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Ist Floor, Skylark Building,
Near Leela Cinema, Newal Kishore Road,
Hazratganj, Lucknow. Call : 7080111582, 7080111595

SAMPLE PAPER - 65

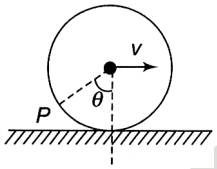
Time : 1 : 15 Hr. **Question : 60**

PHYSICS

01. Two bodies have their moments of inertia I and 2I, respectively about their axis of rotation. If their kinetic energies of rotation are equal, their angular velocity will be in the ratio

(1) 2 : 1 (2) 1 : 2 (3) $\sqrt{2}$:1 (4) 1: $\sqrt{2}$

02. A hoop rolls on a horizontal ground without slipping with linear speed v. Speed of a particle P on the circumference of the hoop at angle θ is



(1) 2v sin (θ/2) (2) v sin θ
(3) 2v cos (θ/2) (4) v cos θ

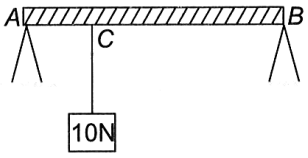
03. A coin is of mass 4.8 kg and radius 1 m rolling on a horizontal surface without sliding with angular velocity 600 rot min^{-1}. What is total kinetic energy of the coin?

(1) 360 J (2) 1440 π^2 J
(3) 4000 π^2 J (4) 600 π^2 J

04. A body is rolling down an inclined plane. If KE of rotation is 40% of KE in translatory state, then the body is a

(1) ring (2) cylinder
(3) hollow ball (4) solid ball

05. A rigid massless rod AB of length 1 m is placed horizontally on two rigid supports at its ends as shown in figure. A weight 10 N is hung from a point C at a distance 30 cm from A. Find the reactions at the supports A and B respectively.



(1) 5 N, 5 N (2) 3 N, 7 N
(3) 10 N, 0 N (4) 7 N, 3 N

06. A force is inclined at 60° to the horizontal. If its rectangular component in the horizontal direction is 50 N, then magnitude of the vertical component of force is approximately

(1) 25 N (2) 84 N
(3) 87 N (4) 90 N

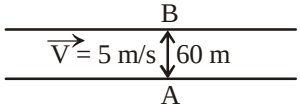
07. A body has an initial velocity of 3 m/s and has an acceleration of 1 m/sec^2 normal to the direction of the initial velocity. Then its velocity 4 seconds after the start is

(1) 7 m/sec along the direction of initial velocity
(2) 7 m/sec along the normal to the direction of initial velocity
(3) 7 m/sec mid-way between the two directions
(4) 5 m/sec at an angle off $\tan^{-1}$ (4/3) with the direction of initial velocity.

08. 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

09. A man is crossing a river flowing with velocity of 5 m/s. He reaches a point directly across at a distance of 60 m in 5 sec. His velocity in still water should be



(1) 12 m/s (2) 13 m/s
(3) 5 m/s (4) 10 m/s

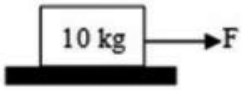
10. The maximum height attained by a projectile is increased by 5%. Keeping the angle of projection constant, what is the percentage increase in horizontal range ?

(1) 5% (2) 10%
(3) 15% (4) 20%

11. Essential characteristic of equilibrium is -

(1) momentum equals zero
(2) acceleration equals zero
(3) K.E.equals zero
(4) velocity equals zero

12. 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

13. Two balls, each of radius R, equal mass and density are placed in contact, then the force of gravitation between them, is proportional to

(1) $F \propto \frac{1}{R^2}$ (2) $F \propto R$ (3) $F \propto R^4$ (4) $F \propto \frac{1}{R}$

14. Find gravitational field at a distance of 2000 km from the centre of earth. (Given R_{earth} = 6400 km, r = 2000 km, $M_{earth} = 6 \times 10^{24}$ kg)
(1) 1.53 ms^{-2} (2) 7.12 ms^{-2}
(3) 3.06 ms^{-2} (4) 1.8 ms^{-2}

15. R is the radius of earth, ω is its angular velocity and g_p is the value of g at the poles. The effective value of g at a latitude $\lambda = 60°$ is

(1) $g_P - \frac{1}{4} R\omega^2$ (2) $g_P + \frac{1}{4} R\omega^2$
(3) $g_P - \frac{1}{2} R\omega^2$ (4) $g_P + \frac{1}{2} R\omega^2$

CHEMISTRY

16. Which of the following is not correct for noble gases?
(1) These are mono-atomic
(2) Their radii are very large because of non-bonding nature
(3) We study van der Waals' radii for them
(4) Their valency is always zero.

17. After the discovery of element of atomic number 120, which group and period, respectively, will it belong to?
(1) 8, 9 (2) 1, 8
(3) 2, 8 (4) 2, 9

18. Select the incorrect statement:
(1) Elements of d-block are characterised by filling of inner d-orbitals by electrons.
(2) Zn^{2+}, Cd^{2+} and Hg^{2+} are coloured and paramagnetic.
(3) Most of these metals and their compounds are used as catalyst.
(4) Elements of d-block form a bridge between chemically active metals of s-block and less active elements of 13 group.

19. For which of the following molecule significant $\mu \neq 0$?

(a) 

(b) 

(c) 

(d) 

(1) Only (a) (2) (a) and (b)
(3) Only (c) (4) (c) and (d)

20. Nylon threads are made of-
(1) Polyamide polymer
(2) Polyethlene polymer
(3) Polyvinyl polymer
(4) Polyster polymer

21. When certain amount of an organic compound is dissolved in acetone, its boiling point increase by 0.34°C. If K_b for acetone is 17.0°C kg mol^{-1}, then find the molality of the solution
(1) 0.1 molal (2) 0.2 molal
(3) 0.01 molal (4) 0.02 molal

22. The vapour pressure of a liquid in pure state is 50 mm Hg while that in solution state is 40 mm Hg. Find the mole fraction of that liquid in solution state.
(1) 0.40 (2) 0.50
(3) 0.60 (4) 0.80

23. If A contains 2% NaCl and is separated by a semi permeable membrane from B which contains 10% NaCl then which of the following event will occur?
(1) NaCl will flow from A to B
(2) NaCl will flow from B to A
(3) Water will flow from A to B
(4) Water will flow from B to A

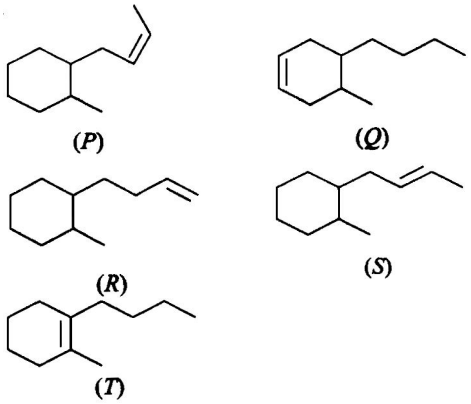
24. If quantities ΔT_f, ΔT_b Δp and π without subscript refer to the electrolyte solution and these with subscript refer to the non-electrolyte solution, then which one is incorrect?

(1) $i = \frac{\Delta T_f}{(\Delta T_f)_0}$ (2) $i = \frac{\Delta T_b}{(\Delta T_b)_0}$
(3) $i = \frac{\Delta P}{(P^o)_0}$ (4) $i = \frac{\pi}{(\pi)_0}$

25. A solution has a 1 : 4 mol ratio of pentane to hexane. The vapor pressure of the pure hydrocarbons at 20°C are 440 mm Hg for pentane and 120 mm Hg for hexane. The mole fraction of pentane in the vapor phase would be
(1) 0.786 (2) 0.549
(3) 0.478 (4) 0.200

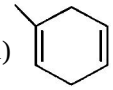
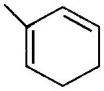
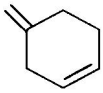
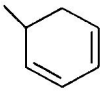
26. The values of observed and calculated molecular weights of silver nitrate are 92.64 and 170, respectively. The degree of dissociation of silver nitrate is
(1) 60% (2) 83.5%
(3) 46.7% (4) 60.23%

27. Arrange the following compounds in increasing order of their heat of combustion.

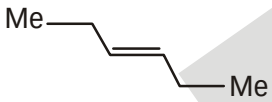


(1) P < Q < R < S < T (2) T < S < P < Q < R
(3) Q < P < R < T < S (4) R < S < T < Q < P

28. Select the most stable structure among following:

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

29. What is the IUPAC name of the following compounds?



(1) trans-hex-3-ene (2) trans-hex-4-ene
(3) trans-hex-5-ene (4) trans-hex-6-ene

30. Name the group which is ortho para directing even ring deactivating group
(1) CH_3 (2) X (halo)
(3) NO_2 (4) OH

BOTANY

31. In meiosis:
(1) First division is reductional
(2) First division is equational
(3) Second division is reductional
(4) None of the above

32. Cross-like configurations when non-sister chromatids of bivalent come in contact during first meiotic division are:
(1) Chiasmata
(2) Chromomeres
(3) Centromeres
(4) Bivalents

33. Match the stages of meiosis in Column–I to their characteristic features in Column–II and select the correct option using the codes given below:

	Column–I		Column–II
(a)	Pachytene	(i)	Pairing of homologous chromosomes
(b)	Metaphase I	(ii)	Terminalization of chiasmata
(c)	Diakinesis	(iii)	Crossing over takes place
(d)	Zygotene	(iv)	Chromosomes align at equatorial plate

(1) a→ii; b→iv; c→iii; d→i
(2) a→iv; b→iii; c→ii; d→i
(3) a→iii; b→iv; c→ii; d→i
(4) a→i; b→iv; c→ii; d→iii

34. In which stage of meiosis the structure, number and shape of chromosomes can be observed?
(1) Prophase I (2) Metaphase I
(3) Anaphase I (4) Telophase I

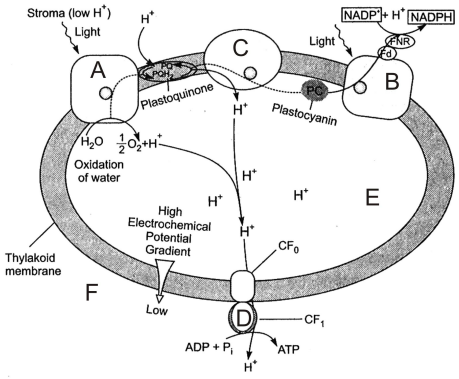
35. Match the following columns:

	Column–I		Column–II
(a)	G_1-phase	(1)	Replication of DNA
(b)	S-phase	(2)	Quiescent stage
(c)	G_2-phase	(3)	Condensation of chromatin
(d)	G_0-phase	(4)	Protein synthesis
		(5)	Interval between mitosis and initiation of DNA replication

(1) (a)–(3); (b)–(5); (c)–(1); (d)–(2)
(2) (a)–(5); (b)–(4); (c)–(1); (d)–(3)
(3) (a)–(5); (b)–(1); (c)–(4); (d)–(2)
(4) (a)–(5); (b)–(2); (c)–(3); (d)–(4)

36. Action spectrum of photosynthesis resembles roughly the
(1) Absorption spectrum of chlorophyll *a*
(2) Absorption spectrum of chlorophyll *b*
(3) Absorption spectrum of chlorophyll *c*
(4) Absorption spectrum of chlorophyll *a* and *b*

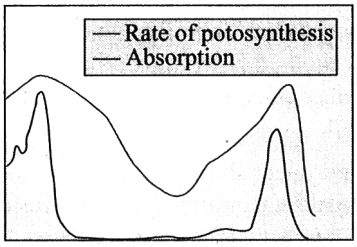
37. Recognise the figure and find out the correct matching.



(1) A-ATP synthase, B–photosystem I, C-photosystem II, E-stroma, F-lumen, D-cytochrome b and f
(2) D-ATP synthase, A-photosystem I; B-photosystem II, F-stroma, E-lumen, C-cytochrome b and f
(3) D-ATP synthase,B–photosystem I, A-photosystem II, F-stroma, E-lumen, C-cytochrome b and f
(4) D-ATP synthase, A-photosystem I, B-photosystem II, E-stroma, F-lumen, C-cytochrome b and f

38. Steps in non-cyclic photophosphorylation include passage of electrons along
(1) FRS → FD → Cyt b_6 → Cyt *f* →PC → Chl a
(2) Chl a → Cyt b_6 → Cyt *f* → PC→ PS I → FRS → FD
(3) Chl a → PQ → Cyt b_6 → Cyt *f* → PC → PSI → FRS →FD
(4) PQ → Cyt b_6 → Cyt *f* → PC → PS I → FRS → FD

39. The following figure shows the



(1) Action spectrum of photosynthesis superimposed on absorption spectrum of chlorophyll a
(2) Action spectrum of photosynthesis superimposed on absorption spectrum of chlorophyll b
(3) Both A and B
(4) Absorption spectrum of carotenoids superimposed on action spectrum of photosynthesis

40. Recognise the following equation :
α-ketoglutaric acid + NH_4^+ + NADPH
↓ Glutamate dehydrogenase
Glutamate + H_2O + NADP
(1) Raductive deamination
(2) Transmination
(3) Nitrogen fixation
(4) Reductive amination

41. Asparagine and glutamine are two important amides which are formed from aspartic acid and glutamic acid, respectively, by replacing the ...a... by another ...b... radicle.
(1) a-hydroxyl part of acid ; b-NH_2^-
(2) a-NH_2^- group of amino acid ; b-OH^-
(3) a-amino group ; b–keto group
(4) a-keto group ; b-amino group

42. Read the following statements and select the incorrect statement
(1) Deficiency of Mg may leads to chlorosis and necrosis
(2) Deficiency of N may leads to inhibition of cell division and delay flowering
(3) Deficiency of S may leads to chlorosis and inhibition of cell division
(4) Deficiency of Mn may leads to loss of chlorophyll and death of tissue

43. In purple and green sulphur bacteria, the hydrogen donor is
(1) H_2S (2) H_2O
(3) H_2SO_4 (4) Sulphate

44. Match the following and choose the correct option below:

(i) Tuberosum	(a) Family
(ii) Solanales	(b) Kingdom
(iii) Solanaceae	(c) Order
(iv) Plantae	(d) Genus
(v) Solanum	(e) Species

(1) i–(e), ii–(c), iii–(a), iv–(b), v–(d)
(2) i–(c), ii–(e), iii–(b), iv–(a), v–(c)
(3) i–(d), ii–(e), iii–(b), iv–(a), v–(c)
(4) i–(e), ii–(c), iii–(b), iv–(a), v–(d)

45. The famous botanical garden of Kew is located in:
(1) India (2) England
(3) Germany (4) France

ZOOLOGY

46. Which of the following is mainly reabsorbed from Henle's loops?
(1) Potassium (2) Glucose
(3) Water and NaCl (4) Urea and NaCl

47. In the deficiency of ADH, the rate of micturition
(1) Decreases (2) Increases
(3) Remains the same (4) None of these

48. The neural mechanism of micturition is called
(1) Micturition reflex (2) Simple reflex
(3) Conditioned reflex (4) All of these

49. An adult human excretes how much urine per day?
(1) 1 – 1.5 litre (2) 1.5 – 2 litres
(3) 5 – 6 litres (4) 3 litres

50. Our lung removes how much CO_2 per minute from the body?
(1) 10 ml (2) 200 ml
(3) 400 ml (4) 2000 ml

51. What would be the heart rate of a person if cardiac output is 5L, blood volume in the ventricles at the end of diastole is 100 mL and at the end of ventricular systole is 50 mL?
(1) 75 beats per minute (2) 100 beats per minutes
(3) 125 beats per minute (4) 50 beats per minute

52. ECG depicts the depolarization and repolarization processes during the cardiac cycle. In the ECG of a normal healthy individual one of the following waves is not represented.
(1) Depolarization of atria
(2) Repolarization of atria
(3) Depolarization of ventricles
(4) Repolarization of ventricles

53. Match the columns.

Column-I		Column-II	
A.	Heart Failure	(I)	Heart muscle is suddently damaged by a inadequate blood supply.
B.	Cardiac arrest	(II)	Chest pain due to inadequate O_2 reaching the heart mucles.
C.	Heart attack	(III)	Atherosclerosis
D.	Coronary artery diasease	(IV)	Heart not pumping blood effectively enough to meet the needs of body (CAD)
E.	Angina pectoris	(V)	Heart stops beating

(1) A-IV, B-V, C-I, D-III, E-II
(2) A-IV, B-V, C-III, D-I, E-II
(3) A-IV, B-III, C-V, D-II, E-I
(4) A-V, B-IV, C-II, D-III, E-I

54. Select the incorrect statement from the following.
(1) Invertibrates posses very simple endocrine system.
(2) Anterior Pituitary is under control of huypothalmus by portal system
(3) Posterior pituitary is under direct neural regulation of hypothalamus.
(4) Hypothalamus secretes torphic hormones.

55. Select the correct statement from the following.
(A) Hypothalamus contains many nuclei which produces hormones.
(B) Posterior pituitary is under direct neural regulation of hypothalamus.
(C) Oxytocin and vasopressin are actually synthesized in hypothalamus and transported axonally to adenohypophysis.
(D) LH induces ovulation and destroys corpus luteum.
(1) A and B only
(2) A and D Only
(3) B and D Only
(4) C and D Only

56. Hormones are called chemical signals that stimulate specific target tissues. Their specificity is due to the presence of signal receiving 'receptors' only in the respective target tissue. Where are these receptros present in case of hormones of protein nature.
(1) Extracellular matrix (2) Blood
(3) Plasma membrane (4) Nucleus

57. Thymosin is responsible for
(1) Raising the blood sugar level
(2) Raising blood calcium level
(3) Differentiation of T-lymphocyte
(4) Decrease in blood RBC

58. The excretory organs in prawns are
(1) Malpighian tubules
(2) Nephridia
(3) Kidneys
(4) Green glands or antennal gland

59. The correct dimensions of human kidney are

	Length	Width	Thickness	Weight
(1)	10-12 cm	5-7 cm	2-3 cm	120-170 gm
(2)	10-12 cm	2-3 cm	5-7 cm	120-140 gm
(3)	12-14 cm	5-7 cm	2-3 cm	120-140 gm
(4)	12-14 cm	2-3 cm	2-3 cm	120-170 gm

60. The cells named podocytes occur in the wall of
(1) Neck region of nephrons
(2) Glomerular capillaries
(3) Outer wall of Bowman's capsules
(4) Inner wall of Bowman's capsules