Meritstore

NEET

TEST ID: 24

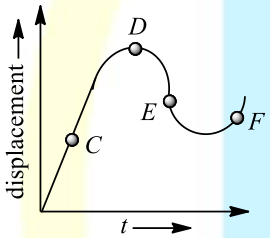
Time : 03:00:00 **Marks** : 720

Single Correct Answer Type

1. The length l, breadth b and thickness t of a block are measured with the help of a metre scale. Given $l = 15.12 \pm 0.01$cm, $b = 10.15 \pm 0.01$cm, $t = 5.28 \pm 0.01$cm.
The percentage error in volume is
a) 0.64% b) 0.28% c) 0.37% d) 0.48%

2. $1kWh$ =
a) 1000 W b) 36×10^5 J
c) 1000 J d) 3600 J

3. The displacement-time graph of a moving particle is shown below. The instantaneous velocity of the particle is negative at the point



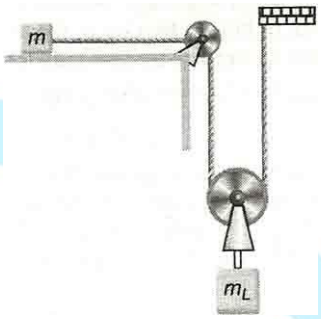
a) C b) D c) E d) F

4. Neglecting the air resistance, the time of flight of a projectile is determined by
a) $U_{vertical}$
b) $U_{horizontal}$
c) $U = U^2_{vertical} + U^2_{horizontal}$
d) $U = U\left(U^2_{vertical} + U^2_{horizontal}\right)^{1/2}$

5. The wheel of toy car rotates about axis. It slows down from 400 rps to 200 rps in 2s. Then its angular retardation in rads^{-2} is
a) 200 π b) 100
c) 400 π d) None of these

6. The backside of a truck is open and a box of 40 kg is placed 5 m away from the rear end. The coefficient of friction of the box with the surface of the truck is 0.15. The truck starts from rest with 2 m/s^2 acceleration. Calculate the distance covered by the truck when the box falls off.
a) 20 m b) 30 m c) 40 m d) 50 m

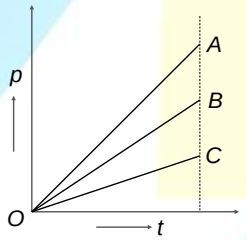
7. If the surface is smooth, the acceleration of the block m_2 will be

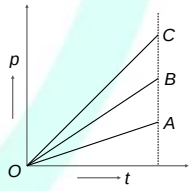


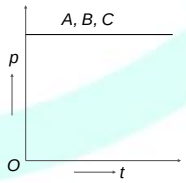
a) $\frac{m_2 g}{4m_1 + m_2}$ b) $\frac{2m_2 g}{4m_1 + m_2}$
c) $\frac{2m_1 g}{m_1 + 4m_2}$ d) $\frac{2m_1 g}{m_1 + m_2}$

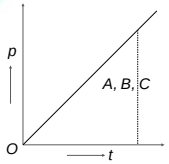
8. A particle moves along the x$-a$xis from x= x_1 to $x = x_2$ under the action of a force given by F=2x. Then the work done in the process is
a) Zero b) $x_2^2 - x_1^2$
c) $2x_2(x_2 - x_1)$ d) $2x_1(x_1 - x_2)$

9. Three stationary particles A, B, C of masses m_A, m_B and m_C are under the action of same constant force for the same time. If $m_A > m_B > m_C$, the variation of momentum of particles with time for each will be correctly shown as

a) 

b) 

c) 

d) 

10. If the radius r of earth suddenly changes to x times the present values, the new period of rotation would be
a) $dT/dt = (T/r)(dr/dt)$
b) $dT/dt = (2T/r)(dr/dt)$
c) $dT/dt = (r/T)(dr/dt)$
d) $dT/dt = \left(\frac{1}{2}T/r\right)(dr/dt)$

11. If then radius of earth R, then the height h at

which the value of g becomes one-fourth, will be

a) $\frac{R}{8}$ b) $\frac{3R}{8}$ c) $\frac{3R}{4}$ d) $\frac{R}{2}$

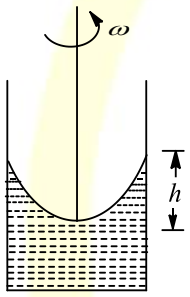
12. A steel wire of cross-sectional area $3 \times 10^{-6}\text{m}^2$ can withstand a maximum strain of 10^{-3} . Young's modulus of steel is $2 \times 10^{11}\text{Nm}^{-2}$. The maximum mass the wire can hold is (take $\text{g} = 10\ \text{ms}^{-2}$)

a) 40 kg b) 60 kg c) 80 kg d) 100 kg

13. A drop of liquid of diameter 2.8 mm breaks up into 125 identical drops. The change in energy is nearly ($S = 75$ dyne cm^{-1})

a) Zero b) 19 erg c) 46 erg d) 74 erg

14. A liquid is kept in a cylindrical vessel which is rotated along its axis. The liquid rises at the sides (figure). If the radius of the vessel is 0.05 m and the sped of rotation is 2 rad s^{-1}, find the difference in the height of the liquid at the centre of the vessel and its sides



a) 20 cm b) 4 cm c) 2 cm d) 0.2 cm

15. An object is at a temperature of 400℃. At what temperature would it radiate energy twice as fast? The temperature of the surroundings may be assumed to be negligible

a) 200℃ b) 200 K c) 800℃ d) 800 K

16. One mole of an ideal monoatomic gas is heated at a constant pressure of 1 atm from 0℃to 100℃. Work done by the gas is

a) 8.31×10^3 J b) 8.31×10^{-3} J
c) 8.31×10^{-2} J d) 8.31×10^2 J

17. Which of the following is correct in terms of increasing work done for the same initial and final state

a) Adiabatic < Isothermal <Isobaric
b) Isobaric < Adiabatic <Isothermal
c) Adiabatic < Isobaric < Isothermal
d) None of these

18. The mean kinetic energy of one mole of gas per degree of freedom (on the basis of kinetic theory of gases) is

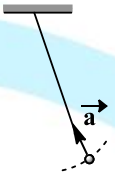
a) $\frac{1}{2}\ kT$ b) $\frac{3}{2}\ kT$ c) $\frac{3}{2}\ RT$ d) $\frac{1}{2}\ RT$

19. If the displacement of a particle executing SHM is given by $y = 0.30\sin(220t + 0.64)$ in $metre$, then the frequency and maximum velocity of the particle is

a) 35 Hz, 66 m/s b) 45 Hz, 66 m/s
c) 58 Hz, 113 m/s d) 35 Hz, 132 m/s

20. A simple pendulum is oscillating without damping. When the displacement of the bob is less than maximum, its acceleration vector $\vec{a}$ is correctly show in figure.

a)



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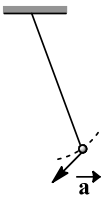

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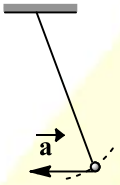
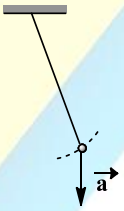


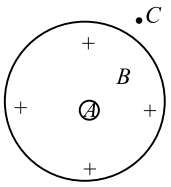
d)



21. A pulse or a wave train travels along a stretched string and reaches the fixed end of the string. It will be reflected back with

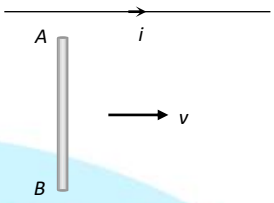
a) The same phase as the incident pulse but with velocity reversed
b) A phase change of 180°with no reversal of velocity
c) The same phase as the incident pulse with no reversal of velocity
d) A phase change of 180° with velocity reversed

22. Two equal metal balls are charged to 10 and -20 units of electricity. Then they are brought in contact with each other and then again separated to the original distance. The ratio of magnitudes of the force between the two balls before and after contact is



a) 8:1 b) 1:8 c) 2:1 d) 1:2

23. The potential to which a conductor is raised, depends on
    a) The amount of charge
    b) Geometry and size of the conductor
    c) Both (a) and (b)
    d) None of these
24. Two capacitors of capacitance 2 μF and 4μF respectively are connected in series. The combination is connected across a potential difference of 10 V. The ratio of energies stored by capacitors will be
    a) $1:\sqrt{2}$ b) 2 : 1 c) 1 : 4 d) 4 : 1
25. A conductor wire having 10^{29} free electrons/m^3 carries a current of 20A. If the cross-section of the wire is $1mm^2$, then the drift velocity of electrons will be
    a) $6.25 \times 10^{-3} ms^{-1}$ b) $1.25 \times 10^{-5} ms^{-1}$
    c) $1.25 \times 10^{-3} ms^{-1}$ d) $1.25 \times 10^{-4} ms^{-1}$
26. A primary cell has an e. m. f. of 1.5 volt, when short-circuited it gives a current of 3 ampere. The internal resistance of the cell is
    a) 4.5 ohm b) 2 ohm
    c) 0.5 ohm d) 1/4.5 ohm
27. A uniform wire has resistance 24 Ω. It is bent in the form of a circle. The effective resistance between the two end points on any diameter of the circle is
    a) 6 Ω b) 12 Ω c) 3 Ω d) 24 Ω
28. An electron having kinetic energy E is moving in a circular orbit of radius R perpendicular to a uniform magnetic field induction $\vec{B}$. If kinetic energy is doubled and magnetic field induction is tripled, the radius will become
    a) $R\sqrt{9/4}$ b) $R\sqrt{3/2}$ c) $R\sqrt{2/9}$ d) $R\sqrt{4/3}$
29. An electron moving around the nucleus with an angular momentum l has a magnetic moment
    a) $\frac{e}{m}l$ b) $\frac{e}{2m}l$ c) $\frac{2e}{m}l$ d) $\frac{e}{2\pi m}l$
30. A small bar magnet of moment M is placed in a uniform field H. If magnet makes an angle of 30° with field, the torque acting on the magnet is
    a) MH b) $\frac{MH}{2}$ c) $\frac{MH}{3}$ d) $\frac{MH}{4}$
31. The current carrying wire and the rod AB are in the same plane. The rod moves parallel to the wire with a velocity v. Which one of the following statements is true about induced emf in the rod



    a) End A will be at lower potential with respect to B
    b) A and B will be at the same potential
    c) There will be no induced e.m.f. in the rod
    d) Potential at A will be higher than that at B
32. In a LCR circuit having $L = 8.0\ henry, C = 0.5\ \mu F$ and $R = 100\ ohm$ in series. The resonance frequency in per second is
    a) 700 $radian$ b) 600 Hz
    c) 500 $radian$ d) 500 Hz
33. The capacity of a pure capacitor is 1 $farad$. In dc circuits, its effective resistance will be
    a) Zero b) Infinite c) 1 ohm d) 1/2 ohm
34. The speed of electromagnetic Wave in vacuum depends upon the source radiation. It
    a) Increases as we move from $\gamma - rays$ to radio waves
    b) Decreases as we move from $\gamma - rays$ to radio waves
    c) Is same for all of them
    d) None of the above
35. A man is suffering from colour blindness for green colour. To remove this defect, he should use goggles of
    a) Green colour glasses b) Red colour glasses
    c) Smoky colour glassesd) none of the above
36. The human eye has a lens which has a
    a) Soft portion at its centre
    b) Hard surface
    c) Varying refractive index
    d) Constant refractive index
37. In Young's double slit experiment, a mica slit of thickness t and refractive index μ is introduced in the ray from the first source S_1. By how much distance the fringes pattern will be displaced
    a) $\frac{d}{D}(\mu - 1)t$ b) $\frac{D}{d}(\mu - 1)t$

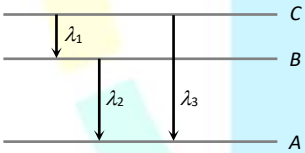
c) $\frac{d}{(\mu-1)D}$ d) $\frac{D}{d}(\mu-1)$

38. When radiation is incident on a photoelectron emitter, the stopping potential is found to be 9 V. Ie/m for the electron is 1.8×10^{11}C Kg^{-1},the maximum velocity the ejected electron is
a) 6×10^5 ms^{-1} b) 8×10^5 ms^{-1}
c) 1.8×10^6ms^{-1} d) 1.8×10^5ms^{-1}

39. X-rays are produced in X-ray tube operating at a given accelerating voltage. The wavelength of the continuous X-rays has values from
a) 0 to ∞
b) λ_{min} to∞, where$\lambda_{min} > 0$
c) 0 toλ_{max}, where$\lambda_{max} < \infty$
d) λ_{min} toλ_{max}, where $0 < \lambda_{min} < \lambda_{max} < \infty$

40. The radius of hydrogen atom in its ground state is 5.3×10^{-11} m. After collision with an electron it is found to have a radius of 212×10^{-11} m. What is the principal quantum number n of the final state of atom?
a) $n = 4$ b) $n = 2$ c) $n = 16$ d) $n = 3$

41. Energy levels A, B, C of a certain atom corresponding to increasing values of energy, $i.e., E_A < E_B < E_C$. If $\lambda_1, \lambda_2, \lambda_3$ are the wavelength of radiations corresponding to the transitions C to B, B to A and C to A respectively, which of the following statements is correct



a) $\lambda_3 = \lambda_1 + \lambda_2$ b) $\lambda_3 = \frac{\lambda_1\lambda_2}{\lambda_1+\lambda_2}$
c) $\lambda_1 + \lambda_2 + \lambda_3 = 0$ d) $\lambda_3^2 = \lambda_1^2 + \lambda_2^2$

42. The spectral series of the hydrogen atom that lies in the visible region of the electromagnetic spectrum
a) Paschen b) Balmer c) Lyman d) Brackett

43. Electric conduction in semi-conductor takes place due to
a) Electrons only
b) Holes only
c) Both electrons and holes
d) None of the above

44. A signal wave of frequency 12 kHz is modulated with a carrier wave of frequency 2.51 MHz. The upper and lower side band frequencies are respectively
a) 2512 kHz and 2508 kHz
b) 2522 kHz and 2488 kHz
c) 2502 kHz and 2498 kHz
d) 2522 kHz and 2498 kHz

45. Let A = light obtained by stimulated emission and B = light obtained by spontaneous, then
a) A is incoherent, B is incoherent
b) A is incoherent , B is coherent
c) A is coherent, B is coherent
d) A is coherent, B is incoherent

46. An example of homogeneous mixture is
a) Mixture of soil and water
b) Mixture of salt and sand grains
c) Sugar solution
d) None of the above

47. 1 mole of methyl amine on reaction with nitrous acid gives at NTP
a) 1.0 L of nitrogen b) 22.4 L of nitrogen
c) 11.2 L of nitrogen d) 5.6 L of nitrogen

48. Correct set of four quantum numbers for valence electron of rubidium ($Z = 37$) is
a) 5,0,0, $+\frac{1}{2}$ b) 5,1,0, $+\frac{1}{2}$
c) 5,1,1, $+\frac{1}{2}$ d) 6,0,0, $+\frac{1}{2}$

49. After np^6 electronic configuration, the next orbital filled will be
a) $(n+1)d$ b) $(n+1)s$
c) $(n+1)f$ d) None of these

50. The Ist IEs of four consecutive elements present in the second period of Periodic Table are 8.3, 11.3, 14.5 and 13.6 eV respectively. Which of these is the IE of nitrogen?
a) 13.6 b) 8.3 c) 14.5 d) 11.3

51. A coordinate bond is a dative covalent bond. Which of the below is true?
a) Three atom form bond by sharing their electrons
b) Two atoms form bond by sharing their electrons
c) Two atoms form bond and one of them provides both electrons
d) Two atoms form bond by sharing electrons obtained from third atom.

52. Geometry of ammonia molecule and the hybridisation of nitrogen involved in it are
a) sp^3 hyridisation and tetrahedral geometry b) sp^3 hyridisation and distorted tetrahedral geometry

c) sp^2 hyridisation and triangular geometry d) None of the above

53. Which is not a surface phenomenon?
a) Surface tension b) Viscosity
c) Evaporation d) All of these

54. A mixture of two moles of carbon monoxide and one mole of oxygen, in a closed vessel is ignited to convert the carbon monoxide. If ΔH is the enthalpy change and ΔE is the change in internal energy, then
a) $\Delta H > \Delta E$
b) $\Delta H < \Delta E$
c) $\Delta H = \Delta E$
d) The relationship depends on the capacity of the vessel

55. Calculate the free energy change of
$2\text{CuO}(s) \rightarrow \text{Cu}_2\text{O}(s) + \frac{1}{2}\text{O}_2(\text{g})$
Given, $\Delta H = 145.6$kJ per mol
$\Delta S = 116$ J per mol per K
a) 113.8 kJ per mol b) 221.5 kJ per mol
c) 55.4 kJ per mol d) 145.6 kJ per mol

56. Under what conditions of temperature and pressure, the formation of atomic hydrogen from molecular hydrogen will be favoured most?
a) High temperature and high pressure
b) High temperature and low pressure
c) Low temperature and low pressure
d) Low temperature and high pressure

57. In acid medium Zn reduces nitrate ion to NH_4^+ ion according to the reaction
$\text{Zn} + \text{NO}_3\text{Zn}^{2+} + \text{NH}_4^+ + \text{H}_2\text{O}$ (unbalanced)
How many moles of HCl are required to teduce half a mole of $NaNO_3$ completely? Assume the availability of sufficient Zn.
a) 5 b) 4 c) 3 d) 2

58. Oxidation states of X, Y, Z are $+2, +5$ and -2 respectively. Formula of the compound formed by these wii be
a) X_2YZ_6 b) XY_2Z_6 c) XY_5 d) X_3YZ_4

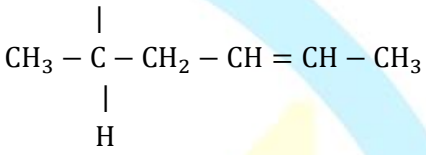
59. When zeolite which is hydrated sodium aluminium silicate is treated with hard water, the sodium ions are exchanged with
a) H^+ ions b) Mg^{2+} ionc) Ca^{2+} ion d) both $Ca^{2\cdot}$

60. $Na_2S_2O_3$ is reduced by I_2 to
a) Na_2S b) Na_2SO_4
c) $NaHSO_3$ d) $Na_2S_4O_6$

61. Aluminium vessels should not be washed with materials containing washing soda since
a) Washing soda reacts with aluminium to form soluble aluminate
b) Washing soda reacts with aluminium to form insoluble aluminium oxide
c) Washing soda is expensive
d) Washing soda is easily decomposed

62. Anhydrous $AlCl_3$ is obtained from
a) Aluminium and chlorine gas
b) Hydrogen chloride gas and Aluminium metal
c) Both of the above
d) None of the above

63. The IUPAC name of



a) 5-chloro-hex-2-ene
b) 2-chloro-hex-5-ene
c) l-chloro-1-methyl-pent-3-ene
d) 5-chloro-5-methyl-pent-2-ene

64. Benzene can be obtained by heating either benzoic acid with X or phenol with Y. X and Y are respectively
a) Zinc dust and soda lime
b) Soda lime and zinc dust
c) Zinc dust and sodium hydroxide
d) Soda lime and copper

65. Correct statement about 1,3-dibutene
a) Conjugated double bonds are present
b) Reacts with HBr
c) Forms polymer
d) All of the above

66. Which of the following causes water pollution?
a) Flyash b) Auto exhausts
c) Aeroplanes d) Pesticides

67. The first order reflection $(n = 1)$ from a crystal of the X-ray from a copper anode tube $(\lambda = 1.54\ \text{Å})$occurs at an angle of 45°. What is the distance between the set of plane causing the diffraction?
a) 0.1089 nm b) 0.1089 m
c) 0.905 Å d) 1.089×10^{-9}m

68. A solid compound contains X, $Y$and Zatoms in a cubic lattice with Xatom occupying the corners. Yatoms in the body centred positions and Zatoms at the centres of faces of the unit cell. What is the empirical formula of the

compound?

a) XY_2Z_3 b) XYZ_3 c) $X_2Y_2Z_3$ d) X_8YZ_6

69. At25°C , the highest osmotic pressure is exhibited by 0.1 M solution of
    a) Decinormalaluminiumsulphate
    b) Decinormal barium chloride
    c) Decinormal sodium chloride
    d) A solution obtained by mixing equal volumes of (b) and (c) and filtering
70. What happens when an egg is kept in saturated solution of NaCl after removing its hard shell in dilHCl?
    a) Egg will swell
    b) Egg will shrink
    c) Egg will remain same
    d) Egg will first shrink and then swell
71. In a cell that utilizes the reaction
    $Zn(s) + 2H^+(aq) \rightarrow Zn^{2+}(aq) + H_2(g)$
    addition of H_2SO_4 to cathode compartment will
    a) Lower the E and shift equilibrium to the right
    b) Lower the E and shift equilibrium to the left
    c) Increase the E and shift equilibrium to the right
    d) Increase the E and shift equilibrium to the left
72. In a 1st order reaction, reactant concentration C varies with time t as
    a) 1/C increases linearly with t
    b) Log C decreases linearly with t
    c) C decreases with 1/t
    d) Log C decreases with 1/t
73. A chemical reaction proceeds following formula
    $k = PZe^{-E_a/RT}$
    Which of the following process will increase the rate of reaction?
    a) Lowering of E_a
    b) Lowering of P
    c) Lowering of Z
    d) Independent of all the above factors
74. An emulsion is a colloidal dispersion of
    a) A liquid in a gas b) A liquid in a liquid
    c) A solid in a liquid d) A gas in a solid
75. Which of the following is not an ore?
    a) Malachite b) Calamine
    c) Satellite d) Cerussite
76. Thomas slag is
    a) $Ca_3(PO_4)_2.2H_2O$ b) $Ca_3(PO_4)_2.CaSiO_3$
    c) $MgSiO_3$ d) $CaSiO_3$
77. Which of the following is more acidic in nature?
    a) HClO b) $HClO_2$ c) $HClO_3$ d) $HClO_4$
78. $K_2Cr_2O_7 \xrightarrow{\Delta} K_2CrO_4 + O_2 + X$. In the above reaction X is
    a) CrO_3 b) Cr_2O_7 c) Cr_2O_3 d) CrO_5
79. Among the following the coloured compound is
    a) CuCl b) $K_3[Cu(CN)_4]$
    c) CuF_2 d) $[Cu(CH_3CN)_4]BF_4$
80. The correct IUPAC name of the compound is
    $CH_3 - \underset{|}{\overset{Cl}{CH}} - \underset{|}{\overset{Br}{CH}} - \underset{|}{\overset{I}{CH}} - CH_2 - CH_3$
    a) 4-bromo-5-chloro-3-iodo hexane
    b) 3-bromo-2-chloro-4-iodo hexane
    c) 3-bromo-4-iodo -2-chloro hexane
    d) 2-bromo-3-bromo-4-iodo hexane
81. $CHCl_3$ reacts with conc. HNO_3 to give
    a) CCl_3NO_2 b) CH_3NO_2
    c) CH_3CN d) $CH_3CH_2NO_2$
82. The acidic character of 1°, 2°, 3° alcohols, H_2O and $RC \equiv CH$ is of the order
    a) $H_2O > 1° > 2° > 3° > RC \equiv CH$
    b) $RC \equiv CH > 3° > 2° > 1° > H_2O$
    c) $1° > 2° > 3° > H_2O > RC \equiv CH$
    d) $3° > 2° > 1° > H_2O > RC \equiv CH$
83. Phenol is heated with a solution of mixture of KBrand $KBrO_3$. The major product obtained in the above reaction is
    a) 2-bromophenol
    b) 3-bromophenol
    c) 4-bromophenol
    d) 2, 4, 6-tribromophenol
84. What is the product in the reaction
    $CH_3CONH_2 \xrightarrow{NaOH_2/HCl} X$?
    a) CH_3COOH b) $CH_3CONH_3Cl^-$
    c) CH_3NH_2 d) CH_3CHO
85. The reagent that reacts with nitromethane to form methyl hydroxylamine is
    a) Zn/HCI b) Zn/NH_4CI
    c) Zn/NaOH d) Sn/HCI
86. Reduction of aniline with acetyl chloride in presence of NaOH produce
    a) Aniline hydrochloride b) Acetanilide
    c) p-choloroaniline d) A red dye
87. The enzymes which have control site in addition to active site are called

a) Holozymes b) Coenzymes
c) Apoenzymes d) Allosteric enzymes

88. Which of the following type of forces are present in nylon-6,6?
a) Van der walls" forces of attraction
b) Hydrogen bonding
c) Three dimensional network of bonds
d) Metallic bonding

89. Which is a polymer of three different monomers?
a) ABS b) SBR
c) NBR d) Nylon-2-nylon-6

90. Amphetamine is used as
a) Anaesthetic b) Antidepressant
c) Antimalarial d) Analgesic

91. Classification based on chromosome number is
a) Cytotaxonomy b) Numerical taxonomy
c) Karyotaxonomy d) Biochemistry

92. The suffix 'phyta' indicates
a) Family b) Class
c) Order d) Division

93. Binomial system of nomenclature was given by
a) Julian Huxley b) Bentham and Hooker
c) Linnaeus d) Casper Bauhin

94. Fungi that absorbs soluble organic matter from dead substrates are called
a) Saprophytes
b) Parasites
c) Obligate parasite
d) Lichens

95. Dinoflagellates are mostly ....A... and ...B.... Here A and B refers to
a) A-freshwater, B-chemosynthetic
b) A-marine, B-photosynthetic
c) A-terrestrial; B-photosynthetic
d) A-marine; B-chemosynthetic

96. Choose the correct statements.
a) Apophysis is the basal fertile part of the capsule in *Funaria*
b) Apophysis is the apical sterile part of the microsporophyll in *Cycas*
c) Apospory is the development of sporophyte from vegetative cells of the gametophyte
d) Apogamy is the development of gametophyte from vegetative cells of the sporophyte

97. In gymnosperms the dominate phase is ...A... .They are heterosporous, produce ...B... and ...C... . Here, A, B and C refers to
a) A-sporophyte, B-haploid microspores, C-haploid megaspores
b) A-gametophyte, B-haploid microspores, C-diploid megaspores
c) A-sporophyte, B-diploid microspores, C-diploid megaspores
d) A-gametophyte, B-diploid microspores, C-haploid megaspores

98. Ommatidia serve the purpose of photoreception in
a) Humans b) Sunflower
c) Cockroach d) Frog

99. Salivary gland in earthworm is found in
a) Dorsal wall of buccal cavity
b) Ventral wall of buccal cavity
c) Pharyngeal wall
d) None of the above

100. Food of *Hydra* is
a) Aquatic plants
b) Aquatic animals
c) Algae and aquatic animals
d) Some crustaceans

101. Inflorescence of *Ficus* is
a) Raceme b) Spike
c) Hypanthodium d) Verticillaster

102. Water stomata are found in
a) Plants lacking normal stomata
b) Plants inhibiting idry regions
c) Plants inhibiting humid region
d) All plants

103. Ginger is an underground stem. It is distinguished from root because it
a) Lacks chlorophyll
b) Stores food
c) Has nodes and internodes
d) Has xylem and vessels

104. The stem is the ...A... part of the axis bears branches, leaves, flowers and fruits. It develops from the ...B... part of embryo of germinating seeds. Complete the given statement by choosing appropriate options for A and B
a) A-descending; B-radicle b) A-radicle; B-descending
c) A-ascending; B-plumule d) A-plumule; B-ascending

105. In leaves, the ground tissues consists of
a) Epidermis b) Vascular tissue
c) Mesophyll cells d) Medullary rays

106. From evolutionary point of view, tracheids and

sieve cells are more primitive than tracheae and sieve tubes respectively. The angiosperms have

a) Tracheae and sieve tubes
b) Tracheids, tracheae and sieve tubes
c) Tracheae, sieve cells and sieve tubes
d) Tracheids, tracheae and sieve cells

107. Which of the following segment contains the cerebral ganglion in the earthworm?

a) 7 b) 5
c) 6 d) 3

108. Ductless glands in human beings produces

a) Saliva
b) Bile
c) Hormones
d) Mucous

109. Assume that an actively respiring cell has 3x number of K^+ in its cytoplasm and 2x number of K^+ entered into the cell. What is the process by which K^+ transport has taken place?

a) Primary active transport
b) Secondary active transport
c) Diffusion
d) Passive transport

110. Which is properly paired?

a) Golgi apparatus – Breaking of complex macromolecules
b) Endoplasmic reticulum – Protein synthesis
c) Chloroplast – Photosynthesis
d) Mitochondria – Oxidative phosphorylation

111. The substance, which is metal ion essential for the normal functioning of enzyme is called

a) Cofactor b) Coenzyme
c) Holoenzyme d) None of these

112. Which one of the following is not a fibrillar protein?

a) Elastin b) Collagen
c) Myosin d) Albumin

113. Meiosis occurs in which of the following cells?

a) Sperm cells b) Unicellular organisms
c) Liver cells d) All of these

114. Mitosis is a process by which eukaryotic cells

a) Grow
b) Get specialized in structure
c) Multiply
d) Expose the genes

115. Munch hypothesis is based on

a) Translocation of food due to TP gradient and imbibition force
b) Translocation of food due to turgor pressure (TP) gradient
c) Translocation of food due to imbibition force
d) None of the above

116. Which one is incorrect statement?

a) Movement of water is expressed in terms of free energy
b) Free energy determines the direction by which physical and chemical changes should occur
c) Water potential is the sum of free energy of water molecules in pure water and in any other system
d) Water potential of pure water is zero

117. Select the wrong statement regarding membrane channels

a) They are proteins
b) They are usually gated, *i.e.*, may be open or closed
c) All ions pass through the same type of channel
d) They form a huge pore in the outer membrane of plastids, mitochondria and some bacteria

118. The enzyme responsible for the reduction of molecular nitrogen to the level of ammonia in leguminous root nodule is

a) Nitrogenase b) Nitrate reductase
c) Nitrite reductase d) hydrogenase

119. On the basis of symptoms of chlorosis in leaves, a student inferred that this was due to the deficiency of nitrogen. This inference could be correct only if we assume that yellowing of leaves appeared first in

a) Old leaves
b) Young leaves
c) Young leaves followed by mature leaves
d) Young leaves followed by young leaves

120. Cyclic photophosphorylation produces

a) NADPH b) ATP
c) $ATP + NADPH_2$ d) $ATP + NADPH_2 + O_2$

121. Which statement about photosynthesis is

false?

a)	b)	c)	d)
The electron carriers involved in photophosphorylation are located on the thylakoid membranes	Photosynthesis is a redox process, in which water is oxidized and carbon dioxide is reduced	The enzymes required for carbon fixation are located only in the grana of chloroplasts	In green plants, both PS-I and PS-II are required for the formation of NADPH $+H^+$

122. When one molecule of glucose is completely oxidized during aerobic respiration, how many molecules of carbon dioxide are released due to Tricarboxylic acid cycle?
   a) One
   b) Two
   c) Three
   d) Four

123. The enzyme ..... is used to catalysed when condensation of acetyl group with oxaloacetic acid and to yield citric acid
   a) Citrate permeate b) citrate synthase
   c) Citrate burate d) Citrate maliate

124. Primary growth of plants is contributed by
   a) Root apical meristem
   b) Shoot apical meristem
   c) Intercalary meristem
   d) All of these

125. In expression, $L_t = L_0 + rt$, of arithmetic growth rate, L_t, L_0 and r represents

	L_t	L_0	r
a)	Length at time zero	Length at time $'t'$	Elongation per unit time
b)	Length at time $'t'$	Length at time zero	Elongation per unit time
c)	Length at time $'t'$	Length at time zero	Growth rate

   d) Both (b) and (c)

126. The maximum growth rate occurs in
   a) Stationary phase b) Senescent phase
   c) Lag phase d) Exponential phase

127. Which hormone is also known as Gastric Inhibitory Peptide (GIP)
   a) Enterokinase
   b) Enterogastrone
   c) Cholecystokinin
   d) Vasoactive intestinal Peptide (VIP)

128. Which one of the following statements is true regarding digestion and absorption of food in humans?
   a) Oxyntic cells in our stomach secrete the proenzyme pepsinogen
   b) Fructose and amino acids are absorbed through intestinal mucosa with the help of carrier ions like Na^+
   c) Chylomicrons are small lipoprotein particles that are transported from intestine into blood capillaries
   d) About 60% of starch is hydrolysed by salivary amylase in our mouth

129. Exchange of O_2 and CO_2 between the blood and tissue is based on
   a) Pressure/concentration gradient
   b) Inspiratory capacity
   c) Osmotic gradient
   d) Tidal volume

130. How much amount of air can be inspired or expired during normal breathing?
   a) 0.5L b) 2.5L c) 1.5L d) 5.5L

131. To obtain a standard ECG, the patient is connected to the machine with three electrical leads. These three electrical lead are connected as one each to the
   a) Biceps and third one at the ankle
   b) Triceps and third one at the ankle
   c) Thigh and third one at the ankle
   d) Wrist and third one at the ankle

132. Formed element constitutes what percentage of the blood?
   a) 55% of blood b) 45% of blood
   c) 35% of blood d) 25% of blood

133. Inner to the hilum of the kidney, there is a broad funnel-shaped space called
   a) Renal pelvis b) Medulla
   c) Cortex d) Adrenal gland

134. Nephritis is caused by
   a) Fungi b) Bacteria c) Virus d) Protozoa

135. The excretory material of bony fish is
   a) Urea b) Protein
   c) Ammonia d) Amino acid

136. Immediate energy source for muscle contraction is
   a) ATP b) ADP

c) Glucose d) Lactic acid

137. Identify the correct statements
I. Acetylcholine is released when the neural signal reaches to the motor end plate
II. Muscle contraction is initiated by signals sent by CNS *via* a sensory neuron
III. During muscle contraction, isotropic bands get elongated
IV. Repeated activation of the muscles can lead to lactic acid accumulation in them
The option with correct choices is
a) I and III b) I and IV c) II and III d) I and II

138. Which statement is correct for muscle contraction?
a) Length of H-zone is decreased
b) Length of A-band remains constant
c) Length of I-band gets increased
d) Length of two Z-line get increased

139. How many pairs of cranial nerves originate from the brain of rabbit?
a) 12 b) 8 c) 9 d) 11

140. Axons can be
a) Non-myelinated b) Myelinated
c) Either (a) or (b) d) None of these

141. ANF has exactly opposite function of which of hormone secreted
a) PTH b) Estrogen
c) Aldosterone d) Androgen

142. The chemical nature of hormones secreted by α and δ cells of pancreas is
a) Glycolipid b) Gycoprotien
c) Steroid d) Polypeptide

143. Self-fertilisation occurs in the
a) Bisexual flower
b) Unisexual flower
c) Both (a) and (b)
d) Monoecious flower

144. Breeding of crops with high levels of minerals, vitamins and proteins is called:
a) Somatic hybridization
b) Bioforfication
c) Micropropagation
d) Biomagnification

145. Flower is a
a) Modified male plant only b) Modified female plant only
c) Modified reproductive shoot d) Vegetative shoot system

146. Ovules contain many embryo in
a) Citrus
b) Orange
c) Mango
d) All of these

147. If the number of chromosomes in egg cell is 8, then what is the number of chromosomes on endosperm?
a) 24 b) 8 c) 16 d) 12

148. Which one of the following pairs correctly matches a hormone with a disease resulting from its deficiency?
a) Luteinizing hormone – failure of ovulation
b) Insulin - Diabetes insipidus
c) Thyroxine - Tetany
d) Parathyroid hormone - Diabetes mellitus

149. Withdrawl of which hormone cause desintegration of corpus luteum?
a) Progesterone b) LH
c) Both (a) and (b) d) None of these

150. hCG (Human Chorionic Gonadotrophin) and hPL (Human Placental Lactogen) are released
a) Before pregnancy
b) During pregnancy
c) At parturition
d) During lactating stage

151. There is no DNA in
a) An enucleated ovum
b) Mature RBCs
c) A mature spermatozoan
d) Hair root

152. The first case of IVF-ET techniques success, was reported by:
a) Bayliss and Starling Taylor
b) Robert Steptoe and Gilbert Brown
c) Louis Joy Brown and Banting best
d) Patrick Steptoe and Robert Edwards

153. Pills have to be taken daily for period of …A… days. Starting preferably within first five days of menstrual cycle?
After a gap of …B… days, it has to be repeated in the same pattern
Complete the given NCERT statement by filling up the blanks A and B
a) A-27; B-1 b) A-21; B-7
c) A-22; B-5 d) A-24; B-4

154. The gene, which controls many characters, is called
a) Codominant gene b) Polygene
c) Pleiotropic gene d) Multiple gene

155. In man, four phenotypes of blood groups are due to the presence of antigen-A and antigen-B on the RBC. The chromosome that has the gene

to control these antigens is
a) X-chromosome b) 21st chromosome
c) 9th chromosome d) 7th chromosome

156. Diploid cells have
a) Two chromosomes
b) One set of chromosomes
c) Two pairs of homologous chromosomes
d) Two sets of chromosomes

157. VNTR varies in size from
a) 0.1-20 kb
b) 0.2-10 kb
c) 0.3-30 kb
d) 0.4-15 kb

158. Which of the following statement is correct?
a) A forms 2 hydrogen bonds with G; T forms 3 hydrogen bonds with C
b) A forms 3 hydrogen bonds with T; G forms 3 hydrogen bonds with C
c) A forms 2 covalent bonds with T; G forms 3 covalent bonds with C
d) A forms 2 hydrogen bonds with T; G forms 3 hydrogen bonds with C

159. Which of the following are the wrong statements
I. Organs which are different in basic structure and origin but performs similar functions are called analogous organ
II. Organs with different to basic structure and origin but perform similar functions are called homologous organs
III. Homologous organs lead to convergent evolution
IV. Analogous organ leads to divergent evolution
The correct combination is
a) I, III and IV
b) I, IV and III
c) I and II
d) II, III and IV

160. 'XX' is a type of selection process in evolution 'XX' promotes the population changes in one particular direction 'XX' favours small or large sized individuals, mean size of population changes in 'XX'. Identify 'XX'
a) Stabilizing selection
b) Directional selection
c) Disruptive selection
d) None of these

161. Passive immunity can be obtained through
a) Antigen b) Vaccines
c) Antibiotics d) Antibodies

162. Female *Anopheles* mosquito is a vector of
a) Filaria b) Malaria c) Typhoid d) AIDS

163. Which of the following options is not appropriate for anxiety disorder?
a) Perspiration occurs
b) Distorted thoughts
c) In this condition, person reacts very strongly to any situation of stress
d) Heart beats increase

164. A superior female, in the case of cattle is the …A… that produces more milk per lactation. On the other hand, a superior …B… is that …C… which gives rise to …D… as compared to those of other males. Here A and D refers to
a) A-cow, B-male, C-bull, D-superior progeny
b) A-buffalo, B-male, C-bull, D-inferior progeny
c) A-cow, B-male, C-bull, D-inferior progeny
d) A-cow, B-male, C-bull, D-normal progeny

165. Silk, honey and lac are:
a) Secretory substances of insects
b) Secretory substances of plants
c) Artificial chemicals
d) All of the above

166. Yeast have been used for the commercial production of
I. ethanol II. bread III. cheese
Choose the correct option
a) I and II b) I and III c) I, II and III d) None of these

167. *Mosascus purpureus* is a yeast (fungus) commercially used in the production of
a) Acetic acid
b) Ethanol
c) Blood cholesterol lowering statin
d) Streptokinase

168. VNTR analysis involves
a) Analyzing specific loci for two base repeating units usually less then 100 bp in size
b) Analyzing specific loci for 2-4 bp repeating units
c) PCR amplification of specific genes
d) Cutting DNA with restriction enzyme and analyzing the banding pattern of fragments

169. Humulin is a:
a) Pig insulin b) Human insulin
c) Viral insulin d) Human clone

170. Secondary cells can't divide because

a) They lose the ability to divide
b) They do not have nucleus
c) They undergo certain irreversible changes during differentiation
d) All of the above

171. The problem of blindness in poor countries can be taken care of by using which of the following?
a) Golden rice b) Transgenic tomato
c) Transgenic maize d) *Bt* brinjal

172. An efficient oil eating 'Super bug' developed through genetic engineering used in cleaning of oil-spill polluted sites is a species of
a) *Arthrobacter* b) *Citrobacter*
c) *Pseudomonas* d) *Thiobacillus*

173. If non-limiting conditions are provided then what will happen?
a) Natality increases and mortality decreases
b) mortality decreases
c) Natality increases
d) Mortality increases

174. Pollinator mutualism are special interactions involving …A…, which receive food or a place to lay eggs and …B…, which receive pollen from other of their kind.
Choose of correct option for A and B
a) A-insects; B-plants
b) A-plants; B-insects
c) A-prey; B-plants
d) A-predators; B-plants

175. In plant succession, when climax community is reached, the net productivity
a) Continues to increase b) Becomes zero
c) Becomes reduced d) Becomes stable

176. The living organisms present in an ecosystem forms
a) Abiotic components
b) Biotic components
c) Physical components
d) Chemical components

177. Biosphere reserves are different from national park as
a) Plants and animals are protected in biosphere reserves
b) Human are integral part of biosphere reserves
c) Humans are not involved in biosphere reserves
d) None of above

178. An endemic species is the one
a) That has been introduced to a new geographic area
b) That is found in many different geographic area
c) That is found only on islands
d) That is found naturally in just one geographic area

179. When the noise was recognized as an air pollutant?
a) 1992 b) 1963 c) 1949 d) 1987

180. Carbon monoxide is a pollutant because it
a) Reacts with O_2
b) Inhibits glycolysis
c) Reacts with haemoglobin
d) Makes nervous system inactive

Meritstore

NEET

TEST ID: 13

Time : 03:00:00 **Marks** : 720

: ANSWER KEY :

1)	**c**	**2)**	**b**	**3)**	**c**	**4)**	**a**	**5)**	**a**	**6)**	**a**	**7)**	**a**
8)	**d**	**9)**	**d**	**10)**	**b**	**11)**	**b**	**12)**	**b**	**13)**	**d**	**14)**	**c**
15)	**d**	**16)**	**d**	**17)**	**a**	**18)**	**d**	**19)**	**a**	**20)**	**c**	**21)**	**d**
22)	**a**	**23)**	**c**	**24)**	**b**	**25)**	**c**	**26)**	**c**	**27)**	**a**	**28)**	**c**
29)	**b**	**30)**	**b**	**31)**	**d**	**32)**	**c**	**33)**	**b**	**34)**	**c**	**35)**	**d**
36)	**c**	**37)**	**b**	**38)**	**c**	**39)**	**b**	**40)**	**b**	**41)**	**b**	**42)**	**b**
43)	**c**	**44)**	**d**	**45)**	**d**	**46)**	**c**	**47)**	**b**	**48)**	**a**	**49)**	**b**
50)	**c**	**51)**	**c**	**52)**	**b**	**53)**	**b**	**54)**	**b**	**55)**	**a**	**56)**	**b**
57)	**a**	**58)**	**b**	**59)**	**d**	**60)**	**d**	**61)**	**a**	**62)**	**c**	**63)**	**a**
64)	**b**	**65)**	**d**	**66)**	**d**	**67)**	**c**	**68)**	**b**	**69)**	**a**	**70)**	**b**
71)	**c**	**72)**	**b**	**73)**	**a**	**74)**	**b**	**75)**	**c**	**76)**	**b**	**77)**	**d**
78)	**c**	**79)**	**c**	**80)**	**b**	**81)**	**a**	**82)**	**a**	**83)**	**d**	**84)**	**a**
85)	**b**	**86)**	**d**	**87)**	**d**	**88)**	**b**	**89)**	**a**	**90)**	**b**	**91)**	**a**
92)	**a**	**93)**	**c**	**94)**	**a**	**95)**	**b**	**96)**	**b**	**97)**	**a**	**98)**	**c**
99)	**c**	**100)**	**d**	**101)**	**c**	**102)**	**c**	**103)**	**c**	**104)**	**c**	**105)**	**c**
106)	**b**	**107)**	**a**	**108)**	**c**	**109)**	**b**	**110)**	**a**	**111)**	**a**	**112)**	**d**
113)	**a**	**114)**	**c**	**115)**	**b**	**116)**	**c**	**117)**	**c**	**118)**	**a**	**119)**	**a**
120)	**b**	**121)**	**c**	**122)**	**d**	**123)**	**b**	**124)**	**c**	**125)**	**d**	**126)**	**d**
127)	**b**	**128)**	**c**	**129)**	**a**	**130)**	**a**	**131)**	**d**	**132)**	**b**	**133)**	**a**
134)	**b**	**135)**	**c**	**136)**	**a**	**137)**	**b**	**138)**	**b**	**139)**	**a**	**140)**	**c**
141)	**c**	**142)**	**d**	**143)**	**a**	**144)**	**b**	**145)**	**c**	**146)**	**d**	**147)**	**a**
148)	**a**	**149)**	**b**	**150)**	**b**	**151)**	**b**	**152)**	**d**	**153)**	**b**	**154)**	**c**
155)	**c**	**156)**	**d**	**157)**	**a**	**158)**	**d**	**159)**	**d**	**160)**	**b**	**161)**	**d**
162)	**b**	**163)**	**a**	**164)**	**a**	**165)**	**a**	**166)**	**a**	**167)**	**c**	**168)**	**d**
169)	**b**	**170)**	**b**	**171)**	**a**	**172)**	**c**	**173)**	**a**	**174)**	**a**	**175)**	**d**
176)	**b**	**177)**	**b**	**178)**	**d**	**179)**	**a**	**180)**	**c**				

: HINTS AND SOLUTIONS :

Single Correct Answer Type

1 **(c)**

$\frac{\Delta l}{l} \times 100 = \frac{0.01}{15.12} \times 100 = 0.07,$

$\frac{\Delta b}{b} \times 100 = \frac{0.01}{10.15} \times 100 = 0.1,$

$\frac{\Delta t}{t} \times 100 = \frac{0.01}{5.28} \times 100 = 0.2$

Required percentage $= 0.07 + 0.1 + 0.2 = 0.37\%$

2 **(b)**

$1\ kWh = 1\ \times 10^3 \times 3600\ W \times \text{sec} = 36 \times 10^5\ J$

3 **(c)**

Slope is negative at the point E.

4 **(a)**

Time of flight $= \frac{2u \sin\theta}{g} = \frac{2u_y}{g} = \frac{2 \times u_{\text{vertical}}}{g}$

5 **(a)**

Given, $\omega_1 = 2\pi \times 400$ rad s^{-1}

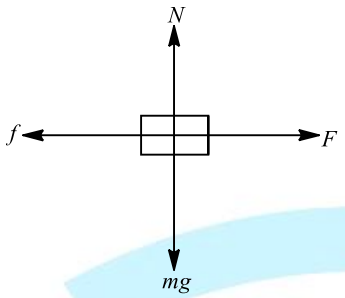
$\omega_2 = 2\pi \times 200$ rad s^{-1}

$\therefore \alpha = \frac{2\pi(400-200)}{2} = 200\pi$ rad s^{-2}

6 **(a)**

The various forces acting on the block are as shown

As the truck moves in forward direction with acceleration 2 m/s^2, the box experiences a force F



in backward direction,

$F = ma = 40 \times 2 = 80$ N

in backward direction.

Its motion will be opposed by force of friction

$f = \mu N = \mu mg = 0.15 \times 40 \times 10 = 60$N

The acceleration of the box relative to the truck toward the rear end is

$$a = \frac{F - f}{m} = \frac{80 - 60}{40} = 0.5\ m/s^2$$

If t be the time taken by the box to fall off the truck

$$s = ut + \frac{1}{2}at^2$$

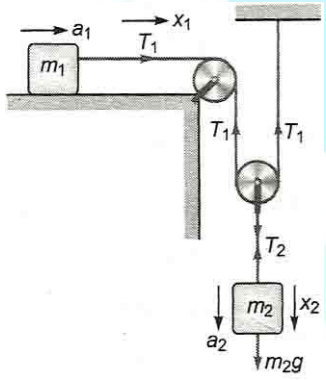
$$5 = 0 + \frac{1}{2} \times 0.5 \times t^2$$

$$t = \sqrt{20}\ s$$

During this time distance covered by truck

$$x = 0 \times t + \frac{1}{2} \times 2 \times (\sqrt{20})^2 = 20 \text{ m}$$

7 **(a)**



From force diagram,

$T_1 = m_1 a_1$ ...(i)

$T_2 = 2T_1$...(ii)

$m_2 g - T_2 = m_2 a_1$

$m_2 g - 2T_2 = m_2 a_1$ ...(iii)

Total work done by tensions should be zero,

$\therefore T_1 x_1 - T_2 x_2 = 0$

or $T_1 x_1 = T_2 x_2$ or $T_1 x_2 = 2T_1 x_2$

or $x_1 = 2x_2$ or $\frac{d^2 x_1}{dt^2} = \frac{2d^2 x_2}{dt^2}$

$\therefore a_1 = 2a_2$...(iv)

After solving Eqs. (i), (iii) and (iv),

$$a_2 = \frac{m_2 g}{4m_1 + m_2}$$

8 **(d)**

Given $F = 2x$,

Work done $W = \int F\, dx$

$$\therefore W = \int_{x_1}^{x_2} 2x\, dx = 2\left[\frac{x^2}{2}\right]_{x1}^{x2}$$

$=(x_2^2 - x_1^2)$

9 **(d)**

Change in momentum $= \vec{F}\, t$ and does not depend on mass of the bodies.

10 **(b)**

As no torque is being applied, angular momentum

$L = l\omega$ =constant

$\left(\frac{2}{5}Mr^2\right)\frac{2\pi}{T}$ =constant

or $\frac{r^2}{T}$ =constant

Differentiating w.r.t time (t), we get

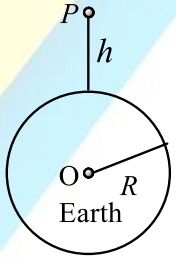
$$\frac{T.2r\frac{dr}{dt} - r^2\frac{dT}{dt}}{T^2} = 0$$

or $2Tr\frac{dr}{dt} = r^2\frac{dT}{dt}$

or $\frac{dT}{dt} = \frac{2T}{r}\frac{dr}{dt}$

11 **(b)**

The value of acceleration due to gravity at height h above the surface of the earth is given by



$$g'' = \frac{g}{\left(1 + \frac{h}{R}\right)^2}$$

$$g'' = g\left(1 + \frac{h}{R}\right)^{-2} = g\left(1 - \frac{2h}{R}\right)$$

Given, $g'' = \frac{g}{4}$

$$\frac{g}{4} = g\left(1 - \frac{2h}{R}\right)$$

$$\Rightarrow \quad \frac{1}{4} = 1 - \frac{2h}{R}$$

$$\Rightarrow \quad \frac{2h}{R} = \frac{3}{4}$$

$$\Rightarrow \quad h = \frac{3R}{8}$$

12 **(b)**

Young's modulus $Y = \frac{\text{Stress}}{\text{Strain}} = \frac{\frac{F}{A}}{\text{Strain}}$

or $Y\ \frac{mg}{A \times \text{strain}}$

or $m = \frac{Y \times A \times \text{strain}}{g}$

$= \frac{2 \times 10^{11} \times 10^{-3} \times 10^{-6}}{10} = 60\text{kg}$

13 **(d)**

Here, $R = 2.8/2 = 1.4$ mm $= 0.14$ cm

$= \frac{4}{3}\pi R^3 = 125 \times \frac{4}{3}\pi r^3$

Or $r = R/5 = 0.14/5 = 0.028$ cm

Change in energy = surface tension × increase in area

$= 75 \times (125 \times 4\pi r^2 - 4\pi R^2)$

$= 74$ erg

14 **(c)**

According to Bernoulli's Theorem; $p = \frac{1}{2}\rho v^2$ =constant. Near the ends, the velocity of liquid is higher so that pressure is lower as a result the liquid rises at the sides to compensate for this drop of pressure

$ie, \rho\ g\ h = \frac{1}{2}\rho v^2 = \frac{1}{2}\rho r^2 \omega^2$

Hence, $h = \frac{r^2\omega^2}{2g} = \frac{r^2(2\pi v)^2}{2g} = \frac{2\pi^2 r^2 v^2}{g}$

$= \frac{2 \times \pi^2 \times (0.05)^2 \times 2^2}{9.8}$

$= 0.02$ m $= 2$ cm

15 **(d)**

$\frac{E_2}{E_1} = \left(\frac{T_2}{T_1}\right)^4 \Rightarrow \frac{2}{1} = \left(\frac{400+273}{T}\right)^4 = \left(\frac{673}{T}\right)^4$

$\Rightarrow T = 2^{1/4} \times 673 = 800\ K$

16 **(d)**

$dW = dQ - dU$

$= C_2(T_2 - T_1) - C_v[\,T_2 - T_1\,]$

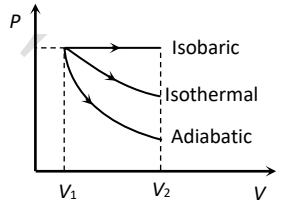
$= R[T_2 - T_1]$

$= 8.31 \times 100 = 8.31 \times 10^2$J

17 **(a)**

In thermodynamic process, work done is equal to the area covered by the PV curve with volume axis

$W_{adiabatic} < W_{isothermal} < W_{isobaric}$



18 **(d)**

The main kinetic energy of one mole of gas $n$degree of freedom.

$E = \frac{n}{2}RT$

The mean kinetic energy of one mole of gas per degree of freedom.

$E' = \frac{E}{n} = \frac{\frac{n}{2}RT}{n}$

$E' = \frac{1}{2}RT$

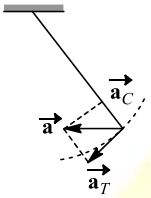
19 **(a)**

$n = \frac{\omega}{2\pi} = \frac{220}{2\pi} = 35Hz$

$v_{\max} = \omega a = 220 \times 0.30 m/s = 66 m/s$

20 **(c)**

When the displacement of bob is less than maximum, there will two compounding acceleratins$\overrightarrow{a_l}$ and $\overrightarrow{a_c}$of the bob as shown in figure. Their resultant acceleration $\vec{a}$ will be represented by the diagonal of the parallelogram



21 **(d)**

On reflection from fixed end (denser medium) a phase difference of π is introduced and velocity is reversed.

22 **(a)**

Given,$Q_1 = 10$unit, $Q_2 = -20$ unit

After contact charges on both become same,ie,

$Q' = \frac{10 - 20}{2} = -5$ units

$|F_1| = \frac{1}{4\pi\varepsilon_0} \times \frac{10 \times 20}{r^2}$

and $|F_2| = \frac{1}{4\pi\varepsilon_0} \times \frac{5 \times 5}{r^2}$

Hence, $\frac{|F_1|}{|F_2|} = \frac{8}{1}$

23 **(c)**

$V = Q/C$

$Q =$ the amount of charge

$C =$ capacitance which depends on geometry and size of conductor

24 **(b)**

Given, $C = 2\mu$F, $C_2 = 4\mu$F, and $V = 10$volt

Capacitors are connected in series

$$\frac{1}{C}=\frac{1}{C_1}+\frac{1}{C_2}$$

$$\therefore\ C=\frac{4\times 2}{4+2}=\frac{4}{3}$$

The charge of combination

$$q=CV=\frac{4}{3}\times 10=\frac{40}{3}$$

The energy of 2μF capacitor

$$E=\frac{1}{2}\times\frac{q^2}{C_1}=\frac{1}{2}\times\frac{1600}{9\times 2}=\frac{400}{9}$$

The energy of 4μF capacitor

$$E_2=\frac{1}{2}\times\frac{q^2}{C_2}=\frac{1}{2}\times\frac{1600}{9\times 4}=\frac{200}{9}$$

The ratio of energies is

$$\frac{E_1}{E_2}=\frac{\frac{400}{9}}{\frac{200}{9}}=\frac{2}{1}$$

25 **(c)**

$$v_d=\frac{I}{nAe}=\frac{20}{10^{29}\times 10^{-6}\times 1.6\times 10^{-19}}$$
$$=1.25\times 10^{-3}\text{m/s}$$

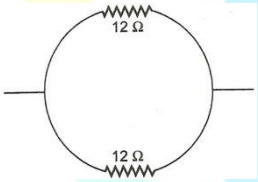
26 **(c)**

Short circuit current $i_{SC}=\frac{E}{r}\Rightarrow 3=\frac{1.5}{r}\Rightarrow r=0.5\Omega$

27 **(a)**

Given, resistance of uniform wire=24Ω.

When the wire is bent in the form of a circle, then resistance will divide the wire in two equal at opposite point in parallel



The effective resistance between the two end points on any diameter of the circle.

$$R=\frac{12\times 12}{12+12}$$

or $R=\frac{144}{24}$

or $R=6\Omega$

28 **(c)**

$$E=\frac{B^2q^2r^2}{2m}\text{ or }r=\frac{\sqrt{2mE}}{Bq}$$

So, $r\propto\sqrt{E}/B$

$$\therefore\ \frac{r_2}{r_1}=\sqrt{\frac{2E}{E}}\times\frac{B}{3B}=\sqrt{\frac{2}{9}}$$

$$\therefore\ r_2=\sqrt{\frac{2}{9}}r_1=\sqrt{\frac{2}{9}}R.$$

29 **(b)**

An electron moving around the nucleus has a magnetic moment μ given by

$$\mu=\frac{e}{2m}l$$

Where l is the magnitude of the angular momentum of the circulating electron around the nucleus. The smallest value of μ is called the bohr magneton μ_B and its value is $\mu_B=9.27\times 10^{-24}\,JT^{-1}$

30 **(b)**

$$\tau=MH\sin\theta=MH\sin 30^\circ=\frac{MH}{2}$$

31 **(d)**

By Fleming's right hand rule

32 **(c)**

Resonance frequency in $radian/second$ is

$$\omega=\frac{1}{\sqrt{LC}}=\frac{1}{\sqrt{8\times 0.5\times 10^{-6}}}=500\ rad/sec$$

33 **(b)**

$$X_C=\frac{1}{2\pi v\,C}=\frac{1}{0}=\infty$$

34 **(c)**

Speed of Electromagnetic Waves in vacuum

$$=\frac{1}{\sqrt{\mu_0\varepsilon_0}}=\text{costant}$$

35 **(d)**

Colour blindness is a genetic disease and still cannot be cured

38 **(c)**

$$\frac{1}{2}mv_{\max}^2=eV_0$$

$$\Rightarrow\qquad v_{\max}=\sqrt{2\left(\frac{e}{m}\right)V_0}$$

$$=\sqrt{2\times 1.8\times 10^{11}\times 9}$$
$$=18\times 10^5 ms^{-1}$$
$$=1.8\times 10^6 ms^{-1}$$

40 **(b)**

$$r\propto n^2$$

$$\frac{r_f}{r_i}=\left(\frac{n_f}{n_i}\right)^2$$

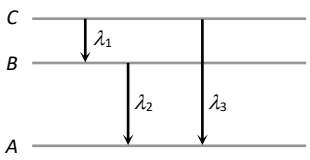
$$\frac{21.2\times 10^{-11}}{5.3\times 10^{-11}}=\left(\frac{n}{1}\right)^2$$

$$n^2=4$$

$$n=2$$

41 **(b)**

Let the energy in A, B and C states be $E_A.E_B$ and E_C, then from the figure



$(E_C-E_B)+(E_B-E_A)=(E_C-E_A)$ or $\frac{hc}{\lambda_1}+\frac{hc}{\lambda_2}=$

$\frac{hc}{\lambda_3}$

$\Rightarrow \lambda_3 = \frac{\lambda_1\lambda_2}{\lambda_1 + \lambda_2}$

42 **(b)**

In the spectral series of the hydrogen atom, Lyman series is in the ultraviolet region, Balmer series is in the visible region, paschen, Brackett and pfund are in the infrared region of the electromagnetic spectrum

43 **(c)**

Electric conduction in semi-conductor takes place due to both electrons and holes.

44 **(d)**

Upper side band (USB) frequency $= f_c + f_m$

$= (2.51)\text{MHz} + (12)\text{kHz} = (2510 + 12)\text{ kHz}$
$= 2522\text{ kHz}$

Lower side band (LSB) frequency $= f_c - f\_m$

$= (2.51)\text{MHz} - (12)\text{kHz} = (2510 - 12)\text{ kHz}$
$= 2498\text{ kHz}$

47 **(b)**

$CH_3 - NH_2 + HNO_2 \rightarrow CH_3OH + N_2 + H_2O$

1 mole of methyl amine gives 1 mole N_2

$i.e.$, 22.4 L of nitrogen at NTP.

48 **(a)**

Electronic configuration of $Rb_{(37)}$ is

$1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^2, 4p^6, 5s^1$

So, for the valence shell electron $5s^1$

$n = 5, l = 0, m = 0, s = +\frac{1}{2}$

50 **(c)**

Generally in a period, IE increases but nitrogen due to the presence of half-filled p-subshell (stable configuration) has higher IE as compared to its consecutive elements. Thus, the IE of nitrogen is 14.5

51 **(c)**

A coordinate bond is a dative covalent bond in which two atoms form bond and one of them provides both electrons.

$X: +Y \longrightarrow X:Y \text{or } X \longrightarrow Y$

52 **(b)**

(i) Hybridisation $= \frac{1}{2}$ (no. of e^- in valence shell of central atom + no. of monovalent atoms + charge on anion – charge on cation)

(ii) Shape or geometry of molecule depends on lone pair and bond pair of electrons present in it.

Hybridisation of

N in $NH_3 = \frac{1}{2}(5 + 3 + 0 - 0) = 4$

$\therefore$ sp^3hybridisation.

$\because$ It has 3 bond pair and 1 lone pair of electrons, so it has distorted tetrahedron shape.

54 **(b)**

$2CO + O_2 \rightarrow 2CO_2$

$\Delta H = \Delta E + \Delta nRT$

$\Delta n =$ No. of moles of gaseous products – No. of moles of gaseous reactants

$\Delta n = 2 - 3 = -1$

$\Delta H = \Delta E - RT$

$\therefore \quad \Delta H < \Delta E$

55 **(a)**

Use $\Delta G = \Delta H - T\Delta S$

$\Delta G = 145.6 - 273 \times 0.116$

$= 113.93\text{ kJ/mol}$

57 **(a)**

$\therefore 4Zn + NO_3^- + 10H^+ \longrightarrow 4Zn^{2+} + NH_4^+ + 3H_2O$(Net equation)

$4Zn + NO_3^- + 10HCl$
$\longrightarrow 4Zn^{2+} + NH_4^+ + 5Cl_2 + 3H_2O$

$\because$ 1 mole of NO_3^- (0r $NaNO_3$) is reduced by
$=$10 moles of HCl

$\therefore \frac{1}{2}$ mole of No_3^- will be reduced by

$= 10 \times \frac{1}{2}$moles of HCl

$= 5$ moles of HCl

58 **(b)**

The sum of the oxidation states is always zero in neutral compound.

The oxidation state of X, Y, and Z are $+2$, $+5$ and -2 respectively.

1. In X_2YZ_6

$2 \times 2 + 5 + 6(-2) \neq 0$

2. In XY_2Z_6

$2 + 5 \times 2 + 6(-2) = 0$

3. In XY_5

$2+5\times 5 \neq 0$

4. In X_3YZ_4

$3 \times 2 + 5 + 4(-2) \neq 0$

Hence, the formula of the compound is XY_2Z_6.

60 **(d)**

$Na_2S_2O_3$ r $2Na^+ + S_2O_3^{2-}$

$S_2O_3^{2-} + I_2 \longrightarrow S_4O_6^{2-} + I^-$

$i.e.,\quad 2Na_2S_2O_3 + I_2 \longrightarrow Na_2S_4O_6 + 2NaI$

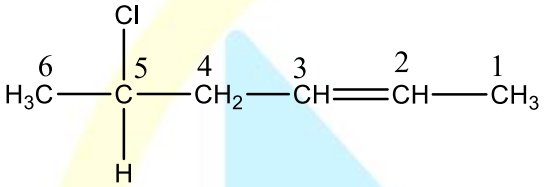
62 **(c)**

$2Al + 6HCl \longrightarrow 2AlCl_3 + 3H_2$

$2Al + 3Cl_2$ (dry gas) $\longrightarrow 2AlCl_3$

63 **(a)**

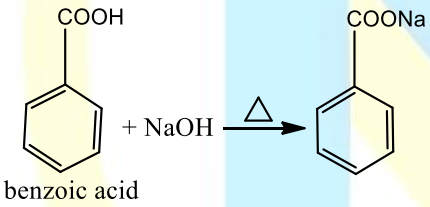
First the longest continuous chain of carbon atoms is selected. Now numbered the chain from the side containing senior functional group ($i.e.$, the group placed above in the seniority table).

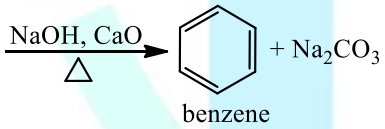


5-chloro-hex-2-ene

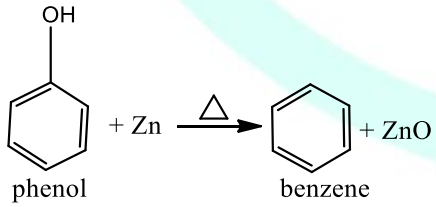
64 **(b)**

Benzene can be obtained by heating benzoic acid with sodalime.





Benzene can also be obtained by heating phenol with zinc dust.



65 **(d)**

$CH_2 = CH - CH = CH_2$ (1,3-dibutene) is a conjugate diene because it has alternate carbon-carbon single and double bonds. It reacts with HBr. It also polymerises to form Buna-N rubber etc.

It also polymerises to form SBr.

67 **(c)**

$n\lambda = 2d\ \sin\theta$

$1 \times 1.54 = 2d\ \sin 45°$

$1 \times 1.54 = 2d \times 0.850$

$$2d = \frac{1.54}{0.850} = 0.905\ \text{Å}$$

68 **(b)**

Since atom X is present at corner and one corner is shared by eight unit cells,

Number of X atoms per unit cell $= \frac{1}{8} \times 8 = 1$

Atom Y is present at body centred position and used by only one unit cell. So, number of Y atoms per unit cell $= 1$

Atom Z is present at the center of each face, so shared by two unit cells,

Thus, number of Z atoms per unit cell $= \frac{1}{2} \times 6 = 3$

Hence, the formula of compound $= XYZ_3$

69 **(a)**

$Al_2(SO_4)_3$ produces maximum number of ions so, it will have highest osmotic pressure.

70 **(b)**

When an egg is kept in saturated solution of NaCl after removing its hard shell in dilHCl, its shrinks. This is due to the fact that water comes out of the egg as salt solution is more concentrated than the egg fluid

71 **(c)**

$Zn(s) + 2H^+(aq) \rightleftharpoons Zn^{2+}(aq) + H_2(g)$

$$E_{cell} = E^\circ_{cell} - \frac{0.059}{2}\log\frac{[Zn^{2+}]}{[H^+]^2}$$

When H_2SO_4 is added then $[H^+]$ will increase therefore E_{cell} will also increase and equilibrium will shift towards right

73 **(a)**

According to formula $k = PZe^{-\frac{E_a}{RT}}$

Lowering of E_a (activation energy), raises the value of k.

74 **(b)**

Emulsions are colloidal system in which dispersion medium and dispersed phase both are liquids. So, emulsion is dispersion of liquid in liquid.

76 **(b)**

Mixture of calcium phosphate and calcium silicate is known as Thomas slag

77 **(d)**

The acidity of oxyacids of halogens increases with increase in oxidation state of halogen.

Oxidation state of Cl in HClO=+1
Oxidation state of Cl in $HClO_2$=+3
Oxidation state of Cl in $HClO_3$=+5
Oxidation state of Cl in $HClO_4$=+7
Hence, $HClO_4$ has highest acidity among oxyacids of chlorine.

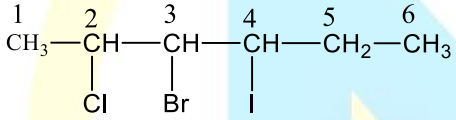
78 **(c)**
Potassium dichromate, on heating give oxygen and chromic oxide(Cr_2O_3)

$$4K_2Cr_2O_7 \xrightarrow{\Delta} 4K_2Cr_2O_4 + 3O_2 + 2Cr_2O_3$$

79 **(c)**
In CuF_2, Cu^{2+} ion exist, having d^9 configuration. Unpaired electron causes colour ($d-d$ transition). In the crystalline form, $CuF_2$is blue coloured.

80 **(b)**
The decreasing order of priority of prefix in numbering the carbon chain of an organic compound is

Bromo $>$ *Chloro* $>$ *Iodo*



3-bromo-2-chloro-4-iodo hexane

81 **(a)**
Chloroform reacts with conc. $HNO_3$to give chloropicrin which is used as tear gas.

$$CHCl_3 + HNO_3 \xrightarrow{\Delta} CCl_3NO_2 + H_2O$$

chloropicrin

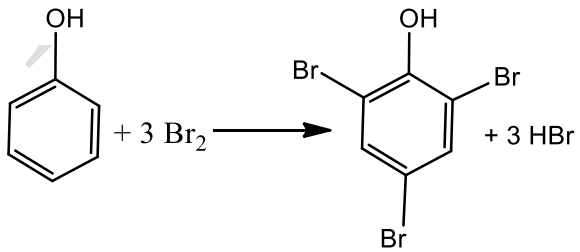
82 **(a)**
Alcohols are more acidic than alkynes but less acidic than water thus, the correct order of acidity is

$H_2O > 1° > 2° > 3° > RC \equiv CH$

83 **(d)**
Br_2 is formed by a redox reaction :

$$5Br^- + BrO_3^- + 6H^+ \rightarrow 3Br_2 + 3H_2O$$

-OH group is the activating group and there is S_E at *o*-and *p*-positions giving yellowish white precipitate of 2, 4, 6-tribromophenol :



84 **(a)**
Amides, on treating with HNO_2, give acids.

$$CH_3CONH_2 \xrightarrow[(HNO_2)]{NaNO_2/HCl} CH_3COOH + N_2 + H_2O$$

acetic acid

85 **(b)**
Nitromethane forms methyl hydroxylamine on reduction in netural medium with Zn/NH_4Cl.

$$CH_3NO_2 + 4[H] \xrightarrow[\Delta]{Zn/NH_4Cl} CH_3NHOH + H_2O$$

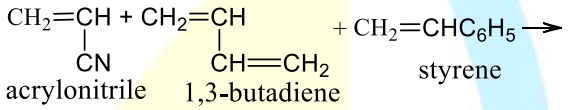
Nitromethane N-methyl hydroxyl amine

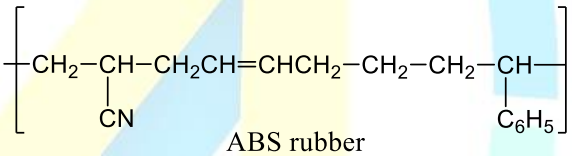
86 **(d)**

$$C_6H_5NH_2 + Cl-COCH_3 \xrightarrow{NaOH} C_6H_5NHCOCH_3 + HCl$$

aniline acetyl chloride acetanilide

89 **(a)**
ABS is acrylonitrile-butadiene-styrene rubber which is obtained by copolymerisation of acrylonitrile, 1, 3-butadiene and styrene.





ABS rubber

90 **(b)**
Amphetamine is used as antidepressant drug.

91 **(a)**
The branch of taxonomy, which is based on cytology, is known as **cytotaxonomy**. It includes the cytological study of chromosomes, i.e., number morphology, chromosome bahaviour, etc.

92 **(a)**
The suffix phyta indicates division

93 **(c)**
Linnaeus not only laid of taxonomy but also introduced binomial nomenclature. According to this scientific name consists of two parts, the first is the name of the 'genus' and the second is called the 'specific epithet' that identifies the particular species within the genus.

94 **(a)**
Fungi absorbs soluble organic matter from dead substrates are called saprophytes

95 **(b)**

The dinoflagellates are important component of phytoplankton. Most of them are marine but some occur in freshwater. Nutrition is photosynthetic in dinoflagellates

96 **(b)**

Apophysis is the apical sterile portion of the microsporophyll in *Cycas*.

Apospory is the formation of gametophyte directly from sporophyte.

Apogamy is the formation of sporophyte directly from gametophyte.

97 **(a)**

A-Sporophyte B-Haploid microspore C-Haploid megaspore

In gymnosperms the dominant phase is sporophyte. They are neterosporous and produce haploid megaspore and microspores. Which are produced with in sporangia born on sporophyll. These sporangia are arranged spirally along an axis to form compact cones

98 **(c)**

Ommatidium is the basic unit of arthropod compound eye. It comprises a cornea lens, crystalline cone, a group of usually 7-8 retinal cells radially arranged around a central rhabdome. Ommatidia serve the purpose of photoreception.

99 **(c)**

In earthworm, pharyngeal wall possesses salivary gland.

100 **(d)**

Hydra is carnivorous and feeds upon small animals specially some crustaceans, *e.g.,Cyclops, Daphnia*.

101 **(c)**

Inflorescence of *Ficus* is Hypanthodium. It is modified head and cyme inflorescence for myrmicophily, here the male flowers are situated on the top near the opening (ostiole) and the female fertile flowers are situated at the bottom, whereas sterile gall flowers are present in between the two.

102 **(c)**

The plants of humid region have water stomata or hydathodes. These perform the function of guttation.

103 **(c)**

Underground stems can be differentiated from roots by (i) absence of root cap (ii) absence of root hair (iii) presence of terminal bud (iv) presence of nodes and internodes (v) occurrence of foliage or scale leaves on the nodes.

104 **(c)**

A-Ascending, B-Plumule

During seed germination the radical of embryo develops into root, while the plumule develops into stem

105 **(c)**

Ground tissue system occupies the whole of the interior of plant organs with the exclusion of vascular system. Ground tissue system of leaves is called mesophyll. Mesophyll is made up of two types of photosynthetic cells, palisade and spongy

106 **(b)**

In angiosperms, xylem consists of tracheids, vessels or tracheae, xylem fibres and xylem parenchyma. Tracheae are absent in pteridophytes and gymnosperms. In angiospermic phloem, sieve elements are sieve tubes, while in gymnosperms and pteridophytes sieves cells are found.

107 **(a)**

Nervous system of the earthworms comprises a pair of cerebral ganglia, located on the pharynx in 3rd segment

108 **(c)**

Endocrine glands do not have ducts and hormones are the product of this gland, which are secreted directly into the fluid bathing the gland

109 **(b)**

Secondary active transport depends upon chemiosmotic energy (membrane potential and /or ion gradient). In the given question, transport is against ion concentration gradient thus, showing secondary active transport.

110 **(a)**

Golgi complex consists of three membranous components, *i. e.*, cisternae, vesicles and vacuoles. The main function of Golgi body is the secretion of metabolites, proteins, polysaccharides, formation of cell wall during cell division and acrosome formation.

111 **(a)**

Cofactor is a non-protein component essential for the normal catalytic activity of an enzyme. Cofactors may be organic molecule or inorganic ions.

112 **(d)**

Albumins are the simple proteins soluble in water and dilute salt solutions are heat-coagulable. The common albumins are leucosin (from wheat), ricin (from caster seeds), legumelin (from legume seeds), β-amylase from barley and albumin from egg white.

113 **(a)**
Meiosis reduces chromosome number from diploid ($2n$) to haploid (n). It occurs in germ cells (eggs or sperm)

114 **(c)**
In prokaryotes and unicellular eukaryotic organisms, cell division is a method of multiplication but in multicellular eukaryotic organism, it is a method of growth.

115 **(b)**
Munch hypothesis is based on translocation of food due to turgor pressure (TP) gradient.

116 **(c)**
The water potential (Ψ_w) in a plant cell or tissues is equal to the algebraic sum of solute potential (Ψ_s) due to dissolved solutes and the pressure potential (Ψ_p) due to pressure developed within the cells or issues, i.e., $\Psi_w = \Psi_s + \Psi_p$.

117 **(c)**
Cell membrane possesses certain pores, which are known as porins. These porins are known as transporter protein and is of two types, carrier proteins and channel proteins
Carrier proteins bind to the particular solute, which has to be transported, while channel proteins are usually gated and allows solute of a particular size to pass through

118 **(a)**
The enzyme responsible for nitrogen fixation is known as **nitrogenase**. Nitrogenase enzyme complex consists of two components, i.e., Fe-protein and Mo-Fe protein. The subunits of Fe-protein contain iron-sulphur cluster (4 Fe and 4S) that participates in the redox reactions involved in the conversion of nitrogen to ammonia.

119 **(a)**
Deficiency of nitrogen leads to yellowing of leaves that appeared first in old leaves.

120 **(b)**
Cyclic photophosphorylation involves only photo system-I and a few electron carriers. During cyclic photophosphorylation, ATP is formed but NADPH does not formed.

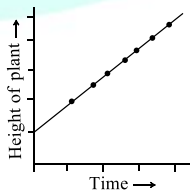
121 **(c)**
The carbon dioxide fixation takes place in the stroma of chloroplasts because it has enzymes essential for fixation of carbon dioxide and synthesis of sugar.

122 **(d)**
Six carbon dioxide molecules are released by complete oxidation of one glucose molecules. Two carbon dioxide molecules are released during oxidative Decarboxylation reaction and four carbon dioxide molecules are released in Krebs' cycle or tricarboxylic Acid cycle.

123 **(b)**
TCA cycle starts with the condensation of acetyl group with Oxalo Acetic Acid (OAA) and water to yield citric acid. The reaction is catalysed by the enzyme citrate synthase

124 **(c)**
Root Apical Meristem (RAM), Shoot Apical Meristem (SAM) and intercalary meristem are responsible for the primary growth to the plants and they principally contributes to the elongation of the plants along their axis.
In the dicotyledons and gymnosperms, the lateral meristems, vascular cambium and cork cambium appear later in life. These are the meristems that causes increase in the girth of the organ in which they are active. This is known as the secondary growth of the plant

125 **(d)**
Both (b) and (c).
Arithmetic Growth Rate The expression of arithmetic growth is exemplified by roots (or organ) elongating at constant rate. On plotting the length of an organ against time, a linear curve is obtained. Mathematically it is expressed as



Constant linear growth, a plot of length L against time
$L_t = L_0 + rt$
L_t = Length of time 't'
L_0 = Length of time to

r = Growth rate or elongation per unit time

126 **(d)**
Exponential phase or **log phase** is characterized by rapid growth in population, which continues till enough food is available.

127 **(b)**
Enterogastrone, a gastrointestinal hormone regulates the digestive secretion along with the other hormones gastrin, secretin, cholecystokinin, etc. Enterogastrone slows down the gastric contraction. Therefore, it is also called as Gastro Inhibitory Peptide (GIP)

128 **(c)**
Chylomicrons are lipoprotein particles synthesized by intestinal epithelial cells and consisting mainly of triglycerides. Chylomicrons are the form, in which dietary fat is transported in the circulatory system.

129 **(a)**
Pressure/Concentration gradient.
Alveoli are the primary site of exchange of gases. Exchange of gases also occur between the blood and tissue. O_2 and CO_2 are exchanged in these sites by simple diffusion, mainly based on pressure concentration gradient

130 **(a)**
Tidal volume is the volume of air inspired or expired with each normal breath. This is about 500 mL (0.5 L) in adult person.

131 **(d)**
To obtain a standard ECG a patient is connected to a machine with three electrical leads (one to each wrist and one to left ankle) that continuously monitor the heart activity. For detailed evaluation of the heart's function, multiple leads are attached to the chest region

132 **(b)**
Formed elements constitutes about 45% of blood

133 **(a)**
Renal pelvis.
Towards the centre of the inner concave surface of the kidney, there is a notch called hilum through which ureter, blood vessels and nerves enter. Inner to the hilum is a broad funnel-shaped space called the renal pelvis with the projections called calyces

134 **(b)**
Nephritis The infection is caused by bacteria (streptococci) which results in inflammation of kidney that involve glomerulus

135 **(c)**
The excretory material of bony fishes like *Hippocampus* is ammonia. So, bony fishes are ammonotelic.

136 **(a)**
ATP is the source of energy for muscle contraction.

137 **(b)**
The junction between a motor neuron and sarcolemma of muscle is called neuromuscular junction
(i) A neural signal reaching this junction (motor end plate) release a neurotransmitter
(ii) Repeated activation of muscles can lead to the accumulation of lactic acid due to anaerobic break down of glucose in them

138 **(b)**
During muscle contraction, actin and myosin interact to form actomyosin. According to sliding filament theory, cross bridge are formed by myosin filament to slide actin filament. During muscle contraction, length of A- band remains constant.

139 **(a)**
From the brain of rabbit, 12 pairs of cranial nerves originate.

140 **(c)**
Axons can be non-myelinated and myelinated both

141 **(c)**
Aldosterone is a steroid hormone (mineralocorticoid family) produced by the outer section (zona glomerulosa) of the adrenal cortex in the adrenal gland. It plays a central role in the regulation of blood pressure mainly by acting on the distal tubules and collecting ducts of the nephron, increasing reabsorption of ions and water in the kidney, to cause the conservation of sodium, secretion of potassium increased water retention and increases blood pressure.
When dysregulated, aldosterone is pathogenic and contributes to the development and progression of cardiovascular and renal disease.
Aldosterone has exactly the opposite function of the atrial natriuretic hormone secreted by the heart

142 **(d)**
The endocrine part of pancreas is represented by about a million of islets of Langerhans with 5 types of endocrine cells secreting different

hormones-α- cells (glucagon), β- cells (insulin), γ-cells (gastrin), δ- cells (somatostatin) and F- cells (pancreatic polypeptide). Insulin, glucagon and somatostain all are polypeptides.

143 **(a)**
Self-fertilisation is very common phenomenon in plants. This phenomenon takes place only when there is the presence of bisexual flower

145 **(c)**
Flower is a modified shoot meant for reproduction

146 **(d)**
In citrus, mango plants some of the nucellar cell surrounding the embryo sac starts dividing, protrude into embryo sac and develop into many embryos. In such species each ovule contains many embryos. Occurrence of more than one embryo is referred to as polyembryony

147 **(a)**
Egg cell is haploid, whereas endosperm is triploid as it is formed by fusion of one male gamete with two polar nuclei. Therefore, the number of chromosomes in endosperm will be 8×3=24.

148 **(a)**
Ovulation occurs under the influence of LH and FSH of anterior pituitary gland.

149 **(b)**
In a 28 day menstrual cycle, the menses takes place. For 3-5 days, the production of LH from the anterior lobe of the pituitary gland considerably reduced. The withdrawal of this hormone causes degeneration of the corpus luteum and therefore, progesterone production is reduced.
Production of oestrogen also reduced in this phase (menstrual). The endometrium of the uterus breaks down and menstruation begins. The cells of endometrium secretions and the unfertilized ovum constitute the menstrual flow

150 **(b)**
hCG (Human Chorionic Gonadotrophic) and HPH (Human Placental hormone) released during the pregnancy

151 **(b)**
The chromatin material inside the nucleus is composed of DNA, some proteins and RNA. Thus, in an enucleated ovum, DNA will be present in mitochondria.
The mature RBCs, lack nucleus and membrane bound cell organelles, *i.e.,* lack DNA in nucleus and mitochondria.

153 **(b)**
Oral Contraceptive Pills (oral pills) They are used in the form of tablets therefore, they are called 'pills'. Pills have to be taken daily for 21 days starting within the first five days of menstrual cycle. After a gap of 7 days, it has to be repeated. They inhibit ovulation and implantation. Pills are very effective with lesser side effects

154 **(c)**
Pleiotropic gene is one which produces or controls more than one effects or characters. In other words, we can say that pleiotropic gene produces a major phenotypic trait and with that also influences some other phenotypic traits, *e.g.*, lethal genes, which are known to control the menifestation of some phenotypic trait alongwith affecting the viability of organism.

155 **(c)**
A set of three alleles present on chromosome number 9 is responsible for the four blood groups.

156 **(d)**
A cell or an organism having two copies of a single genome (with chromosome number 2*x*) is called **diploid.**

157 **(a)**
1. to 20 kb
VNTR refer to class of satellite DNA. Referred as minisatellite DNA
Minisatellite DNA
Unit 15-400 bp (average about 20)
Repeat generally 20-50 times (1000 = 5000 bp long)
Location Generally euchromatic
Use in DNA fingerprints. Tandemly repeated but often in dispersed clusters. Also called VNTR's (Variable Number Tandem Repeats)
Minisatellite DNA
Unit 2-4 bp (most 2)
Repeat on the order of 10-100 times
Location Generally euchromatic
Use in Most usefull marker for population level studies

158 **(d)**
A forms two hydrogen bond with T.
C forms three hydrogen bond with G.
Watson and Crick Model of DNA
IN 1953 James Watson and Francis Crick, based on the X-ray diffraction data (produced by Maurice Wilkins and Rosalind Franklin),

proposed a very simple but famous double helix model of DNA

According to Watson and Crick

(i) The DNA molecule consists of two long, parallel chains, which are joined together by short crossbars at regular intervals

(ii) The two chain are spirally around a common axis in a regular manner to form a double helix

(iii) The double helix is of constant diameter of 2 nanometer or 20 Å (angstrom) and has major groove about 22Å wide minor groove 12Å wide alternatively

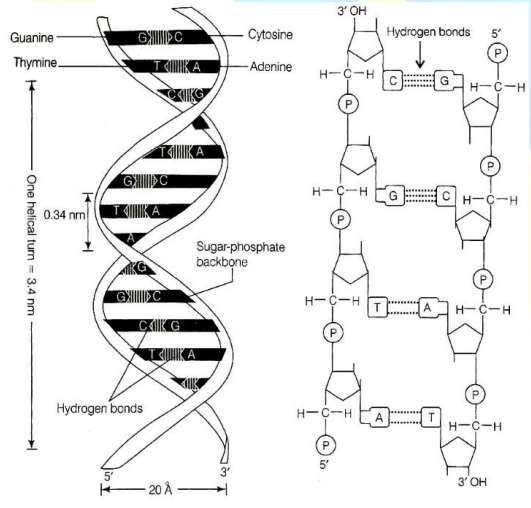
(iv) One complete turn (spiral) of helix is 3.4 nm (34Å) and has 10 base pairs

(v) Each base pair is 3.4 Å (34 nm) apart

(vi) Sugar and phosphate components forms the backbone on outside and helix is generally right handed (clock wise)

(vii) The bases in two strands are paired through hydrogen bond, forming base pairs. Adenine (A) forms two hydrogen bonds with thymine (T). Similarly guanine is bonded with cytosine with three H-bonds

(viii) Two chains of DNA runs a antiparallel to each other, 5'-3' and 3'-5'



Structure of DNA (a) DNA double helix (b) Double stranded polynucleotide chain sequence in a DNA molecule

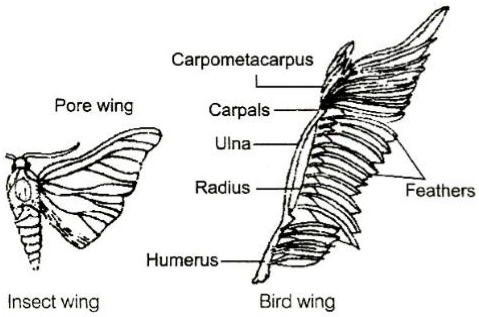
159 **(d)**

II, III and IV.

Homologous Organs The organs which have the same fundamental structure but are different in functions are called homologous orangs. These organs follows the same basic plan of organization during development. But in adult condition, these organs are modified to perform different function as an adaptation to the different environment. Homologous organs are the resultant of divergent evolution

Implants homologous organs may be a those of *Bougainvillea* or a tendril of *Cucurbita*, both arising in the axillary position

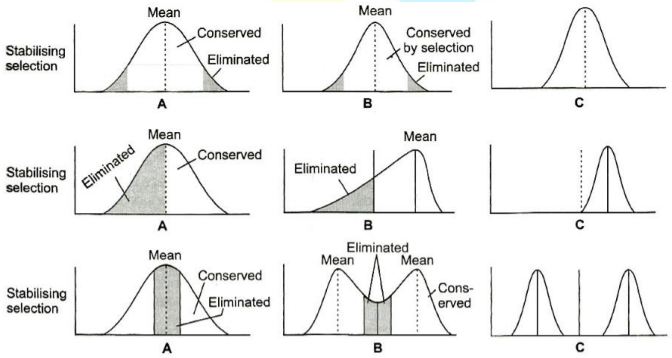
Analogous Organs The organs which have similar functions but are different in their details and origin are called analogous organs. The analogous organs shows convergent evolution



160 **(b)**

Directional selection.

Selection process in natural selection are



(i) **Stabilizing Selection** (Balancing selections) This type of selection favours average sized individuals, while eliminates small sized individuals. It reduces variation and hence, do not promote evolutionary changes. It maintains the mean value from generation to generation. If we draw a graphical curve of population, it is bell-shaped

(ii) **Directional Selection** (Progressive Selection) In this selection, the population changes towards one particular direction. It means this type of selection favours small or large-sized individuals and more individuals of that type will be present in new generation. The mean size of the population changes

(iii) **Disruptive Selection** (Diversifying selection) This type of selection favours both small-sized and large-sized individuals. It eliminates most of the members with mean expression, so as to produce two peaks in the distribution of the trait that may lead to the development of two different populations. This kind of selection is opposite of

stabilizing selection and is rare nature but is very important in bringing about evolutionary changes

161 **(d)**
Passive immunity results when antibodies are produced by one individual and then acquired by another

162 **(b)**
Female *Anopheles* mosquito is a vector of malaria

163 **(a)**
Anxiety disorders develop when there is an over reaction or phobia to stressful events. These are associated with a range of unpleasant bodily symptoms including nausea, palpitation, trembling, muscle tension and diarrhoea.

164 **(a)**
A-Cow, B-Male, C-Bull, D-Superior progeny

166 **(a)**
Alcoholic beverages are defined as beverages that contain ethanol (C_2H_5OH). This ethanol is almost always produced by fermentation, the metabolism of carbohydrates by certain species of yeast under anaerobic or law-oxygen conditions. Beverages such as, wine, beer, or distilled spirits all use yeast at some stage of their production.
Yeast the most common one being *Sacharomyces cerevisiae,* is used in baking as leavening agent, where it converts the food/fermentable sugars present in dough into the gas carbon dioxide. This causes the dough to expand or rise as gas forming pockets or bubbles. When the dough is baked, the yeast dies and the air pockets 'set', giving the baked product a soft and spongy textures.
Cheese is formed by partial degradation of milk by different other microorganisms

167 **(c)**
Statins are products of fermentation activity of yeast *Monascuspurpureus*. This inhibits cholesterol synthesis, statins are therefore, used in lowering blood cholesterol

168 **(d)**
VNTRs were an important sources of RFLP genetic markers used in linkage analysis of genomes. VNTRs have become essential to forensic crime investigations, *via* DNA fingerprinting

170 **(b)**
Secondary cells are formed from divisions in primary meristematic cells. These newly formed secondary cells become lose the ability to divide due to irreversible changes during differentiation or due to loss of nucleus at the maturation.

171 **(a)**
Golden rice is transgenic rice having carotene and iron. Carotene is precursor of vitamin-A
Flavrsavr(transgenic tomato) remains fresh and retain their flavor much longer than normal tomato. *Btbrinjal* is insect resistance brinjal.

172 **(c)**
Prof. **Anand Mohan Chakravorty** has developed a new strain of oil eating bacteria called super bug by using species of *Pseudomonas* through recombinant DNA technology.

173 **(a)**
Due to non-limiting condition, natality (birth rate) will increase and mortality (death rate) will decrease, that will cause population explosion.

174 **(a)**
A-Insects; B-plants

176 **(b)**
The living organisms present in an ecosystem forms biotic components. They are interconnected through food chain

177 **(b)**
Biosphere reserves are multipurpose protected areas, which are meant for preserving genetic diversity in representative ecosystems of various natural biomes and unique biological communities by protecting wild populations, traditional life style of tribals and domesticated plant and animal genetic resources. Humans are integral part of biosphere reserves but not of the National Parks.

178 **(d)**
An endemic species is the one found naturally in just one geographic area

179 **(a)**
In 1987, under Air Prevention and control of pollution Act, noise was recognised as an air pollutant

180 **(c)**
Carbon monoxide is a pollutant. It is a poisonous gas. Hbhas maximum affinity for CO.