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SAMPLE PAPER - 42

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

PHYSICS

01. If $\vec{A} = 2\hat{i} + 4\hat{j} - 5\hat{k}$ then the direction of cosines of the vector $\vec{A}$ are

(1) $\frac{2}{\sqrt{45}}, \frac{4}{\sqrt{45}}$ and $\frac{-5}{\sqrt{45}}$

(2) $\frac{1}{\sqrt{45}}, \frac{2}{\sqrt{45}}$ and $\frac{3}{\sqrt{45}}$

(3) $\frac{4}{\sqrt{45}}$, 0 and $\frac{4}{\sqrt{45}}$

(4) $\frac{3}{\sqrt{45}}, \frac{2}{\sqrt{45}}$ and $\frac{5}{\sqrt{45}}$

02. If $\vec{A} = 2\hat{i} + 3\hat{j} - \hat{k}$ and $\vec{B} = -\hat{i} + 3\hat{j} + 4\hat{k}$ then projection of $\vec{A}$ on $\vec{B}$ will be

(1) $\frac{3}{\sqrt{13}}$ (2) $\frac{3}{\sqrt{26}}$ (3) $\sqrt{\frac{3}{26}}$ (4) $\sqrt{\frac{3}{13}}$

03. A body is projected at 60° with ground. It covers a horizontal distance of 100 m. If the same body is projected at 60° with vertical with same velocity, the new range is
(1) 50 m (2) 100 m (3) 200 m (4) 150 m

04. Two tall buildings are 30 m apart. The speed with which a ball must be thrown horizontally from a window 150 m above the ground in one building so that it enters a window 27.5 m from the ground in the other building is:
(1) 2 ms^{-1} (2) 6 ms^{-1}
(3) 4 ms^{-1} (4) 8 ms^{-1}

05. A car 'A' moves due north at a speed of 40 km/hr, while another car 'B' moves due east at a speed of 30 km/hr. Find the velocity of car B relative to car A (both in magnitude and direction).

(1) 40 km/hr, at an angle $\tan^{-1}\left(\frac{3}{5}\right)$ east of south

(2) 50 km/hr, at an angle $\tan^{-1}\left(\frac{3}{5}\right)$ east of south

(3) 40 km/hr, at an angle $\tan^{-1}\left(\frac{3}{4}\right)$ east of south

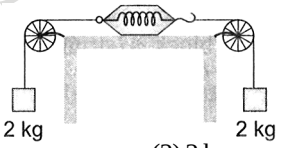
(4) 50 km/hr, at an angle $\tan^{-1}\left(\frac{3}{4}\right)$ east of south

06. An automobile of mass m is crossing over a convex upwards over bridge with a speed *v*. If the radius of the bridge is r, the thrust on the bridge at the highest point will be

(1) $mg + \frac{mv^2}{r}$ (2) $mg - \frac{mv^2}{r}$

(3) mg (4) $\frac{mv^2}{r}$

07. As shown in the figure, two equal masses each of 2 kg are suspended from a spring balance. The reading of the spring balance will be



(1) Zero (2) 2 kg
(3) 4 kg (4) Between zero and 2 kg

08. A block placed on a horizontal surface is being pushed by a force F making an angle θ with the vertical. The coefficient of friction between block and surface is μ. The forces required to slide the block with uniform velocity on the floor is :

(1) $\frac{\mu mg}{(\sin\theta - \mu\cos\theta)}$ (2) $\frac{(\sin\theta - \mu\cos\theta)}{\mu mg}$

(3) μmg (4) none of these

09. Two particles with charges q_1 and q_2 (both positive) are initally at rest at a distance d at t = 0 and are released. The total kinetic energy of the two particles when they are at a distance 3d apart (taking coulombian forces into account) is

(1) $\frac{q_1 q_2}{12\pi\varepsilon_0 d}$ (2) $\frac{q_1 q_2}{6\pi\varepsilon_0 d}$

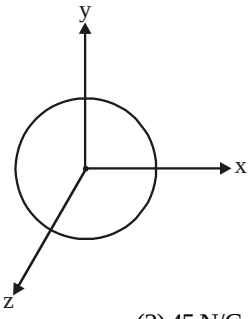
(3) $\frac{q_1 q_2}{4\pi\varepsilon_0 d}$ (4) $\frac{q_1 q_2}{3\pi\varepsilon_0 d}$

10. A charge Q is situated at the edge centre of a cube. The electric flux passed through the cube is

(1) $\frac{Q}{6\varepsilon_0}$ (2) $\frac{Q}{4\varepsilon_0}$

(3) $\frac{Q}{\varepsilon_0}$ (4) $\frac{Q}{2\varepsilon_0}$

11. A 1 μC charge is uniformly distributed on a spherical shell given by the equation $x^2 + y^2 + z^2 = 25$. What will be the intensity of electric field at a point (1, 1, 2)



(1) 5 N/C (2) 45 N/C
(3) 112.5 N/C (4) Zero

12. A wheel whose moment of inertia is 10 kgm^2 has an initial angular velocity of 20 rad/s. A constant torque of 200 Nm acts on the wheel. The time in which wheel is accelerated to 100 rad/s is
(1) 4 s (2) 40 s
(3) 80 s (4) 8 s

13. A body of mass m slides down an incline and reaches the bottom with a velocity v. If the same mass was in the form of a ring which rolls down this incline, the velocity of the ring at the bottom would have been

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

(3) $\frac{v}{\sqrt{2}}$ (4) $\left(\sqrt{\frac{2}{5}}\right)v$

14. A heavy solid sphere is thrown on a hoizontal rough surface with initial velocity u without rolling. What will be its speed, when it starts pure rolling motion ?

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

(3) $\frac{5u}{7}$ (4) $\frac{2u}{7}$

15. A satellite of mass m is revolving close to surface of a planet of density d with time period T. The value of universal gravitational constant G on planet is given by
(1) $2d^2T\pi$ (2) $dt^2\pi$

(3) $\frac{1}{d^2T\pi}$ (4) $\frac{3\pi}{dT^2}$

CHEMISTRY

16. Given that :

Gas	Henry's law constant (K_n)
Ar	40.39
CO_2	1.67
HCHO	1.83×10^{-5}
CH_4	0.413

Which of the following is the correct order of increasing solubility.
(1) HCHO < CH_4 < CO_2 < Ar
(2) HCHO < CO_2 < CH_4 < Ar
(3) Ar < CO_2 < CH_4 < HCHO
(4) Ar < CH_4 < CO_2 < HCHO

17. Vapour pressure of pure A (p_A^0) = 100 mm Hg

Vapour pressure of pure B (p_B^0) = 150 mm Hg

2 mole of liquid A and 3 mole of liquid B are mixed to form an ideal solution. The vapour pressure of solution will be:
(1) 135 mm (2) 130 mm (3) 140 mm (4) 145 mm

18. Depression in freezing point is 6 K for NaCl solution If K_f for water is 1.86 K/kg mol, amount of NaCl disssoved in 1 kg water is :
(1) 3.42 (2) 1.62 (3) 3.24 (4) 1.71

19. If, in the reaction $N_2O_4(g) \rightleftharpoons 2NO_2(g)$, x is that part of N_2O_4 which dissociates, then the number of molecules at equilibrium will be:
(1) 1 (2) 3
(3) (1 +x) (4) $(1 + x)^2$

20. Equilibrium constant for the reaction,

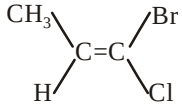
$$2NO(g) + Cl_2(g) \rightleftharpoons 2NOCl(g),$$

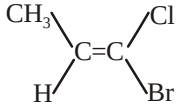
is correctly given by the expression

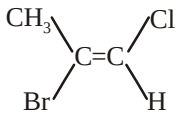
(1) $K_c = \frac{[NOCl]^2}{[NO]^2[Cl_2]}$ (2) $K_c = \frac{[NOCl]}{[2NO]\,[Cl_2]}$

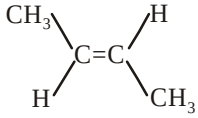
(3) $K_c = \frac{[NO]^2 + [Cl_2]}{[NOCl]}$ (4) $K_c = \frac{[NO]^2\ [Cl_2]}{[NOCl]^2}$

21. Which one of the following is a Z isomer?

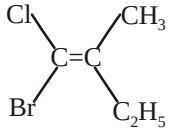
(1) 

(2) 

(3) 

(4) 

22. Which among the following will NOT show chain isomerism?
(1) C_3H_8 (2) C_4H_{10}
(3) $C_5H_{12}O$ (4) $C_5H_{10}O$

23. In which compound, cis-trans nomenclature cannot be used?
(1) $CH_3 - CH = CH - CH_3$
(2) $CH_3 - CH = CH - COOH$
(3) 
(4) $C_6H_5 - CH = CH - CHO$

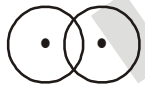
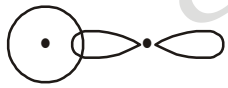
24. Which conformational of n-butane is most stable?
(1) Anti-staggered
(2) Fully eclipsed
(3) Eclipsed
(4) Guache staggered

25. The most stable conformer of
C_6H_5–CHOH–CHOH–C_6H_5
(1) Gauch conformation
(2) Anti conformation
(3) Eclipsed conformation
(4) Staggered conformation

26. The option with only amphoteric oxide
(i) BeO, B_2O_3, Al_2O_3, ZnO
(ii) Cr_2O_3, Mn_2O_7, N_2O_5
(iii) Al_2O_3, SnO, SnO_2, CO_2
(iv) ZnO, Al_2O_3, PbO, PbO_2
(1) i, ii, iii (2) iii, iv
(3) i, iii, iv (4) i, iv

27. Which of the following elements is metalloid.
(1) Be (2) S
(3) Ge (4) Pb

28. Maximum melting point among the following compound is
(1) NaCl (2) KCl
(3) LiCl (4) CsCl

29. Which of the following is not showing the formation of sigma bond?
(1) 
(2) 
(3) 
(4) 

30. Which of the following pairs of ions are isoeletronic and isostructural?
(1) ClO_3^{Θ}, $CO_3^{2\Theta}$ (2) $SO_3^{2\Theta}$, NO_3^{Θ}
(3) ClO_3^{Θ}, $SO_3^{2\Theta}$ (4) $CO_3^{2\Theta}$, $SO_3^{2\Theta}$

BOTANY

31. Pick the reaction of glycolysis where a water molecule is removed
(1) 2-phosphoglycerate → PEP
(2) PEP → Pyruvic acid
(3) Glucose → Glucose 6-phosphate
(4) Fructose, 6-phosphate → Fructose 1, 6-biphosphate

32. First reaction in photorespiration is
(1) Carboxylation
(2) Decarboxylation
(3) Oxygenation
(4) Phosphorylation

33. In Krebs' cycle, number of molecules of CO_2, NADH, $FADH_2$ and ATP produced from one glucose molecule
(1) 6 CO_2, 8 NADH, 1 $FADH_2$, 1 ATP
(2) 6 CO_2, 6 NADH, 2 $FADH_2$, 2 ATP
(3) 4 CO_2, 6 NADH, 1 $FADH_2$, 1 ATP
(4) 4 CO_2, 6 NADH, 2 $FADH_2$, 2 ATP

34. There is no transfer of electrons from cyt b to cyt c as
(1) Energy is not available
(2) The two are not nearby
(3) Electrons are transported in paris
(4) Electrons have no affinity for cytochromes

35. Single turn of citric acid cycle yields
(1) 2 $FaDH_2$, 2$NaDH_2$, 2 GTP
(2) 1 $FADH_2$, 2$NADH_2$, 1 GTP
(3) 1$FADH_2$, 3$NADH_2$, 1 GTP
(4) 1 $FADH_2$, 4$NADH_2$, 1 GTP

36. Which is the correct chemical formula of tripalmitin?
(1) $C_{16}H_{32}O_2$ (2) $C_{54}H_{108}O_2$
(3) $C_{32}H_{64}O_4$ (4) $C_{51}H_{98}O_6$

37. Respiratory quotient (R.Q.) is
(1) Volume of O_2 evolved/Volume of CO_2 consumed
(2) Volume of CO_2 evolved/Volume of O_2 consumed
(3) Volume of O_2 consumed/Volume of CO_2 evolved
(4) Volume of CO_2 consumed/Volume of O_2 evolved

38. Which of the following is correct about growth ?
(1) Growth is regarded as one of most fundamental and conspicuous characteristics of living being.
(2) Growth can be defined as an irreversible permanent increase in size of an organ or its parts or even of an individual cell.
(3) generally growth is accompained by metabolic processes (both anabolic and catabolic), that occur at the expense of energy
(4) All of the above

39. The number of obligate categories which are always used in a taxonomic hierarchy are
(1) 7 (2) 5 (3) 3 (4) 8

40. Which one of the following in not a correct statement?
(1) A museum has collection of photographs of plants and animals
(2) Key is taxonomic aid for identification of specimens
(3) Herbarium houses dried, pressed and preserved plant specimens
(4) Botanical gardens have collection of living plants for reference

41. The cell wall is absent in
(1) dinoflagellates (2) bacillariophyceae
(3) euglenoids (4) both (1) and (2)

42. The unicellular eukaryotic organisms were placed in
(1) Protista (2) Monera
(3) Fungi (4) Animalia

43. Coenocytic, aseptate hyphae are a characteristic feature of
(1) Penicillium (2) Agaricus
(3) Yeast (4) Rhizopus

44. A polysome translate the m-RNA into-
(1) Carbohydrate (2) Protein
(3) Phospholipids (4) Fat

45. Ribosomes take part in protein synthesis in-
(1) Viruses
(2) Prokaryotes only
(3) Both prokaryotes are eukaryotes
(4) Eukaryotes only

ZOOLOGY

46. Which is not a steroid hormone?
(1) Aldosterone (2) Androgen
(3) Estrogen (4) Thyroxine

47. Deficiency of a hormone increases K^+ ion and decreases Na^+ ions in blood; it is secreted by
(1) Zona fasciculata
(2) Zona glomerulosa
(3) Target organs
(4) Zona pellucida

48. Which of the following statements is correct in relation to the endocrine system?
(1) Non-nutrient chemical produced by the body in trace amounts that act as intercellular messenger are known as hormones
(2) Releasing and inhibitory hormones are produced by the pituitary gland
(3) Adenohypophysis is under direct neural regulation of the hypothalamus
(4) Organs in the body like gastrointestinal tract, heart, kidney and liver do not produce any hormones

49. Thymosin is responsible for:
(1) Raising the blood sugar level
(2) Raising the blood calcium level
(3) Formation of T-lymphocytes
(4) Decrease in blood RBCs

50. Parkinson's disease (characterised by tremors and progressive rigidity of limbs) is cause by degeneration of brain neurons that are involved in movement control and make use of neurotransmitter
(1) Acetylcholine (2) Nor epinephrine
(3) Dopamine (4) GABA

51. Gastrin acts on ...A... gland are ...B... the secretion of HCl and ...C.... Choose the correct combination. Here A, B and C refers to
(1) A–pancreatic, B–inhibits, C–protease
(2) A–pancreatic, B–stimulates, C–pepsinogen
(3) A–gastric, B–stimulates, C–pepsinogen
(4) A–gastric, B–inhibit, C–pepsinogen

52. Neuron help in
(1) Detection of stimulus
(2) Recieve the stimulus
(3) Transmit the stimulus
(4) All of the above

53. Common collagenous connective tissue layer that holds together the fascicles /muscle bundles is known as:
(1) Myelin sheath (2) Fascia
(3) Neurilemma (4) Sarcolemma

54. Motor end plate or neuromuscular junction is between:
(1) Motor neuron and fascia of muscle
(2) Motor neuron and sarcolemma of muscle fibre
(3) Any neuron with myosin head
(4) Any neuron with myofibril

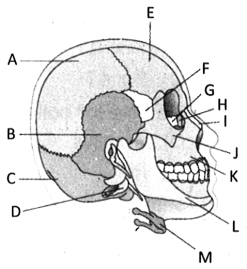
55. Acromian process can be observed in following:
(1) Pelvic girdle (2) Pectoral girdle
(3) Carpals (4) Tarsals

56. Which of the following bone does not participate in cranium?
(1) Maxilla (2) Parietal
(3) Occipital (4) Frontal.

57. Identify the unpaired bone:
(1) Frontal bone
(2) Coxal bone
(3) Maxilla
(4) All of these

58. Statement A Human skull is monocondylic.
Statement B: Ribs in human are bicephalic.
(1) Only statement A is correct.
(2) Only Statement B is correct
(3) Both statements A and B are correct.
(4) Both statements A and B are incorrect

59. Select the option with correct identification of human cranial and facial bones:



	Cranial Bones	Facial Bones
(1)	A, B, C, D, E, F, G	H, I, J, K, L, M
(2)	A, B, C, E, F, G	H, I, J, K, L
(3)	A, B, C, D, F	G, H, I, J, K, J, M
(4)	A, B, C, D	E, F, G, H, I, J, K, L

60. Which of the following hormones can play a significant role in osteoporosis?
(1) Aldosterone and Prolactin
(2) Progesterone and Aldosterone
(3) Estrogen and Parathyroid hormone
(4) Parathyroid hormone and Prolactin