ALL INDIA MOCK TEST

Sample Paper - 7

DURATION : 180 Minutes **MARKS : 720**

Topic Covered

Physics	**: FULL SYLLABUS : 45 Questions**
Chemistry	**: FULL SYLLABUS : 45 Questions**
Biology	**: FULL SYLLABUS : 90 Questions**

Please read the instructions carefully :

1. The test is of **3 hours** duration and Test Booklet contains **180** questions. Each question carries 4 marks. For each correct response, the candidate will get **4 marks**. For each incorrect response, **one mark** will be deducted. The maximum marks are **720**.
2. Use **Blue/Black Ball Point Pen** only for writing particulars on this page/marking responses.
3. Rough work is to be done on the space provided in the Test Booklet only.
4. **On completion of the test, the candidate must handover the Answer Sheet to the invigilator before leaving the Room/Hall. The candidates are allowed to take away this Test Booklet with them.**
5. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your roll no. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
6. Before attempting the question paper ensure that it contains all the pages and no question is missing.
7. Each candidate must show on demand his/her Admission Card to the Invigilator.
8. If any student is found to have occupied the seat of another student, both the students shall be removed from the examination and shall have to accept any other penalty imposed upon them.
9. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
10. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice.
11. Use of Electronic/Manual Calculator is prohibited.
12. The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of the Board.
13. The candidates will write the Correct Test ID Code as given in the Test Booklet/Answer Sheet in the Attendance Sheet.

Name of the Student (In CAPITALS) : _____

Candidate ID : _____

Candidate Signature : _____ **Invigilator's Signature :** _____

PHYSICS

1. The SI unit of pole strength is: **[4]**

   a) Am^{-1} b) Am^{-2}

   c) Am^{2} d) Am

2. A wire has a mass 0.3 ± 0.003 g, radius 0.5 ± 0.005 mm and length 6 ± 0.06 cm. The maximum percentage error in the measurement of density is: **[4]**

   a) 4 b) 1

   c) 3 d) 2

3. The period of oscillation of a simple pendulum in the experiment is recorded as 2.63 s, 2.56 s, 2.42 s, 2.71 s and 2.80 s respectively. The average absolute error is: **[4]**

   a) 1.0 s b) 0.01 s

   c) 0.11 s d) 0.1 s

4. A ball is dropped on the floor from a height of 10 m. It rebounds to a height of 2.5 m. If the ball is in contact with the floor for 0.01 sec, the average acceleration during contact is: **[4]**

   a) $1400 \frac{m}{sec^2}$ b) $2100 \frac{m}{sec^2}$ upwards

   c) $700 \frac{m}{sec^2}$ d) $2100 \frac{m}{sec^2}$ downwards

5. A body is thrown upwards with velocity 100 m/s and it travels 5 m in the last second of its upward journey. If the same body is thrown upward with velocity 200 m/s, what distance will it travel in the last second of an upward journey? **[4]**

a) 10 m
b) 5 m
c) 20 m
d) 25 m

6. A stone falls freely under gravity. It covers distances h_1, h_2 and h_3 in the first 4 seconds, the next 4 seconds and the next 4 seconds respectively. The relation between h_1, h_2 and h_3 is ($g = 10\ m/s^2$) **[4]**

a) $h_2 = 3h_1$ and $h_3 = 3h_2$
b) $h_2 = 3h_1$ and $h_3 = 5h_1$
c) $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$
d) $h_1 = 2h_2 = 3h_3$

7. A cannon is adjusted at an angle to obtain a maximum range of 20 m with initial velocity 20 m/s. Minimum range of fire is obtained when the cannon is fired with an angle of 30^o with initial velocity 15 m/s. If bullets are fired from both the angles, the difference in the height attained will be **[4]**

a) 7.84 m
b) 1.28 m
c) 8.24 m
d) 2.13 m

8. When a projectile is fired at an angle θ w.r.t. horizontal component ignoring air resistance: **[4]**

i. remains same
ii. goes on increasing with height
iii. goes on decreasing with height
iv. first increases then decrease with height

a) ii and iii
b) iii and iv
c) only i
d) iv and i

9. The time taken by an object to slide down 45^{o} rough inclined plane is n times as it takes to slide down a perfectly smooth 45° incline plane. The coefficient of kinetic friction between the object and the incline plane is **[4]**

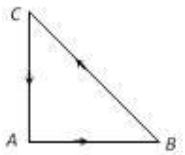
a) $1 - \frac{1}{n^2}$

b) $\sqrt{\frac{1}{1-n^2}}$

c) $\sqrt{1 - \frac{1}{n^2}}$

d) $1 + \frac{1}{n^2}$

10. Three forces start acting simultaneously on a particle moving with velocity $\vec{v}$. These forces are represented in magnitude and direction by the three sides of a triangle ABC (as shown). The particle will now move with velocity **[4]**



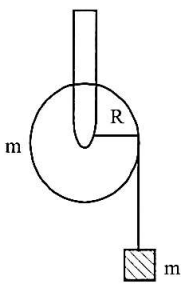
a) less than $\vec{v}$

b) $|\vec{v}|$, in the direction of the largest force BC

c) greater than $\vec{v}$

d) $\vec{v}$, remaining unchanged

11. A mass **m** is supported by a massless string wound around a uniform hollow cylinder of mass m and radius R. If the string does not slip on the cylinder, with what acceleration will the mass fall or release? **[4]**



a) $\frac{5g}{2}$

b) g

c) $\frac{2\,g}{3}$

d) $\frac{g}{2}$

12. A force $\vec{F} = 3\hat{i} + 2\hat{j} + a\hat{k}$ acting on a particle causes a displacement $\vec{s} = \hat{i} + \hat{j} - 2\hat{k}$ in its own direction. If the work done is 11 J, then the value of **a** will be **[4]**

a) 0 along positive z direction

b) 1 along negative z direction

c) 3 along positive z direction

d) -3 along the negative z-direction

13. The working principle of rocket propulsion is conservation of: **[4]**

a) linear momentum

b) kinetic energy

c) angular momentum

d) mass

14. A cylinder of mass 10 kg is rolling on a rough plane with a velocity of 10 m/s. If the coefficient of friction between the surface and cylinder is 0.5, then before stopping, it will cover a distance of: (Take g = 10 m/s^2) **[4]**

a) 2.5 m

b) 5 m

c) 10 m

d) 7.5 m

15. A rigid horizontal smooth rod AB of mass 0.75 kg and length 40 cm can rotate freely about a fixed vertical axis through its mid-point O. Two rings each of mass 1 kg initially at rest at a distance of 10 cm from O on either side of the rod. The rod is set in rotation with an angular velocity of 30 radian per sec and when the rings reach the ends of the rod, the angular velocity (in rad/sec) is: **[4]**

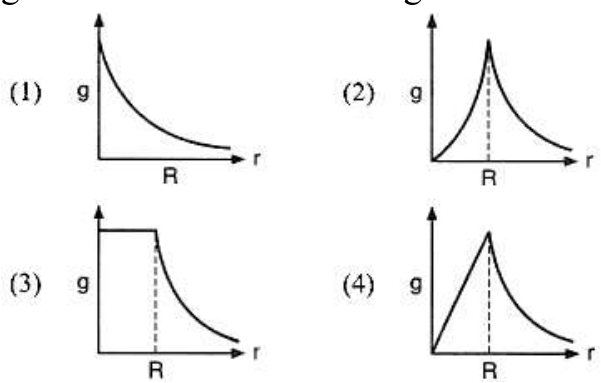
a) 10

b) 15

c) 5

d) 20

16. The dependence of acceleration due to gravity g on the distance r from the centre of the earth assumed to be a sphere of radius R of uniform density is as shown in figures given below. The correct figure is: **[4]**



a) (4)

b) (3)

c) (2)

d) (1)

17. The radius of orbit of a planet is two times that of the earth. The time-period of the planet is: **[4]**

a) 4.2 T
b) 8.4 T
c) 5.6 T
d) 2.8 T

18. The earth (mass = 6×10^{24} kg) revolves around the sun with an angular velocity of 2×10^{-7} radian/sec in a circular orbit of radius 1.5×10^{8} km. The force exerted by the sun, on the earth is: **[4]**

a) 27×10^{39} N
b) 6×10^{19} N
c) 36×10^{21} N
d) 18×10^{25} N

19. A load of 1 kg weight is attached to one end of a steel wire of area of cross-section 3 mm^2 and Young's modulus 10^{11} N/m^2. The other end is suspended vertically from a hook on a wall, then the load is pulled horizontally and released. When the load passes through its lowest position the fractional change in length is: (Take g = 10 m/s^2) **[4]**

a) 0.3×10^{-4}
b) 0.3×10^{3}
c) 0.3×10^{-3}
d) 0.3×10^{4}

20. Two rods of different materials having coefficients of linear expansion α_1 and α_2 and Young's moduli Y_1 and Y_2 respectively are fixed between two rigid massive walls. The rods are heated such that they undergo the same increase in temperature. There is no bending of rods. If: $\alpha_1 : \alpha_2 = 2:3$, the thermal stress developed in two rods are equal provided $Y_1:Y_2$ is equal to: **[4]**

a) 3:2
b) 4:9
c) 2:3
d) 1:1

21. A thermometric liquid which can be used to measure temperature between - 40°C to 40°C is: **[4]**

a) mercury
b) alcohol
c) water
d) phenol

22. A monoatomic gas at pressure P and volume V is suddenly compressed to one eights of its original volume. The final pressure at constant entropy will be: **[4]**

a) P
b) 32 P
c) 8 P
d) 64 P

23. Air in a cylinder is suddenly compressed by a piston, which is then maintained at the same position. After some time, the **[4]**

a) pressure becomes zero
b) pressure will increase
c) pressure will decrease
d) pressure will remain the same

24. The initial pressure and volume of an ideal gas are P_0 and V_0. The final pressure of the gas when the gas is suddenly $\frac{V_0}{4}$ compressed to volume will be: (Given γ = ratio of specific heats at constant pressure and at constant volume) **[4]**

a) $P_0(4)^{\frac{1}{\gamma}}$
b) $4P_0$
c) $P_0(4)^{\gamma}$
d) P_0

25. One moles of a gas A at 27^oC mixed with two moles of gas at 37^oC. If both are monatomic ideal gases, what will be the temperature of the mixture? **[4]**

a) 37^oC
b) 27^oC
c) 34.27^oC
d) 33.67^oC

26. A body executes SHM, with an amplitude A. At what displacement from the mean position is the PE of the body 25% of its total energy? **[4]**

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

27. What happens to the natural frequency of vibration of stretched spring, when its length and diameter are increased? **[4]**

a) May increase or decrease
b) Frequency decreases

c) Frequency increases

d) No change in frequency

28. x_1 - A sin (ωt - 0.1x) **[4]**

and $X_2 = A\sin\left(\omega t - 0.1x - \frac{\phi}{2}\right)$

resultant amplitude of combined wave is:

a) $2A\cos\frac{\phi}{4}$

b) $2A\cos\frac{\phi}{2}$

c) $A\sqrt{2\left(1+\cos\frac{\phi}{4}\right)}$

d) $A\sqrt{2\cos\phi/2}$

29. In a stationary wave: **[4]**

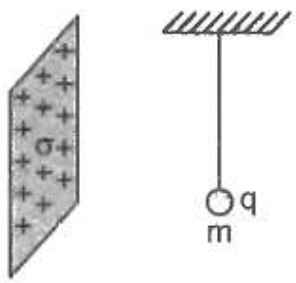
a) Energy is uniformly distributed

b) Alternating maxima and minima of energy are produced at nodes and antinodes

c) Energy is maximum at nodes and minimum at antinodes

d) Energy is minimum at nodes and maximum at antinodes

30. A small charged particle of mass m and charge q is suspended by an insulated thread in front of a very large conducting charged sheet of uniform surface density of charge σ. The angle made by the thread with the vertical in equilibrium is: **[4]**



a) $\tan^{-1}\left(\frac{\sigma q}{2\varepsilon_0 mg}\right)$

b) zero

c) $\tan^{-1}\left(\frac{\sigma}{q\varepsilon_0 mg}\right)$

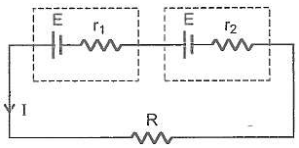
d) $\tan^{-1}\left(\frac{q}{2\sigma\varepsilon_0 mg}\right)$

31. Two parallel plate capacitors of capacitances C and 2C are connected in parallel and charged to a potential difference V_0. The battery is then disconnected and the region between the plates of the capacitor C completely filled with a material of dielectric constant 2. The potential difference across the capacitors now becomes: **[4]**

a) $\frac{V_0}{2}$ b) $\frac{3V_0}{4}$

c) $\frac{V_0}{4}$ d) V_0

32. If the potential difference across the internal resistance r_1 is equal to the emf E of the battery, then: **[4]**



a) $R = \frac{r_2}{r_1}$ b) $R = \frac{r_1}{r_2}$

c) $R = r_1 - r_2$ d) $R = r_1 + r_2$

33. A conducting circular loop of radius r carries a constant current I. It is placed in a uniform magnetic field $\vec{B}$ such that $\vec{B}$ is perpendicular to the plane of the loop. The magnetic force acting on the loop is: **[4]**

a) Zero b) $2\pi rIB$

c) IrB d) πrIB

34. The magnetic needle of an oscillation magnetometer makes 10 oscillation per minute under the action of the earth's magnetic field alone. When a bar magnet is placed at some distance along the axis of the needle it makes 14 oscillation per minute. If the bar magnet is turned so that its poles interchange their position, then the new frequency of oscillation of the needle is: **[4]**

a) 14 vibration per minute b) 2 vibration per minute

c) 10 vibration per minute d) 4 vibration per minute

35. Permanent magnet has properties-retentivity and coercivity respectively: **[4]**

a) low, low b) high, low

c) low, high d) high, high

36. A small piece of metal wire is dragged across the gap between the poles of a magnet in 0.4 s. If the change in magnetic flux in the wire is 8×10^{-4} wb, then emf induced in **[4]**

the wire is:

a) 6×10^{-3} V

b) 2×10^{-3} V

c) 4×10^{-3} V

d) 8×10^{-3} V

37. A copper disc of radius 0.1 m rotates about its centre with 10 revolutions per second in a uniform magnetic field of 0.1 T. The emf induced across the radius of the disc is: **[4]**

a) $\frac{2\pi}{10}$ V

b) 10π mV

c) $\frac{\pi}{10}$ V

d) 20π mV

38. For a series LCR circuit $R = X_L = 2X_C$ The impedance of the circuit and phase difference between V and I respectively will be: **[4]**

a) $\frac{\sqrt{5}R}{2}$, $\tan^{-1}\left(\frac{1}{2}\right)$

b) $\frac{\sqrt{5}R}{2}$, $\tan^{-1}(2)$

c) $\sqrt{5}$R, $\tan^{-1}\left(\frac{1}{2}\right)$

d) $\sqrt{5}\ X_C$, $\tan^{-1}(2)$

39. The target element in an X-ray tube must have a high: **[4]**

a) melting point only

b) atomic number only

c) both atomic number and melting point

d) mass number only

40. Out of the following: **[4]**

A. pole

B. focus

C. the radius of curvature and

D. principal axis for a spherical mirror, the quantities that do not depend on whether the rays are paraxial or not, are:

a) only (A), (B) and (C)

b) all (A), (B), (C) and (D)

c) only (A), (C) and (D)

d) only (A) and (D)

41. If a thin mica sheet of thickness t and refractive index μ is placed in the path of one of the waves producing interference, then the whole interference pattern shifts towards **[4]**

the side of the sheet by a distance:

a) $\frac{d}{D}(\mu - 1)t$ b) $\frac{D}{d}(\mu - 1)t$

c) $(\mu - 1)t$ d) $Dd(\mu - 1)t$

42. An electron, a doubly ionized helium ion (He^{++}) and a proton are having the same kinetic energy. The relation between their respective de-Broglie wavelengths λ_e, $\lambda_{He^{++}}$ and λ_p is: **[4]**

a) $\lambda_e < \lambda_p < \lambda_{He^{++}}$ b) $\lambda_e > \lambda_{He^{++}} > \lambda_p$

c) $\lambda_e > \lambda_p > \lambda_{He^{++}}$ d) $\lambda_e < \lambda_{He^{++}} = \lambda_p$

43. For which one of the following, Bohr model is not valid? **[4]**

a) Singly ionized helium atom (He^{+}) b) Hydrogen atom

c) Singly ionized neon atom (Ne^{+}) d) Deuteron atom

44. If m is the mass of electron, v its velocity, r is the radius of stationary circular orbit around a nucleus with charge Ze, then from Bohr's second postulate, the radius of the quantised orbit in CGS system is given by: **[4]**

a) $\frac{n^2h^2}{4\pi^2me^2Z}$ b) $\frac{4\pi^2m}{n^2h^2Ze^2}$

c) $\frac{4\pi^2mZe^2}{n^2h^2}$ d) $\frac{n^2h^2Ze^2}{4\pi^2m}$

45. Consider two nuclei of the same radioactive nuclide. One of the nuclei was created in a supernova explosion 5 billion years ago. The other was created in a nuclear reactor 5 minute ago. The probability of decay during the next time is: **[4]**

a) nuclei created in explosion decays first b) nuclei created in the reactor decays first

c) independent of the time of creation d) different for each nuclei

CHEMISTRY

46. What will be the molarity of a solution, which contains 5.85 g of NaCl(s) per 500 mL? **[4]**

a) 2 mol L^{-1} b) 0.2 mol L^{-1}

c) 20 mol L^{-1} d) 4 mol L^{-1}

47. On treatment of 100 mL of 0.1 M solution of $CoCl_3 \cdot 6H_2O$ with excess $AgNO_3$; 1.2 $\times$ 10^{22} ions are precipitated. The complex is: **[4]**

a) $[Co(H_2O)_6]Cl_3$ b) $[Co(H_2O)_3Cl_3] \cdot 3H_2O$

c) $[Co(H_2O)_5Cl]Cl_2 \cdot H_2O$ d) $[Co(H_2O)_4Cl_2]Cl \cdot 2H_2O$

48. The electronic configuration $1s^2$, $2s^2 2p^6$, $3s^1 3p^1$ correctly describes: **[4]**

a) excited state of Mg b) excited state of Al^{3+}

c) ground state of Si^+ d) ground state of Na

49. When a 1.8 g sample of hydrogen atom is irradiated with light, a certain fraction of atoms get excited to n = 3 level and n = 2 level. When the excited atoms fall back to the ground state, the energy evolved is 5.67 $\times$ 10^5 J and 2.65 $\times$ 10^5 J respectively. What % of **H** atoms do NOT get excited upon irradiation? **[4]**

a) 38% b) 70%

c) 58% d) 42%

50. Ψ^2 (psi) the wave function represents the probability of finding electron. Its value depends: **[4]**

a) how much it is near the nucleus b) upon the type of orbital

c) how much it is inside the nucleus d) how much it is far from the nucleus

51. In the P^{3-}, S^{2-} and Cl^- ions, the increasing order of size is **[4]**

a) $P^{3-} < S^{2-} < Cl^-$ b) $S^{2-} < P^{3-} < Cl^-$

c) $S^{2-} < Cl^- < P^{3-}$ d) $Cl^- < S^{2-} < P^{3-}$

52. The molecules having dipole moment are: **[4]**

a) Trans-2-pentene
b) 2, 2, 3, 3-tetramethylbutane
c) 2, 2-dimethylpropane
d) Trans-3-hexene

53. The ion which is not tetrahedral in shape is **[4]**

a) $Cu(NH_3)_4^{2+}$
b) BF_4^-
c) NH_4^+
d) $NiCl_4^{2-}$

54. Which of the following are sp^2 hybridised species? **[4]**

a) All of these
b) BF_3
c) NO_3^-
d) CO_3^{2-}

55. The enthalpies of formation of N_2O and NO are 28 and 90 kJ mol^{-1} respectively. The enthalpy of the reaction, $2N_2O(g) + O_2(g) \longrightarrow 4NO(g)$ is equal to: **[4]**

a) 88 kJ
b) 304 kJ
c) -16 kJ
d) 8 kJ

56. The standard heat of combustion of solid boron is equal to: **[4]**

a) $2\Delta_f H^o (B_2O_3)$
b) $-\frac{1}{2}\Delta_f H^o (B_2O_3)$
c) $\Delta_f H^o (B_2O_3)$
d) $\frac{1}{2}\Delta_f H^o (B_2O_3)$

57. Equal volumes of 0.06 M $AgNO_3$ and 0.2 M KCN solutions are mixed. K_c for the reaction $Ag(CN)_2(aq.) \rightleftharpoons Ag^+(aq.) + 2CN^-(aq.)$ is 1.6×10^{-19} at 25°C. The concentration of Ag^+ (aq.) in solution is: **[4]**

a) 3×10^{-20} M
b) 1.5×10^{-18} M
c) 1.5×10^{-19} M
d) 3×10^{-18} M

58. In a particular reaction, FeS_2 is oxidised by O_2 in Fe_2O_3 and SO_2. If the equivalent of O_2 used is E, then equivalent of FeS_2 consumed and the equivalent of Fe_2O_3 and SO_2 formed respectively are: **[4]**

a) E, $\frac{E}{22}$, $\frac{2E}{11}$

b) E, $\frac{E}{2}$, $\frac{E}{5}$

c) $\frac{11}{2}$ E, E, 2E

d) E, E, E

59. In $K_2Cr_2O_7$ titration, using the indicator diphenylamine, an intense blue color is obtained just after the equivalence point. In this process, $Cr_2O_7^{2-}$ oxidizes the indicator and itself undergoes reduction. How many electrons are needed when the following half-reaction is balanced? **[4]**

$Cr_2O_7^{2-} + H^+ + ?e^- \longrightarrow Cr^{3+} + H_2O$

a) 4

b) 2

c) 6

d) 3

60. The reaction: $Pb(NO_3)_2 \longrightarrow PbO + NO_2 + O_2$ is: **[4]**

a) disproportionation

b) proportionator

c) intramolecular redox

d) intermolecular redox

61. It is because of inability of ns^2 electrons of the valence shell to participate in bonding that _____. **[4]**

a) Sn^{2+} is oxidising while Pb^{4+} is reducing

b) Sn^{4+} is reducing while Pb^{4+} is oxidising

c) Sn^{2+} and Pb^{2+} are both oxidising and reducing

d) Sn^{2+} is reducing while Pb^{4+} is oxidising

62. Which of the following compounds of elements in group IV would you expect to be most ionic in character? **[4]**

a) $SiCl_4$

b) $PbCl_4$

c) CCl_4

d) $PbCl_2$

63. A straight-chain hydrocarbon has the molecular formula C_8H_{10}. The hybridization of the carbon atoms from one end of the chain to the other are respectively sp^3, sp^2, sp^2, sp^3, sp^2, sp^2, sp and sp. The structural formula of the hydrocarbon would be _____. **[4]**

a) $CH_3CH = CHCH_2 - C \equiv CCH = CH_2$

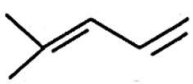
b) $CH_3CH = CHCH_2 - CH = CHC \equiv CH$

c) $CH_3CH_2 - CH = CHCH = CHC \equiv CH$

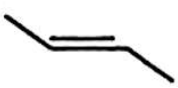
d) $CH_3C \equiv CCH_2 - CH = CHCH = CH_2$

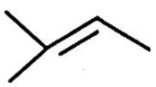
64. Alkene $\xrightarrow[H^+]{\text{Hot } KMnO_4}$ Acetone + Oxalic acid **[4]**

Identify the structure of alkene from the following.

a) 

b) 

c) 

d) 

65. Dihedral angle of least stable conformer of ethane is: **[4]**

a) 0^o

b) 120^o

c) 180^o

d) 60^o

66. A solution containing 8.6 g urea in 1 L was found to be isotonic with a 5% (mass/vol.) solution of an organic non-volatile solute. The molar mass of latter is: **[4]**

a) 3489

b) 34.89

c) 861.2

d) 348.9

67. The vapour pressure of CCl_4 at 25°C is 143 mm Hg. If 0.5 g of a non-volatile solute (mol. weight = 65) is dissolved in 100 mL CCl_4, the vapour pressure of the solution will be: **[4]**

a) 143.99 mm Hg

b) 141.43 mm Hg

c) 199.34 mm Hg

d) 94.39 mm Hg

68. The vapour pressure of water depends upon: **[4]**

a) all of these

b) surface area of container

c) temperature

d) volume of container

69. On the basis of information given below mark the correct option. **[4]**

i. In bromoethane and chloroethane mixture intermolecular interactions of A - A and B - B type are nearly same as A - B type interactions.

ii. In ethanol and acetone mixture A - A or B - B-type intermolecular interactions are stronger than A - B type interactions.

iii. In chloroform and acetone mixture A - A or B - B type intermolecular interactions are weaker than A - B type interactions.

a) Solution (i) will follow Raoult's law.

b) Solution (iii) will show positive deviation from Raoult's law.

c) Solution (ii) will show negative deviation from Raoult's law.

d) Solution (ii) and (iii) will follow Raoult's law.

70. Equivalent conductances of $BaCl_2$, H_2SO_4 and HCl at infinite dilution are a, b and c S cm^2 eq^{-1}. If conductivity of a saturated solution of $BaSO_4$ is y, then K_{sp} of $BaSO_4$ is: **[4]**

a) $\frac{10^6y^2}{2(a+b-2c)^2}$

b) $\frac{10^6y^2}{4(a+b-2c)^2}$

c) $\frac{10^6y}{2(a+b-2c)^2}$

d) $\frac{10^3y}{2(a+b-2c)}$

71. The oxidation potential of a hydrogen electrode at pH =10 and P_{H_2} = 1 is: **[4]**

a) 0.059 V

b) +0.59 V

c) 0.00 V

d) 0.51 V

72. E^o_{RP} for the change $[Fe(CN)_6]^{3-} + e \longrightarrow [Fe(CN)_6]^{4-}$ is +0.36V. The ratio of oxidised and reduced forms which will provide E_{RP} for the reaction equal to 0.24V: **[4]**

a) 108 : 1

b) 1 : 100

c) 100 : 1

d) 1 : 108

73. Select the incorrect statement: **[4]**

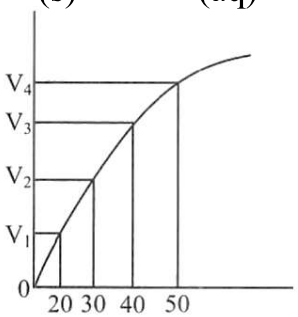
a) In Arrehenius equation: K = $Ae^{\frac{-Ea}{RT}}$; if T $\longrightarrow \infty$ K = A

b) Rate of exothermic reactions increases with increase in temperature

c) For $N_2 + 3H_2 \rightleftharpoons 2NH_3$; if rate of formation of NH_3 is 0.001 kg hr, than rate of consumption of H_2 is 0.0015 kg/hr

d) Alkaline hydrolysis of ester is irreversible reaction

74. A graph of volume of hydrogen released versus time for the reaction $Zn_{(s)} + 2HCl_{(aq)} \longrightarrow H_{2(g)} + ZnCl_{2(aq)}$ is given in figure. **[4]**



The incorrect statement is _____.

a) Average rate between 20 and 40 seconds is $\frac{V_3 - V_1}{20}$

b) Average rate upto 30 seconds is $\frac{V_2}{30}$

c) Average rate upto 40 seconds is $\frac{V_3 - V_1}{40 - 20}$

d) Average rate between 30 and 40 seconds is $\frac{V_3 - V_2}{10}$

75. When Cu^{2+} ion is treated with KI, a white precipitate, X appears in solution. The solution is titrated with sodium thiosulphate, the compound Y is formed. X and Y respectively are **[4]**

a) X = CuI_2 Y = $Na_2S_4O_6$

b) X = Cu_2I_2 Y = $Na_2S_4O_5$

c) X = CuI_2 Y = $Na_2S_4O_3$

d) X = Cu_2I_2 Y = $Na_2S_4O_6$

76. Which of the following elements is extracted commercially by the electrolysis of an aqueous solution of its compound? **[4]**

a) Br

b) Cl

c) Na d) Al

77. The rusting of iron is formulated as $Fe_2O_3 \cdot xH_2O$ which involves the formation of: **[4]**

a) $Fe(OH)_2$ b) $Fe(OH)_3$

c) $Fe_2O_3 + Fe(OH)_3$ d) Fe_2O_3

78. The metal complex that is diamagnetic is (Atomic number: Fe, 26; Cu, 29) **[4]**

a) $K_3[Cu(CN)_4]$ b) $K_2[Cu(CN)_4]$

c) $K_3[Fe(CN)_4]$ d) $K_4[FeCl_6]$

79. Match the coordination number and type of hybridisation with distribution of hybrid orbitals in space based on valence bond theory. **[4]**

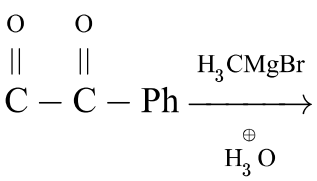
Coordination number and type of hybridisation	**Distribution of hybrid orbitals in space**
i. 4, sp^3	a. Trigonal bipyramidal
ii. 4, dsp^2	b. Octahedral
iii. 5, sp^3d	c. Tetrahedral
iv. 6, d^2sp^3	d. Square planar

Select the CORRECT option:

a) i - d, ii - a, iii - b, iv - c b) i - b, ii - c, iii - d, iv - a

c) i - c, ii - a, iii - d, iv - b d) i - c, ii - d, iii - a, iv - b

[4]

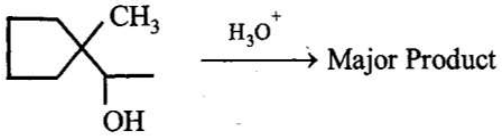
80. 

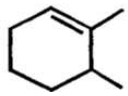
How many products will be obtained and how many can be separated by fractional distillation method?

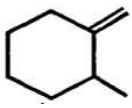
a) 3, 3 b) 3, 2

c) 2, 2 d) 2, 3

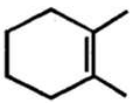
81. Find out the major product for the following reaction. **[4]**



a) 

b) 

c) 

d) 

82. The increasing order of pK_a for the following phenols is **[4]**

a. 2,4-Dinitrophenol

b. 4 - Nitrophenol

c. 2 ,4 ,5-Trimethylphenol

d. Phenol

e. 4-Chlorophenol

a) Only (b),(d)

b) Only (b),(e)

c) Only (e),(d)

d) Only (b)

83. $X \xrightarrow[CS_2, H_3O^+]{CrO_2Cl_2 \text{ in}} C_6H_5\text{-}CHO \xleftarrow[\text{quinoline}]{H_2, \text{Pd - BaSO}_4} Y$. Predict X and Y. **[4]**

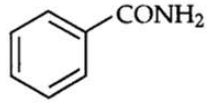
a) X = C_6H_5CN
Y = $C_6H_5COOCH_3$

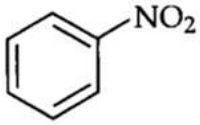
b) X = $C_6H_5CH_3$
Y = C_6H_5COCl

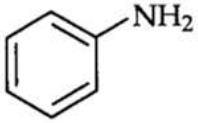
c) X = $C_6H_5CH_2OH$
Y = $C_6H_5CH_2CN$

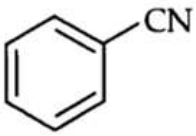
d) X = C_6H_5COOH
Y = $C_6H_5CH_2CH_3$

84. A given nitrogen-containing aromatic compound **A** reacts with Sn/HCI, followed by HNO_2 to give an unstable compound **B**. **B**, on treatment with phenol, forms a beautiful coloured compound **C** with the molecular formula $C_{12}H_{10}N_2O$. The structure of compound **A** is: **[4]**

a) 

b) 

c) 

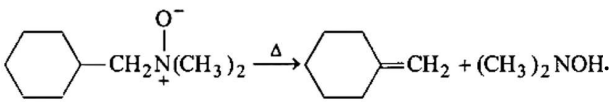
d) 

85. The following metal ion activates many enzymes, participates in the oxidation of glucose to produce ATP and with Na, is responsible for the transmission of nerve signals. **[4]**

a) Copper
b) Potassium
c) Iron
d) Calcium

86. A sugar **X** dehydrates very slowly under acidic condition to give furfural which on farther reaction with resorcinol gives the coloured product after sometime. Sugar **X** is: **[4]**

a) Aldopentose
b) Ketotetrose
c) Aldotetrose
d) Oxalic acid

87.  This is called: **[4]**

a) Saytzeff reaction
b) Cope reaction
c) Hofmann elimination
d) Carbyl amine reaction

88. 3 faraday of electricity is passed through molten AI_2O_3, aqueous solution of $CuSO_4$ and molten NaCl taken in three different electrolytic cells. The amount of Al, Cu and Na deposited at the cathodes will be in the ratio of : **[4]**

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

89. Which method will be used for separation of a mixture of acetone and ethanol? **[4]**

a) Fractional distillation
b) Sublimation

c) Simple distillation

d) Crystallisation

90. The alkaline earth metal that imparts apple green colour to the bunsen flame when introduced in it in the form of its chloride is **[4]**

a) Barium

b) Magnesium

c) Strontium

d) Calcium

BOTANY

91. Which one of the following animals is correctly matched with its particular named taxonomic category? **[4]**

a) Housefly - Musca, order

b) Humans - Primate, family

c) Cuttlefish - Mollusca,class

d) Tiger - Tigris, species

92. Select the incorrect statement about taxon, and genus. **[4]**

a) It is a group or assemblage of related species.

b) A genus essentially possesses more than one number of species.

c) Solanum, Penicillium, Withania and Canis are the examples of genera.

d) Lion, Tiger, Leopard, Jaguar are closely related species which have been placed in the genus Panthera and are respectively named as Panthera leo, P tigris, P pardus and P onca.

93. Which of the following is true for living organisms? **[4]**

a) Metabolic reactions are living

b) All of these

c) All living organisms are made of chemicals

d) Anabolic reactions constitutes breakdown reactions

94. How many characters for lichens are correct from given characters? **[4]**

i. Lichens are symbiotic associations.

ii. It is an association between algae and fungi.

iii. The algal component is known as mycobiont.

iv. The fungal component as phycobiont.

v. Lichens are very good pollution indicators.

a) Two
b) Four
c) Three
d) One

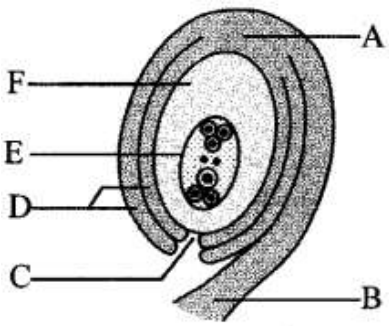
95. Which of the following is correct for kingdom plantae? **[4]**

a) Cellulosic cell wall present
b) Nuclear membrane present
c) Eukaryotic cell type
d) All of these

96. In which type of flowers, stigma is rough and sticky? **[4]**

a) Insect pollinated
b) All of these
c) Wind pollinated
d) Water pollinated

97. Identify the parts labelled as A to F in the given figure and select the correct option. **[4]**



a) A-Embryo sac; B-Funicle; C-Chalaza; D-Integuments; E-Nucellus; F-Micropyle
b) A-Chalaza; B-Funicle; C-Micropyle; D-Integuments; E-Nucellus; F-Embryo sac
c) A-Funicle; B-Embryo sac; C-Integuments; D-Chalaza; E-Nucellus; F-Micropyle
d) A-Chalaza; B-Funicle; C-Micropyle; D-Integuments; E-Embryo sac; F-Nucellus

98. The true embryo develops as a result of fusion of **[4]**

a) a synergid and a male gamete.
b) two polar nuclei of embryo sac.
c) an egg cell and a male gamete.
d) a male gamete and antipodals.

99. Primitive types of stomata are found in the **[4]**

a) All of these
b) Apophysis of capsule
c) Axis of the moss plant
d) Leaves of moss plants

100. The coralloid roots of Cycas are: **[4]**

a) Apogeotropic
b) Positively geotropic
c) Phototropic
d) Aerial

101. Choose the correct one for Phaeophyceae from given statements. **[4]**

i. The members of Phaeophyceae are found primarily in freshwater habitats.
ii. Kelps is simple branched, filamentous form while Ectocarpus is profusely branched form, which may reach at height of 100 metres.
iii. They possess chlorophyll-a, c, carotenoids and xanthophylls.
iv. They vary in colour from olive green to various shades of brown.
v. Colour depending upon the amount of the xanthophylls and fucoxanthin pigment.

a) (i), (ii), (iv) and (v)
b) (iii), (iv) and (v)
c) (ii), (iii), (iv) and (v)
d) (i), (iii) and (iv)

102. Heterospory has been reported in: **[4]**

a) Equisetum
b) Lycopodium
c) Selaginella
d) Ophioglossum

103. A close relation between flower and the pollinating agent is best exhibited by: **[4]**

a) Yucca
b) Amorphophallus
c) Wheat
d) Both Amorphophallus and Yucca

104. In angiosperms, _____ could be used to study the various stages of meiosis. **[4]**

a) zygote
b) mature anthers
c) primary endosperm nucleus
d) young anthers

105. Flowers are zygomorphic in **[4]**

a) mustard
b) Datura
c) gulmohur
d) tomato

106. The term Meristem was given by: **[4]**

a) Hanstein
b) M. Malpighi
c) N. Grew
d) Nageli

107. Closed vascular bundles lack: **[4]**

a) Conjunctive tissue
b) Ground tissue
c) Pith
d) Cambium

108. Epidermis is usually consist of how many layers? **[4]**

a) Triple layer
b) Multi layer
c) Double layer
d) Five

109. Probability of four son to a couple is: **[4]**

a) $\frac{1}{32}$
b) $\frac{1}{4}$
c) $\frac{1}{16}$
d) $\frac{1}{8}$

110. Match List I with List II and select the correct answer using the codes given below the list: **[4]**

List I (peculiarity of male determining sperm	**List II (Organism in which it is seen**
(A) Sex-linked	(1) Baldness

(B) Sex-influenced	(2) Acquired immune deficiency syndrome
(C) Sex-limited	(3) Klinefelter's syndrome
	(4) Haemophilia
	(5) Beard in man

a) A-5, B-l, C-3
b) A-4, B-1, C-5
c) A-4, B-3, C-2
d) A-5, B-3, C-2

111. DNA consists of two complementary nucleotide chains. If the sequence of nucleotides in one of the chains is AGCTTCGA, then the nucleotides sequence in the other chain shall be: **[4]**

a) GCTAAGCT
b) GATCCTAG
c) TAGCATAT
d) TCGAAGCT

112. Operon system consists of: **[4]**

a) Operator, regulator, repressor
b) Promoter, regulator
c) Promoter, operator, regulator, repressor and structural genes
d) Operator and structural genes

113. The word chromosome was given by: **[4]**

a) Waldeyer
b) C. de Duve
c) Benda
d) Johnson

114. Which of the following components of plasma membrane facilitated the process of cell recognition and cell adhesion? **[4]**

a) Glycolipids and glycoproteins
b) Peptidoglycan
c) Lipids only
d) Sugar molecule

115. The structures that help some bacteria to attach to rocks and for host tissues are: **[4]**

a) Fimbriae
b) Mesosomes
c) Holdfast
d) Rhizoids

116. When an organ is transplanted and is rejected by the body, the lymphocytes responsible for it is: **[4]**

a) Neutrophils
b) P-cells
c) B-cells
d) T-cells

117. The substance given to cancer patients in order to activate their immune system and destroy the tumour is **[4]**

a) α-interferon
b) interleukin
c) morphine
d) histamine

118. Tick the correct option about disorder, causative factor, effected organ and treatment of this: **[4]**

Disorder	**Causative factor**	**Effected organ**
(i) Rheumatoid arthritis	IgM	Joints
Ascariasis	Nematode	Scrotum and intestine
Pneumonia	Streptococcus	Neuromuscular junction
Ringworm	Epidermophyton	T-lymphocytes

a) (ii)
b) (iii)
c) (i)
d) (iv)

119. The branch, which is associated with diagnosis, prevention and cure of mental disorders is called **[4]**

a) Neuropsychiatry
b) Psychology
c) Psychiatry
d) Neurology

120. Which one of the following structures is not found in mitotic cells of higher plants? **[4]**

a) Centromere
b) Cell plate
c) Spindle fibres
d) Centrioles and asters

121. Term **biosphere** is used for the zone of earth where life exists: **[4]**

a) In the lithosphere and hydrosphere only
b) In the hydrosphere only
c) On lithosphere only
d) In the lithosphere, hydrosphere and atmosphere

122. Rate of decomposition depends upon **[4]**

a) temperature
b) All of these
c) chemical composition of detritus
d) soil moisture and soil pH

123. Study the given differences between primary sludge and activated sludge and select the incorrect ones. **[4]**

Primary sludge	**Activated sludge**
(i) It is sludge formed during primary-sew-age treatment	It is sludge formed during secondary sewage treatment
(ii) It possesses floes of decomposer microbes	It does not posses floes of decomposer microbes
(iii) It does not require aeration	Formation of activated sludge requires aeration
(iv) A lot of decomposition occurs during formation of primary sludge	Very little decomposition occurs during formation of activated sludge

a) (i) and (ii)
b) (ii) and (iv)
c) (i), (iii) and (iv)
d) (ii) and (iii)

124. The nutritive medium for growing bacteria and many fungi in the laboratory is called **[4]**

a) fermentation media
b) growth media

c) culture media
d) baking media

125. Silent valley of Kerala is preserved because: **[4]**

a) Many new plants
b) New hybrids
c) New fauna
d) Has many rare species

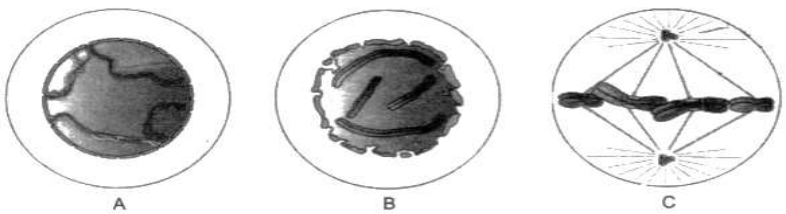
126. New Wild Life Protection Act was passed in: **[4]**

a) 1987
b) 1962
c) 1972
d) 1982

127. Meaning of MAB is: **[4]**

a) Man and Biosphere programme
b) Mammals and Biosphere
c) Man and Biology programme
d) Mammals and Biology programm

128. Given diagram A, B and C are different stages of cell division, choose correct option for given diagram: **[4]**



a) A - Early Prophase, B - Anaphase, C - Metaphase
b) A - Prophase, B - Metaphase, C - Telophase
c) A - Early Prophase, B - Late Prophase, C - Metaphase
d) A - Prophase, B - Anaphase, C - Metaphase

129. The dividing and undifferentiated cells are known as: **[4]**

a) Primordial
b) Tissue
c) Callus
d) Embryo

130. In the leaves of C_4 plants, malic acid formation during CO_2 fixation occurs in the cells of: **[4]**

a) Epidermis
b) Mesophyll
c) Bundle sheath
d) Phloem

131. Blackmann's law of limiting factor is applied to: **[4]**

a) Photosynthesis
b) Growth
c) Transpiration
d) Respiration

132. Jan Ingenhousz showed that small bubbles were formed around the green parts of an aquatic plant in bright sunlight (not in dark). These bubbles were of **[4]**

a) H_2O
b) CO_2
c) H_2
d) O_2

133. Photosynthesis is that it: **[4]**

a) Converts light energy into chemical energy
b) Creates useful energy
c) Fixes CO_2 into carbohydrates
d) Reverses the action of respiration

134. The main purpose of electron transport chain is to **[4]**

a) Glucose - 6 - PO_4, to fructose - e - PO_4,
b) cycle $NADH + H^+$ back to NAD^+.
c) use the intermediates from TCA cycle.
d) breakdown pyruvate.

135. Phytotron is a device by which: **[4]**

a) Plants are grown in controlled environment
b) Electron bombarding system

c) Induce mutation breeding in wheat

d) Heavy water plants

ZOOLOGY

136. Apteryx occurs in: **[4]**

a) North India

b) New Zealand

c) South America

d) Australia

137. What is common between parrot, platypus and kangaroo? **[4]**

a) Homoeothermy

b) Ovoparity

c) Monocytes

d) Toothless jaws

138. Which of the following animals are mostly endoparasites having hooks and suckers in the parasitic forms and absorbs nutrients from the host directly through their body surface? **[4]**

a) Coelenterates

b) Arthropods

c) Platyhelminthes

d) Molluscs

139. Which of the following characteristic features always holds true for the corresponding group of animals? **[4]**

a) Viviparous - Mammalia

b) Possess a mouth with an upper and a lower jaw - Chordata

c) 3-chambered heart with one incompletely divided ventricle - Reptilia

d) Cartilaginous endoskeleton - Chondrichthyes

140. In which of the following animals the body is covered by dry and cornified epidermal scales or scutes and tympanum represents ear? **[4]**

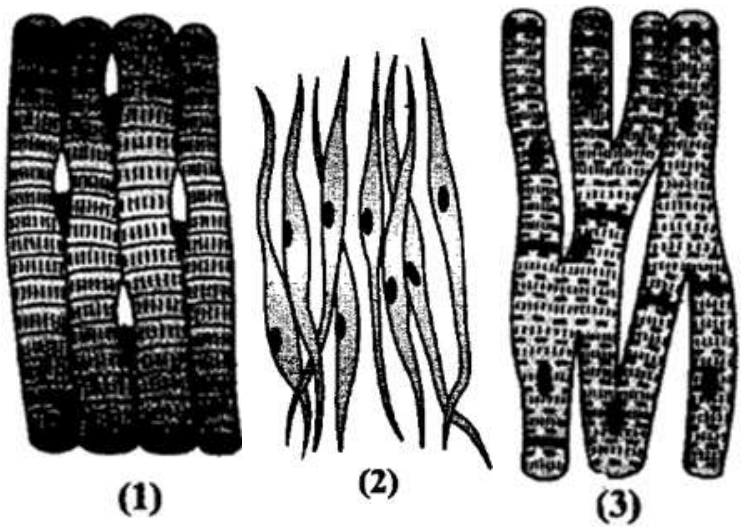
a) Reptiles

b) Aves

c) Pisces

d) Amphibians

141. The given figures marked as 1, 2, and 3 showing different types of muscle. Identify the correct name from the given options. **[4]**



a)

1	2	3
Striated muscle	Smooth muscle	Cardiac muscle

b)

1	2	3
Involuntary muscle	Smooth muscle	Cardiac muscle

c)

1	2	3
Involuntary muscle	Voluntary muscle	Heart muscle

d)

1	2	3
Cardiac muscle	Smooth muscle	Striated muscle

142. Lymph differs from blood in possessing **[4]**

a) more RBC and few WBC
b) only WBC
c) more WBC and few RBC
d) more RBC and WBC

143. Which one of the following types of cell is involved in making of the inner walls of blood vessels? **[4]**

a) Columnar epithelium
b) Stratified epithelium
c) Cuboidal epithelium
d) Squamous epithelium

144. Rate of breathing in an adult human is: **[4]**

a) 12-16/min
b) 10-12/min

c) 25-30/min d) 20-25/min

145. Which of the following can respire anaerobically in human body? **[4]**

a) RBCs b) Both RBCs and Skeletal muscles

c) Skeletal muscles d) Liver

146. Choose the correct equation. **[4]**

a. Total capacity of lungs = vital capacity + tidal air

b. Total capacity of lungs = vital capacity + residual air

c. Vital capacity of lungs = tidal air + complemental air

d. Total capacity of lungs = tidal air + complemental air + supplemental air

a) Only (c) b) Only (b)

c) Only (d) d) Only (a)

147. Oxygen and carbon dioxide are transported in blood through: **[4]**

a) RBCs and WBCs b) RBCs and plasma

c) Platelets and corpuscles d) WBCs and serum

148. Lungs are enclosed in **[4]**

a) pleural membrane b) perichondrium

c) peritoneum d) pericardium

149. Haldane effect is due to: **[4]**

a) CO_2 b) Lactic acid

c) pH d) Oxyhaemoglobin

150. **Match the column:** **[4]**

(A) Leydig cells	(i) Placenta
(B) Bulbo-urethral gland	(ii) Bulbo-vestibular gland
(C) Bartholin gland	(iii) Cowper's gland

(D) hCG	(iv) ICSH

a) (A)-(iv), (B)-(ii), (C)-(iii), (D)-(i)

b) (A)-(ii), (B)-(iii), (C)-(i), (D)-(iv)

c) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)

d) (A)-(i), (B)-(ii), (C)-(iii), (D)-(iv)

151. The nutritive cells found in seminiferous tubules are **[4]**

a) placenta

b) Sertoli cells

c) Leydig's cells

d) chorionic villi

152. Match the features of developing embryo given in column I with their time of formations given in column II. **[4]**

Column I (Features of developing embryo)	**Column II (Time of Formation)**
(A) Heart	(i) End of 24 weeks
(B) Formation of eyelashes	(ii) Fifth month
(C) First movement	(iii) End of 12 weeks
(D) Formation of major organs	(iv) After 1 month of pregnancy

a) A - (i), B - (ii), C - (iii), D - (iv)

b) A - (ii), B - (iii), C - (i), D - (iv)

c) A - (iv), B - (iii), C - (i), D - (ii)

d) A - (iv), B - (i), C - (ii), D - (iii)

153. _____ contains certain cells which have the potency to give rise to all the tissues and organs. **[4]**

a) Trophoblast

b) Both Trophoblast and Placenta

c) Placenta

d) Inner cell mass

154. Reproductive health in society can be improved by **[4]**

i. introduction of sex education in schools.

ii. increased medical assistance.

iii. awareness about contraception and STDs.

iv. equal opportunities to male and female child.

v. encouraging myths and misconceptions.

a) (ii) and (v)

b) (i), (ii), (iv), and (v)

c) (i), (ii), (iii), (iv), and (v)

d) (i), (ii), (iii), and (iv)

155. Which of the following is not true for MTP? **[4]**

a) It is an intentional termination of pregnancy before fall term

b) Misuse of MTP is, by amniocentesis determine the sex of the unborn child and if the foetus is found to be female, it is followed by MTP

c) It is an involuntary termination of pregnancy before full term

d) It is an induced abortion before full term

156. Choose the correct statement: **[4]**

a) IUD increase phagocytosis of sperm within the uterus and the Zn ions released from IUD suppress sperm motility.

b) Statutory ban on amniocentesis for sex determination to legally check increasing female foeticides.

c) Hepatitis-B can't be transmitted by sharing of injection needles.

d) CDRI (Central Drug Research Institute) located in Chennai.

157. Maximum fossils are formed by: **[4]**

a) Desert animals

b) Aquatic animals

c) Terrestrial animals

d) Aerial animals

158. Choose the correct sequential order: **[4]**

a) Silurian → Devonian → Triassic → Cretaceous → Permian

b) Silurian → Cretaceous → Triassic → Cretaceous → Permian

c) Silurian → Permian → Devonian → Triassic → Cretaceous

d) Silurian → Devonian → Permian → Triassic → Cretaceous

159. Vasa recta is minute vessel of Peritubular capillaries network, which is **[4]**

a) running parallel to PCT.

b) running parallel to loop of Henle.

c) running parallel to DCT.

d) also known as juxta-glomerular apparatus.

160. Removal of proximal convoluted tubule from the nephron will result in **[4]**

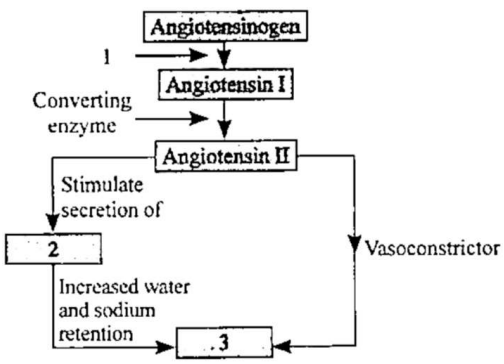
a) More diluted urine

b) No urine-formation

c) More concentrated urine

d) No change in quality and quantity of urine

161. The given figure explains renin-angiotensin-aldosterone system in which few parts are labelled as 1, 2, and 3. Identify 1, 2, and 3. **[4]**



a) 1-Renin; 2-ADH; 3-Decreased blood pressure

b) 1-Lipase; 2-ADH; 3-Increased blood pressure

c) 1-Aldosterone; 2-Renin; 3-Increased blood pressure

d) 1-Renin; 2-Aldosterone; 3-Increased blood pressure

162. Which one has nothing to do with nitrogenous excretion? **[4]**

a) Liver

b) Kidneys

c) Skin

d) Lungs

163. Lubrication occurs at hinge joints which need to be able to move without friction. Which one of the following substances aids lubrication? **[4]**

a) Connective tissue
b) Cartilage
c) Ligament
d) Synovial fluid

164. The reactions which change lactic acid into glycogen come under? **[4]**

a) Glycolysis
b) Krebs' cycle
c) Cori cycle
d) Calvin cycle

165. In given table disorders of the muscular and skeletal system are given, match the items of Column I with those of Column II: **[4]**

Column I	Column I
(A) Muscular dystrophy	(i) Rapid spasms in muscle due to low Ca^{++} in body fluid
(B) Arthritis	(ii) Age-related disorder, decreased bone mass, estrogen is a common cause.
(C) Myasthenia gravis	(iii) Inflammation of joints due to the accumulation of uric acid crystals.
(D) Tetany	(iv) Progressive degeneration of skeletal muscle mostly due to genetic disorder
(E) Osteoporosis	(v) Autoimmune disorder affecting neuromuscular junction, paralysis of skeletal muscle
(F) Gout	(vi) Inflammation of joints.

a) (A)-(iv), (B)-(vi), (C)-(ii), (D)-(i), (E)-(v), (F)-(iii)
b) (A)-(v), (B)-(vi), (C)-(iv), (D)-(i), (E)-(ii), (F)-(iii)
c) (A)-(iv). (B)-(iii), (C)-(v), (D)-(i), (E)-(ii), (F)-(vi)
d) (A)-(iv), (B)-(vi), (C)-(v), (D)-(i), (E)-(ii), (F)-(iii)

166. If myelin sheath is continued in myelinated nerve fibre then what will happen in neuronal conduction? **[4]**

a) Velocity is increased
b) Conduction is slow
c) Conduction is stopped
d) No effect

167. At blind spot **[4]**

a) optic nerves leave the eye and retinal blood vessels enter it.
b) there is no involvement of retinal blood vessels at all.
c) there is no involvement of optic nerves at all.
d) retinal blood vessels leave the eye and optic nerves enter it.

168. For visual sense, the nerve impulse generated by: **[4]**

a) All of these
b) Repolarisation
c) Depolarisation
d) Hyper polarisaion

169. Chemical transmission of nerve impulses from one neuron to another at a synapse is by: **[4]**

a) Acetylcholine
b) ATP
c) Cholesterol
d) Cholecystokinin

170. Conn's disease is caused by the over-secretion of **[4]**

a) ATH
b) ADH
c) ACTH
d) Aldosterone

171. Conn's disease is due to: **[4]**

a) Hypo secretion of aldosterone
b) Hypo secretion of STH
c) Hyper secretion of aldosterone
d) None of thes

172. Addison's disease results from **[4]**

a) Hyposecretion of adrenal
b) Hyposecretion of gonads
c) Hyperactivity of cells of Leydig
d) Hypertrophy of gonads

173. Which of the following is associated with decrease incardiac output? **[4]**

a) Parasympathetic neural signals
b) Sympathetic nerves
c) Adrenal medullary hormones
d) Pneumotaxic centre

174. Cardiac activity could be moderated by the autonomous neural system. Tick the correct answer: **[4]**

a) The parasympathetic system decreases the heart rate but increase stroke volume
b) The sympathetic system stimulates heart rate and stroke volume
c) The parasympathetic system stimulates heart rate and stroke volume
d) The sympathetic system decreases the heart rate but increase stroke volume

175. Which of the following statements is correct? **[4]**

a. The T-wave in an ECG represents excitation of ventricles.
b. The sum of P and T waves in a given time period can determine the heart beat rate of an individual.
c. The end of the P-wave marks the end of the systole.
d. Ina standard ECG, a person is connected to the machine with three electrical leads.

a) Statement (a) is correct.
b) Statement (b) is correct.
c) Statement (d) is correct.
d) Statement (c) is correct.

176. Restriction endonuclease (RE) was discovered by: **[4]**

a) Arber
b) Cohen
c) Meselson
d) Watson

177. Consider the following statements. **[4]**

i. In microinjection method, foreign DNA is directly injected into the nucleus of animal cell or plant cell by using microneedles or micropipettes.
ii. Microinjection method is used in oocytes, eggs, and embryo.

iii. Electroporation is the formation of temporary pores in the plasma membrane of host cell by using lysozyme or calcium chloride.

iv. In chemical mediated gene transfer method, certain chemicals such as $Ca^{2}+$ help foreign DNA to enter the host cell.

Which of the statements given above are correct?

a) (i), (ii), (iii), and (iv)
b) (i), (ii), and (iv)
c) (ii), (iii), and (iv)
d) (i) and (ii)

178. The sequence that controls the copy number of the linked DNA in the vector, is termed: **[4]**

a) Selectable marker
b) Ori site
c) Palindromic sequence
d) Recognition site

179. Probiotics are: **[4]**

a) cancer inducing microbes.
b) safe antibiotics.
c) new kind of food allergens.
d) live microbial food supplement.

180. Which kind of therapy was given in 1990 to a four year old girl with Adenosine Deaminase (ADA) deficiency? **[4]**

a) Immunotherapy
b) Chemotherapy
c) Radiation therapy
d) Gene therapy

S O L U T I O N

PHYSICS

1.

(d) Am

Explanation:

$[m] = \frac{[M]}{2l} = \frac{Am^2}{m} = A\text{-}m.$

2. **(a)** 4

Explanation:

Since, $\rho = \frac{m}{\pi r^2 l}$

$\therefore \left(\frac{\Delta\rho}{\rho}\right) \times 100 = \left(\frac{\Delta m}{m} + \frac{2\Delta r}{r} + \frac{\Delta L}{L}\right) \times 100$

$= \left(\frac{0.003}{0.3} + 2 \times \frac{0.005}{0.5} + \frac{0.06}{6}\right) \times 100$

$= (0.01 + 0.02 + 0.01) \times 100 = 4$

3.

(c) 0.11 s

Explanation:

As we know that,

Average value $= \frac{2.63+2.56+2.42+2.71+2.80}{5}$

$\overline{a}_n = 2.62$ s

$|\Delta T_1| = |2.63 - 2.62| = 0.01$

$|\Delta T_2| = |2.62 - 2.56| = 0.06$

$|\Delta T_3| = |2.62 - 2.42| = 0.20$

$|\Delta T_4| = |2.71 - 2.62| = 0.09$

$|\Delta T_5| = |2.80 - 2.62| = 0.18$

$|\Delta T| = \frac{|T_1|+|T_2|+|T_3|+|T_4|+|T_5|}{5}$

$= \frac{0.54}{5}$

$= 0.108 \approx 0.11$ s

4.

(b) $2100 \frac{m}{sec^2}$ upwards

Explanation:

The velocity at time the ball strikes the floor,

$u = \sqrt{2gh_1}$

$= \sqrt{2 \times 9.8 \times 2.5}$

= 7 m/s

Hence, change in velocity:

$\Delta v = 7 - (-14)$

= 21 m/s

$\text{Acceleration} = \frac{\Delta v}{\Delta t}$

$= \frac{21}{0.01}$

= 2100 m/s^2, upwards

5.

(b) 5 m

Explanation:

$s = u + \frac{a}{2}(2n - 1)$

u = 100 m/s, a = -10 m/s^2, s = 5 m

$5 = 100 - \frac{10}{2}(2n - 1)$ or n = 10

Body thrown upwards with velocity 100 m/s takes 10 sec to reach the highest point.

So body thrown upwards with velocity of200 m/s will take 20 sec to reach the highest point.

Hence, distance travelled in 20th sec,

$s = 200 - \frac{10}{2}(20 \times 2 - 1)$

= 200 - 5 × 39 = 200 - 195 = 5 m

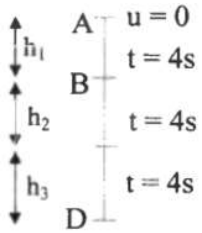
[**Note:** Bodies travel the same distance in the last second of their upward journey irrespective of their velocities.]

6.

(b) $h_2 = 3h_1$ and $h_3 = 5h_1$

Explanation:

At point A, u = 0



$\therefore h_1 = \frac{1}{2}gt^2 = \frac{1}{2} \times 10 \times 16$

$\therefore h_1 = 80$ m

Now, $v = u + gt = 0 + 10(4)$

$\therefore v = 40$ m/s

At point B, final velocity from A to B = initial velocity at B

$\therefore h_2 = ut + \frac{1}{2}gt^2 = 40 \times 4 + \frac{1}{2} \times 10 \times 16$

$= 240$ m

$v = u + gt = 40 + 10(4)$

$\therefore v = 80$ m/s

Similarly, At point C,

$h_3 = 400$ m

$\therefore h_1 : h_2 : h_3 = 80 : 240 : 400 = 1 : 3 : 5$

i.e., $h_2 = 3h_1$ and $h_3 = 5h_1$

7.

(d) 2.13 m

Explanation:

$H_{max} = \frac{R_{max}}{4}$

$\therefore H_1 = \frac{20}{4} = 5$ m

$H_2 = \frac{(v_0 \sin\theta_0)^2}{2g} = \frac{(15 \times \sin 30)^2}{2 \times 9.8} = 2.87$ m

Difference in heights attained,

$H_1 - H_2 = 5 - 2.87 = 2.13$ m

8.

(c) only i

Explanation:

Because there is no acceleration or retardation along the horizontal direction, hence the horizontal component of velocity remains the same.

9. **(a)** $1 - \frac{1}{n^2}$

Explanation:

Let a_1 be the acceleration when it slide down smooth incline plane.

Then, $a_1 = g \sin\theta = \frac{g}{\sqrt{2}}$

Let a_2 be the acceleration when it slide down rough inclined plane

Then, $a_2 = g\sin\theta - \mu_k g\cos\theta = \frac{g}{\sqrt{2}} - \frac{\mu_k g}{\sqrt{2}}$

Let t_1 be the time taken when it slide down smooth surface

and t_2 be the time taken when it slide down rough surface.

$t_2 = nt_1 \& \frac{1}{2}a_1t_1^2 = \frac{1}{2}a_2t_2^2$

$\Rightarrow \frac{1}{2}\frac{g}{\sqrt{2}}t_1^2 = \frac{1}{2}\left(\frac{g}{\sqrt{2}} - \frac{\mu_k g}{\sqrt{2}}\right)n^2t_1^2 \Rightarrow \mu_k = 1 - \frac{1}{n^2}$

10.

(d) $\vec{v}$, remaining unchanged

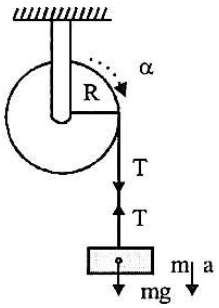
Explanation:

Net force on the particle is zero so the $\vec{v}$ remains unchanged.

11.

(d) $\frac{g}{2}$

Explanation:



From figure,

Acceleration a = Rα ...(i)

and mg - T = ma ...(ii)

From equation (i) and (ii)

T × R = mR$^2\alpha = mR^2\left(\frac{a}{R}\right)$

or T = ma

$\Rightarrow$ mg - ma = ma

$\Rightarrow a = \frac{g}{2}$

12.

(d) -3 along the negative z-direction

Explanation:

$W = \vec{F} \cdot \vec{s} = (3\hat{i} + 2\hat{j} + a\hat{k}) \cdot (\hat{i} + \hat{j} - 2\hat{k})$

$\therefore$ 11 = 3 + 2 - 2a

$\Rightarrow$ a = -3 i.e., along negative z direction.

13. **(a)** linear momentum

Explanation:

A rocket propulsion is based on the conservation of linear momentum.

14.

(c) 10 m

Explanation:

$S = \frac{u^2}{2\mu g} = \frac{10^2}{2\times 0.5\times 10} = 10m$

15. **(a)** 10

Explanation:

According to law of conservation of angular momentum,

$I_1\omega_1 = I_2\omega_2$

$\left(\frac{ML^2}{12} + 2md^2\right)\omega_1 = \left[\frac{ML^2}{12} + 2m\left(\frac{L}{2}\right)^2\right]\omega_2$

or $\left[\frac{0.75\times(0.4)^2}{12} + 2\times 1\times(0.1)^2\right]30 = \left[\frac{0.75\times(0.4)^2}{12} + 2\times 1\times(0.2)^2\right]\omega_2$

Solving it, we get; ω_2 = 10 rad/sec

16. **(a)** (4)

Explanation:

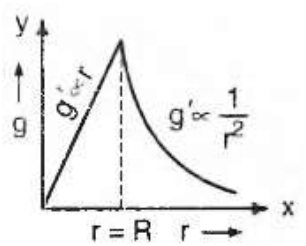
The acceleration due to gravity at a depth d below surface of the earth is,

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

g' = 0 at d = R

i.e., acceleration due to gravity is zero at the centre of the earth.

Thus, the variation in the value of g with r is:



For r > R:

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

or $g' \propto \frac{1}{r^2}$

Here, R + h = r

For r < R: $g' = g\left(1 - \frac{d}{R}\right) = \frac{gr}{R}$

Here, R - d = r

or $g' \propto r$

Therefore, the variation of g with distance from centre of the earth will be as shown in the figure above.

17.

(d) 2.8 T

Explanation:

$T^2 \propto R^2$

$\therefore \left(\frac{T_1}{T_2}\right)^2 = \left(\frac{R_1}{R_2}\right)^3$

$\therefore T_2 = \sqrt{\left(\frac{R_2}{R_1}\right)^3 \cdot T_1^2}$

$\Rightarrow \sqrt{\left(\frac{2R}{R}\right)^3 \cdot 1}$ $\because T_1 = 1$year

$\Rightarrow \sqrt{8} = 2.8$ years

18.

(c) 36×10^{21} N

Explanation:

$M = 6 \times 10^{24}$ kg, $\omega = 2 \times 10^{-7}$ rad/sec

$r = 1.5 \times 10^8$ km $= 1.5 \times 10^{11}$ m

Force exerted on the earth

$= m\omega^2 r = (6 \times 10^{24}) \times (2 \times 10^{-7})^2 \times (15 \times 10^{11})$

$= 36 \times 10^{21}$ N

19. **(a)** 0.3×10^{-4}

Explanation:

$Y = \frac{mgl}{A\Delta l}$ or $\frac{\Delta l}{l} = \frac{mg}{AY}$

$\therefore \frac{\Delta l}{l} = \frac{1 \times 10}{3 \times 10^{-6} \times 10^{11}} = 0.3 \times 10^{-4}$

20. **(a)** 3:2

Explanation:

We know that $\gamma = \frac{\text{stress}}{\text{strain}}$ γ = Young's modulus

Stress = γ. strain $\rightarrow 1$

Also, Strain = $\frac{\Delta L}{L} = \frac{\alpha \triangle T}{L}$

Using equation1

$\gamma_1 \cdot$strain 1 = $\gamma_2 \cdot$straub 2

$\gamma_1 \cdot \frac{\gamma_1 \Delta T}{L} = \gamma_2 \cdot \frac{\gamma_2 \Delta T}{L}$

$\frac{\gamma_1}{\gamma_2} = \frac{\alpha_2}{\alpha_1} = \frac{3}{2}$

Hence ratio of Y_1:Y_2 is 3:2

21.

(b) alcohol

Explanation:

Alcohol can be used to measure temperature between - 40^oC to 40^oC is:

22.

(b) 32 P

Explanation:

For monoatomic gas, $\gamma = \frac{5}{3}$

For an adiabatic process, PV^{γ} = constant

For an adiabatic process, $PV^{\gamma} = P'(V')^{\gamma}$

$\Rightarrow \quad PV^{5/3} = P'\left(\frac{V}{8}\right)^{5/3}$ $\left(\text{Given, } V' = \frac{V}{8}\right)$

$\Rightarrow P' = (8)^{5/3}P = (2)5\ P = 32\ P$

23.

(c) pressure will decrease

Explanation:

The pressure of the gas on the cylinder will try to balance the weight of the piston.

If compressed and left, the pressure would relieve itself until it is balancing the weight of the piston.

24.

(c) $P_0(4)^{\gamma}$

Explanation:

If gas is compressed suddenly, the processes is adiabatic.

And equation for adiabatic process PV^{γ} = constant

or $P_1\ V_1^{\gamma} = P_2\ V_2^{\gamma}$

$\Rightarrow P_0\ V_0^{\gamma} = P_2\left(\frac{V_0}{4}\right)^{\gamma} \therefore P_2 = P_0(4)^{\gamma}$

25.

(d) $33.67^{o}C$

Explanation:

Since there is no loss of energy in the process.

So, Temperature of the mixture,

$$T = \frac{n_1T_1 + n_2T_2}{n_1 + n_2}$$

$$= \frac{1(27 + 273) + 2(37 + 273)}{1 + 2}$$

$$= \frac{920}{3}$$

$\therefore T = 306.67\ K$

$= 33.67^{o}C$

26.

(c) $\frac{A}{2}$

Explanation:

According to a given condition,

PE = $\frac{25}{100}\times$ (TE)

$\therefore \frac{1}{2}m\omega^2x^2 = \frac{1}{4}\left(\frac{1}{2}m\omega^2A^2\right)$

$\therefore x^2 = \frac{1}{4}A^2$

or, x = $\frac{A}{2}$

27.

(b) Frequency decreases

Explanation:

The frequency decreases when its length and diameter are increased.

28. **(a)** $2A\cos\frac{\phi}{4}$

Explanation:

x_1 = A sin (ωt - 0.1x)

$x_2 = A\sin\left(\omega t - 0.1x - \frac{\phi}{2}\right)$

$x_1 + x_2$ = A sin (ωt - 0.1x) + A sin $\left(\omega t - 0.1x - \frac{\phi}{2}\right)$

$= A\left[\sin(\omega t - 0.1x) + \sin\left(\omega t - 0.1x - \frac{\phi}{2}\right)\right]$

$= A \times 2\sin\left[\frac{\omega t - 0.Lx + \omega t - 0.1x - (\phi/2)}{2}\right]$

$\cos\left[\frac{\omega t - 0.1x - \omega t + 0.1x + \phi/2}{2}\right]$

$= 2A\sin\left[\omega t - 0.1x - \frac{\phi}{4}\right]\cos\left(\frac{\phi}{4}\right)$

$= 2A\cos\left(\frac{\phi}{4}\right)\sin\left(\omega t - 0.1x - \frac{\phi}{4}\right)$

29.

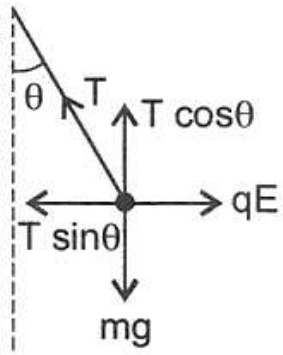
(d) Energy is minimum at nodes and maximum at antinodes

Explanation:

Energy is minimum at nodes and maximum at antinodes

30. **(a)** $\tan^{-1}\left(\frac{\sigma q}{2\varepsilon_0 mg}\right)$

Explanation:



T sin $\theta = qE = \frac{q\sigma}{2\varepsilon_0}$ ...(i)

T cos θ = mg

tan $\theta = \frac{q\sigma}{2\varepsilon_0 mg}$

31.

(b) $\frac{3V_0}{4}$

Explanation:

$Q_1 = CV_0$

or $V_0 = \frac{Q_1}{C}$

Capacitors are in parallel.

$\therefore \quad \frac{Q_1}{C} = \frac{Q_2}{2C}$

or $Q_2 = 2\ Q_1$

$V_0 = \frac{Q_2}{2C}$

After disconnecting the battery and inserting the dielectric in C.

$V_1' = \frac{Q_1}{CK} = \frac{Q_1}{2C}$

$V_2' = \frac{Q_2}{2C} = \frac{2Q_1}{2C} = \frac{Q_1}{C}$ [from eqn. (i)]

Charge will flow from 2 to 1 till $\frac{Q_2'}{2C} = \frac{Q_1'}{2C}$ i.e.., the two potentials are equal.

$Q_1 = Q'_2$

Earlier potential is $V_0 = \frac{Q_1}{C}$

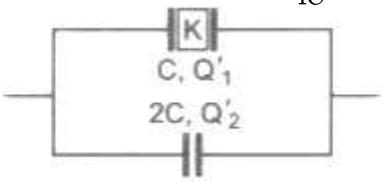
Now, it is $\frac{Q_1'}{2C}$

$Q_1 + Q_2 = 3\ Q_1 = Q_1' + Q_2'$.

$\frac{Q_2'}{2C} = \frac{Q_1'}{2C}$

or $Q_2' = Q_1' = \frac{3Q_1}{2}$

$\therefore$ New potential $= \frac{3Q_1}{4C}$ or $\frac{3V_0}{4}$



32.

(c) $R = r_1 - r_2$

Explanation:

From circuit, $V_1 + V_2 = IR$

or $E - Ir_1 + E - IR_2 = IR$

Given, $Ir_1 = E$

$\therefore Ir_1 - Ir_1 + lr_1 - lr_2 = IR$

$\therefore R = r_1 - r_2$

33. **(a)** Zero

Explanation:

The forces acting on various small current-carrying elements of the circumference of the loop will be distributed randomly in all possible directions. The vector addition of such randomly distributed forces will be zero.

34.

(b) 2 vibration per minute

Explanation:

First case: $\frac{60}{10} = 2\pi\sqrt{\frac{I}{MB_H}}$ ...(i)

Second case: $\frac{30}{7} = 2\pi\sqrt{\frac{I}{M(B_H+B)}}$ ...(ii)

$\therefore \quad \frac{6}{30/7} = \sqrt{\frac{B_H+B}{B_H}}$

or $B = \left(\frac{24}{25}\right) B_H$ ...(iii)

Third case: $\frac{60}{n} = 2\pi\sqrt{\frac{I}{M(B_H-B)}}$

$= 2\pi\sqrt{\frac{I}{M\left(B_H-\frac{24}{25}B_H\right)}}$

$= 2\pi\sqrt{\frac{I}{MB_H\times(1/25)}}$

$= 2\pi \times 5 \times \sqrt{\frac{I}{MB_H}}$ ....(iv)

From eqn. (i) and (iv), we get

$\frac{60}{n} = 5 \times 6 = 30$

$\therefore$ n = 2 vibration per minute

35.

(d) high, high

Explanation:

The material for a permanent magnet should have high retentivity (so that magnet is strong) and high coercivity (so that magnetism is not wiped out by strong magnetic fields).

36.

(b) 2×10^{-3} V

Explanation:

Given: Time (t) = 0.4 sec and magnetic flux(ϕ) = 8×10^{-4} Wb. From the Faraday's law of electromagnetic induction that the induced e.m.f. in the wire

$\varepsilon = \frac{d\phi}{dt} = \frac{8 \times 10^{-4}}{0.4}$

$= 2 \times 10^{-3}$ V

37.

(b) 10π mV

Explanation:

The induced emf between centre and rim of the rotating disc is,

$E = \frac{1}{2} B\omega r^2$

$= \frac{1}{2} \times 0.1 \times 2\pi \times 10 \times (0.1)^2$

$= 10\pi \times 10^{-3}$ V

$= 10\pi$ mV

38. **(a)** $\frac{\sqrt{5}R}{2}$, $\tan^{-1}\left(\frac{1}{2}\right)$

Explanation:

Given:

$R = X_L = 2X_C$

$Z = \sqrt{R^2 + (X_L - X_C)^2}$

$= \sqrt{(2X_C)^2 + (2X_C - X_C)^2}$

$= \sqrt{4X_C^2 + X_C^2}$

$= \sqrt{5}\ X_C$

$= \frac{\sqrt{5}R}{2}$

$\tan\phi = \frac{X_L - X_C}{R}$

$= \frac{2X_C - X_C}{2X_C}$

$\tan\phi = \frac{1}{2}$

$\phi = \tan^{-1}\left(\frac{1}{2}\right)$

39.

(c) both atomic number and melting point

Explanation:

both atomic number and melting point

40.

(c) only (A), (C) and (D)

Explanation:

only (A), (C) and (D)

41.

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

Explanation:

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

42.

(c) $\lambda_e > \lambda_p > \lambda_{He^{++}}$

Explanation:

de-Broglie wavelength, $\lambda = \frac{h}{P} = \frac{h}{\sqrt{2m(\text{KE})}}$

$\therefore \lambda \propto \frac{1}{\sqrt{m}}$

As $m_{He^{++}} > m_p > m_e$

$\lambda_{He^{++}} < \lambda_P < \lambda_e$ or $\lambda_e > \lambda_p > \lambda_{He^{++}}$

43.

(c) Singly ionized neon atom (Ne^{+})

Explanation:

Singly ionized neon has electron count more than one. Bohr's model is valid for atoms with single electron.

44. **(a)** $\frac{n^2h^2}{4\pi^2me^2Z}$

Explanation:

$\frac{n^2h^2}{4\pi^2me^2Z}$

45.

(c) independent of the time of creation

Explanation:

Radioactive decay is a statistical process that depends upon the instability of the particular radioisotope. But as far as two nuclei are concerned, one cannot predict anything. The statistical probability is applied to a large number of nuclei. One cannot apply this to an individual nucleus.

CHEMISTRY

46.

(b) 0.2 mol L^{-1}

Explanation:

Molarity = $\frac{5.85 \times 1000}{58.5 \times 500}$ = 0.2 M

47.

(c) $[Co(H_2O)_5Cl]Cl_2 \cdot H_2O$

Explanation:

millimole of AgCl precipitated = $\frac{1.2 \times 10^{22}}{6 \times 10^{23}} \times 1000 = 20$

millimole of $CoCl_3 \cdot 6H_2O = 0.1 \times 100 = 10$

Thus, each mole of $CoCl_3 \cdot 6H_2O$ gives two chloride ions to give 2 mole of AgCl.

Thus complex is $[Co(H_2O)_5Cl]Cl_2 \cdot H_2O$

48. **(a)** excited state of Mg

Explanation:

Ground state of $_{12}Mg$ $1s^2, 2s^2 2p^6, 3s^2$.

49.

(c) 58%

Explanation:

Number of 'H' atoms in 1.8 g H is:

$1.8 \text{ g 'H'} \times \frac{1 \text{ mol 'H'}}{1 \text{ g 'H'}} \times \frac{N_A \text{ atoms}}{1 \text{ mol 'H'}}$

$= 1.08 \times 10^{24}$ atoms

For n = 3 to n = 1 transition,

energy evolved = 5.67×10^5 J

i.e., E = $(E_3 - E_1) \times$ 'X' atoms $\times 1.602 \times 10^{-19}$

$\therefore 5.67 \times 10^5$

$= \left[\frac{-13.6}{(3)^2} - \frac{-13.6}{(1)^2}\right] \times$ 'X' atoms $\times 1.602 \times 10^{-19}$

3.54×10^{24} = [-1.51 + 13.6] × 'X' atoms

$\therefore$ 'X' = 2.92×10^{23} 'H' atoms are excited to n = 3 level

For n = 2 to n = 1 transition,

energy evolved = 2.65×10^5 J

i.e., E = $(E_2 - E_1) \times$ 'Y' atoms $\times 1.602 \times 10^{-19}$

$= 2.65 \times 10^5$

$= \left[\frac{-13.6}{(2)^2} - \frac{-13.6}{(1)^2}\right] \times$ 'Y' atoms $\times 1.602 \times 10^{-19}$

1.65×10^{24} = [-3.4 + 13.6] × 'Y' atoms

$\therefore$ 'Y' = 1.62×10^{23} 'H' atoms are excited to n = 2 level

$\therefore$ Total excited 'H' atoms = X + Y

$= 4.54 \times 10^{23}$

% of excited 'H' atoms = $\frac{4.54 \times 10^{23}}{1.08 \times 10^{24}} \times 100 = 42\%$

$\therefore$ % of unexcited atoms = 58%

50.

(b) upon the type of orbital

Explanation:

For s-orbitals, Ψ^2 is maximum for closer to nucleus. For p-orbital, Ψ^2 maximum for far away distance from nucleus.

51.

(d) $Cl^- < S^{2-} < P^{3-}$

Explanation:

$P^{3-} > S^{2-} > Cl^- \Longrightarrow$ Increasing z/e ratio

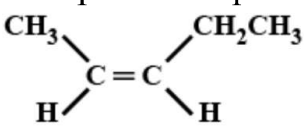
So, the order of size will be $Cl^- < S^{2-} < P^{3-}$

52. **(a)** Trans-2-pentene

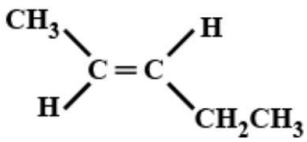
Explanation:

The molecules having dipole moment is trans-2-pentene.

Except trans-2-pentene the vector sum in each is zero.



cis-2-pantene



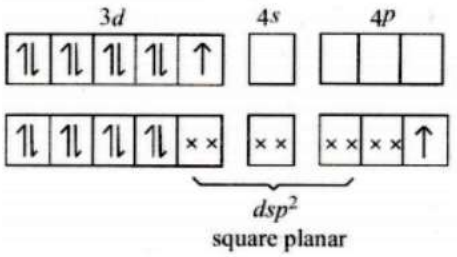
trans-2-pantene

53. **(a)** $Cu(NH_3)_4{}^{2+}$

Explanation:

$[Cu(NH_3)_4]^{2+}$, $Cu^{2+} \rightarrow 3d^9\ 4s^0$

$[Cu(NH_3)_4]^{2+} \longrightarrow$



One electron is shifted from 3d to 4p orbital.

54. **(a)** All of these

Explanation:

All of these

55.

(b) 304 kJ

Explanation:

First write the balanced chemical; equations for he formation of dinitrogen oxide and nitric oxide.

$N_2 + \frac{1}{2}O_2 \rightarrow N_2O$; $\Delta H = 28$ kJ ...(i)

$\frac{1}{2}N_2 + \frac{1}{2}O_2 \rightarrow NO$; $\Delta H = 90$ kJ ...(ii)

Then multiply second equation with 4 and first equation with 2

$2N_2 + O_2 \rightarrow 2N_2O$; $\Delta H = 2 \times 28$ kJ ...(iii)

$2N_2 + 2O_2 \rightarrow 4NO$; $\Delta H = 4 \times 90$ kJ ...(iv)

Now substract third equation from fourth equation.

$2N_2O + O_2 \rightarrow 4NO$; $\Delta H = 304$ kJ

Thus, the enthalpy of the reaction $2N_2O(g) + O_2(g) \rightarrow 4NO(g)$ is 304 kJ.

56.

(d) $\frac{1}{2}\Delta_f H^o\ (B_2O_3)$

Explanation:

$\frac{1}{2}\Delta_f H^o\ (B_2O_3)$

The balanced chemical equation for the formation of B_2O_3 from B and oxygen is as shown below.

$2B + \frac{3}{2}O_2 \rightarrow B_2O_3$; $\Delta_f H^o$ of B

The balanced chemical equation for the combustion of 1 mole of B is as shown below.

$(B + \frac{3}{4}O_2 \rightarrow \frac{1}{2}B_2O_3)$; $\Delta_c H^o$ of B

Hence, $\Delta_{comb}\ H^o$ of boron = $\frac{1}{2}\ \Delta_f H^o$ of B_2O_3

Thus, standard heat of combustion of solid boron is equal to one half the standard heat of formation of B_2O_3.

57.

(d) 3×10^{-18} M

Explanation:

3×10^{-18} M

58.

(d) E, E, E

Explanation:

E, E, E

59.

(c) 6

Explanation:

The balanced reaction is:

$Cr_2O_7^{2-} + 14H^+ + 6e^- \rightarrow 2Cr^{3+} + 7H_2O$

60.

(c) intramolecular redox

Explanation:

intramolecular redox

61.

(d) Sn^{2+} is reducing while Pb^{4+} is oxidising

Explanation:

Pb and Sn belong to group 14 and have a valency of 4. They cannot lose electrons beyond 4. Therefore, Sn^{4-} and Pb^{4+} cannot lose electrons. However, Pb^{4+} can gain electrons. Further, the stable oxidation state for Pb is +2. Hence, Pb^{4+} can act as oxidising agent.

62.

(d) $PbCl_2$

Explanation:

$PbCl_2$ is most ionic because on going down the group the metallic character increases and also the inert pair effect predominates.

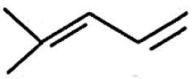
63.

(b) $CH_3CH = CHCH_2 - CH = CHC \equiv CH$

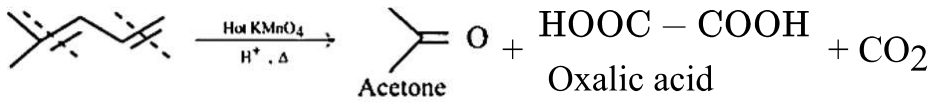
Explanation:

$CH_3CH = CHCH_2 - CH = CHC \equiv CH$

64. **(a)**



Explanation:

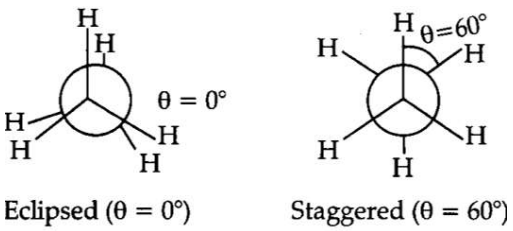


65. **(a)** 0^{o}

Explanation:

Conformers are obtained by the free rotation of carbon-carbon single bond. Ethane has two conformer (1) Eclipsed (2) Staggered.

In eclipsed structure, dihedral angle is 0° and it is least stable while in staggered structure, dihedral angle is 60^{o} and it is stable.



66.

(d) 348.9

Explanation:

For two non-electrolyte solutions, if isotonic $C_1 = C_2$

$\therefore \quad \frac{8.6}{60 \times 1} = \frac{5 \times 1000}{M_{w_2} \times 100}$

$M_{w_2} = 348.83$

67.

(b) 141.43 mm Hg

Explanation:

$\frac{P^o - P_S}{P_S} = \frac{w}{m} \times \frac{M}{W}$

$\frac{143}{P_S} - 1 = \frac{0.5}{65} \times \frac{154}{100}$

$\therefore P_S = 141.3$ mm

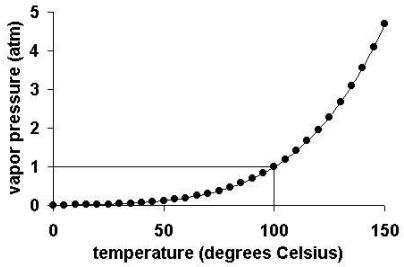
68.

(c) temperature

Explanation:

The vapor pressure of water depends upon temperature. Vapor pressures have an exponential relationship with temperature and always increase as temperature increases.

It is independent of the surface area and volume of the container.



69. **(a)** Solution (i) will follow Raoult's law.

Explanation:

Raoult's law is an important law of thermodynamics. It states that the partial pressure of each component of an ideal mixture of the liquids will be equal to the vapour pressure of the pure component multiplied by its mole fraction in the mixture. Here solution-i will follow Raoult's law because the solution formed after the mixing will be ideal. And hence it will not show any deviation as the intermolecular forces after mixing will also be the same.

70.

(b) $\frac{10^6 y^2}{4(a+b-2c)^2}$

Explanation:

$\Lambda^{\circ}_{M\mathrm{BaSO_4}} = \Lambda^{\circ}_{MBaCl_2} + \Lambda^{\circ}_{M\mathrm{H_2SO_4}} - 2 \times \Lambda^{\circ}_{M\mathrm{HCl}}$

$= (a + b - 2c)\ S\ cm^2\ eq^{-1}$

Now, $\Lambda_{M\mathrm{BaSO_4}} = \frac{\kappa \times 1000}{N} = \frac{1000 \times y}{N}$

$\Lambda_{M\mathrm{BaSO_4}} = \Lambda^{\circ}_{\mathrm{BaSO_4}}$ as $BaSO_4$ is sparingly soluble salt

Thus, $\frac{1000 \times y}{N} = (a + b - 2c)$

$\therefore N = \frac{10^3 y}{(a+b-2c)}$ or $M = \frac{10^3 y}{2 \times (a+b-2c)}$

Also for M $BaSO_4$, $[Ba^{2+}] = M$ and $[SO_4^{2-}] = M$

Thus, $K_{sp}\ BaSO_4 = \left[\frac{10^3 y}{2 \times (a+b-2c)}\right]^2$

$= \frac{10^6 y^2}{4(a+b-2c)}$

71.

(b) +0.59 V

Explanation:

$E_{OP} = E^{\circ}_{OP} - \frac{0.059}{1} \log \frac{[H^+]}{P_{H_2}}$

$\because [H^+] = 10^{-10}$; $P_{H_2} = 1$ atm

$E_{OP} = 0.59$ V

72.

(d) 1 : 108

Explanation:

1 : 108

73.

(c) For $N_2 + 3H_2 \rightleftharpoons 2NH_3$; if rate of formation of NH_3 is 0.001 kg hr, than rate of consumption of H_2 is 0.0015 kg/hr

Explanation:

For $N_2 + 3H_2 \rightleftharpoons 2NH_3$; if rate of formation of NH_3 is 0.001 kg hr, than rate of consumption of H_2 is 0.0015 kg/hr

74.

(c) Average rate upto 40 seconds is $\frac{V_3 - V_1}{40 - 20}$

Explanation:

Average rate (upto 40 s) = $\frac{V_3 - V_0}{40 - 0}$

$= \frac{V_3 - 0}{40} = \frac{V_3}{40}$

75.

(d) X = Cu_2I_2 Y = $Na_2S_4O_6$

Explanation:

$Cu^{2+} + 2KI \longrightarrow \underset{\text{Unstable}}{CuI_2} \downarrow + 2K^+$

I^- is strond reducing agent it reduces Cu^{2+} to Cu^+

$2CuI_2 \longrightarrow \underset{(\text{White})'X'}{Cu_2I_2} \downarrow I_2$

$KI + I_2 \longrightarrow K^+I_3^-$ (Brown solution)

$I_3^- \rightleftharpoons I_2 + I^-$

$KI_3 + Na_2S_2O_3 \rightarrow KI + \underset{(Y)}{Na_2S_4O_6}$

76.

(b) Cl

Explanation:

Caustic soda is manufactured by electrolysis of NaCl solution where Cl_2 is evolved at the anode and H_2 at the cathode.

At anode: $Cl^- \rightarrow Cl + e^-, Cl + Cl \rightarrow Cl_2 \uparrow$

At cathode : $Na^+ + e^- \rightarrow Na$

77.

(c) $Fe_2O_3 + Fe(OH)_3$

Explanation:

$Fe_2O_3 + Fe(OH)_3$

78. **(a)** $K_3[Cu(CN)_4]$

Explanation:

$K_3[Cu(CN)_4]$

O.N. of copper is Cu^+

$Cu^+ \Rightarrow [Ar]3d^{10} \Rightarrow$ Diamagnetic

79.

(d) i - c, ii - d, iii - a, iv - b

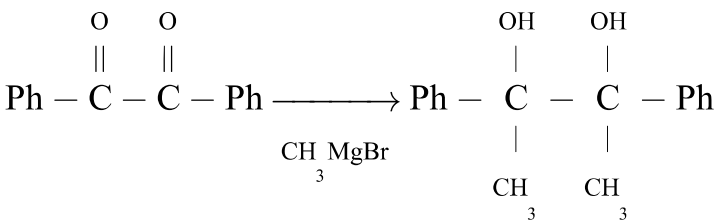
Explanation:

Coordination number	Hybridisation	Geometry
4	sp^3	Tetrahedral
4	dsp^2	Square planar
5	sp^3d	Trigonal bipyramidal
6	d^2sp^3	Octahedral

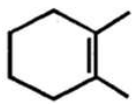
80.

(b) 3, 2

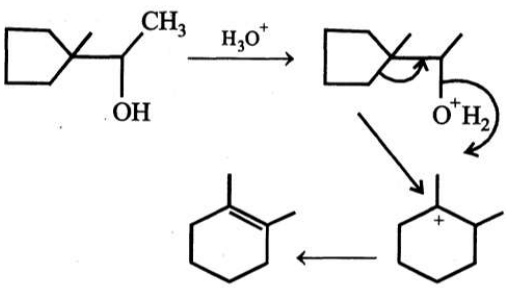
Explanation:



81.

(d) 

Explanation:

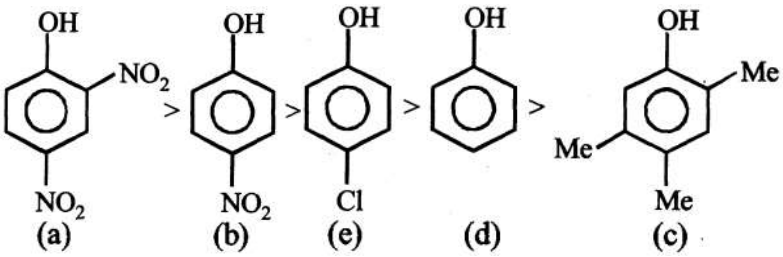


82.

(d) Only (b)

Explanation:

Order of acidity for following phenol is



-M and -I effect of the substituents increase acidity

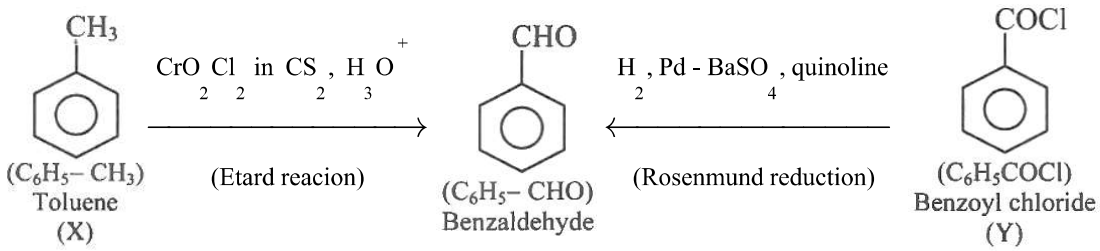
+M and +1 effect of the substituents decrease acidity

83.

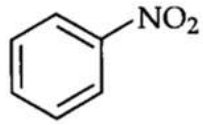
(b) $X = C_6H_5CH_3$

$Y = C_6H_5COCl$

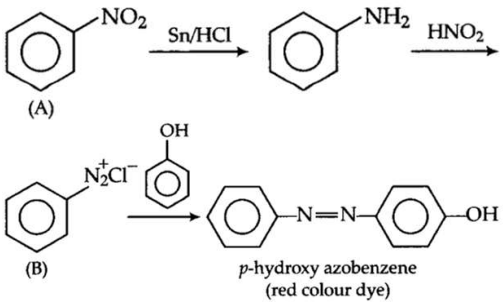
Explanation:



84.

(b) 

Explanation:



85.

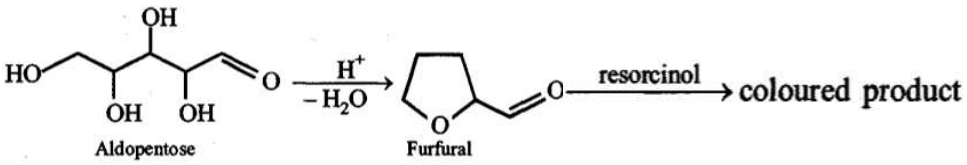
(b) Potassium

Explanation:

Potassium (K) activates many enzymes participate in the oxidation of glucose to produce ATP and helps in the transmission of nerve signal along with Na.

86. **(a)** Aldopentose

Explanation:

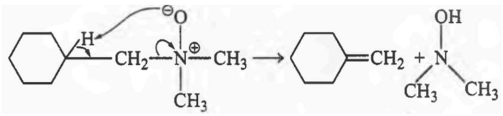


87.

(b) Cope reaction

Explanation:

Cope elimination reaction.



88.

(d) 1 mole : 1.5 mole : 3 mole

Explanation:

Eq. of AI = Eq. of Cu = Eq. of Na

or $\frac{1}{3}$ mole AI = $\frac{1}{2}$ mole Cu = 1 mole Na

or 2 : 3 : 6 or 1 : 1.5 : 3 mole ratio

89. **(a)** Fractional distillation

Explanation:

The fractional distillation method will be used for the separation of a mixture of acetone and ethanol.

90.

(b) Magnesium

Explanation:

Ba^{2+} imparts green colour to the flame in its chloride forms.

BOTANY

91.

(d) Tiger - Tigris, species

Explanation:

The scientific name of the tiger is *Panthera tigris* where Panthera is the genus name and tigris is the species name. Hence, the correct animal name matched with its particular taxonomic category is Tiger - Tigris, the species.

92.

(b) A genus essentially possesses more than one number of species.

Explanation:

It is not essential for a genus to have several species. The genus which has single species is called monotypic, while the genus which has several species is called polytypic.

93.

(c) All living organisms are made of chemicals

Explanation:

The body of all living organisms are made of a variety of chemicals. The sum total of all chemical reactions occurring in an organism due to specific interactions amongst different types of molecules within the interior of cells is called metabolism.

94.

(c) Three

Explanation:

(iii) and (iv) are the wrong statement.

The algal component is known as phycobiont and fungal component as mycobiont, which are autotrophic and heterotrophic, respectively. Algae prepare food for fungi and fungi provide shelter and absorb mineral nutrients and water for its partner.

95.

(d) All of these

Explanation:

Kingdom Plantae contains eukaryotic, multicellular autotrophs with cell wall formed of cellulose and other polysaccharides.

96. **(a)** Insect pollinated

Explanation:

Insect pollinated

97.

(d) A-Chalaza; B-Funicle; C-Micropyle; D-Integuments; E-Embryo sac; F-Nucellus

Explanation:

The given figure represents an anatropous ovule where the parts labelled from A to F are chalaza, funicle, micropyle, integuments, embryo sac, and nucellus, respectively.

98.

(c) an egg cell and a male gamete.

Explanation:

The embryo develops from zygote which results from the fusion of a male gamete with the egg cell.

99.

(b) Apophysis of capsule

Explanation:

In apophysis of capsule of moss, the guard cells and subsidiary cells originate from same mother cell.

100. **(a)** Apogeotropic

Explanation:

The coralloid roots of Cycas are apogeotropic, that is they grow upward toward the surface of the soil, instead of downward into its depths.

101.

(b) (iii), (iv) and (v)

Explanation:

(iii), (iv) and (v) are right.

- The members of Phaeophyceae or brown algae are found primarily in marine habitats.
- They show great variation in size and form. They range from simple branched, filamentous forms (Ectocarpus) to profusely branched forms as represented by kelps, which may reach a height of 100 meters.
- They possess chlorophyll a, c, carotenoids, and xanthophylls.
- They vary in colour from olive green to various shades of brown
- The colour of brown algae depends upon the amount of the xanthophyll pigment, fucoxanthin present in them.

102.

(c) Selaginella

Explanation:

Selaginella produces two types of spores, macro(large) and micro(small) spores, hence it is known as heterosporous.

103.

(d) Both Amorphophallus and Yucca

Explanation:

Both Amorphophallus and Yucca

104.

(d) young anthers

Explanation:

Meiosis takes place in reproductive parts of plants such as young anthers so these can be used the stages of meiosis.

105.

(c) gulmohur

Explanation:

Flowers are zygomorphic in gulmohur. Flowers of gulmohur have bilateral symmetry. The other three options (Datura, mustard and tomato) have actinomorphic flowers.

106.

(d) Nageli

Explanation:

The term meristem is given by C.Nageli in 1858. It was derived from Greek word meristos which means divisible.

107.

(d) Cambium

Explanation:

In monocot stem vascular bundles are closed ie they lack Cambium. Thus no secondary thickening occurs.

108.

(d) Five

Explanation:

Five

109.

(c) $\frac{1}{16}$

Explanation:

$\frac{1}{16}$

110.

(b) A-4, B-1, C-5

Explanation:

A-4, B-1, C-5

111.

(d) TCGAAGCT

Explanation:

TCGAAGCT

112.

(c) Promoter, operator, regulator, repressor and structural genes

Explanation:

Promoter, operator, regulator, repressor, and structural genes

113. **(a)** Waldeyer

Explanation:

The word chromosome was given by Waldeyer in the year 1888.

114. **(a)** Glycolipids and glycoproteins

Explanation:

Glycolipids and glycoproteins of plasma membrane facilitated the process of cell recognition and cell adhesion.

115. **(a)** Fimbriae

Explanation:

The structures that help some prokaryotic cells (bacteria) to attach to rocks and/or host tissues are Fimbriae.

Fimbriae are thin, protein tubes originating from the cytoplasmic membrane.

116.

(d) T-cells

Explanation:

T-cells

117. **(a)** α-interferon

Explanation:

Cancer patients are given substances called biological response modifiers like α-interferon which activate their immune system and help in destroying the tumours.

118.

(c) (i)

Explanation:

(i)

119.

(c) Psychiatry

Explanation:

The branch of medicine associated with diagnosis, prevention and cure of mental disorders is called psychiatry.

120.

(d) Centrioles and asters

Explanation:

The centriole and Aster is not common to the mitotic cell of higher plants. The main function of the centrosome is at the time of cell division when the two centrioles separate and move on

two poles. Aster and spindle are formed from it which help in the movement of chromatids. They form the basal body, cilia, flagella, etc.

121.

(d) In the lithosphere, hydrosphere and atmosphere

Explanation:

In the lithosphere, hydrosphere and atmosphere

122.

(b) All of these

Explanation:

Rate of decomposition of detritus depends upon chemical nature of detritus, temperature, soil moisture and soil pH. A soil temperature of 25^{o} C and more hastens decomposition. A low temperature of less than 10®C reduces rate of decomposition. Moisture is essential for decomposition. Excessive moisture also impedes decomposition probably due to anaerobiosis. Neutral and slightly alkaline soils are rich in detritivores, earthworms and decomposer microbes. Acidity decreases the number of detritivores and earthworms. Soil with small amount of lignin/chitin/cellulose and rich in nitrogen and water soluble substances (like sugars), decomposes rapidly.

123.

(b) (ii) and (iv)

Explanation:

Activated sludge possesses floes of decomposer microbes, whereas, primary sludge does not possess floes. Unlike primary sludge, a lot of decomposition occurs during formation of activated sludge.

124.

(c) culture media

Explanation:

The nutritive medium for growing bacteria and many fungi in the laboratory is called culture media.

125.

(d) Has many rare species

Explanation:

Has many rare species

126.

(c) 1972

Explanation:

1972

127. **(a)** Man and Biosphere programme

Explanation:

Man and Biosphere programme

128.

(c) A - Early Prophase, B - Late Prophase, C - Metaphase

Explanation:

- **Early prophase -** the nuclear membrane becomes more and more indistinct and the chromatin fibers become more and more packaged and condensed.
- **late prophase** - the nuclear membrane and the nucleolus finally vanishes completely.
- **Metaphase** is a stage in the cell cycle where all the genetic material is condensing into chromosomes.

129.

(c) Callus

Explanation:

Callus - unspecialised, unorganised growing, undifferentiated cell & dividing the mass of cells.

130.

(b) Mesophyll

Explanation:

Mesophyll is the site in plant leaves, where chlorophyll pigment is present. Thus carbon dioxide fixation occurs there, which produces malic acid. It is then transferred to agranal chloroplast in bundle sheath.

131. **(a)** Photosynthesis

Explanation:

Blackman proposed the law of limiting factors in 1905. According to this law, when a process depends on a number of factors, its rate is limited by the pace of the slowest factor. Blackman's law of limiting factors determines the rate of photosynthesis.

132.

(d) O_2

Explanation:

The small bubbles formed around the green parts of an aquatic plant in bright sunlight in the experiment performed by Jan Ingenhousz were of oxygen.

133. **(a)** Converts light energy into chemical energy

Explanation:

Converts light energy into chemical energy

134.

(b) cycle NADH + H^+ back to NAD^+.

Explanation:

The electron transport chain is a process in which the NADH and $FADH_2$ produced during glycolysis, beta-oxidation, and other catabolic processes are oxidised with a release of energy in the form of ATP. The main purpose of electron transport chain is to cycle NADH + H^+ back to NAD^+.

135. **(a)** Plants are grown in controlled environment

Explanation:

Plants are grown in controlled environment

ZOOLOGY

136.

(b) New Zealand

Explanation:

Apteryx Mantelli occurs in isolated and fragmented populations on the North Island and some adjacent islands of New Zealand.

137. **(a)** Homoeothermy

Explanation:

Parrot belongs to Class Aves and platypus and kangaroo belong to Class Mammalia. The animals of both the Classes are warm-blooded (homoiothermous) animals.

138.

(c) Platyhelminthes

Explanation:

Platyhelminthes are mostly endoparasites having hooks and suckers in the parasitic forms. Some of them absorb nutrients from the host directly through their body surface.

139.

(d) Cartilaginous endoskeleton - Chondrichthyes

Explanation:

Phylum chordata includes both jawless vertebrates (agnatha) and jawed vertebrates (gnathostomata). Crocodile belongs to reptilia and has four chambered heart with two auricles and two ventricles. Duck-billed platypus and spiny anteater are oviparous mammals.

140. **(a)** Reptiles

Explanation:

The body of reptiles is covered by dry and cornified skin, epidermal scales or scutes. They do not have external ear openings. Tympanum represents ear.

141. **(a)**

1	2	3
Striated muscle	Smooth muscle	Cardiac muscle

Explanation:

Figures 1, 2, and 3 show striated, smooth and cardiac muscles respectively. Striated muscles show striations. Smooth muscles do not have striations and are spindle-shaped. Cardiac muscle shows striations and has intercalated discs.

142.

(b) only WBC

Explanation:

Lymph is a colourless, mobile, fluid connective tissue. The lymph is usually a clear, transparent fluid. It consists of two parts: a fluid matrix, the plasma, in which float amoeboid cells, the white blood corpuscles, or leucocytes. The lymph differs from the blood in lacking red corpuscles, platelets and some plasma proteins, and in having less calcium and phosphorus than the blood.

143.

(d) Squamous epithelium

Explanation:

Endothelium is the single layer of the squamous epithelium lining the inner wall of blood vessels.

144. **(a)** 12-16/min

Explanation:

The normal respiration rate for an adult at rest is 12 to 20 breaths per minute. A respiration rate under 12 or over 25 breaths per minute while resting is considered abnormal.

145.

(b) Both RBCs and Skeletal muscles

Explanation:

Both RBCs and Skeletal muscles

146.

(b) Only (b)

Explanation:

Total capacity of lungs = vital capacity + residual air

147.

(b) RBCs and plasma

Explanation:

RBCs and plasma

148. **(a)** pleural membrane

Explanation:

The lungs are covered in a membrane called pleural membrane. The outer covering is called parietal pleura and the inner covering is called visceral pleura.

149.

(d) Oxyhaemoglobin

Explanation:

Oxyhaemoglobin

150.

(c) (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)

Explanation:

(A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)

151.

(b) Sertoli cells

Explanation:

Each seminiferous tubule is lined on its inside by two types of cells, male germ cells (spermatogonia) and Sertoli cells. The male germ cells undergo meiotic divisions finally leading to sperm formation, while Sertoli cells provide nutrition to the germ cells.

152.

(d) A - (iv), B - (i), C - (ii), D - (iii)

Explanation:

In human beings, after 1 month of pregnancy, the embryo's heart is formed. By the end of the second month of pregnancy, the foetus develops limbs and digits. By the end of 12 weeks (first trimester), most of the major organ systems are formed. The first movements of the foetus and appearance of hair on the head are usually observed during the fifth month. By the end of 24 weeks (second trimester), the body is covered with fine hair, eyelids separate, and eyelashes are formed.

153.

(d) Inner cell mass

Explanation:

The inner cell mass contains certain cells called stem cells which have the potency to give rise to all the tissues and organs.

154.

(d) (i), (ii), (iii), and (iv)

Explanation:

Introduction of sex education in schools would provide right information to the young and discourage children from believing in myths and having misconceptions about sex-related aspects. Proper information about reproductive organs, adolescence and related changes, safe and hygienic sexual practices, sexually transmitted diseases (STD), AIDS, etc., would help people, especially those in the adolescent age group to lead a reproductively healthy life.

155.

(c) It is an involuntary termination of pregnancy before full term

Explanation:

It is an involuntary termination of pregnancy before full term

156.

(b) Statutory ban on amniocentesis for sex determination to legally check increasing female foeticides.

Explanation:

Statutory ban on amniocentesis for sex determination to legally check increasing female foeticides.

157.

(b) Aquatic animals

Explanation:

Aquatic animals

158.

(d) Silurian → Devonian → Permian → Triassic → Cretaceous

Explanation:

Silurian → Devonian → Permian → Triassic → Cretaceous

159.

(b) running parallel to loop of Henle.

Explanation:

Vasa recta are the blood vessels running parallel to loop of Henle forming a counter-current system in juxta-medullary nephron.

160. **(a)** More diluted urine

Explanation:

The removal of proximal convoluted tubule from the nephron results in lack of reabsorption of high threshold substance from renal tubules and obligatory reabsorption of water is also affected leading to more diluted urine. Since proximal convoluted tubule is mainly associated with reabsorption of much water by osmosis, reabsorption of glucose and amino acids by secondary active transport and other salts and ions as Na^+, K^+ vitamins act by primary active transport.

161.

(d) 1-Renin; 2-Aldosterone; 3-Increased blood pressure

Explanation:

The part labelled as 1, 2, and 3 are renin, aldosterone and Increased blood pressure respectively. The given figure explains reninangiotensin-aldosterone system. The reninangiotensin-aldosterone system (RAAS) is a hormonal system that regulates the body's blood pressure and fluid balance. The system can be activated when there is a loss of blood volume or a drop-in blood pressure (such as in haemorrhage or dehydration). This loss of pressure is interpreted by baroreceptors in the carotid sinus. In alternative fashion, a decrease in filtrate flow rate due to renal hypoperfusion will stimulate the macula densa to signal the juxtaglomerular cells to release renin.

162.

(d) Lungs

Explanation:

Nitrogenous waste products are generated during the breakdown of proteins by the cells as they catabolize amino acids to obtain energy. During the process of delamination, enzymes remove the amino group as ammonia which is highly toxic even in small quantities. In humans, this is combined with carbon dioxide to give urea and uric acid, which is thrown out by the function of the kidneys in the form of urine.

163.

(d) Synovial fluid

Explanation:

Synovial fluid is a transparent viscid lubricating fluid secreted by a membrane of an articulation, bursa, or tendon sheath. Synovial fluid is necessary for normal joint function.

164.

(c) Cori cycle

Explanation:

Generally, the glucose undergoes metabolism in the presence of oxygen to form ATP (Adenosine triphosphate) which is essential for the muscle contraction but during strenuous exercise, the body cannot meet the oxygen demand and the glucose undergoes metabolism in the absence of oxygen which results in the formation and accumulation of lactic acid. This accumulated lactic acid is moved to the liver and converted into glycogen thorough Cori cycle. Cori cycle takes place in the liver. Hence the reactions which change lactic acid into glycogen come under the Cori cycle. So, the correct answer is 'Cori cycle'.

165.

(d) (A)-(iv), (B)-(vi), (C)-(v), (D)-(i), (E)-(ii), (F)-(iii)

Explanation:

(A)-(iv), (B)-(vi), (C)-(v), (D)-(i), (E)-(ii), (F)-(iii)

166.

(c) Conduction is stopped

Explanation:

The purpose of the myelin sheath is to allow electrical impulses to transmit quickly and efficiently along with the nerve cells. Nerve impulses cannot pass through the myelination, so they jump from one node of Ranvier to the next. If the whole nerve becomes myelinated then the conduction will be stopped.

167. **(a)** optic nerves leave the eye and retinal blood vessels enter it.

Explanation:

At blind spot optic nerves leave the eye and retinal blood vessels enter it.

168.

(c) Depolarisation

Explanation:

For visual sense, the nerve impulse is generated by depolarization. The optic nerve is the nerve that carries the visual impulse from the eye to the optic lobe of the forebrain. During depolarization, the charge within the cell rapidly shifts from negative to positive.

169. **(a)** Acetylcholine

Explanation:

Acetylcholine

170.

(d) Aldosterone

Explanation:

Conn's syndrome occurs by the over-secretion of aldosterone by adrenal glands.

171.

(c) Hyper secretion of aldosterone

Explanation:

Hyper secretion of aldosterone

172. **(a)** Hyposecretion of adrenal

Explanation:

Addison's disease is caused due to hyposecretion of steroid hormones, cortisol, and aldosterone, which are secreted from the adrenal cortex of the adrenal glands.

173. **(a)** Parasympathetic neural signals

Explanation:

Parasympathetic nerves decrease cardiac output.

174.

(b) The sympathetic system stimulates heart rate and stroke volume

Explanation:

Neural signals through the sympathetic nerves (part of ANS) can increase the rate of heart beat, the strength of ventricular contraction and thereby the cardiac output.

175.

(c) Statement (d) is correct.

Explanation:

In a standard ECG, a patient is connected to the machine with three electrical leads, one to each wrist and one to the left ankle.

176. **(a)** Arber

Explanation:

Restriction enzymes were discovered and characterized in the late 1960s and early 1970s by molecular biologists Werner Arber, Hamilton O. Smith, and Daniel Nathans.

For their work in the discovery and characterization of restriction enzymes, the 1978 Nobel Prize for Physiology or Medicine was awarded to them.

177.

(b) (i), (ii), and (iv)

Explanation:

In microinjection, DNA is directly injected into plant protoplasts or cells. This method of gene transfer is used to introduce DNA into large cells such as oocytes, eggs, and the cells of early embryo. Electroporation involves a pulse of high voltage applied to

protoplasts/cells/tissues to make transient (temporary) pores in the plasma membrane which facilitates the uptake of foreign DNA.

178.

(b) Ori site

Explanation:

Ori site or the site of origin controls replication in circular plasmid DNA and hence, the copy number of linked DNA in the vector.

179.

(d) live microbial food supplement.

Explanation:

Probiotics are live microorganisms that may be able to help prevent and treat some illnesses. Promoting a healthy digestive tract and a healthy immune system are their most widely studied benefits at this time. These are also commonly known as friendly, good, or healthy bacteria.

180.

(d) Gene therapy

Explanation:

Gene therapy is a technique of genetic engineering which involves replacement of a faulty / disease causing gene by a normal healthy functional gene. The first clinical gene therapy was given in 1990 to a 4 - year old girl with adenosine deaminase (ADA) deficiency. This enzyme is very important for the immune system to function. The deficiency of this enzyme can lead to severe combined immune deficiency (SCID).