) $\dfrac{ut}{\sqrt{3}}$ (2) $\dfrac{\sqrt{3}ut}{2}$ (3) $\sqrt{3}\ ut$ (4) $2\ ut$

04. A person walks at the rate of 3 km/hr. Rain appears to him in vertical direction at the rate of $3\sqrt{3}$ km/hr. Find magnitude and direction of true velocity of rain.
(1) 6 km/hr, inclined at an angle of 45° to the vertical towards the person's motion.
(2) 3 km/hr, inclined at an angle of 30° to the vertical towards the person's motion.
(3) 6 km/hr, inclined at an angle of 30° to the vertical towards the person's motion.
(4) 6 km/hr, inclined at an angle of 60° to the vertical towards the person's motion.

05. Velocity vector and acceleration vector in a uniform circular motion are related as :
(1) both in the same direction
(2) perpendicular to each other
(3) both in opposite direction
(4) not related to each other

06. A body is in equilibrium under the action of three coplanar forces P, Q, and R as shown in the figure. Select the correct statement.
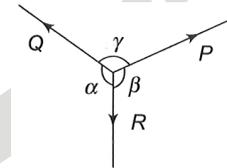

(1) $\dfrac{P}{\sin\alpha}=\dfrac{Q}{\sin\beta}=\dfrac{R}{\sin\gamma}$

(2) $\dfrac{P}{\cos\alpha}=\dfrac{Q}{\cos\beta}=\dfrac{R}{\cos\gamma}$

(3) $\dfrac{P}{\tan\alpha}=\dfrac{Q}{\tan\beta}=\dfrac{R}{\tan\gamma}$

(4) $\dfrac{P}{\sin\beta}=\dfrac{Q}{\sin\gamma}=\dfrac{R}{\sin\alpha}$

07. In the figure if block A and wedge B will move with same acceleration, then the magnitude of normal reaction between the block and the wedge will be (There is no friction between block and the wedge and the wedge moves on horizontal surface as shown.)
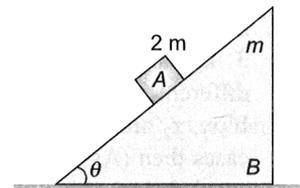
(1) 2 mg/cos θ   (2) 2 mg cos θ
(3) mg cos θ   (4) none of these

08. In a Van de Graaff accelerater, charge is always transferred from the inner shell of radius r in to the outer shell of radius R (r << R). The charge is tranferred because
(1) irrespective of potentials, the charge is always transferred whenever two metallic bodies have electric contact.
(2) irrespective of the quantity of charge on the outer shell, the potential of the inner shell is higher than that of outer shell.
(3) The outer shell has larger charge holding capacity.
(4) Surface charge density is higher of the inner shell.

09. The given figure shows, two parallel plates A and B of charge densities $+\sigma$ and $-\sigma$ respectively. Electric field intensity will be zero in region

$$
\begin{array}{ccc}
\text{I} & \text{II} & \text{III} \\
& & \\
\text{A} & \text{B} &
\end{array}
$$
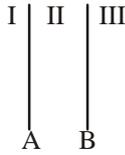
(1) I only (2) II only
(3) III only (4) Both (1) & (3)

10. Two parallel plates carry opposite charges such that the electric field in the space between them is in upward direction, An electron is shot in the space and parallel to the plates. Its deflection from the original direction will be
(1) Upwards (2) Downwards
(3) Circular (4) Elliptical

11. If initial charge on all the capacitors were zero, work done by the battery in the circuit shown is

$$4\,\mu F \quad 4\,\mu F$$
$$2\,\mu F$$
$$10\,V$$
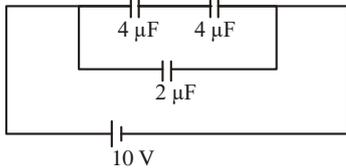
(1) 0.2 mJ (2) 200 mJ (3) 0.4 mJ (4) 400 mJ

12. A particle performs uniform circular motion with an angular momentum L. If the frequency of particle's motion is doubled and its kinetic energy is halved it's angular momentum becomes

(1) $\dfrac{L}{2}$ (2) $\dfrac{L}{4}$ (3) $\dfrac{L}{6}$ (4) $\dfrac{L}{8}$

13. A solid sphere of radius R is placed on a smooth horizontal surface. A horizontal force F is applied at height h from the lowest point. For the maximum acceleration of centre of mass, which is correct ?
(1) h = R
(2) h = 2R
(3) h = 0
(4) Centre of mass has same acceleration in each case

14. Two planets of same density have the ratio of their radii as 1 : 3. The ratio of escape speed on them will be
(1) 9 : 1 (2) 1 : 9
(3) 1 : 3 (4) 3 : 1

15. A spherical charged conductor has surface charge density σ. The electric field on its surface is E and electric potential of conductor is V. Now the radius of the sphere is halved keeping the charge to be constant. The new values of electric field and potential would be:
(1) 2E, 2V (2) 4E, 2V
(3) 4E, 4V (4) 2E, 4V

CHEMISTRY

16. Mole fraction of the component A in vapour phase is x_1 and the mole fraction of component A in liquid mixture is x_2, then (p_A^0 = vapour pressure of pure A; p_B^0 = vapour pressure of pure B), the total vapour pressure of liquid mixture is :

(1) $p_A^0 \dfrac{x_2}{x_1}$ (2) $p_A^0 \dfrac{x_1}{x_2}$ (3) $p_B^0 \dfrac{x_1}{x_2}$ (4) $p_B^0 \dfrac{x_2}{x_1}$

17. van't Hoff factor of Hg_2Cl_2 in its aqueous solution will be (Hg_2Cl_2 is 80% ionized in the solution):
(1) 1.6 (2) 2.6
(3) 3.6 (4) 4.6
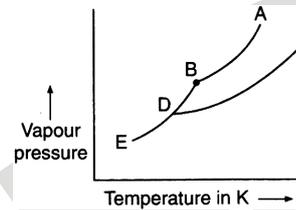
18.

Which of the following is correctly matched ?
(1) Curve (A – B) - solution
(2) Curve (C – D) - liquid solvent
(3) Curve (B – D – E) - frozen solvent
(4) Curve (A – B) - Frozen solution

19. For a hypothetical reaction :
$$4A(g) + 5B(g) \rightleftharpoons 4P(g) + 6Q(g)$$
The equilibrium constant K_c has units:
(1) $mol\,L^{-1}$ (2) $mol^{-1}\,L$
(3) $(mol\,L^{-1})^{-2}$ (4) unitless

20. The decomposition of N_2O_4 to NO_2 is carried at 280 K in chloroform. When equilibrium has been established, 0.2 mole of N_2O_4 and 2×10^{-3} moles of NO_2 are present in a 2 litre solution. The equilibrium constant for the reaction $N_2O_4(g) \rightleftharpoons 2NO_2\,(g)$ is:
(1) 1×10^{-2} (2) 2×10^{-3}
(3) 1×10^{-5} (4) 2×10^{-5}

21. Molecular formula $C_6H_{14}O$ will show:
(1) functional isomerism (2) chain isomerism
(3) metamerism (4) All of these

22. Which one among the following compounds will show geometrical isomerism?

(1) $CH_3 - CH = CH_2$ (2) $CH_3 - \overset{\displaystyle |}{\underset{\displaystyle CH_3}{C}} = CH_2$

(3) $CH_3 - \overset{\displaystyle |}{\underset{\displaystyle CH_3}{C}} = CHD$ (4) $CH_3 - CH = CHD$

23. Number of conformational isomers of ethane is:
   (1) Two   (2) Four
   (3) Infinite   (4) Six

24. Geometrical isomerism is possible in case of:
   (1) tartaric acid   (2) 1-butene
   (3) 2-butene   (4) propene

25. The geometrical isomerism is shown by
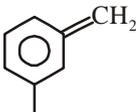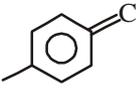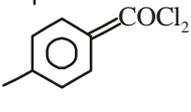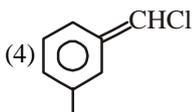
26. Match the species in Column–I with the type of hybrid orbitals in Column–II.

	Column–I		Column–II
(i)	SF_4	(A)	sp^3d^2
(ii)	IF_5	(B)	d^2sp^3
(iii)	NO_2^+	(C)	sp^3d
(iv)	NH_4^+	(D)	sp^3
		(E)	sp

   (1) (i)→C; (ii)→B; (iii)→E; (iv)→D
   (2) (i)→A; (ii)→B; (iii)→C; (iv)→D
   (3) (i)→C; (ii)→A; (iii)→D; (iv)→E
   (4) (i)→A; (ii)→C; (iii)→D; (iv)→D

27. Which of Ne_2, O_2, C_2 and Li_2 has/have double bond?
   (1) Ne_2 (2) O_2 and C_2 both
   (3) Li_2 (4) Li_2 and N_2 both

28. Species having pyramidal shape is:
   (1) SO_3 (2) BrF_3 (3) SiO_3^{2-} (4) OSF_2

29. The electronic configuration of gadolinium (Atomic number = 64) is:
   (1) [Xe] $4f^3 5d^5 6s^2$ (2) [Xe] $4f^7 5d^2 6s^1$
   (3) [Xe] $4f^7 5d^1 6s^2$ (4) [Xe] $4f^8 5d^0 6s^2$

30. Select the incorrect statement out of the following:
   (1) Δ_{eg} H for halogens is large –ve
   (2) Δ_{eg} H for noble gases is large +ve
   (3) Δ_{eg} H is negative for alkali metals and positive for alkaline earth metals
   (4) As a general rule, Δ_{eg} H becomes more +ve with increase in atomic number across a period

BOTANY

31. During photorespiration oxygen consuming reaction(s) accur in
   (1) Stroma of chloroplasts
   (2) Stroma of chloroplasts
   (3) Stroma of chloroplasts and peroxisomes
   (4) Grana of chloroplasts and peroxisomes

32. Recognise the figure and findout the correct matching
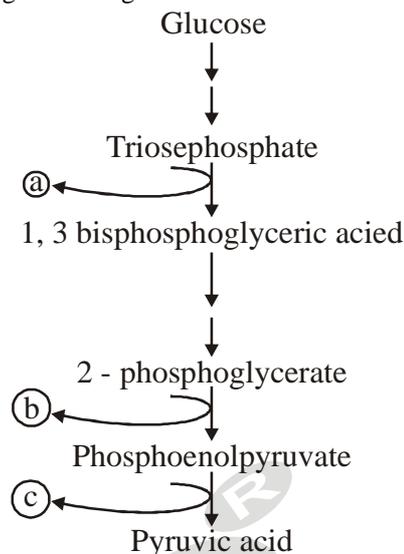
   (1) a-ATP, b-NADH, c -H_2O
   (2) a-H_2O, b-NADH, c-ATP
   (3) a-NADH, b-H_2O, c-ATP
   (4) a-H_2O, b-ATP, c-NADH

33. The crucial events in aerobic respiration are
   1. The complete oxidation of pyruvate by the stepwise removal of all the hydrogen atoms, leaving three molecules of CO_2
   2. The passing on of the electrons removal as part of the hydrogen atoms to molecular O_2 with simulataneous synthesis of ATP
   (1) First process is ETS and takes place in matrix of the mitochondria while second process is TCA and takes place in on the inner membrane of mitochondria
   (2) First process is TCA and takes place in the matrix of mitochondria while the second process is ETS and is located on the inner membrane of mitochondria
   (3) First process is ETS and takes place on the inner membrane of mitochondria while second process is TCA and takes place in the matrix of the mitochndria
   (4) First process is TCA and takes place on the inner membrane of mitochndria while second process is ETS and takes place in the matrix of mitochondria

34. Given are the defining features of living being :
   (1) cellular organisation   (2) consciousness
   (3) both (1) and (2)   (4) none of the above

35. In Whittaker's five kingdom system of classification, eukaryotes are placed in
   (1) three kingdoms   (2) two kingdoms
   (3) four kingdoms   (4) all the five kingdoms

36. The primitive prokaryotes responsible for the production of biogas from the dung of ruminant animals, include the
   (1) Thermoacidophiles
   (2) Methanogens
   (3) Eubacteria
   (4) Halophiles

37. Which of the following does not belong to the kingdom Protista?
(1) Chrysophytes   (2) Euglenoids
(3) Ascomycetes   (4) Dinoflagellates

38. Recognise the figur and find out the correct matching.

Pyruvate (3C) → Acetyl conzyme A (2C), with NAD$^+$, CoA, NADH + H$^+$, CO$_2$

Citrate synthase, CoA
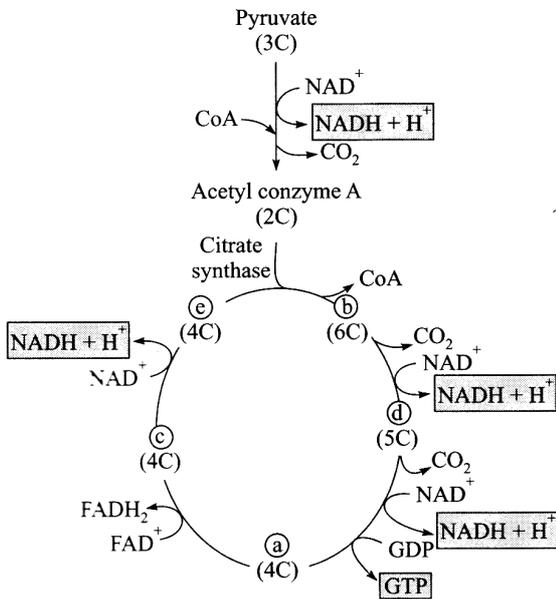
(1) b-malic acid, d-OAA, e-α-ketoglutaric acid, c-succinic acid, a-citric acid
(2) a-malic acid, c-OAA, b-α-ketoglutaric acid, d-succinic acid, e-citric acid
(3) c-malic acid, e-OAA, d-α-ketoglutaric acid, a-succinic acid, b-citric acid
(4) e-malic acid, a-OAA, c-α-ketoglutaric acid, b-succinic acid, d-citric acid

39. Identify the products a, b, c and d and fine out the correct option.

Glucose → glycolysis → a → Kreb's Cycle → b; Fermentation → Bacteria → c, Yeast → d
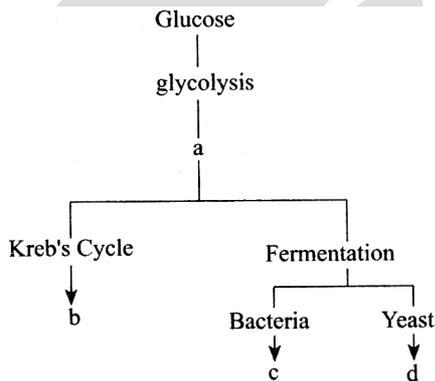
(1) a-pyruvic acid, b-CO$_2$ + H$_2$O, c-ethyl alcohol + CO$_2$, d-lactic acid
(2) a-pyruvic acid, b-ethyl alcohol + CO$_2$, c-lactic acid, d-CO$_2$ + H$_2$O
(3) a-CO$_2$ + H$_2$O, b-pyruvic acid, c-ethyl alcohol + CO$_2$, d-lactic acid
(4) a-pyruvic acid, b-CO$_2$ + H$_2$O, c-lactic acid, d-ethyl alcohol + CO$_2$

40. Recognise the figure and find out the correct matching.
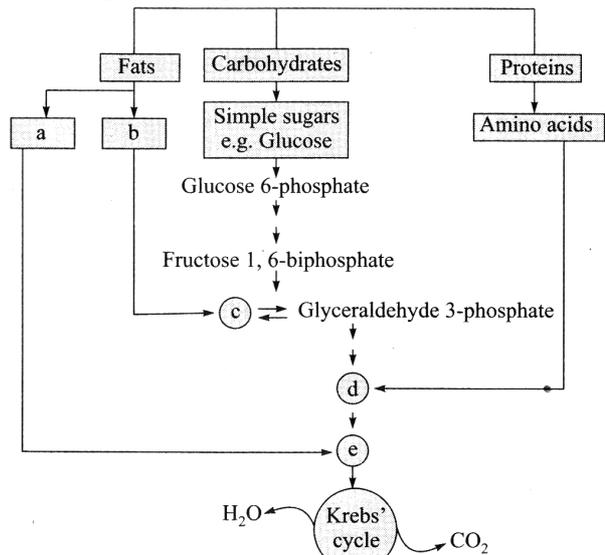
(1) c-DHAP, d-acetyl CoA, e-pyruvic acid, b-fatty acid, a-glycerol
(2) d-DHAP, e-acetyl CoA, c-pyruvic acid, a-fatty acid, b-glycerol
(3) c-DHAP, e-acetyl CoA, d-pyruvic acid, a-fatty acid, b-glycerol
(4) c-DHAP, d-acetyl CoA, e-pyruvic acid, A-fatty acid, b-glycerol

41. Choose the correct combinations of labelling in calvin cycle.
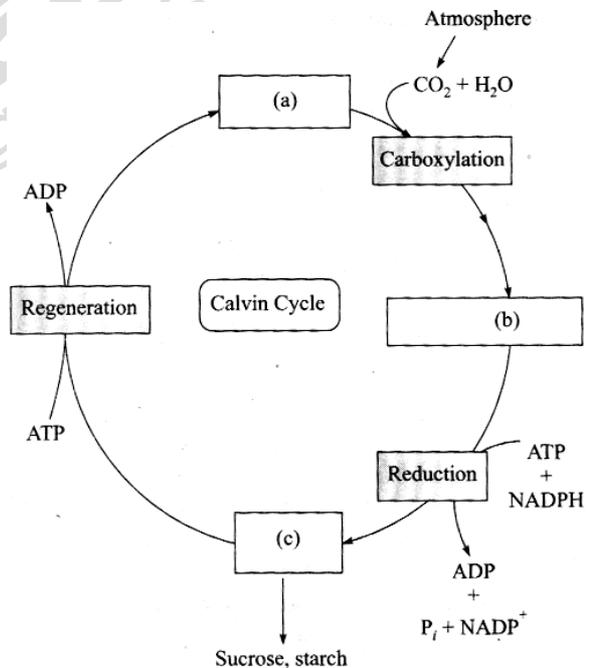
(1) a-RuBP, b-Triose phosphate, c-PGA
(2) a-PGA, b-RuBP, c-Triose Phosphate
(3) a-PGA, b-Triose phosphate, c-RuBP
(4) a-RuBP, b-PGA, c-Triose phosphate

42. Which is the "perfect stage" of the fungus?
    (1) When it reproduces sexually
    (2) When it reproduces asexually
    (3) When it form perfect resting spores.
    (4) When the fungus is perfectly healthy

43. Match column I with column II and select the correct option.

	Column I (Kingdom)		Column II (Class)
A.	Morels	1.	Deuteromycetes
B.	Smut	2.	Ascomycetes
C.	Bread mould	3.	Basidiomycetes
D.	Imperfect fungi	4.	zygomycetes

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

44. Given diagram showing flagellum's internal structure. In which of the following all the four parts labelled as A, B, C and D are correctly identified?
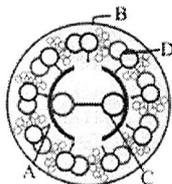
	A	B	C	D
(1)	Radial Spoke	Central Microtubule	Peripheral Microtubule	Plasma Membrane
(2)	Bridge	Plasma membrane	Central Sheath	Peripheral Microtubule
(3)	Bridge	Plasma Membrane	Peripheral Microtubule	Central Microtubule
(4)	Radical spoke	Plasma Membrane	Central Microtubule	Peripheral Microtubule

    (1) 1   (2) 2   (3) 3   (4) 4

45. Kinetochores are associated with-
    (1) Primary constriction
    (2) Centrosome
    (3) Secondary constriction
    (4) Satellite

ZOOLOGY

46. Which hormone possess anti - insulin effect?
    (1) Cortisol   (2) Calcitonin
    (3) Oxytocin   (4) Aldosterone

47. Choose incorrect statement with respect to insulin.
    (1) It stimulates conversion of glucose to glycogen
    (2) Insulin only acts on hepatocytes and enhance cellular glucose uptake and utilization
    (3) Deficiency of insulin can cause formation of harmful compounds known as ketone bodies
    (4) Insulin is a peptide hormone

48. In an accident, the anterior pituitary of a boy was damaged, but boy survived. What is likely to happed?
    (1) High level of thyroxine will be released
    (2) Spermatogenesis will be stimulated
    (3) The body will not grow much in height
    (4) The growth of mammary gland will be stimulated

49. Which of the following condition is not linked to deficiency of thyroid hormone?
    (1) Cretinism   (2) Simple goitre
    (3) Myxoedema   (4) Exophthalmia

50. Graves' disease is caused due to:
    (1) Hyposecretion of adrenal gland
    (2) Hypersecretion of adrenal gland
    (3) Hyposecretion of thyroid gland
    (4) Hypersecretion of thyroid gland

51. Which of the following statement are correct and incorrect.
    1. Synaptic cleft of neurons secrete adrenaline
    2. Myelinated nerve fibres are enveloped with Schwann cells, which form a myelin sheath around the axon
    3. Non-myelinated nerve fibre is enclosed by a Schwann cell that does not form a myelin sheath
    4. Spinal cord and cranial nerves are made of non-myelinated nerve fibres–
    of the four statements
    (1) 1, 2 are correct but 3 and 4 are incorrect
    (2) 1, 2 and 3 are correct but 4 is incorrect
    (3) 3 and 4 are correct but 1 and 2 are incorrect
    (4) 2 and 3 are correct while 1 and 4 are incorrect

52. Which one of the following is anti abortion hormone?
    (1) Relaxin   (2) Progesterone
    (3) Estrogen   (4) Epinephrine

53. Involuntary muscles giving stripped appearance are located in:
    (1) Stomach   (2) Colon
    (3) Uterus   (4) Heart

54. Globular head in a myosin filament is having active site for:
    (1) ATP   (2) Actin
    (3) Troponin   (4) Two of these

55. Which of the following is not the part of axial skeleton?
    (1) Pectoral girdle (2) Facial bones
   (3) Ear ossicles   (4) Sternum

56. Number of facial bones in human are:
    (1) 8   (2) 14   (3) 24   (4) 26

57. Vertebro-chondral ribs in human:
    (1) Attached to vertebra only
    (2) Attached to sternum only
    (3) Join the 7th rib
    (4) Are 2 pairs only

58. Appendicular skeleton in human consists of:
    (1) 80 bones   (2) 82 bones
    (3) 120 bones   (4) 126 bones

59. Right pelvic girdle and lower limb are shown is the figure. Select the incorrect statement:
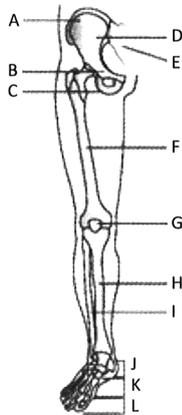
    (1) Each pelvic girdle is made up of two 'D' bones and each 'D' bone is formed by fusion of 3 bones A, B and C
    (2) F, H and I are long bones
    (3) In each limb, number of G, J, K and L are respectively 1, 7, 5 and 14
    (4) E is lumbar vertebra attached to pelvic girdle

60. All of the following joints are synovial except
    (1) Knee joint   (2) Intervertebral joint
    (3) Saddle joint   (4) Both (2) and (3)