Atomic Energy Central School No. 4 Rawatbhata

Multiple Choice Question Examination (October 2019)

Class XI (PCB) Subjects: Physics, Chemistry and Biology MM: 120

Name:_____ Class/Sec: _____

OMR Roll No:_____Invigilator's Sign:_____

Instruction: 1) Fill & darken roll number field correctly on OMR Sheet. In case of any error, OMR Answer Sheet will be not be read by the OMR Scanner.

2) Darken the most suitable option no. on OMR Answer Sheet.

3) There is no negative marking.

Physics

1. The scalar product of two vectors A and B in terms of the projections of the vectors on the x, y and z axis is **1**

   a) $\mathbf{AB} = A_xB_x + A_yB_y + A_zB_z$ b) $\mathbf{AB} = A_xB_x - A_yB_y - A_zB_z$
   c) $\mathbf{AB} = A_xB_x - A_yB_y + A_zB_z$ d) $\mathbf{AB} = A_xB_x + A_yB_y - A_zB_z$

2. How many joules of energy does a 100-watt light bulb use per hour? How fast would a 70-kg person have to run to have that amount of kinetic energy? **1**

   a) 360000 J, 101 m/s b) 320000 J, 130 m/s
   c) 380000 J, 120 m/s d) 340000 J, 140 m/s

3. In which case is the work done zero? **1**

   a) Force and displacement are perpendicular to each other b) Force and displacement are in the same direction
   c) Force and displacement are at an angle of 45° d) Force and displacement are at an angle of 75°

4. A 6.0-kg box moving at 3.0 m/s on a horizontal, frictionless surface runs into a light spring of force constant 75 N/cm Use the work–energy theorem to find the maximum compression of the spring. **1**

   a) 7.5 cm b) 8.5 cm
   c) 9.5 cm d) 6.5 cm

5. A trolley of mass 200 kg moves with a uniform speed of 36 km/h on a frictionless track. A child of mass 20 kg runs on the trolley from one end to the other (10 m away) with a speed of 4 m s^{-1} relative to the trolley in a direction opposite to the its motion, and jumps out of the trolley. What is the final speed of the trolley? **1**

   a) 11.36 m/s b) 8.13 m/s
   c) 10.36 m/s d) 9.36 m/s

6. A person trying to lose weight (dieter) lifts a 10 kg mass, one thousand times, to a height of 0.5 m each time. Assume that the potential energy lost each time she lowers the mass is dissipated. Fat supplies 3.8×10^7 J of energy per kilogram which is converted to mechanical energy with a 20% efficiency rate. How much fat will the dieter use up? **1**

   a) 8.85×10^{-3} kg b) 8.45×10^{-3} kg
   c) 7.45×10^{-3} kg d) 6.45×10^{-3} kg

7. Two billiard balls each with a mass of 150g collide head-on in an elastic collision. Ball 1 was travelling at a speed of 2 m /s and ball 2 at a speed of 1.5 m /s. After the collision, ball 1 travels away from ball 2 at a velocity of 1.5 m /s .What is the velocity of ball 2? **1**

   a) ball 2 moves with a velocity of 3.5 m/s b) ball 2 moves with a velocity of 2 m /s
   c) ball 2 moves with a velocity of 2.5 m /s d) ball 2 moves with a velocity of 3.7 m/s

8. A12-pack of Omni-Cola (mass 4.30 kg) is initially at rest on a horizontal floor. It is then pushed in a straight line for 1.20 m by a trained dog that exerts a horizontal force with magnitude 36.0 N. Use the work–energy theorem to find the final speed of the 12-pack if the coefficient of kinetic friction between the 12-pack and the floor is 0.30. **1**

   a) 3.81 m/s b) 4.01 m/s
   c) 3.61 m/s d) 4.22 m/s

9. In which of the following cases is the work done positive? **1**

a) Work done by gravitational force while a man in lifts a bucket out of a well by means of a rope tied to the bucket

b) Work done by friction on a body sliding down an inclined plane

c) Work done by the resistive force of air on a vibrating pendulum in bringing it to rest.

d) work done by an applied force on a body moving on a rough horizontal plane with uniform velocity

10. The work done by the force is defined to be **1**

a) the product of component of the force in the direction of the displacement and the magnitude of the displacement

b) the product of component of the force in the direction perpendicular to displacement and the magnitude of the displacement

c) the negative product of component of the force in the direction of the displacement and the magnitude of this displacement

d) the product of force and the magnitude of the displacement

11. A 50.0-kg marathon runner runs up the stairs to the top of a 443-m-tall Tower. To lift herself to the top in 15.0 minutes, what must be her average power output? **1**

a) 261 W

b) 221 W

c) 201 W

d) 241 W

12. The Sun converts an enormous amount of matter to energy. Each second, 4.19×10^9 kg—approximately the capacity of 400 average-sized cargo ships—is changed to energy. What is the power output of the Sun? **1**

a) 1.57×10^{26} W

b) 3.77×10^{26} W

c) 2.62×10^{26} W

d) 0.72×10^{26} W

13. A sled with mass 8.00 kg moves in a straight line on a frictionless horizontal surface. At one point in its path, its speed is 4.00 m/s; after it has traveled 2.50 m beyond this point, its speed is 6.00 m/s. Use the work–energy theorem to find the force acting on the sled, assuming that this force is constant and that it acts in the direction of the sled's motion. **1**

a) 30.0 N

b) 32.0 N

c) 28.0 N

d) 34.0 N

14. The total mechanical energy of a system is conserved if the **1**

a) forces, doing work on it, are not conservative

b) forces, doing work on it, are damped

c) forces, doing work on it, are conservative

d) forces, doing work on it, are viscous

15. In a graph of F(x) vs x, the area under the curve **1**

a) represents energy of F(x).

b) represents work done by F(x).

c) represents the impulse of F(x)

d) represents the momentum of F(x).

16. Adult cheetahs, the fastest of the great cats, have a mass of about 70 kg and have been clocked running at up to 72 mph (32 m/s) How many joules of kinetic energy does such a swift cheetah have? **1**

a) 34,000 J

b) 32,000 J

c) 29,000 J

d) 35840 J

17. Consider the collision of two cars. Car 1 is at rest and Car 2 is moving at a speed of 2 m /s in the negative x-direction. Both cars each have a mass of 500 kg. The cars collide inelastically and stick together. What is the resulting velocity of the resulting mass of metal? **1**

a) 1.4 m /s to the left

b) 1 m /s to the left.

c) 1.2 m /s to the left

d) 1.5 m /s to the left

18. For a ball dropped from a tower of height h the total mechanical energy is **1**

a) the difference of potential and kinetic energies

b) the potential energy

c) the sum of potential and kinetic energies

d) the kinetic energy

19. A pump on the ground floor of a building can pump up water to fill a tank of volume 30 m^3 in 15 min. If the tank is 40 m above the ground, and the efficiency of the pump is 30%, how much electric power is consumed by the pump? **1**

a) 33.6 kW

b) 45.2 kW

c) 38.3 kW

d) 43.3 kW

20. A 3.00-kg crate slides down a ramp. The ramp is 1.00 m in length and inclined at an angle of 30.0° . The crate starts from rest at the top, experiences a constant frictional force of magnitude 5.00 N, and continues to move a short distance on the flat floor after it leaves the ramp. Use energy methods to determine the speed of the crate at the bottom of the ramp. **1**

a) 2.78 m/s
b) 2.54 m/s
c) 2.25 m/s
d) 1.76 m/s

21. If F is a force and d is the displacement in the direction of force then the work done by the force is given by **1**

a) 2F.d
b) - F.d
c) F.d
d) -2F.d

22. The S.I unit of force is **1**

a) Joule
b) dyne
c) Newton
d) erg

23. A 0.800-kg ball is tied to the end of a string 1.60 m long and swung in a vertical circle. Calculate the total work done on the ball by (i) the tension in the string and (ii) gravity for motion along the semicircle from the lowest to the highest point on the path. **1**

a) 0, -281 J
b) 0, -251 J
c) 0, -2.51 J
d) 0, -25.1 J

24. The scalar product of two vectors A and B is **1**

a) a tensor
b) vector
c) a scalar
d) a complex number

25. Physically, the notion of potential energy is applicable only to **1**

a) The class of forces where work done against the force gets converted to thermal energy
b) The class of forces where work done against the force gets dissipated
c) The class of forces where work done against the force gets converted to kinetic energy
d) The class of forces where work done against the force gets stored up as energy.

26. A body of mass 0.5 kg travels in a straight line with velocity v =a $\mathbf{x}^{3/2}$ where a = 5 $\mathbf{m}^{-1/2}\mathbf{s}^{-1}$. What is the work done by the net force during its displacement from x = 0 to x = 2 m? **1**

a) 50 J
b) 30 J
c) 40 J
d) 60 J

27. A trolley of mass 200 kg moves with a uniform speed of 36 km/h on a frictionless track. A child of mass 20 kg runs on the trolley from one end to the other (10 m away) with a speed of 4 m $\mathbf{s}^{-1}$ relative to the trolley in a direction opposite to the its motion, and jumps out of the trolley. How much has the trolley moved from the time the child begins to run? **1**

a) 25.9 m
b) 23.3 m
c) 27.8 m
d) 24.1 m

28. The work done by a conservative force **1**

a) depends on both the end points as well as the path
b) depends on the path
c) depends only on the end points
d) depends only on the end point and the path

29. The bob of a pendulum is released from a horizontal position. If the length of the pendulum is 1.5 m, what is the speed with which the bob arrives at the lowermost point, given that it dissipated 5% of its initial energy against air resistance? **1**

a) 5.5 m/s
b) 4.7 m/s
c) 5.3 m/s
d) 4.9 m/s

30. work-energy theorem does not give information on **1**

a) work done
b) time dependence
c) difference of kinetic energies
d) change in kinetic energy

31. Consider two 2 marbles. Marble 1 has mass 100 g and marble 2 has mass 50 g. Edward rolls marble 1 along the ground towards marble 2 in the positive x-direction. Marble 2 is initially at rest and marble 1 has a velocity of 3 m /s in the positive x-direction. After they collide elastically, both marbles are moving. What is the final velocity of each marble? **1**

a) ball 1 moves to the right at 3 m /s and ball 2 moves to the left with a velocity of 2m /s
b) ball 1 moves to the right at 5 m /s and ball 2 moves to the left with a velocity of 3m /s
c) ball 1 moves to the right at 2 m /s and ball 2 moves to the left with a velocity of 2m /s
d) ball 1 moves to the right with a velocity of 1m/s and ball 2 also moves to the right at 4 m/s

32. A bolt of mass 0.3 kg falls from the ceiling of an elevator moving down with an uniform speed of 7 m/s. It hits the floor of the elevator (length of the elevator = 3 m) and does not rebound. What is the heat produced by the impact? **1**

a) 9.22 J
b) 8.42 J
c) 8.82 J
d) 8.11 J

33. A12-pack of Omni-Cola (mass 4.30 kg) is initially at rest on a horizontal floor. It is then pushed in a straight line for 1.20 m by a trained dog that exerts a horizontal force with magnitude 36.0 N. Use the work–energy theorem to find the final speed of the 12-pack if there is no friction between the 12-pack and the floor **1**

a) 4.38 m/s
b) 4.58 m/s
c) 4.48 m/s
d) 4.68 m/s

34. The launching mechanism of a toy gun consists of a spring of unknown spring constant. When the spring is compressed 0.120 m, the gun, when fired vertically, is able to launch a 35.0-g projectile to a maximum height of 20.0 m above the position of the projectile before firing. Neglecting all resistive forces, determine the spring constant. **1**

a) 873 N/m
b) 993 N/m
c) 903 N/m
d) 953 N/m

35. A tandem (two-person) bicycle team must overcome a force of 165 N to maintain a speed of 9.00 m/s. Find the power required per rider, assuming that each contributes equally. **1**

a) 742.5 W
b) 765 W
c) 798 W
d) 702 W

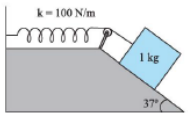
36. A person trying to lose weight (dieter) lifts a 10 kg mass, one thousand times, to a height of 0.5 m each time. Assume that the potential energy lost each time she lowers the mass is dissipated. How much work does she do against the gravitational force? **1**

a) 49000 J
b) 55000 J
c) 59000 J
d) 45000 J

37. A pump is required to lift 800 kg of water per minute from a well 14.0 m deep and eject it with a speed of 18.0 m/s. How much work is done per minute in lifting the water? **1**

a) 1.10×10^5 J
b) 1.40×10^5 J
c) 1.30×10^5 J
d) 1.20×10^5 J

38. A 1 kg block situated on a rough incline is connected to a spring of spring constant 100 N m^{-1} as shown in Figure. The block is released from rest with the spring in the unstretched position. The block moves 10 cm down the incline before coming to rest. Find the coefficient of friction between the block and the incline. Assume that the spring has a negligible mass and the pulley is frictionless. **1**



a) 0.115
b) 0.3
c) 0.07
d) 0.25

39. A 75.0-kg painter climbs a ladder that is 2.75 m long leaning against a vertical wall. The ladder makes an angle of 30° angle with the wall. How much work does gravity do on the painter? **1**

a) -1950 J
b) -1850 J
c) -2050 J
d) -1750 J

40. A block having a mass of 0.80 kg is given an initial velocity 1.2 m/s to the right and collides with a spring of negligible mass and force constant k =50 N/m. Assuming the surface to be frictionless, calculate the maximum compression of the spring after the collision. **1**

a) 0.15 m
b) 0.20 m
c) 0.10 m
d) 0.25 m

41. Calculate the total number of electrons present in 1.4 g of dinitrogen gas. 1

a) 4.4521×10^{23} electrons
b) 4.2154×10^{23} electrons
c) 5.0832×10^{23} electrons
d) 4.6329×10^{23} electrons

42. In Van der Waal's equation of state for a non-ideal gas the net force of attraction among the molecules is given by 1

a) $P - \frac{an^2}{V^2}$
b) $-\frac{an^2}{V^2}$
c) $\frac{an^2}{V^2}$
d) $P + \frac{an^2}{V^2}$

43. 34.05 mL of phosphorus vapour weighs 0.0625 g at 546 C and 0.1 bar pressure. What is the molar mass of phosphorus? 1

a) 1247.7 g/mol
b) 1325.9 g/mol
c) 1097.6 g/mol
d) 1120.3 g/mol

44. under which of the following two conditions, a gas deviates most from the ideal behavior? 1

a) Low temperature only
b) High temperature and Low pressure
c) Low pressure only
d) High pressure and Low temperature

45. Which of the following property of water can be used to explain the spherical shape of rain droplets? 1

a) critical phenomena
b) viscosity
c) surface tension
d) pressure

46. The three states of matter of $_2O$ are in equilibrium at 1

a) critical point.
b) steam point.
c) the triple point.
d) ice point.

47. With rise in temperature, the surface tension of a liquid 1

a) Remaining the same
b) Decreases
c) Increases
d) None of these

48. How does the surface tension of a liquid vary with increase in temperature? 1

a) Increases
b) Decreases
c) No regular pattern is followed
d) Remains same

49. Water has high surface tension and high capillarity because of 1

a) dispersion forces.
b) hydrogen bonds.
c) ionic bonds.
d) covalent bonds.

50. CO can be easily liquified and even solidified because 1

a) It has weak forces of attraction
b) It has comparatively more force of attraction than other gases
c) It has more intermolecular space
d) It is present in atmosphere

51. The average kinetic energy of the gas molecule is 1

a) Inversely proportional to its absolute temperature
b) Equal to the square of its absolute temperature
c) All of these
d) Directly proportional to its absolute temperature

52. Dipole-dipole forces act between the molecules possessing permanent dipole. Ends of dipoles possess 'partial charges'. The partial charge is 1

a) more than unit electronic charge
b) less than unit electronic charge
c) double the unit electronic charge
d) equal to unit electronic charge

53. At $^\circ C$, the density of a certain oxide of a gas at 2 bar is same as that of dinitrogen at 5 bar. What is the molecular mass of the oxide? 1

a) 270 g/mol
b) 70 g/mol
c) 90 g/mol
d) 170 g/mol

54. Which of the following statements about Hydrogen bond incorrect? 1

a) In hydrogen bonding H atom becomes partially negative and is attracted to the more positive N atom.
b) In hydrogen bonding H atom becomes partially positive and is attracted to the more negative N atom.
c) In hydrogen bonding H atom becomes partially positive and is attracted to the more negative O atom.
d) In hydrogen bonding H atom becomes partially positive and is attracted to the more negative F atom.

55. At constant temperature, the pressure of the gas is reduced to one third, the volume 1

a) Remaining the same
b) Cannot be predicted
c) Increases by three times
d) Reduce to one third

56. Which of the following is the correct mathematical relation for Charles law at constant pressure? 1

a) $V \alpha n$
b) V is independent of T
c) $V \alpha T$
d) $V \alpha \frac{1}{T}$

57. What will be the pressure exerted by a mixture of 3.2 g of methane and 4.4 g of carbon dioxide contained in a 9 m^3 flask at 27 $^\circ C$? 1

a) 8.314×10^4 Pa
b) 6.224×10^4 Pa
c) 9.313×10^4 Pa
d) 7.452×10^4 Pa

58. Gay Lussac's law states that at constant volume, pressure of a fixed amount of a gas ? 1

a) Varies inversely with the temperature.
b) Varies directly with the temperature
c) Constant irrespective of its absolute temperature.
d) Directly proportional to square of absolute temperature.

59. The compressibility factor, z for an ideal gas is 1

a) Equal to one
b) Zero
c) Less than one
d) Greater than one

60. A mixture of dihydrogen and dioxygen at one bar pressure contains 20% by weight of dihydrogen. Calculate the partial pressure of dihydrogen. 1

a) 0.97 bar
b) 1.12 bar
c) 0.65 bar
d) 0.8 bar

61. The entropy change can be calculated by using the expression $\Delta S = \frac{q_{rev}}{T}$ When water freezes in a glass beaker, choose the correct statement amongst the following : 1

a) ΔS (system) decreases and ΔS (surroundings) also decreases.
b) ΔS (system) decreases but ΔS (surroundings) increases.
c) ΔS (system) decreases but ΔS (surroundings) remains the same.
d) ΔS (system) increases but ΔS (surroundings) decreases.

62. An isochoric process takes place at constant 1

a) temperature
b) pressure
c) volume
d) concentration

63. For the process, H O (l) + 40.7 kJ H_2O (g) ,select the correct statement: 1

a) ΔH < 0 hence process is endothermic
b) ΔH > 0 hence process is exothermic
c) ΔH < 0 hence process is exothermic
d) ΔH > 0 hence process is endothermic

64. Which of the following statement is not correct? 1

a) ΔG is positive for a non-spontaneous reaction
b) ΔG is zero for a reaction at equilibrium
c) ΔG is positive for a spontaneous reaction
d) ΔG is negative for a spontaneous reaction

65. Which one is the correct unit for entropy? 1

a) JK^{-1} mol
b) kJ mol
c) JK^{-1} mol^{-1}
d) KJ mol^{-1}

66. During complete combustion of one mole of butane, 2658 kJ of heat is released. The thermochemical reaction for above change is 1

a) $C_4H_{10}(g) + O_2(g) \rightarrow 4CO_2(g) + 5H_2O(l)\ \Delta_c H = 2658.0\ kJ\ mol^{-1}$
b) $2C_4H_{10}(g) + 13O_2(g) \rightarrow 8CO_2(g) + 10H_2O(l)\ \Delta_c H = -2658.0\ kJ$
c) $C_4H_{10}(g) + O_2(g) \rightarrow 4CO_2(g) + 5H_2O(l)\ \Delta_c H = -2658.0\ kJ\ mol^{-1}$
d) $C_4H_{10}(g) + \frac{13}{2}O_2(g) \rightarrow 4CO_2(g) + 5H_2O(l)\ \Delta_c H = +2658.0\ kJ\ mol^{-1}$

67. For the reaction at 298 K, $A + B \rightarrow C$, ΔH = 400 kJ mol^{-1} and ΔS = 0.2 kJ $K^{-1}mol^{-1}$ .At what temperature will the reaction become spontaneous considering ΔH and ΔS to be constant over the temperature range. 1

a) 3500 K
b) 2000 K
c) 1500 K
d) 2500 K

68. Thermodynamics is not concerned about 1

a) energy changes involved in a chemical reaction.
b) the rate at which a reaction proceeds.
c) the feasibility of a chemical reaction.
d) the extent to which a chemical reaction proceeds.

69. A reaction, A+B $\rightarrow$ C+D+q is found to have a positive entropy change reaction will be: 1

a) spontaneous at high temperature
b) spontaneous only at low temperature
c) spontaneous at all temperature
d) nonspontaneous at all temperature

70. Which of the following relationship is true? 1

a) $C_p = C_v$
b) $C_p > C_v$
c) $C_p = C_v = 0$
d) $C_v > C_p$

71. Enthalpies of formation of CO(g), O_2 (g), N_2O (g)and N_2O_4 (g) are -110, –393, 81 and 9.7 kJ mol^{-1}respectively. Find the value of $\Delta_r H$ for the reaction: N_2O_4 (g) + 3CO (g) $\rightarrow$ N_2O (g) + $3CO_2$ (g) 1

a) - 850 kJ
b) -600 kJ
c) -778 kJ
d) -802 kJ

72. Enthalpy of sublimation of a substance is equal to 1

a) enthalpy of fusion
b) enthalpy of fusion + enthalpy of vapourisation
c) twice the enthalpy of vapourisation
d) enthalpy of vapourisation

73. For the process to occur under adiabatic conditions, the correct condition is: 1

a) q = 0
b) $\triangle$T = 0
c) $\triangle$p = 0
d) w = 0

74. The standard enthalpies for formation of elements in their reference states are taken as zero. The standard molar enthalpy of formation of a compound 1

a) is never negative
b) may be positive or negative
c) is always negative
d) is always positive

75. Which of the following property is not a state function? 1

a) Work
b) enthalpy
c) internal energy
d) entropy

76. Standard Molar Enthalpy of Formation is the standard enthalpy change for the formation of - 1

a) one mole of a compound from its elements in their most stable states of aggregation.
b) one kg of a compound from its elements in their most stable states of aggregation.
c) one mole of a compound from its elements in at a pressure of 2 bar and 25° C.
d) one mole of a compound from its elements in at a pressure of 10 bar and 30° C.

77. The bond enthalpy depends on: 1

a) electronegativity
b) all of these
c) bond length
d) size of the atom

78. The state of a gas constant can be described by quoting the relationship between 1

a) temperature, amount, pressure
b) pressure, volume, temperature
c) amount, volume, temperature
d) pressure, volume, temperature, amount

79. Enthalpy of combustion of carbon to CO_2 is 393.5 kJ mol^{-1}. Calculate the heat released upon formation of 35.2 g of CO_2 from carbon and dioxygen gas. 1

a) -275 kJ
b) -375 kJ
c) -398 kJ
d) -315 kJ

80. For the process depicted by the equation: 1

H_2O (s) $\longrightarrow$ H_2O (l)

Δ H = + 1.43 kcal mol^{-1}. It represents:

a) Enthalpy of vaporization
b) Enthalpy of sublimation
c) Enthalpy of condensation
d) Enthalpy of fusion

Biology

81. The ovary belonging to a single free carpel is called 1

a) Syncarpous
b) Apocarpous
c) Polycarpous
d) Megacarpous

82. Pulses which we use for daily purpose belong to the family 1

a) Malvaceae
b) Solanaceae
c) Fabaceae
d) Liliaceae

83. The dye plant belonging to family Fabaceae is 1

a) Lupin
b) Trifolium
c) Indigofera
d) Sesbania

84. The Aleurone layer of Maize grain is especially rich in 1

a) Lipid
b) Auxine
c) Protein
d) Starch

85. In acropetal succession of an inflorescence, the position of youngest floral bud is at 1

a) Distal
b) Intercalary
c) Proximal
d) Anywhere

86. Largest bud is found in 1

a) Cabbage
b) Wolffia
c) Sunflower
d) Cauliflower

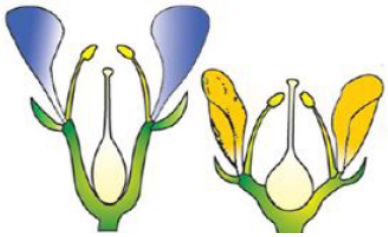
87. The science that deals with the study of form, size, colour, structure and relative position of various parts of organism is called 1

a) Morphology
b) Histology
c) Cytology
d) Anatomy

88. In floral formula, 'P' stands for 1

a) Petals
b) Position of the petals
c) Parallel venation
d) Perianth

89. The diagram below shows 1



a) Perigynous and Hypogynous
b) Epigynous and Hypogynous
c) Hypogynous and Epigynous
d) Both are perigynous.

90. Edible part of Coconut is **1**

a) Mesocarp and Endospem
b) Mesocarp and Embryo
c) Epicarp and Mesocarp
d) Endosperm and Embryo

91. A flower which can be divided into two equal vertical halves by only one plane is called **1**

a) Zoomorphic
b) None of these
c) Zygomorphic
d) Actinomorphic

92. Edible part of apple is **1**

a) Fleshy thalamus
b) Fleshy ovary
c) Endosperm and pericarp
d) Pericarp and placenta

93. Placentation in a syncarpous, unilocular ovary bearing two or more placentae longitudinally along the wall is called **1**

a) Axile
b) Marginal
c) Apical
d) Parietal

94. The mature seeds of plants do not possess endosperm because **1**

a) The plants are not angiosperms.
b) Endosperm is not formed in them.
c) Double fertilization does not take place in the plants.
d) Endosperm gets used up by the developing embryo during seed development.

95. Among pea tendril, lemon thorn and Opuntia spines, which one are homologous structures? **1**

a) Pea tendrils and Opuntia spines
b) Opuntia and lemon thorn
c) All of these
d) Pea tendrils and lemon thorn

96. Ribosome are granules formed of **1**

a) mRNA and rRNA
b) rRNA and protein
c) rRNA and tRNA
d) mRNA and protein

97. Who was the first to explain that cells divide? **1**

a) Anton von LeeuwenHoek
b) Schwann
c) Rudolph Virchow
d) Robert Brown

98. Which one is not a difference between Prokaryotic and Eukaryotic cell? **1**

a) Presence of cell wall
b) Number of chromosomes
c) Presence of membrane bounded organells
d) Presence of nuclear membrane

99. Which one is present nearest to plasmamembrane? **1**

a) Middle lamella
b) Tonoplast
c) Primary wall
d) Secondary wall

100. The chromatin contains some basic proteins are called as **1**

a) Satellite
b) Non-histones
c) Kinetochores
d) Histones

101. Which of the following plastids stores starch? **1**

a) Elaioplasts
b) Chloroplasts
c) Amyloplasts
d) Aleuroplasts

102. Proteins synthesized by ribosomes on the endoplasmic reticulum are modified in **1**

a) Tubules
b) Cisternae
c) Vesicles
d) Stroma

103. The organelle involved in respiration is **1**

a) Chloroplast
b) Golgi complex
c) Endoplasmic reticulum
d) Mitochondria

104. Golgi apparatus are the site for formation of **1**

a) Enzymes
b) Glycolipids and glycoproteins
c) Lipids
d) Carbohydrates

105. Subunits of 80S ribosome are **1**

a) 60 S and 20 S
b) 60 S
c) 40 S and 60 S
d) 40 S

106. Proteins are polymerisation product of **1**

a) Monosaccharide b) Muramic acid
c) Glucose d) Amino acids

107. Metal ions required for functioning of enzyme is **1**

a) Prosthetic group b) Co-factor
c) Holoenzyme d) Co-enzyme

108. Enzymes functional inside the living cells are called **1**

a) Endoenzymes b) Holoezymes
c) Exoenzymes d) Coenzymes

109. The energy currency of cell is— **1**

a) NAD b) ATP
c) GDP d) ADP

110. Base pairs found in 5 turns of DNA spirals are **1**

a) 50 b) 100
c) 10 d) 20

111. Which of the following elements is highest in percentage composition in the human body? **1**

a) Hydrogen b) Carbon
c) Nitrogen d) Oxygen

112. The amino acids are linked together serially by **1**

a) Peptide bonds b) Covalent bonds
c) Hydrogen bonds d) Ionic bonds

113. Which type of cell division helps in regeneration? **1**

a) Meiosis b) Amitosis
c) Mitosis d) Meiotic

114. In some lower plants and social insects, the haploid cells are divide by **1**

a) Meiosis b) Karyokinesis
c) Mitosis d) Cytokinesis

115. During which stage the cell organelles reappear in cell division? **1**

a) Telophase b) Prophase
c) Metaphase d) Anaphase

116. What is the function of mitosis? **1**

a) Growth and repair b) None of these
c) Cell division d) Growth

117. Number of chromosome and amount of DNA content per cell change during **1**

a) Metaphase and S-phase b) Telophase and M-phase
c) Interphase and G1 phase d) Anaphase and S-phase

118. Astral bodies are formed of **1**

a) Microvilli b) Microtubules
c) Microfilaments d) Intermediate filaments

119. At the end of meiosis II how many cells are formed? **1**

a) Four haploid cells. b) Two haploid cells
c) Four diploid cells d) Two diploid cells

120. In which stage of mitosis, the number and shape of chromosome can be observed? **1**

a) Anaphase b) Metaphase
c) Prophase d) Telophase

Solution

Class 11 - Physics

Multiple Choice Examination (October-2019)

Section A

1. (a)
$\mathbf{A}\mathbf{B} = \mathrm{A_x B_x} + \mathrm{A_y B_y} + \mathrm{A_z B_z}$

Explanation:
A = A_x i+ A_y j+ A_zk
B = B_x i+ B_y j+ B_zk
A. B = (A_x i+ A_y j+ A_zk). (B_x i+ B_y j+ B_zk)
A. B = A_xB_x + A_yB_y + A_zB_z

2. (a)
360000 J, 101 m/s

Explanation:
$P = \frac{Energy}{Time}$
$Energy = P \times Time = 100 \times 1Hr$
$Energy = 100 \times 1 \times 60 \times 60 = 360000J$
for a 70 Kg man $K = \frac{1}{2}mv^2$
speed of man $v = \sqrt{\frac{2K}{m}} = \sqrt{\frac{2 \times 360000}{70}} = 101m/s$

3. (a)
Force and displacement are perpendicular to each other

Explanation:
Work done is given as
W = Fdcosθ
Here θ is the angle between F and d if both are perpendicular then θ = 90 degree so cosθ = 0 and thus work done is 0 .

4. (b)
8.5 cm

Explanation:
For maximum compression of spring kinetic energy will be converted into potential energy of spring.
$\frac{1}{2}kx^2 = \frac{1}{2}mv^2$
$x^2 = \frac{mv^2}{k} = \frac{6 \times 3 \times 3}{75 \times 10^2}$
$x = \sqrt{\frac{6 \times 3 \times 3}{75 \times 10^2}} = 0.085m = 8.5cm$

5. (c)
10.36 m/s

Explanation:
Mass of troly M = 200Kg
mass of child m = 20Kg

speed of trolley v = 36Km/hr=36 x 5/18 = 10m/s
Let v' be the final velocity of the trolley with respect to the ground.
Final velocity of the boy with respect to the ground = $v' - 4$
from conservation of linear momentum

$p_i = p_f$

$(M + m)v = Mv' + m(v' - 4)$

$(200 + 20) \times 10 = 200v' + 20(v' - 4)$

$2200 = 220v' - 80$

$v' = \frac{2280}{220} = 10.36m/s$

6. (d)
6.45×10^{-3} kg

Explanation:
Work done by force applied against gravity for one lift will be
$W = Fs = mgh = 10 \times 9.8 \times 0.5 = 49J$
So work done for 1000 lifts = 49 x 1000 = 49000 J
efficiency = Work done / energy from fat
energy from fat used =Work done / efficiency
$E = \frac{W}{\eta} = \frac{49000}{0.2} = 245000J$
Energy from per kilogram fat = 3.8×10^7 J
Fat used $= \frac{245000}{3.8 \times 10^7} = 64473 \times 10^{-7} = 6.45 \times 10^{-3} Kg$

7. (b)
ball 2 moves with a velocity of 2 m /s

Explanation:
in elastic collision (e = 1) if mass of colliding bodies is same then their velocities after collision interchanged.

$m_1 = 150gm$

$m_2 = 150gm$

$u_1 = 2m/s$

$u_2 = -1.5m/s$

$v_1 = \left(\frac{m_1 - m_2}{m_1 + m_2}\right) u_1 + \left(\frac{2m_2}{m_1 + m_2}\right) u_2 = -u_2 = -1.5m/s$

$v_2 = \left(\frac{2m_1}{m_1 + m_2}\right) u_1 + \left(\frac{m_2 - m_1}{m_1 - m_2}\right) u_2 = u_1 = 2m/s$

so that ball 2 moves with a velocity of 2 m /s

8. (c)
3.61 m/s

Explanation:

$\Delta K = W$

$F = 36N$

$f = \mu R = \mu mg = 0.3 \times 4.3 \times 9.8 = 12.642N$

$F_{net} = F - f = 36 - 12.642 = 23.358N$

$s = 1.2m$

$\frac{1}{2}mv^2 - 0 = F_{net}s$

$\frac{1}{2} \times 4.3 \times v^2 = 23.358 \times 1.2$

$v^2 = \frac{23.358 \times 1.2 \times 2}{4.3} = 13.03$

$v = \sqrt{13.03} = 3.61m/s$

9. (d)
work done by an applied force on a body moving on a rough horizontal plane with uniform velocity

Explanation:
When a body is moving on a rough horizontal surface then their will be 2 forces acting on the body
1. Applied force (in the direction of motion)
2. friction (opposite to direction of motion)
As applied force is in same direction as displacement so work done will be positive.

10. (a)
the product of component of the force in the direction of the displacement and the magnitude of the displacement

Explanation:
Work done is given by
W = (Fcosθ)d
here Fcosθ is the component of applied force in direction of displacement and d is magnitude of displacement.

11. (d)
241 W

Explanation:

$P = \frac{W}{t}$

$W = mgh = 50 \times 9.8 \times 443$

$t = 15 \times 60 \sec$

$P = \frac{50 \times 9.8 \times 443}{15 \times 60} = 241W$

12. (b)
3.77×10^{26} W

Explanation:
Energy liberated per second
$E = mc^2 = 4.19 \times 10^9 \times 3 \times 10^8 \times 3 \times 10^8 = 37.71 \times 10^{25}J$
power output of sun is equal to energy output per second
$P = \frac{W}{t} = \frac{37.71 \times 10^{25}}{1} = 3.77 \times 10^{26}W$

13. (b)
32.0 N

Explanation:
from work–energy theorem
change in kinetic energy = work done

$$\Delta K = W$$

$$K_f - K_i = Fs$$

$$\frac{1}{2}m{v_f}^2 - \frac{1}{2}m{v_i}^2 = Fs$$

$$\frac{1}{2}m\left({v_f}^2 - {v_i}^2\right) = Fs$$

m = 8Kg, s = 2.5m
v_f = 6m/s, v_i = 4m/s

$$\frac{1}{2} \times 8\left(6^2 - 4^2\right) = F \times 2.5$$

$$4 \times 20 = F \times 2.5$$

$$F = \frac{80}{2.5} = 32N$$

14. (c)
forces, doing work on it, are conservative

Explanation:
Mechanical energy is the sum of kinetic and potential energy in an object that is used to do work. In other words, it is energy in an object due to its motion or position, or both. In case of conservative forces total mechanical energy remains conserved because potential energy applicable only for conservative forces.

15. (b)
represents work done by F(x).

Explanation:
Work done by a variable force is given by
W = $\int F(x)dx$
above integration gives us area area under F and x.

16. (d)
35840 J

Explanation:
Kinetic energy of cheetah

$$K = \frac{1}{2}mv^2$$

$$m = 70Kg$$

$$v = 32m/s$$

$$K = \frac{1}{2} \times 70 \times 32 \times 32 = 35840J$$

17. (b)
1 m /s to the left.

Explanation:
from conservation of linear momentum initial momentum = final momentum

$\vec{p}_i = \vec{p}_f$

$(500 \times 0) + [500 \times (-2)] = (500 + 500)\, v$

$-1000 = 1000v$

$v = -1m/s$

negative sign indicate that cars moves to the left.

18. (c)
the sum of potential and kinetic energies

Explanation:
mechanical energy = sum of potential and kinetic energies
a falling ball will have both these energies in between topmost and bottomost points of its motion so mechanical energy is the sum of potential and kinetic energies.

19. (d)
43.3 kW

Explanation:

$P = \dfrac{W}{t}$

$W = mgh$

$30m^3 = 30000 = 3 \times 10^4 lit$

mass of 30000 lit water = 30000 Kg

$P = \frac{mgh}{t} = \frac{3 \times 10^4 \times 9.8 \times 40}{15 \times 60} = 1.30 \times 10^4 W$

efficiency = power output / power consumption

$\eta = \dfrac{P}{P_c}$

$P_c = \dfrac{P}{\eta} = \dfrac{1.30 \times 10^4}{0.3} = 4.33 \times 10^4 = 43.3KW$

20. (b)
2.54 m/s

Explanation:
Height of ramp $h = l \sin 30^\circ = 1 \times \frac{1}{2} = 0.5m$
from work kinetic energy theorm

$K_f - K_i = W_{mg} + W_f$

$\dfrac{1}{2}mv^2 - 0 = mgh + fd$

$\dfrac{1}{2} \times 3v^2 = (3 \times 9.8 \times 0.5) + [5 \times (-1)]$

$\dfrac{3}{2}v^2 = 14.7 - 5$

$v = \sqrt{\dfrac{9.7 \times 2}{3}} = 2.54m/s$

21. (c)
F.d

Explanation:
Work done = force in the direction of displacement multiplied by displacement
$W = \vec{F}.\vec{d}$

22. (c)

Newton

Explanation:
In International System of Units (SI) the newton is the unit for force. It is equal to the amount of net force required to accelerate a mass of one kilogram at a rate of 1 m/sec^2 in direction of the applied force. It is named after Isaac Newton in recognition of his work on classical mechanics, specifically Newton's second law of motion.
$1N = 1Kgm/\sec^2$
Dyne is a cgs unit of force. One dyne is equal to 10^{-5} N

23. (d)
0, -25.1 J

Explanation:
work done by tension will be zero because tension is perpendicular to displacement.
$W = Ts\cos 90^\circ = 0$
work done by gravity in semicircle from the lowest to the highest point on the path
$W = mgh\cos 180^\circ = 0.8 \times 9.8 \times 3.2 \times (-1) = -25.1J$

24. (c)
a scalar

Explanation:
Scalar product means dot product and dot product of 2 vectors gives a scalar , example dot product of force and displacement gives work which is scalar

25. (d)
The class of forces where work done against the force gets stored up as energy.

Explanation:
Potential energy is the stored energy of an object. It is the energy by virtue of an object's position relative to other objects. Potential energy is often associated with restoring forces such as a spring or the force of gravity. It is applicable only for conservative forces.

26. (a)
50 J

Explanation:
Mass of the body, *m*= 0.5 kg
Velocity of the body $v = ax^{3/2}$
$\mathrm{a} = 5\mathrm{m}^{-1/2}\mathrm{s}^{-1}$
Initial velocity at *x* = 0 is u = 0
Final velocity at *x* = 2 m is $v = 10\sqrt{2}m/s$
work done = Change in kinetic energy
$W = K_f - K_i$
$W = \frac{1}{2}mv^2 - 0$
$W = \frac{1}{2} \times 0.5 \times \left(10\sqrt{2}\right)^2 = \frac{1}{2} \times 0.5 \times 200 = 50J$

27. (a)
25.9 m

Explanation:
Mass of troly M = 200Kg
mass of child m = 20Kg
speed of trolley v = 36Km/hr=36 x 5/18 = 10m/s

Let v' be the final velocity of the trolley with respect to the ground.
Final velocity of the boy with respect to the ground = $v' - 4$
from conservation of linear momentum

$p_i = p_f$

$(M + m)v = Mv' + m(v' - 4)$

$(200 + 20) \times 10 = 200v' + 20(v' - 4)$

$2200 = 220v' - 80$

$v' = \frac{2280}{220} = 10.36m/s$

Time taken by the boy to run t = 10/4 = 2.5 sec
Distance moved by the trolley = $v't = 10.36 \times 2.5 = 25.9m$

28. (c)
depends only on the end points

Explanation:
A force is said to be conservative if work done by this force is independent of path and is dependent only on end points .

29. (c)
5.3 m/s

Explanation:
95% potential energy is converted in kinetic energy.
applying conservation of mechanical energy between horizontal and lowermost points

$mgl \times \frac{95}{100} = \frac{1}{2}mv^2$

$gl \times \frac{95}{100} = \frac{1}{2}v^2$

$v = \sqrt{\frac{2 \times gl \times 95}{100}} = \sqrt{\frac{2 \times 9.8 \times 1.5 \times 95}{100}} = 5.3m/s$

30. (b)
time dependence

Explanation:
According to work energy theorem :
Net work done on a body equals change in its kinetic energy
So it does not give any information about time dependence.

31. (d)
ball 1 moves to the right with a velocity of 1m/s and ball 2 also moves to the right at 4 m/s

Explanation:

$m_1 = 100gm$

$m_2 = 50gm$

$u_1 = 3m/s$

$u_2 = 0$

$v_1 = \left(\frac{m_1 - m_2}{m_1 + m_2}\right)u_1 + \left(\frac{2m_2}{m_1 + m_2}\right)u_2 = \left(\frac{50}{150} \times 3\right) + 0 = 1m/s$

$v_2 = \left(\frac{2m_1}{m_1 + m_2}\right)u_1 + \left(\frac{m_2 - m_1}{m_1 - m_2}\right)u_2 = \left(\frac{200}{150} \times 3\right) + 0 = 4m/\text{s}$

32. (c)

8.82 J

Explanation:
Whole of the potential energy of bolt converted in to heat energy
heat produced by the impact = mgh =$0.3 \times 9.8 \times 3 = 8.82J$

33. (c)
4.48 m/s

Explanation:
from work–energy theorem
change in kinetic energy = work done
$\Delta K = W$
$K_f - K_i = Fs$
$\frac{1}{2}mv^2 - 0 = Fs$
m = 4.30Kg, s = 1.2m, F= 36N
v_f = vm/s, v_i = 0
$\frac{1}{2}mv^2 = Fs$
$\frac{1}{2} \times 4.3 \times v^2 = 36 \times 1.2$
$v = \sqrt{\frac{36 \times 1.2 \times 2}{4.3}} = 4.48m/s$

34. (d)
953 N/m

Explanation:
Potential energy of spring converted in to potential energy
$\frac{1}{2}kx^2 = mgh$
$k = \frac{2mgh}{x^2} = \frac{2 \times 35 \times 10^{-3} \times 9.8 \times 20}{0.12 \times 0.12} = 953N/m$

35. (a)
742.5 W

Explanation:
Total power required to overcome a force of 165 N and to maintain a speed of 9.00 m/s
F = 165N
v = 9m/s
$P = Fv = 165 \times 9 = 1485W$
if each rider contribute equal power, then power required per rider will be P/2 = 1485/2 = 742.5W

36. (a)
49000 J

Explanation:
Work done by force applied against gravity for one lift will be
$W = Fs = mgh = 10 \times 9.8 \times 0.5 = 49J$
So work done for 1000 lifts = 49 x 1000 = 49000 J

37. (a)
1.10×10^5J

Explanation:
m = 800Kg per minute
h = 14m
work done per minute in lifting the water
$W = mgh = 800 \times 9.8 \times 14 = 109760J = 1.1 \times 10^5 J$

38. (a)
0.115

Explanation:
Weight of block can be resolved in two components.
component parellal to incline plane $(mg\sin 37^\circ)$and component perpendicular to plane $(mg\cos 37^\circ)$
at equilibrium

R = mg cos 37^o
f = μR = μmg cos 37
Net force acting on the block = $mg\sin 37^\circ - f$
$= mg\sin 37^\circ - \mu mg\cos 37^\circ$
At equilibrium, the work done by the block is equal to the potential energy of the spring, i.e.,
= mg sin 37^o - μmg cos 37^o = $\frac{1}{2}$kx^2
$(1 \times 9.8 \times 0.6) - (\mu \times 1 \times 9.8 \times 0.8) = \frac{1}{2} \times 100 \times 0.1$
0.602 - 0.799μ = 0.510
$\mu = \frac{0.092}{0.799} = 0.115$

39. (d)
-1750 J

Explanation:
$W = -mgh$

$h = x\cos 30^\circ = 2.75 \times \dfrac{\sqrt{3}}{2}$

$W = -75 \times 9.8 \times 2.75 \times \dfrac{\sqrt{3}}{2} = -1750J$

40. (a)
0.15 m

Explanation:
for maximum compression
$\dfrac{1}{2}kx^2 = \dfrac{1}{2}mv^2$

$x = \sqrt{\dfrac{mv^2}{k}} = \sqrt{\dfrac{0.8 \times 1.2 \times 1.2}{50}} = 0.15m$

the maximum compression of the spring after the collision = 0.15m

Solution

Class 11 - Chemistry

Multiple Choice Examination (October-2019)

Section A

41. (b) 4.2154×10^{23} electrons
Explanation:
$moles\ of\ N_2 = \frac{1.4}{28} = 0.05\ mol$
$And\ 1\ mole\ of\ N_2 = 6.022 \times 10^{23}\ molecules\ of\ N_2$
$And\ 1\ molecule\ of\ N_2\ has\ 14\ electrons$
$total\ number\ of\ electrons\ in\ 1.4\ g\ of\ N_2 = 0.5 \times 6.022 \times 10^{23} \times 14 = 4.214 \times 10^{23}$

42. (c)
$\frac{an^2}{V^2}$

Explanation:
The term represents the correction in pressure due to the forces of attraction between the molecules in a real gas. The actual pressure exerted on the walls of the vessel by real gas is less, by the amount $\frac{an^2}{V^2}$ than the pressure exerted by an ideal gas.

43. (a)
1247.7 g/mol

Explanation:
$PV = \frac{mRT}{M}$
$M = \frac{mRT}{PV}$
$M = \frac{0.0625g \times 0.083bar\ dm^3K^{-1}mol^{-1} \times 819K}{0.1bar \times 34.05 \times 10^{-3}dm^3}$
M = 1247.7g/mol

44. (d) High pressure and Low temperature
Explanation:
A gas which obeys the ideal gas equation, p V = nRT under all conditions of temperature and pressure is called an 'ideal gas'.
However, there is no gas which obeys the ideal gas equation under all conditions of temperature and pressure. Hence, the concept of ideal gas is only theoretical or hypothetical. The gases are found to obey the gas laws fairly well when the pressure is low or the temperature is high.
Such gases are, therefore, known as 'real gases'. All gases are real gases. Hence, at high pressure and low temperature, a real gas deviates most from ideal behaviour.

45. (c) surface tension
Explanation:
Due to surface Tension, the water droplet tends to acquire minimum surface area, hence water droplet attains spherical shape.

46. (c)
the triple point.

Explanation:
Triple point of a substance is the temperature and pressure at which three phases (i.e. gas, liquid and solid) of that substance coexist at thermal equilibrium.
The triple point of pure water is at 0.01°C (273.16K, 32.01°F) and 4.58 mm (611.2Pa) of mercury, where all the three (i.e., solid, liquid and gas) states coexist in equilibrium.

47. (b)
Decreases

Explanation:
In general, **surface tension** decreases when **temperature** increases because cohesive forces decrease with an **increase** of molecular thermal activity. The influence of the surrounding environment is due to the adhesive action **liquid** molecules have at the interface.

48. (b) Decreases
Explanation:
As temperature increases surface tension decreases beacuse the cohesive forces decreases with increase of molecular thermal activity.

49. (b)
hydrogen bonds.

Explanation:
In water molecules, due to high electronegitivity difference between H and O atoms and lone pairs of electrons on oxygen atom, greater number of hydrogen bonds formed

50. (b)
It has comparatively more force of attraction than other gases

Explanation:
It has comparatively more force of attraction than other gases

51. (d)
Directly proportional to its absolute temperature

Explanation:
The question is based on understanding the postulates of kinetic theory of gases, according to which,the average kinetic energy of a gas particle is **directly proportional** to the **absolute** temperature. An increase in temperature increases the speed in which the gas molecules move. All gases at a given temperature have the same average kinetic energy.

52. (b) less than unit electronic charge
Explanation:
Partial charge is a small charge developed by displacement of electrons. It is less than unit electronic charge and is represented as δ^+ or δ^-

53. (b)
70 g/mol

Explanation:
using relation; PV=(m/M)RT
we have
$P_1M_1 = P_2M_2$
$P_1 = \frac{P_2M_2}{M_1} = \frac{5\times28}{2} = 70$

54. (a)
In hydrogen bonding H atom becomes partially negative and is attracted to the more positive N atom.

Explanation:
Hydrogen atom covalently bonded to highly electronegative atom such as N,O experience electrostatic field of another highly electronegative atom due to which a partial positive charge is developed on H atom.

55. (c)
Increases by three times

Explanation:
This question is based on simple application of Boyle's Law which states that the pressure of a given mass of an ideal gas is inversely proportional to its volume at a constant temperature.
$P_1V_1 = P_2V_2$
$according\ to\ the\ question,\ P_1 = P,\ V_1 = V\ ,\ P_2 = \frac{P}{3},\ V_2 = ?$
$V_2 = \frac{P_1V_1}{P_2} = \frac{P\,V}{\frac{P}{3}} = 3V$

56. (c)
$V\alpha T$

Explanation:
Charles' Law states that the volume of a fixed mass of a gas is directly proportional to the absolute temperature,**when pressure is kept constant**.

57. (a)
$8.314\ \times\ 10^4$ Pa

Explanation:
Acc. To Daltons Law
$P = P_1 + P_2$
and by applying PV=nRT
$P_1 \times 9 = 0.2 \times RT$ and $P_2 \times 9 = 0.1 \times RT$ where T = 300K
now using $P = P_1 + P_2$
$P = P_1 + P_2 = \frac{(0.2+0.1)}{9} \times RT = \frac{(0.2+0.1)}{9} \times \frac{0.0821\times300}{1} = 0.82\ atm$
$P\ =\ 0.82\ atm\ =\ 0.82\ \times 101325\ =\ 83086.5\ pa\ =\ 8.3\ \times\ 10^4\ pa$

58. (b)
Varies directly with the temperature

Explanation:
The question is based on statement of **Gay Lussac's law-**" At constant temperature, the pressure of a given mass of a gas is directly proportional to its absolute temperature."
mathematically;
$P\alpha T$ (at constant temperature)
or P/T = constant

59. (a)
Equal to one

Explanation:
Compressibility Factor :
It is simply defined as the ratio of the molar volume of a **gas** to the molar volume of an **ideal gas** at the same temperature and pressure. hence for an ideal gas, the compressibility factor is equal to 1. The Compressibility Factor is a useful thermodynamic property for modifying the **ideal gas** law to account for the real **gas** behavior.

60. (d) 0.8 bar
Explanation:
A mixture of $_{H2}$ and O_2 contains 20% by weight of H_2 means H_2= 20g and O_2 =80g
moles of hydrogen , $n_{H_2}\ = \frac{20}{2} = 10\ mol$
moles of oxygen, $n_{O_2}\ = \frac{80}{32} = 2.5\ mol$
mole fraction of hydrogen, $x_{H_2}\ = \frac{n_{H_2}}{n_{H_2}+n_{O_2}} = \frac{10}{10+2.5} =\ 0.8$
partial pressure of H_2 , $P_{H_2} = P_{Total} \times x_{H_2} = 1bar \times 0.8 = 0.8\ bar$

61. (b)
ΔS (system) decreases but ΔS (surroundings) increases.

Explanation:
For freezing of process since process is spontaneous therefore if ΔS (system) decreases but ΔS (surroundings) increases.Also, Freezing is exothermic process. The heat released increases the entropy of surrounding.

62. (c) volume
Explanation:
An isochoric process is a thermodynamic process in which the volume remains constant.

63. (d)
ΔH > 0 hence process is endothermic

Explanation:

Heat is utilized in this reaction so reaction is endothermic and for an endothermic process $\Delta H > 0$.

64. (c)
ΔG is positive for a spontaneous reaction

Explanation:
ΔG <0 (negative) for a spontaneous change.

65. (c)
JK^{-1} mol^{-1}

Explanation:
$As\ \triangle S = \frac{q_{rev}}{T}$
$It\ is\ an\ extensive\ entropy,\ therefore,\ the\ SI\ \ unit\ of\ entropy\ change\ is\ Joule\ K^{-1}mol^{-1}$

66. (b)
$2C_4H_{10}\left(g\right) + 13O_2\left(g\right) \rightarrow 8CO_2\left(g\right) + 10H_2O\left(l\right) \Delta_cH = -2658.0\ kJ\ mol^{-1}$

Explanation:
Enthapy of combustion is the energy released when 1mole of a hydrocarbon (butane) reacts completely in presence of excess of oxygen. The chemical equation for exothermic reaction for combustion of one mole of butane is represented as;
$2C_4H_{10}\left(g\right) + 13O_2\left(g\right) \rightarrow 8CO_2\left(g\right) + 10H_2O\left(l\right) \Delta_cH = -2658.0\ kJ\ mol^{-1}$

67. (b)
2000 K

Explanation:
Gibbs free energy, ΔG= ΔH-TΔS.
At equilibrium ΔG=0; then T= ΔH/ΔS = 2000K.
Therefore, above 2000K, the reaction will be spontaneuous.

68. (b)
the rate at which a reaction proceeds.

Explanation:
Thermodynamics tells that whether reaction will take place or not. It doesnot tell about the rate (speed) of reaction.

69. (c)
spontaneous at all temperature

Explanation:
We know, Δ G = Δ H - TΔ S
Δ H = -ve (as reaction is exothermic)
Δ S = +ve
so, Δ G = - Δ H - TΔ S
Δ G will be negative at all temperature hence reaction will be spontaneous at all temperature.

70. (b)
$C_p > C_v$

Explanation:
We know, $C_p - C_v = R$
Hence, $C_p > C_v$

71. (c)
-778 kJ

Explanation:
$Heat\ of\ reaction,\ \triangle_rH = \sum\triangle_rH_{products} - \sum\triangle_rH_{reactants} \ \ \Rightarrow\triangle_rH = [\triangle_fH(N_2O) + 3\triangle_fH(CO_2)] - [\triangle_fH(N_2O_4) + 3\triangle_fH(CO)] \Rightarrow\triangle_rH = [81\ + \{3 \times (-393$

72. (b)
enthalpy of fusion + enthalpy of vapourisation

Explanation:
The process of sublimation involves the change of solid into vapour. Though in sublimation a solid does not pass through the liquid phase on its way to the gas phase, the enthalpy change is equal to the sum of enthalpy of fusion and enthalpy of vaporization because enthalpy is a state function.

73. (a)
q = 0

Explanation:
Adiabatic condition would not allow exchange of heat between system and surroundings. Hence q = 0

74. (b)
may be positive or negative

Explanation:
Standard molar enthapy of formation of a compound from its elements can be +ve or –ve.
$For\ example:\ C\ +\ O_2(g) \rightarrow\ CO_2(g)\ ;\ \triangle_rH =\ -393.5\ kJmol^{-1}$
$N_2(g)\ +\ \frac{1}{2}\ O_2\ (g)\ \rightarrow N_2O\ (g\ )\ ;\triangle_rH =\ +92\ kJmol^{-1}$

75. (a)
Work

Explanation:
Work is not a state function because it is proportional to the distance an object is moved, which depends on the path used to go from the initial to the final state.

76. (a)
one mole of a compound from its elements in their most stable states of aggregation.

Explanation:
The standard enthalpy change for the formation of one mole of a compound from its elements in their most stable states of aggregation (reference states) is standard molar enthalpy of formation.

77. (b)
all of these

Explanation:
The bond enthalpy depends on many factors: sizes of atoms involved in the bond, differences in their electronegativity, bond length, electron affinities etc.

78. (d)
pressure, volume, temperature, amount

Explanation:
State of gas constant is determined by stating the value of P,V,n,T.
i.e. $R = \frac{PV}{nT}$

79. (d)
-315 kJ

Explanation:
When 1 mole of CO_2 is produced energy released is –393.5 kJ mol^{-1}. Moles of CO_2 given = 35.2/44 = 0.8 moles; So energy released $= 0.8 \times 393.5$ kJ/mol = 315 kJ/mol

80. (d)
Enthalpy of fusion

Explanation:
In this process 1 mole of solid water is converted to liquid state. Fusion or melting is endothermic, so all enthalpies of fusion are positive.

Solution

Class 11 - Biology

Multiple Choice Examination October 2019

Section A

81. (b)
Apocarpous

Explanation:
When the several pistils of thesame flower are separate and the ovary belongs to a single free carpel, it is called apocarpous.

82. (c)
Fabaceae

Explanation:
Fabaceae are the sources of pulses such as gram, arhar,sem, moong, soyabean.

83. (c)
Indigofera

Explanation:
Indigofera is a dye belonging to family Fabaceae.

84. (c)
Protein

Explanation:
Aleurone layer of maize grain is rich in proteins. It is the outermost layer of the endosperm followed by the inner starchy endosperm.

85. (a)
Distal

Explanation:
In acropetal succession of an inflorescence, the youngest floral buds are found at distal end and the oldest flower are found at proximal end.

86. (a)
Cabbage

Explanation:
Cabbage is bud of thecabbage plant. Cabbage bud is considered as largest bud present in angiospermic plants. Successive layer of leaves cover the buds to form round structure on condensed stem.

87. (a)
Morphology

Explanation:
Morphology is the branch of science in which we study about form, size, colour, structure and relative position of various parts of organisms.

88. (d)
Perianth

Explanation:
In floral formula, ‘P’ stands for Perianth.

89. (d)

Both are perigynous.

Explanation:
If gynoecium is situated in the centre and otherparts of the flower are located on the rim of the thalamus almost at thesame level, it is called perigynous. The ovary here is said to be half inferior.

90. (d)
Endosperm and Embryo

Explanation:
The edible part of Coconut is endosperm and embryo. The water inside the coconut is cellular embryo and white kernel surrounding it is main edible part that is endosperm.

91. (c)
Zygomorphic

Explanation:
The symmetry in which a flower can be divided into two equal vertical halves by only one plane is called zygomorphic flower as in pea.

92. (a)
Fleshy thalamus

Explanation:
The edible part of apple is fleshy thalamus. Apple is an example of false fruit as it contain thalamus along with ovary.

93. (d)
Parietal

Explanation:
Placentation in a syncarpous, unilocular ovary bearing two or more placentae longitudinallyalong the wall is called parietal placentation.

94. (d)
Endosperm gets used up by the developing embryo during seed development.

Explanation:
The mature seeds of plants do not possess endosperm because, it gets used up by the developing embryo during seed development.

95. (a)
Pea tendrils and Opuntia spines

Explanation:
Homologous structures are those structures in which they havecommon origin and structure but perform different functions. Pea tendrils and Opuntia spines are homologous structures.

96. (b)
rRNA and protein

Explanation:
A ribosome is a small, dense granular particle comprising usually three or four ribosomal RNA molecules and more than 50 protein molecules, interconnected to form the site of protein synthesis.

97. (c)
Rudolph Virchow

Explanation:

The German doctor Rudolf Virchow proposed in 1855 that all cells result from the division of previously existing cells, and this idea became a key piece of modern cell theory.

98. (a)
Presence of cell wall

Explanation:
Prokaryotic and Eukaryotic cells and differentiated on the basis of number of chromosomes, presence or absence of nuclear membrane and presence and absence of membrane bounded organelles. Cell wall is not a difference.

99. (d)
Secondary wall

Explanation:
The cell wall of a young plant cell, the primary wallis capable of growth, which gradually diminishes as the cell matures and the secondary wall is formed on the inner (towards membrane) side of the cell.

100. (d)
Histones

Explanation:
Histone proteins are the basic packer and arranger of chromatin.

101. (c)
Amyloplasts

Explanation:
Amyloplasts are non-pigmented organelles found in some plant cells. They are responsible for the synthesis and storage of starch granules, through the polymerization of glucose. Amyloplasts also convert this starch back into sugar when the plant needs energy.

102. (b)
Cisternae

Explanation:
The cisternae of the golgi apparatus is responsible for transporting, modifying, and packaging proteins and lipids into vesicles for delivery to targeted destinations.

103. (d)
Mitochondria

Explanation:
Mitochondria are the sites of aerobic respiration. They produce cellular energy in the form of ATP

104. (b)
Glycolipids and glycoproteins

Explanation:
Golgi apparatus is the important site of formation of glycoproteins and glycolipids.

105. (c)
40 S and 60 S

Explanation:
Each ribosome consists of two subunits.
Eukaryotes have 80S ribosomes, each consisting of a small (40S) and large (60S) subunit.
Their 40S subunit has an 18S RNA (1900 nucleotides) and 33 proteins.
The large subunit is composed of a 5S RNA (120 nucleotides), 28S RNA (4700 nucleotides), a 5.8S RNA (160 nucleotides) subunits and 46 proteins.

106. (d)
Amino acids

Explanation:
Polymerisation is the chain of large number of repeating units. Proteins are polymerizationproduct of Amino acids combine together with peptide bonds.

107. (b)
Co-factor

Explanation:
A number of enzymes require metal ions for their activity which form coordination bonds with side chains at the active site and at the same time form one or more cordination bonds with the substrate, e.g., zinc is a cofactor for the proteolytic enzyme carboxypeptidase.

108. (a)
Endoenzymes

Explanation:
Enzymes functional inside the living cells are called endoenzyme or intracellular enzyme. It function only inside the cell in which it was produced.

109. (b)
ATP

Explanation:
The most important form of energy currency in living systems is the bond energy in a chemical called ATP.

110. (a)
50

Explanation:
Each turn of DNA spirals contains 10 base pairs. So, in five turns of DNA total number of Base pair is $5 \times 10 = 50$ base pairs.

111. (d)
Oxygen

Explanation:
By mass, oxygen is the most abundant element in the human body. most of the body consists of water or H_2O. Oxygen accounts for 61-65% of the mass of the human body.

Even though there are many more atoms of hydrogen in your body than oxygen, each oxygen atom is 16 times more massive than a hydrogen atom.

112. (a)
Peptide bonds

Explanation:
The amino acids are linked together one after the other by peptide bonds. This bond is formed between NH3 of one amino acids with carboxyl end of another amino acids to release water.

113. (c)
Mitosis

Explanation:
Regeneration is the ability of organism to regain its lost body parts. Regeneration is achieved by mitotic cell division to maintain same number of chromosomes in the cell.

114. (c)
Mitosis

Explanation:
Mitosis is called equational division. Since the parent cells are haploi so mitosis will lead to restoration of chromosome number in haploid cells.

115. (a)
Telophase

Explanation:
Telophase results in reapperance of cell organelles and their subsequent distribution to the two different cells since cytokinesis begins towards the end of telophase.

116. (a)
Growth and repair

Explanation:
One of the key aspects of mitosis is to bring about increase in cell number leading to growth of the organs and replacement of the injured cells with the newly formed ones.

117. (d)
Anaphase and S-phase

Explanation:
Number of chromosome changes during anaphase of meiosis I and amount of DNA content increaseS during S-phase of cell cycle. This is reflected in disturnace of nucleocytoplasmic ratio.

118. (b)
Microtubules

Explanation:
Astral body are formed of protein microtubules. Astral bodies are produced by centriole during cell division and attach with centromere of the chromosome.

119. (a)
Four haploid cells.

Explanation:
Four haploid cells are formed at the end of meiosis II. It is reductional division resulting in halving of chromosome number in daughter cells.

120. (b)
Metaphase

Explanation:
The metaphase is characterised by all the chromosomes coming to lie at the equator with one chromatid of each chromosome connected by its kinetochore to spindle fibres from one pole and its sister chromatid connected by its kinetochore to spindle fibres from the opposite pole.