Aakash
Medical | IIT-JEE | Foundations

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MM : 720 Final Test Series(P2)-2024-25_Test-02D **Time : 180 Min.**

Topics Covered:
Physics: Electromagnetic Induction, Alternating Current, Electromagnetic Waves, Ray Optics and Optical Instruments, Wave Optics
Chemistry: Thermodynamics, Equilibrium, Redox Reactions
Botany: Morphology of Flowering Plants, Anatomy of Flowering Plants
Zoology: Human Health and Disease, Biotechnology: Principles and Processes, Biotechnology and Its Applications

General Instructions :
Duration of Test is 3 hrs.
The Test consists of 180 questions. The maximum marks are 720.
There are four parts in the question paper consisting of Physics, Chemistry, Botany and Zoology having 45 questions in each part of equal weightage.
Each question carries +4 marks. For every wrong response, –1 mark shall be deducted from the total score. Unanswered/unattempted questions will be given no marks.
Use blue/black ballpoint pen only to darken the appropriate circle.
Mark should be dark and completely fill the circle.
Dark only one circle for each entry.
Dark the circle in the space provided only.
Rough work must not be done on the Answer sheet and do not use white fluid or any other rubbing material on the Answer sheet.

PHYSICS

1. Two coherent monochromatic light beams of intensities *I* and 4*I* are superposed. The ratio of maximum and minimum intensities in resulting beam are

(1) 5 : 1

(2) 5 : 3

(3) 9 : 1

(4) 9 : 3

2. The amplitude of electric field associated with plane electromagnetic wave travelling through vaccum is 300 V/m. The amplitude of magnetic field associated with this electromagnetic wave is

(1) 10^{-6} T

(2) 3×10^{-6} T

(3) 3×10^{10} T

(4) 300 T

3. Transverse nature of light was confirmed by the phenomenon of

(1) Refraction of light

(2) Diffraction of light

(3) Dispersion of light

(4) Polarisation of light

4. A compound microscope uses an objective lens of focal length 4 cm and eye lens of focal length 10 cm. If an object is placed at 6 cm from objective lens, then the magnifying power of compound microscope for the final image formed at near point will be

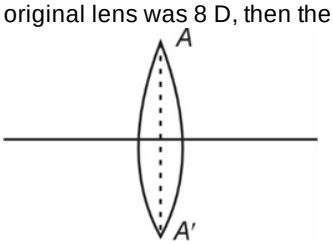
(1) 7

(2) 2.5

(3) 2

(4) 3.5

5. A symmetric double convex lens is cut into two equal parts by a plane perpendicular to principal axis. If power of original lens was 8 D, then the power of divided lens will be



(1) 2 D

(2) 6 D

(3) 4 D

(4) 5 D

6. A coil of resistance 20 Ω and inductance 5 H is connected to a 200 V battery. The maximum energy stored in the coil is

(1) 250 J

(2) 100 J

(3) 200 J

(4) 350 J

7. Two coils *A* and *B* are placed close to each other have a mutual inductance of 5 mH. The current flowing through coil *A* is given by, $i = t^2 - 2t$ where *i* is in A and *t* is in s. The magnitude of induced emf in coil *B* at $t = 4$ s will be

(1) 10 mV

(2) 20 mV

(3) 30 mV

(4) 40 mV

8. A transformer is used to illuminate a bulb rated as 100 W and 110 V, from a 220 V mains. If main current is 0.6 A, then the efficiency of transformer is nearly

(1) 100%

(2) 76%

(3) 88%

(4) 94%

9. The angle of minimum deviation of a prism is 37°. If angle of prism is 53°, then the refractive index of the material of prism will be (Take $\sin(26.5°) \approx 0.44$)

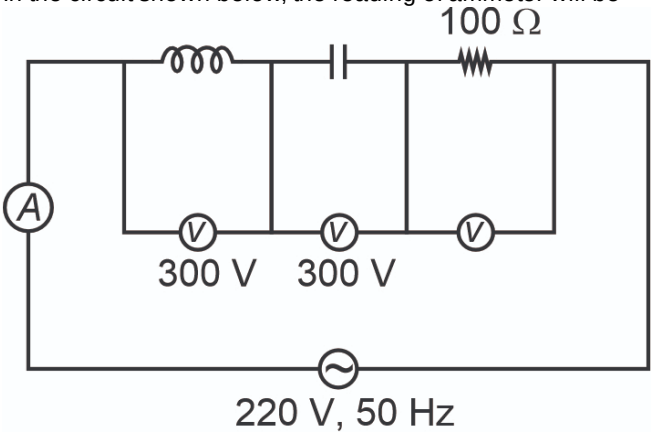
(1) 1.6

(2) 1.33

(3) 3.5

(4) 2.8

10. In the circuit shown below, the reading of ammeter will be



(1) 2 A

(2) 2.2 A

(3) 0.63 A

(4) 4.2 A

11. A circular coil of radius '*R*' is placed in variable magnetic field as shown in figure.

If strength of magnetic field as a function of time is $5t^2$ and resistance of the coil is

ϒ

Ω then the induced current in the coil at any instant is

(1) $\left(\frac{5\pi R^2}{\gamma}\right) t$

(2) $\left(\frac{10\pi R^2}{\gamma}\right) t$

(3) $\frac{5t^2 R}{\gamma}$

(4) $10\pi\gamma R^2 t$

12. Fringe width for a YDSE experiment is 0.84 mm, when placed in air and wavelength of light is 6300 Å. Now the whole apparatus is immersed in a liquid of refractive index 1.33, then new fringe width will be

(1) 0.84 mm

(2) 0.80 mm

(3) 0.63 mm

(4) 1.11 mm

13. Read the following statements:
(a) Angle of deviation from prism depends upon angle of incidence.
(b) For equilateral prism, at minimum deviation condition refracted ray inside the prism becomes parallel to its base.
(c) For small angled prism, the minimum deviation (δ_m) is given by (μ + 1)*A*, where μ is refractive index and *A* is refractive angle of prism
The incorrect statement(s) is/are

(1) (a) and (b) only

(2) (a) and (c) only

(3) (b) and (c) only

(4) (c) only

14. In YDSE, the number of maxima that can be obtained on a large screen, if wavelength of light used is 200 nm and separation between the slits is 700 nm is .

(1) 12

(2) 7

(3) 18

(4) 5

15. A : In a step-up transformer, number of turn in secondary coil is less than primary coil.
R : DC current can also be stepped up by the transformer.

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

16. The SI unit of displacement current is

(1) Henry

(2) Coulomb

(3) Ampere

(4) Farad

17. A conducting rod of length *l* is moved with a constant velocity $\vec{V}$ in a magnetic field ($\vec{B}$). A potential difference may appear across the two ends if

(1) $\vec{V} \parallel \vec{l}$

(2) $\vec{V} \parallel \vec{B}$

(3) $\vec{l} \parallel \vec{B}$

(4) $\vec{V} \perp \vec{B}$

18. The absolute refractive indices of glass and water are $\frac{3}{2}$ and $\frac{4}{3}$. The ratio of velocity of light in glass and water will be

(1) 4 : 3

(2) 3 : 4

(3) 8 : 9

(4) 7 : 8

19. The peak value of an alternating emf, $E = E_0\sin(\omega t)$ is 10 V and frequency is 50 Hz. At a time, $t = \frac{1}{600}s$, the instantaneous value of the emf will be

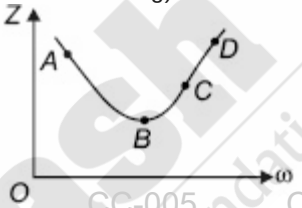
(1) 1 V

(2) $5\sqrt{3}$ V

(3) 5 V

(4) $\frac{10}{\sqrt{2}}$V

20. The variation of impedance (*Z*) of a series LCR circuit with angular frequency (ω) of the source is as shown in the figure. Then choose incorrect statement (Symbols have usual meaning)



(1) At point A, the circuit is essentially capacitive in nature

(2) At point C, $X_L = X_C$

(3) Point *C* and *D* lies in inductive region

(4) At point *B*, current will be maximum in circuit

21. A transformer has 200 primary turns and 10 secondary turns. If V_P = 220 V, then V_S with an open circuit is

(1) 4400 V

(2) 11 V

(3) 220 V

(4) 110 V

22. A coil having an area A_0 is placed in a transverse magnetic field which changes from B_0 to $3B_0$ in a time interval *t*. The average emf induced in the coil will be

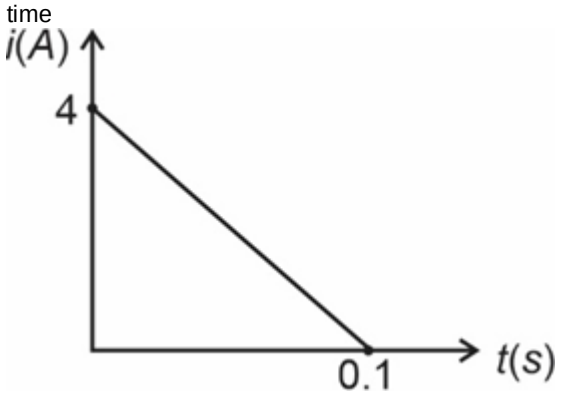
(1) $\frac{B_0A_0}{t}$

(2) $\frac{2B_0A_0}{t}$

(3) $\frac{3B_0A_0}{t}$

(4) $\frac{B_0A_0}{2t}$

23. In a coil of resistance 5 Ω, the induced current developed by changing magnetic flux through it is shown as function of time



The magnitude of change in flux in weber will be

(1) 2

(2) 4

(3) 1

(4) 6

24. In a plane electromagnetic wave travelling in vacuum, the electric field oscillates sinusoidally at a frequency of 2×10^{10} Hz and amplitude 48 V/m. The wavelength of electromagnetic wave will be

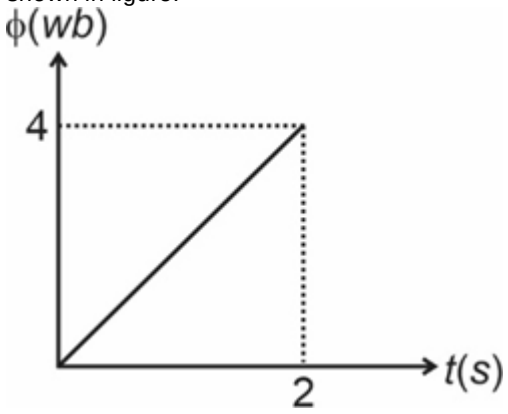
(1) 1.5×10^{-2} m

(2) 2.5×10^{-2} m

(3) 5.2×10^{-2} m

(4) 6.2×10^{-2} m

25. Magnetic flux passing through a coil of resistance 2 Ω is shown in figure.



Based on above information, match Column-I with Column-II.

Column-I	Column-II
a. Average induced emf produced in volts	(i) 4
b. Induced current in Ampere	(ii) 1
c. Charge flown in 2 s in Coulomb	(iii) 8
d. Heat generated in 2 s in Joules	(iv) 2

(1) a(iv), b(ii), c(iv), d(i)

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

(3) a(iv), b(ii), c(i), d(iv)

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

26. An small air bubble in a glass slab with refractive index μ(near normal incidence) is at depth of d_1 when viewed from one surface and at depth of d_2 when viewed from opposite face. The thickness of slab is

(1) $\mu(d_1 + d_2)$

(2) $\mu(d_1 - d_2)$

(3) $\mu(d_1 + 2d_2)$

(4) $\mu(d_1 - 2d_2)$

27. A : Energy of an electromagnetic wave is equally distributed among the electric field and magnetic field.
R : Direction of propagation of e.m. wave will be along $\vec{B} \times \vec{E}$

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

28. An inductor of self-inductance 1.5 H is connected in series with a resistance of 10 Ω and a battery of 2 V. The energy stored by the inductor in steady state will be

(1) 0.003 J

(2) 0.03 J

(3) 0.3 J

(4) 0.15 J

29. When an electromagnetic wave propagates through a material medium of relative permittivity, ε_r and relative permeability, μ_r , the velocity of electromagnetic wave *v* is given by (Where *c* denotes speed of light in vacuum)

(1) *c*

(2) $\frac{c}{\sqrt{\varepsilon_r \mu_r}}$

(3) $c\sqrt{\frac{\mu_r}{\varepsilon_r}}$

(4) $c\sqrt{\frac{\varepsilon_r}{\mu_r}}$

30. Two coherent sources each emitting light of intensity I_0 interfere in a medium at a point where phase difference between them is $\frac{\pi}{3}$. The resultant intensity at that point would be

(1) I_0

(2) $3I_0$

(3) $2I_0$

(4) $4I_0$

31. Two concentric circular coils, one of small radius r_1 and other of large radius r_2, such that $r_1 << r_2$, are placed coaxially. The mutual inductance of arrangement will be

(1) $\frac{\pi\mu_0 r_1^2}{r_2}$

(2) $\frac{\pi\mu_0 r_2^2}{r_1}$

(3) $\frac{\pi\mu_0 r_1^2}{2r_2}$

(4) $\frac{\pi\mu_0 r_2^2}{2r}$

32. A 15 μF capacitor is connected to 220 V, 50 Hz source. If frequency is doubled then what happens to capacitive reactance and current?

(1) The capacitive reactance is halved and current is doubled

(2) The capacitive reactance is doubled and current is doubled

(3) The capacitive reactance remains same and current is doubled

(4) The current remains same and capacitive reactance is halved

33. Choose the incorrect statement among the following

(1) TIR occur when light ray travels from denser to rarer medium and value of angle of incident ray exceed the critical angle

(2) TIR occur when light ray travel from a medium in which speed of light is higher to the medium in which speed of light is lower

(3) Frequency of light ray does not change while moving from one medium to another

(4) TIR is a major reason why diamonds shine

34. In Young's double slit experiment slit separation is *d*, and distance of screen from slit is *D* (*D* >> *d*). If first dark fringe is formed infront of one of the slit, then wavelength of light used will be

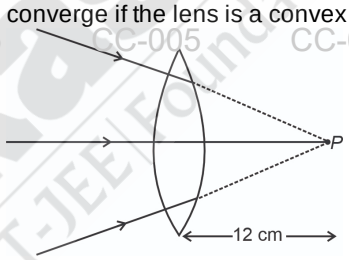
(1) $\frac{3d^2}{2D}$

(2) $\frac{d^2}{2D}$

(3) $\frac{3D^2}{2d}$

(4) $\frac{d^2}{D}$

35. A beam of light converges to a point *P* as shown. A lens is placed in the path of the convergent beam at a distance of 12 cm from *P*. At what distance from lens does the beam converge if the lens is a convex lens of focal length 20 cm



(1) 48 cm

(2) 7.5 cm

(3) 10.3 cm

(4) 24.5 cm

36. The Maxwell's equations are written as

(i) $\oint \vec{E} \cdot d\vec{s} = \frac{q_{\text{enclosed}}}{\varepsilon_0}$

(ii) $\oint \vec{B} \cdot d\vec{s} = 0$

(iii) $\oint \vec{E} \cdot d\vec{l} = \frac{-d\phi_B}{dt}$

Which of the Maxwell's equations contains non-conservative electric field?

(1) (i) only

(2) (ii) & (iii)

(3) (i) & (iii)

(4) (iii) only

37. Power factor for a purely capacitive circuit is

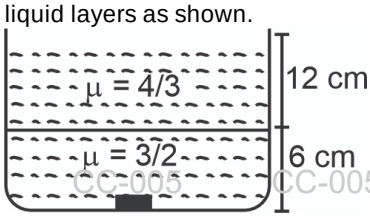
(1) 1

(2) $\frac{1}{\sqrt{2}}$

(3) $\frac{\sqrt{3}}{2}$

(4) Zero

38. A coin is placed at the bottom of a tank which is filled by two liquid layers as shown.



The apparent depth of coin from top of surface for normal viewing will be

(1) 6 cm

(2) 13 cm

(3) 5 cm

(4) 18 cm

39. The first diffraction minima due to a single slit diffraction is at 30° for a light wavelength 6000 Å. The width of the slit is (in μm)

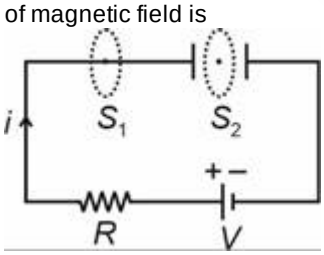
(1) 1.2

(2) 2.1

(3) 4.3

(4) 3.4

40. A parallel plate capacitor is charged by connecting it to a battery through a resistor *R* as shown in figure. The source of magnetic field is



(1) Conduction electric current due to flowing charges for loop S_1

(2) Time rate of change of electric field between the plates of capacitor for loop S_2

(3) Both (1) and (2)

(4) Resistance *R*

41. Ordinary light of intensity I_0 incident on a polariser, then it passes through analyser whose axis is at 45° w.r.t. polariser axis. The intensity of light coming out through analyser will be

(1) I_0

(2) $\frac{I_0}{2}$

(3) $\frac{I_0}{4}$

(4) $\frac{I_0}{8}$

42. The polarising angle for air-material interface is 53°. Then the refractive index of the material is

(1) 4/3

(2) 3/2

(3) 5/3

(4) 5/4

43. The self inductance *L* of a solenoid of length ℓ and area of cross-section *A*, for a fixed number of turns N will definitely decrease as

(1) *A* decrease and ℓ increase

(2) Both *A* and ℓ decrease

(3) Both *A* and ℓ increases

(4) *A* increases and ℓ decreases

44. Which of the following will have zero average value in a plane electromagnetic wave?

(1) Electric field

(2) Magnetic field

(3) Magnetic energy

(4) Both 1 and 2

45. The potential difference across the resistor, capacitor and inductor are 80 V, 40 V and 100 V respectively, in an LCR circuit. The power factor of the circuit will be

(1) 0.4

(2) 0.5

(3) 0.8

(4) 1

CHEMISTRY

46. For the given redox reaction, the coefficients of the reactants for the balanced reaction are

$Cr_2O_7^{2-} + SO_3^{2-} + H^+ \rightarrow Cr^{3+} + SO_4^{2-} + H_2O$

	$Cr_2O_7^{2-}$	SO_3^{2-}	H^+
(1)	1	4	7
(2)	1	2	6
(3)	1	4	8
(4)	1	3	8

(1) (1)

(2) (2)

(3) (3)

(4) (4)

47. Match List-I with List-II

List-I Species		**List-II Oxidation state of central atom**
a. C_3O_2	(i)	+6
b. Br_3O_8	(ii)	+1
c. CrO_5	(iii)	0
d. H_3PO_2	(iv)	+4

Choose the **correct** option.

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

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

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

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

48. The number of S = O bond(s), S – O bond(s) and S – S bond(s) respectively in tetrathionate ion are

(1) 4, 2 and 3

(2) 4, 2 and 1

(3) 2, 1 and 3

(4) 2, 2 and 1

49. Given below are two statements : one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**:

Assertion (A) : Standard electrode potential of hydrogen electrode is taken as zero.

Reason (R) : Standard electrode potential of a half-cell is determined with reference to standard hydrogen electrode.

In the light of the above statements, choose the **correct** answer from the options given below:

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion.

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion.

(3) Assertion is true statement but Reason is false.

(4) Both Assertion and Reason are false statements.

50. Given the standard electrode potentials:

Na^+/Na = –2.71 V

Pb^{+2}/Pb = –0.13 V

K^+/K = –2.93 V

Mg^{+2}/Mg = –2.37 V

Arrange these metals in their decreasing order of reducing power.

(1) Na > K > Mg > Pb

(2) Pb > Mg > Na > K

(3) K > Na > Mg > Pb

(4) Pb > K > Mg > Na

51. Oxidation numbers of P, Q and R are +3, +4 and –2 respectively. Possible formula of the compound is

(1) $P_2(QR_3)_2$

(2) $P_3(QR_3)_3$

(3) $P_2(QR_3)_3$

(4) $P_2(Q_2R)_3$

52. Match the reactions given in List I with types of redox reactions in List II

	List I		List II
(a)	$CH_4(g) + 2O_2(g) \xrightarrow{\Delta} CO_2(g) + 2H_2O(l)$	(i)	Decomposition
(b)	$2KClO_3(s) \xrightarrow{\Delta} 2KCl(s) + 3O_2(g)$	(ii)	Combination
(c)	$Cr_2O_3(s) + 2Al(s) \xrightarrow{\Delta} Al_2O_3(s) + 2Cr(s)$	(iii)	Non-metal displacement
(d)	$2Na(s) + 2H_2O(l) \rightarrow 2NaOH(aq) + H_2(g)$	(iv)	Metal displacement

The **correct** match is

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

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

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

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

53. $E°_{Ag^+/Ag}$ = 0.8 V and $E°_{Zn^{2+}/Zn}$ = –0.76 V . $E°_{cell}$ value when these electrodes are connected to construct a working cell will be

(1) 1.56 V

(2) –1.56 V

(3) 0.04 V

(4) –0.04 V

54. Which among the following metals will not give $H_2(g)$ on reaction with dilute HCl?

(1) Al

(2) Fe

(3) Cu

(4) Zn

55. How many moles of $Cr_2O_7^{2-}$ is needed to oxidise one mole of H_2S to sulphur in acidic medium?

(1) $\frac{1}{3}$

(2) 3

(3) $\frac{1}{2}$

(4) 2

56. Consider the following statements.
(a) Oxidation refers to loss of electron(s) by any species.
(b) Reduction refers to gain of electron(s) by any species.
(c) Oxidising agents are donor of electron(s).
The **correct** statements are

(1) (a) and (b) only

(2) (b) and (c) only

(3) (a) and (c) only

(4) (a), (b) and (c)

57. The species which will not show disproportionation reaction is

(1) ClO^-

(2) ClO_2^-

(3) ClO_3^-

(4) ClO_4^-

58. Heat necessary to raise the temperature of 54.0 g of aluminium from 45°C to 55°C will be (Molar heat capacity of Al is 24 J mol^{-1} K^{-1})

(1) 0.62 kJ

(2) 0.31 kJ

(3) 0.48 kJ

(4) 0.37 kJ

59. Given below are the two statements.
Statement (I): For adiabatic process, q = 0.
Statement (II): For adiabatic process work is done on the expense of change in internal energy.
Choose the correct option from the following

(1) Both statement I and Statement II are correct

(2) Statement I is correct but statement II is incorrect

(3) Statement I is incorrect but statement II is correct

(4) Both statement I and II are incorrect

60. For the reaction, $4A(g) + B(s) \rightarrow 4C(g)$, if $\Delta U° = -10$ kJ and $\Delta S° = -40$ J K^{-1}, then value of $\Delta G°$ at 298 K will be

(1) 2.88 kJ

(2) 1.92 kJ

(3) 3.84 kJ

(4) 0.72 kJ

61. If 10 kJ work is done on the system then 2 kcal heat is released by the system then change in internal energy is (1 cal = 4.2 J)

(1) 1.6 J

(2) 1.6 cal

(3) 1600 cal

(4) 1600 J

62. If one mole of an ideal gas undergoes expansion in volume from 10 L to 100 L at 27°C, isothermally and reversibly, then the work done by the gas is

(1) – 8.4 kJ

(2) – 5.7 kJ

(3) – 12.3 kJ

(4) – 2.3 kJ

63. $N_2(g) + 2O_2(g) \rightarrow 2NO_2(g) + x$ kJ
$2NO(g) + O_2(g) \rightarrow 2NO_2(g) + y$ kJ
The enthalpy of formation of NO (in kJ mol^{-1}) is

(1) x – y

(2) 2x – 2y

(3) $\frac{1}{2}(y - x)$

(4) $\frac{1}{2}(x - y)$

64. Select an incorrect match from the following.

(1) Volume – Extensive

(2) Density – Intensive

(3) Temperature – Intensive

(4) Pressure – Extensive

65. If the equilibrium constant of a reaction is 2×10^3 at 25°C then the standard Gibbs free energy change for the reaction will be nearly

(1) – 2.5R × 298

(2) – 7.6R × 298

(3) – 7.6R

(4) – 5.1R × 298

66. If for a reaction A(g) → B(g) + C(g), ΔH = 30 kJ/mol and ΔS = 60 J/Kmol, then temperature at which reaction will be spontaneous is

(1) 520 K

(2) 127 K

(3) 227 K

(4) 27 K

67. For the reaction,

$C_6H_5COOH\,(s) + \frac{15}{2}O_2\,(g) \rightarrow 7CO_2\,(g) + 3H_2O\,(l)$

The difference between enthalpy change and internal energy change at temperature T (K) is

(1) +RT

(2) –RT

(3) $\frac{3}{2}RT$

(4) $-\frac{RT}{2}$

68. The amount of heat released when 0.1 M, 100 mL HCl is mixed with 0.2 M, 200 mL NaOH is

[Given: $H^+ + OH^- \rightarrow H_2O,\ \Delta H = -57.1\ kJ\ mol^{-1}$]

(1) 0.571 kJ

(2) 5.71 kJ

(3) 571 kJ

(4) 0.0571 kJ

69. If enthalpy change for the reaction 4P(g) → P_4(g) is –x kJ mol^{-1}, then the bond dissociation energy of P – P bond (in kJ mol^{-1}) is

(1) x

(2) $\frac{x}{4}$

(3) $\frac{x}{6}$

(4) 4 x

70. The heat of combustion of carbon to CO_2 is –393.5 kJ mol^{-1}. The heat released upon the formation of 22 g of CO_2 from carbon and oxygen gas is

(1) 196.75 kJ

(2) 196.75 J

(3) 19.675 kJ

(4) 1.967 kJ

71. In which of the following cases change in entropy is positive?

(a) $Cl_2(g) \rightarrow 2\,Cl(g)$

(b) A liquid crystallizes into a solid

(c) $2\,NaHCO_3(s) \rightarrow Na_2CO_3(s) + CO_2(g) + H_2O(g)$

(d) Expansion of gas at constant temperature

(1) (a), (c) and (d) only

(2) (a) and (b) only

(3) (a), (b) and (d) only

(4) (c) and (d) only

72. Consider the following statements

(a) Standard molar enthalpies of formation of 'S'(rhombic) and H_2(g) are zero

(b) Heat is a path function

(c) For spontaneous process ΔS_{total} is greater than zero.

The correct statement(s) is/are

(1) (a) and (c) only

(2) (a), (b) and (c)

(3) (c) only

(4) (a) and (b) only

73. If the bond dissociation energies of AB, A_2 and B_2 (all diatomic molecules) are in the ratio of 1 : 1 : 0.5 and $\Delta_f H$ for the formation of AB is –100 kJ mol^{-1}, then the bond dissociation energy of A_2 will be

(1) 100 kJ mol^{-1}

(2) 200 kJ mol^{-1}

(3) 800 kJ mol^{-1}

(4) 400 kJ mol^{-1}

74. Out of following, the example of heterogenous equilibrium is

(1) $CH_3COOC_2H_5(aq) + H_2O(l) \rightleftharpoons CH_3COOH(aq) + C_2H_5OH(aq)$

(2) $Ca(OH)_2(s) + (aq) \rightleftharpoons Ca^{2+}(aq) + 2\,OH^-(aq)$

(3) $N_2(g) + 3H_2(g) \rightleftharpoons 2\,NH_3(g)$

(4) $N_2O_4(g) \rightleftharpoons 2\,NO_2(g)$

75. At 298 K, the equilibrium constant of $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ is K_1. The equilibrium constant of $NH_3(g) \rightleftharpoons \frac{1}{2}N_2 + \frac{3}{2}H_2(g)$ will be

(1) $\sqrt{K_1}$

(2) K_1^2

(3) $\frac{1}{K_1^2}$

(4) $\frac{1}{\sqrt{K_1}}$

76. Given below are two statements:
Statement I: If $\Delta G^\ominus < 0$, then $-\Delta G^\ominus/RT$ is positive, which implies a spontaneous reaction.
Statement II: If $\Delta G^\ominus > 0$, then $-\Delta G^\ominus/RT$ is negative, which implies a non-spontaneous reaction.
In the light of the above statements, choose the correct answer from the options given below:

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

77. Which of the following reactions has $\log \frac{K_P}{K_C}$ equal to zero?

(1) $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$

(2) $H_2(g) + Br_2(g) \rightleftharpoons 2HBr(g)$

(3) $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$

(4) $2NO_2(g) \rightleftharpoons N_2O_4(g)$

78. Match List-I with List-II.

List-I Salt		List-II K_{sp} value
a. Hg_2I_2	(i)	$108s^5$
b. $Fe(OH)_3$	(ii)	s^2
c. $Al_2(SO_4)_3$	(iii)	$4s^3$
d. AgCl	(iv)	$27s^4$

The correct match is

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

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

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

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

79. Given below are two statements:
Statement I: The equilibrium constant for an endothermic reaction decreases as the temperature increases.
Statement II: The equilibrium constant for an exothermic reaction increases as the temperature increases.
In the light of the above statements, choose the correct answer from the options given below:

(1) Both statement I and statement II are correct

(2) Both statement I and statement II are incorrect

(3) Statement I is correct but statement II is incorrect

(4) Statement I is incorrect but statement II is correct

80. Consider the following aqueous salt solution.
(i) Sodium chloride
(ii) Sodium acetate
(iii) Ammonium chloride
(iv) Ammonium formate
Change in concentration of which of the above solution(s) will lead to pH change?

(1) (i) and (iv) only

(2) (ii) and (iii) only

(3) (i) and (ii) only

(4) (iii) and (iv) only

81. The percent ionisation of 0.02 M acetic acid in 0.1 M HCl will be (K_a of acetic acid is 1.8×10^{-5})

(1) 0.18%

(2) 0.09%

(3) 0.018%

(4) 0.009%

82. If K_a of monobasic weak acid HA is 10^{-6}, then the hydrolysis constant of 0.02 M NaA solution is

(1) 1×10^{-8}

(2) 1×10^{-9}

(3) 2×10^{-10}

(4) 2×10^{-9}

83. For the reaction,
$FeO(s) + CO(g) \rightleftharpoons Fe(s) + CO_2(g)$
$K_p = 0.3$, the equilibrium partial pressure of CO if the intial pressure of CO is 5 atm, will be

(1) 1.67 atm

(2) 4.67 atm

(3) 3.85 atm

(4) 2.89 atm

84. If equal volumes of two solutions of pH 3 and 4 are mixed, then pH of resulting solution is (log 5.5 = 0.74)

(1) 3.26

(2) 4.47

(3) 2.16

(4) 3.57

85. Out of the following options, which forms a buffer on mixing?

(1) 40 mL of 0.5 M CH_3COOH and 100 mL of 0.2 M NaOH

(2) 50 mL of 0.5 M CH_3COOH and 250 mL of 0.1 M NaOH

(3) 150 mL of 0.2 M CH_3COOH and 100 mL of 0.1 M NaOH

(4) 100 mL of 0.2 M CH_3COOH and 50 mL of 0.4 M NaOH

86. The dissociation constant of an acid HA is 5×10^{-5}, then dissociation constant of its conjugate base A^- is

(1) 5×10^{-9}

(2) 4×10^{-7}

(3) 2×10^{-10}

(4) 5×10^{-7}

87. Given below are two statements: one is labelled as **Assertion (A)** and the other is labelled as **Reason (R)**.
Assertion (A) : BF_3 acts as a Lewis acid.
Reason (R) : In BF_3 molecule, central atom has incomplete octet.
In the light of the above statements, choose the **correct** answer from the options given below :

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) (A) is true but (R) is false

(4) Both (A) and (R) are false

88. pH of 0.1 M sodium phenoxide solution will be (pK_a of phenol = 9.89)

(1) 8.72

(2) 11.44

(3) 9.03

(4) 10.12

89. Consider the following statements
(a) Conjugate acid of OH^- is H_2O
(b) Both NH_3 and $BeCl_2$ act as Lewis acid
(c) pH of 10^{-8} M aqueous HCl solution is 6.96
The correct statement(s) is/are

(1) (a) only

(2) (a), (b) and (c)

(3) (a) and (b) only

(4) (a) and (c) only

90. The solubility of MgF_2($K_{sp} = 6.5 \times 10^{-9}$) in 0.2 M solution of KF will be

(1) 2.7×10^{-5} M

(2) 1.8×10^{-6} M

(3) 1.6×10^{-7} M

(4) 2.9×10^{-6} M

BOTANY

91. Read the following statements, state them as **true** (**T**) or **false** (**F**) and choose the **correct** option.
a. Epidermis is usually single-layered
b. Cuticle is absent in roots.
c. In monocot leaf, mesophyll cells is differentiated into palisade and spongy parenchyma.
d. The cells of root epidermis bear a number of hairs.

(1) a(T), b(F), c(F), d(T)

(2) a(T), b(T), c(F), d(T)

(3) a(F), b(F), c(T), d(F)

(4) a(T), b(T), c(F), d(F)

92. The plant found in arid region having fleshy, cylindrical green stem modified for photosynthesis is

(1) *Acacia*

(2) *Euphorbia*

(3) *Citrus*

(4) *Eichhornia*

93. The arrangement of flowers on the floral axis is termed as

(1) Venation

(2) Floral symmetry

(3) Inflorescence

(4) Phyllotaxy

94. Collenchyma differs from parenchyma as the

(1) Former has cell wall thickened at the corners with cellulose, hemicellulose and pectin

(2) Later is living

(3) Later is dead mechanical tissue

(4) Former can store food

95. Both xylem and phloem parenchyma are similar in

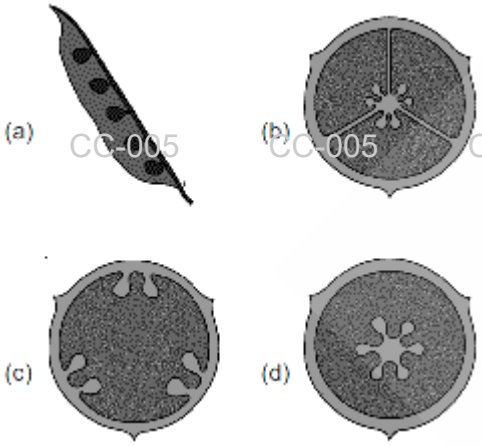
(1) Being the only living components of xylem and phloem respectively

(2) Storing food reserves

(3) Being absent in most of the monocots

(4) Helping in the radial conduction of water

96. Which of the following types of placentation is found in *Dianthus*?



(1) (a)

(2) (b)

(3) (c)

(4) (d)

97. A student observed T.S. of some plant structure having following features.
(a) Conjoint but closed vascular bundles.
(b) Epidermis on upper and lower surfaces with conspicuous cuticle.
(c) Chloroplast containing parenchymatous tissue divided into two regions.
(d) Stomata mostly on abaxial surface.
Identify the plant structure based on the given features

(1) Monocot stem

(2) Dicot root

(3) Dicot leaf

(4) Monocot leaf

98. Drupe fruit of mango

(1) Has thin fibrous mesocarp

(2) Develops from monocarpellary ovary

(3) Has stony epicarp

(4) Does not have well differentiated pericarp

99. Select the **incorrect** statement w.r.t. endodermis.

(1) It is innermost layer of cortex in dicot roots

(2) It is rich in starch grains in case of dicot stems

(3) It is sclerenchymatous in monocot stems

(4) It is single layer of barrel shaped cells without any intercellular spaces in monocot roots

100. Syncarpous gynoecium is found in
a. Rose and China rose
b. Mustard and Tomato
c. Potato and Tulip
d. Lotus and Brinjal
Choose the **correct** one(s).

(1) b and c

(2) a, c and d

(3) a and b

(4) b only

101. Subsidiary cells differ from guard cells in

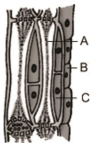
(1) Being parenchymatous

(2) Lacking mitochondria

(3) Lacking of chloroplasts

(4) Lacking vacuole

102. In below given diagram correctly identify A, B and C.



(1) A $\longrightarrow$ Sieve tube
C $\longrightarrow$ Phloem parenchyma

(2) A $\longrightarrow$ Sieve tube element
B $\longrightarrow$ Phloem parenchyma

(3) A $\longrightarrow$ Companion cell
B $\longrightarrow$ Albuminous cell

(4) A $\longrightarrow$ Phloem fibre
B $\longrightarrow$ Companion cell

103. Match the following columns and select the **correct** option.

Column-I	Column-II
a. Staminode	(i) Carpels are free
b. Apocarpous condition	(ii) Petals are fused
c. Perigynous flower	(iii) Sterile stamen
d. Gamopetalous condition	(iv) Half inferior ovary

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

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

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

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

104. Parthenocarpic fruits develop from

(1) Floral parts other than ovary

(2) Ovary without fertilization

(3) Fertilized ovule without the involvement of ovary

(4) Swollen part of pedicels only

105. _____ is a scar on the seed coat, through which developing, seeds were attached to the fruit.
Select the **correct** option to fill in the blank.

(1) Testa

(2) Micropyle

(3) Hilum

(4) Tegmen

106. In which of the following plants, a pair of leaves arise at each node and lie opposite to each other?

(1) Mustard

(2) Guava

(3) *Nerium*

(4) China rose

107. In which of the given plants flowers are asymmetric?
(a) *Canna*
(b) *Cassia*
(c) Bean
(d) Mustard
(e) *Datura*
Choose the correct one(s).

(1) Only (b)

(2) Both (c) and (e)

(3) Both (d) and (e)

(4) Only (a)

108. Hypodermis is

(1) The outermost portion of stele in stems of flowering plants

(2) Sclerenchymatous in the monocot stems

(3) Protective in function and can not perform photosynthesis

(4) Single to multilayered in the roots

109. Which of the following components of the vascular tissues are not present in angiosperms?

(1) Albuminous cells

(2) Sieve tube elements

(3) Companion cells

(4) Tracheids

110. Read the following statements and select the **correct** option.
Statement A: Pith rays are radially arranged parenchymatous cells, which help in radial conduction of food.
Statement B: The outer walls of the guard cells in dicots are highly thickened as compared to their inner walls.

(1) Only statement A is incorrect

(2) Only statement B is incorrect

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

111. Read the statements given below.
(a) The sticky secretions of trichomes help in holding water and minerals for nutrition.
(b) Dorsiventral leaves have their dorsal and ventral surface differ in colour and anatomical features.
(c) Pit fields present on the sieve plates enable easy transfer of material between sieve tube elements and companion cells.
(d) Cuticle is absent in submerged hydrophytes.
Identify the above statements as True/False and choose the **correct** answer from options given below.

	(a)	(b)	(c)	(d)
(1)	T	F	F	T
(2)	F	T	T	F
(3)	F	F	T	F
(4)	F	T	F	T

(1) 1

(2) 2

(3) 3

(4) 4

112. Variation in the length of the filament of stamens is observed in

(1) Tomato

(2) Pea

(3) *Salvia*

(4) *Petunia*

113. All of the given are common features between China rose and mustard, **except**

(1) Presence of bisexual flowers

(2) Type of aestivation in corolla

(3) Type of phyllotaxy

(4) Position of floral parts w.r.t. ovary on thalamus

114. How many plants given below possess inferior ovary?

Sunflower, *Petunia*, Makoi, Pea, Lupin, Guava, Rose, Cucumber

(1) 3

(2) 4

(3) 5

(4) 2

115. Marginal placentation is observed in

(1) Lemon

(2) Pea

(3) *Argemone*

(4) Marigold

116. Read the following statements and find the **odd** one w.r.t. lateral meristems.

(1) These are cylindrical meristems, which divide in the radial direction

(2) They occur in those plants that produce the woody axis

(3) Lateral meristems are produced by secondary tissues

(4) They are generally not present from the very beginning of the life of a plant

117. The cells of parenchyma form

(1) Tracheids of gymnosperms

(2) Fruit wall of nuts and provide hardness to it

(3) Epiblema of root

(4) Cork cambium in stem of most monocot plants

118. Outer most layer of stele in dicot stem is

(1) Impervious to water and has barrel shaped cells

(2) Single layered and stores starch grains

(3) Sclerenchymatous semi lunar patches and provides support to the dicot stem

(4) Composed of long tube like cells that conduct water from roots to leaves

119. An angiospermic family which includes a plant that produces colchicine

(1) Bears non endospermous seeds

(2) Has tricarpellary superior ovary

(3) Has flowers which show zygomorphic symmetry

(4) Has unisexual flowers only

120. Read the following statements and identify the **correct** ones regarding dicot stem.
(a) Hypodermis is made up of living mechanical tissue.
(b) Presence of eustele.
(c) Bundle sheath are usually present.
(d) Metaxylem is present towards the periphery.
(e) Presence of water-containing cavities in vascular bundles.
Select the **correct** answer from the options given below.

(1) (a) and (c) only

(2) (a), (d) and (e) only

(3) (a), (b) and (d) only

(4) (b), (c) and (e) only

121. In maize seed,

(1) Cotyledon is called scutellum

(2) Aleurone layer is absent

(3) Radicle is covered with coleoptile

(4) Perisperm is found

122. Aestivation in which margins of petals just touch each other without overlapping is found in

(1) *Cassia*

(2) *Calotropis*

(3) Pea

(4) Gulmohur

123. Non-essential appendages of flowers are

(1) Sepals and petals

(2) Sepals and carpels

(3) Sepals and gynoecium

(4) Androecium and gynoecium

124. Bulliform cells are

(1) Present in the abaxial epidermis of leaves

(2) Present in the substomatal cavity

(3) Responsible for curling of leaves, when they are turgid

(4) Large, empty and colourless cells

125. Casparian strips
(a) Are found in endodermis
(b) Are made of impermeable waxy material
(c) Are seen only in stems
(d) Allow passage of water molecules through them
Choose the **correct** ones.

(1) (a) and (b)

(2) (b), (c) and (d)

(3) (a), (b) and (c)

(4) (b) and (d)

126. Xylem in majority of gymnosperms lack

(1) Tracheids

(2) Tracheids and xylem fibres

(3) Vessels

(4) Xylem parenchyma

127. Read the following statements of Assertion (A) and Reason (R) and select the **correct** answer
A : Nucellus remains persistent in seed of *Piper nigrum.*
R : In *Piper nigrum*, during development of seed nucellus is not fully consumed.

(1) Both Assertion & Reason are true and the reason is the correct explanation of the assertion

(2) Both Assertion & Reason are true but the reason is not the correct explanation of the assertion

(3) Assertion is true statement but Reason is false

(4) Both Assertion and Reason are false statements

128. The gritty texture of fruits like guava is due to the presence of

(1) Sclereids

(2) Xylem fibres

(3) Phloem fibres

(4) Collenchyma

129. Intercalary meristem in grasses is responsible for

(1) Secondary growth in roots

(2) Regenerating the removed parts

(3) Transpiration and water conduction

(4) Secondary growth in stems

130. When calyx and corolla are not distinct then it is termed as perianth as in

(1) Tulip

(2) Mustard

(3) Bean

(4) *Petunia*

131. Companion cells are specialised

(1) Parenchymatous cells

(2) Sclerenchymatous cells

(3) Collenchymatous cells

(4) Enucleated cells

132. In Makoi the flowers are

(1) Actinomorphic with hypogynous, monocarpellary and syncarpous gynoecium

(2) Zygomorphic with perigynous, bicarpellary, syncarpous gynoecium

(3) Actinomorphic with hypogynous bicarpellary, syncarpous gynoecium.

(4) Actinomorphic, epigynous, bicarpellary, apocarpous gynoecium

133. The floral formula of Solanaceae family is

(1) Br % or $\oplus\ \male\ K_{Pappus}\ \overset{\frown}{C_{(5)}\ A_{(5)}}\ \overline{G}_{(2)}$

(2) $\oplus\ \male\ K_{2+2}\ C_4\ A_{2+4}\ \underline{G}_{(2)}$

(3) $Br \oplus\ \male\ \overset{\frown}{P_{(3+3)}\ A_{3+3}}\ \underline{G}_{(3)}$

(4) $\oplus\ \male\ K_{(5)}\ \overset{\frown}{C_{(5)}\ A_5}\ \underline{G}_{(2)}$

134. Cortex in dicot stem has all of the following sub-zones, **except**

(1) General cortex

(2) Hypodermis

(3) Epidermis

(4) Endodermis

135. Adaxially placed cells, that are elongated and arranged vertically to each other in leaves form

(1) Pericycle

(2) Palisade parenchyma

(3) Spongy parenchyma

(4) Bundle sheath

ZOOLOGY

136. In which disease male genital organs are often affected resulting in the gross deformities in gonads in severe conditions?

(1) Filariasis

(2) Ascariasis

(3) Malaria

(4) Typhoid

137. The problem of vitamin-A deficiency in poor countries can be overcome by using

(1) Golden rice

(2) Transgenic maize

(3) Transgenic tomato

(4) Bt brinjal

138. Choose the **mismatch** regarding immunity.

(1) Antibodies – Humoral immunity

(2) Ready made antibodies – Active immunity

(3) Colostrum for neonates – Natural passive immunity

(4) Recovery from measles – Natural active immunity

139. Which of the following drugs has stimulating action on CNS and is responsible for producing a sense of euphoria and increased energy?

(1) Cocaine

(2) Morphine

(3) Heroin

(4) Smack

140. Organ/graft rejection is mainly associated with

(1) Cell mediated immunity

(2) Passive immunity

(3) Innate immunity

(4) Humoral immunity

141. Which of the following is a non-ionizing radiation responsible for oncogenic transformation?

(1) X-ray

(2) Gamma rays

(3) UV light

(4) Visible spectrum of light

142. 'DNA cannot pass through cell membranes.' The given characteristic is due to the presence of _____ in DNA.
Select the **correct** option to fill in the blank.

(1) Hydrophilic moiety

(2) Hydrophobic moiety

(3) Large structural components

(4) Nitrogenous bases

143. The synthesised product in a bioreactor after completion of the biosynthetic stage is subjected to a series of processes. Select the option in which these processes are arranged in a proper sequence
a. Separation and purification
b. Quality – Control testing
c. Formulation with suitable preservatives
d. Clinical trials
e. Marketing

(1) abdec

(2) acbed

(3) acbde

(4) ecbad

144. If a '4 kb' fragment of dsDNA is to be amplified, how many copies will be obtained at the end of 30 PCR cycles approximately?

(1) 1 billion

(2) 1 million

(3) 2 billion

(4) 2 million

145. Which of the following features cannot be associated with Ti-plasmid of *Agrobacterium tumefaciens* which is modified into a cloning vector?

(1) Able to deliver genes of our interest into a variety of plants

(2) T-DNA of this plasmid is replaced by gene of interest

(3) Pathogenic to the plants

(4) Is a natural genetic engineer

146. Select the incorrect statement.

(1) Genome is the total DNA content in the cells of an organism that provides all the information for required functions..

(2) Addition of methyl groups protects the bacterial genome from its own restriction enzyme.

(3) Bacteriophages generally have very high copy numbers of their genome within the bacterial cells

(4) All restriction enzymes cut the strand of DNA exactly at the centre of the palindromic sites.

147. A mutated gene can be identified directly by using

(1) Probe followed by autoradiography

(2) MRI

(3) Microscopy

(4) Serum analysis

148. Read the following statements A and B and choose the **correct** option.
Statement-A : Mind influences our immune system through neural and endocrine systems which in turn maintains our health.
Statement-B : Lifestyle, infections and genetic disorders can affect our health.

(1) Only Statement A is correct

(2) Only Statement B is correct

(3) Both statements A and B are correct

(4) Both statements A and B are incorrect

149. To obtain virus free plants, which of the following should be used?

(1) Roots

(2) Stem

(3) Meristem

(4) Flower

150. Consider the following genes
(a) *crylAc*
(b) *crylAb*
(c) *cryIIAb*
Which of the above gene(s) is/are used to control corn borer?

(1) (a) only

(2) (a) and (b) only

(3) (b) only

(4) (b) and (c) only

151. All of the following statements are **correct** w.r.t. gene therapy, **except**

(1) It can only be performed at early embryonic stages.

(2) In this method, the functional genes are inserted into host cells *via* disarmed retroviral vectors to treat the disease.

(3) Delivery of a normal gene into a cell takes over the function and compensates for the non-functional gene.

(4) In patients with ADA deficiency, ADA cDNA is introduced into their cultured lymphocytes and subsequently these are returned to them.

152. Virus infected cells secrete which protein to protect non infected cells from further viral infection?

(1) Histamine

(2) Heparin

(3) Interferon

(4) Serotonin

153. Which of the following is the mechanical carrier for the pathogen of amoebiasis?

(1) Housefly

(2) *Aedes* mosquito

(3) *Culex* mosquito

(4) *Microsporum*

154. Which of the following options is **correct** representation of sequence of steps in PCR?

(1) Denaturation, Annealing, Extension

(2) Annealing, Denaturation, Extension

(3) Extension, Annealing, Denaturation

(4) Denaturation, Extension, Annealing

155. All of the following are features of an ideal cloning vector, **except**

(1) Presence of selectable markers

(2) Multiple recognition sites for a single restriction enzyme

(3) '*ori*' site

(4) Small size for easy integration into the host cells

156. Tobacco contains alkaloids that stimulate the release of hormones into blood circulation which

(1) Raise blood pressure and increase heart rate

(2) Reduce heart rate and blood pressure

(3) Increase duration of cardiac cycle

(4) Reduce time of each cardiac cycle and blood pressure

157. Select the **incorrect** statement w.r.t. RNAi.

(1) It is a naturally occurring mechanism that leads to the silencing of certain genes

(2) This mechanism is used for restricting the translation of certain mRNAs

(3) This mechanism provides defence against pathogens

(4) It takes place in all prokaryotic organisms as cellular defence mechanism

158. Bacteria, plants and animals whose genes have been altered by manipulation are called

(1) Genetically modified organisms

(2) Hybrid organisms

(3) Pest resistant organisms

(4) Insect resistant organisms

159. Choose the most probable reason for the death of cotton bollworms due to Bt toxin protein from the following.

(1) Inhibition of nerve impulse in them

(2) Disturbed digestion of food in their foregut due to acidic pH of their stomach

(3) Creation of pores that cause cell swelling and lysis in the epithelial cells of midgut

(4) Lysis of cells of their hindgut that convert the toxin into protoxin

160. Select the statement that best explains the role of sticky ends in recombinant DNA technology, obtained after RE digestion.

(1) They allow any DNA fragment to ligate randomly, as they do not require complementary sequence.

(2) These facilitate the ligation of DNA fragments from different sources by forming hydrogen bonds between nitrogenous bases with complementary sequences.

(3) They ensure that DNA fragments are joined only in one orientation by covalent bonds.

(4) They participate in the formation of phosphodiester bonds only in presence of restriction endonuclease.

161. If in a plasmid pBR322, the sequence 5′ GAATTC 3′ appears at one site, how many restriction fragments will result if we use *Bam*HI for restriction digestion?

(1) Two

(2) Three

(3) Four

(4) One

162. In an experiment, the gene of interest encoding for plant defensive protein possesses only *Eco*RI restriction site, while hypothetical plasmid pSS78 has one restriction site for each *Eco*RI, *Hin*d III, and *Bam*HI.
If both, the gene of interest and pSS78 are cut using *Hin*d III then what will be the most possible outcome?

(1) Since, pSS78 is circular in shape, 3 DNA fragments will be obtained after restriction digestion.

(2) The recombinant transformants will show immune reactions in their colonies.

(3) Digestion of the gene of interest with *Hin*d III will produce complementary hanging ends in both, thus preventing ligation.

(4) No recombinant vector molecule would be created.

163. Choose the direct method of gene transfer that can be used for the genetic transformation of a tomato plant.

(1) *Agrobacterium* mediated

(2) Micro-injection

(3) Retrovirus mediated

(4) Gene gun

164. Primary lymphoid organs can be differentiated from secondary lymphoid organs as

(1) Former acts as the site for immune cell activation, while latter acts as the site for immune cell production

(2) Latter includes thymus, while former includes Peyer's patches

(3) Both are directly involved in lymphocyte production and differentiation after antigen exposure

(4) Former is involved in the maturation of lymphocytes, whereas latter facilitates antigen trapping and immune response initiation

165. In *Pst* I, 'P' indicates the name of

(1) Eukaryotic genus from which the enzyme has been derived

(2) Prokaryotic species from which the enzyme has been derived

(3) Eukaryotic species from which the enzyme has been derived

(4) Prokaryotic genus from which the enzyme has been derived

166. Choose the incorrect match.

(1) *Hind* II - Recognises a specific sequence of four base pairs

(2) Transformation - Procedure through which a piece of alien DNA is introduced in a host bacterium

(3) *Eco*RI – Produces staggered ends

(4) Bioprocess engineering - Maintenance of sterile ambience

167. **Assertion (A):** For the multiplication of any alien piece of DNA in an organism, it needs to be a part of a chromosome which has a specific sequence known as 'origin of replication'.
Reason (R): *ori* is a sequence from where replication starts but it cannot control the copy number of the linked DNA.
In the light of above statements, select the correct option.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) Both (A) and (R) are false

(4) (A) is true; (R) is false

168. ELISA can be used for molecular diagnosis which is based on principle of

(1) Antigen detection only

(2) Amplification of DNA

(3) Post-transcriptional silencing of RNA

(4) Specific antigen-antibody interaction

169. Source of coke is found to be native to

(1) South America

(2) South Africa

(3) North America

(4) East Africa

170. In case of tobacco plant, which part mainly gets affected by *Meloidogyne incognita?*

(1) Leaves

(2) Stem

(3) Roots

(4) Branches

171. Sampling ports in a bioreactor are meant for

(1) Temperature control system

(2) pH control system

(3) Introduction of raw material

(4) Withdrawing small volumes of culture periodically

172. The mature recombinant insulin

(1) Contains three polypeptide chains

(2) Has two interchain covalent bonds that stabilize the structure

(3) Was produced by Eli Lilly in the year 1989

(4) Is expressed in the plasmid of *Entamoeba histolytica*

173. All of the following are correct w.r.t tissue culture, **except**

(1) Whole plants could be regenerated from explants

(2) The capacity to generate a whole plant from any cell/explant is called micropropagation

(3) Thousands of plants produced through micropropagation are clones of the original plant.

(4) Protoplast is a single cell that is surrounded by plasma membrane but have no cell wall

174. PCR can be employed to detect
(a) Genetic disorders
(b) Cancer
(c) HIV
(d) Mutations
Select the correct option.

(1) (a) and (b) only

(2) (a), (c) and (d) only

(3) (a), (b), (c) and d)

(4) (c) and (d) only

175. Select the incorrect statement.

(1) Pomato is a somatic hybrid.

(2) 95 per cent of all the existing transgenic animals are mice.

(3) Transgenic monkeys are being developed to replace mice for testing the safety of polio vaccines.

(4) Transgenic animals are developed for testing chemicals by making them more sensitive to toxic substances than non-transgenic animals.

176. Match column I with column II w.r.t diseases and their causative agents.

	Column I		Column II
a.	Amoebiasis	(i)	*Microsporum*
b.	Ringworms	(ii)	*Wuchereria bancrofti*
c.	Elephantiasis	(iii)	*Entamoeba histolytica*
d.	Pneumonia	(iv)	*Haemophilus influenzae*

Choose the correct option.

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

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

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

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

177. Which of the following is **not** responsible for spreading of HIV infection?

(1) Sharing of infected needles

(2) By mere touch or physical contact

(3) Transfusion of contaminated blood

(4) Sexual contact with an infected individual

178. **Assertion (A):** During the life cycle of *Plasmodium*, the sexual reproduction occurs in the RBCs of the human host.
Reason (R): Human RBCs are the site where fusion of male and female gametocytes occur and zygote formation takes place.
In the light of above statements, choose the correct option.

(1) Both (A) and (R) are true and (R) is the correct explanation of (A)

(2) Both (A) and (R) are true but (R) is not the correct explanation of (A)

(3) Both (A) and (R) are false

(4) (A) is true; (R) is false

179. Cancer cells differ from normal cells because they are

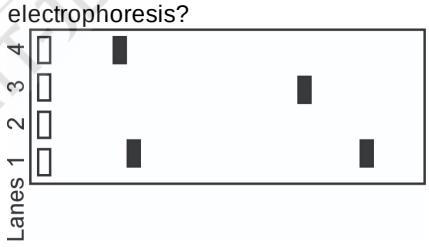
(1) Dividing cells with low telomerase activity

(2) Undergoing rapid cell division and exhibit metastasis

(3) Well differentiated cells than normal cell

(4) Non-dividing cells of the body

180. Analyse the statements given below:
(a) Blue colour producing ethidium bromide and orange colour producing bromophenol blue are used as the tracking dye.
(b) The DNA fragment in 'Lane 3' has more weight as compared to that in 'Lane 4'.
(c) The gel matrix is made up of agarose which is a natural monomer obtained from sea weeds.
(d) The DNA migrates from anode to cathode as it is negatively charged due to the presence of phosphate groups.
(e) The DNA fragments separate according to their size through sieving effect provided by the agarose gel.
How many of the above given statements is/are correct w.r.t. below given gel image obtained after performing gel electrophoresis?



(1) Two

(2) Three

(3) Four

(4) One