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SKD New Standard Coaching Institute
38 YEARS OF TEACHING EXCELLENCE
Ist Floor, Skylark Building,
Near Leela Cinema, Newal Kishore Road,
Hazratganj, Lucknow. Call : 7080111582, 7080111595

SAMPLE PAPER - 76

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

PHYSICS

01. A body is projected vertically upwards with a speed of $\sqrt{\frac{2GM}{3R}}$ (M is mass and R is radius of earth). The body will attain a height of
(1) R/2 (2) R (3) 5/4 R (4) 3R / 2

02. The distance of two planets from the sun are 10^{13} m and 10^{12} m respectively. The ratio of time periods of the planets is
(1) $\sqrt{10}:1$ (2) $10\sqrt{10}:1$
(3) 10 : 1 (4) 1 : 1

03. Consider a planet moving around a star in an elliptical orbit with period T. The area of the elliptical orbit is proportional to
(1) $T^{4/3}$ (2) T (3) $T^{2/3}$ (4) $T^{1/2}$

04. The least count of a vernier calipers is 0.01 cm and if the zero mark of the vernier scale is to the left of zero of the main scale and the vernier coincidence is 7 when the jaws are in contact, then the zero error is .....cm.
(1) $+6\times0.01$ (2) $+7\times0.01$
(3) -7×0.01 (4) -6×0.01

05. A vernier scale has 10 divisions. It slides over a main scale whose least count is 1.0 mm. when mearsurement is taken it was found that the number of divisions on the main scale, to the left-hand side of zero of the vernier scale is 4 and the 8th vernier scale division coincides with the main scale, find the measurement.
(1) 2.8 mm (2) 4.8 cm
(3) 4.8 mm (4) 3.2 mm

06. A ball is projected from a certain point on the surface of a planet at a certain angle with the horizontal surface. The horizontal and vertical displacement x and y vary with time t (in seconds) as $x = 10\sqrt{3}t$ and $y = 10t - t^2$. The maximum height attained by the ball is
(1) 100 m (2) 75 m (3) 50 m (4) 25 m

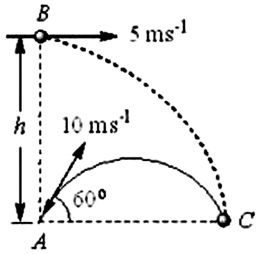
07. A car is negotiating a curved road of radius R. The road is banked at an angle θ. The coefficient of friction between the tyres of the car and the road is μ_s. The maximum safe velocity on this road is:
(1) $\sqrt{gR^2\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}}$ (2) $\sqrt{gR\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}}$
(3) $\sqrt{\frac{g}{R}\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}}$ (4) $\sqrt{\frac{g}{R^2}\frac{\mu_s+\tan\theta}{1-\mu_s\tan\theta}}$

08. A force $F = 2t^2$ is applied to the cart initially at rest. The speed of cart at t = 5 s is

(1) 10 m s^{-1} (2) 8.33 m s^{-1}
(3) 2 m s^{-1} (4) zero

09. A projectile is projected from the ground by making an angle of 60° with the horizontal. After 1s projectile makes an angle of 30° with the horizontal. The maximum height attained by the projectile is (Take g = 10 ms^{-2})
(1) $\frac{45}{2}$m (2) $\frac{45}{4}$m
(3) $\frac{43}{2}$m (4) $\frac{43}{4}$m

10. A particle A is projected from the ground with an initial velocity of 10 ms^{-1} at an angle of 60° with horizontal. From what height h should an another particle B be projected horizontally with velocity 5 ms^{-1} so that both the particles collide in ground at point C if both are projected simultaneously? (g = 10 ms^{-2})



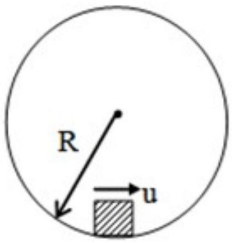
(1) 10 m (2) 30 m
(3) 15 m (4) 25 m

11. A particle of mass m describes a circle of radius r. The centripetal acceleration of the particle is $\frac{4}{r^2}$. The momentum of the particle is

(1) $\frac{4m}{r}$ (2) $\frac{2m}{r}$

(3) $\frac{4m}{\sqrt{r}}$ (4) $\frac{2m}{\sqrt{r}}$

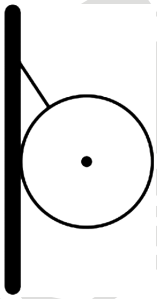
12. A particle is given an initial speed u inside a smooth spherical shell of radius R = 1 m such that it is just able to complete the circle. Acceleration of the particle, when its velocity is vertical, is



(1) $g\sqrt{10}$ (2) g

(3) $g\sqrt{2}$ (4) 3g

13. A uniform sphere of weight w and radius 3 m is being heid by a string of length 2 m and attached to a frictioless wall, as shown in the figure. The tension in the string will be



(1) $\frac{5w}{4}$ (2) $\frac{15w}{4}$

(3) $\frac{15w}{6}$ (4) none of these

14. Two bodies x and y of weight 600 N and 1000 N are dropped simultaneously from the same height large above the earth's surface from same place. Their acceleration will be

(1) $a_x > a_y$ (2) $a_y > a_x$

(3) $a_x = a_y$ (4) Can't be predicted

15. The acceleration due to gravity g and mean density of the earth ρ are related by which of the following relations? (where G is the gravitational constant and R is the radius of the earth)

(1) $\rho = \frac{3g}{4\pi GR}$ (2) $\rho = \frac{3g}{4\pi GR^3}$

(3) $\rho = \frac{4\pi gR^2}{3G}$ (4) $\rho = \frac{4\pi gR^3}{3G}$

CHEMISTRY

16. The biodegradable polymer is :-

(1) nylon–6,6 (2) nylon 2–nylon 6

(3) nylon–6 (4) Buna–S

17. Which of the following is a natural polymer?

(1) cis-1, 4-polyisoprene

(2) poly (Butadiene-styrene)

(3) polybutadiene

(4) poly (Butadiene-acrylonitrile)

18. Which of the following is a cationic detergent?

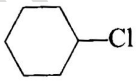
(1) Sodium lauryl sulphate

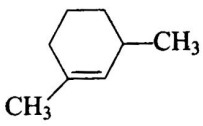
(2) Sodium stearate

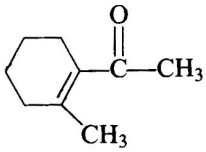
(3) Cetyltrimethyl ammonium bromide

(4) Sodium dodecylbenzene sulphonate

19. In which of the following molecules all the carbon atoms have sp^2 hybridization?

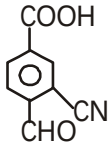
(1) 

(2) 

(3) 

(4) 

20. The IUPAC name of the compound is :



(1) 2-Cyano-1-formylbenzene-4-carboxylic acid

(2) 3-Cyano-4-formylbenzene-1-carboxylic acid

(3) 4-Carboxy-2-cyanobenzene-1-carbaldehyde

(4) 2-Formyl-5-carboxybenzene-1-carbonitrile

21. At certain Hill-station pure water boils at 99.72 °C. If Kb for water is 0.513 °C kg mol^{-1}. The boiling point of 0.69 m solution of urea will be-

(1) 100.074 °C (2) 103 °C

(3) 100.359 °C (4) Un predictable

22. 2 moles of non-volatile solute is added to 1 kg water at –8° C. K_f of water is 2 K kg mol^{-1}. Mass of ice that separates out is (Ignoring the effect of change in volume)
(1) 250 g (2) 500 g (3) 750 g (4) 100 g

23. One mole of sugar is dissolved in two moles of water. The V.P. of the solution relative to that of pure H_2O is
(1) 2/3 (2) 1/3 (3) 3/2 (4) 1/2.

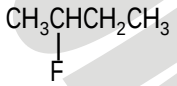
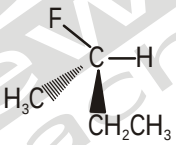
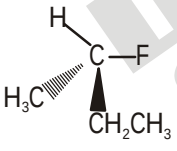
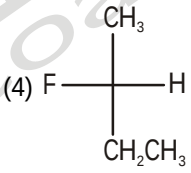
24. A 5% solution of cane sugar (molar mass = 342) is isotonic with 1% of a solution of an unknown solute. The molar mass of unknown solute in g/mol is
(1) 136.2 (2) 171.2 (3) 68.4 (4) 34.2

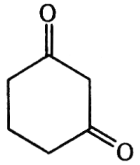
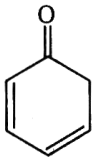
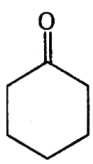
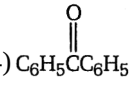
25. Total vapour pressure of mixture of 1 mol of volatile component A (p^0_A=100 mmHg) and 3 mol of volatile component B (p^0_B = 60 mm Hg) is 75 mm. For such case component is positive deviation from Raoult's law :
(1) there is positive deviation from Raoult's law
(2) boiling point has been lowered
(3) force of attraction between A and B is smaller than that between A and A or between B and B
(4) all the above statements are correct

26. The electronic configuration of two elements X and Y are given below:
$X = 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2$
$Y = 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$
The formula of the ionic compound that can be formed between these elements is
(1) XY (2) XY_2 (3) X_2Y (4) XY_3

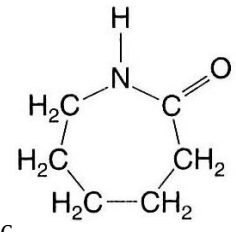
27. The highest electron affinity is shown by
(1) O^- (2) F^- (2) Cl_2 (4) F_2

28. Which of the following has 'S configuration :-

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

29. Enolisation is maximum in case of
(1) 
(2) 
(3) 
(4) 

30. Which of the following polymer can be formed by using the following monomer unit?



(1) Nylon 6, 6
(2) Nylon 2-nylon 6
(3) Melamine polymer
(4) Nylon-6

BOTANY

31. Sweet potato stored food in:
(1) Tap root (2) Stem
(3) Adventitious root (4) Bud

32. Hanging root of banyan is:
(1) Stilt root
(2) Pneumatophores
(3) Prop root
(4) More than one is correct

33. Organs of perennation is/are:
(1) Underground stems of Potato
(2) Underground stems of Ginger
(3) Underground stems of Turmeric
(4) All are correct

34. Phylloclade (Flattened stem) found in:
(1) Opuntia (2) Euphorbia
(3) Cassia
(4) More than one is correct

35. In aquatic plants like Pistia and Eichhornia, which of the following term is applicable?
(1) Offset (2) Stolon
(3) Cladode (4) Phylloclade

36. Fill in the blanks:
1. Light saturation occurs at .....a..... per cent of full sunlight.
2. There is a .....b..... relationship between incident light and CO_2 fixation rates at low light intensities.
3. C_3 plants show saturation at about ...c... $\mu 1\ L^{-1}$ while C_4 corresponds to saturation at about ...d... $\mu 1\ L^{-1}$
(1) a–2–5%, b—sigmoid, c–350, d–460
(2) a–50%, b—linear, c–460, d—350
(3) a–10%, b—sigmoid, c–360, d–450
(4) a–10%, b—linear, c–450, d–360

37. With reference to factors affecting the rate of photosynthesis, which of the following statements is not correct.
(1) Increasing atmospheric CO_2 concentrarion up to 0.05% can enhance CO_2 fixation.
(2) C_3 plants respond to higher temperature with enhanced photosynthesis while C_4 plants have much lower temperature optimum.

(3) Tomato is a greenhouse crop which can be grown in CO_2-enriched atmosphere for higher yield.
(4) Light saturation for CO_2 fixation occurs at 10% of full sunlight.

38. Phosphorylation during photosynthesis is.
(1) Oxidative phosphorylation and Photophosphorylation occurring in light and dark conditions.
(2) Oxidative phosphorylation occurs in light conditions and Photophosphorylation occurs in dark conditions.
(3) Oxidative phosphorlation occurs in dark conditions and Photophosphorylation occurs in light conditions.
(4) Oxidative phosphorylation occurs in light and dark conditions and Photophosphorylation occurs only in the presence of light.

39. In the Calvin cycle for the fixation of 5 molecules of CO_2, how many ATP and NADPH are required in the reduction step?
(1) 18 ATP and 12 NADPH
(2) 15 ATP and 10 NADPH
(3) 10 ATP and 10 NADPH
(4) 3 ATP and 2 NADPH

40. Maximum absorption by chlorophyll-a is seen in (P). The maximum rate of photosynthesis is seen in (Q). The correct words filling (P) and (Q) are.
(1) (P) : red light and (Q) : red light
(2) (P) : blue light and (Q) : blue light
(3) (P) : blue light and (Q) : red light
(4) (P) : red light and (Q) : blue light

41. Study the following columns and choose the correct option.

	Column - I		Column - II
(A)	Oxygen-evolving complex	(1)	Ribulose Bisphosphate
(B)	Proton gradient	(2)	High oxygen concentration
(C)	Calvin Cycle	(3)	ATP synthesis
(D)	Photorespiration	(4)	Pheophytin
		(5)	Photolysis of water

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

42. C_2 cycle is studied in.
(1) C_4 plants
(2) Those plants that show photorespiration
(3) Both C_4 plants and those plants that show photorespiration.
(4) None of the above

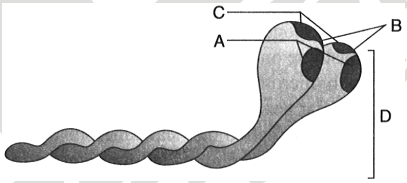
43. How many cycles of cyclic and non-cyclic photophosphorylation would be required in order to generate enough energy for the production of one glucose molecule?
(1) 10 cyclic and 4 non-cyclic photophosphorylation
(2) 6 cyclic and 6 non-cyclic photophosphorylation
(3) 2 cyclic and 4 non-cyclic photophosphorylation
(4) 8 cyclic and 1 non-cyclic photophosphorylation

44. Sub-unit of coat (capside) of virus is:
(1) Nucleosome
(2) Capsomere
(3) Nucleotide
(4) None of these

45. Which statement is correct for viroids?
(1) Smaller than viruses
(2) Causes potato spindle tuber disease
(3) It was found to be free RNA
(4) All are correct

ZOOLOGY

46. Identify A to D in the below figure.



(1) A–Actin binding sites, B–Head, C–Cross arm, D–ATM binding sites
(2) A–Cross arm, B–Actin binding sites, C–ATP binding sites, D–Head
(3) A–ATP binding sites, B–Head, C–Actin binding sites, D–Cross arm
(4) A–Head, B–Cross arm, C–ATP binding sites, D–Actin binding sites

47. Binding of Ca^{2+} with ____ in the skeletal muscles which leads to exposure of the binding site for ____ on the filament ____
(1) Troponin, myosin, actin
(2) Troponin, actin, relaxin
(3) Actin, myosin, troponin
(4) Tropomyosin, myosin, actin

48. F-actin is a polymer of
(1) G-actin (2) Troponin T
(3) Troponin I (4) Troponin C

49. The dark bands (A-bands) of a skeletal muscle are known as
(1) Isotropic bands (2) Anisotropic bands
(3) Intercalated disc (4) Cross bridges

50. Sarcoplasmic reticulum is the store house of which of the following ion?
(1) Ca^{2+} (2) Na^{+}
(3) K^{+} (4) Fe^{2+}

51. Which among the following is the principal cation in the human blood?
(1) Potassium (2) Sodium
(3) Calcium (4) Maganese

52. There are two major types lymphocytes (20-25%), B and T forms. Identify their function
(1) Blood coagulation
(2) Thickness of blood
(3) Immune responses
(4) All of the above

53. A 'Christmas disease' patient lacks antihaemophilic
(1) homogenetisic acid oxidase
(2) factor VIII
(3) factor XI
(4) factor IX

54. Mitral valve is present between
(1) left auricle and right auricle
(2) left vetricle and right ventricle
(3) left auricle and left ventricle
(4) right auricle and right ventricle

55. The condition in which the kidenys fail to conserve water leading to water loss and dehydration due to impaired ADH synthesis or release is
(1) Graves' disease (2) Addison's disease
(3) diabetes insipidus (4) cretinism

56. Cretinism, mental retardation, low intelligence quotient, abnormal skin, deaf-mutism, etc., are the effects of
(1) hyperthyroidism (2) goitre
(3) hypothyroidism (4) both (2) and (3)

57. Erythropoietin is secreted from
(1) pituitary gland (2) pancreas
(3) adrenal gland (4) kidney

58. The shoulder and hip are
(1) Pivot joints (2) Hinge joints
(3) Ellipsoid joints (4) Ball and socket joints

59. Carpals, metacarpals, tarsals and metatarsals are _____ and _____ in numbers, respectively.
(1) 8, 5, 7, 5 (2) 8, 7, 5, 5
(3) 8, 5, 8, 5 (4) 8, 5, 5, 7

60. Malleus is a part of
(1) Forelimbs of vertebrates
(2) Reproductive organs of cockroach
(3) Auditory ossicles of middle ear of human
(4) Skull of frog