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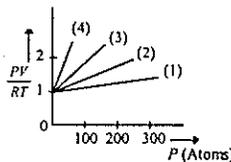e Medical Prep

Model Test Paper-6

Time : $3\frac{1}{2}$ hours.

Maximum Marks : 200

PHYSICS

1. The temperature of the sink of a Carnot engine is 27°C. If the efficiency of the engine is 25%, the temperature of the source is
   (a) 227°C
   (b) 327°C
   (c) 127°C
   (d) 27°C.

2. Which is not a thermodynamical function?
   (a) enthalpy
   (b) workdone
   (c) Gibb's energy
   (d) internal energy.

3. Stream at 100°C is passing into 1.1 kg of water contained in a calorimeter of water equivalent to 0.02 kg at 15°C till the temperature of the calorimeter and its contents rises to 80°C. The mass of the steam condensed in kg is
   (a) 0.130
   (b) 0.065
   (c) 0.260
   (d) 0.135.

4. Melting point of ice
   (a) increases with increasing pressure
   (b) decreases with increasing pressure
   (c) is independent of pressure
   (d) is proportional to pressure.

5. A fixed amount of nitrogen gas (1 mole) is taken and is subjected to pressure and temperature variation. The experiment is performed at high pressure as well as high temperatures. The results obtained are shown in the fig. The correct variation of PV/RT with P will be exhibited by
   (a) curve (4)
   (b) curve (3)
   (c) curve (2)
   (d) curve (1).
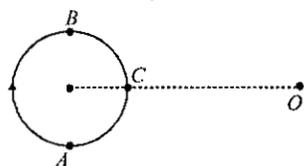
6. An aluminium rod, Young's Modulus is 7.0 ×10⁹ N/m² has a breaking strain of 0.21. The minimum cross sectional area of the rod in m² in order to support a load of 10⁴ N is
   (a) 1 × 10⁻²
   (b) 1 × 10⁻³
   (c) 1.4 × 10⁻²
   (d) 7.1 × 10⁻⁴.

7. In order that a floating object be in a stable equilibrium, its centre of buoyancy should be
   (a) vertically above its centre of gravity
   (b) vertically below its centre of gravity
   (c) horizontally in lines with its centre of gravity
   (d) may be anywhere.

8. A crown made of gold and copper weighs 210 gm in air and 198 gm in water. The weight of gold in crown is
   (a) 93 gm
   (b) 100 gm
   (c) 150 gm
   (d) 193 gm.
   Density of gold = 19.3 gm/cm³ and
   Density of copper = 8.5 gm/cm³.

9. When a 20 gm mass hangs attached to one end of a light spring of length 10 cm, the spring stretches by 2 cm. The mass is pulled down until the total length of the spring is 14 cm. The elastic energy J, stored in the spring is
   (a) 2 × 10⁻³
   (b) 4 × 10⁻²
   (c) 4 × 10⁻³
   (d) 8 × 10⁻³.

10. A spring having a spring constant K is loaded with a mass m. The spring is cut into two equal parts and one of these is loaded again with the same mass. The new spring constant is
    (a) $K/2$
    (b) K
    (c) $2K$
    (d) K^2.

11. A cord is used to lower vertically a block of mass M at a distance d at a constant downward acceleration of $g/4$. Then the work done by the cord on the block is

(a) $\dfrac{Mgd}{4}$ (b) $\dfrac{-Mgd}{4}$

(c) $\dfrac{3Mgd}{4}$ (d) $\dfrac{-3Mgd}{4}$.

12. A rifle bullet loses $(1/20)^{th}$ of its speed in passing through a plank. The least number of such planks required to stop the bullet is
    (a) 5   (b) 10
    (c) 11   (d) 20.

13. Two spheres of masses M and $2M$ are initially at rest at a distance R apart. Due to mutual force of attraction they approach each other. When they are at separation $R/2$, the acceleration of their centre of mass would be
    (a) 0   (b) $1\ g$ m/s²
    (c) $3\ g$ m/s²   (d) $12\ g$ m/s².

14. Two masses m and M are connected by a light string that passes through a smooth hole O at the centre of a table. Mass m lies on the table and M hangs vetically. m is moved round in a horizontal circle with O as the centre. If l is the length of the string from O to m then the frequency with which m should revolve so that M remains stationary is

    (a) $\dfrac{1}{2\pi}\sqrt{\dfrac{Mg}{ml}}$ (b) $\dfrac{1}{\pi}\sqrt{\dfrac{Mg}{ml}}$

    (c) $\dfrac{1}{2\pi}\sqrt{\dfrac{ml}{Mg}}$ (d) $\dfrac{1}{\pi}\sqrt{\dfrac{ml}{Mg}}$.

15. A car is moving in a circular track of radius r with a constant speed v. A plumb bob is suspended from the roof of the car by a light spring of length l. The angle made by the string with the vertical is

    (a) $\tan^{-1}\left(\dfrac{v^2}{rg}\right)$ (b) $\tan^{-1}\left(\dfrac{v^2}{lg}\right)$

    (c) $\tan^{-1}\left(\dfrac{rg}{v^2}\right)$ (d) $\tan^{-1}\left(\dfrac{lg}{v^2}\right)$.

16. A cord is wound round the circumference of a wheel of radius r. The axis of the wheel is horizontal and its moment of inertia about this axis is I. A weight mg is attached to the end of the cord and

is allowed to fall from rest. The angular velocity of the wheel, when the weight has fallen through a distance h, is

(a) $\left[\dfrac{2gh}{I+mr}\right]^{1/2}$ (b) $\left[\dfrac{2mgh}{I+mr^2}\right]^{1/2}$

(c) $\left[\dfrac{2mgh}{I+2mr^2}\right]^{1/2}$ (d) $(2gh)^{1/2}$.

17. At what depth below the surface of the earth is the value of g same as that of a height of 5 km?
    (a) 10 km   (b) 7.5 km
    (c) 5 km   (d) 2.5 km.

18. The mass of moon is 1/81 of earth's mass and its radius is 1/4 of that of earth. If the escape velocity from the earth's surface is 11.2 km/s, its value for the moon is
    (a) 0.14 km/s   (b) 0.5 km/s
    (c) 2.5 km/s   (d) 5.0 km/s.

19. For a planet moving around the sun in an elliptical orbit of semi-major and semi-minor axes a and b, respectively, and period T,
    (a) the torque acting on the planet around the sun is non-zero
    (b) the angular momentum of the planet around the sun is constant
    (c) the areal velocity is $\dfrac{\pi ab}{T}$
    (d) the planet moves with a constant speed around the sun.

20. A simple pendulum has a time period T. The pendulum is completely immersed in a non-viscous liquid whose density is $1/10^{th}$ of that of the material of the bob. The time period of the pendulum immersed in the liquid is

    (a) T (b) $\sqrt{\dfrac{9}{10}}\,T$

    (c) $\sqrt{\dfrac{10}{9}}\,T$ (d) $\dfrac{T}{10}$.

21. What is the common base current amplification factor (α) of a transistor, if the common emitter current amplification factor (β) is 200?
    (a) 0.895   (b) 0.995
    (c) 0.855   (d) 0.915.

22. What isotope will be produced from $_{90}Th^{232}$ after 3α decays and two β decays?
(a) $_{88}Ra^{218}$ (b) $_{86}Rn^{218}$
(c) $_{88}Ra^{220}$ (d) $_{86}Rn^{220}$.

23. A transformer has a turns ratio of 100. The secondary supplies 16 W of power to a load. Assuming 80% efficiency, find the current in the primary if the input to the primary is 200 V A.C.
(a) 0.3 A   (b) 0.2 A
(c) 0.05 A   (d) 0.1 A.

24. The load resistance of a single transistor amplifier is 2000 Ω. If the transistor constant $\beta = 100$, what change in base current will produce a change in p.d. of 2 V across the load resistor?
(a) 1 μA   (b) 20 μA
(c) 10 μA   (d) 15 μA.

25. A convex lens of focal length 10 cm is made of glass of refractive index 1.5. It is immersed in a liquid of refractive index 1.3. What is the new focal length of the lens?
(a) 30.5 cm   (b) 32.5 cm
(c) 27.5 cm   (d) 33.5 cm.

26. A small source of sound moves along a circle as shown in the figure. The frequencies heard by a stationary listener at O when the source is at A, B and C are v_1, v_2, and v_3 respectively. It follows that
(a) $v_1 > v_3 > v_2$ (b) $v_2 > v_3 > v_1$
(c) $v_1 > v_2 > v_3$ (d) $v_3 > v_2 > v_1$.

27. If more air is pushed into a soap bubble, the pressure in it
(a) remains the same
(b) becomes zero
(c) increases   (d) decreases.

28. A particle falls through a vertical distance of 10 m on a fixed smooth plane making an angle α with the horizontal, If its impact with the plane is perfectly elastic, the time interval in seconds between the first and second impacts on the plane is
(a) $\dfrac{20}{7} \sin\alpha$ (b) $\dfrac{20}{7} \tan\alpha$
(c) $\dfrac{20}{7} \cos\alpha$ (d) $\dfrac{20}{7}$.

29. A small object is projected up along the surface of a rough inclined plane of angle 45°. The object takes η times to descend than to ascend. The coefficient of kinetic friction between the object and plane is
(a) $\left(\dfrac{\eta-1}{\eta+1}\right)^2$ (b) $\dfrac{\eta-1}{2\eta^2+1}$
(c) $\dfrac{\eta-1}{\eta^2+1}$ (d) $\dfrac{2\eta-1}{\eta^2+1}$.

30. A balloon of mass m descends with a constant acceleration a. To acquire an upward acceleration of the same magnitude, it should reject a mass of
(a) $\dfrac{m(a+g)}{2g}$ (b) $\dfrac{2ma}{a+g}$
(c) $\dfrac{1}{2}\left(\dfrac{ma}{a+g}\right)$ (d) $\dfrac{2m}{g}(a+g)$.

31. A ball falls freely under gravity. The distances covered in the first, second and third second of motion are in the ratio
(a) 1 : 2 : 3   (b) 1 : 4 : 9
(c) 1 : 4 : 6   (d) 1 : 3 : 5.

32. A uniform iron chain lies on a horizontal surface. The maximum fraction of the length of the chain that can hang over the edge of the horizontal surface is ......
Given: coefficient of static friction = 0.25.
(a) 10%   (b) 15%
(c) 20%   (d) 25%.

33. An athlete completes one round of a circular track of radius R in 40 second. The displacement at the end of 2 minute 20 second is
(a) 0   (b) 2R
(c) $2\pi R$ (d) $7\pi R$.

34. If $|\vec{v}_1 + \vec{v}_2| = |\vec{v}_1 - \vec{v}_2|$ and $\vec{v}_2$ is finite then
(a) $\vec{v}_1$ is parallel to $\vec{v}_2$ (b) $\vec{v}_1 = \vec{v}_2$

(c) $|\vec{v}_1| = |\vec{v}_2|$

(d) $\vec{v}_1$ and $\vec{v}_2$ are mutually perpendicular.

35. A car is moving along a straight horizontal road with a speed of 72 km h^{-1}. If the coefficient of static friction between the tyres and the road is 0.5, the shortest distance in which the car be stopped is ......
Given : $g = 10$ m s^{-2}.

(a) 30 m   (b) 40 m

(c) 72 m   (d) 20 m.

36. To shake off water from a wet cloth, it is common to give it a sudden jerk. In so doing, we are taking advantage of

(a) Newton's first law of motion

(b) Newton's second law of motion

(c) Newton's third law of motion

(d) impulse.

37. A lens of power +2 D and a lens of power –1 D are kept in contact. The combination behaves as:

(a) a lens of power +3 D

(b) a lens of power –3 D

(c) a lens of power +1 D

(d) a lens of power –1 D.

38. Two lenses of power +2 D and –5 D are kept in contact. The focal length of the combination is:

(a) –1/3 m   (b) 1/3 m

(c) 3 m   (d) –3 m.

39. Two spheres of equal masses but radii R and $2R$ are allowed to fall in a liquid. The ratio of their terminal velocities is:

(a) 1 : 4   (b) 1 : 2

(c) 2 : 1   (d) 1 : 16.

40. The displacement of a body is proportional to the cube of time elapsed. The magnitude of acceleration of the body is:

(a) increasing with time

(b) decreasing with time

(c) constant, but not zero

(d) zero.

Instructions for Q. No. 41 to 60
Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to

the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion

(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion

(c) If the assertion is true, but the reason is false

(d) If both assertion and reason are falses

41. *Assertion (A) :* The internal resistance of a cell depends on the concentration of the electrolyte used in the cell.
Reason (R) : dilution increases the ionisation of the electrolyte.

42. *Assertion (A) :* For a given mass of an ideal gas, the product of the pressure and volume is constant, at constant temperature.
Reason (R) : The root-mean square speed of the molecules is inversely proportional to the square root of their mass.

43. *Assertion (A) :* The ratio of C_p/C_v for a diatomic gas is more than that for a monoatomic gas.
Reason (R) : The molecules of a monoatomic gas have more degrees of freedom than those of a diatomic gas.

44. *Assertion (A) :* Newton's corpuscular theory of light could not explain refraction of light.
Reason (R) : It predicted that light should travel faster in denser media than in rarer media.

45. *Assertion (A) :* When temperature of a semi-conductor is increased, then its resistance decreases.
Reason (R) : The energy gap between conduction band and valence band is very small.

46. *Assertion (A) :* Electric appliances with metallic body have three connections, whereas an electric bulb has a two pin connection.
Reason (R) : Three pin connections reduce heating of connecting wires.

47. *Assertion (A) :* Environmental damage has increased the amount of ozone in the atmosphere.
Reason (R) : Increase of ozone increases the amount of ultraviolet radiation on earth.

48. *Assertion (A)* : The ratio of $\dfrac{C_p}{C_v}$ is more for helium than for hydrogen gas.
    Reason (R) : Atomic mass of helium is more than that of hydrogen.

49. *Assertion (A)* : Machine parts are jammed in winter.
    Reason (R) : The viscosity of lubricant used in machine parts increases at low temperatures.

50. *Assertion (A)* : The phenomenon of pair production is not possible unless the energy of gamma ray photon is equal to or greater than 1.20 MeV.
    Reason (R) : The rest mass of an electron is 0.51 MeV.

51. *Assertion (A)* : A dip needle becomes vertical at magnetic equator of the earth.
    Reason (R) : The magnetic field due to the earth at the magnetic equator is vertical.

52. *Assertion (A)* : When two electrons are brought close to each other, the electrical potential energy increases.
    Reason (R) : Work must be done against electrical force of repulsion.

53. *Assertion (A)* : If Young's double slit experiment is performed in water, the fringe width will decrease.
    Reason (R) : Wavelength of light in water is smaller than in air.

54. *Assertion (A)* : Interference pattern is obtained on a screen due to two identical coherent sources of monochromatic light. The intensity at the central part of the screen becomes one half if one of the sources is blocked.
    Reason (R) : The resultant intensity is the sum of the intensities due to two sources; if one is blocked the intensity obviously reduces to one-half.

55. *Assertion (A)* : If hydrogen and oxygen molecules have the same *rms* speeds, they must be at the same temperature.
    Reason (R) : The *rms* speed of a given gas is directly proportional to the square root of its absolute temperature.

56. *Assertion (A)* : Insulators do not allow flow of current through them.
    Reason (R) : They have no free charge carriers

57. *Assertion (A)* : The shape of an automobile is so designed that its front resembles the streamline pattern of the fluid through which it moves.
    Reason (R) : The resistance offered by the fluid is maximum.

58. *Assertion (A)* : Two satellites of mass m_1 and m_2 ($m_1 > m_2$) are going around the earth in orbits of radii r_1 and r_2 ($r_1 > r_2$).
    Reason (R) : They will have same velocity.

59. *Assertion (A)* : It is not possible for a system, unaided by an external agency to transfer heat from a body at a lower temperature to another at a higher temperature.
    Reason (R) : It is not possible to avoid the second law of thermodynamics.

60. *Assertion (A)* : In the process of nuclear fission the fragments emit two or three neutrons as soon as they are formed and subsequently particles.
    Reason (R) : As the fragments contain an excess of neutrons over proton ratio to stable values.

CHEMISTRY

61. Energy of a electron in H-atom is given by: $E = -13.6/n^2$. Which one of the following statements is true when n is changed from 1 to 4? Energy will:
    (a) decrease 4 times   (b) increase 16 times
    (c) increase 4 times   (d) decrease 16 times

62. Of the following a copolymer is:
    (a) neoprene   (b) nylon
    (c) PVC   (d) natural rubber

63. Silver acetate when refluxed with Br_2 in CCl_4 gives:
    (a) CH_3Br (b) CH_3COBr
    (c) C_2H_5Br (d) $BrCH_2COOH$

64. The *pH* of 0.1 M methyl amine
    $(K_b = 5.0 \times 10^{-4})$ is
    (a) 10.38   (b) 9.83
    (c) 13.83   (d) 11.83

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65. Addition of HOCl to allyl alcohol gives:
    (a) 2-chloropropane 1, 3-diol
    (b) 2, 3-dichloropane
    (c) 3-chloropropane-1, 2-diol
    (d) 1, 2, 3-trichloropropane

66. 0.2 g of organic compound on Kjehldahl's analysis gave enough NH_3 to just neutralise 20 cm^3 of 0.1N H_2SO_4. The percentage of nitrogen should be:
    (a) 14   (b) 42
    (c) 28   (d) 4.2

67. A hydrocarbon with molecular formula C_8H_{18} gives only one monochloro derivative. It should be:
    (a) n-octane
    (b) 2, 2, 4-tri methyl pentane
    (c) 2-methyl heptane
    (d) 2, 2, 3, 3 tetramethyl butane

68. To make a solution of pH 12, the amount of NaOH dissolved in 250 ml of solution should be:
    (a) 0.1   (b) 0.3
    (c) 0.2   (d) 0.25 g

69. Which of the following is a steroid-hormone?
    (a) insulin
    (b) adrenaline
    (c) testosterone
    (d) oxytocin

70. Treatment of propionaldehyde with dilute NaOH causes an aldol condensation to give:
    (a) $CH_3CH_2COOCH_2CH_2CH_3$
    (b) $CH_3CH_2CH(OH)CH_2CH_2CHO$
    (c) $CH_3CH_2CHOHCH(CH_3)CHO$
    (d) $CH_3CH_2COOH(CH_3)CHO$

71. If F represents 1 faraday & N represents avogadro's number then the charge on the electron will be:
    (a) F/N (b) $F \cdot N$
    (c) N/F (d) F

72. Natural rubber is a polymer of:
    (a) 1, 3 butadiene
    (b) 1, 2-butadiene
    (c) 2-methyl-1, 3 butadiene
    (d) 2-chloro-1, 3 butadiens

73. The magnetic moment (in Bm) of a transition metal ion containing three unpaired electron is:
    (a) 1.73   (b) 2.45
    (c) 3.87   (d) 3.46

74. Which of the following complexes has maximum molar conductivity in the solution:
    (a) $CrCl_3 6NH_3$ (b) $CrCl_3 4NH_3$
    (c) $CrCl_3 5NH_3$ (d) $CrCl_3 3NH_3$

75. Glyptal is polymer of:
    (a) ethylene glycol and phthalic acid
    (b) phenol and formaldehyde
    (c) ethylene glycol and terephthalic acid
    (d) melamine and formaldehyde

76. The raw material used for making nylon-6 is:
    (a) glycol and phthalic acid
    (b) adipic acid and hexamethylene diamine
    (c) chloroprene
    (d) caprolactum

77. Stephen's reaction is reduction of:
    (a) alkyl cyanide with LiAlH$_4$
    (b) alkyl isocyanide with Na and C_2H_5OH
    (c) alkyl cyanide with $SnCl_2$ and HCl
    (d) acylhalide in the presence of $Pd/BaSO_4$

78. Which one of the following legand cannot form chelate?
    (a) EDTA   (b) 2, 2′, 2″-tripyridine
    (c) etheylene diamine   (d) pyridine

79. Hydrolysis of an easter gives acid A and alcohol B. The acid A reduces Fehling's solution. Oxidation of alcohol B gives acid A. The ester is:
    (a) methyl formate   (b) methyl acetate
    (c) ethyl formate   (d) ethyl acetate

80. In the laboratory by dehydration of ethyl alcohol ethylene was obtained with 50% yield. The ethylene so obtained reacted with bromine to give ethylene dibromide with 80% yield. If the amount of ethyl alcohol was 0.5 mol then ethylene dibromide produced would be:
    (a) 0.1 mol   (b) 4.0 mol
    (c) 0.2 mol   (d) 0.8 mol

81. Lewisite, a poisonous gas used in world war-II, is formed by the action of $AsCl_3$ with:
    (a) $CH \equiv CH$
    (b) $CH_3 - CH_3$
    (c) $CH_2 == CH_2$
    (d) C_6H_6

82. Cassiterite is an ore of:
    (a) tin
    (b) lead
    (c) mercury
    (d) iron

83. German silver is an alloy of:
    (a) Cu & Zn
    (b) Ag & Ni
    (c) Au. Cu & Zn
    (d) Cu. Zn & Ni

84. For neutralising 0.183 gms of a monobasic acid dissolved in water, 15 ml of N/10 NaOH were required. The molecular mass of acid is:
    (a) 63
    (b) 122
    (c) 90
    (d) 140

85. Anti-Markownikoff's rule involves the formation of an intermediate
    (a) carbocations
    (b) free radicals
    (c) carbanions
    (d) carbenes

86. The rate of a particular reaction quadruples, when the temperature changes from 293 K to 313 K. The activation energy for such reaction would be:
    (a) 50.855 KJ mol^{-1}
    (b) 54.855 KJ mol^-
    (c) 52.855 KJ mol^{-1}
    (d) 56.855 KJ mol^{-1}

87. The solubility product of silver carbonate be ksp, its solubility is:
    (a) $3\sqrt{\dfrac{k_{sp}}{8}}$
    (b) $3\sqrt{\dfrac{k_{sp}}{4}}$
    (c) $3\sqrt{k_{sp}}$
    (d) $3\sqrt{\dfrac{k_{sp}}{2}}$

88. Two moles of NH_3 gas are introduced into a previously evacuated one litre vessel in which it partially dissociates at high temperature as $2NH_{3\,(g)} \rightleftharpoons N_{2\,(g)} + 3H_{2\,(g)}$. At equilibrium, one mole of $NH_{3\,(g)}$ remains. The value of K_c is:
    (a) 3/2 mol^2 l^{-1}
    (b) 3/2 mol
    (c) 27/16 mol^2 l^{-2}
    (d) 27/64 $mol^2 l^{-2}$

89. The heat of combustion of ethane, ethylene and hydrogen are 370.44 k cal, 333.4 kcal and 68.4 kcal respectively. The heat evolved in the formation of ethane $(C_2H_4 + H_2 \rightarrow C_2H_6)$ would be:
    (a) –31.30 k cal
    (b) –62.60 k cal
    (c) + 31.30 k cal
    (d) + 62.60 k cal

90. When the pressure is not too high the Van der Waal's equation reduces to:
    (a) $PV = RT - \dfrac{a}{V}$
    (b) $PV = RT - \dfrac{a}{V^2}$
    (c) $PV = RT + Rb$
    (d) $PV = RT$

91. The enolic form of acetone contains:
    (a) 9 sigma bonds, 1 pi bond and two lone pair
    (b) 10 sigma bonds, 1 pi bond and 1 lone pair
    (c) 8 sigma bonds, 2 pi bonds and 2 lone pair
    (d) 9 sigma bonds, 2 pi bonds and 1 lone pair

92. The volume of 0.25 N tribasic acid required to neutralize 0.500 g, of $Ca(OH)_2$ completely is
    (a) 45.0 ml
    (b) 27.0 ml
    (c) 54.0 ml
    (d) .054 ml

93. The number of protons in 1 c.c. of a solution whose pH = 12 is:
    (a) 6.02×10^{11}
    (b) 6.02×10^8
    (c) 6.02×10^{-12}
    (d) 6.02×10^{23}

94. By increasing the salt concentration ten times in acidic buffer solution, the pH is:
    (a) lowered by 1 unit
    (b) increased by 2 units
    (c) increased by 1 unit
    (d) not changed

95. The pH of a solution made by mixing 50 ml of 0.01 M $Ba(OH)_2$ solution with 50 ml of water is:
    (a) 8
    (b) 12
    (c) 10
    (d) 7

96. Equal weights of methane and hydrogen are mixed in an empty container at 25°C. The fraction of total pressure exerted by hydrogen is:
    (a) 1/2
    (b) 1/9
    (c) 8/9
    (d) 1/4

97. In which of the following compounds iron has lowest oxidation state?
    (a) $FeSO_4 \cdot (NH_4)_2 \, SO_4 \cdot 6H_2O$
    (b) $K_4Fe(CN)_5$
    (c) $Fe(CO)_5$
    (d) K_2FeO_4

98. Potassium permanganate is converted to MnO_2 in a reaction. Equivalent weight of $KMnO_4$ is. Equivalent weight of $KMnO_4$ is:
    (a) mol. wt/5   (b) mol. wt/2
    (c) mol. wt/3   (d) mol. wt/1

99. A nucleide has half life of 25 min. If 100 gms of the nucleide decays for 100 min, the amount of nucleide left is:
    (a) 1.0 gm   (b) 4.0 gms
    (c) 6.25 gms   (d) 12.5 gms

100. Ordinary boron is a mixture of two isotopes B^{11} and B^{10}. If the atomic weight of boron is 10.81, the percentage of B_{11} in the mixture is:
    (a) 50%   (b) 81%
    (c) 19%   (d) 60%

Instructions for Q. No. 101 to 120

Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.

(a) If both assertion and reason are true and the reason is a correct explanation of the assertion

(b) If both assertion and reason are true but the reason is not a correct explanation of the assertion

(c) If the assertion is true, but the reason is false

(d) If both assertion and reason are falses

101. *Assertion (A)* : Alkanes can have an infinite number of conformations.
    Reason (R) : In configurational isomerism, the isomers are distinct individual substances.

102. *Assertion (A)* : As a salt such as NaCl dissolves, the Na^+ and Cl^- ions leaving the crystal lattice acquire far greater freedom.
    Reason (R) : In thermodynamic terms, the formation of solution occurs with a favourable change in free energy *i.e.*, ΔH has a high positive value and $T \, \Delta S$ a low negative value.

103. *Assertion (A)* : Water is specially effective in screening the electrostatic interactions between the dissolved ions.
    Reason (R) : The force of ionic interactions depends upon the dielectric constant (ε) of the solvent.

104. *Assertion (A)* : When two uncharged similar atoms are brought very close together, their surrounding electron clouds influence each other, and a force of attraction is built up between them.
    Reason (R) : The random variation in the positions of electrons around one nucleus may creat a transient electric dipole, which induces a transient opposite electric dipole in the nearby atom.

105. *Assertion (A)* : The equilibrium constant is fixed and a characteristic for any given chemical reaction at a specified temperature.
    Reason (R) : The composition of the final equilibrium mixture at a particular temperature depends upon the starting amount of reactants.

106. *Assertion (A)* : The degree of ionization of water is small at 25°C, only about one of every 10^7 molecules in pure water is ionized at any instant.
    Reason (R) : In pure water at 25°C the molar concentration of water is essentially constant.

107. *Assertion (A)* : The p^{ka} of a weak acid becomes equal to pH of the solution at the midpoint of its titration.
    Reason (R) : The molar concentrations of proton acceptor and proton donor become equal at the midpoint of titration of a weak acid.

108. *Assertion (A)* : Maleic and fumeric acids are well defined compounds. These two compound are stereo isomers but not enantiomers.
    Reason (R) : Maleic and fumeric acids have same molecular formula but they are not mirror images of each other.

109. *Assertion (A)* : The nearly tetrahedral arrangement of the orbitals about the oxygen atom allow each water molecule to form hydrogen bonds with as

many as four neighbouring water molecules.
Reason (R) : In ice each water molecule forms four hydrogen bonds as each molecules is fixed in the space.

110. *Assertion (A)* : Hydrogen has three isotopes namely protium, deuterium and tritium.
Reason (R) : All the three isotopes of hydrogen have same number of protons in their nuclei.

111. *Assertion (A)* : Sodium ammonium hydrogen phosphate tetrahydrate is used in the bead test.
Reason (R) : The colourless transparent sodium metaphosphate combines with metallic oxides giving coloured orthophosphates.

112. *Assertion (A)* : Lead is a metal with a high density. It readily dissolves in moderately concentrated nitric acid giving colourless fumes which turn red in contact with air.
Reason (R) : Nitric oxide (NO) is a colourless oxide of nitrogen while NO_2 is a coloured oxide of nitrogen.

113. *Assertion (A)* : The reaction of ammonia solution with calomel is a disproportionation reaction in which a mixture of Hg (II) amido chloride and Hg are formed.
Reason (R) : In a disproportionation reaction species under reaction is neither oxidised nor reduced.

114. *Assertion (A)* : Sodium thiosulphate dissolves the white precipitate of silver chloride.
Reason (R) : The thiosulphate ions act as strong complexing agents.

115. *Assertion (A)* : When $SnCl_2$ solution is added to $HgCl_2$ solution, a milky white precipitate is obtained and on adding excess of $SnCl_2$, a black precipitate is formed.
Reason (R) : The disproportionation of Hg(II) is easier than its reduction only.

116. *Assertion (A)* : The electron affinity of chlorine is greater than that of fluorine.
Reason (R) : Chlorine is more electronegative than fluorine.

117. *Assertion (A)* : The boiling point of *n*-alkanes increases regularly with the increase in the number of carbon atoms.

Reason (R) : The magnitude of Van der Waal's forces increases with the increase in molecular mass and molecular size.

118. *Assertion (A)* : *p*-nitroaniline is stronger base than *p*-toluidine.
Reason (R) : The electron withdrawing NO_2 group in the *p*-nitroaniline makes it a stronger base.

119. *Assertion (A)* : All the amines, except tertiary amines are capable of forming intermolecular hydrogen bonds.
Reason (R) : Tertiary amines have larger molecules and surface area.

120. *Assertion (A)* : Phenol is strongly acidic than ethanol.
Reason (R) : Phenoxide ion is more stablized by resonance than ethoxide ion.

BIOLOGY

121. The maximum biomagnification would be in which of the following in case of aquatic ecosystem?
    (a) fishes   (b) birds
    (c) zooplanktons   (d) phytoplanktons.

122. In DNA when AGCT occurs, their association is as per which of the following pair?
    (a) AG-CT   (b) AC-GT
    (c) AT-GC   (d) all of these.

123. The process of replication in plasmid DNA other than initiation, is controlled by
    (a) Plasmid gene   (b) bacterial gene
    (c) mitochondrial gene
    (d) none of these.

124. Cholecystokinin is secreted by
    (a) intestine   (b) pancreas
    (c) adrenal cortex (d) thyroid gland.

125. Koch's postulates are not applicable to
    (a) TB   (b) leprosy
    (c) diphtheria   (d) cholera.

126. The problem, due to Rh factor arises when the blood of two (Rh^+ and Rh^-) mix up
    (a) in a test tube   (b) through transfusion
    (c) during pregnancy (d) both 'b' and 'c'.

127. The term 'humulin' is used for
    (a) human insulin   (b) isoenzyme
    (c) hydrolytic enzyme (d) powerful antibiotic.

128. Which one of the following statements about cytochrome P450 is wrong?
    (a) it has an important role in metabolism
    (b) it contains iron
    (c) it is present in coloured cell
    (d) it is an enzyme involved in oxidation reactions.

129. Puccinia forms uredia and
    (a) pycnia on barberry leaves
    (b) aecia on wheat leaves
    (c) telia on wheat leaves
    (d) aecia on barberry leaves.

130. A few organisms are known to grow and multiply at temperatures of 100-105° C.They belong to
    (a) thermophilic subaerial fungi
    (b) marine archaebacteria
    (c) thermophilic sulphur bacteria
    (d) hot spring blue-green algae.

131. Botulism caused by *Clostridium botulinum* affects the
    (a) spleen
    (b) intestine
    (c) lymph glands
    (d) neuromuscular junction.

132. The functional unit of contractile system in striated muscle is
    (a) cross bridges   (b) myofibril
    (c) sarcomere   (d) Z-band.

133. Calcitonin is a thyroid hormone which
    (a) elevates potassium level in blood
    (b) lowers calcium level in blood
    (c) elevates calcium level in blood
    (d) has no effect on calcium.

134. Loss of a X-chromosome in a particular cell, during its development, results into
    (a) diploid individual
    (b) triploid individual
    (c) gynandromorphs
    (d) both 'a' and 'b'.

135. Which one among the following chemicals is used for causing defoliation of forest trees?
    (a) amo-1618   (b) phosphon D
    (c) malic hydrazide   (d) 2,4-D.

136. Albinism is known to be due to an autosomal recessive mutation. The first child of a couple with normal skin pigmentation was an albino. What is the probability that their second child will also be an albino?
    (a) 100%   (b) 25%
    (c) 50%   (d) 75%.

137. Co-factor(prosthetic group) is a part of holoenzyme, it is
    (a) loosely attached inorganic part
    (b) accessory non-protein substance attached firmly
    (c) loosely attached organic part
    (d) none of these.

138. A fruit fly is heterozygous for sex-linked genes, when mated with normal female fruit fly, the male specific chromosome will enter egg cell in the proportion
    (a) 1 : 1   (b) 2 : 1
    (c) 3 : 1   (d) 7 : 1.

139. Which one of the following statements is correct regarding evolution of mankind?
    (a) neanderthal man and cro-magnon man were living at the same time
    (b) australopithecus was living in Australia
    (c) homoerectus is preceded by homohabilis
    (d) none of these.

140. The embryonated egg of *Ascaris* represents
    (a) an egg with an egg
    (b) an egg with gastrula
    (c) an egg with blastula
    (d) an egg with a juvenile.

141. Elater mechanism for seed dispersal is exhibited by
    (a) *Riccia*   (b) *Funaria*
    (c) *Liverworts*   (d) *Marchantia*.

142. The breeding place of *Flamingo* (Hansawar) in India is most likely
     (a) Sambhar lake   (b) Chilka lake
     (c) Rann of Kutch   (d) Ghana Vihar.

143. In C_4 plants, CO_2 combines with
     (a) phosphoglyceric acid
     (b) ribulose diphosphate
     (c) phosphoenol pyruvate
     (d) phosphoglyceraldehyde.

144. The polygenic genes show
     (a) different genotypes
     (b) different phenotypes
     (c) different karyotypes
     (d) none of these.

145. Which of the following statement is without exception for sponges?
     (a) they are found only in marine water
     (b) they are all radially symmetric
     (c) they all have calcareous spicules
     (d) they have high regenerative power.

146. What are the most diversed molecules in the cell?
     (a) proteins   (b) carbohydrates
     (c) lipids   (d) mineral salts.

147. Which of the following is common among mammals?
     (a) they are carnivores
     (b) they have ventral nerve cord
     (c) they undergo no moulting
     (d) they have seven cervical vertebrae.

148. The ornithine cycle removes two waste products from the blood in liver. These products are
     (a) CO_2 and urea
     (b) ammonia and urea
     (c) CO_2 and ammonia
     (d) ammonia and uric acid.

149. The black rust of wheat is a fungal disease caused by
     (a) *Melampsore lini*
     (b) *Claviceps purpurea*
     (c) *Albugo candida*
     (d) *Puccinia graminis tritici.*

150. The pigment, that absorbs red and far red light in plants is
     (a) xanthophyll-II   (b) cytochrome
     (c) phytochrome   (d) carotene.

151. The sympathetic nerves in mammals, arise from
     (a) thoraco-lumber nerves
     (b) cervical nerves   (c) sacral nerves
     (d) 3rd,7th,9th and 10th cranial nerves.

152. Identify the correct match between tiger reserve and its state
     (a) Bandipur-Tamil Nadu
     (b) Palanau-Orissa   (c) Manas-Assam
     (d) Corbett-Madhya Pradesh.

153. When two genetic loci produce identical phenotypes in *cis* and *trans* position, they are considered to be
     (a) pseudoalleles
     (b) different genes
     (c) multiple alleles
     (d) the parts of same gene.

154. Rickettsiae form a group under
     (a) fungi
     (b) a category between viruses and bacteria
     (c) viruses   (d) bacteria.

155. Which one of the following statements is correct with reference to a test tube baby?
     (a) a prematurely born baby is reared in an incubator
     (b) fertilization of the egg and growth of the embryo are effected in a large test tube
     (c) fertilization of the egg is effected outside the body, the fertilized egg is then placed in the womb of the mother where the gestation is completed
     (d) fertilization of the egg is effected in the female genital tract, it is then taken out and grown in a large test tube.

156. Organisms phenotypically similar but genotypically different are said to be
     (a) multizygous   (b) heterozygous
     (c) homozygous   (d) monozygous

157. Which of the following is the most evident source of evolution?
(a) fossils
(b) morphology
(c) embryos
(d) vestigial organs

158. Number of post-zygote nuclear divisions of synkaryon in exconjugant of *Paramecium* is
(a) one
(b) five
(c) three
(d) eight

159. Gigantism and acromegaly are due to increase of
(a) GH
(b) STH
(c) ADH
(d) none of these

160. The head of humerus articulated in the pectoral girdle, the joint is
(a) hinge
(b) immovable
(c) pivot joint
(d) ball and socket

Instructions for Q. No. 161 to 180
Directions : Each of the questions given below consists of two statements, an assertions (A) and reason (R). Select the number corresponding to the appropriate response in the answer sheet as follows.
(a) *If both assertion and reason are true and the reason is a correct explanation of the assertion*
(b) *If both assertion and reason are true but the reason is not a correct explanation of the assertion*
(c) *If the assertion is true, but the reason is false*
(d) *If both assertion and reason are falses*

161. *Assertion (A)* : Some roots perform photosynthesis.
Reason (R) : *Trapa* & *Tinospora* have these type of roots.

162. *Assertion (A)* : Water potential is represented by negative sign.
Reason (R) : Pure water has maximum water potential.

163. *Assertion (A)* : Growing plants in soilless culture is called hydroponics.

Reason (R) : This was first developed by Van Helmont.

164. *Assertion (A)* : Molybdenum deficiency causes whiptail disease of cauliflower.
Reason (R) : It is responsible for the synthesis of IAA.

165. *Assertion (A)* : Light is a limiting factor in photosynthesis.
Reason (R) : Pigment other than chlorophyll *a* are called accessory pigments.

166. *Assertion (A)* : Heavy perspiration results in muscular cramps.
Reason (R) : Skin is an accessory excretory organ.

167. *Assertion (A)* : Multiplicative growth takes place in embryos of animals.
Reason (R) : Growth in embryo occurs due to an increase in the number of cells.

168. *Assertion (A)* : Linkage and crossing over are inversely related.
Reason (R) : Crossing over is visible in prophase stage of meiosis-I.

169. *Assertion (A)* : The endocrine part of human pancreas is represented by α and β cells.
Reason (R) : Endocrine gland have ducts.

170. *Assertion (A)* : Inheritance of Kappa particles in *Paramecium* is a type of extra nuclear inheritance.
Reason (R) : Extra nuclear inheritance or cytoplasmic inheritance are inherited through nucleoplasm.

171. *Assertion (A)* : The nucleus is a membrane-bounded body found in cytoplasm of cell and contains DNA in the form of chromosomes.
Reason (R) : The nucleus is therefore the repository of the molecular information that controls the characteristics of cells and their progeny.

172. *Assertion (A)* : Histone proteins are synthesized during the S-phase when DNA synthesis occurs.
Reason (R) : Histone proteins form an association with DNA to form nucleosome.

173. *Assertion (A)* : Annelids, arthropods and molluscs are all protostomial coelomate.

Reason (R) : Adults of all the above have bilateral symmetry, the tube with-in-a-tube body plan and organs derived from three germ layers.

174. *Assertion (A)* : Sponges are primitive multicellular animals, that probably evolved a multicellular structure independently of other multicellular animals.
Reason (R) : Sponges are stationary, remain attached to substratum while water passes over them.

175. *Assertion (A)* : Active transport results in solute movement against a concentration gradient.
Reason (R) : Active transport of Na^+ and K^+ is energized by ATP.

sertion (A) : Lichens bear a composite structure consisting of two dissimilar organisms, a fungus and an alga.
Reason (R) : The fungal component of association is either a member of myxophyceae or chlorophyceae.

177. *Assertion (A)* : In C_4 plants, CO_2 fixation occurs at three sites.
Reason (R) : CO_2 fixation occurs in mesophyll cells, bundle sheath cells and vascular cambium.

178. *Assertion (A)* : Reduction division, in *Selaginella*, occurs during microspore formation only.
Reason (R) : It has been proved experimentally by Zacharich in 1963.

179. *Assertion (A)* : In case of *Nepenthes*, lamina is modified to capture insects to get nitrogenous food.
Reason (R) : The plant proteins are broken down to amino acids then absorbed by plants.

180. *Assertion (A)* : Energy can be transformed from one form into another but it can not be created or destroyed.
Reason (R) : When one form of energy is transformed into another form, some useful energy is always lost as heat, hence, energy can not be recycled.

GENERAL KNOWLEDGE

181. What kind of soil is treated with gypsum to make it suitable for cropping ?
(a) alkaline
(b) acidic
(c) water-logged
(d) soil with excessive clay content

182. Where is the world's first Integrated Solar Combined Cycle Power Project proposed to be set up ?
(a) Cuttack   (b) Jaipur
(c) Patna   (d) Jodhpur

183. Who started the Saka Era which is still used by the Government of India ?
(a) Kanishka   (b) Vikramditya
(c) Samudra Gupta   (d) Asoka

184. Which of the following districts is on the international border of India ?
(a) Gorakhpur
(b) West Khasi Hills
(c) Kinnaur
(d) Kullu

185. Laterite soil devlop as a result of -
(a) deposits of alluvial
(b) deposition of loess
(c) leaching
(d) continued vegetation cover

186. The variety of coffee largely grown in India is
(a) Old Chicks   (b) Coorgs
(c) Aribica   (d) Kents

187. Which one of the following is not an example of indirect tax
(a) sales tax
(b) excise duty
(c) custom duty
(d) expenditure tax

188. Structural unemployment arises due to -
(a) deflationary conditions
(b) heavy industry bias
(c) shortage of raw materials
(d) inadequate productive capacity

189. What can be the maximum interval between two sessions of Parliament ?
   (a) three months   (b) four months
   (c) six months   (d) nine months

190. Who amongst the following is renowned in Hindustani classical music (vocal) ?
   (a) Shovana Narayan
   (b) M. S. Subbalakshmi
   (c) Pt. Jasraj
   (d) M.S.Gopalakrishnan

191. What is the chemical name for 'baking soda' ?
   (a) sodium carbonate
   (b) sodium bicarbonate
   (c) sodium nitrite
   (d) sodium nitrate

192. An atomic pile is used for
   (a) producing X- rays
   (b) conducting nuclear fission
   (c) conducting thermonuclear fusion
   (d) accelerating atoms

193. Clove the commonly used spice, is obtained from the
   (a) root   (b) stem
   (c) flower bud   (d) fruit

194. What is the number of the permanent members of the security council of United Nations Organisation ?
   (a) 6   (b) 4
   (c) 5   (d) 7

195. Who was honoured with 'Bharat Ratna' on the Republic Day 2000 ?
   (a) Pt. Ravi Shankar
   (b) K.Kasturirangan
   (c) A.P.J. Abdul Kalam
   (d) none of these

196. A 'breath test' used by traffic police to check drunken driving uses -
   (a) potassium dichormate-sulphuric acid
   (b) potassium permanganate sulphuric acid
   (c) turmeric on filter paper
   (d) silica gel coated with silver nitrate

197. Who is the author of *Business @Speed of Thought?*
   (a) Dick Francis   (b) john Gray
   (c) Bill Gates   (d) David Baldacci

198. Anglo-Nubian is a breed of
   (a) sheep   (b) goat
   (c) poultry   (d) cattle

199. Who received the Dada Sahib Phalke award 2002 for film excellence ?
   (a) Asha Bhosle
   (b) Girish Kannad
   (c) Dipti Naval
   (d) Lata Mangeskar

200. Total no. of moons of planet jupiter is
   (a) 18   (b) 16
   (c) 17   (d) 30

■ ■ ■