Thomas Tutorials

Date : NEET – 2016 **TEST ID: 04**

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

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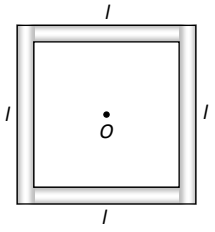
1. The dimensions of $\frac{a}{b}$ in the equation $p = \frac{a - t^2}{bx}$ where p is pressure, x is distance and t is time, are
   a) $[M^2LT^{-3}]$ b) $[MT^{-2}]$
   c) $[LT^{-3}]$ d) $[ML^3T^{-1}]$
2. $Henry/ohm$ can be expressed in
   a) $Second$ b) $Coulomb$
   c) Mho d) $Metre$
3. A stone dropped from a balloon which is at a height h, reaches the ground after t second. From the same balloon, if two stones are thrown, one upwards and the other downwards, with the same velocity u and they reach the ground after t_1 and t_2 second respectively, then
   a) $t = t_1 - t_2$ b) $t = \frac{t_1 + t_2}{2}$
   c) $t = \sqrt{t_1 t_2}$ d) $t = \sqrt{t_1^2 - t_2^2}$
4. A mass of 100 gm is tied to one end of a string 2 m long. The body is revolving in a horizontal circle making a maximum of 200 revolutions per min. The other end of the string is fixed at the centre of the circle of revolution. The maximum tension that the string can bear is (approximately)
   a) 8.76 N b) 8.94 N c) 89.42 N d) 87.64 N
5. A particle is moving with velocity $\vec{v} = K(y\hat{\imath} + x\hat{\jmath})$, where K is a constant. The general equation for its path is
   a) $y^2 = x^2 +$ constant b) $y = x^2 +$ constant
   c) $y^2 = x +$ constant d) $xy =$ constant
6. Consider the following statement: When jumping from some height, you should bend your knees as you come to rest, instead of keeping your legs stiff. Which of the following relations can be useful in explaining the statement
   a) $\Delta\overrightarrow{P_1} = -\Delta\overrightarrow{P_2}$
   b) $\Delta E = -\Delta(PE + KE) = 0$
   c) $\vec{F}\Delta t = m\Delta\vec{v}$
   d) $\Delta\vec{x} \propto \Delta\vec{F}$
7. The spring balance inside a lift suspends an object. As the lift begins to ascend, the reading indicated by the spring balance will
   a) Increase
   b) Decrease
   c) Remain unchanged
   d) Depend on the speed of ascend
8. A ball hits a vertical wall horizontally at 10 m/s bounces back at 10 m/s
   There is no acceleration because
   a) $10\frac{m}{s} - 10\frac{m}{s} = 0$
   b) There may be an acceleration because its initial direction is horizontal
   c) There is an acceleration because there is a momentum change
   d) Even though there is no change in momentum there is a change in direction. Hence it has an acceleration
9. Four thin rods of same mass M and same length l, form a square as shown in figure. Moment of inertia of this system about an axis through centre O and perpendicular to its plane is



   a) $\frac{4}{3}Ml^2$ b) $\frac{Ml^2}{3}$ c) $\frac{Ml^2}{6}$ d) $\frac{2}{3}Ml^2$
10. A parallel undergoes uniform circular motion. About which point on the plane of the circle, will the angular momentum of the particle remain conserved
    a) Centre of the circle
    b) On the circumference of the circle
    c) Inside the circle
    d) Outside the circle
11. Two spheres of mass m and M are situated in air and the gravitational force between them is F. The space around the masses is now filled

with a liquid of specific gravity 3. The gravitational force will now be

a) F b) $\frac{F}{3}$ c) $\frac{F}{9}$ d) $3F$

12. For most materials the Young's modulus is n times the rigidity modulus, where n is

a) 2 b) 3 c) 4 d) 5

13. A piece of solid weighs 120 g in air, 80 g in water and 60 g in a liquid. The relative density of the solid and that of the liquid are respectively

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

14. Choose the correct statement(s) for a cricket ball that is spinning clockwise through air

S1 : Streamlines of air are symmetric around the ball

S2 : The velocity of air above the ball relative to it is larger than that below the ball

S3 : The velocity of air above the ball relative to it is smaller than that below the ball

S4 : There is a net upward force on the ball

a) S1, S2 and S4 b) S2 and S4

c) S4 only d) S3 only

15. Liquid oxygen at 50 K is heated to 300 K at constant pressure of 1 atm. The rate of heating is constant. Which of the following graphs represents the variations of temperature with time?

a) b)

c) d)

16. First law of thermodynamics is based on

a) Law of conservation of momentum

b) Law of conservation of energy

c) Law of conservation of charge

d) None of the above

17. In changing the state of thermodynamics from A to B state, the heat required is Q and the work done by the system is W. The change in its internal energy is

a) $Q+W$ b) $Q-W$ c) Q d) $\frac{Q-W}{2}$

18. The absolute temperature of a gas is determined by

a) The average momentum of the molecules

b) The velocity of sound in the gas

c) The number of molecules in the gas

d) The mean square velocity of the molecules

19. A mass M, attached to a spring, Oscillates with a period of 2 s. If the mass is increased by 4 kg, the time period increases by 1 s. Assuming that Hooke's law is obeyed, the initial mass M was

a) 3.2 kg

b) 1 kg

c) 2 kg

d) 8 kg

20. A point mass oscillates along the x-axis according to the law $x = x_0\cos(\omega t - \pi/4)$. If the acceleration of the particle is written as: $a = A\cos(\omega t + \delta)$, then

a) $A = x_0, \delta = -\pi/4$

b) $A = x_0\omega^2, \delta = \pi/4$

c) $A = x_0\omega^2, \delta = -\pi/4$

d) $A = x_0\omega^2, \delta = 3\pi/4$

21. Velocity of sound in air

I. increases with temperature

II. Decreases with temperature

III. Increase with pressure

IV. Is independent of pressure

V. Is independent of temperature

Choose the correct answer

a) Only I and II are true

b) Only I and III are true

c) Only II and III are true

d) Only I and IV are true

22. Charges are placed on the vertices of a square as shown. Let E be the electric field and V the potential at the centre. If the charges on A and B are interchanged with those on D and C respectively, then

a) $\vec{E}$ remains unchanged, V changes

b) Both $\vec{E}$ and V change

c) $\vec{E}$ and V remains unchanged
d) $\vec{E}$ changes, V remains unchanged

23. Two identical charged spheres suspended from a common point by two massless strings of length l are initially a distance $d(d << l)$ apart because of their mutual repulsion. The charge begins to leak from both the spheres at a constant rate. As a result charges approach each other with a velocity v .Then as a function of distance x between them
a) $v \propto x^{-1}$ b) $v \propto x^{1/2}$
c) $v \propto x$ d) $v \propto x^{-1/2}$

24. The figure shows electric potential Vas a function of x. Rank the four regions according to the magnitude of x-component of the electric field Ewithin them, greatest first

a) $E_4 > E_2 > E_3 > E_1$ b) $E_2 > E_4 > E_1 = E_3$
c) $E_1 > E_2 > E_3 > E_4$ d) $E_1 > E_3 > E_2 > E_4$

25. In above question, if length is doubled, the drift velocity
a) Is doubled b) Is halved
c) Remains same d) Becomes zero

26. Two wires of resistance R_1 and R_2 have temperature coefficient of resistancesα_1 and α_1 respectively. These are joined in series. The effective temperature coefficient of resistance is
a) $\frac{\alpha_1 + \alpha_2}{2}$ b) $\sqrt{\alpha_1 \alpha_2}$
c) $\frac{\alpha_1 R_1 + \alpha_2 R_2}{R_1 + R_2}$ d) $\frac{\sqrt{R_1 R_2 \alpha_1 \alpha_2}}{\sqrt{R_1^2 + R_2^2}}$

27. The relation between voltage sensitivity (σ_V) and current sensitivity (σ_i) of a moving coil galvanometer is (resistance of galvanometer is G).
a) $\frac{\sigma_i}{G} = \sigma_{\mathrm{v}}$ b) $\frac{\sigma_{\mathrm{v}}}{\mathrm{G}} = \sigma_{\mathrm{i}}$ c) $\frac{G}{\sigma_{\mathrm{v}}} = \sigma_{\mathrm{i}}$ d) $\frac{G}{\sigma_{\mathrm{i}}} = \sigma_{\mathrm{V}}$

28. In the above question, the magnetic induction at O due to the whole length of the conductor is
a) $\frac{\mu_0 i}{r}$ b) $\frac{\mu_0 i}{2r}$ c) $\frac{\mu_0 i}{4r}$ d) Zero

29. The magnetic susceptibility of paramagnetic materials is
a) Positive, but very high
b) Negative, but very small
c) Negative, but very high
d) Positive, but small

30. Iron would become paramagnetic at about
a) 200°C b) 400°C c) 600°C d) 800°C

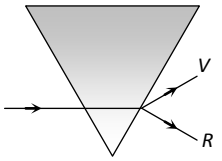
31. Lenz's law is statement of
a) Law of conservation of charge
b) Law of conservation of current
c) Law of conservation of energy
d) None of the above

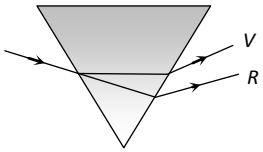
32. A LCR series $A.C.$ circuit is tuned to resonance. The impedence of the circuit is now
a) R
b) $\left[R^2 + \left(\frac{1}{\omega C} - \omega L\right)^2\right]^{1/2}$
c) $\left[R^2 + (\omega L)^2 + \left(\frac{1}{\omega C}\right)^2\right]^{1/2}$
d) $\left[R^2 + \left(\omega L - \frac{1}{\omega C}\right)^2\right]^{1/2}$

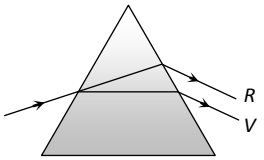
33. An alternating e.m.f. is applied to purely capacitive circuit. The phase relation between e.m.f. and current flowing in the circuit is **or** In a circuit containing capacitance only
a) e.m.f. is ahead of current by $\pi/2$
b) Current is ahead of e.m.f. by $\pi/2$
c) Current lags behind e.m.f. by π
d) Current is ahead of e.m.f. by π

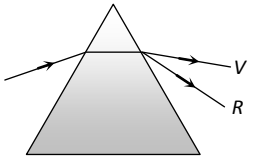
34. If the earth did not have atmosphere, its surface temperature on a day time would be
a) Higher b) Lower
c) Same as now d) Not sure

35. Which of the following diagrams shows correctly the dispersion of white light by a prism

a) 

b) 

c) 

d) 

36. Deviation of 5° is observed from a prism whose angle is small and whose refractive index is 1.5. The angle of prism is
a) 7.5° b) 10° c) 5° d) 3.3°

37. In Fresnel diffraction, if the distance between the disc and the screen is decreased, the

intensity of central bright spot will
a) Increase b) Decrease
c) Remain constant d) None of these

38. The velocity, v, at which the mass of a particle is double its rest mass is
a) $v = c$ b) $v = \sqrt{\frac{3}{4}}c$ c) $v = \sqrt{\frac{3}{2}}c$ d) $v = 2c$

39. Sodium and copper have work functions 2.3 eV and 4.5 eV respectively. Then the ratio of their threshold wavelengths is nearest to
a) 1 :2 b) 4 :1 c) 2 :1 d) 1 :4

40. In a hydrogen atom, the electron in a given orbit has total energy -1.5 eV. The potential energy is
a) 1.5 eV b) -1.5 eV c) 3.0 eV d) -3.0 eV

41. 10 g of radioactive material of half-life 15 year is kept in store for 20 years. The disintegrated material is
a) 12.5 g b) 10.5 g c) 6.03 g d) 4.03 g

42. Who discovered spin quantum number
a) Uhlenbeck & Goudsmit
b) Niels's Bohr
c) Zeeman
d) Sommerfeld

43. In the depletion region of an unbiased P-N junction diode there are
a) Only electrons
b) Only holes
c) Both electrons and holes
d) Only fixed ions

44. In space communication, the sound waves can be sent from one place to another
a) Through space
b) Through wires
c) By superimposing it on undamped electromagnetic waves
d) By superimposing it on damped electromagnetic waves

45. While tuning in a certain broadcast station with a receiver, we are actually
a) Varying the local oscillator frequency
b) Varying the frequency of the radio signal to be picked up
c) Tuning the antenna
d) None of these

46. In the reaction,
$I_2 + 2S_2O_3^{2-} \longrightarrow 2I^- + S_4O_6^{2-}$
Equivalent weight of iodine will be equal to
a) Molecular weight
b) 1/2 of molecular weight
c) 1/4 of molecular weight
d) Twice of molecular weight

47. A compound contains 54.55% carbon, 9.09 % hydrogen, 36.36% oxygen. The empirical formula of this compound is
a) C_3H_5O b) $C_4H_8O_2$ c) $C_2H_4O_2$ d) C_2H_4O

48. The characteristic not associated with Planck's theory is
a) Radiations are associated with energy
b) The magnitude of energy associated with a quantum is proportional to frequency
c) Radiation energy is neither emitted nor absorbed continuously
d) Radiation energy is neither emitted nor absorbed discontinuously

49. A particle having a mass of 1.0 mg has a velocity of 3600 km/h. Calculate the wavelength of the particle ($h = 6.626 \times 10-27$erg$-$s
a) 6.626×10^{-28}cm b) 6.626×10^{-29}cm
c) 6.626×10^{-30}cm d) 6.626×10^{-31}cm

50. The statement that is true for the long form of the Periodic Table is
It reflects the sequence of filling the
a) electrons in the order of sub-energy levels s, p, d and f
b) It helps to predit the stable valency states of the elements
c) If reflects trends in physical and chemical properties of the elements
d) All of the above

51. Which one of the following contains both ionic and covalent bonds?
a) C_6H_5Cl b) H_2O c) NaOH d) CO_2

52. 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.

53. Types of forces that can be present in ethanol giving it a liquid state
a) Dipole-dipole interaction
b) London forces
c) Hydrogen bonding

d) All of these

54. Enthalpy is equal to

a) $T^2\left[\frac{\delta(G/T)}{\delta T}\right]_p$ b) $-T^2\left[\frac{\delta(G/T)}{\delta T}\right]_p$

c) $T^2\left[\frac{\delta(G/T)}{\delta T}\right]_V$ d) $-T^2\left[\frac{\delta(G/T)}{\delta T}\right]_V$

55. The heats of combustion of carbon monoxide at constant pressure and at constant volume at 27°C will differ from one another by

a) 27 cal b) 54 cal c) 300 cal d) 600 cal

56. 5 moles of SO_2 and 5 moles of O_2 are allowed to react to forms SO_3 in a closed vessel. At the equilibrium stage 60% of SO_2 is used up. The total number of moles of SO_2, O_2 and SO_3 in the vessel now is

a) 8.5 b) 9.5 c) 10 d) 10.5

57. White phosphorus reacts with caustic soda, the products are PH_3 and NaH_2PO_2. This reaction is an example of

a) Oxidation b) Reduction
c) Disproportionation d) Neutralisation

58. Which of the following acts as an oxidising as well as reducing agent?

a) Na_2O b) Na_2O_2 c) $NaNO_3$ d) $NaNO_2$

59. There is a sample of 20 volume of hydrogen peroxide solution. Calculate its strength

a) 6.07% b) 3.035% c) 2.509% d) 4.045%

60. In the hardening stage of plaster of Paris, the compound formed is

a) $CaSO_4$ b) Orthorhombic $CaSO_4 . 2H_2O$

c) $CaSO_4 . H_2O$ d) Monoclinic $CaSO_4 . 2H_2O$

61. Aluminium reacts with caustic soda to form

a) Aluminium hydroxide
b) Aluminium oxide
c) Sodium meta-aluminate
d) Sodium tetra aluminate

62. Common alum is

a) $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$
b) $(NH_4)_2SO_4 \cdot FeSO_4 \cdot 6H_2O$
c) $K_2SO_4 \cdot Cr_2(SO_4)_3 \cdot 24H_2O$
d) $K_2SO_4 \cdot Fe_2(SO_4)_3 \cdot 24H_2O$

63. Lactic acid molecule has

a) One chiral carbon atom
b) Two chiral carbon atoms
c) No chiral carbon atom
d) asymmetric molecule

64. Which of the following reactions can be used to prepare methane?

a) Clemmensen reduction
b) Wurtz reaction
c) Reduction of $CH_2 = CH_2$ by $LiAlH_4$
d) Reduction of methyl iodine by using a zinc-copper couple

65. $A \xleftarrow[(II)H_2O_2,OH^-]{(I)\ BH_3.THF} CH_3C \equiv CH \xrightarrow[H_2SO_4]{HgSO_4} B$

Identify A and B

a) CH_3CHO, CH_3COCH_3
b) CH_3CH_2CHO, CH_3COCH_3
c) $CH_3CH_2CHO, CH_3COCH_2CH_3$
d) $HCHO, CH_3COCH_3$

66. Methane gas producing field is

a) Wheat field b) Paddy field
c) Cotton field d) Groundnut field

67. What is the number of tetrahedral voids per atom in a crystal?

a) 1 b) 2 c) 6 d) 8

68. How many unit cells are present in a cube shaped ideal crystal of NaCl of mass 1.00g? [Atomic masses : $Na = 23, Cl = 35.5$]

a) 2.57×10^{21} b) 5.14×10^{21}
c) 1.28×10^{21} d) 1.71×10^{21}

69. Elevation in boiling point was 0.52°C when 6 g of a compound was dissolved in 100 g of water. Molecular weight of X is (k_b of water is 5.2°C per 100 g water)

a) 120 b) 60 c) 600 d) 180

70. A solution is prepared by dissolving 24.5 g of sodium hydroxide in distilled water to give 1L solution. The molarity of NaOH in the solution is
(Given, that molar mass of NaOH = 40.0 $gmol^{-1}$)

a) 1000 g of solvent b) 1 L of solvent
c) 1 L of solution d) 1000 g of solution

71. If 3 F of electricity is passed through the solutions of $AgNO_3$, $CuSO_4$ and $AuCl_3$, the molar ratio of the cations deposited at the cathodes will be

a) 1:1:1 b) 1:2:3 c) 3:2:1 d) 6:3:2

72. For the first order reaction half-life is 14 s, the time required for the initial concentration to reduce to 1/8 of its value is

a) $(14)^3 s$ b) 28 s c) 42 s d) $(14)^2 s$

73. The activation energy for most of the reactions is approximately 50 kJ mol^{-1}. The value of temperature coefficient for such reactions is

a) > 2 b) >3 c) <1 d) >4

74. Which of the following is not correct?
a) Milk is a naturally occurring emulsion
b) Gold sol is a lyophilic sol
c) Physical adsorption decreases with rise in temperature
d) Chemical adsorption is unilayered

75. van-Arker method of purification of metals involves converting the metal to a
a) Volatile stable compound
b) Non-volatile stable compound
c) Volatile unstable compound
d) None of the above

76. Which of the following is correct?
a) Tin stone is magnetic in nature
b) Wolframite is non-magnetic in nature
c) Wolframeite is $FeWO_4$
d) Cassiterite and rutile are sulphides ore

77. In ramsay and rayleigh's isolation of noble gases from air, the nitrogen of the air is finally converted into
a) $NaNO_2$ Only b) NO and NO_2
c) $NaNO_3$ Only d) $NaNO_2$ and $NaNO_3$

78. Which among the following metals does not dissolve in aqua regia?
a) Pt b) Pd c) Au d) Ir

79. Which of the following ion is diamagnetic?
a) Nd^{3+} b) La^{3+} c) Tb^{3+} d) Er^{3+}

80. IUPAC name of
$Cl_2CH-\underset{\underset{C_2H_5}{|}}{CH}-\underset{\underset{C_2H_5}{|}}{CH}-CCl_3$ is
a) 1,1,1,4,4-pentachloro-2,3-diethyl-butane
b) 3-(dichloromethyl)-4-(trichloromethyl)-hexane
c) 3-(trichloromethyl)-4-(dichloromethyl)-hexane
d) 1,1,4,4,4-pentachloro-2,3-diethyl butane

81. Wurtz's reaction involves the reduction of alkyl halide with
a) Zn/HCl b) HI
c) Zn/Cu couple d) Na in ether

82. Which among the following compounds will give a secondary alcohol on reacting with Grignard reagent followed by acid hydrolysis?
I. HCHO
II. C_2H_5CHO
III. CH_3COCH_3
IV. $HCOOC_2H_5$
Select the correct answer using the codes given below.
a) II only b) III only c) I and IV d) II and IV

83.
a) b)
c) d)

84. Which of the aldehyde is most reactive?
a) C_6H_5CHO
b) CH_3CHO
c) HCHO
d) All are equally reactive

85. In pyridine, the state of hybridization of the nitrogen atom is
a) sp^2 b) sp^3
c) sp d) None of these

86. Reaction of aniline with benzaldehyde is
a) Substitution b) Addition
c) Condensation d) Polymerisation

87. All protein are
a) Simple b) Biocatalysts
c) Useful d) Polymers

88. $F_2C=CF_2$ is a monomer is
a) Teflon b) Nylon c) Glyptal d) Buna-S

89. Which of the following has been used in the manufacture of non-inflammable photographic films?
a) Cellulose nitrate
b) Cellulose xanthate
c) Cellulose perchlorate
d) Cellulose acetate

90. Aspartame is a non-nutritive sweetener. Assuming that both, amide and ester bonds are hydrolysed in the stomach, the amino acids obtained is
a)
b) $H_2N-\underset{\underset{COOH}{|}}{CH}CH_2COOH$
c) Both (a) and (b) d) None of these

91. Which one is correctly written scientific name?
a) *Panther Tigris* b) *Mangifera indica* c) *Pucnther a Leo* d) *Columnba a LIVEA*

92. Different (various) group of ranks or levels in classification is known/called as
a) Category b) Order c) Genera d) Taxon

93. Scientific name are printed (with english) and derived from
a) Bold and English b) Italics and Latin c) Italics and German d) Italics and French

94. Substances secreted by bacteria are
a) Proteins b) Toxins c) Interferons d) Antibiotics

95. Deuteromycetes is also known as
a) Sac fungi b) Club fungi
c) Imperfect fungi d) Bracket fungi

96. The amphibians of plant kingdom are
a) Multicellular non-motile algae
b) Bryophytes with simple internal organization
c) Unicellular motile algae
d) Pteridophytes with complex internal organization

97. Sexual reproduction in *Spirogyra* is an advanced feature because it shows
a) Morphologically differentiated sex organs
b) Physiologically differentiated sex organs
c) Different sizes of motile sex organs
d) Same size of motile sex organs

98. Two-chambered heart is a feature of
a) Amphibians b) Fishes
c) Reptiles d) Birds

99. Ampullae of Lorenzini are present in
a) Fish b) Lizard c) Frog d) Rabbit

100. Among the following, colonial insects are
a) Locusts b) Mosquitoes
c) White ants d) Bed bug

101. Root is distinguishable from stem in
a) Having root hairs b) Having root cap
c) Absence of nodes and internodes d) All of the above

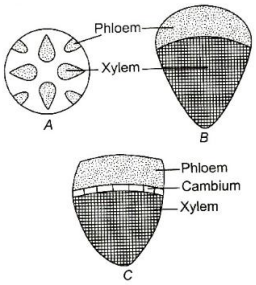
102. A drupe develop in
a) Wheat b) Pea c) Tomato d) Mango

103. Which of the following is not a character of a monocot?
a) Presence of a single seed leaf
b) Endosperm present in the mature seed
c) Leaves with parallel veins and smooth edges
d) Floral parts as multiples of four or five

104. Why is vivipary an undesirable character for annul crop plants?
a) It reduces the vigour of plant
b) The seeds cannot be stored under normal conditions for the next season
c) The seeds exhibit long dormancy
d) It adversely affects the fertility of the plant

105. Fusiform initial forms
a) Vascular rays b) Ray parenchyma
c) Tracheary elements d) Primary phloem

106. Identify type of vascular bundle with respect to A, B and C figure



a) A-Conjoint closed, B-Conjoint open, C-Radial
b) A-Radial, B-Conjoint open, C-Conjoint closed
c) A-Radial, B-Conjoint closed, C-Conjoint open
d) A-Conjoint open, B-Conjoint closed, C-Radial

107. Which of the following cells are round and biconcave in shape?
a) White blood cells
b) Red blood cells
c) Columnar epithelial cells
d) Nerve cells

108. The ventral surface of the body of earthworm is distinguished by
a) Blood vessels b) Mouth
c) Genital pores d) Segment size

109. What is mitoplast?
a) Membraneless mitochondria
b) Another name of mitochondria
c) Mitochondria without outer membrane
d) Mitochondria without inner membrane

110. In eukaryotes, the cell wall constitutes
a) Primary and secondary walls b) Primary walls only
c) Primary wall, middle lamella and secondary d) None of the above

111. Which of the following statements are correct?
I. Acetic acid can form cholesterol
II. Flow of metabolites through metabolic pathway has a definite rate and direction. It is called dynamic state of body constituents
III. Anabolic pathway is endergonic while catabolic pathway is exergonic
IV. All biomolecules have a term over, *i.e.*, they are constantly being changed into some other biomolecules and also made from other biomolecules
The correct options is

a) All are correct
b) I and II are correct
c) Only IV is correct
d) All are wrong

112. Benedict's reagent test is conducted to confirm the presence of
a) Polysaccharides like starch
b) Lipids
c) Reducing sugars
d) proteins

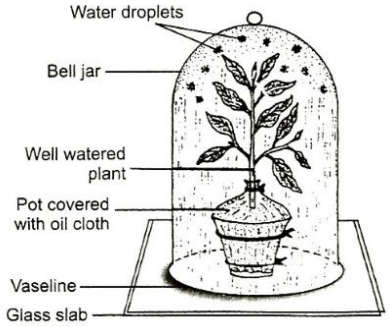
113. In the somatic cell cycle
In G_1-phase, DNA content is double the
a) amount of DNA present in the original cell
b) DNA replication takes place in S-phase
c) A short interphase is followed by a long mitotic phase
d) G_2-phase follows mitotic phase

114. Meiosis occurs in organism during
a) Vegetative reproduction
b) Sexual reproduction
c) Both (a) and (b)
d) None of these

115. The value of pure water potential is
a) Always positive or more than zero
b) Always negative or less than zero
c) Always zero
d) Variable in different solution

116. Which type of soil has least water retaining capacity?
a) Sandy soil
b) Black or alluvial soil
c) Laterite soil
d) Loan soil

117. What is depicted by the given diagram below?



a) Measuring the rate of transpiration
b) Demonstration of ascent of sap
c) Demonstration of transpiration
d) Both (a) and (c)

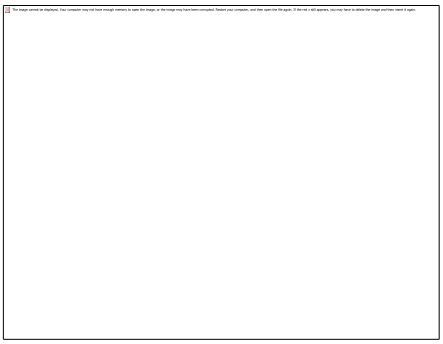
118. Which of the following statements are not correct in reference to hydroponics?
I. It determines the mineral nutrients essential for the plants
II. The hydroponics involves the culture of plants in a soil with, defined mineral solution
III. Hydroponics requires purified water with non-defined mineral nutrient salts
IV. In the hydroponics technique, plants are grown in sandy soil with nutrient solution
V. By this method, essential elements required for the growth of plants can be identified and their deficiency symptoms can also be discovered
Choose the correct options
a) Only IV
b) Only V
c) Only III
d) None of these

119. Premature leaf fall is due to deficiency of
a) Phosphorus
b) Nitrogen
c) Calcium
d) Potassium

120. Malic acid or aspartic acid and oxaloacetic acid both are found in
a) Mesophyll cell
b) Bundle sheath cell
c) Bundle sheath cell wall
d) Mesophyll cell wall

121. Identify the correct sequence of enzymes given below which participate in the regeneration phase of Calvin cycle.
1. Ribulose-5-phosphate isomerase
2. Ribulose-5-phosphate epimerase
3. Transketolase
4. Triose phosphate isomerase
a) VI, I, III, II
b) III, IV, II, I
c) IV, III, I, II
d) II, I, IV, III

122. Choose the correct combination of labeling the molecules involved in the pathway of anaerobic respiration in yeast.



a) A – Ethanol, B – CO_2, C – Acetaldehyde
b) A - CO_2 , B – Ethanol, C- Acetaldehyde
c) A - CO_2, B - Acetaldehyde, C- Ethanol
d) A – Ethanol, B - Acetaldehyde, C - CO_2

123. Identify enzyme A in the given reaction of Kreb's cycle

$OAA + \text{Acetyl Co} - A + H_2O \xrightarrow{A}$ Citric acid + Co – A

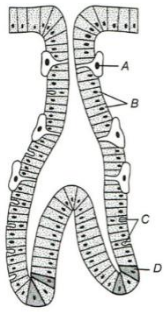
a) Oxaloacetate synthetase
b) Citrate synthetase
c) Aconitase
d) Dehydrogenase

124. Shock movement in 'touch me not' plant is
a) Seismonasty b) Photonasty
c) Chemonasty d) Thermonasty

125. The hormone present in the liquid endosperm of coconut is
a) Cytokinin b) Gibberellins
c) Ethylene d) auxin

126. I. Lag phase
II. Stationary phase
III. Exponential phase
Arrange the above steps of geometrical growth (from beginning to last) in a correct sequence of their occurrence and choose the correct option accordingly
a) I → II → III b) I → III → II
c) III → II → I d) III → I → II

127. The given below diagram represents the gastric glands. Label it from A to D and choose the correct option accordingly



a) A-Oxyntic cell, B-Chief cell, C-Mucous cell, D-Argentaffin cell
b) A-Argentaffin cell, B-Oxyntic cell, C-Mucous cell, D-Chief cell
c) A-G cell, B-Chief cell, C-Mucous cell, D-Argentaffin cell
d) A-Oxyntic cell, B-G cell, C-Mucous cell, D-Chief cell

128. Pancreatic secretion and gall bladder contraction are stimulated by
a) Gastrin b) Enterocrinin
c) Enterogasterone d) Cholecystokinin

129. Approximate volume of air a healthy man can expire or inspire per minute is
a) 5000 to 6000 mL b) 6000 to 7000 mL
c) 6000 to 8000 mL d) 7000 to 9000 mL

130. Partial pressure of O_2 and CO_2 in atmospheric airs compared to those in alveolar air is $\rho O_2 \rho CO_2$
a) Higher Lower
b) Higher Higher
c) Lower Lower
d) Lower Higher

131. Papillary muscles are found in mammalian
a) Auricles b) Ventricles
c) Pinna d) Eyes

132. Which of the following sentences is correct?
I. ECG is of a great clinical significance
II. Electrocardiograph is the recording of electrical changes during the cardiac cycle
III. To obtain a standard ECG, a patient is connected to the machine with 3 electrical electrodes (one to each wrist and to the left ankle)
IV. Normal activities of the heart are regulated intrinsically
V. Electrocardiogram is the electrical activity of heart
The option with correct statements is
a) I, II, III and IV b) I, III, IV and V
c) II, III, IV and V d) I, II, IV and V

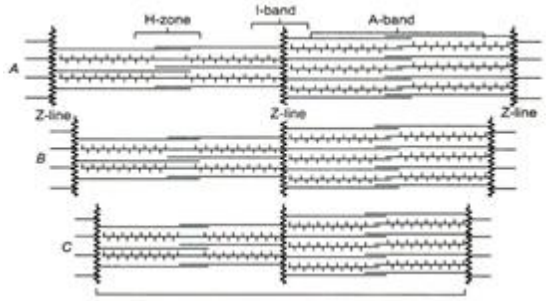
133. The excretory material of bony fish is
a) Urea b) Protein
c) Ammonia d) Amino acid

134. Uricotelic mode of passing out nitrogenous wastes is found in
a) Birds and annelids
b) Amphibians and reptiles
c) Insects and amphibians
d) Reptiles and birds

135. Which one is mismatched?
a) Bowman's capsule—Glomercular filtration
b) PCT—Absorption of Na^+ and K^+
c) DCT—Absorption of glucose
d) None of the above

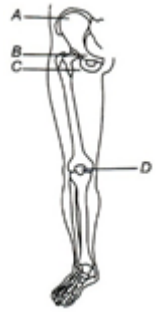
136. Each actin (thin filament) of is made up of
a) Two 'F' (filamentous) actins
b) Two filament tropomyosin
c) Tropin
d) All of the above

137. Identify the state of sarcomere in the diagram and choose the correct option accordingly



a) A-Contracting, B-Relaxed, C-Maximally contracted
b) A-Maximally contracted, B-Contracting, C-Relaxed
c) A-Relaxed, B-Contracting, C-Maximally contracted
d) A-Relaxed, B-Maximally contracted, C-Contracting

138. Identify *A*, *B*, *C* and *D* in the given diagram. Choose the correct option



a) A-Ilium, B-Ischium, C-Pubis, D-Patella
b) A-Ilium, B-Pubis, C-Ischium, D-Patella
c) A-Ilium, B-Patella, C-Ischium, D-Pubis
d) A-Ilium, B-Patella, C-Pubis, D-Ischium

139. Rods and cones are present in
a) Iris b) Cornea c) Sclerotic d) Retina

140. Which of the following statements are correct for cones of human eye?
I. Cones are responsible for daylight vision
II. Cones are responsible for colour vision
III. Cones are responsible for photopic vision
Choose the correct option
a) Only I b) I and II
c) II and III d) I, II and III

141. Accumulation and release centre of pituitary gland hormones is
a) Neurohypophysis b) Adenohypophysis
c) Hypothalamus d) Pars distalis

142. Pituitary gland is divided into
a) Adenohypophysis and neurohypophysis
b) Adenohypophysis and pars distalis
c) Adenohypophysis and pars intermedia
d) Adenohypophysis and anterior pituitary

143. Regeneration of a plant cell to give rise to new plant is called:
a) Reproduction b) Budding
c) Totipotency d) Pleuripotency

144. Which of the following is hermaphrodite?
a) Ant b) Aphids
c) Earthworm d) Cockroach

145. Viability of pollen grains depends on
a) Temperature
b) Humidity
c) Both (a) and (b)
d) Pressure

146. Type of pollination in *commelina* is
a) Chasmogamy b) Geitonogamy
c) Xenogamy d) Cleistogamy

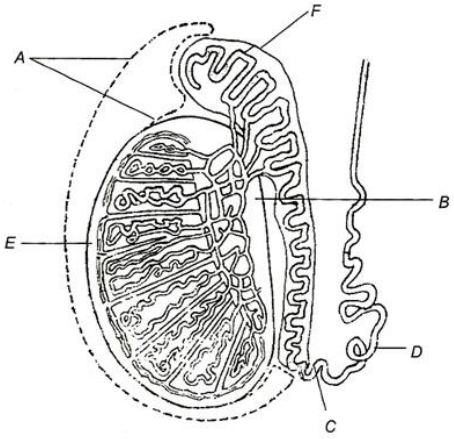
147. For good growth of pollen tube, necessary element is
a) Ca b) B c) Mg d) Mo

148. Cleavage forms 2-4-6-8-16 cells. These cells are called
a) Blastocysts b) Blastomeres c) Morula d) Trophoblast

149. Select the correct statement.
a) Cleavage follows gastrulation
b) Yolk content in egg has no role in cleavage
c) Cleavage is repeated mitotic division of zygote
d) Gastrulation and blastulation are followed by each other

150. Ovulatory phase lasts for
a) 1 day
b) 2 days
c) 3 days
d) 4 days

151. Identify *A*to*F* in the diagram given below



a) A-Tunica vaginalis, B-Rete testis, C-Caput epididymis, D-Vas deferens, E-Septa of testis, F-Cauda epididymis
b) A-vaginalis, B-Rete testis, C- Cauda

epididymis, D-Mediastinum testis, E- Vas deferens, F- Caput epididymis

c) A-Tunica vaginalis, B-Rete testis, C- Cauda epididymis, D-Vas deferens, E-Tunica albuginea, F- Caput epididymis

d) A-Tunica vaginalis, B-Rete testis, C-Caput epididymis, D- Mediastinum testis, E- Vas deferens, F-Cauda epididymis

152. Administration of progesterone, progesterone oestrogen combination and IUDs are effective in

a) 72 hr b) 48 hr c) 24 hr d) 96 hr

153. CDRI is situated in

a) Delhi b) Kanpur
c) Lucknow d) Tamil Nadu

154. Trisomy of which chromosome is involved in Down's syndrome?

a) 15^{th} b) 21^{st} c) 20^{th} d) 19^{th}

155. Pure tall plants are crossed with pure dwarf plants. In the F_1-generation, all plants were tall. These tall plants of F_1-generation were selfed and the ratio of tall to dwarf plants obtained was 3: 1. This is called

a) Dominance b) Inheritance
c) Codominance d) heredity

156. Select the incorrect statemant from the following.

a) Linkage is an exception to the principle of independent assortment in heredity

b) Galactosemia is an inborn error of metabolism

c) Small population size result in random genetic drift in a population

d) Baldness is a sex-limited trait

157. In 125 amino acid sequence, if 25 amino acid is mutated to UAA, then

a) A polypeptide of 124 amino acid is formed

b) A polypeptide of 25 amino acid is formed

c) A polypeptide of 24 amino acid is formed

d) Any of the above can be possible

158. RNA is the genetic material in

a) All viruses b) Tobacco Mosaic Viruses (TMV)
c) Q B bacteriophage d) Both (b) and (c)

159. Information molecule to get evolved first on the primitive earth was

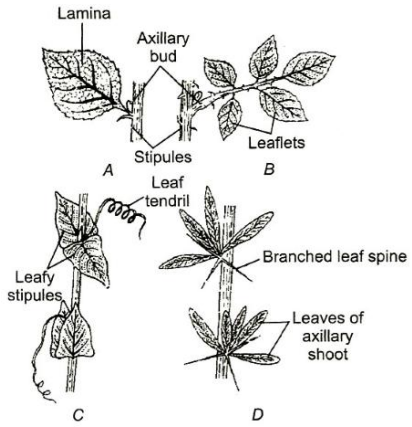
a) Protein

b) DNA

c) RNA

d) All of these

160. Diagram given below indicates



a) Analogous organs b) Homologous organs
c) Convergent evolution d) All of these

161. Active immunity may be acquired by

a) Natural infection b) Vaccines c) Toxoids d) All of these

162. Which one of the following is correctly matched?

a) Body louse - Typhoid

b) House fly- Yellow fever

c) *Anopheles*- Malaria

d) *Aedes*-Plague

163. Human health can be maintained by

a) Balanced diet b) Personal hygiene
c) Regular exercise d) All of these

164. Which of the following is not an oil seed?

a) *Helianthusannus* b) *Cocosnucifera*
c) *Arachis hypogea* d) *Phaseolusaureus*

165. Single cell protein is an alternative protein source for animal and human nutrition formed from certain beneficial microorganisms like

a) *Spirulina* b) *Methylophilus methylotrophus* c) *Candida utilis* d) All of the above

166. Brewer's yeast is

a) *Aspergillus fumigatus* b) *Saccharomyces cerevisiae*
c) *Streptomyces griseus* d) *Clostiridium botulinum*

167. Curd is formed by adding a small amount of curd to milk, which acts as a

a) Starter

b) Inoculum

c) Both (a) and (b)

d) None of these

168. Producing a 'giant mouse' in the laboratory was possible through:

a) Gene mutation b) Gene duplication
c) Gene synthesis d) Gene manipulation

169. In bacteria, genes for antibiotic resistance are usually located in:
a) Chromosomal DNA b) Cytoplasm
c) Mitochondria d) Plasmids

170. Consider the following statements about the responsibility of GEAC (set-up by the Indian Government)
I. GEAC make decisions regarding the validity of the GM research
II. It checks the safety of introducing GM organisms for the public services for their large scale use
Which of the statements given above is/are correct?
a) Only I b) Only II
c) I and II d) None of these

171. The vector for T-DNA is
a) *Thermos aquaticus*
b) *Salmonella typhimurium*
c) *Agrobacterium tumefaciens*
d) *Escherichia coli*

172. Which of the following is obtained from genetic engineering?
a) Haemoglobin b) Glucose
c) Golden rice d) None of these

173. Adaptation of parasite may be
I. loss of unnecessary organs
II. presence of adhesive organs
III. origin of suckers to cling to host
IV. loss of digestive system
V. high reproductive capacity
Choose the correct combination
a) I, III and IV b) II, IV and V
c) I, IV and V d) I, II, III, IV and V

174. Resource partitioning includes
a) Temporal partitioning
b) Spatial partitioning
c) Morphological partitioning
d) All of the above

175. The products of decomposition process are
a) Humus b) Inorganic nutrients
c) Organic nutrients d) Both (a) and (b)

176.

How many food chains are there in the food web shown above?
a) 2 b) 3 c) 5 d) 7

177. What is true approximate percentage of the earth covered by hot spots?
a) 2.5% b) 3.5%
c) 1.5% (less than 2%) d) 4.5%

178. India has nearly …… varieties of plants
a) 25,000 b) 54,000 c) 45,000 d) 35,000

179. Effect of pollution is on
a) Crossing over b) Ecological balance
c) Linkage d) Mutation

180. Euro II norms were stipulated to control sulphur content at 350 ppm in …A… and 150 ppm in …B…. and aromatic hydrocarbons are to be contained at …C…
Complete the given statement by choosing appropriate option for A-C
a) A-petrol, B-diesel, C-44%
b) A-diesel, B-petrol, C-42%
c) A-petrol, B-diesel, C-49%
d) A-diesel, B-petrol, C-45%

Thomas Tutorials

Date : NEET – 2016 **TEST ID: 04**

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

: ANSWER KEY :

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

: HINTS AND SOLUTIONS :

Single Correct Answer Type

1 **(b)**

Given, $p = \frac{a-t^2}{bx}$ or $pbx = a - t^2$

By the law of homogeneity of dimensional equation.

Dimensions of a = dimensions of $t^2 = [\mathrm{T}^2]$

Dimensions of b =dimensions of $\frac{t^2}{px} = [\mathrm{M}^{-1}\mathrm{T}^4]$

So, dimensions of $\frac{a}{b}$ is $[\mathrm{MT}^{-2}]$.

2 **(a)**

$\frac{L}{R}$ is a time constant of L-Rcircuit so $Henry/ohm$ can be expressed as $second$

3 **(c)**

From equation of motion, we have

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

Where, u is initial velocity, g the acceleration due to gravity and t the time.

For upward motion

$$h = -ut_1 - \frac{1}{2}gt_1^2 \qquad \text{... (i)}$$

for downward motion

$$h = -ut_2 + \frac{1}{2}gt_2^2 \qquad \text{... (ii)}$$

multiplying Eq. (i) by t_2 and Eq. (ii) by t_1 and subtracting Eq. (ii) by Eq. (i), we get

$$h(t_2 - t_1) = \frac{1}{2}gt_1t_2(t_2 - t_1)$$

$$h = \frac{1}{2}gt_1t_2 \qquad \text{... (iii)}$$

When stone is dropped from rest $u = 0$, reaches the ground in t second.

$$\therefore \qquad h = \frac{1}{2}gt^2 \qquad \text{... (iv)}$$

Equating Eqs. (iii) and (iv), we get

$$\frac{1}{2}gt^2 = \frac{1}{2}g\,t_1t_2$$

$$\Rightarrow \qquad t^2 = t_1t_2 \;\Rightarrow t = \sqrt{t_1t_2}$$

4 **(d)**

Maximum tension $= m\omega^2 r = m \times 4\pi^2 \times n^2 \times r$

By substituting the values we get $T_{\max} = 87.64\ N$

5 **(a)**

$v = K(y\hat{\imath} + x\hat{\jmath})$

$v_x = Ky$

$\frac{dx}{dt} = Ky$

Similarly, $\frac{dy}{dt} = Kx$

Hence $\frac{dy}{dx} = \frac{x}{y}$

$\Rightarrow\ ydy = xdx$, by integrating

$y^2 = x^2 + c$

6 **(c)**

$\vec{F}\Delta t = m\Delta\vec{v} \Rightarrow F = \frac{m\Delta\vec{v}}{\Delta t}$

By doing so time of change in momentum increases and impulsive force on knees decreases

7 **(a)**

Let R be the reaction of base of lift and g the acceleration due to gravity, acting downwards. Their resultant provides the net acceleration to the lift. Therefore,

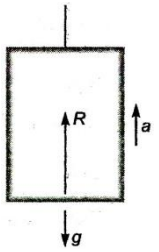
$R - mg = ma$

$\Longrightarrow R = m(g + a)$

Also, $R = mg'$

$\Longrightarrow g' = g + a$

Therefore, net acceleration increases and hence, reading indicated by spring balance will increase.



8 **(c)**

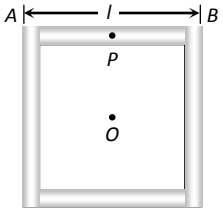
As the ball bounces back with same speed so change in momentum $= 2\,mv$

And we know that force = rate of change of momentum

$i.e.$ force will act on the ball so there is an acceleration

9 **(a)**

Moment of inertia of rod AB about point P and perpendicular to the plane $= \frac{Ml^2}{12}$



M.I. of rod AB about point $'O' = \frac{Ml^2}{12} + M\left(\frac{l}{2}\right)^2 = \frac{Ml^2}{3}$

(By using parallel axis theorem)

But the system consists of four rods of similar type so by but the symmetry $I_{System} = 4\left(\frac{Ml^2}{3}\right)$

10 **(a)**

Force does not produce any torque because it passes through the centre (Point of rotation) and we know that if $\tau = 0$ then $L =$ constant

11 **(a)**

Gravitational force dsesnot depend on the medium.

12 **(b)**

For most materials, the modulus of rigidity, G is one third of the Young's modulus, γ

$G = \frac{1}{3}\gamma$ or $\gamma = 3G$

$\therefore n = 3$

13 **(c)**

Relative density of solid

$= \dfrac{\text{weight in air}}{\text{weight in air} - \text{weight in water}}$

$\Longrightarrow$ Relative density of solid $= \frac{120}{120-80} = \frac{120}{40} = 3$

Relative density of liquid

$= \dfrac{\text{weight in air} - \text{weight in liquid}}{\text{weight in air} - \text{weight in water}}$

$\Longrightarrow$ Relative density of liquid

$= \dfrac{120-60}{120-80} = \dfrac{60}{40} = \dfrac{3}{2}$

14 **(b)**

The streamlines of air for a ball which is moving and spinning at the same time is as shown in figure below. The ball is moving forward and relative to it the air is moving backwards. Therefore, the velocity of air above the ball relative to it is larger and below it is smaller. The streamlines thus get crowded above and rarified below. This difference in the velocities of air results in the pressure difference between the lower and upper faces and there is a net upward force on the ball. This dynamic lift due to spinning is known as magnus effect

15 **(c)**

Temperature of liquid oxygen will first increase in the same phase. The phase change (liquid to gas) will take place. During which temperature will remain constant. After that temperature of oxygen in gaseous state will further increase.

16 **(b)**

First law of thermodynamics is infact, the law of conservation of energy.

17 **(b)**

$\Delta Q = \Delta U + \Delta W$

$\Rightarrow \Delta U = \Delta Q - \Delta W = Q - W$ [using proper sign]

18 **(d)**

Since $v_{rms} \propto \sqrt{T}$. Also mean square velocity $\overline{v^2} = v_{rms}^2$

19 **(a)**

$T = 2 = 2\pi\sqrt{\dfrac{M}{k}}$

and $2 + 1 = 2\pi\sqrt{\frac{M+4}{k}}$

or $3 = 2\pi\sqrt{\frac{k+4}{k}}$ so $\frac{4}{9} = \frac{M}{M+4}$

or $4M + 16 = 9M \text{ or } M = \frac{16}{5} = 3.2$ kg

20 **(d)**

$x = x_0 \cos\left(\omega t - \dfrac{\pi}{4}\right)$

Acceleration, $a = \frac{d^2x}{dt^2}$

$= -\omega^2 x_0 \cos\left(\omega t - \dfrac{\pi}{4}\right)$

$= -\omega^2 x_0 \cos\left(\omega t + \dfrac{3\pi}{4}\right)$

So, $A = \omega^2 x_0$

and $\delta = \frac{3\pi}{4}$

21 **(d)**

Speed of sound $v \propto \sqrt{T}$ and it is independent of pressure

22 **(d)**

As $\vec{E}$ is a vector quantity

23 **(d)**

At an instants

$T\cos\theta = mg$ ..(i)

$T\sin\theta = F_e$ ...(ii)

$= \dfrac{ka^2}{x^2}$

From Eqs. (i) and (ii), we have

$\frac{ka^2}{x^2} = mg\tan\theta$

$\Longrightarrow q^2 = \dfrac{mg}{k}\dfrac{x}{2l}x^2 \left(\tan\theta \approx \dfrac{a}{2l}\right)$

$\Longrightarrow q^2 = \dfrac{mg}{2kl}x^3$ ...(iii)

$\Longrightarrow 2q\dfrac{dq}{dt} = \dfrac{3mg}{2kl}x^2\dfrac{dx}{dt}$

$\Longrightarrow 2\left(\dfrac{mg}{2kl}x^3\right)^{\frac{1}{2}}\dfrac{dq}{dt} = \dfrac{3mg}{2kl}x^2 v$

$\left[\because q = \left(\dfrac{mg}{2kl}x^3\right)^{\frac{1}{2}}\right]$

$\Longrightarrow vx^{1/2} = \text{constant}$

$\Rightarrow v \propto x^{-1/2}$

24 **(b)**

Electric field

$$E = -\frac{dV}{dx}$$

For I region, V_1=constant

$$\therefore \frac{dV_1}{dx} = 0$$

$$\therefore E_1 = 0$$

For II region,

$V_2 = +\text{ve} = +f(x)$

$$\therefore E_2 = -\frac{dV_2}{dx} = -\text{ve}$$

For III region.

V_3=constant

$$\therefore \frac{dV_3}{dx} = 0$$

$$\therefore E_3 = 0$$

For IV region, $V_1 = -f(x)$

$$\therefore E_4 = -\frac{dV_4}{dx} = +\text{ve}$$

From these values, we have

$E_2 > E_4 > E_1 = E_3$

25 **(b)**

$v_d \propto 1/l$. Therefore, drift velocity is halued

26 **(c)**

$R_{t_1} = R_1(1 + \alpha_1 t)$ and $R_{t_2} = R_2(1 + \alpha_2 t)$

Also $R_{eq} = R_{t_1} + R_{t_2} \Rightarrow R_{eq} = R_1 + R_2 + (R_1\alpha_1 + R_2\alpha_2)t$

$$\Rightarrow R_{eq} = (R_1 + R_2)\left[1 + \left(\frac{R_1\alpha_1 + R_2\alpha_2}{R_1 + R_2}\right).t\right]$$

So $\alpha_{eff} = \frac{R_1\alpha_1 + R_2\alpha_2}{R_1 + R_2}$

27 **(a)**

$$\sigma_i = \frac{\theta}{i} = \frac{\theta}{iG}.G = \sigma_V G \Longrightarrow \frac{\sigma_i}{G} = \sigma_v$$

28 **(c)**

The induction due to AB and CD will be zero. Hence the whole induction will be due to the semicircular part BC. $B = \frac{\mu_o i}{4r}$

29 **(d)**

Magnetic susceptibility

$$X_m = \frac{I}{H}$$

For paramagnetic substanceX_m is slightly positive.

31 **(c)**

Lenz's law restates the law of conservation of energy.

32 **(a)**

In LCR series circuit, impedance Z of the circuit is given by

$Z = \sqrt{(R)^2 + (X_L - X_C)^2}$ where $X_L = \omega L, X_C = 1/\omega C$

At resonance $X_L = X_C \ \therefore Z = R$

33 **(b)**

For purely capacitive circuit $e = e_0 \sin \omega t$

$i = i_0 \sin\left(\omega t + \frac{\pi}{2}\right)$, $i.e.$, current is ahead of emf by $\frac{\pi}{2}$

35 **(b)**

Because in dispersion of white light, the rays of different colours are not parallel to each other. Also deviation takes place in same direction

36 **(b)**

$5 = (\mu - 1)A = (1.5 - 1)A \Rightarrow A = 10°$

37 **(b)**

$A = n\pi d\lambda \Rightarrow nd = \frac{A}{\pi\lambda} = \text{constant}$

$\Rightarrow n \propto \frac{1}{d}$ (n = number of blocked HPZ) on decreasing d, n increases, hence intensity decreases

38 **(b)**

Using Einstein's realtion for relativistic mass

$$m = \frac{m_0}{\sqrt{1 - V^2/C^2}} [m_0 = \text{rest mass}]$$

$$\Rightarrow \frac{m}{m_0} = \frac{1}{\sqrt{1 - V^2/C^2}}$$

Given $\frac{m}{m_0} = 2 = \frac{1}{\sqrt{1 - V^2/C^2}}$

$\Rightarrow 1-\frac{V^2}{C^2}=\frac{1}{4}\Rightarrow \frac{V^2}{C^2}=\frac{3}{4}$

$\Rightarrow \frac{V}{C}=\frac{\sqrt{3}}{2}\Rightarrow V=\frac{\sqrt{3}}{2}C$

39 **(c)**

$W_0 \propto \frac{1}{\lambda}\Rightarrow \frac{\lambda_1}{\lambda_2}=\frac{(W_0)_2}{(W_0)_1}=\frac{4.5}{2.3}=\frac{2}{1}$

40 **(d)**

PE= 2 ×total energy

$= 2(-1.5)\text{eV} = -3.0\text{ eV}$

41 **(c)**

Remaining material $N=\frac{N}{2^{t/T}}$

$\Rightarrow N=\frac{10}{(2)^{20/15}}=\frac{10}{2.51}=3.96g$

So decayed material $= 10-3.96=6.04\ g$

44 **(c)**

In space communication, the sound waves can be sent from one place to another by superimposing it on undamped electromagnetic waves

47 **(d)**

Given, % of C=54.55%

% of H=9.09%

%of O=36.36%

Element	%	At. no.	Ratio of atoms	Simplest ration
C	54.55	12	54.55/12= 4.54	4.54/2.27=2
H	9.09	1	9.09/1=9.09	9.09/2.27=4
O	36.06	16	36.16/16= 2.27	2.27/2.27=1

∴ Empirical formula is C_2H_4O.

49 **(b)**

$\lambda=\frac{h}{mv}$

Here, $v = 3600$ km/h

$= 10^5$cm/s

$m = 1.0\text{mg} = 10^{-3}$

$\lambda=\frac{6.626\times10^{-27}}{10^{-3}\times10^5}$

$= 6.626\times10^{-29}$cm

50 **(c)**

It reflects trends in physical and chemical properties of the elements

51 **(c)**

In NaOH, Na^+andOH^- ions are bonded together by ionic bond while in OH^- ion oxygen and hydrogen atoms are bonded together by covalent bond $Na^+[O-H]^-$.

52 **(c)**

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

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

54 **(b)**

The Gibb's-Helmholtz equation is as

$G=H+T\left(\frac{\partial G}{\partial T}\right)_P$

Dividing above equation by T^2

$\frac{G}{T^2}=\frac{H}{T^2}+\frac{1}{T}\left(\frac{\partial G}{\partial T}\right)_P$

This on arrangement becomes

$\left[\frac{\partial(G/T)}{\partial T}\right]_P=-\frac{H}{T^2}$

$H=T^2\left[\frac{\partial(G/T)}{\partial T}\right]_P$

where, $H=$ enthalpy.

55 **(c)**

$CO(g)+\frac{1}{2}O_2(g)\rightarrow CO_2(g)$

$\because \quad q_p=q_v+\Delta nRT$

$\Delta n=1-1\frac{1}{2}=-\frac{1}{2}; R=2\text{ cal}, T=300\text{ K}$

$q_p=q_v+\left(-\frac{1}{2}\right)(2)(300)$

$q_p=q_v-300$

$q_p-q_v=-300\text{ cal}$

56 **(a)**

$SO_2+\quad\frac{1}{2}O_2\quad\rightleftharpoons SO_3$

5 mol 5 mol 0 initially

$(5-x)\left(5-\frac{1}{2}x\right)x$ at equilibrium

$x=\frac{60}{100}\times5=3$

Total number of moles $=(5-x)+\left(5-\frac{1}{2}x\right)+x$

$=(5-3)+\left(5-\frac{1}{2}\times3\right)+3$

$=8.5$

57 **(c)**

∵ In this reaction phosphorus is simultaneously oxidised and reduced.

∴ It is disproportionation reation.

$\overset{0}{P_4}+3NaOH+3H_2O\longrightarrow 3\overset{+}{NaH_2}\overset{-3}{PO_2}+PH_3$

58 **(d)**

$NaNO_2$ (Sodium nitrite) acts both as oxidising as well as reducing agent because in it N-atom is in +3 oxidation state (intermediate oxidation state).

Oxidising property

$2NaNO_2 + 2KI + 2H_2SO_4 \longrightarrow Na_2SO_4 + K_2SO_4 + 2NO + 2H_2O + I_2$

Reducing property

$H_2O_2 + NaNO_2 \longrightarrow NaNO_3 + H_2O$

59 **(a)**

$\left[H_2O_2 \rightarrow H_2O + \frac{1}{2}O_2\right] \times 2$

$2H_2O_2 \rightarrow 2H_2O + O_2$

68 g 22.4 L at NTP

$\because$ 22.4 L O_2 at NTP is obtained by 68 g of H_2O_2

$\therefore$ 20 L O_2 at NTP will be obtained by H_2O_2

$= \frac{68}{22.4} \times 20 = 60.7$ g/L

$\therefore$ 1000 mL O_2 atNTP is obtained by $H_2O_2 = 60.7$ g

$\therefore$ Percentage strength $= \frac{60.7 \times 100}{1000} = 6.07$ g

60 **(d)**

Plaster of Paris absorb water to form monoclinic gypsum which is a hard substance.

$CaSO_4 . \frac{1}{2}H_2O \xrightarrow{3/2H_2O} CaSO_4 . 2H_2O$

monoclinic gypsum

61 **(c)**

Aluminium reacts with caustic soda to form sodium meta aluminate.

$2Al + 2NaOH + 2H_2O \longrightarrow 2NaAlO_2 + 3H_2 \uparrow$

sodium meta aluminate

63 **(a)**

Chiral carbon atom has all four different groups attached to it.

$\therefore$ It has one asymmetric or chiral carbon atom.

66 **(b)**

Methane gas producing field is paddy field. It is also known as marsh gas

67 **(b)**

In the close packing of 'n' atoms, the number of tetrahedral voids are '$2n$'. Hence, their number per atom is 2.

68 **(a)**

Mass of one unit-cell (m)

$= \text{volume} \times \text{density}$

$= a^3 \times d = a^3 \times \frac{MZ}{N_0 a^3} = \frac{MZ}{N_0}$

$m = \frac{58.5 \times 4}{6.02 \times 10^{23}}$ g

$\therefore$ Number of unit cells in 1 g $= \frac{1}{m}$

$= \frac{6.02 \times 10^{23}}{58.5 \times 4}$

$= 2.57 \times 10^{21}$

69 **(b)**

$M = \frac{100 \times k_b \times w}{\Delta T_b \times W}$

Given, $k_b = 5.2$

w= mass of solute = 6 g

W=mass of solvent =100 g

ΔT_b = elevation in boiling point = 0.52°C

M= molecular weight =?

$\therefore$ $M = \frac{100 \times 5.2 \times 6}{0.52 \times 100} = 60$

70 **(c)**

$\text{Molarity} = \frac{\text{moles of solute}}{V \text{ of soution in litre}}$

$\therefore$ Molar solution means 1 mole of solute is present in 1 L of solution.

71 **(d)**

The increasing order of deposition of cations at the cathode is

$Cu^{2+} < Ag^+ < Au^{3+}$

$E \propto Z$

$Ag^+ + e^- \rightarrow Ag$

$Cu^{2+} + 2e^- \rightarrow Cu$

$Au^{3+} + 3e^- \rightarrow Au$

3 Faradays liberate 1 mole of Au, 3 moles of Ag and 3/2 moles of Cu. Thus, molar ratio of Ag:Cu: Au is 3:3/ 2:1 or 6:3:2.

72 **(c)**

$N = N_0 \times \left(\frac{1}{2}\right)^n$

$\frac{1}{8}N_0 = N_0 \times \left(\frac{1}{2}\right)^n$

N=3

$T = n \times t_{1/2}$

$=3 \times 14 = 42$s

73 **(a)**

The temperature coefficient is the ratio of two velocity constants having the difference of 10°C.

Temperature coefficient

$$= \frac{k_t + 10}{k_t}$$

For most of the reactions its value lies between 2 and 3.

74 **(b)**

Gold is a lyophobic sol.

75 **(a)**

$$Ti + 2I_2 \xrightarrow{500\ K} \underset{\text{volatile stable compound}}{TiI_4} + 2I_2 \xrightarrow{1700\ K} \underset{\text{pure metal}}{Ti}$$

76 **(c)**

Wolframite is ferrous tungstate ($FeWO_4$) which is magnetic in nature

77 **(d)**

Rayleigh –ramsay separation method

$N_2 + O_2 \xrightarrow{\text{Electric spark}} 2NO$

$2NO + O_2 \longrightarrow 2NO_2$

$2NaOH + 2NO_2 \longrightarrow NaNO_2 + NaNO_3 + H_2O$

78 **(d)**

Ir does not dissolve in aqua regia as it is much more noble than Au and Pt

79 **(b)**

Paramagnetism is shown by the positive ions of lanthanides except $La^{3+}(4f^0)$ and $Lu^{3+}(4f^{14})$. These ions are diamagnetic

81 **(d)**

Wurtz's reaction involves the reduction of alkyl halide with Na in ether.

84 **(c)**

Among the carbonyl compounds, the reactivity decreases with increase in number of alkyl group and size of alkyl group because the positive charge on the carbon atom decreases due to $+I$ effect of alkyl groups.

Thus, the correct order reactivity is

$HCHO > CH_3CHO > C_6H_5CHO$

86 **(c)**

Reaction of aniline with benzaldehyde is condensation reaction.

$$C_6H_5 - \underset{|}{\overset{H}{C}} = O + H_2NC_6H_5 \xrightarrow{\text{Condensation}} C_6H_5CH = NC_6H_5 + H_2O$$

Benzaldehyde aniline benzylidene aniline

88 **(a)**

Teflon is a polymer of tetrafluorothylene. It is used for coating articles and cookware to make them non sticky.

Nylon66 is a polymer of adipic acid and hexamethylenediamine. Glyptal is a polymer of ethylene glycol and phthalic acid. Buna –S is a polymer of butadiene and styrene.

89 **(a)**

Cellulose acetate has been used in the manufacture of non inflammable pohotographic films.

91 **(b)**

Mangifera indica, scientific name consists of two words a generic and another specific name. It is binomial system of nomenclature.

The first word denoting the genus start with capital letter, while specific epithets start with small letter

92 **(d)**

→ A taxon is the taxonomic group of any rank in the system of classification

93 **(b)**

Binomial system of nomenclature was proposed by Carolus Linnaeus. The system of nomenclature was firsts issued in Species Plantarum. Binomial system approve two name for an organism, i.e., generic and specific name

94 **(b)**

Some bacteria like *Staphylococcus*, *Micrococcus*, *Salmonella*, *Pseudomonas*, *Escherichia*, *Clostridium*, etcsecr et endotoxins which spoil food stuff and cause food poisoning.

95 **(c)**

Class-Deuteromycetes This class of artificially grouped fungi have no sexual reproduction and are consequently called the fungi imperfecti because their life cycles are imperfect

96 **(b)**

Though bryophytes are the land plants but water is essential for fertilization. It provides a medium of transport for antherozoids to reach archegonia. Hence, bryophytes are called amphibians of plant kingdom.

97 **(b)**

In *Spirogyra*, the sexual reproduction involves

the fusion of two morphologically identical isogametes, and physiologically dissimilar anisogametes. This is an advanced feature. In this, the active gamete is known as the male and the passive as the female.

98 **(b)**
Fishes (super class-Pisces) have two chambered heart (one auricle and one ventricle), with very well developed sinus venous and conus arteriosus. However lung fishes have three chambered heart (two auricles and one ventricle).

99 **(a)**
In *Scoliodon* or dog fish, there are present some pores, the ampullary pores on the upper and lower surface of the head, each of which leads into an ampulla (pl. ampullae) called ampulla of Lorenzini. Through these, the fish receives information of the temperature fluctuations in the surrounding water.

100 **(c)**
While ants are social, colonial and polymorphic insects.

101 **(d)**
Morphology of Root
(i) They normally constitutes the descending part of plant axis
(ii) They are non-green
(iii) Each functional root is covered by root cap
(iv) Root hairs are present
(v) They are positively hydrotropic
(vi) They don't have nodes and internodes

102 **(d)**
In mango, coconut, plum, etc., the fruit is known as drupe (stony fruit). They develop from monocarpellary, superior ovaries and are one seeded. In mango, the pericarp is well differentiated into an outer thin Epicarp, a middle fleshy edible mesocarp and an inner stony hard endocarp.

103 **(d)**
Monocots possess floral parts in multiple of four or five.

104 **(b)**
Due to vivipary the seeds cannot be stored under normal condition for the next season.

105 **(c)**
Fusiform initial divided to form secondary phloem on the outer side and secondary xylem on the inner side. With the formation of secondary xylem (tracheary elements) on the inner side, the vascular cambium moves gradually to the outside by adding new cells. This phenomenon is called dilation.

106 **(c)**
A–radial, B–conjoint closed, C–conjoint open
1. Radially arranged vascular tissue found in the dicot root
2. When vascular bundle is present in between xylem and phloem it is called open otherwise close-vascular bundle

107 **(b)**
Red blood cells (RBC_S) or erythrocytes are the most abundant of all the cells in blood. They are devoid of nucleus in most of the mammals and are round or biconcave in shape. It is biconcave because such a shape has increase surface area (for O_2 transfer) and allows easy squeezability of the RBC_S through the blood vessels.

108 **(c)**
The body of earthworm is divided into hundred short segments, which are similar. The ventral surface is distinguished by the presence of genital openings (pores)

109 **(c)**
A mitochondria that has its outer membrane removed is called mitoplast.

110 **(c)**
In eukaryotic cell, a cell wall can have upto three parts-middle lamella, primary wall and secondary wall

111 **(a)**
All are correct

112 **(c)**
Such sugars, which give positive tests with Benedict's solution and Tollen's reagent are called reducing sugars. Most monosaccharides and some disaccharides are reducing sugars.

114 **(b)**
Meiosis occurs in organisms during sexual reproduction

115 **(b)**
The value of water potential is always negative or less than zero. Water potential of a solution is determined by using pure water as the standard of reference, which has zero water potential at normal temperature and pressure.
The presence of solute particles reduce free energy of the water. Hence, it decreases the water potential in negative value. So, water potential of

a solution is always less than zero

116 **(a)**

Mineral matter in the soil are responsible for holding the water present in the soil. They are of following 5 types according to their size in ascending order clay, slit, fine sand, coarse sand and gravel. Clay having mineral salt, is more active chemically and shows higher capacity to retain water and ions. A loam soil is made up of ratio 1:2:2 of clay, slit and sand respectively. While sandy soil has little clay matter and shows least retaining capacity and is not fit for plant growth

117 **(c)**

It is demonstration of transpiration by bell jar experiment. It this experiment a potted plant is placed on a slab and a dry bell jar is inverted over it. Having sealed the edge of jar with wax or Vaseline, the whole apparatus is left undisturbed. After sometimes the inner surface of bell jar became misty due to transpiration by plant

118 **(c)**

The technique of growing plants in a nutrient solution is known as hydroponics. Since then, a number of improvised methods have been employed to try and determine the mineral nutrients essential for plants.

The essence of all three methods involves the culture of plants in a soil free, defined mineral solution. These plants in a soil free, defined mineral solution. These methods require purified water and mineral nutrient salts

119 **(a)**

Phosphorus is a constituent of nucleic acids, proteins, $NADP^+$, etc. its deficiency causes, poor growth, chlorosis (mottled), necrosis and premature falling of leaves and flowers.

120 **(a)**

Mesophyll cell.

After the fixing of CO_2 to Oxaloacetic Acid (OAA) in C_4 cycle, the oxaloacetic acid changes into the malic aspartic acid

$$OAA + NADPH \xrightarrow{\text{Malic acid dehydrogenase}} \text{Malic acid} + NADP^+$$

$$OAA + NH_3 + NADPH \xrightarrow{\text{Transaminase}} \text{Aspartic acid} + NADP^+ + H_2O$$

Both of these reactions occur in mesophyll cell

121 **(c)**

Triose phosphate isomerase enzyme converts glyceraldehydes-3 phase molecule into dihydroxy acetone phosphate. Then an enzyme **transketolase** comes, which acts on sedoheptulose-7-phosphate molecule and changes it into ribulose-5-phosphate and xylulose-5-phosphate. Then ribulose-5-phosphate isomerase enzyme comes and acts on ribulose-5-phosphate. This reactionhas a molecule of ribulose-5-phosphate, while xylulose-5-phosphate molecule is also converted into ribulose-5-phosphate by ab other enzyme, ribulose-5-phosphate epimerase.

122 **(d)**

Alcoholic fermentation by yeast causes decorboxylation of pyruvate to acetaldehyde producing CO_2 as byproduct. Acetalatehyde accepts 2H atoms from $NADH_2$ to produce ethanol.

123 **(b)**

The TCA cycle starts with the condensation of acetyl group with oxaloacetic acid (OAA) and water to yield citric acid. The reaction is catalyzed by the enzyme citrate synthase and molecule of Co-A is released

124 **(a)**

Seismonastic movement is a type of nastic movement. It comes in response of touch and this phenomenon is known as seismonasty, *e.g.,* leaflets of *Mimosapudica*.

The nastic movements in response to light, chemical, temperature, etc, are called as photonastic, chemonastic and thermonastic movements respectively.

125 **(a)**

In coconut, the endosperm is multicellular in the outer part and free nuclear in the centre (*i.e.,* liquid endosperm). The endosperm of coconut contains hormone **cytokinin**.

126 **(b)**

Geometrical Growth In most system the initial growth is slow (lag phase), and it increases there after at a exponential rate (log or exponential phase). Both the progeny cells following mitotic cell division retains the ability to divide and continue to do so. However due to the limited nutrient supply, the growth slows down leading to stationary phase. If we plot the parameter of growth against time, a typical sigmoid curve is obtained.

It has following stages

1. During lag phase, organism adapt themselves to growth conditions. It is the period where the individual organism are maturing and not yet able to divide. During the lag phase of the bacterial growth cycle, synthesis of RNA, enzymes and other molecules occurs

2. The log phase (sometimes called the logarithmic phase or the exponential phase) is a period characterised by cell doubling. The number of new organism appering per unit time is proportional to the present population.

3. The stationary phase is often due to a growth-limiting factor such as the depletion of an essential nutrient, and/or the formation of an inhibitory product such as an organic acid. Stationary phase results from a situation in which growth rate and death rate are equal

4. Death phase, organism run out of nutrients and die

127 **(a)**
A-Oxyntic cells, B-Chief cells, C-Mucous cells, D-Argentaffin cells

128 **(d)**
Cholecystokinin- pancreozymine hormone is secreted by the epithelium of entire small intestine.It stimulates the gall bladder to release bile and pancreas to secrete and release digestive enzymes in the pancreatic juice.

129 **(c)**
A healthy man can inspire or expire approximately 6000 to 8000 mL of air per minute

130 **(a)**
Partial pressure of O_2 is higher in atmosphere as compared to the alveolar air. Due to this pressure gradient, O_2 goes inside the body and same phenomena happens in case of CO_2 but in opposite direction

131 **(b)**
The papillary muscles are attached to the lower portion of the interior wall of the ventricles. They connect to the chordae tendinae, which attach to the tricuspid valve in the right ventricle and the mitral valve in the left ventricle. The contraction of the papillary muscles opens these valves, when the papillary muscles relax, the valves close.

132 **(b)**
Electrocardiograph is not the recording of electrical changes during the cardiac cycle. Rather, it is the graph of electrical activity of the heart

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

134 **(d)**
Reptiles, birds, land snails and insects excrete nitrogenous waste as uric acid in the form of pellet of paste with a minimum loss of water and are called Uricotelic animals.

135 **(c)**
The urine formation includes glomerular filtration. Selective reabsorption and tubular secretion. The glucose is reabsorbed at proximal convoluted tubules.

136 **(a)**
Two f-actins

137 **(c)**
A-Relaxed, B-Contracting, C-Maximally contracted

139 **(d)**
Retina is formed of four layer of cells.
(i)Pigmented epithelium - having melanin pigment granules in cytoplasm.
(ii)Layer of photoreceptors - rods and cones.
(iii)A layer of bipolar neurons - Act as both sensory and conducting neurons.
(iv)Retinal ganglion cells - axons form the optic nerve

140 **(d)**
I, II and III.
Both (a) and (b), *i.e.,* cones and rods

141 **(c)**
Almost all secretion by the pituitary gland are controlled by hormonal signal from hypothalamus

144 **(c)**
Ant, aphids, cockroaches are unisexual only earthworm have both the sexes (hermaphrodite)

145 **(c)**
The period in which the pollen grains remain viable is highly variable. It depends on the temperature and humidity. In some cereals such as rice and wheat, the pollen grains loose viability with in 30 minutes of their release and in some

members of Rosaceae, Leguminosae and Solanaceae, they maintain variability for months

146 **(d)**

Cleistogamous flowers never open and in them only self-pollination is operated. In *Commelina benghalensis* (kankauoa), the underground flowers are cleistogamous, in which Cleistogamy (a type of self-pollination) occurs.

147 **(b)**

Boron (B) is an essential micro-element or trace element, which is required for pollen germination, good growth of pollen tube and fertilization.

148 **(b)**

The cells formed by cleavage are called blastomere.

Implantation

(i) Zygote divides rapidly by mitotic division. This is called cleavage. As a result 2, 4, 8, 16 daughter cells are produced which are termed as blastomeres

(ii) Embryo with 8-16 blastomeres is called a morula

(iii) The morula changes into a large mass of cells called blastocyst, which passes further into the uterus

(iv) Blastomeres in the blastocyst are arranged into an outer layer called trophoblast and an inner group of cells attached to trophoblast called inner cell mass

(v) The trophoblast layer gets attached to the cells of the endometrium and the inner cell mass gives rise to the embryo

(vi) The cells of endometrium divide rapidly and cover the blastocyst

(vii) So, the blastocyst gets embedded in the endometrium of the uterus. This is called implantation, which leads to pregnancy

149 **(c)**

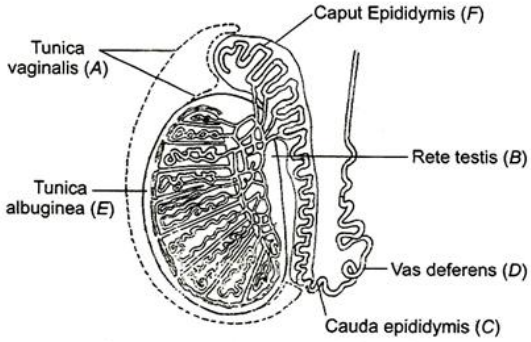
Fertilized zygote is divided by special type of mitotic divisions, known as **cleavage**. Cleavage increases the number of cells.

150 **(b)**

In ovulatory phase, release of ova occurs due to the rapid increase in LH called LH surge. It last for maximum two days

151 **(c)**

Testis is covered by tough compact fibrous capsule called **tunica albuginea**, which is externally covered by peritoneal layer of flat cells called **tunica vaginalis**; which is supplied by a network of blood capillaries called **tunica vasculosa**



LS of mammalian testis and different ducts

152 **(a)**

Oral contraceptive pills increases the risk of intravascular clotting. Therefore, they are not recommended for women with a history of disorders of blood clotting. Administration of oral contraceptives and IUD are effective in 72 hours

153 **(c)**

Lucknow, India

Research in Reproductive Health It should be encouraged and supported to find out the new methods in reproduction related areas. 'Saheli' a new oral contraceptive for the females was developed by scientists in Central Drug Research Institute (CDRI) in Lucknow

154 **(b)**

The **Down's syndrome** (Mongolian idiocy) arises due to **trisomy** of **21st chromosome**, *i.e.*, total 47 chromosomes will present in such person. The main features are mental deficiency, short stature, round face, flaccid muscles, protruding tongue, etc.

155 **(a)**

If a character is expressed equally in the homozygous and heterozygous conditions, it is called **dominant** and the other character is said to be **recessive**. In given question, 'Tall' character is dominant over 'dwarf', hence, the cross shows dominance and segregation of traits.

156 **(d)**

Baldness is not a sex-limited trait. Balaness is a sex influenced trait.

Linkage is an exception to the principle of independent assortment in heredity.

Galactosemia is a hereditary disease that is caused by the lack of a liver enzyme required to

digest galactose.

Small population size results in random genetic drift in population.

157 **(c)**
The codonUAA function as stop or termination codon. It does not code for any amino acid and therefore called non sense codon. Hence, the polypeptide synthesis terminated and a polypeptide of 24 amino acids is formed.

Polypeptide chain of 124 amino acids is formed only when the 125th codon works as stop codon.

158 **(d)**
RNA is genetic material in some viruses like, TMV and Q B bacteriophage

159 **(c)**
In the first living body, basic organic molecule formed was RNA that served as the genetic material.
Enzymatic activities of RNA molecules are constantly being discovered, but no enzymatic activity has ever been attributed to DNA. Further, ribose is much more readily synthesized than deoxyribose under stimulated prebiotic conditions. A selective advantageous RNA molecule would be one that directs the synthesis of protein that accelerates the replication of particular RNA (*i.e.*, RNA polymerase)

160 **(b)**
Homologous organs.
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

161 **(d)**
When a host is exposed to antigens. Which may be in the form of living or dead microbes or proteins, antibodies are produced in the host body. This type of immunity is called active immunity. All the three options are *via* media through, which an antigen enters into host body

162 **(c)**
Malaria is widely known human disease caused by infection with pathogenic protozoan, the *Plasmodium*. Female *Anopheles* mosquitoes transmit *Plasmodium* from person to person.

163 **(d)**
Health is maintained by balanced diet, personal hygiene and regular exercise

165 **(d)**
Single cell proteins are the dried cells of microorganisms belonging to bacteria, yeasts, moulds, higher fungi and some algae
Bacteria – *Methylophilus methylotrophus*
Yeast – *Candida utilis*
Cyanobacteria - *Spirulina*

166 **(b)**
Saccharomyces cerevisiae.
Bread is made through fermentation by *Saccharomyces cerevisiae* or commonly called baker's yeast. Yeast species also used in alcoholic fermentation is *S. cerevisiae* (Brewer's yeast)

167 **(c)**
The starter or inoculum used in preparation of milk products actually contains million of Lactic Acid Bacteria (LAB)

170 **(c)**
Both statements are corrects.
GEAC was set up by the ministry of environment and forests to regulate research, testing and commercial release of GM crops, food and organisms
The aim and objectives of GEAC are
(i) to permit the use of GM organisms and their products for the commercial applications
(ii) to adopt the procedures for restriction, production a scale, import, export and application of GM organisms
(iii) approval to conduct a large scale field trails and release of transgenic crops in the environment
(iv) to authorise agencies or persons to have large scale production and the release of GM organisms into the environment or curb and take **punitive** action against them

171 **(c)**
Vector is used to introduce genes into a host cell, where the genes may be amplified or otherwise manipulated, e.g., *A. tumefaciens.*

173 **(d)**
In accordance to their life style parasite evolved

special adaptation such as loss of digestive systems, loss of unnecessary organs, presence of adhesive organs, origin of suckers and high reproductive capacity accordance to their host

174 **(d)**

Gause's exclusion principle does not always leads to the species exclusion. The competiting species may co-exist due to different partitioning like temporal portioning, spatial partitioning, morphological patitioning.

Darwin found fourteen species of finches to co-exist in Galapagos islands due to development of different feeding habits. Similarly, in Serengeti plains over 20 species of antelopes graze in the same area. Several plants can grow together by sending their roots to various lengths. Therefore, competition does not always result in extinction of species but causes development of larger number of niches

175 **(d)**

The end result of decomposition is the production of dark brown, smelling, humus rich organic matter and inorganic substance like carbon dioxide, water and nutrients

176 **(c)**

Plant → Deer → Python

Plant → Grasshopper → Frog

Plant → Goat → Lion

Plant → Goat → Python

Plant → Deer → Lion

177 **(a)**

The approximate percentage of the earth covered by the terrestrial hot spots is 1.5% (less than 2%)

178 **(c)**

India has nearly 45000 plants and twice as many animals

179 **(b)**

Ecological balance is the maintenance of an equilibrium between living and non-living components of an ecosystem. So, the pollution disturbs the ecological balance.

180 **(b)**

A-diesel, B-petrol, C-42%