# SAMPLE PAPER - 98

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

PHYSICS

01. Two wires of copper have lengths in the ratio 1: 2 and radii in the ratio 2 : 1. Their Young's moduli are in the ratio :
(1) 1 : 1   (2) 1 : 8   (3) 8 : 1   (4) 1 : 4

02. Two capacitors C_1 and C_2 are charged to 120 V and 200 V respectively. When they are connected in parallel it is found that the potential on each one of them is zero. Therefore
(1) $5\,C_1 = 3\,C_2$ (2) $3\,C_1 = 5\,C_2$
(3) $3\,C_1 = 5\,C_2 = 0$ (4) $9\,C_1 = 4\,C_2$

03. Two capacitors C and 3C are connected as shown in the circuit terminals a and b of the key k are connected to charge capacitor C using battery of emf V volt. Now disconnecting a and b the terminals b and c are connected. Due to this, what will be the percentage loss of energy?
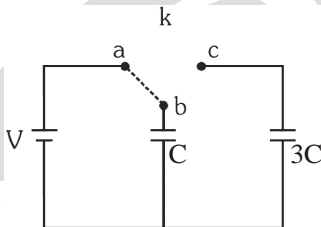
(1) 75%   (2) 0%   (3) 50%   (4) 25%

04. A uniform metal rod of 2 mm² cross-section is heated from 0⁰C to 20⁰C. The coefficient of the linear expansion of the rod is $12 \times 10^{-6}/^0C$. Its Young's modulus of elasticity is 10^{11} N/m². The energy stored per unit volume of the rod is:
(1) 1440 J/m³   (2) 15760 J/m³
(3) 1500 J/m³   (4) 2880 J/m³

05. The height at which the weight of a body becomes 1/4th, of its weight on the surface of earth (radius R), is
(1) R   (2) 2 R
(3) 3 R   (4) 4 R.

06. Which one of the following plots represents the variation of gravitational field on a particle with distance r due to a solid sphere of radius R ? (r is measured from the centre of the sphere.

(1)

(2)

(3)

(4)
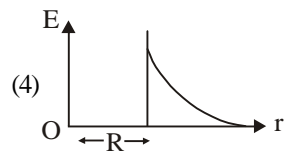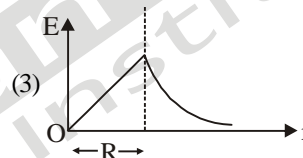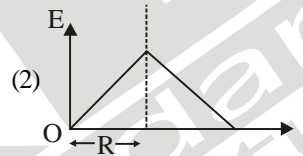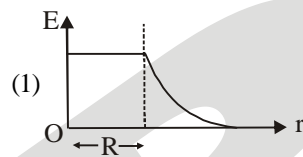
07. A body of mass m is placed on earth surface. It is then taken from earth's surface to a height h = 2R, then the change in gravitational potential energy is:
(1) $\dfrac{mgh}{R}$ (2) $\dfrac{2}{3}mgR$
(3) $\dfrac{3}{4}mgR$ (4) $\dfrac{mgR}{2}$

08. A body weighs 1400 gram weight on the surface of earth. How much will it weigh on the surface of a planet whose mass is $\dfrac{2}{7}$ and radius is $\dfrac{1}{3}$ that of the earth ?
(1) 450 gram   (2) 900 gram
(3) 1800 gram   (4) 3600 gram

09. The gravitational potential at the centre of a square of side a, when four point masses m each are kept at its vertices will be

(1) $4\sqrt{2}\dfrac{Gm}{a}$ (2) $-4\sqrt{2}\dfrac{Gm}{a}$

(3) $2\sqrt{2}\dfrac{Gm}{a}$ (4) $-2\sqrt{2}\dfrac{Gm}{a}$

10. If compressibility of a material is 4×10^{-5} per atm, pressure is 100 atm and volume is 100 cm³, then find the value of ΔV
(1) 0.4 cm³ (2) 0.8 cm³
(3) 0.6 cm³ (4) 0.2 cm³

11. The Young's modulus of brass and steel are respectively 1.0×10^{11} Nm^{-2} and 2.0×10^{11} Nm^{-2}. A brass wire and a steel wire of the same length are extended by 1 mm each under the same force. If radii of brass and steel wires are R_B and R_S respectively, then

(1) $R_S = \sqrt{2}\, R_B$ (2) $R_S = \dfrac{R_B}{\sqrt{2}}$

(3) $R_S = 4R_B$ (4) $R_S = \dfrac{R_B}{2}$

12. When a weight of 10 kg is suspended from a copper wire of length 3 m and diameter 0.4 mm, its length increases by 2.4 cm. If the diameter of the wire is doubled, then the extension in its length will be
(1) 7.6 cm (2) 4.8 cm
(3) 1.2 cm (4) 0.6 cm

13. A stress of 3.18×10^8 Nm^{-2} is applied to a steel rod of length 1 m along its length, its Young's modulus is 2×10^{11} Nm^{-2}. Then, the elongation produced in the rod (in mm) is
(1) 3.18 (2) 6.36
(3) 5.18 (4) 1.59

14. A train 200 m long crosses a bridge 300 m long. It enters the bridge with velocity 30 ms^{-1} and leaves it with velocity 50 ms^{-1}. What is the time taken to cross the bridge ?
(1) 2.5 s (2) 7.5 s
(3) 12.5 s (4) 15.0 s

15. A lift is coming from 8th floor and is just about to stop at 4th floor. Taking ground floor as origin and take positive direction upwards for all quantities, which one of the following is correct?
(1) $x < 0, v < 0, a > 0$
(2) $x > 0, v < 0, a < 0$
(3) $x > 0, v < 0, a > 0$
(4) $x > 0, v > 0, a < 0$

CHEMISTRY

16. Which has the highest f.p. at 1 atm?
(1) 0.1 M NaCl solution
(2) 0.1 M BaCl₂ solution
(3) 0.1 M sugar solution
(4) 0.1 M FeCl₃ solution

17. An aqueous solution contains 5% and 10% of urea and glucose respectively. (by wt.). If K_f for water is 1.86, the f.p. of the solution is
(1) 3.03 K (2) 3.03°C
(3) –3.03°C (4) –3.03 K

18. For the equilibrium A + B $\rightleftharpoons$ C + D, equilibrium constant may be equal to

(1) $\dfrac{[C].[A]}{[D].[B]}$ (2) $\dfrac{[A].[B]}{[C].[D]}$

(3) $\dfrac{[C]+[D]}{[A]+[B]}$ (4) all wrong

19. Which of the following is correct ?
(1) K_p will always have some unit
(2) K_c will always have some unit
(3) K_x will never have any unit
(4) When $\Delta n = 0$, $K_p = K_c = K_x$ then all the three Ks have the same unit

20. The oxidation of SO_2 by O_2 to SO_3 is an exothermic reaction. The yield of SO_3 will be maximum if
(1) temperature is increased and pressure is kept constant
(2) temperature is reduced and pressure is increased
(3) both temperature and pressure are increased
(4) both temperature and pressure are reduced

21. When $NaNO_3$ is heated is a closed vessel, O_2 is liberated and $NaNO_2$ is left behind. At equilibrium
(1) addition of $NaNO_2$ favours reverse reaction
(2) addition of $NaNO_2$ favours forward reaction
(3) Increasing temperature favours forward reaction
(4) increasing pressure favours forward reaction

22. Each of the mixture listed below was placed in a closed container and allowed to stand. Which of the following mixtures is not capable of attaining the equilibrium: $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$?
(1) Pure $CaCO_3$
(2) CaO and a pressure of CO_2 greater than K_p
(3) Some $CaCO_3$ and a pressure of CO_2 greater than K_p
(4) $CaCO_3$ and CaO

23. What is the minimum mass of $CaCO_3$, below which it decomposes completely, required to establish equilibrium in a 6.50-litre container for the reaction:
$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$?
$[K_c = 0.05 \text{ mole/litre}]$
(1) 32.5 g (2) 24.6 g
(3) 40.9 g (4) 8.0 g

24. In a gaseous reaction of the type $aA + bB \longrightarrow cC + dD$, which is wrong?
(1) a litre of A combines with b litre of B at same P & T to give C and D
(2) a mole of A combines with b mole of B to give C and D
(3) a g of A combines with b g of B to give C and D
(4) a molecules of A combines with b molecules of B to give C and D

25. In the synthesis of ammonia
$N_2(g) + 3H_2 \rightleftharpoons 2NH_3(g)$
If the quantity of N_2 reacted is 700 mL, the quantity of H_2 and NH_3 would be
(1) 300 mL H_2 and 200 mL NH_3
(2) 300 mL H_2 and 300 mL NH_3
(3) 300 mL H_2 and 100 mL NH_3
(4) 100 mL H_2 and 200 mL NH_3

26. The maximum oxidation state of an element of p-block can be:
(1) 8 (2) equal to e^- in V.S.
(3) $8-e^-$ in V.S. (4) group number

27. Which is the following is correct for NO_3^- and PO_4^{3-}?
(1) Both use p-orbital of central atom to form π-bond
(2) Both use d-orbital of central atom to form π-bond
(3) In NO_3^-, N-atom uses p-orbital to form π-bond while in PO_4^{3-}, P-atom uses d-orbital to form π-bond
(4) In NO_3^-, N-atom uses d-orbital to form π-bond while in PO_4^{3-}, P-atom uses p-orbital to form π-bond

28. Hex-1-ene reacts with HBr in the absence of peroxide to give 'A' and in the presence of peroxide to give 'B'. What are 'A' and 'B'?
(1) A–1-Bromohexane; B–2-Bromohexane
(2) A–2-Bromohexane; B–1-Bromohexane
(3) A–1-Bromohexane; B–1-Bromohexane
(4) A–2-Bromohexane; B–2-Bromohexane

29. Which of the following is the most stable shape?
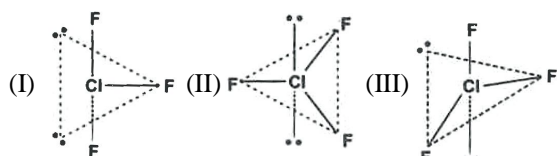
(1) I (2) II
(3) III (4) All equal

30. 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 Ne_2 both

BOTANY

31. Zinc is essential for
(1) Stomatal closing
(2) Stomatal opening
(3) Biosynthesis of IAA
(4) Oxidation of carbohydrates

32. Which one is not a micronutrient
(1) Mo (2) B (3) K (4) Zn

33. Nitrogen fixing symbiotic bacteria present in a legume root is
(1) Azotobacter (2) Rhizobium
(3) Nitrobacter (4) Nitrosomonas

34. Inorganic nutrients are present in the soil as
(1) Molecules
(2) Atoms
(3) Electrically charged ions
(4) Colloids

35. Energy contained in plant carbohydrates comes from
(1) Minerals (2) CO_2
(3) Proteins (4) Sunlight

36. If plants stop photosynthesis which gas will disappear
(1) CO_2 (2) N_2 (3) O_2 (4) NH_3

37. Energy required for ATP synthesis in PSII comes from
(1) Proton gradient
(2) Electron gradient
(3) Reduction of glucose
(4) Oxidation of glucose

38. Kreb's cycle starts with the formation of six carbon compound by reaction between
(1) Malic acid and acetyl CoA
(2) Succinic acid and pyruvic acid
(3) Fumaric acid and pyruvic acid
(4) Oxalo-acetic acid and acetyl CoA

39. The net gain of energy from one gram mole of glucose during aerobic respiration is
(1) 2 ATP (2) 4 ATP (3) 38 ATP (4) 40 ATP

40. 1 molecule of NADH gives rise to ——— molecules of ATP, while 1 molecule of $FADH_2$ gives ——— molecule of ATP
(1) 3, 2 (2) 2, 3 (3) 2, 2 (4) 3, 3

41. What indicated A – F in the given figure?

Pyruvate (3C)

Citric acid cycle
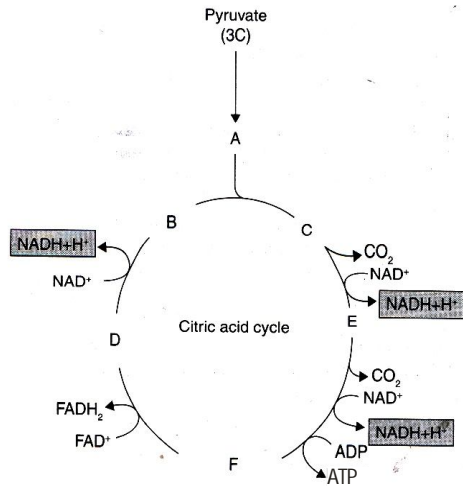
(1) A–Oxaloacetic acid (4C), B–Malic acid (4C), C–Succinic acid (4C), D–Acetyl coenzyme A (2C), E–Citric acid (6C), F–α–ketoglutaric acid

(2) A–α–ketoglutaric acid, B–Citric acid (6C), C:Oxaloacetic acid (4C), D–Succinic acid (4C), E–Acetyl coenzyme A (2C), F–Malic acid (4C)

(3) A–Acetyl coenzyme A (2C), B–Oxaloacetic acid (4C), C–Citric acid (6C), D–Malic acid (4C), E–α–ketoglutaric acid, F–Succinic acid (4C)

(4) A–Succinic acid (4C), B–Acetyl coenzyme A (2C), C–Malic acid, D–α–ketoglutaric acid, E–Citric acid (6C), F–Oxaloacetic acid (4C)

42. What is the correct order of the stages during aerobic respiration?
(1) Kreb's cycle — Electron transport chain — Glycolysis
(2) Electron transport chain — Krebs' cycle — Glycolysis
(3) Glycolysis — Krebs' cycle — Electron transport chain
(4) Glycolysis — Electron transport chain — Krebs' cycle

43. The enzyme responsible for oxidative decarboxylation of pyruvate to acetyl Co–A is
(1) Hexokinase
(2) Succinic dehydrogenase
(3) Pyruvate dehydrogenase
(4) RuBP carboxylase / oxygenase

44. The period from birth to the natural death of an organism represents its:
(1) Juvenile phase   (2) Life span
(3) Vegetative phase   (4) None of these

45. In Protists and Monerans, mode of reproduction is:
(1) Binary fission   (2) Fragmentation
(3) Buds   (4) Zoospores

ZOOLOGY

46. MSH is secreted by:
(1) Pars intermedia
(2) Pars tuberalis
(3) Pars distalis
(4) Pars nervosa

47. Alcohol inhibits the secretion of:
(1) ADH
(2) Insulin
(3) Oxytocin
(4) Progesterone

48. A woman started developing male characters. It may be due to:
(1) Damage to posterior pituitary
(2) Damage to mammary glands
(3) Over production of estrogens
(4) Over production of adrenal androgens

49. Thymus in mammals is mainly concerned with:
(1) Regulation of body growth
(2) Secretion of thyrotropin
(3) Regulation of body temperature
(4) Immunological functions

50. If ovaries of a lady are removed in fourth month of pregnancy, the result will be:
(1) Embryo will develop normally till birth
(2) Abortion will occur after sometime
(3) Development of embryo becomes abnormal
(4) None of the above

51. Hormone that causes the milk ejection from the breast when the baby begins to suckle is called:
(1) Prolactin
(2) Oxytocin
(3) Progesterone
(4) Estrogen

52. The hypofunction of β-cells of Islets of Langerhans results in :
(1) hypoglycaemia and glycosuria
(2) hyperglycaemia and glycosuria
(3) hyper insulinisms and uraemia
(4) hyperglycaemia and diabetes mellitus

53. Down syndrome is due to:
(1) chromosome number increase in 18th pair of autosomes
(2) chromosome number increase in 21st pair of autosomes
(3) chromosome number decrease in 21st pair of autosomes
(4) chromosome number decrease in 18th pair of autosomes

54. Any change in sex chromosome constitution is not involved in:
(1) Supermale
(2) Superfemale
(3) Turner syndrome
(4) Down syndrome

55. `Webbed neck' is a characteristic ot:
    (1) XO   (2) XXX   (3) XY   (4) XXY

56. In case of haemophilia, if the carrier daughter (Hh) marries a normal man 'H', then among their daughters:
    (1) 50% will be normal and 50% carrier.
    (2) 50% will be normal and 50% haemophilic
    (3) 50% will be carrier and 50% haemophilic
    (4) 25% will be carrier and 75% haemophilic

57. In sickle-cell anaemia, which of the following amino acids is substituted?
    (1) Glutamic acid by valine in β chain
    (2) Valine by glutamic acid in β chain
    (3) Glutamic acid by valine in α chain
    (4) Valine by glutamic acid in α chain

58. Which of the following enzyme is known as molecular scissors?
    (1) Ligase   (2) DNA polymerase
    (3) Restriction enzyme (4) Helicase

59. When does first recombinant DNA was developed?
    (1) 1962   (2) 1972   (3) 1982   (4) 1992

60. The procedure through which a piece of DNA is introduced in a host bacterium is called
    (1) Cloning   (2) Transformation
    (3) PCR   (4) Clonal selection