



# ALL INDIA TEST SERIES

## NEET - 2020

TEST ID : 2513

TEST-13

DATE : 12-04-2020

Duration 3 Hrs

### INSTRUCTIONS

**Do not open this Booklet until you are asked to do so.**

- The test is of **3 hours** duration and consists of **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**.
- The Answer Sheet is Provided Separately. Fill the particulars Carefully with blue/black ball point pen only.
- Use **Blue/Black Ball point Pen only** for writing particulars on this page/marking responses.
- Rough work is to be done on the space provided for this purpose in the Test Booklet only.
- On completion of the test, the candidate must handover the Answer Sheet to the Invigilator in the Room/Hall.**
- Use of **white fluid for correction is not permissible** on the Answer Sheet.
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- Use of Electronic/Manual Calculators is prohibited.
- No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
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- The candidate should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet.
- The candidates are governed by all Rules and Regulations of the Institute with regard to their conduct in the examination Hall.

### SYLLABUS

<u>PHYSICS</u>	<u>CHEMISTRY</u>	<u>BIOLOGY</u>
Full Syllabus	Full Syllabus	Full Syllabus

Name of the Candidate (in Capitals)

Roll Number (in Figures)

(in Words)

Centre of Examination (in Capitals)

Candidate Signature

Invigilator's Signature

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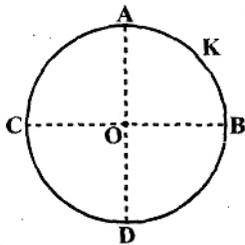
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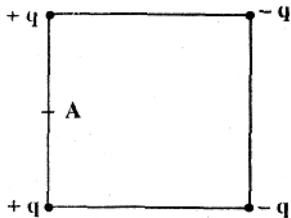
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## PHYSICS

1. The electric potential at a point in free space to a charge  $Q$  coulomb is  $Q \times 10^{11}$  volts, electric field at that point is  
 (a)  $12 \pi \epsilon_0 Q \times 10^{20}$  volt/m  
 (b)  $4 \pi \epsilon_0 Q \times 10^{20}$  volt/m  
 (c)  $12 \pi \epsilon_0 Q \times 10^{22}$  volt/m  
 (d)  $4 \pi \epsilon_0 Q \times 10^{22}$  volt/m
2. A thin conducting ring of radius  $R$  is given a charge  $+Q$ . The electric field at the centre  $O$  of the ring due to the charge on the part  $AKB$  of the ring is  $E$ . The electric field at the centre due to the charge on the part  $ACDB$  of the ring is



- (a)  $E$  along  $OK$       (b)  $E$  along  $KO$   
 (c)  $3E$  along  $OK$       (d)  $3E$  along  $KO$
3. Four electric charges  $+q$ ,  $+q$ ,  $-q$  and  $-q$  are placed at the corners of a square of side  $2L$  (see figure). The electric potential at point  $A$ , midway between the two charges  $+q$  and  $+q$ , is



- (a)  $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} (1 + \sqrt{5})$  (b)  $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} \left(1 + \frac{1}{\sqrt{5}}\right)$   
 (c)  $\frac{1}{4\pi\epsilon_0} \frac{2q}{L} \left(1 - \frac{1}{\sqrt{5}}\right)$  (d) zero.
4. What is the flux through a cube of side  $a$  if a point charge of  $q$  is at one of its corner ?

(a)  $\frac{q}{\epsilon_0}$       (b)  $\frac{q}{\epsilon_0} \cdot 6a^2$       (c)  $\frac{2q}{\epsilon_0}$       (d)  $\frac{q}{8\epsilon_0}$

5. Four points charges  $-Q$ ,  $-q$ ,  $2q$  and  $2Q$  are placed, one at each corner of the square. The relation between  $Q$  and  $q$  for which the potential at the centre of the square is zero, is  
 (a)  $Q = q$       (b)  $Q = + \frac{1}{q}$   
 (c)  $Q = -q$       (d)  $Q = - \frac{1}{q}$

6. The electric field associated with an e.m. wave in vacuum is given by

$$E = \hat{i} 40 \cos (ka - 6 \times 10^8 t),$$

where  $E$ ,  $z$  and  $t$  are in volt/m, metre and seconds respectively. The value of wave vector  $k$  is

(a)  $6 \text{ m}^{-1}$       (b)  $3 \text{ m}^{-1}$       (c)  $2 \text{ m}^{-1}$       (d)  $0.5 \text{ m}^{-1}$

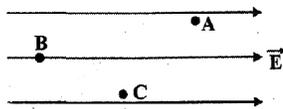
7. An electric dipole of moment  $p$  is placed in an electric field of intensity  $E$ . The dipole acquires a position such that the axis of the dipole makes an angle  $\theta$  with the direction of the field. Assuming that the potential energy of the dipole to be zero when  $\theta = 90^\circ$ , the torque and the potential energy of the dipole will respectively be  
 (a)  $pE \sin \theta$ ,  $2pE \cos \theta$   
 (b)  $pE \cos \theta$ ,  $-pE \sin \theta$   
 (c)  $pE \sin \theta$ ,  $-pE \cos \theta$   
 (d)  $pE \sin \theta$ ,  $-2pE \cos \theta$

8. **Assertion :** If a proton and an electron are placed in the same uniform electric field, they experience different acceleration.

**Reason :** Electric force on a test charge is independent of its mass.

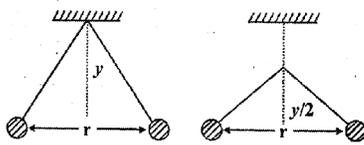
- (a) If both assertion and reason are true and reason is the correct explanation of assertion.  
 (b) If both assertion and reason are true but reason is not the correct explanation of assertion.  
 (c) If assertion is true but reason is false.  
 (d) If assertion is false but reason is true.
9. A, B and C are three points in a uniform electric field. The electric potential is

Space for Rough Work



- (a) Maximum at A
- (b) Maximum at B
- (c) Maximum at C
- (d) Same at all the three points A, B and C

10. Two pith balls carrying equal charges are suspended from a common point by strings of equal length, the equilibrium separation between them is  $r$ . Now the strings are rigidly clamped at half the height. The equilibrium separation between the balls now become



- (a)  $\left(\frac{1}{\sqrt{2}}\right)^2$
- (b)  $\left(\frac{r}{\sqrt[3]{2}}\right)$
- (c)  $\left(\frac{2r}{\sqrt{3}}\right)$
- (d)  $\left(\frac{2r}{3}\right)$

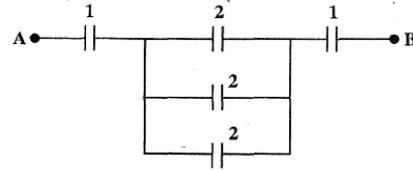
11. The energy required to change a parallel plate condenser of plate separation  $d$  and plate area of cross-section  $A$  such that the uniform electric field between the plates is  $E$ , is

- (a)  $\epsilon_0 E^2 / Ad$
- (b)  $\epsilon_0 E^2 Ad$
- (c)  $\frac{1}{2} \epsilon_0 E^2 Ad$
- (d)  $\frac{1}{2} \epsilon_0 E^2 / Ad$

12. A parallel plate air capacitor of capacitance  $C_0$  is connected to a cell of e.m.f.  $V$  and then disconnected from it. A dielectric slab of dielectric constant  $K$ , which can just fill the air gap of the capacitor, is now inserted in it. Which of the following is incorrect ?

- (a) The potential difference between the plates decreases  $K$  times
- (b) The energy stored in the capacitor decreases  $K$  times
- (c) The change in energy  $\frac{1}{2} C_0 V^2 (K - 1)$
- (d) The change in energy  $\frac{1}{2} C_0 V^2 \left(\frac{1}{K} - 1\right)$ .

13. In the connections shown in the adjoining figure, the equivalent capacity between A and B will be



- (a)  $\frac{13}{6}$
- (b)  $\frac{6}{13}$
- (c) 6
- (d) 13.

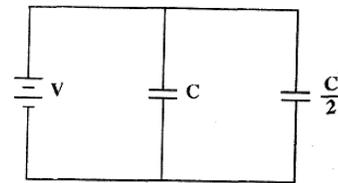
14. The energy stored in a condenser of capacity  $C$  which has been raised to a potential  $V$  is given by

- (a)  $\frac{1}{2} CV$
- (b)  $\frac{1}{2} CV^2$
- (c)  $CV$
- (d)  $\frac{1}{2VC}$

15. Work done in placing a charge of  $8 \times 10^{-18}$  C on a condenser of capacity  $100 \mu\text{F}$  is

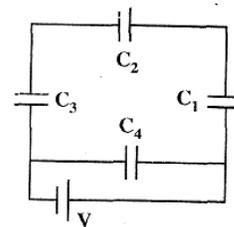
- (a)  $16 \times 10^{-32}$  J
- (b)  $31 \times 10^{-26}$  J
- (c)  $4 \times 10^{-10}$  J
- (d)  $32 \times 10^{-32}$  J

16. Two condensers, one of capacity  $C$  and the other of capacity  $\frac{C}{2}$ , are connected to a  $V$  volt battery, as shown. The work done in charging fully both the condensers is



- (a)  $2CV^2$
- (b)  $\frac{1}{4} CV^2$
- (c)  $\frac{3}{4} CV^2$
- (d)  $\frac{1}{2} CV^2$

17. A network of four capacitors of capacities equal to  $C_1 = C$ ,  $C_2 = 2C$ ,  $C_3 = 3C$  and  $C_4 = 4C$  are connected to a battery as shown in the figure. The ratio of the charges on  $C_2$  and  $C_4$  is

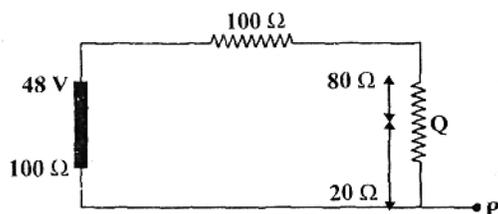


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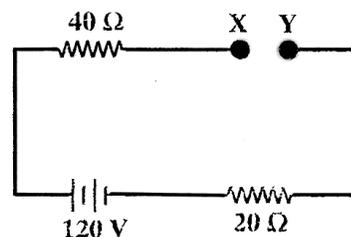
- (a)  $\frac{22}{3}$  (b)  $\frac{3}{22}$  (c)  $\frac{7}{4}$  (d)  $\frac{4}{7}$
- 18.** A parallel plate air capacitor has a capacitance  $C$ . When it is half filled with a dielectric of dielectric constant 5, the percentage increase in the capacitance will be  
(i) 400% (b) 66.6% (c) 33.3% (d) 200%
- 19.** The capacitance of a parallel plate capacitor with air as medium is  $3 \mu\text{F}$ . With the introduction of a dielectric medium between the plates, the capacitance becomes  $15 \mu\text{F}$ . The permittivity of the medium is  
(a)  $5 \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$   
(b)  $15 \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$   
(c)  $0.44 \times 10^{-10} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$   
(d)  $8.845 \times 10^{-11} \text{ C}^2 \text{ N}^{-1} \text{ m}^{-2}$
- 20.** A series combination of  $n_1$  capacitors, each of value  $C_1$ , is charged by a source of potential difference  $4V$ . When another parallel combination of  $n_2$  capacitors, each of value  $C_2$ , is charged by a source of potential difference  $V$ , it has the same (total) energy stored in it, as the first combination has. The value of  $C_2$ , in terms of  $C_1$ , is then  
(a)  $\frac{2C_1}{n_1 n_2}$  (b)  $16 \frac{n_2}{n_1} C_1$   
(c)  $2 \frac{n_2}{n_1} C_1$  (d)  $\frac{16C_1}{n_1 n_2}$
- 21.** The mean free path of electrons in a metal is  $4 \times 10^{-8} \text{ m}$ . The electric field which can give on an average  $2 \text{ eV}$  energy to an electron in the metal will be in unit of  $\text{Vm}^{-1}$   
(a)  $8 \times 10^7$  (b)  $5 \times 10^{-11}$   
(c)  $8 \times 10^{-11}$  (d)  $5 \times 10^7$
- 22.** A steady current is set up in a metallic wire of non-uniform cross-section. How is the rate of flow  $K$  of electrons related to the area of cross-section  $A$ ?  
(a)  $K$  is independent of  $A$   
(b)  $K \propto A^{-1}$   
(c)  $K \propto A$   
(d)  $K \propto A^2$
- 23.** The maximum current that flows in the fuse wire, before it blows out, varies with the radius  $r$  as  
(a)  $r^{3/2}$  (b)  $r$  (c)  $r^{2/3}$  (d)  $r^{1/2}$
- 24.** The length of the wire is doubled, its conductance will  
(a) remain unchanged (b) be halved  
(c) be doubled (d) be quadrupled
- 25.** In electrolysis the mass deposited on an electrode is directly proportional to  
(a) current  
(b) square of current  
(c) concentration of solution  
(d) inverse of current
- 26.** The resistance of the filament of a lamp increases with the increase in temperature. A lamp rated  $100 \text{ W}$  and  $200 \text{ V}$  is connected across  $220 \text{ V}$  power supply. If the voltage drops by  $10\%$ , then the power of the lamp will be  
(a)  $90 \text{ W}$   
(b)  $81 \text{ W}$   
(c) between  $90$  and  $100 \text{ W}$   
(d) between  $81$  and  $90 \text{ W}$
- 27.** Two wires of the same material but of different diameters carry the same current  $I$ . If the ratio of their diameters is  $2 : 1$ , then the corresponding ratio of their mean drift velocities will be  
(a)  $4 : 1$  (b)  $1 : 1$  (c)  $1 : 2$  (d)  $1 : 4$
- 28.** In producing chlorine by electrolysis  $100 \text{ kW}$  power at  $125 \text{ V}$  is being consumed. How much chlorine per minute is liberated (ECE of chlorine is  $0.367 \times 10^{-1} \text{ kgC}^{-1}$ )  
(a)  $1.76 \times 10^{-3} \text{ kg}$  (b)  $9.67 \times 10^{-3} \text{ kg}$   
(c)  $17.61 \times 10^{-3} \text{ kg}$  (d)  $3.67 \times 10^{-3} \text{ kg}$
- 29.** The rate of increase of thermo e.m.f. with temperature at the neutral temperature of a thermocouple  
(a) is positive  
(b) is zero  
(c) depends upon the choice of the two materials of the thermocouple  
(d) is negative

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- 30.** If voltage across a bulb rated 220 volt-100 watt drops by 2.5% of its rated value, the percentage of the rated value by which the power would decrease is  
 (a) 5% (b) 10% (c) 20% (d) 2.5%
- 31.** The potential difference across the terminals of a battery is 50 V when 11 A current is drawn and 60 V when 1 A current is drawn. The emf and the internal resistance of the battery are  
 (a) 62 V, 2  $\Omega$  (b) 63 V, 1  $\Omega$   
 (c) 61 V, 1  $\Omega$  (d) 64 V, 2  $\Omega$
- 32.** Two electric bulbs rated 50 W and 100 V are glowing at full power, when used in parallel with a battery of emf 120 V and internal resistance 10  $\Omega$ . The maximum number of bulbs that can be connected in the circuit when glowing at full power, is  
 (a) 6 (b) 4 (c) 2 (d) 8
- 33.** In an experiment of Wheatstone bridge, a null point is obtained at the centre of the bridge wire. When a resistance of 10  $\Omega$  is connected in one gap, the value of resistance in other gap is  
 (a) 10  $\Omega$  (b) 5  $\Omega$  (c)  $\frac{1}{2}$   $\Omega$  (d) 500  $\Omega$



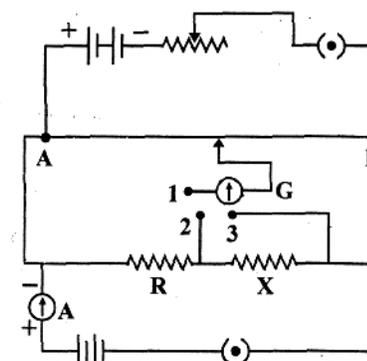
- (a) 9.6 V (b) 6.6 V (c) 4.6 V (d) 3.2 V
- 35.** A battery of e.m.f. 10 V and internal resistance 3  $\Omega$  is connected to a resistor. The current in the circuit is 0.5 A. The terminal voltage of the battery when the circuit is closed is  
 (a) 10 V (b) zero (c) 1.5 V (d) 8.5 V
- 36.** In the circuit shown in the figure, the potential difference between X and Y will be



- (a) zero (b) 20 V (c) 60 V (d) 120 V

- 37.** In a Wheatstone's bridge all the four arms have equal resistance R. If the resistance of the galvanometer arm is also R, the equivalent resistance of the combination as seen by the battery is  
 (a) R (b) 2 R (c)  $\frac{R}{4}$  (d)  $\frac{R}{2}$

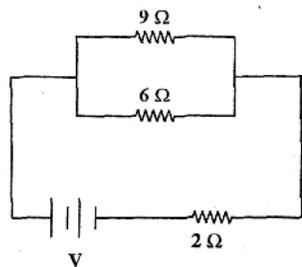
- 38.** A potentiometer circuit is set up as shown. The potential gradient across the potentiometer wire, is k V/cm and the ammeter, present in the circuit, reads 1.0 A when two way key is switched off. The balance points, when the key between the terminals (i) 1 and 2 (ii) 1 and 3, is plugged in, are found to be at lengths  $l_1$  cm and  $l_2$  cm respectively. The magnitudes, of the resistors R and X, in ohm, are then, equal, respectively, to



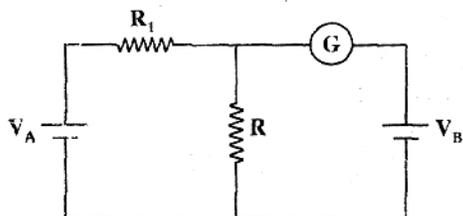
- (a)  $k(l_2 - l_1)$  and  $k l_2$   
 (b)  $k l_1$  and  $k(l_2 - l_1)$   
 (c)  $k(l_2 - l_1)$  and  $k l_1$   
 (d)  $k l_1$  and  $k l_2$

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39. If power dissipated in the  $9\ \Omega$  resistor in the circuit shown is 36 watt, the potential difference across the  $2\ \Omega$  resistor is

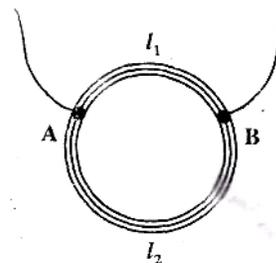


- (a) 4 volt (b) 8 volt (c) 10 volt (d) 2 volt
40. Consider the following two statements  
 I. Kirchhoff's junction law follows from the conservation of charge.  
 II. Kirchhoff's loop law follows from the conservation of energy.  
 Which of the following is correct?  
 (a) both I and II are wrong  
 (b) I is correct and II is wrong  
 (c) I is wrong and II is correct  
 (d) both I and II are correct
41. In the circuit shown the cells A and B have negligible resistances. For  $V_A = 12\text{ V}$ ,  $R_1 = 500\ \Omega$  and  $R = 100\ \Omega$  the galvanometer (G) shows no deflection. The value of  $V_B$  is



- (a) 12 V (b) 6 V (c) 4 V (d) 2 V
42. A current of 2 A flows through a  $2\ \Omega$  resistor when connected across a battery. The same battery supplies a current of 0.5 A when connected across a  $9\ \Omega$  resistor. The internal resistance of the battery is  
 (a)  $0.5\ \Omega$  (b)  $\frac{1}{3}\ \Omega$  (c)  $\frac{1}{4}\ \Omega$  (d)  $1\ \Omega$
43. A ring is made of a wire having a resistance  $R_0 = 12\ \Omega$ . Find the points A and B, as shown in the figure, at which a current

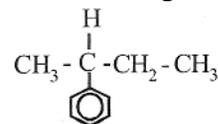
carrying conductor should be connected so that the resistance  $R$  of the sub circuit between these points is equal to  $\frac{8}{3}\ \Omega$



- (a)  $\frac{I_1}{I_2} = \frac{3}{8}$  (b)  $\frac{I_1}{I_2} = \frac{1}{2}$  (c)  $\frac{I_1}{I_2} = \frac{5}{8}$  (d)  $\frac{I_1}{I_2} = \frac{1}{3}$
44. The internal resistance of a 2.1 V cell which gives a current of 0.2 A through a resistance of  $10\ \Omega$  is  
 (a)  $0.2\ \Omega$  (b)  $0.5\ \Omega$  (c)  $0.8\ \Omega$  (d)  $1.0\ \Omega$
45. The resistances of the four arms P, Q, R and S in a Wheatstone's bridge are 10 ohm, 30 ohm, 30 ohm and 90 ohm, respectively. The e.m.f. and internal resistance of the cell are 7 volt and 5 ohm respectively. If the galvanometer resistance is 50 ohm, the current drawn from the cell will be  
 (a) 1.0 A (b) 0.2 A (c) 0.1 A (d) 2.0 A

### CHEMISTRY

46. The correct decreasing order of priority of functional groups is  
 (a)  $-\text{SO}_3\text{H}$ ,  $-\text{OH}$ ,  $-\text{COCl}$ ,  $>\text{C}=\text{C}$   
 (b)  $-\text{COOH}$ ,  $-\text{SO}_3\text{H}$ ,  $-\text{COOR}$ ,  $-\text{OH}$   
 (c)  $-\text{C}\equiv\text{C}$ ,  $-\text{NH}_2$ ,  $-\text{OH}$ ,  $>\text{C}=\text{O}$   
 (d)  $-\text{CN}$ ,  $-\text{CONH}_2$ ,  $>\text{C}=\text{O}$ ,  $-\text{OH}$
47. IUPAC name of following compound is

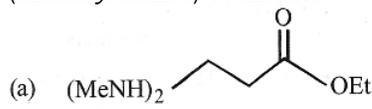
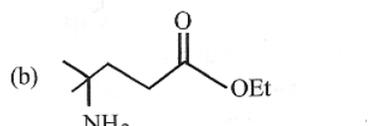
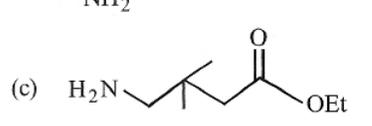
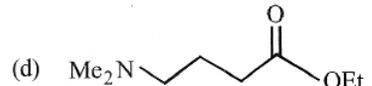


- (a) 2-cyclohexylbutane  
 (b) 2-phenylbutane  
 (c) 3-cyclohexylbutane  
 (d) 3-phenylbutane
48. Which of the following compounds has wrong IUPAC name?

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- (a)  $\text{CH}_3\text{-CH}_2\text{-CH}_2\text{-COO-CH}_2\text{CH}_3 \rightarrow$  ethyl butanoate  
 (b)  $\text{CH}_3\text{-CH(CH}_3\text{)-CH}_2\text{-CHO} \rightarrow$  3-methyl-butanal  
 (c)  $\text{CH}_3\text{-CH(OH)-CH(CH}_3\text{)-CH}_3 \rightarrow$  2-methyl-3-butanol  
 (d)  $\text{CH}_3\text{-CH(CH}_3\text{)-C(=O)-CH}_2\text{-CH}_3 \rightarrow$  2-methyl-3-pentanone

49. Which one of the following is ethyl-4-(dimethyl amino) butanoate ?

- (a) 
- (b) 
- (c) 
- (d) 

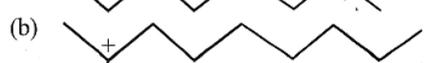
50. Which of the following statements is not correct ?

- (a) Carbocation posses sextet of electrons.  
 (b) The order of carbocation stability is :  
 $\text{CH}_3^+ > (\text{CH}_3)_2\text{CH}^+ > (\text{CH}_3)_3\text{C}^+$   
 (c) Carbocations have trigonal planar shape  
 (d) Carbocations are formed by heterolytic cleavage

51. Which of the following is not correctly matched ?

- | Group showing + R effect | Group showing - R effect |
|--------------------------|--------------------------|
| (a) -NHCOR               | -COOH                    |
| (b) $\text{>C=O}$        | -OH                      |
| (c) -OR                  | -CHO                     |
| (d) -OCOR                | -NO <sub>2</sub>         |

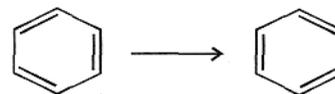
52. Select the most stable carbocation amongst the following

- (a) 
- (b) 
- (c) 
- (d) 

53. Arrange the carbanions,  $(\text{CH}_3)_3\text{C}^-$ ,  $\text{C}_6\text{H}_5\text{C}^-\text{Cl}_3$ ,  $(\text{CH}_3)_2\text{CH}^-$ ,  $\text{C}_6\text{H}_5\text{C}^-\text{H}_2$  in order of their decreasing stability:

- (a)  $(\text{CH}_3)_2\text{CH}^- > \text{C}_6\text{H}_5\text{C}^-\text{H}_2 > \text{C}_6\text{H}_5\text{C}^-\text{Cl}_3 > (\text{CH}_3)_3\text{C}^-$   
 (b)  $\text{C}_6\text{H}_5\text{C}^-\text{Cl}_3 > \text{C}_6\text{H}_5\text{C}^-\text{H}_2 > (\text{CH}_3)_2\text{CH}^- > (\text{CH}_3)_3\text{C}^-$   
 (c)  $(\text{CH}_3)_3\text{C}^- > (\text{CH}_3)_2\text{CH}^- > \text{C}_6\text{H}_5\text{C}^-\text{H}_2 > \text{C}_6\text{H}_5\text{C}^-\text{Cl}_3$   
 (d)  $\text{C}_6\text{H}_5\text{C}^-\text{H}_2 > \text{C}_6\text{H}_5\text{C}^-\text{Cl}_3 > (\text{CH}_3)_3\text{C}^- > (\text{CH}_3)_2\text{CH}^-$

54. Which of the following statements regarding the resonance energy of benzene is correct ?



- (a) Resonance energy is the energy required to break the C - H bond in benzene  
 (b) Resonance energy is the energy required to break the C - C bond in benzene  
 (c) Resonance energy is a measure of stability of benzene  
 (d) Resonance energy is the energy required to convert

55. Which of the following is not the criteria of purity of a substance ?

- (a) solubility (b) melting point  
 (c) boiling point (d) density

56. In estimation of percentage of oxygen. The mixture of gaseous products containing oxygen is passed over red hot coke. All oxygen is converted to A. This mixture is passed through B when A is converted to C. What is A, B and C in above statement.

- (a) A = CO<sub>2</sub>, B = KOH, C = pure O<sub>2</sub>  
 (b) A = CO, B = I<sub>2</sub>O<sub>5</sub>, C = CO<sub>2</sub>  
 (c) A = CO, B = I<sub>2</sub>, C = CO<sub>2</sub>

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(d) A = CO<sub>2</sub>, B = Ca(OH)<sub>2</sub>, C = CaCO<sub>3</sub>

57. Which of the following statement(s) is/are correct ?

- (i) A carbon atom having an sp hybrid orbital is less electronegative than carbon atoms possessing sp<sup>2</sup> or sp<sup>3</sup> hybridised orbitals.  
 (ii) π-bonds provide the most reactive centres in the molecules containing multiple bonds  
 (iii) The number of σ and π bonds in compound CH<sub>2</sub>=C=CHCH<sub>3</sub> are 7 and 2 respectively,

- (a) (i) and (iii)                      (b) (ii) and (iii)  
 (c) (ii) only                              (d) (i) only

58. Which of the following is/are correct for inductive effect ?

- (i) In inductive effect polarisation of sigma bond is caused by the adjacent σ bond,  
 (ii) Halogens, -NO<sub>2</sub>, -CN, and -CH<sub>3</sub> are electron withdrawing groups.  
 (iii) -CH<sub>2</sub>CH<sub>3</sub> and -OC<sub>6</sub>H<sub>5</sub> are electron donating groups,

- (a) (i) only                              (b) (ii) only  
 (c) (i) and (iii)                        (d) (i), (ii) and (iii)

59. Match the columns

Column-I

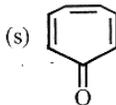
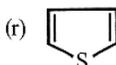
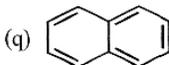
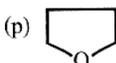
(A) Non - benzenoid compound

(B) Alicyclic compound

(C) Benzenoid compound

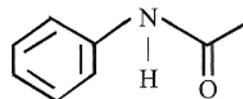
(D) Heterocyclic aromatic compound

Column-II



- (a) A - (r), B - (p), C - (s), D - (q)  
 (b) A - (s), B - (p), C - (q), D - (r)  
 (c) A - (p), B - (r), C - (s), D - (q)  
 (d) A - (r), B - (p), C - (q), D - (s)

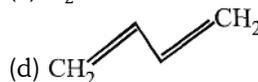
60. The IUPAC name of the following compounds is



- (a) N-phenyl ethanamide  
 (b) N-phenyl ethanone  
 (c) N-phenyl methanamide  
 (d) None of these

61. Which of the following represents the given mode of hybridisation sp<sup>2</sup> - sp<sup>2</sup> - sp - sp from left to right ?

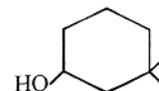
- (a) H<sub>2</sub>C = CH - C ≡ N  
 (b) CH ≡ C - C ≡ CH  
 (c) H<sub>2</sub>C = C = C = CH<sub>2</sub>



62. The compound in which <sup>x</sup>C uses its sp<sup>3</sup> - hybrid orbitals for V bond formation is

- (a) <sup>x</sup>HCOOH                              (b) (H<sub>2</sub>N)<sub>2</sub><sup>x</sup>CO  
 (c) (CH<sub>3</sub>)<sub>3</sub><sup>x</sup>COH                        (d) CH<sub>3</sub><sup>x</sup>CHO

63. The IUPAC name of the compound is



- (a) 3, 3-dimethyl-1-cyclohexanol  
 (b) 1, 1-dimethyl-3-hydroxycyclohexane  
 (c) 3, 3-dimethyl-1-hydroxy cyclohexane  
 (d) 1, 1-dimethyl-3-cyclohexanol

64. Which pair of isomerism is not possible together?

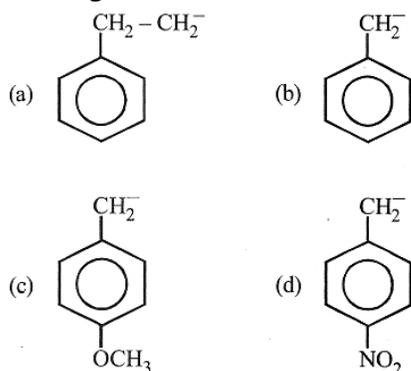
- (a) Ring-chain and functional  
 (b) Geometrical and optical  
 (c) Metamerism and functional  
 (d) Metamerism and chain

65. Which of the following represents the correct order of stability of the given carbocations ?

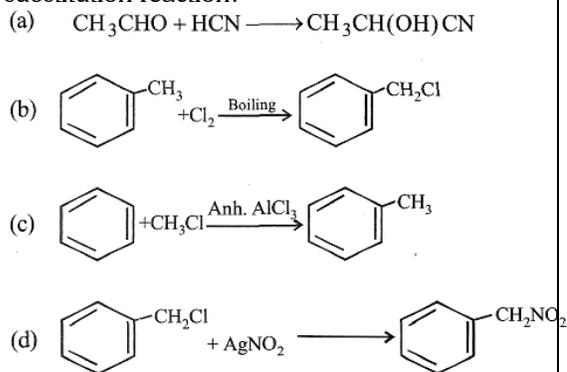
- (a) F<sub>3</sub>C<sup>+</sup> > F<sub>3</sub>C-C<sup>+</sup> > CH<sub>3</sub><sup>+</sup>    (b) H<sub>3</sub>C<sup>+</sup> > F<sub>3</sub>C-C<sup>+</sup> > F<sub>3</sub>C<sup>+</sup>  
 (c) F<sub>3</sub>C-C<sup>+</sup> > F<sub>3</sub>C<sup>+</sup> > H<sub>3</sub>C<sup>+</sup>    (d) F<sub>3</sub>C-C<sup>+</sup> > H<sub>3</sub>C<sup>+</sup> > F<sub>3</sub>C<sup>+</sup>

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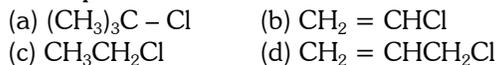
66. The most stable carbanion among the following is



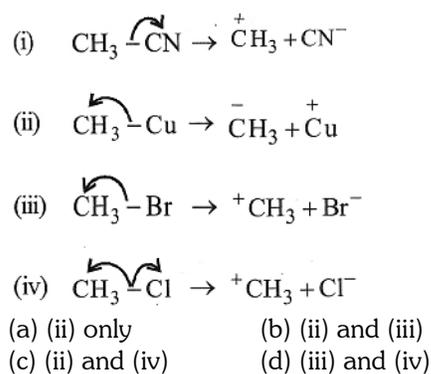
67. Which one of the following is a free-radical substitution reaction?



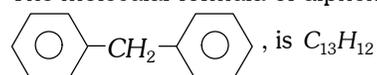
68. Which of the following is least reactive in a nucleophilic substitution reaction.



69. Which of the following does not represent formation of reactive intermediate correctly?



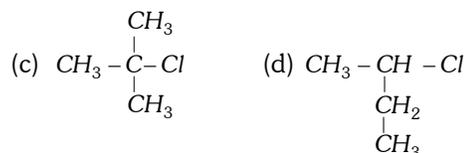
70. The molecular formula of diphenyl methane,



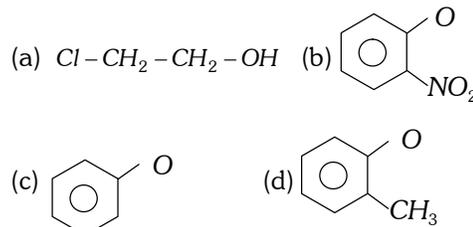
How many structural isomers are possible when one of the hydrogens is replaced by a chlorine atom

- (a) 8 (b) 7 (c) 6 (d) 4

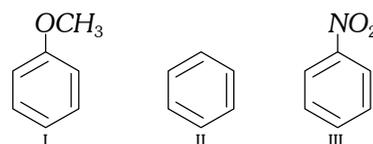
71.  $\text{S}_{\text{N}}1$  reaction is faster in



72. Which one of the following compounds is most acidic



73. Among the following compounds (I-III) the correct order of reaction with electrophilic reagent is



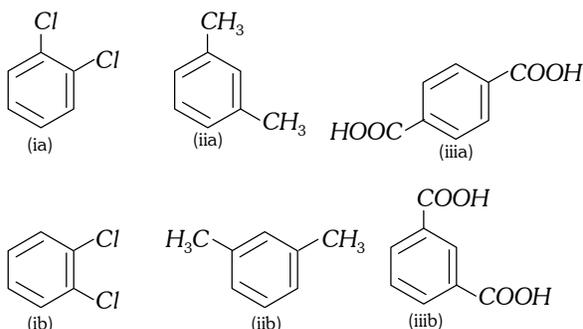
- (a)  $\text{II} > \text{III} > \text{I}$  (b)  $\text{III} < \text{I} < \text{II}$   
 (c)  $\text{I} > \text{II} > \text{III}$  (d)  $\text{I} = \text{II} > \text{III}$

74. Which one of the following pairs represents stereoisomerism

- (a) Chain isomerism and rotational isomerism  
 (b) Structural isomerism and geometric isomerism  
 (c) Linkage isomerism and geometric isomerism  
 (d) Optical isomerism and geometric isomerism

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75. Examine the following three pairs of possible isomers



Now state whether the pairs represent identical compounds or different isomers

- (a) All three pairs represent different compounds  
 (b) (ia) and (ib) are identical; (iia) and (iib) are identical; and (iia) and (iib) are identical  
 (c) (ia) and (ib) are isomers; (iia) and (iib) are identical; and (iia) and (iib) are isomers  
 (d) (ia) and (ib) are identical; (iia) and (iib) are identical, and (iia) and (iib) are isomers

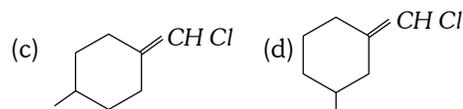
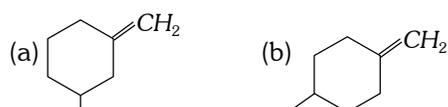
76. Which of the following gives most stable carbocation by dehydration

- (a)  $(CH_3)_2CH-OH$   
 (b)  $(CH_3)_3C-OH$   
 (c)  $CH_3-CH_2-OH$   
 (d)  $CH_3-CH_2-O-CH_2-CH_3$

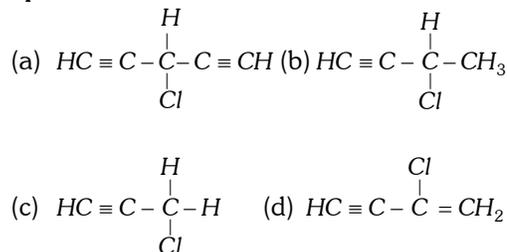
77. The C - C bond length of the following molecules is in the order

- (a)  $C_2H_6 > C_2H_4 > C_6H_6 > C_2H_2$   
 (b)  $C_2H_2 < C_2H_4 < C_6H_6 < C_2H_6$   
 (c)  $C_2H_6 > C_2H_2 > C_6H_6 > C_2H_4$   
 (d)  $C_2H_4 > C_2H_6 > C_2H_2 > C_6H_6$

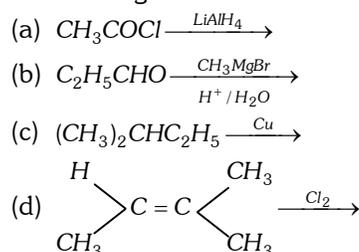
78. The geometrical isomerism is shown by



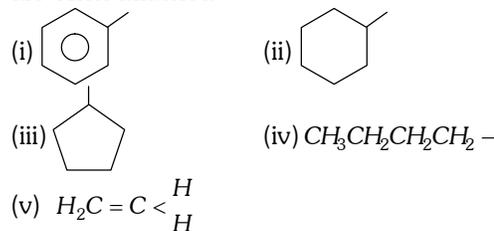
79. Which of the following is most likely to show optical isomerism



80. Which will give chiral molecule



81. Examine the following common chemical structures to which simple functional groups are often attached



Which of these systems have essentially planar geometry

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

82. The number of  $\pi$  bonds in 3-hexyne-1-ene is

- (a) 1 (b) 2 (c) 3 (d) 4

83. A carbon-carbon triple bond in ethyne ( $-C \equiv C-$ ) consists of

- (a) All  $\sigma$  bonds  
 (b) Two  $\sigma$  bonds and one  $\pi$ -bond  
 (c) One  $\sigma$  bond and two  $\pi$  bonds

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- (d) All  $\pi$  bonds
84. Maximum bond energy of C-H bonds is found in the compound
- Ethane
  - Ethene
  - Ethyne
  - Equal in all the three

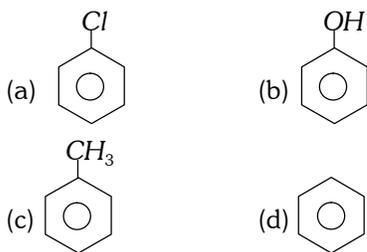
85. Which of the following is the most stable compound

- $Ph_3C^+$
- $Ph_2CH^+$
- $Ph_3CH_2^+$
- $PhCH_2^+$

86. The order of decreasing stability of the carbanions

- $(CH_3)_3\bar{C}$
  - $(CH_3)_2\bar{C}H$
  - $CH_3\bar{C}H_2$
  - $C_6H_5\bar{C}H_2$  is
- $1 > 2 > 3 > 4$
  - $4 > 3 > 2 > 1$
  - $4 > 1 > 2 > 3$
  - $1 > 2 > 4 > 3$

87. Which of the following will be most easily attacked by an electrophile



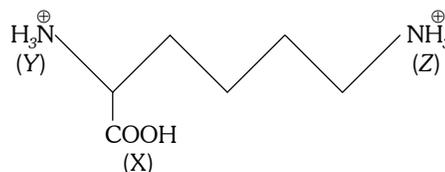
88. Reactivity towards nucleophilic addition reaction of (I)  $HCHO$ , (II)  $CH_3CHO$ , (III)  $CH_3COCH_3$  is

- $II > III > I$
- $III > II > I$
- $I > II > III$
- $I > II < III$

89. Which of the following requires radical intermediate

- $CH_3 - CH = CH_2 + HBr \rightarrow CH_3 - \underset{\text{Br}}{\text{CH}} - CH_3$
- $CH_3 - CHO + HCN \rightarrow CH_3 - \underset{\text{OH}}{\text{CH}} \begin{matrix} \text{CN} \\ \text{OH} \end{matrix}$
- $CH_3 - CH = CH_2 + HBr \rightarrow CH_3 - CH_2 - CH_2 - Br$
- $CH_3CHO + NH_2OH \xrightarrow{H^+} CH_3 - CH = N - OH$

90. In the compound given below



The correct order of the acidity of the positions (X), (Y) and (Z) is

- $(Z) > (X) > (Y)$
- $(X) > (Y) > (Z)$
- $(X) > (Z) > (Y)$
- $(Y) > (X) > (Z)$

## BIOLOGY

91. Which of the following pairs of the cell structures are important for determining the movement of molecules in or out of the plant cell ?

- Tonoplast + Vacuolar membrane
- Tonoplast + Cell membrane
- Cell wall + Cell membrane
- Cell wall + Tonoplasts.

92. Find out the incorrect statements.

- The process of plasmolysis is usually irreversible.
- The pressure exerted by the protoplasts due to entry of water against the rigid walls is called  $\psi_p$ .
- The T.P. is responsible for enlargement and extension growth of cells.
- Plant cells swell in hypotonic solutions.

93. Which of the following statement is incorrect regarding stomata?

- It helps in exchange of oxygen and carbon dioxide in the leaf.
- It is open in the day time and close during the night.
- Opening or closing of the stomata is a change in the turgidity of the guard cells.
- The inner wall of each guard cell, towards the stomatal aperture is thin and rigid.

94. Which of the following statements is/are not incorrect ?

- Water and minerals, and food are generally moved by a mass or bulk flow system,
- Bulk flow can be achieved either through a positive hydrostatic pressure gradient or

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- a negative hydrostatic pressure gradient,  
 (iii) The bulk movement of substances through the conducting tissues of plants is called translocation.  
 (iv) Xylem translocates organic and inorganic solutes, mainly from roots to the aerial parts of the plants.  
 (v) Phloem translocates water, mineral salts, some organic nitrogen and hormones, from the leaves to other parts of the plants.

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

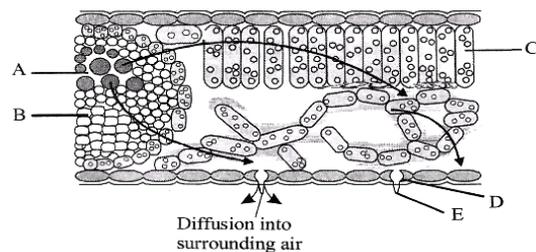
**95.** The following statements are associated with translocation of mineral ions.

- (i) Mineral ions are slowly remobilised.  
 (ii) Younger leaves export most of their minerals content to older leaves.  
 (iii) Elements most readily mobilised are P, S, N and K.  
 (iv) Some elements that are structural components like calcium are not remobilised.

Which of the above statements are correct?

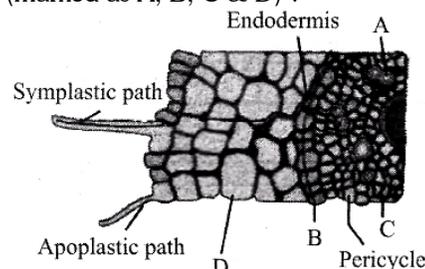
- (a) (i) and (iii)              (b) (i) and (ii)  
 (c) (iii) and (iv)            (d) (ii) and (iii)

**96.** Choose the option which shows the correct labelling of the parts marked as A, B, C, D and E in the given figure of water movement in the leaf.



- (a) A - Tracheids, B - Phloem, C - Mesophyll, D - Stomatal pore, E - Guard cell  
 (b) A - Phloem, B - Xylem, C - Palisade, D - Guard Cell, E - Water pore  
 (c) A - Xylem, B - Phloem, C - Palisade, D - Guard cell, E - Stomatal pore  
 (d) A - Phloem, B - Xylem, C - Mesophyll cell, D - guard cell, E - Water pore

**97.** The given figure represents symplastic and apoplastic pathways of water & ion absorption & movement in roots. Few parts are marked as A, B, C & D. At the endodermis, water movement through the apoplast pathway is obstructed by which part (marked as A, B, C & D) ?



- (a) A      (b) B      (c) C      (d) D

**98.** A plant cell placed in pure water will

- (a) expand until the osmotic potential or solute potential reaches that of water.  
 (b) becomes more turgid until the pressure potential of cell reaches its osmotic potential.  
 (c) become more turgid until osmotic potential reaches that of pure water.  
 (d) becomes less turgid until the osmotic potential reaches that of pure water.

**99.** Water will move from its region of higher chemical potential to its region of lower chemical potential until

- (a) equilibrium is reached.  
 (b) amount of both solvent and solute in both regions become equal.  
 (c) solvent amount in both regions become equal.  
 (d) solute amount in both regions become equal.

**100.** Read the given statement and answer the question :

"Osmosis is the diffusion of a solution of a weaker concentration when both are separated by semipermeable membrane".

What is the error in the statement ?

- (a) The movement of solvent molecule is not specified.  
 (b) There is no mention of DPD.  
 (c) Behaviour of semipermeable membrane

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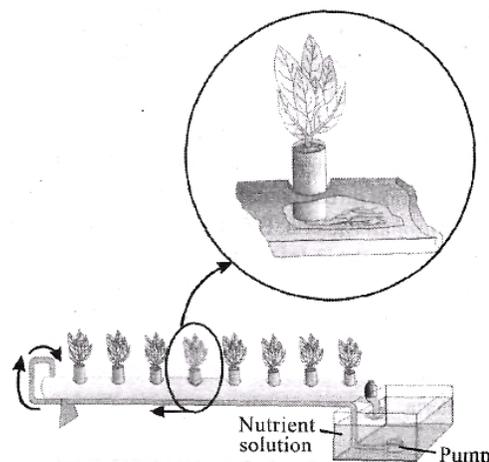
- is not specified.
- (d) The exact concentration of solutions are not indicated.
- 101.** A cell is said to be flaccid when
- there is no net flow of water towards the inside or outside.
  - the external solution balances the osmotic pressure of the cytoplasm.
  - water flows into the cell and out of the cell and are in equilibrium.
  - the external solution is more dilute than the cytoplasm.
- 102.** A boy has taken fresh twig from a tree and then he placed it into a coloured water. After a few hours he cut the surface of the twig and examine it with a magnifying glass to study the path of water movement. This experiment demonstrates that movement of water occurs through
- xylem
  - phloem
  - sieve tube
  - casparian strip
- 103.** A Botanist discovered a mutant plant that was unable to produce materials that form casparian strip. This plant would
- unable to transport water or solutes to the leaves.
  - unable to use its sugar as a sugar sink.
  - able to exert greater root pressure than the normal plant.
  - unable to control amounts of water and solutes it absorbs.
- 104.** Which of the following is correct regarding guttation?
- It occurs through stomata.
  - It occurs through hydathodes.
  - It occurs mostly during night and early morning.
  - Both (b) and (c)
- 105.** Arrange the following events in a correct order that explain the mass flow of materials in the phloem?
- Water diffuses into the sieve tube elements.
  - Leaf cells produce sugar by photosynthesis.
  - Solutes are actively transported into the sieve elements
- (iv) Sugar is transported from cell to cell in the leaf.
- (v) Sugar moves down the stem.
- (ii)-(iv)-(iii)-(i)-(v)
  - (ii)-(iv)-(i)-(iii)-(v)
  - (i)-(ii)-(iii)-(iv)-(v)
  - (iv)-(ii)-(i)-(iii)-(v)
- 106.** Leghaemoglobin helps in
- transport of food in plant.
  - nitrogen fixation.
  - protecting nitrogenase from  $O_2$ .
  - nodule formation.
- 107.** Nitrogen fixation is a process of
- converting nitrogen in the air to form a usable form by plants.
  - recycling nitrogen from organic matter in the soil.
  - absorbing nitrogen from the soil,
  - conversion of  $NO_3$  to  $N_2$ .
- 108.** Which of the following statements is not correct about macro-nutrients?
- They are present in plant tissues in excess of 100 m mole per kg of dry matter.
  - They include C, H, O, N, P, S, K, Ca, Mg.
  - Some elements attained from  $CO_2$  and  $H_2O$  while the others are absorbed from the soil.
  - C, H & O are mainly obtained from  $CO_2$  and  $H_2O$ .
- 109.** Which of the following statements about Rhizobium legume nodule formation is not correct ?
- Rhizobium can only fix nitrogen after it becomes a bacteroid within a root cortex cell.
  - Rhizobium induces invagination of root hairs.
  - Within an infection thread, Rhizobium is still extracellular to the plant.
  - The infection thread can fuse with any root cell of an appropriate legume species.
- 110.** Which of the following statements are correct?

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- (i) Magnesium competes with iron and manganese for uptake and with iron for binding with enzymes,  
 (ii) Magnesium inhibit calcium translocation in shoot apex,  
 (iii) Excess of manganese may induce deficiencies of iron, magnesium and calcium.  
 (iv) Symptoms of manganese toxicity may actually be the deficiency symptoms of iron, magnesium and calcium,  
 (a) (i), (ii) and (iii)      (b) (i) and (ii)  
 (c) (iii) and (iv)          (d) (ii), (iii) and (iv)
- 111.** How many of the given statements are correct?  
 (i) The deficiency of any element can cause multiple symptoms,  
 (ii) Same symptoms may be caused by the deficiency of one or several different elements,  
 (iii) The concentration of the essential element below which plant growth is retarded is termed as critical concentration,  
 (iv) Chlorosis is the loss of chlorophyll due to deficiency of N, K, Mg, Fe, S, Mn, Zn Mo.  
 (v) Different plants respond differently to the deficiency of the same element.  
 (a) (iii) and (iv)          (b) (i) and (iv)  
 (c) (i) and (iii)          (d) All of these
- 112.** Ion transport in root occurs  
 (i) passively through channels.  
 (ii) actively through channels.  
 (iii) actively through carriers.  
 (iv) through both symplast and apoplast.  
 (a) (i) and (iii)          (b) (ii), (iii) and (iv)  
 (c) (i), (iii) and (iv)      (d) (iii) and (iv)
- 113.** Which of the following mineral is associated with the characters/notions given below ?  
 (i) Helps in formation of middle lamella.  
 (ii) Needed in mitotic spindle formation.  
 (iii) Accumulates in older leaves.  
 (iv) Involves in normal functioning of the cell membranes,  
 (v) Activate certain enzymes.  
 (vi) Plays an important role in regulating

metabolic activities.  
 (a)  $K^+$       (b)  $Fe^{3+}$       (c)  $NO_3^-$       (d)  $Ca^{2+}$

- 114.** The functions given below are performed by which of the following mineral ?  
 (i) An important constituent of proteins involved in ETS.  
 (ii) Activator of catalase.  
 (iii) Essential for chlorophyll synthesis,  
 (a) N      (b) Mg      (c) Fe      (d) Cd
- 115.** Find the incorrectly matched pair.  
 (a) Rhizobium → Alfalfa  
 (b) Frankia → Alnus  
 (c) Rhodospirillum → Aerobic  
 (d) Bacillus → Free –living
- 116.** The given diagram shows hydroponic/soilless plant production. Plants are grown in a tube or trough placed on a slight incline. The arrows indicate the direction of flow of



Nutrient solution is sent to the elevated end of the tube from the reservoir by X and it flows back to the reservoir due to Y. Identify X and Y.

- (a) pump, pump      (b) gravity, gravity  
 (c) pump, gravity      (d) gravity, pump
- 117.** The minerals involved in the synthesis of DNA and RNA, for maintenance of the turgidity of cells and for the activation of the enzyme catalase are respectively  
 (a) potassium, magnesium, chlorine  
 (b) sulphur, potassium, iron  
 (c) phosphorus, potassium, chlorine

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- (d) magnesium, potassium, iron
- 118.** The term critical concentration means
- essential element concentration below which plant remains in the vegetative phase.
  - essential element concentration below which the plant growth is retarded.
  - essential element concentration above which the plant growth is stunted
  - non-essential element concentration below which plant growth is retarded.
- 119.** A gardner purchases a commercial fertilizer. The label says that it is 10-20-10. This label refers to the
- percentage of nitrogen, phosphate and potassium.
  - percentage of nitrogen, carbon and oxygen.
  - rate at which nitrogen is released from the fertilizer.
  - ratio of organic to inorganic matter in the fertilizer.
- 120.** The deficiencies of micronutrients, not only affects growth of plants but also vital functions such as photosynthetic and mitochondrial electron flow. Among the list given below, which group of three elements shall affect most, both photosynthetic and mitochondrial electron transport?
- Co, Ni, Mo
  - Ca, K, Na
  - Mn, Co, Ca
  - Cu, Mn, Fe
- 121.** Minerals are known to enter the plant root by means of a number of mechanisms, including all except one of the following. Which one of the following is a mechanism for moving minerals into roots?
- Foliar feeding
  - Active transport
  - Proton ( $H^+$ ) pump
  - Cation exchange
- 122.** In plants a common symptom caused by deficiencies of Cu, K, Ca and Mg is the
- formation of anthocyanin.
  - bending of leaf tip.
  - poor development of vasculature.
  - appearance of dead necrotic tissues.
- 123.** Which of the following groups contain no species that are able to fix nitrogen ?
- Cyanobacteria in the ocean and fresh water.
  - Soil bacteria including Rhizobium.
  - Cyanobacteria in lichens.
  - Aerobic bacteria in the genera Bacillus and Pseudomonas.
- 124.** The light harvesting complex (LHC) is made up of
- one molecule of Chi a.
  - very few molecules of Chi a.
  - hundreds of pigment molecules bound to proteins.
  - Chi a + Chi c + protein + DNA.
- 125.** In photosynthesis, protons accumulate in the
- inner membrane space of mitochondria.
  - matrix of mitochondria.
  - lumen of thylakoid.
  - stroma of thylakoid.
- 126.** The light-driven synthesis of ATP & NADPH, provides energy and reducing power for the
- conversion of inorganic carbon into organic carbon.
  - fixation of  $CO_2$  into trioses.
  - for the production of sugars.
  - all of the above.
- 127.** Bundle sheath cells
- are rich in RuBisCO.
  - are rich in PEP carboxylase.
  - lack RuBisCO.
  - lackboth RuBisCO and PEP carboxylase.
- 128.** By looking at which internal structure of a plant can you tell I whether a plant is  $C_3$  or  $C_4$  ?
- Kranz anatomy
  - Distribution of mesophyll cells
  - Bundle sheath cells only
  - Both (a) and (b)
- 129.** Photorespiration
- occurs because oxygen rather than carbon dioxide links to the rubisco enzyme in the Calvin cycle.
  - occurs more in  $C_4$  than in  $C_3$  plants under identical conditions.
  - describes the uptake of  $CO_2$  & the release of oxygen in chloroplasts.

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(d) All of the above

**130.** Which of the following statement is incorrect?

- (a) Photosystem-I receives electrons from photosystem-II.
- (b) Photosystem-II receives electrons from photolytic dissociation of water.
- (c) Formation of NADPH is associated with photosystem-II.
- (d) Reaction centre of photosystem I is  $P_{700}$ .

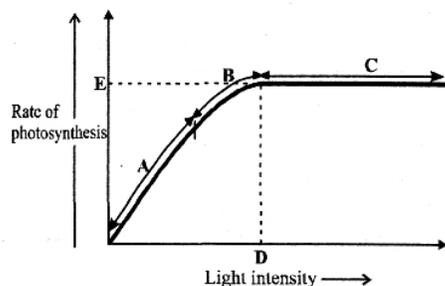
**131.** Which among the following sentence is incorrect about light reaction?

- (a) It is also known as 'photochemical' phase.
- (b) It includes light absorption, water splitting, oxygen release, and the formation of high-energy chemical intermediates.
- (c) Reaction centre consist of single molecule of chl d but 2 molecules of chl b.
- (d) The pigments are organised into two discrete photochemical light harvesting complexes (LHC) within PS-I and PS-II.

**132.** Why  $C_4$  plants are special ? Because,

- (i) they have a special type of leaf anatomy,
  - (ii) they tolerate higher temperatures,
  - (iii) they show a response to high light intensities,
  - (iv) they lack a process called photorespiration.
  - (v) they have greater productivity of biomass.
- (a) (i) and (ii)                      (b) (i), (iii) and (iv)  
 (c) (i), (ii), (iii) and (iv) (d) All of these

**133.** The given figure shows the graph of light intensity (on x-axis) on the rate of photosynthesis (on y-axis). Few points are marked as A, B, C, D and E.



Match the marked alphabets given in column I with these correct interpretation given in

column II.

Column - I	Column - II
A. Limiting factor in region A	I. Some factor other than light intensity is becoming the limiting factor
B. B represents to	II. Light is no longer limiting factor
C. C represents to	III. Light intensity
D. D represents to	IV. Maximum rate of photosynthesis
E. E represents to	V. Saturation point for light intensity

The correct option is

- (a) A-I; B-II; C-III; D-IV; E-V
- (b) A-III; B-I; C-II; D-V; E-IV
- (c) A-IV; B-II; C-V; D-III; E-I
- (d) A-V; B-IV; C-III; D-II; E-I

**134.** Which of the following pair is mismatched?

- (a) Photosystem I - Uses the  $P_{700}$  molecule in its photocenter.
- (b) Antennacomplex-Contains hundreds of pigmentmolecule.
- (c) PGA - 3- carbon compound.
- (d) Dark reaction - Takes place in the grana of the chloroplast.

**135.** Which of the following pair is not correctly matched ?

- (a)  $C_3$  plant - Maize
- (b)  $C_4$  plant-Kranz anatomy
- (c) Calvin cycle-PGA
- (d) Hatch and Slack pathway-Oxaloacetic acid

**136.** A student sets up an experiment on photosynthesis as follows:

He takes soda water in a glass tumbler and add chlorophyll extracts into the contents and keeps the tumbler exposed to sunlight hoping that he has provided necessary ingredients for photosynthesis to proceed (viz.,  $CO_2$ ,  $H_2O$ , chlorophyll and light). What do you think what will happen after, say, a few hours of exposure of light?

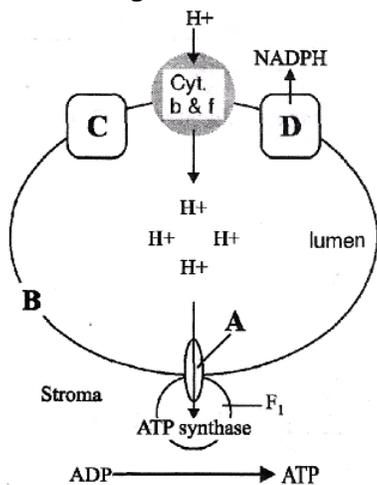
- (a) Photosynthesis will take place and glucose will be produced.
- (b) Photosynthesis will take place and starch will be produced which will turn the mixture turbid.
- (c) Photosynthesis will not take place

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because  $\text{CO}_2$  dissolved in soda water escapes into the atmosphere.

- (d) Photosynthesis will not take place because intact chloroplasts are needed for the process.

**137.** The diagram given below shows ATP synthesis through chemiosmosis.



Which option shows the correct labelling of A, B, C and D in the diagram ?

- (a) A -  $\text{F}_1$ , B - Thylakoid membrane, C - Photosystem (I), D - Photosystem (II)  
 (b) A -  $\text{F}_0$ , B - Thylakoid membrane, C - Photosystem (I), D - Photosystem (II)  
 (c) A -  $\text{F}_1$ , B - Thylakoid membrane, C - Photosystem (II), D - Photosystem (I)  
 (d) A -  $\text{F}_0$ , B - Thylakoid membrane, C - Photosystem (II), D - Photosystem (I)
- 138.** The reactions of Calvin cycle not directly dependent on light, but they usually do not occur at night. Why?  
 (a) Night is often too cold for these reactions to occur.  
 (b)  $\text{CO}_2$  concentration in night is too high for these reactions to occur.  
 (c) Plants usually open their stomata at night.  
 (d) Calvin cycle is dependent on the products of light reaction.
- 139.** To make 100 molecules of glucose, how many molecules of ATP & NADPH are required?  
 (a) 1800 and 1200 respectively.

- (b) 1200 and 1800 respectively.  
 (c) 1800 and 600 respectively.  
 (d) 200 and 600 respectively.

**140.** Which of the following plant species have highest photosynthetic yield?

- (a) Species that perform photorespiration  
 (b) Species possessing  $\text{C}_3$  pathway  
 (c) Species possessing  $\text{C}_4$  pathway  
 (d) Same for all

**141.** Under water stress, the rate of photosynthesis declines because of

- (a) stomatal closure leading to decrease in  $\text{CO}_2$  supply.  
 (b) reduced water potential that decreases leaf surface areas for photosynthesis.  
 (c) both (a) and (b)  
 (d) turgidity of leaf.

**142.** In  $\text{C}_4$  (sugarcane plant) plant,  $14\text{CO}_2$  is fixed in malic acid in / which the enzyme that fixes  $\text{CO}_2$  is

- (a) fructose phosphatase  
 (b) ribulose biphosphate carboxylase  
 (c) phosphoenol pyruvic acid carboxylase  
 (d) ribulose phosphate kinase

**143.** What will happen if the supply of oxygen is decreased to an illuminated wheat plant?

- (a) Its photosynthesis would decrease.  
 (b) Its respiration process would stop.  
 (c) All physiological process would stop.  
 (d) Its photosynthesis would increase.

**144.** During light reaction, as electrons move through photosystems, protons are transported across the membrane. This happens because of

- (a) the primary acceptor of  $e^-$  (located towards the outer surface of the membrane) transfers its electron not to an  $e^-$  carrier but to H carrier.  
 (b) the primary acceptor of  $e^-$  transfers only its  $e^-$  to  $e^-$  carrier.  
 (c) the primary acceptor of  $e^-$  transfers only  $\text{H}^+$  to the next carrier.  
 (d) NADP - reductase is present in grana.

**145.** Which of the following is not concern with cyclic photophosphorylation?

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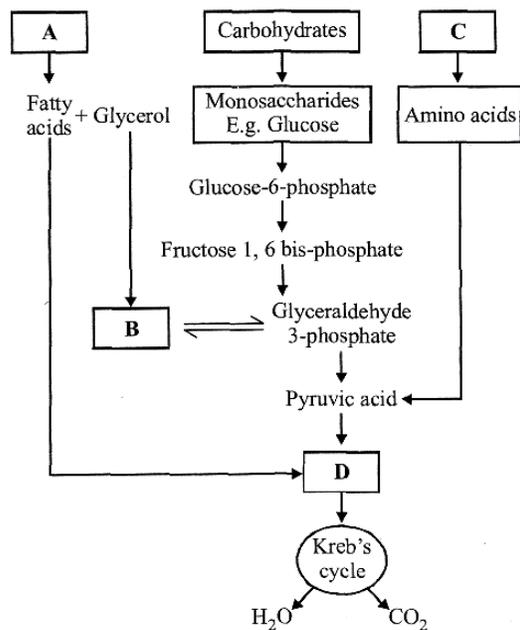
- (a) Liberation of oxygen.  
 (b) Synthesis of ATP.  
 (c) It occurs in certain photosynthetic bacteria.  
 (d) Electron expelled from  $P_{700}$  return to it after passing through different electron acceptor
- 146.** Cyclic and non-cyclic flow of  $e^-$  is used in plants to  
 (a) meet the ATP demands of Calvin-cycle  
 (b) avoid producing excess  $NADPH + H^+$ .  
 (c) balance ATP and  $NADPH + H^+$  ratio in chloroplasts.  
 (d) All of the above
- 147.** In a crop field a weedicide is used to remove weeds in order to increase the yield. But the effect of this weedicide is that, it blocks electron transport from photosystem II to photosystem I. This will result in  
 (a) enhancement of dark reaction.  
 (b) failure of ATP synthesis.  
 (c) lack of reduction of  $NADP^+$ .  
 (d) both (b) and (c)
- 148.** Cooperation of the two photosystems of the chloroplast is required for  
 (a) ATP synthesis.  
 (b) reduction of  $NADP^+$ .  
 (c) enhancement of dark reaction.  
 (d) generation of protein motive force.
- 149.** Chlorophyll is suited for the capture of light energy because  
 (a) certain wavelengths of light raise it to an excited state  
 (b) in its excited state chlorophyll gives off electrons.  
 (c) chlorophyll's structure allows it to attach to thylakoid membranes.  
 (d) all of the above
- 150.** In Kranz anatomy, the bundle sheath cells have  
 (a) thin walls, many intercellular spaces and no chloroplasts.  
 (b) thick walls, no intercellular spaces and large number of chloroplasts.  
 (c) thin walls, no intercellular spaces and several chloroplasts.  
 (d) thick walls, many intercellular spaces and few chloroplasts.
- 151.** Which of the following statement is correct in relation to the ETS?  
 (a) It is present in the mitochondrial matrix.  
 (b) Oxidation of one molecule of NADH gives rise to 2 molecules of ATP, while that of one molecule of  $FADH_2$  produces 3 molecules of ATP.  
 (c) Oxygen acts as the final hydrogen acceptor,  
 (d) In respiration, light energy is utilized for the production of proton gradient.
- 152.** Which of the following statement(s) concerning ATP synthesis is/are correct?  
 (a) ATP can be synthesized through substrate level phosphorylation, photophosphorylation and oxidative phosphorylation.  
 (b) The proton-motive force is the establishment of proton gradients and electrochemical potentials across the inner membrane.  
 (c) Proton-motive force is essential for back flow of  $H^+$  from outer chamber of matrix of mitochondria through proton channel ( $F_0$ ) of  $F_0 - F_1$  particle to produce ATP.  
 (d) All of the above
- 153.** Which of the following statements (i to v) regarding glycolysis are correct.  
 (i) It is ten enzymatic reactions that convert a six-carbon molecule to a three carbon pyruvate and result in a net gain of 2 ATP molecules,  
 (ii) Glucose undergoes partial oxidation to form one molecule of pyruvic acid,  
 (iii) Glucose is phosphorylated to give rise to glucose-6-phosphate by the activity of the enzyme phosphofructokinase.  
 (iv) The scheme of glycolysis was given by Gustav Embden, Otto Morrison, and J. Parnas and is often referred to as the BMP pathway,  
 (v) ATP is utilized at two steps: first in the conversion of glucose into glucose 6-phosphate & second in the conversion of fructose - 6- phosphate to fructose 1, 6-

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disphosphate.

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

**154.** The given figure represents the interrelationship among metabolic pathways showing the respiration mediated breakdown of different organic molecules to  $\text{CO}_2$  and  $\text{H}_2\text{O}$ . Now identify A to D.



- | A              | B          | C          | D          |
|----------------|------------|------------|------------|
| (a) Protein    | Acetyl CoA | Fat        | DHAP       |
| (b) Fat        | DHAP       | Proteins   | Acetyl CoA |
| (c) Acetyl CoA | Fat        | DHAP       | Protein    |
| (d) Fat        | DHAP       | Acetyl CoA | Protein    |

**155.** What is the function of molecular oxygen in cellular / respiration?

- (a) It causes the breakdown of citric acid.  
 (b) It combines with glucose to produce carbon dioxide.  
 (c) It combines with carbon from organic molecules to produce carbon dioxide.  
 (d) It combines with hydrogen from organic molecules to produce water.

**156.** An glycolysis, there is one step where  $\text{NADH} + \text{H}^+$  is formed from  $\text{NAD}^+$ , this is when 3-phosphoglyceraldehyde (PGAL) is converted to 1, 3-bisphosphoglycerate (BPGA). This

reaction shows

- (a) oxidative dehydrogenation  
 (b) oxidative phosphorylation  
 (c) oxidative dehydration  
 (d) oxidation reduction

**157.** For bacteria to continue growing rapidly when they are shifted from an environment containing  $\text{O}_2$  to an anaerobic environment, they must

- (a) produce more ATP per mole of glucose during glycolysis.  
 (b) produce ATP during oxidation of glucose.  
 (c) increase the rate of glycolysis.  
 (d) increase the rate of TCA cycle.

**158.** Fermentation takes place

- (a) under anaerobic conditions in many prokaryotes and unicellular eukaryotes.  
 (b) under aerobic conditions in many prokaryotes and unicellular eukaryotes.  
 (c) under anaerobic conditions in all prokaryotes and unicellular eukaryotes.  
 (d) under aerobic conditions in all prokaryotes and unicellular eukaryotes.

**159.**  $\text{O}_2$  is used by

- (a) citric acid cycle  
 (b) electron transport chain  
 (c) substrate level phosphorylation  
 (d) ATP synthase

**160.** The chemiosmotic coupling hypothesis of oxidative phosphorylation proposes that adenosine triphosphate (ATP) is formed because

- (a) high energy bonds are formed in mitochondrial proteins.  
 (b) ADP is pumped out of the matrix into the intermembrane space.  
 (c) a proton gradient forms across the inner membrane.  
 (d) there is a change in the permeability of the inner mitochondrial membrane toward adenosine diphosphate (ADP).

**161.** Germination takes place when the

- (a) previously dormant embryo is activated.  
 (b) cotyledons emerges above the ground.  
 (c) hypocotyl or epicotyl emerges above the ground.

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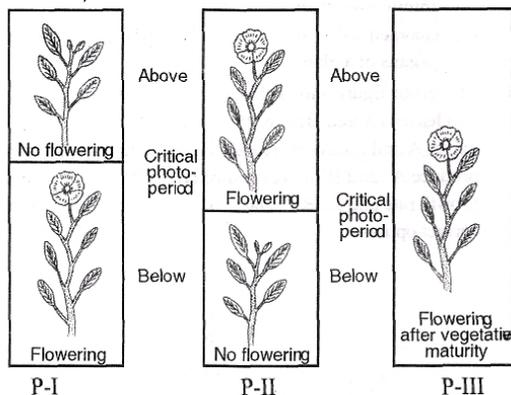
- (d) vascular tissues begin to transport fluids.
- 162.** Hormone responsible for bolting is  
(a) IAA (b) kinetin (c) ABA (d) GA
- 163.** Highest concentration of cytokinin is found in  
(a) area of continuous growth and meristematic region.  
(b) meristematic region only.  
(c) mature leaves.  
(d) ripened fruit.
- 164.** Seed dormancy  
(a) is the temporal delay to the process of germination.  
(b) is the permanent delay to the process of germination.  
(c) minimizes seedling survival by preventing germination.  
(d) occurs due to the presence of growth inhibitors only.
- 165.** Which of the following statement is not the characteristic of growth of an organism?  
(a) It is an irreversible permanent increase in size of an organ / its part / an individual cell.  
(b) It is accompanied by metabolic processes  
(c) It is quantitative and intrinsic.  
(d) None of the above
- 166.** Which of the following statement is correct regarding ethylene?  
(a) It delayed senescence.  
(b) It decreases the respiration rate during fruit ripening.  
(c) It breaks seeds and bud dormancy.  
(d) It inhibits flowering in mango.
- 167.** Which of the following statement regarding vernalisation is correct?  
(a) Vernalisation refers to the promotion of flowering by a period of low temperature.  
(b) The spring variety of crops are normally planted in the spring and come to flower before the end of the growing season.  
(c) It is not seen in biennial plants.  
(d) Subjecting cold treatment to sugar beet will result in flowering.
- 168.** Identify the correct and incorrect statements from the y following.
- (i) 17,500 new cells are produced per hour by a single maize root apical meristem.  
(ii) With the help of length, growth of pollen tube is measured.  
(iii) The growth of the leaf is measured in term of volume,  
(iv) Cells in a watermelon may increase in size by upto 3,50,000 times.  
(a) (i), (ii), (iii) are correct and (iv) is incorrect.  
(b) (i), (ii), (iv) are correct and (iii) is incorrect.  
(c) (ii), (iii) are correct and (i), (iv) are incorrect.  
(d) (i), (iv) are correct and (ii), (iii) are incorrect.
- 169.** Which of the following statements on phytohormones & their action are correct?  
(i) Cytokinins specially help in delaying senescence.  
(ii) Auxins are involved in regulating apical dominance.  
(iii) Ethylene is specially useful in enhancing seed germination.  
(iv) Gibberellins are responsible for immature falling of leaves.  
(a) (i) and (iii) only (b) (i) and-(iv) only  
(c) (i) and (ii) only (d) (ii) and (iii) only
- 170.** Read the following statements (i-iv) regarding "ethephon" and answer the question which follows them.  
(i) Ethephon is sprayed in aqueous solution and is readily absorbed and transported within the plant,  
(ii) It hastens fruit ripening in tomatoes and apples,  
(iii) It can be used to induce fruit thinning in cotton, cherry and walnut,  
(iv) It is used to promote female sex expression in cucumber and increase yield.  
How many of the above statement(s) is/ are correct?  
(a) One (b) Two (c) Three (d) All
- 171.** The picture below shows three different types of plants (marked as P-I, P-II and P-III) which

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flower on the basis of their critical photoperiod. Now identify these plants (P-I, II and III).



- P-I                      P-II                      P-III
- (a) P-I = Long day plant; P-II = Short day plant; P-III = Day neutral plant  
 (b) P-I = Short day plant; P-II = Long day plant; P-III = Day neutral plant  
 (c) P-I = Short day plant; P-II = Short day plant; P-III = Day neutral plant  
 (d) P-I = Long day plant; P-II = Long day plant; P-III = Day neutral plant

**172.** A sigmoidal curve is obtained in geometrical growth because

- (a) it has lag, log and then stationary phase.  
 (b) one daughter cell remains meristematic while the other daughter cell differentiates and matures.  
 (c) of the effect of environment on mitosis.  
 (d) none of the above

**173.** De-differentiation is

- (a) regaining the lost capacity of division by living cells.  
 (b) the ability of plant to produce different structure in response to environment.  
 (c) the intrinsic factor affecting plant growth.  
 (d) none of the above.

**174.** Ethylene is used for

- (a) retarding ripening of tomatoes.  
 (b) ripening of fruits.  
 (c) slowing down ripening of apples.  
 (d) both (b) and (c).

**175.** Skoog and Miller stimulated cell division in tobacco plant with degraded DNA. The active ingredient in stimulants, which resembles cytokinins, was modified

- (a) adenine                      (b) auxin  
 (c) terpenes                      (d) carotenoids

**176.** Flowering in pineapple is promoted by

- (a)  $GA_1$     (b)  $C_2H_4$     (c) NAA    (d) Kinetin

**177.** Farmers in a particular region were concerned that pre-mature yellowing of leaves of a pulse crop might caused decrease in the yield. Which treatment could be most beneficial to obtain maximum seed yield?

- (a) Removed of all yellow leaves and spraying the remaining green leaves with 2, 4, 5-trichlorophenoxy acetic acid.  
 (b) Frequent irrigation of the crop.  
 (c) Treatment of the plants with cytokinins along with a small doses of nitrogenous fertilizer.  
 (d) Application of iron and magnesium to promote synthesis of chlorophyll.

**178.** Climacteric in the plants means

- (a) increase in respiration rate before the ripening phase.  
 (b) decrease in respiration rate before the ripening phase.  
 (c) increase in respiration rate after the ripening phase.  
 (d) decrease in respiration rate after the ripening phase.

**179.** Which one of the following is not a mechanical method for breaking seed dormancy?

- (a) Abrasions with knives  
 (b) Abrasions with sandpaper  
 (c) Vigorous shaking into the flask  
 (d) By the action of microbes

**180.** Which of the following effects is brought about by gibberellins but not by auxins?

- (a) Inhibition of leaf abscission.  
 (b) Stimulation of cambial activity.  
 (c) Stimulation of fruit development.  
 (d) Breaking of dormancy in leaf buds.

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