Regn. No. 0920
SKD New Standard Coaching Institute
ESTD. 1985
37 YEARS OF TEACHING EXCELLENCE
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SAMPLE PAPER - 48

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

PHYSICS

01. The position of a particle as a function of time t, is given by

$$x(t) = at + bt^2 - ct^3$$

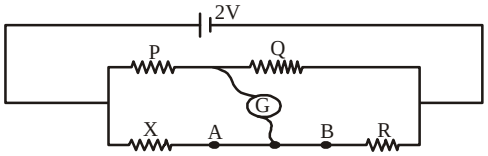
where a, b and c are constants. When the particle attains zero acceleration, then its velocity will be :

(1) $a + \frac{b^2}{4c}$ (2) $a + \frac{b^2}{c}$ (4) $a + \frac{b^2}{2c}$ (4) $a + \frac{b^2}{3c}$

02. A parallel plate capacitor has charge Q coul, potential V volt. and energy E joule. A dielectric slab is now inserted between the two plates; then
(1) V and E both decrease,
(2) V and E both increase,
(3) V decreases, E increases
(4) V increases, E decreases

03. A car accelerates from rest at a constant rate $2m/s^2$ for some time. Then it retards at constant rate of $4 m/s^2$ and comes to rest. If the total time for which it remains in motion is 12 s, the total distance travelled is :
(1) 32 m (2) 48 m (3) 64 m (4) 96 m

04. A wheat stone bridge is set up with arms P, Q, R, X and an additional feature that a uniform wire AB of resistance 2Ω is connected between X and R. The resistances of P, Q, R are 10, 20 and 30 Ω respectively the value of unknown resistance X, When null point is at mid point of wire AB, is.

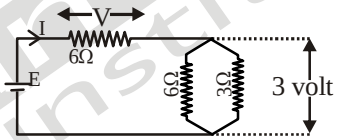


(1) 14.5 Ω (2) 15.5 Ω
(3) 15 Ω (4) 13.5 Ω

05. A bird is flying towards north with a velocity 40 km/h and a train is moving with velocity 40 km/h towards east. What is the velocity of the bird noted by a man in the train :
(1) $40\sqrt{2}$ km/h north-east
(2) $40\sqrt{2}$ km/h south-east
(3) $40\sqrt{2}$ km/h north-west
(4) $40\sqrt{2}$ km/h south-west.

06. One end of a string of length 1.0 m is tied to a body of mass 0.5 kg. It is whirled in a vertical circle with angular frequency 4 rad/s. The tension in the string when the body is at the lower most point of its motion will be equal to.
(1) 3 N (2) 5 N (3) 8 N (4) 13 N

07. In the adjoining circuit



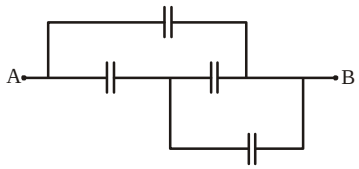
(1) E = 6 volt and I = 1 amps
(2) E = 12 volt and V = 6 volt
(3) E = 12 volt and V = 9 volt
(4) E = 9 volt and V = 6 volt

08. A particle is moving with speed $v = b\sqrt{x}$ along positive x-axis. Calculate the speed of the particle at time $t = \tau$ (assume that the particle is at origin at t = 0).

(1) $\frac{b^2\tau}{4}$ (2) $\frac{b^2\tau}{2}$

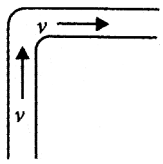
(3) $b^2\tau$ (4) $\frac{b^2\tau}{\sqrt{2}}$

09. In the figure the capacitance of each capacitor is 3 μF. The effective capacitance between A and B is



(1) 3/4μF (2) 3μF
(3) 6μF (4) 5μF

10. A fire hydrant delivers water of density ρ at a volume rate L. The water travels vertically upward through the hydrant and then does 90° turn to emerge horizontally at speed v.



The pipe and nozzle have uniform cross-section throughout. The force exerted by the water on the corner of the hydrant is

(1) ρvL (2) zero

(3) 2 ρvL (4) $\sqrt{2}$ ρvL

11. A particle of mass m is located in a one dimensional potential field where potential energy is given by
U (x) = A (1 – cos px)
where A and p are constants. The period of small oscillations of the particle is

(1) $2\pi\sqrt{m/(Ap^2)}$ (2) $2\pi\sqrt{m/(Ap)}$

(3) $2\pi\sqrt{m/A}$ (4) $\left(\frac{1}{2\pi}\right)\sqrt{(Ap/m)}$

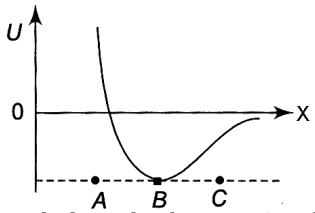
12. If the magnitude of sum of two vectors is equal to the magnitude of difference of the two vectors, the angle between these vectors is :
(1) 0° (2) 90° (3) 45° (4) 180°

13. A vertical spring with force constant K is fixed on a table. A ball of mass m at a height h above the free upper end of the spring falls vertically on the spring so that the spring is compressed by a distance d. The net work done in this process is :

(1) $mg(h-d)+\frac{1}{2}Kd^2$ (2) $mg(h+d)+\frac{1}{2}Kd^2$

(3) $mg(h+d)-\frac{1}{2}Kd^2$ (4) $mg(h-d)-\frac{1}{2}Kd^2$

14. The potential energy U between two molecules as a function of the distance X between them has been shown in the figure. The two molecules are



(1) Attracted when x lies between A and B and are repelled when X lies between B and C
(2) Attracted when x lies between B and C and are repelled when X lies between A and B
(3) Attracted when they reach B
(4) Repelled when they reach B

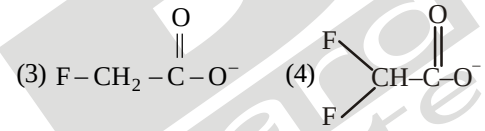
15. A spherical mercury droplet of radius r = 1mm has a charge q = 200 μC. Twenty seven such droplets are combined to make one large spherical drop. The ratio of surface potential of the larger drop to that of the each droplet is
(1) 1 (2) 3 (3) 9 (4) 27

CHEMISTRY

16. A sample of ammonium phosphate, $(NH_4)_3PO_4$, contains 6 moles of hydrogen atoms. The number of moles of oxygen atoms in the sample is:
(1) 1 (2) 2
(3) 4 (4) 6

17. Ionic species are stabilized by the dispersal of charge. Which of the following carboxylate ion is the most stable?

(1) $CH_3-\overset{\overset{O}{\|}}{C}-O^-$ (2) $Cl-CH_2-\overset{\overset{O}{\|}}{C}-O^-$

(3) $F-CH_2-\overset{\overset{O}{\|}}{C}-O^-$ (4) 

18. The reaction shows oxidising property of H_2O_2 in acidic medium
(1) $H_2O_2 + Mn^{+2} \rightarrow Mn^{+4} + 2OH^-$
(2) $2Fe^{+2} + H_2O_2 \rightarrow 2Fe^{+3} + 2OH^-$
(3) $2MnO_4^- + 6H^+ + 5H_2O_2 \rightarrow 2Mn^{+2} + 8H_2O + 5O_2$
(4) $Fe^{+2} + H_2O_2 + H^+ \rightarrow Fe^{+3} + 2H_2O$

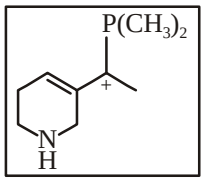
19. The pH values 0.1 M solution of HCOONa (I), HCOOH (II), CH_3COONH_4 (III), NaOH (IV), HCl (V), will be in the order:
(1) IV > III > I > II > V (2) IV > I > III > II > V
(3) II > III > I > IV > V (4) V > II > III > I > IV

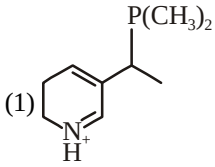
20. Which acid-base reaction would not take place as written?
(1) $CH_3Li + CH_3CH_2OH \rightarrow CH_4 + CH_3CH_2OLi$
(2) $H_2C = CH_2 + NaOH \rightarrow H_2C = CHNa + H_2O$
(3) $CH_3C \equiv CNa + H_2O \rightarrow CH_3C \equiv CH + NaOH$
(4) $(CH_3)_2CHOH + NaH \rightarrow (CH_3)_2CHONa + H_2$

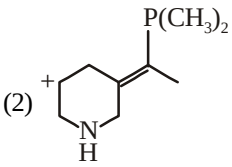
21. In which of the following compounds, the carbon marked with asterisk is expected to have greatest positive charge?
(1) $^*CH_3-CH_2-Cl$ (2) $^*CH_3-CH_2-Mg^+Cl^-$
(3) $^*CH_3-CH_2-Br$ (4) $^*CH_3-CH_2-CH_3$

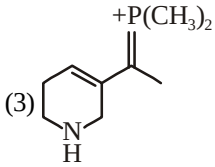
22. 0.2 mole of HCl and 0.2 mole of barium chloride were dissolved in water to produce a 500 mL solution. The molarity of the Cl^- ions is:
(1) 0.06 M (2) 0.09 M
(3) 1.2 M (4) 0.80 M

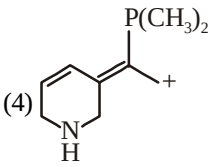
23. Which of the following species is a resonance form of the species in the box?



(1) 

(2) 

(3) 

(4) 

24. Increasing order of stability among the three main conformations (i.e., eclipse, anti, gauche) of 2–fluoroethanol is
(1) eclipse, anti, gauche (2) anti, gauche, eclipse
(3) eclipse, gauche, anti (4) gauche, eclipse, anti

25. Due to the presence of an unpaired electron, free radicals are
(1) chemically reactive (2) chemically inactive
(3) anions (4) cations

26. Flame test is not given by
(1) Ca (2) Ba
(3) Be (4) Li

27. Covalent bond can undergo fission in two different ways. The correct representation involving a heterolytic fission of $CH_3 - Br$ is
(1) $CH_3 - Br \rightarrow \overset{+}{C}H_3 + Br^-$
(2) $CH_3 - Br \rightarrow \overset{+}{C}H_3 + Br^-$
(3) $CH_3 - Br \rightarrow \overset{-}{C}H_3 + Br^+$
(4) $CH_3 - Br \rightarrow \dot{C}H_3 + \dot{B}r$

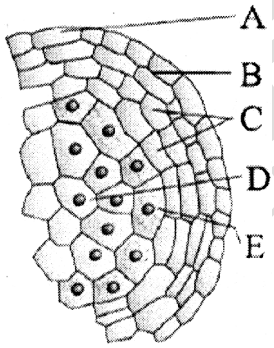
28. Hydrogen is prepared from H_2O by adding
(1) Ca, which acts as reducing agent
(2) Al, which acts as oxidising agent
(3) Ag, which acts as reducing agent
(4) Au, which acts as oxidising agent

29. Which of the following is most soluble in water?
(1) $Ba_3(PO_4)_2$ ($K_{sp} = 6\times10^{-39}$)
(2) ZnS($K_{sp} = 7\times10^{-16}$)
(3) $Fe(OH)_3$($K_{sp} = 6\times10^{-38}$)
(4) $Ag_3(PO_4)$($K_{sp} = 1.8\times10^{-18}$)

30. Consider the following abbreviations for hydrated alkali ions $x = [Li(H_2O)_n]^+$, $y = [K(H_2O)_n]^+$, $z = [Cs(H_2O)_n]^+$
What is the correct order of size of these hydrated alkali ions?
(1) x > y > z (2) z > y > x
(3) x = y = z (4) z > x > y

BOTANY

31. The applications of Biotechnology include
(A) Therapeutics
(B) Diagnostics
(C) GM crops for agriculture
(D) Processed food
(E) Bioremediation
(F) Waste treatment
(G) Energy production
(1) A, B, C, E Only (2) C only
(3) B, C, D, E Only (4) All of these

32. 

Depict a figure of enlarged view of microsporangium. Select the correct option in which any tow labelled structures are correctly identified.
(1) E = Microspore mother cell, B = Endothecium
(2) A = Epidermis, E = Microspore mother cell
(3) C = Middle layer, D = Tapetum
(4) D = Microspore mother cell, E = Tapetum

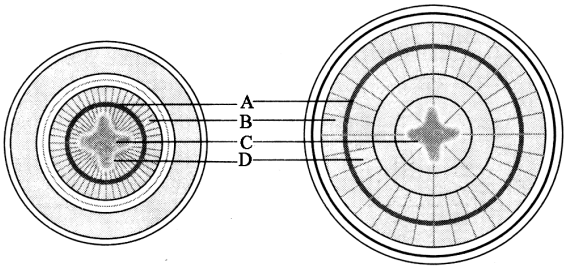
33. Which variety or rice was patented by a US company even though the highest number of varieties of this rice is found in India?
(1) Sharbati Sonora (2) Co–667
(3) Basmati (4) Lerma Roja

34. Ability to rise in thin tubes and ability to resist pulling force are respectively
(1) Tensile strength and capillarity
(2) Cohesion and adhesion
(3) Capillarity and tensile strength
(4) Adhesion and capillarity

35. Humulin was first marketed by
(1) Eli Lilly (2) Sun pharma
(3) Nova Industry (4) May and Baker

36. Which is correct about monocot stem ?
(1) Hypodermis is sclerenchymatous, vascular bundles are close, phloem parenchyma is absent
(2) Hypodermis is sclerenchymatous, vascular bundles are open, phloem parenchyma is absent
(3) hypodermis is collenchymatous, vascular bundles are closed, phloem parenchyma is present
(4) Hypodermis is sclerenchymatous, vascular bundles are closed, phloem parenchyma is present

37. Recognise the figure and find out the correct matching.



(1) D-primary xylem, C-secondary xylem, B-vascular cambium, A-secondary phloem
(2) C-primary xylem, D-secondary xylem, A-vascular cambium, B-secondary phloem
(3) B-primary xylem, A-secondary xylem, C-vasculr cambium, D-secondary phloem
(4) A-primary xylem, B-secondary xylem, D-vascular combium, C-secondary phloem

38. Match column I with column II, and choose the correct combination from the options given below.

Column-I		Column-II	
A.	Osmosis	1.	Shrinkage of protoplast
B.	Plasmolysis	2.	Hydrophilic substances
C.	Diffusion	3.	Free movement of molecules
D.	Imbibition	4.	Semi permeable membrane

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

39. Which of the following is categorized as a 'beneficial element,' but not an 'essential element' for the growth of higher plants ?
(1) Cobalt
(2) Iron
(3) Molybdenum
(4) Copper

40. Match Column I and Column II and choose the correct option given below the columns.

Column I (Element)		Column II (Function)	
A.	Calcium	1.	Required for ionic-balance
B.	Boron	2.	Required for absorption of calcium
C.	Phosphorus	3.	Required for absorption of calcium
D.	Chlorine	4.	Required toactivate respiratory enzyme
E.	Manganese	5.	Required for synthesis of mitotic spindle

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

41. What is produced when succinyl CoA is changed to succinate ?
(1) ATP
(2) GTP
(3) CTP
(4) ATP in plants and GTP in animals

42. Gibberellin facilitates seed germination by triggering the synthesis of
(1) α-amylase
(2) β-amylase
(3) α-amylase and β-amylase
(4) α-amylase and protease

43. Match column I with column II, and choose the correct combination from the options given below.

Column I		Column II	
A.	Inhibit seed germination	1.	Gibberellin
B.	Sprouting of potato tuber	2.	Ehylene
C.	Increase yield of sugarcane	3.	Zeatin
D.	Promote lateral shoot growth	4.	ABA

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

44. 5-methyl uracil is also known as
(1) Thymine (2) Uracil
(3) Adenine (4) Guanine

45. Negatively charged DNA is wrapped around the positively charged histone octamer called
(1) Nucleosome
(2) Nucleolus
(3) Nucleotides
(4) Nucleoside

ZOOLOGY

46. In the ventricular diastole, the ...A... valve closed. This causes the second heart sound ...B...
Choose the correct option A and B.
(1) A–Semilunar; B–Dub
(2) A–Mitral; B–Dub
(3) A–Bicuspid; B–Dub (4) A–Tricupsid; B–Dub

47. Which of the following can be detected in ELISA?
(1) Protein antigen
(2) Glycoprotein antigen
(3) Antibodies synthesized against pathogen
(4) Any of these

48. Which of the following can not be taken as a feature of open type of circulatory system
(1) Low pressure system
(2) Well regulated blood supply to different organs
(3) Blood returns to heart slowly
(4) Non formation of capillaries

49. Select the incorrectly matched pair.
(1) Phragmoplast – Persistent spindle
(2) Reductional division – Meiosis – I
(3) Equational division – Meiosis – II
(4) Crossing over – Non–homologous chromosomes

50. Which of the following statements are/is correct?
I. Dendrites are long fibre, with branched distal end.
II. Axons are short fibres which arise from the cell body.
III. Cell body of a neuron contains cytoplasm, nucleus with cell organelles and Nissl's granules.
IV. The dendrites transmits nerve impulses away from the cell body to a synapse.
The correct option is
(1) Only III (2) I and I
(3) I, II and III (4) I, II and IV

51. Correct sequence of layers of bacterial cell envelope from outward to inward is
(1) Cell wall → Glycocalyx → Cell membrane
(2) Cell membrane → Glycocalyx → Cell wall
(3) Glycocalyx → Cell wall → Cell membrane
(4) Glycocalyx → Cell membrane → Cell wall

52. Consider the following statements.
I. Calcitonin is non-iodised.
II. Calcitonin is secreted by parafollicular cells.
III. Calcitonin regulates the calcium level in blood.
IV. Calcitonin is also called as TCT (Thyrocalcitonin).
V. TCT is hyperglycemic agent (factor).
Select the option containing correct statements from the above given statements.
(1) I, II and V (2) I, II, III and IV
(3) III, IV and V (4) II, III, IV and V

53. Blood leaving the liver and going towards the heart is rich in
(1) bile (2) urea (3) ammonia (4) oxygen

54. The middle layer of hyman eye, choroid contains ...A... and looks ...B... in colour.
Choose the correct option for A, B.
(1) A–blood vessels, B–bluish
(2) A–connective tissue, B–redish
(3) A–bipolar cells, B–blackish
(4) A–muscle fibre, B–brownish

55. Fastest distribution of some injectible material/medicine with no risk of any kind can be achieved by injecting it into the
(1) Muscles (2) Arteries
(3) Veins (4) Lymph vessels

56. Following are the principle action of insulin except
(1) Increase transport of Glucose in to the cells
(2) Stimulate glycogenesis
(3) Promote Glycogenolysis
(4) Increase lipogenesis

57. A tumour in the adrenal zona glomerulosa can cause hyper secretion of hormones produced in that region. Which of the following might you expect to find in a patient with such a tumour?
(1) Increased blood sodium levels
(2) Increased blood glucose levels
(3) Decreased blood calcium levels
(4) Increased dehydration

58. Polar nuclei are situated :-
(1) Below the antipodal cells
(2) Below the egg apparatus
(3) Above the egg apparatus
(4) Above the egg cell

59. Pheromones when secreted upon the skin surface, its odour generally affects:
(1) skin colour
(2) genitalia
(3) breast
(4) mutual behaviour of members of a species

60. When breast feeding is replaced by less nutritive food low in proteins and calories; the infants below the age of one year are likely to suffer from:
(1) Rickets (2) Kwashiorkor
(3) Pellagra (4) Marasmus