Uh - 2014

Test Admission Ticket No.						

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PHYSICS

1. Three charges 1 x 10^{-8} C, 2 x 10^{-8} C and 3 x 10^{-8} C are placed at x = 1 cm, x = 2 cm, and x = 3 cm, respectively, on x-axis from the origin. The potential energy of this arrangement relative to the potential energy for infinite separation is

   a) 7.9 x 10^{-2} J
   b) 8.55 x 10^{-4} J
   c) 6.5 x 10^{-7} J
   d) Zero

2. It is easy to climb a mountain in a zig-zag path than climbing up straight because

   a) The energy spent is less
   b) Work done is less
   c) Power required is less
   d) The velocity is less

3. A large solid sphere has a narrow tunnel through its centre and a positive charge of + Q is uniformly distributed over it. A small negatively charged particle, initially at rest at a large distance from the sphere, approaches it along the line of the tunnel and passes through it. If the speed of the particle when it reaches the surface is v, then the speed at the centre is

   a) Zero
   b) $\sqrt{2}v$
   c) $\frac{v}{\sqrt{2}}$
   d) $\sqrt{1.5v}$

4. A circuit has a resistance of 30 Ω in series with an inductive reactance of 40 Ω. They are connected in series with an *ac* source. If the peak value of current is 1 A and the voltage is 220 V, the power consumed by the circuit is

   a) 66 W
   b) 6.6 W
   c) 0.66 W
   d) 33 W

5. The wave length of the first line of Balmer series is 656nm. Second line of the series has a wavelength of

   a) 328 nm
   b) 426nm
   c) 486 nm
   d) 437.3 nm

6. When a monochromatic source of light is at a distance of 0.2 m from a photocell, the stopping potential (cut off voltage) and the saturation current are found to be respectively 1 volt and 27 mA. If the same source is placed at a distance 0.6m from the cell then

   a) The stopping potential will be 0.25 volt and current will be 27 mA
   b) The stopping potential will be 1 volt and the current will be 3 mA
   c) The stopping potential will be 1 volt and the current will be 9 mA
   d) The stopping potential and the current will be same as before

7. Fathom, a unit used to describe the depth of water is equal to

   a) 30 cm
   b) 183 cm
   c) 91.4 cm
   d) 200 cm

15. A vessel of height h is filled with a liquid of refractive index n_1 to a height $\frac{h}{2}$ and the upper half of the vessel is filled with a liquid of refractive index n_2. The apparent depth of the vessel as seen along the normal is

a) $h\left[\frac{n_1 n_2}{n_1+n_2}\right]$

b) $\frac{h}{2}\left[\frac{n_1 n_2}{n_1+n_2}\right]$

c) $\frac{h}{2}\left[\frac{n_1+n_2}{n_1 n_2}\right]$

d) $\frac{2}{h}\left[\frac{n_1 n_2}{n_1+n_2}\right]$

16. The photo electric work function of a metal is 1eV. Light of wavelength $\lambda = 3000\ A^o$ falls on it. The photoelectrons will come out with approximate speed equal to

a) 10 m /s
b) 10^2 m / s
c) 10^4 m / s
d) 10^6 m / s

17. A plane mirror is placed on ground with a thin convex lens of focal length 'f' on it. If an object is placed at the focal point of the lens, then the image will be formed at

a) < f
b) f
c) > f
d) Infinity

18. A mass suspended from a spring executes simple harmonic motion. When the body is at half the amplitude from the mean position, the ratio of the kinetic energy and the potential energy of the body will be

a) 3 : 1
b) 1 : 4
c) 1 : 2
d) 1 : 3

19. An electron moving towards the east enters a magnetic field directed towards the north. The force on the electron will be directed

a) Vertically upwards
b) Vertically downwards
c) Towards the east
d) Towards the south

20. The energy that should be added to an electron to reduce its de Broglie wave length from 10^{-10} m to 0.5×10^{-10} m will be

a) Twice the initial energy
b) Thrice the initial energy
c) Four times the initial energy
d) Equal to the initial energy

21. The refractive index of an equilateral prism is $\sqrt{3}$. The angle of incidence at which the deviation is minimum

a) 30^{o} b) 45^{o}
c) 60^{o} d) 75^{o}

22. In a Young's double slit experiment, 12 fringes are observed to be formed in a certain segment of the screen when light of wavelength 600 nm is used. If the wave length of light is changed to 400 nm, number of fringes observed in the same segment of screen is given by

a) 12 b) 18
c) 24 d) 30

23. A grass hopper can jump through a maximum distance of 1.8 *m*. If it spends negligible time on the ground, the distance covered by it in 10 second is (Assume g = 10 ms^{-2})

a) $5\sqrt{2}m$ b) 30 *m*
c) $10\sqrt{2}m$ d) $20\sqrt{2}m$

24. A stone of mass 1 kg tied to one end of a string of length *l* is whirled in a vertical circle at a constant speed of 4 m s^{-1}. The tension in the string becomes 6 N, when the stone is (assume g = 10 m s^{-2})

a) At the top of the circle b) At the bottom of the circle
c) Half way down d) At 1/4 th of the circumference

25. A satellite is revolving round the earth in a circular orbit. In order to make the satellite move to infinity, the speed must be increase by

a) 15% b) 24.4%
c) 41.4% d) 7.07%

26. A wall has two layers A and B made of different materials but have the same thickness. The thermal conductivity of A is twice that of B. Under steady state condition, the temperature difference across the wall is $36^{o}C$. The temperature difference across the layer B is

a) $6^{o}C$ b) $12^{o}C$
c) $18^{o}C$ d) $24^{o}C$

27. A small object is placed at a distance of 20 cm from a glass block of 10 cm thick. The farther side of the glass block is silvered. The image is formed 23.2 cm behind the silvered face of the block. The refractive index of the glass is

a) 1.49 b) 1.51
c) 1.59 d) 1.48

28. A 45^{o} -45^{o} -90^{o} prism is immersed in water of refractive index (4/3). A ray of light is incident normally on one of its shorter faces. If the ray is to be totally reflected at the other face, the minimum refractive index that the prism must have is

a) 1.5
b) 1.89
c) 1.414
d) 1.62

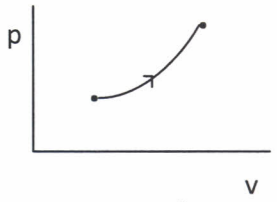
29. If u and v represent the object and the image distances, respectively, of a concave lens, the shape of the graph obtained by plotting $\frac{1}{u}$ *and* $\frac{1}{v}$ for the lens, is

a) A straight line
b) A parabola
c) A hyperbola
d) An ellipse

30. Two identical point charges repel each other with a force F when they are separated by certain distance. If the charge is reduced to one fourth the initial value and the distance between them is halved, the force becomes

a) F / 8
b) F / 16
c) F / 4
d) F / 2

31. The figure below shows a process on a gas in which pressure and volume both change. The molar heat capacity C for this process is



a) $C = 0$
b) $C = C_v$
c) $C > C_v$
d) $C < C_v$

32. Four cylinders contain equal number of moles of argon, hydrogen, nitrogen and carbon dioxide at the same temperature. The energy is minimum in

a) Argon
b) Hydrogen
c) Nitrogen
d) Carbon dioxide

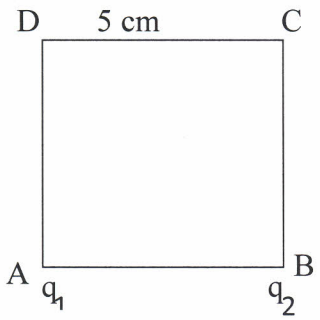
33. Two bodies A and B having equal surface areas are maintained at temperatures 10^{0}C and 20^{0}C. The thermal radiation emitted in a given time by A and B are in the ratio

a) 1 : 1.15
b) 1 : 2
c) 1 : 4
d) 1 : 16

34. Which of the following is a hadron?

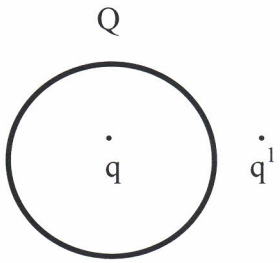
a) Electron
b) Neutrino
c) Muon
d) Proton

35. Charges 2.0 x 10^{-6}C and 1.0 x 10^{-6}C are placed at corners A and B of a square of side 5.0 cm as shown in the figure below. How much work will be done against the electric field in moving a charge of 1.0 x 10^{-6}C from C to D?



a) 0.090J
b) 0.027J
c) 0.106J
d) 0.053J

36. A thin, metallic spherical shell contains a charge Q on it. A point charge q is placed at the centre of the shell and another charge q^1 is placed outside as shown in figure below. All the three charges are positive. The force on the charge at the centre is



a) Towards left
b) Towards right
c) Upward
d) Zero

37. Mark the correct options

a) Gauss's law is valid only for symmetrical charge distributions
b) Gauss's law is valid only for charges placed in vacuum
c) The electric field calculated by Gauss's law is the field due to the charges inside the Gaussian surface
d) The flux of the electric field through a closed surface due to all the charges is equal to the flux due to the charges enclosed by the surface.

38. Two parallel-plate capacitors, each of capacitance 40 μF, are connected in series. The space between the plates of one capacitor is filled with a dielectric material of dielectric constant K = 4. The equivalent capacitance of the system is

a) C = 8μF
b) C = 16μF
c) C = 32μF
d) C = 64μF

39. The type of vibrations produced in a sitar wire are

a) Transverse and progressive
b) Longitudinal and progressive
c) Stationary and transverse
d) Stationary and longitudinal

40. The energy stored in the electric field produced by a metal sphere of radius R containing a charge Q is

a) $U = \frac{Q^2}{8\pi \varepsilon_0 R}$

b) $U = \frac{Q^2}{4\pi \varepsilon_0 R}$

c) $U = \frac{Q^2}{2\pi \varepsilon_0 R}$

d) $U = \frac{Q^2}{\pi \varepsilon_0 R}$

41. Consider the following two statements.

(A) Free-electron density is different in different metals.
(B) Free-electron density in a metal depends on temperature.

Seebeck effect is caused:

a) Due to both A and B
b) Due to A but not due to B
c) Due to B but not due to A
d) Neither due to A nor due to B

42. A charged particle moves in a uniform magnetic field. The velocity of the particle at some instant makes an acute angle with the magnetic field. The path of the particle will be

a) A straight line
b) A circle
c) A helix with uniform pitch
d) A helix with non-uniform pitch

43. Light of wavelength λ falls on a metal having work function $\frac{hc}{\lambda_0}$. Photoelectric effect take place only if

a) $\lambda \geq \lambda_0$
b) $\lambda \geq 2\lambda_0$
c) $\lambda \leq \lambda_0$
d) $\lambda = 4\lambda_0$

44. Light travels through a glass plate of thickness t with refractive index 'μ'. If 'c' is the velocity of light in vacuum, the time taken by light to pass through this thickness of glass plate is

a) tc / μ
b) $t / \mu c$
c) $\mu t / c$
d) $\mu c / t$

45. Two concentric coplanar circular loops of radii r_1 and r_2 carry currents of I_1 and I_2 respectively in opposite directions. The magnetic field at centre of the loops is half that due to I_1 alone at the centre. If $r_2 = 2r_1$, the value of I_2 / I_1 is

a) 2
b) 1 / 2
c) 1 / 4
d) 1

46. A uniform chain of length 'l' and mass 'm' overhangs a smooth table with its two third part lying on the table. The kinetic energy of the chain if it completely slips off the table will be

a) 2/5 mgl
b) 4/9 mgl
c) 2/7 mgl
d) 4/7 mgl

47. A unitless quantity

a) Never has a non-zero dimension
b) Always has a non-zero dimension
c) May have a non-zero dimension
d) Does not exist

48. A man running on a horizontal road at 8 km/hr finds the rain falling vertically. He increases his speed to 12 km/hr and finds that the drops make angle 30° with the vertical. The speed and direction of the rain with respect to the road will be

a) $4\sqrt{7}$ km/hr
b) $8\sqrt{7}$ km/hr
c) $6\sqrt{7}$ km/hr
d) $2\sqrt{7}$ km/hr

49. A particle travels in a circle of radius 20 cm at a speed that uniformly increases. If the speed changes from 5.0 m/s to 6.0 m /s in 2.0s, the angular acceleration will be

a) 2.5 rad / s^2
b) 5.0 rad / s^2
c) 7.5 rad / s^2
d) 5.5 rad / s^2

50. A car has to move on a level turn of radius 45 m. If the coefficient of static friction between the tyre and the road is μ_s =2.0, the maximum speed the car can take without skidding is

a) 54 km / hr
b) 108 km / hr
c) 27 km / hr
d) 81 km / hr

51. Consider the following two statements

A. The linear momentum of a particle is independent of the frame of reference
B. The kinetic energy of a particle is independent of the frame of reference

a) Both A and B are true
b) A is true but B is false
c) A is false but B is true
d) Both A and B are false

52. The moment of inertia of a uniform semicircular wire of mass M and radius r about a line perpendicular to the plane of the wire through the centre is

a) Mr^2
b) $\frac{1}{2} Mr^2$
c) $\frac{1}{4} Mr^2$
d) $\frac{2}{5} Mr^2$

53. A simple pendulum has a time period exactly 2s when used in a laboratory at North Pole. What will be the time period if the same pendulum is used in a laboratory at equator?
(Account for the earth's rotation only). Take

$g = \frac{GM}{R^2} = 9.8 m/s^2$ and radius of earth = 6400 km

a) 2.004 seconds
b) 1.002 seconds
c) 4.008 seconds
d) 3.003 seconds

54. A particle of mass 0.50 kg executes a simple harmonic motion under a force $F = -(50\ N/m)\ x$. If it crosses the centre of oscillation with a speed of 10 m / s, the amplitude of motion 'A' will be

a) 0.25 m
b) 0.50 m
c) 0.75 m
d) 1.0 m

55. A mixture of hydrogen and oxygen has volume 2000 cm^3, temperature 300 K, pressure 100 kPa and mass 0.76g. The masses of hydrogen and oxygen in the mixture will be

a) The mass of hydrogen = 0.06 g and the mass of oxygen = 0.32g
b) The mass of hydrogen = 0.12 g and the mass of oxygen = 0.64g
c) The mass of hydrogen = 0.18 g and the mass of oxygen = 0.96g
d) The mass of hydrogen = 0.36 g and the mass of oxygen = 1.28g

56. The pressure of an ideal gas is written as $p = \frac{2E}{3V}$. Here E refers to

a) Translational kinetic energy
b) Rotational kinetic energy
c) Vibrational kinetic energy
d) Total kinetic energy

57. A lead bullet penetrates into a solid object and melts. Assuming that 50% of its kinetic energy was used to heat it, the initial speed of the bullet is
(The initial temperature of the bullet is 27°C and its melting point is 327°C. Latent heat of fusion of lead = 2.5×10^4 J/kg and specific heat capacity of lead = 125 J/kg-K)

a) v = 125 m/s
b) v = 250 m/s
c) v = 375 m/s
d) v = 500 m/s

58. A system can be taken from the initial state p_1, V_1 to the final state p_2, V_2 by two different methods. Let ΔQ and ΔW represent the heat given to the system and the work done by the system. Which of the following must be the same in both the methods?

a) ΔQ
b) ΔW
c) $\Delta Q + \Delta W$
d) $\Delta Q - \Delta W$

59. A sample of 100 g water is slowly heated from 27°C to 87^0C. The change in the entropy of the water will be (Specific heat capacity of water = 4200 J/kg-K)

a) 76.6 J/K
b) 38.3J/K
c) 114.9J/K
d) 153.2J/K

60. An ideal gas has a molar heat capacity at constant pressure Cp = 2.5 R. The gas is kept in a closed vessel of volume $0.0083m^3$, at a temperature of 300 K and a pressure of 1.6×10^6 N/m^2. An amount 2.49×10^4 J of heat energy is supplied to the gas. The final temperature and pressure of the gas respectively will be

a) 300K and 7.2×10^6 N/m^2
b) 677 K and 3.6×10^6N/m^2
c) 377K and 0.9×10^6N/m^2
d) 338.5K and 1.8×10^6N/m^2

CHEMISTRY

61. Rayon is a

a) Protein fiber generally made from animal tissue
b) Protein fiber made by the silkworms
c) Cellulosic fiber generally made from soft wood
d) None of the above

62. Identify the statement which is incorrect about activated carbon

a) It is used for adsorbing gases and vapour
b) It is used for decolorizing and purifying liquids
c) It is used as carrier for dehydrogenation catalyst
d) It is used as medicine for adsorptions of gases toxins and poisons

63. All the statements are true about properties of a solid catalyst **EXCEPT**

a) It must be active in a given reaction
b) It should be stable to the action of poisons
c) It should be heat resistant and have light mechanical strength
d) It should have a variable thermal conductivity

64. The half-life of ^{131}I is

a) 32.4 days
b) 16.2 days
c) 8.1 days
d) 4.05 days

65. Phenolphthalein is a white crystalline solid insoluble in water but soluble in alcohol and produces deep violet colour when alkali is added. The deep violet colour is due to

a) The formation of disodium salt in which one of the two rings of phenols is in quinol form
b) The formation of disodium salt in which both the rings of phenol are in quinol forms
c) The formation of monosodium salt in which one of the two rings of phenols is in quinol forms
d) The formation of monosodium salt in which both rings of phenol are in quinol forms

66. Graph between p and V at constant temperature is

a) Straight
b) Curve increasing
c) Straight line with slope
d) None of the above

67. The flame colours of metal ions are due to

a) Schottky defect
b) Frenkel defect
c) Metal excess defect
d) Metal deficiency defect

68. Oxygen is more electronegative than sulphur, yet H_2S is more acidic in nature while H_2O is neutral because

a) H_2O molecule are associated due to intermolecular hydrogen bonding
b) H_2O has higher boiling point than H_2S
c) H-S is weaker than O-H bond
d) All of the above

69. The correct order of C-O bond length among CO, CO_3^{2-},CO_2

a) $CO_2 < CO_3^{2-} < CO$
b) $CO < CO_3^{2-} < CO_2$
c) $CO_3^{2-} < CO_2 < CO$
d) $CO < CO_2 < CO_3^{2-}$

70. Of the following statement all are true about diastereomers **EXCEPT**

a) Are mirror images of each other
b) Are not the mirror images of each other
c) Have similar chemical properties
d) Have different physical properties

71. Which one of the following is **NOT** a surface phenomenon

a) Surface tension
b) Viscosity
c) Evaporation
d) All of the above

72. An ideal gas obeying kinetic gas equation can be liquefied if

a) Its temperature is more than critical temperature
b) Its pressure is more than critical pressure
c) Its pressure is more than critical pressure but temperature is less than critical temperature
d) It cannot be liquefied at any value of *p* and *t*

73. Isotonic solutions have

a) Same vapour pressure
b) Same osmotic pressure
c) Same boiling point
d) Same temperature

74. Of the following which change will shift the reaction towards the product?

$I_2(g) \rightleftharpoons 2I(g)\ \Delta H^{\circ}(298K) = +150\ kJ$

a) Increase in concentration of I
b) Decrease in concentration of I_2
c) Increase in temperature
d) Increase in total pressure

75. The correct name for the complex $[CrCl_2(H_2O)_4]NO_3$ is

a) Dichloro-tetra-aqua-chromium (III)nitrate
b) Tetra-aqua-dichloro-chromate (III)nitrate
c) Dichloro-tetra-aqua-chromium (III)nitrate
d) Tetra-aqua-dichloro-chromium (III)nitrate

76. All are natural waxes **EXCEPT**

a) Spermaceti wax
b) Candelilla wax
c) Ozocerite wax
d) Lanetee wax

77. When HCl gas is passed through a saturated solution of common salt, Pure NaCl is precipitated because

a) The impurities dissolve in HCl and NaCl precipitated
b) HCI is highly soluble in water compared to NaCl
c) The ionic product ($[Na^+][Cl^-]$ exceeds the solubility product of NaCl
d) The solubility product of NaCl is lowered by Cl^- of HCl

78. Three Faraday of electricity are passed through molten $AlCl_3$, aqueous solution of $CuSO_4$ and molten NaCl taken in different electrolytic cells. The amount of Al, Cu and Na deposited at the cathodes will be in the ratio of

a) 1 mole : 2 mole : 3 mole
b) 3 mole : 2 mole : 1 mole
c) 1 mole : 1.5 mole : 3 mole
d) 1.5 mole : 2 mole : 3 mole

79. p-type silicon is formed by adding a minute amount of an element with

a) Three valence electrons
b) Five valence electrons
c) Four valence electrons
d) Six valence electrons

80. The complex ions $[Fe(CN)_6]^{3-}$ and $[Fe(CN)_6]^{4-}$

a) Are both octahedral and paramagnetic
b) Are both octahedral and diamagnetic
c) Have same structure but opposite magnetic character
d) Have different structures but same magnetic character

81. In the first order reaction 75% of the reactant disappeared in 22 minutes. The rate constant of the reaction

a) 3.15×10^{-2} / sec
b) 5.25×10^{-4} / sec
c) 6.3×10^{-2} / sec
d) 1.05×10^{-3} / sec

82. Solution A, B, C and D are 0.1M glucose, 0.05M NaCl, 0.05M $BaCl_2$ and 0.1M $AlCl_3$ respectively. Which pair is isotonic?

a) A and B
b) B and C
c) A and D
d) A and C

83. An ideal gas expands from 10^{-3} m^3 to 10^{-2} m^3 at 300K against constant pressure of 10^5 Nm^{-2}. The work done is

a) -1.1×10^3 kJ
b) 1.1×10^3 kJ
c) -0.9 kJ
d) -900 kJ

84. 2, 3- Dimethyl butane is obtained by Wurtz reaction. The reactant is

a) Ethyl bromide
b) Vinyl chloride
c) Isopropyl chloride
d) Allyl chloride

85. Examine the following statements about a dipole and comment

(A) A dipole is often symbolized by $+\longrightarrow$, where the arrow points from positive to negative.
(B) A dipole molecule possesses a dipole moment μ which is equal to the magnitude of the charge, 'e' multiplied by distance, 'd' between the centers of the charge

a) Statement A is correct and Statement B is incorrect
b) Statement B is correct and Statement A is incorrect
c) Statement A and statement B both are correct
d) Statement A and statement B both are incorrect

86. Arrange the following ions in the order of basicity – F^-, OH^-, NH_2^-, CH_3^-

a) $CH_3^- > NH_2^- > OH^- > F^-$
b) $CH_3^- > OH^- > NH_2^- > F^-$
c) $F^- > OH^- > NH_2^- > CH_3^-$
d) $CH_3^- > NH_2^- > F^- > OH^-$

87. Besides free radicals, we shall encounter two other kinds of reactive particles carbanions and carbocations. Suggest an electronic configuration and from this, predict the shapes of methyl cation CH_3^+ and methyl anion CH_3^- respectively as

a) SP^2, trigonal, flat ; SP^3, pyramidal
b) SP^3, pyramidal ; SP^2, trigonal, flat
c) SP^2, pyramidal; SP^3trigonal, flat
d) None of the above

88. Reaction of acid chlorides with sodium azide NaN_3 yields acylazides $RCON_3$. If this is heated, it undergoes Curtius rearrangements to form

a) Amides
b) Ammonia
c) Amines
d) Isocyanate

89. In white lead which has an approximate formula of $2PbCO_3 . Pb(OH)_2$, the percentage of $PbCO_3$ and $Pb(OH)_2$ respectively are

a) 31.1% and 68.9 %
b) 80.2 % and 19.8 %
c) 24.8 % and 75.2%
d) 68.9 % and 31.1%

90. Carborundum is

a) Silicon carbonate
b) Silicon carbide
c) Calcium carbide
d) Calcium carbonate

91. Reaction of alkyl bromide with an alcoholic solution of sodium ethoxide to give ether is an example of

a) Williamson's reaction
b) Markownikoff reaction
c) Sandmeyer reaction
d) Perkin reaction

92. Which of the following electronic configurations corresponds to an element having lowest ionization energy?

a) $1s^2 2s^2 2p^6$
b) $1s^2 2s^2 2p^6 3s^1$
c) $1s^2 2s^2 2p^5$
d) $1s^2 2s^2 2p^3$

93. The half-life for the reaction $N_2O_5 \rightarrow 2\ NO_2 + 1/2\ O_2$ is 24 hours at 30° C. Starting with 10 g of N_2O_5 how many grams will remain after a period of 96 hours?

a) 1.25 g
b) 0.63 g
c) 1.77 g
d) 0.5 g

94. All are true about Ergosterol **EXCEPT**

a) It contains a steroid ring
b) It is seen in fungus
c) It is a pro-vitamin D
d) It is seen in animal tissues

95. Sodium carbonate may be manufactured by the solvary process from

a) Sodium Hydroxide + calcium carbonate
b) Sodium chloride + calcium carbonate
c) Sodium oxide + calcium carbonate
d) Sodium Cyanide+ calcium carbonate

96. Acheson process is

a) An industrial process for the manufacture of graphite by heating coke mixed with clay
b) A laboratory process for the manufacture of graphite by heating coal with sand
c) A laboratory process for the manufacture of diamond by heating coal with sand
d) An industrial process for the manufacture of diamond by heating coke mixed with clay

97. A low density igneous rock containing more than 65% of light coloured silicate minerals is called

a) Acid Rock
b) Basic Rock
c) Neutral Rock
d) None of the above

98. Actinoid contraction refers to

a) A strong sudden decrease in atomic or ionic radius with increasing proton number in the actinoides.
b) A smooth decrease in atomic or ionic radius with increasing proton number found in the actinoides.
c) A sudden decrease in atomic or ionic radius with increasing electron number found in the actinoides.
d) A smooth decrease in atomic or ionic radius with increasing electron number found in the actinoides.

99. All are true about Alpha – Napthol test **EXCEPT**

a) A biochemical test to detect carbohydrates
b) It is also known as Molisch test
c) A positive test is indicated by the formation of violet ring
d) It is performed under alkaline condition

100. The test employed to check the purity of butter through estimation of volatile acids is:

a) Iodine number
b) Reichert – Meissl number
c) Acid number
d) Saponification number

101. Nitrogenous base present in phospholipid lecithin is

a) Choline
b) Adenine
c) Xanthine
d) ethanolamine

102. De-fluorination of water is carried out by using $MgCl_2$ and $Ca(OH)_2$. During the reaction the fluorides in water is precipitated primarily as

a) CaF_2
b) MgF_2
c) Mg (OH)F
d) Ca (OH)F

103. Peat is the product of

a) Aerobic decomposition of plant remains under moist condition
b) Aerobic decomposition of plant remains under dry conditions
c) Aerobic decomposition of animal remain under moist conditions
d) Aerobic decomposition of animal remain under dry conditions

104. All are true about catalytic cracking of petroleum **EXCEPT**

a) Octane number of gasoline is high
b) Yield of gasoline is high
c) Sulphur content in the gasoline is low
d) Requires aluminium borate catalyst

105. One of the following is not a property of polyethylene

a) Is a thermoplastic resin and can exhibit varied density
b) It has excellent chemical resistance
c) It has excellent Mechanical strength
d) It has excellent flexibility

106. A 500 ml sample of 0.100 M formate buffer pH 3.75 is treated with 5 ml of 1.00 M KOH. The resultant pH will be

a) pH 3.93
b) pH 3.98
c) pH 3.88
d) pH 3.83

107. The combustion of glucose to carbon dioxide and water is a major source of energy in aerobic organisms. It is a reaction favoured mainly by large negative enthalpy change. Given.

$C_6H_{12}O_6$ (s) + $6O_2$ (g) $\rightarrow 6CO_2$ (g) + $6H_2O$ (l)

ΔH^o = - 2816 kJ /mol, ΔS^o = + 181J /K.mol

At 37°C the value of ΔG^o will be

a) -2872 kJ /mol
b) -1436 kJ/mol
c) -786 kJ/mol
d) -3658 kJ/mol

108. Bolometer is an instrument used to measure

a) Pressure
b) Enthalpy
c) Entropy
d) Radiant heat

109. In nuclear chain reactions, the succession depends on production and capture of

a) Protons
b) Neutrons
c) Positrons
d) None of the above

110. Collodion is prepared by

a) Dissolving cellulose acetate in ethanol
b) Dissolving cellulose acetate in benzene
c) Dissolving cellulose nitrate in ethanol
d) Dissolving cellulose nitrate in benzene

111. An amino acid which contains an indole ring is

a) Tyrosine
b) Proline
c) Tryptophan
d) Histidine

112. Diazotization can be carried out by the action of sodium nitrite and hydrochloric acid on ice cold

a) Aliphatic primary amine
b) Aromatic nitro compound
c) Acid amide
d) Aromatic primary amine

113. Nessler's reagent used to detect ammonium compounds, consists of

a) Mercuric chloride solution to which is added excess of potassium iodide and alkali
b) Mercuric nitrate solution to which is added excess of sodium iodide and alkali
c) Mercuric nitrate solution to which is added excess of potassium nitrate and alkali
d) Copper nitrate solution to which copper sulphate and ammonium hydroxide are added

114. The well-known analgesic aspirin is an acetyl derivative of

a) Phenol
b) Aniline
c) Benzyl alcohol
d) Salicylic acid

115. A compound containing only carbon, hydrogen and oxygen has a molecular weight of 44, on oxidation; it is converted into a compound of molecular weight 60. The original compound is

a) An aldehyde
b) An alcohol
c) An ether
d) An acid

116. Cupellation

a) Is a method of separation of gold from base metals
b) Is a method of separation of copper from other base metals
c) Is a method for separation of chromium from base metals
d) Is a method for separation of cobalt from base metals

117. When concentrated nitric acid acts on tin

a) Stannous nitrate is formed
b) Hydrated stannous oxide is formed
c) Hydrated stannic oxide is formed
d) Stannic nitrate is formed

118. A group of atoms can function as a ligand only when

a) It has vacant d -orbital
b) It has an unshared electron pair
c) It is a negatively charged ion
d) It is a positively charged ion

119. In the process of extracting copper from chalcopyrites, matte obtained from the blast furnace is mainly

a) Cuprous oxide
b) Crude copper
c) Cupric sulphate
d) Cuprous sulphide

120. Which of the following statements does not apply for weak electrolytes?

a) Conductivity of weak electrolytes at moderate concentration is extremely poor
b) Law of chemical equilibrium can be applied to the dissociation of weak electrolytes
c) Dissociation constant for weak electrolyte is very low
d) Degree of dissociation of weak electrolyte is appreciably high at higher concentration

BIOLOGY

121. Which of the following groups of algae do not have eukaryotic organization?

a) Golden brown algae
b) Red algae
c) Blue-green algae
d) Green algae

122. A frustule of a diatom is made up of

a) Cellulose
b) Lignin
c) Suberin
d) Silica

123. Biochemical function of ascorbic Acid is to

a) Act as coenzyme in transamination reaction
b) Act as coenzyme in transamidation reaction
c) Act in post translational hydroxylation of proline
d) Act as coenzyme in carboxylation

124. Basidiospores are produced by

a) Bacteria
b) Agaricus
c) Diatoms
d) Yeasts

125. The prothallus of fern is

a) Autotrophic
b) Saprophytic
c) Parasitic
d) Chemosynthetic

126. Removing RNA primers and replacing them with DNA in the lagging strand is the function of

a) DNA polymerase I
b) RNA polymerase
c) DNA polymerase II
d) DNA polymerase III

127. The smallest part of DNA affected by mutation is

a) Replicon
b) Muton
c) Cistron
d) Operon

128. The cellulosic cell walls of guard cells are

a) Uniformly thick
b) Uniformly thin
c) Thinner on the inner side
d) Thicker on the inner side

129. In which of the following processes, greatest amount of energy would be released?

a) Conversion of glucose to pyruvate
b) Conversion of peptides into proteins
c) Oxidation of glucose in to CO_2 and water
d) Oxidation of pyruvic acid to lactate

130. Anaerobic respiration is very often called

a) Molecular respiration
b) Intramolecular respiration
c) Intermolecular respiration
d) Extramolecular respiration

131. Which one of the following processes makes use of oxygen directly?

a) Glycolysis
b) Krebs cycle
c) Alcoholic fermentation
d) Electron transport chain

132. Heterosis is due to

a) Hybrid incompatibility
b) Hybrid vigour
c) Hybrid sterility
d) Hybrid compatibility

133. Which one of the following is a derived protein?

a) Haemoglobin
b) Casein
c) Collagen
d) Peptones

134. In hypogynous flower, the position of ovary is

a) superior
b) half inferior
c) inferior
d) None of the above

135. Magnetic Resonance Imaging was invented by

a) R. V. Damadian
b) G.M. Edelman
c) L.H. Hartwell
d) J.M. Bishop

136. PECTIN present in plant cell wall is a

a) Polymer of glucosamine and glucose
b) Polymer of xyloglucon and mannose
c) Homogalacturonans and rhamnogalacturonans
d) N.acetylgalatosamine and gluconic acid

137. Xeroderma pigmentosum is an inherited syndrome due to

a) Mutation in the tyrosinase enzyme
b) Defective melanin synthesis
c) Excessive iron storage in the skin
d) Defective DNA excision repair

138. Which one of these correctly describes the location of the organ of corti

a) Between the tympanic membrane and the oval window in the inner ear
b) In the utricle and saccule within the vestibule
c) Between the tectorial membrane and the basilar membrane in the cochlear canal
d) Between the outer and inner ear within the semicircular canals

139. A pivot joint can be found between which of the following bones?

a) Clavicle and sternum
b) Radius and ulna
c) Scapula and humerus
d) Tibia and fibula

140. In human vestige of the tail is made up of four fused bones. this structure is known as

a) Sacrum
b) Coccyx
c) Sternum
d) Centrum

141. The archenteron develops in to

a) Blastocoel
b) Endoderm
c) Lumen of the digestive tract
d) Placenta

142. Which of the following is a strong inhibitor of photosystem II in photosynthesis

a) Dichlorophenyldimethylurea
b) Ethylene
c) Indole acetic Acid
d) Chloroform

143. In a bisexual flower when the gynoecium matures earlier than the anthers, the phenomenon is called

a) Protogyny
b) Protandry
c) Hekogamy
d) Heterostyly

144. A small out growth from the testa of a seed that develops from the micropyle

a) Funicle
b) Cuticle
c) Caruncle
d) Calyx

145. All the statements are true about Brown fat **EXCEPT**

a) It is a darker coloured region of adipose tissue commonly seen in hibernating animals
b) Compared to white adipose tissue brown colour tissue contains more mitochondria
c) They contain very high concentration of cytochrome oxidase
d) Obesity in human beings is due to the presence of large amounts of brown adipose tissue.

146. Gynaecomastism is a symptom of

a) Klinefelter's syndrome
b) Turner's syndrome
c) Goucher's syndrome
d) Down's syndrome

147. Which one of the following arrangement of sub-stages of prophase-1 is correct?

a) Leptotene, diplotene, zygotene, diakinesis, pachytene
b) Pachytene, diplotene, zygotene, leptotene, diakinesis
c) Leptotene, pachytene, diplotene, diakinesis, zygotene
d) Leptotene, zygotene, pachytene, diplotene, diakinesis

148. When smooth muscle tissue is affected by malignancy the condition is

a) Myeloma
b) Leiomyosarcoma
c) Osteosarcoma
d) Rhabdomyosarcoma

149. Antibiotics are ineffective in treating viruses because

a) They have a resistant covering
b) They live inside host cells
c) They do not have metabolic machinery
d) They release interferons

150. Bacteria having tufts of flagella at one end is called

a) Atrichous
b) Peritrichous
c) Lophotrichous
d) Monotrichous

151. One among the following functions is a specific of Thiamine

a) Nucleotide formation
b) Calcium absorption and metabolism
c) Involves in oxidative decarboxylation
d) Involves in non-oxidative decarboxylation

152. The typical lub-dub sound heard in the heart beat of a healthy person is due to:

a) Closing of the semilunar valves
b) Closing of the tricuspid and bicuspid valves
c) Closing of the bicuspid and tricuspid valves followed by closing of the semilunar valves
d) Blood flow through the aorta and pulmonary artery

153. Blood pressure is high in ---------- and lowest in ----------

a) Arteries; veins
b) Arteries; ventricles
c) Arteries; relaxed atria
d) Arterioles and veins

154. Mottle leaf in citrus plants is due to the deficiency of

a) Boron
b) Magnesium
c) Zinc
d) Molybdenum

155. Which of the following part of the nephron is least permeable to water:

a) Proximal tubule
b) Collecting duct
c) Descending limb of the loop of Henle
d) Ascending limb of the loop of Henle

156. Which one of the following hormones is directly associated with maintenance of pregnancy

a) Prolactin
b) Estrogen
c) Progesterone
d) Oxytocin

157. Steroid hormones exert their action by

a) Activating adenylate cyclase
b) Activating gene expression
c) Binding to the receptors on cell surface
d) Activating Phosphodiesterase

158. Action potentials are usually propagated in only one direction along an axon because

a) Nodes of Ranvier only conduct impulse in one direction
b) Brief refractory period prevents a depolarization from occurring in the direction from which the impulse originate / came
c) Axon hillock has a higher membrane potential than the tips of the telodendria
d) Both sodium and potassium voltage gates open in one direction

159. A sensory neuron enters the spinal cord from the

a) Anterior root
b) Posterior root
c) Lateral horn
d) Supernal root

160. Which of the following organisms doesn't have the ability to fix atmospheric nitrogen

a) Nostoc
b) Ulothrix
c) Rhizobium
d) Azotobacter

161. The depolarization of the presynaptic membrane of an axon directly causes

a) Voltage-sensitive calcium channels to open
b) Synaptic vesicles to fuse with the membrane
c) Formation of an action potential in the postsynaptic cell
d) Chemical-sensitive gates that allow neurotransmitter to spill in to the synaptic cleft to open

162. Which of the following is correctly matched

a) Organophosphate - malathion
b) Organochlorine - parathion
c) Carbamate - aldrin
d) Triazine - Pyrethrin

163. For a T–cell to recognize an antigen, it must interact with

a) complement system
b) a macrophage
c) a B cell
d) all the above

164. HIV infects all of the following **EXCEPT**

a) Monocytes
b) T-cells
c) Macrophages
d) B cells

165. All are True about Micro RNA **EXCEPT**

a) Short (21-26 nucleotides) eukaryotic RNAs
b) Produced by the processing of specialized RNA transcripts coded in the genome
c) Regulate gene expression through complementary base pairing with mRNA
d) Regulate gene expression through complementary base pairing with DNA

166. All are true about statocyst **EXCEPT**

a) A balancing organ found in invertebrates
b) It consists of a fluid filled sac with sensory hairs
c) It is also called as otocyst
d) It contains granules of calcium phosphate

167. **MRSA** stands for

a) Metronidazole Resistant Staphylococcus Aureus
b) Methicillin Resistant Staphylococcus Aureus
c) Mebendazole Resistant Staphylococcus Aureus
d) Miconazole Resistant Staphylococcus Aureus

168. All are true about spermatids **EXCEPT**

a) Are motile cells produced during spertomatogenesis
b) Are non-motile cell produced during spertomatogenesis
c) Four spermatid are formed after two meiotic divisions of primary spermatocytes
d) spermatids contains haploid number of chromosomes

169. Which theory of evolution stressed the role of the environment in origin of species

a) Theory of polymorphism
b) Theory of mutation
c) Theory of natural selection
d) Theory of inheritance of acquired characteristics

170. Tasar Silk is obtained from

a) Bombyx mori
b) Anthreraea assama
c) Anthreraea mylitta
d) Philosamia ricini

171. Deep burrowing earthworms which live in vertical complex burrows are called

a) Epigeic
b) Endogeic
c) Anecic
d) Endozoic

172. The pigment other than chlorophylls, which might be involved in opening of stomata by light is

a) Phytochrome
b) Carotenes
c) Phycobilins
d) Phytocyanin

173. Deficiency of which of the following elements may cause leaf tip bending

a) Sulphur
b) Phosphorous
c) Calcium
d) Nitrogen

174. Which of the following is an obligate root parasite?

a) Rafflesia
b) Viscum
c) Loranthus
d) Neottia

175. Photo respiration is a form of

a) Fixation of Carbondioxide in C_4 plants
b) Fixation of Carbondioxide in C_3 plants
c) Release of Carbondioxide in C_4 plants
d) Release of Carbondioxide in C_3 plants

176. Anticoagulant Heparin chemically is a

a) Glycosaminoglycans
b) Lipoproteins
c) Glycoproteins
d) Proteoglycans

177. Flowering process is ---------- response

a) Phototropic
b) Photoperiodic
c) Geotropic
d) Thigmotropic

178. Cardiac Muscle is

a) Involuntary
b) Striated
c) Smooth
d) Both (a) and (b)

179. Which structures contribute most to the tensile strength of loose connective tissue?

a) Elastic fibers
b) Myofibrils
c) Collagenous fibers
d) Chondrin fibers

180. Enterokinase is a

a) Proteolytic enzyme
b) Phosphorylating enzyme
c) Group transfer enzyme
d) A kinesin protein subunit