MEDJEE
DIGITEXT | DEXTERITY | DEVELOPMENT

SUBJECTS	XII STD	WT - 1	NEET QP
PHYSICS	ELECTROSTATICS (S1-S4)		
CHEMISTRY	SOLUTIONS (S1-S3)		
BIOLOGY	SEXUAL REPRODUCTION IN FLOWERING PLANTS (S1-S3)		
TOTAL MARKS – 720		*DURATION – 3 HRS*	
EACH QUESTION CARRIES 4 MARKS. (-1 MARK) FOR WRONG ANSWER.			

PHYSICS

1. Among two discs A and B, first have radius 10 cm and charge 10 cm and 10^{-6} C and second have radius 30 cm and charge 10^{-5} C. When they are touched, charge on both q_A and q_B respectively will, be:

a) $q_A = 2.75\ \mu C$, $q_B = 3.15\ \mu C$ b) $q_A = 1.09\ \mu C$, $q_B = 1.53\ \mu C$

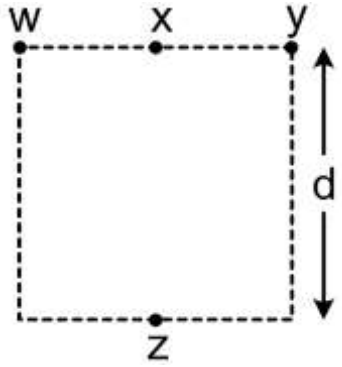
c) $q_A = q_B = 5.5\mu C$ d) None of these

2. A negatively charged object X is repelled by another charged object Y. However an object Z is attracted to object Y. Which of the following is the most possibility for the object Z?

a) positively charged only b) negatively charged only

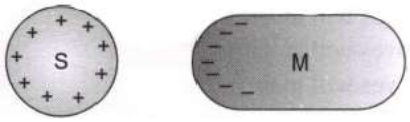
c) neutral or positively charged d) neutral or negatively charged

3. Four objects W, X, Y and Z, each with charge +q are held fixed at four points of a square of side d as shown in the figure. Objects X and Z are on the midpoints of the sides of the square. The electrostatic force exerted by object W on object X is F. Then the magnitude of the force exerted by object W on Z is



a) $\frac{F}{7}$ b) $\frac{F}{5}$ c) $\frac{F}{3}$ d) $\frac{F}{2}$

4. An uncharged metal object M is insulated from its surroundings. A positively metal sphere S is then brought near to M. Which diagram best illustrates the resultant distributions of charge on S and M?

a) 

b) 

c) 

d) 

5. **Statement I:** Electric charge is additive in nature
   Statement II: The total charge of a system is the algebraic sum of individual charges
   a) Both Statements are true, and Statement II is correct explanation of Statement I
   b) Both Statements are true, but Statement II is not correct explanation of Statement I
   c) Statement I is true Statement II is false
   d) Statement I is false Statement II is true
6. When a body is charged by induction, then the body
   a) becomes neutral b) does not lose any charge
   c) loses whole of the charge on it d) loses part of the charge on it
7. Assume that each of copper atom has one free electron and there is 1 mg of copper. Given that atomic weight of copper = 63.5 and Avogadro number = 6.02×10^{23}. What is the charge possessed by these free electrons?
   a) 1.52 C b) 1.76 C c) 4.76 C d) 1.25 C
8. When a comb rubbed with dry hair attracts pieces of paper. This is because the
   a) comb polarizes the piece of paper
   b) comb induces a net dipole moment opposite to the direction of field
   c) electric field due to the comb is uniform
   d) comb induces a net dipole moment perpendicular to the direction of field
9. Two copper balls, each weighing 10g, are kept in air 10cm apart. If one electron from every 10^6 atoms is transferred from one ball to the other, the coulomb force between them is (atomic weight of copper is 63.5)
   a) 2.0×10^{10}N b) 2.0×10^{4}N c) 2.0×10^{8}N d) 2.0×10^{6} N
10. **Assertion (A):** Coulomb force is the dominating force in the universe
    Reason (R): Coulomb force is weaker than the gravitational force
    a) Both Assertion and Reason are true and Reason is correct explanation of Assertion
    b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion
    c) If Assertion is true and Reason is false
    d) If both Assertion and Reason is false
11. Two identical balls each have a mass of 10g. What charges should these balls be given so that their interaction equalizes the force of universal gravitation acting between them? The radii of the balls may be ignored in comparison to distance between them.
    a) 6.34×10^{-11}C b) 8.57×10^{-11} C c) 6.34×10^{-13}C d) 8.57×10^{-13} C
12. Two point charges +3 μC and +8 μC repel each other with a force of 40 N. If a charge of -5 μC is added to each of them, then the force between them will become
    a) – 10N b) +10 N c) +20N d) – 20 N
13. Calculate the ratio of electrostatic to gravitational force between two electrons placed at certain distance in air. Given that $m_e = 9.1 \times 10^{-31}$ kg, e = 1.6×10^{-19} C and G = 6.6×10^{-11} N m^2 kg^{-2}
    a) 8.4×10^{42} b) 3.2×10^{41} c) 4.2×10^{42} d) 1.2×10^{42}
14. Three charges each equal to 2μC are placed at the corners of an equilateral triangle. If force between any two charges is 2F, then the net force on either will be
    a) $2\sqrt{3}F$ b) $\sqrt{2}F$ c) 3F d) F/3
15. Two charges +4e and +e are at a distance x apart. At what distance a charge q must be placed from charge +e so that it is in equilibrium?
    a) x/2 b) 2x/3 c) x/3 d) x/6

16. Three charges each of magnitude q are placed at the corners of an equilateral triangle. The electrostatic force on the charge placed at the centre is (each side of triangle is L)

a) Zero b) $\frac{1}{4\pi\varepsilon_0}\frac{q^2}{L^2}$ c) $\frac{1}{4\pi\varepsilon_0}\frac{3q^2}{L^2}$ d) $\frac{1}{12\pi\varepsilon_0}\frac{q^2}{L^2}$

17. Match the scenarios in Column A with the corresponding descriptions in Column B

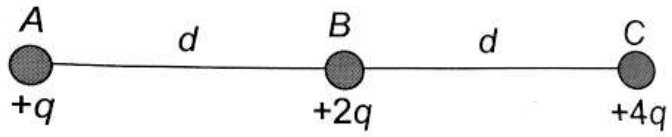
Column A	Column B
A) Equal charges placed at the corners of a square	i) Forces on the charges are balanced along diagonals
B) Charges of different magnitudes placed on a line	ii) Force depends on magnitude and sign of charges
C) Net force on a charge in a system	iii) Vector sum of all individual forces
D) Zero net force on a test charge	iv) Charges symmetrically placed around the test charge

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

18. A charge q is placed at the centre of the line joining two equal charges Q. The system of the three charges will be in equilibrium, if q is equal to

a) $-\frac{Q}{2}$ b) $-\frac{Q}{4}$ c) $+\frac{Q}{4}$ d) $+\frac{Q}{2}$

19. Three charges +q, +2q and 4q are connected by strings as shown in the figure and are in equilibrium. What is ratio of tension in the strings AB and BC?

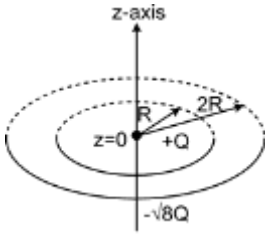


a) 1 : 2 b) 1 : 3 c) 2 : 1 d) 3 : 1

20. Infinite charges of magnitude q each are lying at x = 1, 2, 4, 8… meter on x- axis. The value of intensity of electric field at point x = 0 due to these charges will be

a) 12×10^9 q N/C b) zero c) 6×10^9qN/C d) 4×10^9q N/C

21. Two concentric rings, one of radius R and total charge +Q and the second of radius R and total charge $-\sqrt{8}Q$, lie in x-y place (i.e., z = plane). The common centre of rights lies at origin and the common axis coincides with z – axis. The charge is uniformly distributed on both the rings. At what distance from origin is the net electric field on z – axis zero?



a) $\frac{R}{2}$ b) $\frac{R}{\sqrt{2}}$ c) $\frac{R}{2\sqrt{2}}$ d) $\sqrt{2}R$

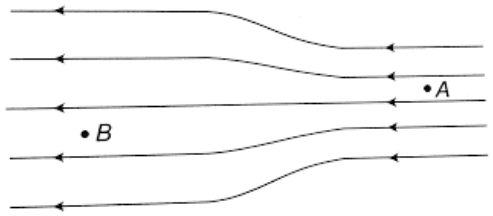
22. How many electrons should be removed from a coin of mass 1.6 g, so that it may float in an electric field of intensity 10^9 NC^{-1} directed upward. (Take g = 10 m/s^2)

a) 10^6 b) 10^7 c) 10^9 d) 10^8

23. An electron of mass m, initially at rest, moves through a certain distance in a uniform electric field in time t. A proton of mass M, also initially at rest, takes time T to move through an equal distance in this uniform electric field. Neglecting the effect of gravity, the ratio $\frac{T}{t}$ is nearly equal to

a) $\frac{2M}{m}$ b) $\sqrt{\frac{m}{M}}$ c) $\sqrt{\frac{M}{m}}$ d) $\frac{M}{m}$

24. In the electric field shown in figure, the electric field lines on the left have twice the separation as that between those on the right. If the magnitude of the field at point A is 40 NC^{-1}, calculate the magnitude of electric field at the point B.



a) 15 NC^{-1} b) 20 NC^{-1} c) 25 NC^{-1} d) 30 NC^{-1}

25. An electron is released with a velocity of 5×10^6 ms^{-1} in an electric field of 10^3 NC^{-1} which has been applied so as to oppose its motion. How much time could it take before it is brought to rest?

a) 2.8×10^{-8} s b) 1.8×10^{-8} s c) 6.4×10^{-8} s d) 4.2×10^{-8} s

26. Under the influence of the coulomb field to charge +Q, a charge –q is moving around it in an elliptical orbit. Find out the correct statement(s)

a) The angular momentum of the charge –q is constant
b) The linear momentum of the charge –q is constant
c) The angular velocity of the charge –q is constant
d) The linear speed of the charge –q is constant

27. Two identical conducting spheres carrying different charges attract each other with a force F when placed in air medium at a distance 'd' apart. The spheres are brought into contact and then taken to their original positions. Now the two spheres repel each other with a force whose magnitude is equal to that of the initial attractive force. The ratio between initial charges on the spheres is

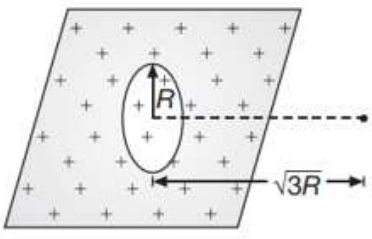
a) $-\left(3+\sqrt{8}\right)$ only b) $-3+\sqrt{8}$ only

c) $+\left(3+\sqrt{8}\right)$ or $\left(+3-\sqrt{8}\right)$ d) $+\sqrt{3}$

28. The electric field that can balance a charged particle of mass 4.8 x 10^{-27} kg is: (Given that the charge on the particle is 1.6 x 10^{-19} C)

a) 19.6×10^{-8} NC^{-1} b) 29.4×10^{-8} NC^{-1} c) 29.7×10^{8} NC^{-1} d) 19.6×10^{-7} NC^{-1}

29. An infinite dielectric sheet having charge density σ has a hole of radius R in it. An electron is released on the axis of the hole at a distance $\sqrt{3}R$ from the centre. The speed with which it crosses the centre of the hole



a) $\sqrt{\frac{\sigma eR}{2m\varepsilon_0}}$ b) $\sqrt{\frac{\sigma eR}{m\varepsilon_0}}$ c) $\sqrt{\frac{2\sigma eR}{m\varepsilon_0}}$ d) None of these

30. Two identical positive point charges each of value Q are fixed at the points (a, 1) and (-a, 0) on the x-axis. A particle of mass m and carrying charge -q is released from rest at the point $P\left(0,\sqrt{3}a\right)$ on the y-axis. The velocity υ_0 of the particle when it passes through the origin O υ_0. Then

a) $\upsilon_0 = \sqrt{\frac{Qq}{\pi\varepsilon_0 ma}}$ b) $\upsilon_0 = \sqrt{\frac{Qq}{2\pi\varepsilon_0 ma}}$ c) $\upsilon_0 = \sqrt{\frac{Qq}{4\pi\varepsilon_0 ma}}$ d) $\upsilon_0 = \sqrt{\frac{Qq}{8\pi\varepsilon_0 ma}}$

31. Two identical charges repel each other with a force equal to 10 mg wt when they are 0.6 m apart in air ($g = 10ms^{-2}$). The value of each charge is

a) 2 mC b) 2×10^{-7}C c) 2 nC d) 2 μC

32. Electric lines of force about n negative point charge are

a) circular anticlockwise b) circular clockwise c) radial, inwards d) radial, outwards

33. Identify the wrong statement in the following. Coulomb's law correctly describes the electric force that

a) Binds the electrons of an atom to its nucleus

b) Binds the protons and neutrons in the nucleus of an atom

c) Binds atoms together to form molecules

d) Binds atoms and molecules together to form solids

34. If a linear isotropic dielectric is placed in an electric field of strength E, then the polarization P is

a) independent of E b) inversely proportional to E

c) directly proportional to $\sqrt{E}$ d) directly proportional to E

35. In a uniform electric field, a charge +q having negligible mass is released at a point. Which of the following statements are correct?

I. Velocity increases wit time

II. A force acts on it in the direction of electric field

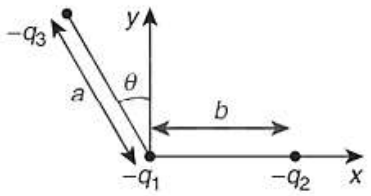
III. Its momentum changes with time

a) I and II b) II and III c) I and III d) I, II and III

36. A positively charged rod is brought near an uncharged conductor. If the rod is then suddenly withdrawn, the charge left on the conductor will be

a) Positive b) Negative c) Zero d) cannot say

37. Three charges $-q_1$, $+q_2$ and $-q_3$ are placed as shown in the figure. The x-component of the force on $-q_1$ is proportional to



a) $\frac{q_2}{b^2} - \frac{q_3}{a^2}\cos\theta$ b) $\frac{q_2}{b^2} + \frac{q_3}{a^2}\sin\theta$ c) $\frac{q_2}{b^2} + \frac{q_3}{a^2}\cos\theta$ d) $\frac{q_2}{b^2} - \frac{q_3}{a^2}\sin\theta$

38. The magnitude of the average electric field normally present in the atmosphere just above the surface of the Earth is about 150 N/C, directed inward towards the centre of the Earth. This gives the total net surface charge carried by the Earth to be (Given $\varepsilon_0 = 8.85 \times 10^{-12}$ $C^2/N\ m^2$, $R_E = 6.37 \times 10^6$ m)

a) +670 kC b) -670 kC c) -680 kC d) +680 kC

39. Assertion (A): If there exists coulomb attraction between two bodies, both of them must be charged
Reason (R): In coulomb attraction two bodies are oppositely charged

a) Both Assertion and Reason are true and Reason is correct explanation of Assertion

b) Both Assertion and Reason are true but Reason is not the correct explanation of Assertion

c) Assertion is true but Reason is false

d) Assertion is false but Reason is true

40. When a body is earth connected, electrons from the earth flow into the body. This means the body is

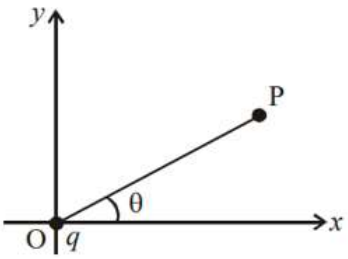
a) Uncharged b) charged positively

c) Charged negatively d) an insulator

41. For a uniformly charged ring of radius R, the electric field on its axis has the largest magnitude at a distance h from its centre. Then value of h is

a) $\frac{R}{\sqrt{5}}$ b) $\frac{R}{\sqrt{2}}$ c) R d) $R\sqrt{2}$

42. In the figure, charge q is placed at origin O. When the charge q is displaced from its position the electric field at point P changes



a) at the same time when q is displaced b) at a time after $\frac{OP}{c}$ where c is the speed of light

c) at a time after $\frac{OP\cos\theta}{c}$ d) at a time after $\frac{OP\sin\theta}{c}$

43. Match the following

Column – I	Column – II
A) Linear charge density	i) $\frac{\text{Charge}}{\text{Volume}}$
B) Surface charge density	ii) $\frac{\text{Charge}}{\text{Length}}$
C) Volume charge density	iii) $\frac{\text{Charge}}{\text{Area}}$
D) Discrete charge distribution	iv) System consisting of ultimate individual charges

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

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

44. Two large vertical and parallel metal plates having a separation of 1cm are connected to a DC voltage source of potential difference X. A proton is released at rest midway between the two plates. It is found to move at 45˚ to the vertical just after release. Then X is nearly

a) 1×10^{-5}V b) 1×10^{-7}V c) 1×10^{-9} V d) 1×10^{-10}V

45. The mean free path of electrons in a metal is 4×10^{-8} m. The electric field which can give on an average 2eV energy to an electron in the metal will be in units of V/m

a) 8×10^{7} b) 5×10^{-11} c) 8×10^{-11} d) 5×10^{7}

CHEMISTRY

46. The density of a 2.03 M solution of acetic acid (molecular mass 60) in water is 1.017 g/mL. Calculate the molality of the solution

a) 2.26 b) 3.28 c) 2.3 d) 4.2

47. How much water is needed to dilute 10 ml of 10N hydrochloric acid to make it exactly decinormal (0.1 N)?

a) 990 ml b) 1000 ml c) 1010 ml d) 100 ml

48. The density of a 3 M sodium thiosulphate solution ($Na_2S_2O_3$) is 1.25 g/mL. Calculate the percentage by mass of sodium thiosulphate

a) 38.3 b) 35.6 c) 37.9 d) 40.5

49. A solution of known concentration is known as

a) Molar solution b) Normal solution

c) Mole solution d) Standard solution

50. The mole fraction of CH_3OH in an aqueous solution is 0.02 and its density is 0.994 g cm^{-3}. Determine its molarity

a) 1.08 b) 2.3 c) 3.28 d) 1.23

51. When the volume of the solution is doubled, the following becomes exactly half

a) Molality b) Mole – fraction c) Molarity d) weight percent

52. Calculate the concentration of NaOH solution in g/mL, which has the same normality as that of a solution of HCl of concentration 0.04 g/mL.

a) 0.258 b) 0.0235 c) 0.652 d) 0.0438

53. The solution having lowest molar concentration is

a) 1.0N HCl b) 0.4N H_2SO_4 c) 0.1N Na_2CO_3 d) 1N NaOH

54. How many Na^+ ions are present in 50 mL of, a 0.5 M solution of NaCl?

a) 1.055×10^{23} b) 1.055×10^{22} c) 3.055×10^{22} d) 4.055×10^{22}

55. Density of a 2.05 M solution of acetic acid in water is 1.02 g/mL. The molality of the solution is

a) 1.14 mol kg^{-1} b) 3.28 mol kg^{-1} c) 2.28 mol kg^{-1} d) 0.44 mol kg^{-1}

56. Which of the following has no units?

a) Molarity b) Normality c) Molarity d) Mole fraction

57. The vapour pressure of pure benzene at 88°C is 957 mm and that of toluene at the same temperature is 379.5 mm. Calculate the composition of benzene-toluene mixture boiling at 88°C

a) $x_{benzene} = 0.66$; $x_{toluene} = 0.34$ b) $x_{benzene} = 0.34$; $x_{toluene} = 0.66$

c) $x_{benzene} = x_{toluene} = 0.5$ d) $x_{benzene} = 0.75$; $x_{toluene} = 0.25$

58. The vapour pressures of ethanol and methanol are 44.5 mm and 88.7 mm Hg respectively. An ideal solution is formed at the same temperature by mixing 60 g of ethanol with 40 g of methanol. Calculate the total vapour pressure of the solution

a) 85.36 b) 56.23 c) 66.13 d) 42.56

59. An aqueous solution of Methyl alcohol contains 48g of alcohol. The mole fraction of alcohol is 0.6. The weight of water in it is

a) 27 g b) 2.7 g c) 18g d) 1.8 g

60. The mass of glucose that would be dissolved in 50 g of water in order to produce the same lowering of vapour pressure as is produced by dissolving 1 g of urea in the same quantity of water is

a) 1g b) 3g c) 6g d) 18g

61. Henry's law constant for CO_2 in water is 1.678×10^8 pa at 298 K calculate the quantity of CO_2 in 500 ml of soda water when packed under 2.5 atm pressure at 298K

a) 0.0084g b) 0.0184g c) 1.848g d) 8.4g

62. At 25°C, the total pressure of an ideal solution obtained by mixing 3 mole of A and 2 mole of B, is 184 torr. What is the vapour pressure (in torr) of pure B at the same temperature (Vapour pressure of pure A at 25°C is 200 torr)?

a) 180 b) 160 c) 16 d) 100

63. Vapour pressure is the pressure exerted by vapours

a) In equilibrium with liquid b) In any condition

c) In an open system d) in atmospheric condition

64. 100 mL of liquid A and 25 mL of liquid B are mixed to form a solution of volume 125 mL. Then the solution is

a) ideal b) non-ideal with positive deviation

c) non-ideal with negative deviation d) cannot be predicted

65. What volume of a 0.8M solution contains 100 millimoles of the solute?

a) 100 ml b) 125 ml c) 500 ml d) 62.5 ml

66. A semi molar solution is the one, which contains

a) One mole solute in 2 litres b) 2 moles solute in 2 litres

c) 0.1 mole solute in 1 litres d) 0.2 moles solute in 2 litres

67. The vapour pressure of a certain pure liquid A at 298 K is 40 m bar. When a solution of B is prepared in A at the same temperature, the vapour pressure is found to be 32 m bar. The mole fraction of A in the solution is:

a) 0.5 b) 0.2 c) 0.1 d) 0.8

68. A solution of 36% water and 64% acetaldehyde (CH_3CHO) by mass. Mole fraction of acetaldehyde is

a) 0.42 b) 0.2 c) 4.2 d) 2.1

69. Vapour pressure of pure $A\left(p_A^0\right)=100$ mm Hg

Vapour pressure of pure $B\left(p_B^0\right)=150$ mm Hg

2 mole of liquid A and 3 mole of liquid B are mixed to form an ideal solution. The vapour pressure of solution will be

a) 135 mm b) 130 mm c) 140 mm d) 145 mm

70. The weight in grams of KCl (Mol.wt = 74.5) in 100 ml of a 0.1 M KCl solution is

a) 74.5 b) 2024 c) 0.745 d) 0.0745

71. 138 grams of ethyl alcohol is mixed with 72 grams of water. The ratio of mole fraction of alcohol to water is

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

72. The density (in g mL^{-1}) of a 3.60M sulphuric acid solution that s 29% H_2SO_4 (molar mass=98 g mol^{-1}) by mass, will be

a) 1.45 b) 1.64 c) 1.88 d) 1.22

73. Four gases like H_2, He, CH_4 and CO_2 have Henry's constant values (K_H) are 69.16, 144.97, 0.413 and 1.67. The gas which is more soluble in liquid is

a) He b) CH_4 c) H_2 d) CO_2

74. Mole fraction of the component A in vapour phase is x_1 and the mole fraction of component A in liquid mixture is x_2, then (p_A^0 = vapour pressure of pure A; p_B^0 vapour pressure of pure B), the total vapour pressure of liquid mixture is

a) $p_A^0\frac{x_2}{x_1}$ b) $p_A^0\frac{x_1}{x_2}$ c) $p_B^0\frac{x_1}{x_2}$ d) $p_B^0\frac{x_2}{x_1}$

75. If 0.01 mole of solute is present in 500 ml of solution, its molarity is

a) 0.01 M b) 0.005M c) 0.02M d) 0.1 M

76. Assertion: A mixture of cyclohexane and ethanol shows –ve deviation from Raoult's law.

Reason: Cyclohexane reduces the intermolecular attraction between ethanol molecules.

a) Assertion and reason are true and reason is the correct explanation of assertion

b) Assertion and reason are true but reason is not the correct explanation of assertion

c) Assertion is true but reason is false

d) Assertion is false but reason is true

77. Assertion (A): Addition of solvent to a solution always lowers the vapour pressure
Reason (R) : The increase in relative surface area given rise to an increase in vapour pressure for a given solution
a) Assertion and reason are true and reason is the correct explanation of assertion
b) Assertion and reason are true but reason is not the correct explanation of assertion
c) Assertion is true but reason is false
d) Assertion is false but reason is true

78. Heptane and octane form ideal solution. At 373 K, the vapour pressures of the two liquids are 105.2 kPa and 46.8 kPa respectively. What will be the vapour pressure, in bar, of a mixture of 25 g of heptane and 35 g of octane?
a) 0.7308 b) 0.6523 c) 0.5263 d) 0.6528

79. Calculate the quantity of sodium carbonate (anhydrous) required to prepare 250 ml 0.1M solution
a) 2.65 grams b) 4.95 grams c) 6.25 grams d) none of these

80. 1 litre solution containing 490 g of sulphuric acid is diluted to 10 litre with water. What is the normality of the resulting solution?
a) 0.5 N b) 1.0 N c) 5.0 N d) 10.0 N

81. Maltose is converted to 'A' by Maltase. The mole fraction of 'A' in 10% (w/w) aq. Solution is approximately
a) 0.18 b) 0.989 c) 0.1 d) 0.017

82. 250 mL of a Na_2CO_3 solution contains 2.65 g of Na_2CO_3. 10 mL of this solution is added to x mL of water to obtain 0.001 M Na_2CO_3 solution. The value of x is....
(Molecular mass of Na_2CO_3 = 106 amu)
a) 1000 b) 990 c) 9990 d)90

83. 100 ml 0.2M NaOH is exactly neutralised by a mixture of which of the following?
a) 100 ml of 0.1 M HCl + 100 ml of 0.1 M H_2SO_4
b) 100 ml of 0.1 M HCl + 50 ml of 0.1 M H_2SO_4
c) 50 ml of 0.1 M HCl + 50 ml of 0.1 M H_2SO_4
d) 50 ml of 0.1 M HCl + 100 ml of 0.1 M H_2SO_4

84. $CO_{(g)}$ is dissolved in H_2O at 30˚C and 0.020 atm. Henry's law constant for this system is 6.20×10^4 atm. Thus, mole fraction of $CO_{(g)}$ is
a) 1.72×10^{-7} b) 3.22×10^{-7} c) 0.99 d) 0.01

85. An unopened soda has an aqueous concentration of CO_2 at 25˚C equal to 0.0408 molal. Thus, pressure of CO_2 gas in the can is (K_H = 0.034 mol/kg bar)
a) 0.671 bar b) 1.49 bar c) 1.39 bar d) 1.71 bar

86. The volumes of two-HCl solutions A (0.5 N) and B (0.1 N) to be mixed for preparing 2 L of 0.2 N HC1 are
a) 0.5 L of A + 1.5 L of B b) 1.5 L of A + 0.5 L of B
c) 1 L of A + 1 L of B d) 0.75 L of A + 1.25 L of B

87. Two bottles A and B contain 2 M and 2m aqueous solutions of sulphuric acid respectively, then
a) A is more concentrated than B b) B is more concentrated than A
c) Conc. of A and B are equal d) It is impossible to compare the concentrations

88. An aqueous solution containing 28% by mass of a liquid A (mol. mass - 140) has a vapour pressure of 160 mm at 37°C. Find the vapour pressure of the pure liquid A (The vapour pressure of water at 37°C is 150 mm)
a) 562.8 b) 360.15 c) 450.6 d) 503.4

89. An aqueous solution of glucose is 10% in strength. The volume in which 2 g mole of it is dissolved will be
a) 18 litre b) 3.6 litre c) 0.9 litre d) 1.8 lite

90. The hardness of water sample containing 0.002 mol of magnesium sulphate dissolved in a litre of water is expressed as

a) 20 ppm b) 200 ppm c) 2000 ppm d) 120 ppm

BIOLOGY

91. A typical angiosperm anther is

a) Monolobed, monothecous and bisporangiate
b) Bilobed, monothecous and tetrasporangiate
c) Bilobed, dithecous and tetrasporangiate
d) Bilobed, dithecous and bisporangiate

92. Read the following statements and identify the wrong statements.

A. Stamen length and number vary amongst the flowers of the same species only.
B. Angiosperm anthers are bilobed, with two theca in each.
C. The theca is often separated by a longitudinal groove.
D. The anther has four microsporangia, one in each lobe.
E. The microsporangia grow into pollen sacs.

a) B, C and E b) A, C and D c) A and D only d) A and B only

93. Match the following

Structure	**Shape**
A. Anther	1. Spindle shaped
B. Microsporangium	2. Spherical shaped
C. Pollen grain	3. Tetragonal (four sided)
D. Generative cell	4. Near circular in outline

	A	**B**	**C**	**D**
a)	4	3	1	2
b)	3	4	2	1
c)	1	2	3	4
d)	2	1	4	3

94. Arrangement of four wall layers in microsporangium from inside to outside is as follows

a) Epidermis, endothecium, tapetum and middle layers
b) Epidermis, middle layers, endothecium and tapetum
c) Epidermis, endothecium, middle layers and tapetum
d) Tapetum, middle layers, endothecium and epidermis

95. Diameter of the pollen grain is generally

a) 5 – 10 μm b) 10 – 50 μm c) 20 – 50 μm d) 25 - 50 μm

96. When the pollen grain is mature it contains two cells, the vegetative cell and generative cell. The vegetative cell

A. Is bigger B. Spindle shaped
C. Has abundant food reserve D. Has large irregularly shaped nucleus

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

97. An anther having four microsporocytes shall produce ____ pollen grains.

a) 24 b) 12 c) 8 d) 16

98. An ovule generally has a single embryo sac formed from a megaspore through

a) Reduction division
b) Mitotic divisions
c) Mitotic division followed by meiotic division
d) Meiotic division followed by mitotic division

99. Read the following statements and identify the wrong statements.

A. The placenta is placed inside the locule, and the ovules develop from it.

B. An ovary can have one or several ovules (papaya, watermelon, and orchids).

C. Each ovule contains one or two protective envelopes known as integuments.

D. The ovule is surrounded by integuments, with the exception of a small aperture called the chalaza near the tip. The micropylar end is located opposite the chalaza.

E. Within the integuments lies a mass of cells known as the perisperm.

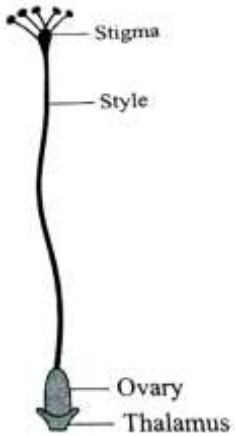
a) B, D and E b) A, C and D c) B, C and E d) A, B and D

100. Match column I with column II, and choose the correct combination from the options given below.

Column I	**Column II**
A. Male gametophyte	1. Ovule
B. Female gametophyte	2. Locule
C. Megasporangium	3. Pollen grain
D. Ovarian cavity	4. Embryo sac

	A	**B**	**C**	**D**
a)	3	4	1	2
b)	4	3	2	1
c)	3	4	2	1
d)	4	3	1	2

101. The following figure shows the



a) Multicarpellary syncarpous pistil of *Papaver*

b) Multicarpellary apocarpous gynoecium of *Michelia*

c) Pentacarpellary syncarpous gynoecium of the *Hibiscus*

d) Multicarpellary apocarpous gynoecium of the china rose

102. Read the following statements and find out the incorrect statements.

A. Ovules generally differentiate single megaspore mother cell (MMC) in the chalazal region of the nucellus.

B. The MMC undergoes reduction division and produces four megaspores.

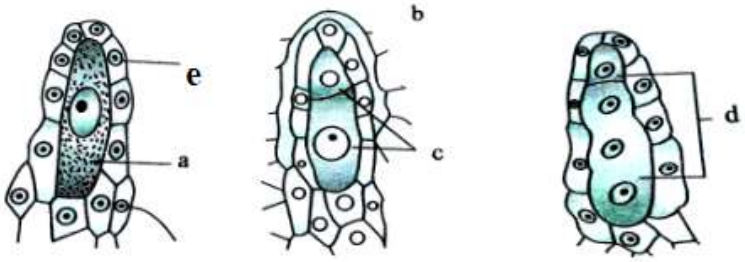
C. In a majority of angiosperms, one of the megaspores degenerate while the other three remains functional.

D. The nucleus of the functional megaspore divides mitotically three times and form 2-nucleate, 4-nucleate and later 8-nucleate stages of the embryo sac.

E. These mitotic divisions are strictly free nuclear, that is, nuclear division are immediately followed by cell wall formation.

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

103. Recognize the figure check out the correct matching



a) a-nucellus, b-chalazal end, c-microspore dyad, d-microspore tetrad, e-megaspore mother cell
b) a-megaspore mother cell, b-chalazal end, c-megaspore dyad, d-megaspore tetrad, e-nucellus
c) a-megaspore mother cell, b-micropylar end, c-megaspore dyad, d-megaspore tetrad, e-nucellus
d) a-nucellus, b-micropylar end, c-megaspore dyad, d-megaspore tetrad, e-megaspore mother cell

104. Embryo sac is monosporic when it develops from
a) One of the four megaspores of a megaspore mother cell
b) Three megaspores of megaspore tetrad
c) Two functional megaspores
d) The megaspore mother cell where meiosis has occurred but cytokinesis does not take place

105. Embryo sac develops from megaspore mother cell through
a) 1 meiosis and 2 mitosis
b) 1 meiosis and 3 mitosis
c) 2 meiosis and 1 mitosis
d) 2 meiosis and 2 mitosis

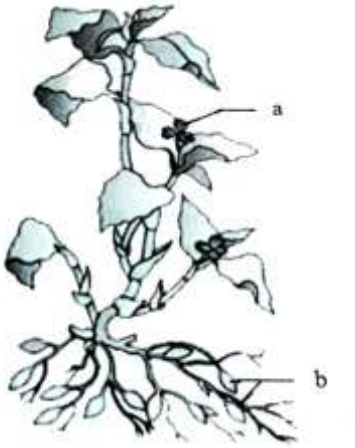
106. Read the following statements and identify the wrong statements.
A. Plants use two abiotic (wind and water) and one biotic (animals) agents to pollinate.
B. The majority of plants rely on abiotic agents for pollination.
C. Only a small percentage of plants utilize biotic agents.
D. Abiotic pollinators frequently use water to pollinate.
E. Wind pollination is rare in flowering plants, affecting just about 30 taxa, the majority of which are monocotyledons.
a) A, B, C and D
b) B, C, D and E
c) A, C, D and E
d) B and D only

107. Read the following statements and find out the incorrect statement
a. Majority of flowering plants use a range of animals as pollinating agents.
b. Bees, butterflies, flies, beetles, wasps, ants, moths, birds (sunbirds and hummingbirds) and bats are the common pollinating agents.
c. Among the animals, insects, particularly bees, are the dominant biotic pollinating agents.
d. Even larger animals such as some primates (lemurs), arboreal (tree dwelling) rodents, or even reptiles (gecko lizards and garden lizards) have also been reported as pollinators in some species.
e. Often flowers of animal pollinated plants are specifically adapted for a particular species of animal.
a) a and b
b) b and c
c) d and e
d) None of the above

108. The flower height in *Amorphophallus* is
a) 6 feet
b) 6 meter
c) 6 cm
d) 12 meter

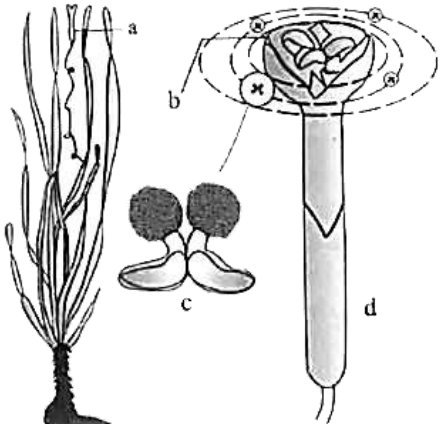
109. Which of the following is an outbreeding device?
A. If pollen release and stigma receptivity are not synchronized.
B. If the anther and stigma are placed at different positions so that pollen cannot come in contact with the stigma of the same flower.
C. Self-incompatibility which prevents self-pollen (from the same plant) from fertilizing the ovules by inhibiting pollen germination or pollen tube growth in the pistil.
D. Production of the unisexual flower.
a) A, B and C
b) B, C and D
c) A, C and D
d) A, B, C and D

110. Recognize the figure and find out the correct matching



a) a-chasmogamous flowers, b-cleistogamous flowers
b) a-cleistogamous flowers, b-chasmogamous flowers
c) a-chamogamous flowers, b-dichogamous flowers
d) a-dichogamous flowers, b-cleistogamous flowers

111. The given figure show the pollination by water in Vallisneria. Find out the correct matching.



a) a-female flower, b-male flower, c-female flower, d-stigma
b) b-female flower, a-male flower, d-female flower, c-stigma
c) a-female flower, b-male flower, d-female flower, c-stigma
d) d-female flower, c-male flower, a-female flower, b-stigma

112. Pollination in lotus is carried out by

a) Wind b) Water c) Insects d) All of the above

113. The occurrence of feathery stigma is noted in

a) Pea b) Wheat/Jowar c) *Datura* d) *Caesalpinia*

114. Assertion: Each cell of sporogenous tissue is a potential pollen mother cell (PMC) or microspore mother cell

Reason: Each cell of the sporogenous tissue is capable of giving rise to a microspore tetrad

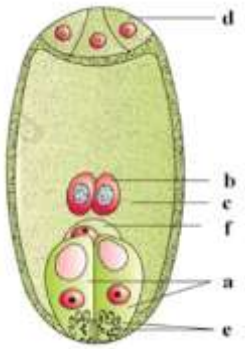
a) Both assertion and reason are true and the reason is the correct explanation of the assertion
b) Both assertion and reason are true but reason is not the correct explanation of the assertion
c) Assertion is true but reason is false
d) Both assertion and reason are false

115. Assertion: Wind pollination requires that the pollen grains are light and non – sticky

Reason: Light pollen grains can be transported easily in wind currents

a) Both assertion and reason are true and the reason is the correct explanation of the assertion
b) Both assertion and reason are true but reason is not the correct explanation of the assertion
c) Assertion is true but reason is false
d) Both assertion and reason are false

116. In the diagram given, parts labelled as a, b, c, d, e and f are respectively identified as



a) Synergids, polar nuclei, central cell, antipodals, filiform apparatus and egg
b) Polar nuclei, egg, antipodals, central cell, filiform apparatus and synergids
c) Filiform apparatus, polar nuclei, egg, antipodals synergids and central cell
d) Central cell, polar nuclei, filiform apparatus, antipodals, synergids and egg

117. Number of male gametes formed by 16 microspore mother cells is

a) 128 b) 64 c) 32 d) 16

118. Identify the pair of wrong statements

I. Intine of pollen grains is made up of sporopollenin,
II. Pollen grains are well preserved as fossils because of the presence of sporopollenin
III. Enzymes can degrade the organic material of the pollen grain exine
IV. Sporopollenin can withstand high temperature, strong acids and alkali

a) III, IV b) I, III c) I, II d) II, III

119. Cells present in mature male gametophyte of angiosperms is

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

120. Match the following

Column - I	**Column - II**
A. Water pollination	1. Corn
B. Wind pollination	2. *Yucca*
C. Insect pollination	3. *Hydrilla*

	A	**B**	**C**
a)	1	2	3
b)	3	1	2
c)	2	3	1
d)	3	2	1

121. Male and female reproductive structures of the angiosperms are

a) Carpel and pistil respectively b) Pistil and stamen respectively
c) Gynoecium and androecium respectively d) Androecium and gynoecium respectively

122. The bilobed nature of an anther is very distinct in the

a) Transverse section b) Longitudinal section
c) Latitudinal section d) Both a and b

123. In the centre of each microsporangium, there is a group of compactly arranged homogenous cells called

a) Tapetum b) Nucellus
c) Sporogenous tissue d) Pollen grains

124. The microspores, as they are formed, are arranged in a cluster of four cells - the microspore tetrad. As the anthers mature and dehydrate, the microspores dissociate from each other and develop into

a) Pollen grains b) Female gametophyte
c) Male gametophyte d) Both a and c

125. Pollen grain has a prominent two layered wall. The inner wall

a) Is made up of cellulose and pectin b) Is thin and continuous

c) Is made up of sporopollenin d) Both a and b

126. Parthenium or carrot grass has become ubiquitous and causes pollen allergy. Parthenium came into India as a contaminant with imported

a) Wheat b) Rice c) Carrot d) Rose

127. Which of the following statement about sporopollenin is wrong?

a) Exine is formed of sporopollenin

b) Sporopollenin is not degraded by any known enzyme

c) Sporopollenin occurs in the area of germ pores only

d) Sporopollenin is most resistant organic material

128. During formation of pollen grains, a microspore mother cell undergoes

a) One meiotic division b) One mitotic division

c) One meiotic and one mitotic division d) One meiotic and two mitotic divisions

129. The process of formation of microspores from pollen mother cell (PMC) through meiosis is called

a) Microgametogenesis b) Microsporogenesis

c) Megagametogenesis d) Megasporogenesis

130. In flowering plants, the male gametes are formed by

a) Generative cell b) Uninucleate microspore

c) Vegetative cell d) Pollen tube

131. Which one of the following statements is not true?

a) Pollen grains of many species cause severe allergies

b) Stored pollen in liquid nitrogen can be used in the crop breeding programmes

c) Tapetum helps in the dehiscence of anther

d) Exine of pollen grains is made up of sporopollenin

132. Proximal end of the filament of stamen is attached to the

a) Placenta b) Thalamus or petal c) Anther d) Connective tissue

133. Largest cell of the ovule is

a) Megaspore mother cell b) Antipodal cell

c) Central cell d) Size of cells variable

134. In female gametophytes, the first haploid cell is

a) Functional megaspore b) Microspore mother cell

c) Megaspore mother cell d) None of the above

135. Which one produces embryo sac?

a) Megaspore mother cell b) Megaspore

c) Microspore d) Embryo cell

136. Which of the following statements is false?

I. *Vallisneria* and *Hydrilla* are fresh water plants while sea-grasses (e.g. *Zostera*) are marine plant.

II. *Vallisneria* is epihydrophilous while *Zostera* is hypohydrophilous

III. Pollination in water lily / Lotus (*Nymphea*) and *Eichhornia* (water hyacinth) takes place by insects

IV. In majority of aquatic plants flowers emerge above the level of water and are pollinated by insects or wind

V. In most of the water pollinated species, pollen grains are protected from wetting due to absence of mucilaginous covering

VI. In hydrophilous plants pollen grains are spherical

a) All b) V and VI c) None d) IV

137. Sequence of development of embyo sac is

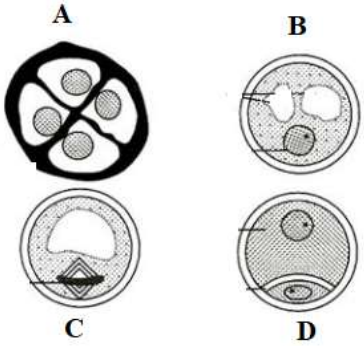
a) Archesporium → Megaspore → megasporpyte → Embryo sac

b) Archesporium → Megaspore mother cell → Embryo sac → Megaspore

c) Archesporium → Megaspore → Megaspore mother cell → Embryo sac

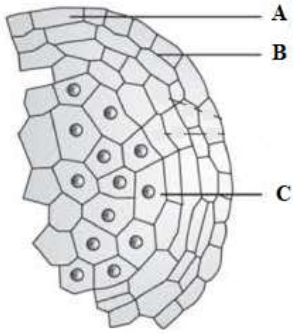
d) Archeporium → Megaspore mother cell → Megaspore → Embryo sac

138. Identify the two cell stage of the pollen grain of the following



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

139. Identify the following from the T.S. of anther



a) A-Endothecium, B-Epidermis, C-Tapetum

b) A-Epidermis, B-Endothecium, C-Tapetum

c) A-Epidermis, B-Middle layers, C-Tapetum

d) A-Epidermis, B-Middle layers, C-Endothecium

140. What does the following diagram represent?

a) Female gametophyte b) Male gametophyte

c) Egg d) Microspore mother cell

141.Statement -A: In over 60 per cent of angiosperms, pollen grains are shed at 3-celled stage

Statement -B: *Parthenium* or carrot grass came into India as a contaminant with imported wheat

a) Statement A is correct but Statement B is incorrect

b) Statement A is incorrect but Statement B is correct

c) Both statements are correct

d) Both statements are incorrect

142. What is the function of tassels in the corn cob?

a) To disperse pollen grains b) To protect seeds

c) To attract insects d) To trap pollen grains

143.Assertion (A): Attraction of flowers prevents all insects from damaging other parts of the plant
Reason (R): Pollination carried out by insects is called Anemophily
a) Assertion and reason are true and reason is the correct explanation of assertion
b) Assertion and reason are true but reason is not the correct explanation of assertion
c) Assertion is true but reason is false
d) Both assertion and reason are false

144. Large, colourful, fragrant flowers with nectar are seen in
a) bat pollinated plants
b) wind pollinated plants
c) insect pollinated plants
d) bird pollinated plants

145.Statement - A: When there are more than one, the pistils may be fused together (syncarpous) or may be free (apocarpous)
Statement - B: Inside the ovary is the ovarian cavity (locule)
a) Statement A is correct but Statement B is incorrect
b) Statement A is incorrect but Statement B is correct
c) Both statements are correct
d) Both statements are incorrect

146. Identify the incorrect statement related to pollination
a) Pollination by water is quite rare in flowering plants
b) Pollination by wind is more common amongst abiotic pollination
c) Flowers produce foul odours to attract flies and beetles to get pollinated
d) Moths and butterflies are the most dominant pollinating agents among insects

147.Assertion (A): Megaspore mother cell undergoes meiosis to produce four haploid gametes of which all are functional
Reason (R): Megaspore mother cell is 2n, mitosis gives haploid structure.
a) Assertion and reason are true and reason is the correct explanation of assertion
b) Assertion and reason are true but reason is not the correct explanation of assertion
c) Assertion is true but reason is false
d) Both assertion and reason are false

148.A typical angiosperm embryo sac at maturity is
a) 8-nucleate and 8-celled
b) 8-nucleate and 7-celled
c) 7-nucleate and 8-celled
d) 7-nucleate and 7-celled

149.Statement - A: Some examples of water pollinated plants are *Vallisneria* and *Hydrilla* which grow in marine water and several fresh water species such as *Zostera*.
Statement -B : The synergids have special cellular thickenings at the chalazal tip called filiform apparatus, which play an important role in guiding the pollen tubes into the synergid.
a) Statement A is correct but Statement B is incorrect
b) Statement A is incorrect but Statement B is correct
c) Both statements are correct
d) Both statements are incorrect

150. In some members of which of the following pairs of families, pollen grains retain their viability for months after release?
a) Rosaceae, Leguminosae
b) Poaceae, Rosaceae
c) Poaceae, Leguminosae
d) Poaceae, Solanaceae

151.Assertion (A): Flowers are the structures related to sexual reproduction in flowering plants
Reason (R): Various embryological processes of plants occur in a flower
a) Assertion and reason are true and reason is the correct explanation of assertion
b) Assertion and reason are true but reason is not the correct explanation of assertion
c) Assertion is true but reason is false
d) Assertion is false but reason is true

152. The plant parts which consist of two generations one within the other
a) pollen grains inside the megaspores
b) germinated pollen grain with two male gametes
c) seed inside the fruit
d) embryo sac inside the ovule

153.Statement-A: Among the animals, insects, particularly bees are the dominant biotic pollinating agents
Statement-B: Continued self-pollination result in inbreeding depression
a) Statement A is correct but Statement B is incorrect
b) Statement A is incorrect but Statement B is correct
c) Both statements are correct
d) Both statements are incorrect

154. Which is the most common type of embryo sac in angiosperms?
a) Tetrasporic with one mitotic stage of divisions
b) Monosporic with three sequential mitotic divisions
c) Monosporic with two sequential miotic divisions
d) Bisporic with two sequential mitotic divisions

155. Pollen grains can be stored for several years in liquid nitrogen having a temperature of
a) -120°C b) -80°C c) -196°C d) -160°C

156. Which of the following has proved helpful in preserving pollen as fossils?
a) Pollenkitt b) Cellulosic intine c) Oil content d) Sporopollenin

157. Functional megaspore in an angiosperm develops into an
a) endosperm b) embryo sac c) embryo d) ovule

158. The developed embryo sac contains the central cell, which is
a) Single nucleate b) Binucleate c) Four nucleate d) Eight nucleate

159. What does filiform apparatus do at the entrance into ovule.?
a) Brings about opening of pollen tube
b) Guides pollen tube from synergid to egg
c) Helps in entry of pollen tube into synergid
d) Prevents entry of more than one pollen tube into embryo sac

160. Ploidy of ovum of angiosperms is
a) Haploid b) Diploid c) Triploid d) Polyploid

161. In a multicarpellary gynoecium, the pistils may be fused together in case of ___ gynoecium, or free in case of ____ gynoecium.
a) Apocarpous, syncarpous b) Syncarpous, apocarpous
c) Syncarpous, syncarpous d) apocarpous, apocarpous

162. What is functional megaspore referred to as?
a) The megaspore that degenerates after formation
b) The megaspore that does not degenerate and undergoes mitosis later
c) The megaspore that undergoes reduction division
d) The megaspore that is functionally inactive

163. Which of the following nucleus is unlike other nuclei in the female gametophyte of angiosperms?
a) Egg nucleus b) Nucleus of synergids
c) Secondary nucleus d) Nuclei of antipodals

164. Ovule of most angiosperms is
a) Orthotropus b) Anatropous c) Campylotropus d) Amphitropous

165. The tips on the ovule where integument are absent are called
a) Micropyle b) Germ pore c) Both a) and b) d) Integuments

166. Out of the 4 megaspores, how many functional megaspores would remain?
a) 2 b) 1 c) 3 d) 2

167. Antipodal cells are present in which end of the embryo sac?
a) Chalazal end b) Micropylar end
c) They are situated in the centre d) None of the above

168. Depending on the source of pollen, pollination can be divided into
a) Two types b) Three types
c) Four types d) Many types

169. The conditions required for the autogamy
a) Bisexuality
b) Synchrony in pollen release and stigma receptivity
c) Anther and stigma should lie close to each other
d) All of the above

170. In the corn cob, the tassels which wave in the wind to trap the pollen grains represents
a) Stigma and style b) Style and ovary c) Stigma d) Style

171. In most of the water pollinated species, pollen grains are protected from wetting by a
a) Mucilaginous covering b) Agar coating
c) Algin coating d) Pectose coating

172. Which of the following species provides floral rewards in the form of providing safe place to lay eggs?
a) Amorphophallus b) Fig c) Yucca d) All of the above

173. Yucca plant is pollinated by
a) A species of moth (*Pronuba*) b) A species of wasp (*Blastophaga*)
c) A species of beetle d) A species of insect

174. Cleistogamous flower is found in
a) Tobacco b) *Mirabilis* c) *Viola* d) None of the above

175. Contrivance for self - pollination is
a) Cleistogamy b) Bisexuality
c) Homogamy d) All of the above

176. Having flowers that are unisexual inhibits
a) Geitonogamy but not xenogamy b) Autogamy and geitonogamy
c) Autogamy but not geitonogamy d) Both geitonogamy and xenogamy

177. The kind of pollination that transports pollen grains of genetically distinct types to the stigma of a plant is referred to as
a) Xenogamy b) Geitonogamy c) Chasmogamy d) Autogamy

178. In which category, pollination is invariably autogamous?
a) Chasmogamy b) Geitonogamy c) Cleistogamy d) Xenogamy

179. Fragrant flowers with well – developed nectaries are an adaptation for
a) Zoophily b) Anemophily c) Entomophily d) Hydrophily

180. Both autogamy and geitonogamy cannot occur in
a) Papaya b) Cucumber c) Castor d) Maize