

Full Length Mock Tests for NEET to Make You Ready to Face the Challenge

MOCK TEST 9

Duration: 3 Hours

Max. Mark : 720

Instructions

- The test is of 3 hours duration and Test Booklet contains 180 questions. Each question carries 4 marks. For each correct response, the candidate will get 4 marks. For each incorrect response, one mark will be deducted from the total scores. The maximum marks are 720.
- The question paper contains three parts of Physics, Chemistry and Biology respectively.
- Part A contains 45 Questions from Physics section. Part B contains 45 Questions from Chemistry section. Part C contains 90 Questions from Biology.

PART A PHYSICS

1. A solid cylinder of radius 5 cm and mass 300 g rolls down an inclined plane (1 in 20). The velocity of cylinder after 5s will be

(a) 1.63 ms ⁻¹	(b) 1.56 ms ⁻¹
(c) 2 ms ⁻¹	(d) 3.26 ms ⁻¹

2. The work done by a gas is maximum, when it expands

a) isothermally	(b) adiabatically
c) isentropically	(d) isobarically

- **3.** When a charged particle moving with velocity **v** is subjected to a magnetic field of induction **B**, the force on it is non-zero. This implies that
 - (a) angle between them is either zero or 180°
 - (b) angle between them can have any value other than zero or 180°
 - (c) angle between them is necessary 90°
 - (d) angle between them can have any value other than 90°

4. Radius of an air bubble at certain depth of Indian ocean is *r* and it becomes 18*r*, when air bubble rises to the top surface of the ocean. If *t* cm of water be the atmospheric pressure, then the depth of the ocean is
(a) 2825 t cm. (b) 2400 t cm. (c) 4852 t cm. (d) 5821 t cm.

(a) 3835*t* cm (b) 3400*t* cm (c) 4852*t* cm (d) 5831*t* cm

- **5.** A battery of emf 8V and internal resistance r is connected to a load resistance of 5 Ω . Then, power at load resistance will be maximum if the value of internal resistance r is
 - (a) 5Ω (b) 10Ω (c) 15Ω (d) 20Ω
- 6. A well with vertical side and water at the bottom resonates at 3 Hz and at no other lower frequency. The air in the well has density 1.10 kg m⁻³ and bulk modulus of 1.32 × 10⁵ Nm⁻², then the depth of well is

 (a) 30 m
 (b) 29 m
 (c) 25 m
 (d) 32 m

7. A brass sphere of mass 5 kg is heated in a furnance to a temperature 500°C and then placed on a large ice block. The mass of ice that will melt in this process will be (specific heat of brass = $500 \text{ J kg}^{-1} \circ \text{C}^{-1}$ and heat of fusion of ice = 336 kJ kg^{-1})

(a) 5.25 kg	(b) 3.86 kg
(c) 2.56 kg	(d) 3.72 kg

8. A planet of mass *m* revolves around the sun of mass *M* in an elliptical orbit. The maximum and minimum distances of the planet from the sun are r_1 and r_2 , respectively. The time period of the planet in terms of r_1 and r_2 is

(a) $T \propto (r_1 + r_2)^2$ (b) $T \propto (r_1 + r_2)^3$ (c) $T \propto (r_1 + r_2)^{1/2}$ (d) $T \propto (r_1 + r_2)^{3/2}$

9. A $6 \mu F$ capacitor is charged to 360 V. If its plates are joined through a resistance, then heat produced in the resistor is

(a) 0.78 J	(b) 0.68 J
(c) 1.2 J	(d) 0.39 J

10. In the case of free expansion,

(i) $\Delta W = 0$	(ii) $\Delta Q = 0$
(iii) $\Delta U = 0$	(iv) $\Delta T = 0$
Correct statements are	
(a) (iii) and (iv)	(b) (i), (ii) and (iii)
(c) (i) and (iv)	(d) (i), (ii), (iii) and (iv)

- A shell of mass 200 g is ejected from a gun of mass 4 kg by an explosion that generates 1.05 kJ of energy. The initial velocity of the shell is

 (a) 40 ms⁻¹
 - (b) $120 \,\mathrm{ms}^{-1}$
 - (c) $100 \,\mathrm{ms}^{-1}$
 - (c) 100 ms^{-1}
- **12.** In the figure shown, $m_1 = 10$ kg, $m_2 = 6$ kg, $m_3 = 4$ kg. If $T_3 = 40$ N, then T_2 is

$$\begin{array}{c|c} T_1 & T_2 & \\ \hline m_1 & \hline m_2 & \hline m_3 & \rightarrow & T_3 \end{array}$$

a) 13 N	(b) 32 N
c) 25 N	(d) 35 N

13. The magnetic flux through a circuit of resistance R changes by an amount $\Delta \phi$ in a time Δt . Then, the total quantity of electric charge Q that passes at any point in the circuit during the time Δt is represented by

(a) $\frac{\Delta \phi}{R}$	(b) $\frac{1}{R} \frac{\Delta a}{\Delta t}$
(c) $R \frac{\Delta \phi}{\Delta t}$	(d) $\frac{\Delta \phi}{\Delta t}$

14. Match the corresponding entries of Column I with Column II and choose the correct option from the codes given below.

			Co (Re	olumn l otation)			(Mo	Columı ment o	n II f inertia)
_	Α.	Thin an ax the re throu	rod of is perp od and igh mi	length <u>/</u> ak pendicular l passing d point	oout to		P.	$\frac{MR^2}{2}$	
-	Β.	Circu abou throu	lar dis t an ax igh the	c of radius kis passing diameter	R		Q.	$\frac{ML^2}{12}$	
-	C.	Hollo abou throu	w cylii t an ax igh the	nder of rad kis passing e axis of cy	ius <i>R</i> linder		R.	2 <i>MR</i> ² 5	-
С	odes								
	А	В	С			А	В	С	
(8	a) Q	Ρ	R		(b)	Ρ	R	Q	
((c) Q	R	Р		(d)	R	Q	Р	

- **15.** The vertical motion of a huge piston in a machine is approximately simple harmonic with a frequency of 0.50 s^{-1} . A block of 20 kg is placed on the piston. The maximum amplitude of the piston's SHM, for the block and the piston to remains together is (a) 0.99 m (b) 1 m (c) 1.99 m (d) 2.8 m
- **16.** The length of a rod is 40 cm and area of cross-section 4 cm². The Young's modulus of the material of wire is 4×10^{10} Nm⁻². If the rod is compressed by 10 kg-wt along its length, then increase in the energy of the rod in joules will be

(a) 8.57 × 10 ⁻⁶ J	(b) 2.36 × 10 ⁻⁴ J
(c) 1.25 × 10 ⁻³ J	(d) 1.25 × 10 ⁻⁴ J

17. Infinite number of charges of magnitude 6μ C each are lying at $y = 2, 4, 8, 16 \dots$ metre on *Y*-axis. The value of electric field intensity at point y = 0 due to these charges will be (a) 6.5×10^3 N/C

(b)
$$4.05 \times 10^4 \text{ N/C}$$

(c) $7.2 \times 10^3 \text{N/C}$

(d) 1.8×10^4 N/C

18. The driver of a train A moving with a uniform speed of 30 ms⁻¹ sees another train B moving with uniform speed 10 ms⁻¹ on the same track in the same direction. He immediately applies brakes and achieves a uniform retardation of 2ms⁻¹ and and finally stops. To avoid collision, the minimum distance between the trains must be

(a) 140 m
(b) 75 m

(c) 80 m (d) 120 m

19. A star of mass 4 times the solar mass and radius 10^8 km rotates about its axis with an angular speed of 10^{-4} rad s⁻¹. When the star collapses to a radius at 10^5 km, then its angular speed is (Take, solar mass = 1.99×10^{30} kg) (a) 10 rad s^{-1} (b) 0.1 rad s^{-1}

(a) 101au 3	(b) 0.11au 3		
(c) 10 ² rad s ⁻¹	(d) 10 ⁻² rad s ⁻¹		

20. Two batteries of emf 3V and 6V with internal resistances 2Ω and 4Ω are connected in a circuit with resistance of 10Ω as shown in the figure. The current and potential difference between the points P and Q are



21. Figure shows two processes X and Y on a ideal gas system. Let ΔQ_X and ΔQ_Y be the heat given to the system in processes X and Y respectively, then



- $\begin{array}{ll} \text{(a)} \ \Delta Q_{\chi} &= \Delta Q_{\gamma} & \text{(b)} \ \Delta Q_{\chi} &> \Delta Q_{\gamma} \\ \text{(c)} \ \Delta Q_{\chi} &< \Delta Q_{\gamma} & \text{(d)} \ \Delta Q_{\chi} &\leq \Delta Q_{\gamma} \end{array}$
- **22.** A positively charged particle enters a magnetic field of value $B\hat{\mathbf{i}}$ with a velocity $v\hat{\mathbf{j}}$, then the instantaneous direction of particle will be along (a) *Z*-axis (b) *Z*-axis (c) *X*-axis (d) *Y*-axis
- **23.** A resonance air column shows resonance with a tuning fork of frequency 256 Hz at column lengths 32.5 cm and 112.9 cm. The end correction and speed of sound in air are

(a) 4.1 cm, 77.7 ms ⁻ '	(b) /./ cm, 411.65 ms ⁻		
(c) 5 cm, 224.5 ms ⁻¹	(d) 6.7 cm, 352.7 ms ⁻¹		

24. A monkey is descending from the branch of a tree with constant acceleration. If the breaking strength is 25% of the weight of the monkey, then

(MODULE 2)

the maximum acceleration with which monkey can slide down without breaking the branch is

(a) <i>g</i>	(b) $\frac{3g}{4}$	(c) $\frac{g}{4}$	(d) $\frac{g}{2}$
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25. In Young's double slit experiment, the fringe width is found to 0.5 mm. If the whole apparatus is immersed in liquid of refractive index $\frac{5}{3}$, without

disturbing the geometrical arrangement, then new fringe width will be

(a) 0.35 m	(b) 0.6 mm
(c) 0.45 mm	(d) 0.3 mm

26. A rectangular bar magnet of area 20 cm² has ability to produce a magnetic field of 2.5 T at a point 30 cm away from its mid point on axial line. If it is assumed that dipole is surrounded by a spherical region in space, then net magnetic flux passes through the sphere is

(a) 0
(b) 0.005 Wb

(u) 0	(0) 0.000 000
(c) 0.15 Wb	(d) 0.05 Wb

27. A charged particle is moving in a uniform magnetic field, then(a) both momentum and total energy will change(b) its momentum changes but total energy remains the same

(c) its total energy changes but total energy remains the same(d) both momentum and total energy remain the same

- **28.** The gravitational field due to a mass distribution is $I = k/r^3$ in the *x*-direction (*k* is a constant). The gravitational potential is taken to be zero at infinity, then its value at a distance *x* is (a) k/x (b) k/2x(c) k/x^2 (d) $k/2x^2$
- **29.** The power factor of the circuit shown in the figure is



(a) 0.2 (b) 0.8 (c) 0.4 (d) 0.6

30. A uniform cylinder has a radius *R* and length *L*. If the moment of inertia of this cylinder about an axis passing through its centre and normal to its circular face is equal to the moment of inertia of the same cylinder about an axis passing through its centre and perpendicular to its length, then $(a) l = \sqrt{2R}$

(a) $L = \sqrt{3}$	(D) L = R
(c) $L = R / \sqrt{3}$	(d) $L = 2R$

- **31.** The plane face of a plano-convex lens is silvered. If μ be the refractive index and R be the radius of curvature of curved surface, then system will behave like a concave mirror of radius of curvature (a) μR (b) R^2 / μ (c) $R / (\mu - 1)$ (d) $[(\mu + 1)/(\mu - 1)]R$
- **32.** The equivalent resistance between *A* and *B* is



- **33.** A ray of light from rarer medium strikes a denser medium such that reflected and refracted rays make an angle of 90° with each other. The angle of reflection and angle of refraction are 60° and 30° respectively, then refractive index of the medium is (a) 1.5 (b) 1.73 (c) 1.41 (d) 1.75
- **34.** A square wire of side 2.0 cm is placed 20 cm in front of a concave mirror of focal length 10 cm with its centre on the axis of the mirror and its plane normal to the axis. The area enclosed by the image of wire is
 (a) 7.5 cm² (b) 6 cm² (c) 2 cm² (d) 4 cm²
- **35.** In photoelectric effect, electrons are liberated from metal's surface, if the incident light has a certain maximum

(a) wavelength (b) frequency (c) amplitude (d) intensity

- 36. An electromagnetic wave is propagating in a medium with a velocity v = -a j. Magnetic field oscillates in the direction of + X -axis. Then, the direction of oscillating electric field of electromagnetic wave will be

 (a) along x-direction
 (b) along + y-direction
 (c) along z-direction
 (d) along + z-direction
- **37.** The dominant mechanism for motion of charge carriers in forward and reverse biased silicon *p n* junction are
 - (a) diffusion in forward biased, drift in reverse bias
 - (b) drift in forward biased, drift in reverse biased
 - (c) diffusion in both forward and reverse bias
 - (d) drift in both forward and reverse bias
- **38.** Two inductors of self inductance L_1 and L_2 are connected in parallel and a time varying current flows as shown in the figure. Then, the ratio of i_1



(a)
$$\frac{L_1}{L_2}$$
 (b) $\frac{L_2}{L_1}$ (c) $\frac{(L_1L_2)^2}{(L_1^2 + L_2^2)^2}$ (d) $\frac{L_1L_2}{(L_1 + L_2)^2}$

- **39.** A radioactive substance decays to $\frac{1}{64}$ of its initial quantity in 30 days. The time during which it will decay $\frac{1}{128}$ of its initial quantity is
 - (a) 50 days (b) 38 days (c) 35 days (d) 46 days
- **40.** In Young's double slit experiment, the intensity at centre of screen is *I*. If one of the slit is closed, the intensity at centre now will be

l (b)
$$\frac{l}{3}$$
 (c) $\frac{l}{4}$ (d) $\frac{l}{2}$

41. The angular momentum of an electron orbiting in the third orbit of an atom is [given, h = 6.6 × 10⁻³⁴ J-s]
(a) 8.25 × 10⁻³⁴ J-s
(b) 6.55 × 10⁻³⁴ J-s
(c) 3.15 × 10⁻³⁴ J-s
(d) 4 × 10⁻³⁴ J-s

(a)

42. The temperature *T* dependence of resistivity ρ of a semiconductor is represented by



- **43.** When a uniform solid sphere and a disc of same mass and of same radius rolls down an inclined smooth plane from rest to the same distance, then the ratio of the time taken by them is (a) $\sqrt{15} : \sqrt{14}$ (b) 15 : 14(c) $\sqrt{14} : \sqrt{15}$ (d) 14 : 15
- **44.** The centripetal acceleration of a satellite of mass 1000 kg orbiting at 1600 km above the earth's surface is

(take, radius of earth = 6.4×10^6 m and $g = 9.8 \text{ ms}^{-2}$)

g = 5.0 ms	
(a) 6.272 ms ⁻²	(b) 2.563 ms ⁻²
(c) 4.525 ms ⁻²	(d) 6.562 ms ⁻²

45. Maximum efficiency of full-wave rectifier is (a) 100% (b) 81% (c) 53% (d) 42%

PART B CHEMISTRY

46. $t_{1/4}$ can be defined as the time taken for the concentration of a reactant to drop to $\frac{3}{4}$ th of its initial value. If the rate constant for a first order reaction is *k*, then $t_{1/4}$ can be given as

(a) 0.10/k	(b) 0.69/ <i>k</i>
(c) 0.29/k	(d) 0.75/k

- **47.** van-Arkel method of purification of metals involves converting the metals to a
 - (a) volatile stable compound
 - (b) non-volatile stable compound
 - (c) volatile unstable compound
 - (d) None of the above
- **48.** Choose the correct order of acidic strength of the following.



- **49.** Calculated spin magnetic moment of Eu³⁺ is (a) 6.93 (b) 7.94 (c) 2.83 (d) 3.87
- **50.** Consider the following reaction:



- **51.** Which of the following method is correct for the formation of benzene?
 - (a) Mixture of calcium benzoate and calcium acetate is heated
 - (b) Calcium benzoate is heated
 - (c) Sodium benzoate is heated with sodalime
 - (d) All of the above method is correct
- **52.** Methyl amine reacts with HNO₂ in the presence of HCl to form

I. CH ₃ ONO	II. CH ₃ OCH ₃
III. CH ₃ OH	IV. CH ₃ CHO

- Choose the correct option. (a) I and II (b) I and III (c) I and IV (d) I, II and III
- 53. An organic compound containing nitrogen atom when treated with the mixture of reagent used in Riemer-Tiemann reaction in 1 : 3 ratio, it produces methyl isocyanide. The organic compound is

 (a) CH₃NH₂
 (b) CH₃CH₂NH₂
 (c) CH₃CONH₂
 (d) CH₃CH₂CONH₂
- **54.** Consider the following groups :

 $\begin{array}{c} - \begin{matrix} \text{OAc} \end{array}; - \begin{matrix} \text{OMe} \end{array}; - \begin{matrix} \text{OSO}_2 \text{Me} \end{smallmatrix}; - \begin{matrix} \text{OSO}_2 \text{CF}_3 \end{matrix} \\ \begin{matrix} \text{II} \end{matrix} \\ \begin{matrix} \text{III} \end{matrix} \\ \begin{matrix} \text{III} \end{matrix} \\ \begin{matrix} \text{IV} \end{matrix} \\ \end{matrix}$

- 55. Ethanal reacts with HCN and the addition product so obtained is hydrolysed to form a new compound. This compound shows

 (a) optical isomerism
 (b) geometrical isomerism
 (c) tautomerism
 (d) metamerism
- **56.** Number of open chain isomers possible for C_4H_8 are (a) 4 (b) 3 (c) 2 (d) 5
- **57.** Consider the reaction equilibrium,

 $2\text{SO}_2(g) + \text{O}_2(g) \Longrightarrow 2\text{SO}_3(g); \Delta H^\circ = -198 \text{ kJ}$

On the basis of Le-Chatelier's principle, the condition favourable for the forward reaction is (a) lowering of temperature as well as pressure (b) lowering the temperature and increasing the pressure (c) increasing the temperature and pressure (d) any value of temperature and pressure

58. What will be the temperature at which liquid and vapour of water will be at equilibrium with each other? Given data are

$$\begin{split} \Delta H_{\rm vap} &= 40.73 \ \rm kJ \ mol^{-1} \\ \Delta S_{\rm vap} &= 0.109 \ \rm kJ \ mol^{-1} \ K^{-1} \\ (a) \ 273 \ \rm K \qquad (b) \ 373 \ \rm K \qquad (c) \ 37^{\circ} \ \rm C \qquad (d) \ 110^{\circ} \rm C \end{split}$$

59. For the following reaction, $H_2(g) + I_2(g) \Longrightarrow 2HI(g)$

If value of equilibrium constant is 50 at 25°C. Then, the value of ΔG will be (a) - 6.964 kJ (b) - 4.964 kJ (c) -9.694 kJ (d) - 6.496 kJ

60. Minimum amount of work done required to compress 5.00 moles of an ideal gas isothermally from 200 L to 40 L is

(a) + 20.1 kJ	(b) – 20.1 kJ
(c) – 20.1 J	(d) + 20.1 J

61. What is the lowest energy of the spectral line emitted by the hydrogen atom in the Lyman series?

(a) $\frac{5hcR_{\rm H}}{36}$ (b) $\frac{4hcR_{\rm H}}{3}$ (c) $\frac{3hcR_{\rm H}}{4}$ (d) $\frac{7hcR_{\rm H}}{144}$

- **62.** In IF_7 molecule, central atom has all the bonded electrons, i.e. no lone pair is present on the central atom. Structure of IF_7 is
 - (a) pentagonal bipyramidal
 - (b) octahedral
 - (c) square pyramidal
 - (d) octahedral monopyramidal
- 63. Which of the following outer electronic configuration may exhibit the largest number of oxidation states?
 (a) 3d³, 4s²
 (b) 3d⁵, 4s¹

(a) $3d^5 4a^2$ (d) $3d^2 4a^2$	a) ou , 10	
(C) 50 ,45 (U) 50 ,45	c) 3d ⁵ ,4s ²	(d) 3d ² ,4s

- **64.** A and B are ideal gases, the molecular weights of A and B are in ratio of 1 : 4. The pressure of a gas mixture containing equal weights of A and B is p atm. What is the partial pressure (in atm) of B in the mixture?
 - (a) $\frac{\rho}{5}$ (b) $\frac{\rho}{2}$ (c) $\frac{\rho}{2.5}$ (d) $\frac{3\rho}{4}$
- **65.** Potassium superoxide is the inorganic compound with the formula, KO₂. It is a yellow solid that decomposes in moist air. It is a rare example of a stable salt of the superoxide ion. Which of the following statement is incorrect regarding potassium superoxide?
 - (a) Oxidation state of oxygen in KO_2 is -1/2
 - (b) Oxidation state of potassium is +1
 - (c) It is used in preparation of breathing mask
 - (d) It is a reducing agent
- **66.** Which of the following statement is not true regarding silicones?
 - (a) Silicones have high thermal stability
 - (b) Silicones are chemically inert
 - (c) Disubstituted silicones on hydrolysis gives cyclic trimer of silicones
 - (d) Trisubstituted silicones on hydrolysis gives cyclic trimer of silicones
- **67.** Ozone hole is a term which refers to
 - (a) hole in ozone layer
 - (b) reduction in thickness of ozone layer in stratosphere
 - (c) reduction in thickness of ozone in troposphere
 - (d) increase concentration of ozone
- **68.** What will be the percentage of iron (III) present in $Fe_{0.03}O$?

(a) 84.95%	(b) 45.64%
(c) 15.05%	(d) 44.36%

- **69.** Consider the reaction, $M^{3+} + 3e^- \longrightarrow M$; If 0.415 g of metal M is deposited at the cathode due to passage of 2*A* of current for 965 sec. then the atomic weight of the metal M is
 (a) 124.5 g
 (b) 62.25 g
 (c) 18.75 g
 (d) 27.5 g
- 70. What will be the value of relative lowering of vapour pressure when 3 g urea is dissolved in 45 g of water?
 - (a) 0.05 (b) 0.04 (c) 0.02 (d) 0.01
- **71.** Which of the following statements is correct for ethyne molecule?
 - (a) Ethyne molecule consist of two C—C $\sigma\text{-bonds}$
 - (b) It has one π -bond
 - (c) It is a non-linear molecule
 - (d) Electron cloud between two C-atoms is cylindrically symmetrical

72. Consider the following compounds,



The correct decreasing order of stability of compounds is

*	
(a) I > III > II > IV	(b) $ V > > > $
(c) $ > > V > $	< < <

- 73. Molarity of a solution obtained by mixing 800 mL of 0.6 M HCl with 200 mL of 1 M HCl will be
 (a) 0.4 M
 (b) 1.6 M
 (c) 0.68 M
 (d) 1.68 M
- 74. Which of the following is not considered as a part of the tertiary structure of proteins?(a) Hydrogen bonds
 - (b) Electrostatic interactions
 - (c) Hydrophobic effect
 - (d) Disulphide bonds
- 75. When stearic acid reacts with polyethylene glycol, then the product so formed belongs to a class of (a) cationic detergents (b) non-ionic detergents (c) anionic detergents (d) None of these
- 76. An aromatic compound A(C₇H₉N) on reacting with NaNO₂/HCl at 0°C forms benzyl alcohol and nitrogen gas. The number of isomers possible for the compound A is
 (a) 5 (b) 3

(u) 0	(0) 0
(c) 7	(d) 6

MODULE 2

- 77. Consider the following complexes : [Ni(CN)₄]²⁻ (A) and [Ni(CO)₄] (B). Both of them possess similar magnetic behaviour but their geometries are different. The geometries of (A) and (B) are
 - (a) (A) has tetrahedral structure, (B) has square planar structure
 - (b) (A) has tetrahedral structure, (B) has trigonal planar structure
 - (c) (A) has square planar structure, (B) has tetahedral structure
 - (d) (A) has tetrahedral structure, (B) has trigonal pyramidal structure
- **78.** Rate of hydration of the given compounds follows the order.



79. The hybridisation state of Co in *cis*-[Co(NH₃)₄Cl₂]⁺ is

(a) $d^2 s p^3$	(b) dsp ²
(c) sp ³	(d) sp ³ d ²

- **80.** Concentrated nitric acid upon long standing turns yellow brown. This is due to the formation of (a) N_2O_4
 - $(a) N_2 O_2$
 - (b) N₂O (c) NO
 - (d) NO₂
 - $(u) \cap O_2$
- **81.** The type of isomerism exhibited by $[Co(NH_3)_5(NO_2)]^{2+}$ complex is
 - (a) functional isomerism
 - (b) linkage isomerism
 - (c) hydrate isomerism
 - (d) coordination isomerism
- 82. The unit of rate constant for 1st and zero order reaction in terms of molarity are respectively
 (a) s⁻¹. Ms⁻¹
 (b) s⁻¹. M
 - (a) s^{-1} , Ms^{-1} (b) s^{-1} , M(c) Ms^{-1} , s^{-1} (d) M, s^{-1}
- **83.** Choose the correct option regarding the product of following reaction.

$$(A) \xrightarrow{(i) \text{ Hg (OAc_2)/H_2}} \text{Product}$$

$$(B)$$

- (a) B is a secondary alcohol
- (b) B is a primary alcohol
- (c) B is a tertiary alcohol
- (d) B is an achiral molecule

84. For a reversible reaction,

$$N_2 + O_2 \implies 2NO$$

Activation energy of the backward reaction is lower than that of forward reaction. The slope of $\ln k$ versus 1/T graph will be

(a) zero
(b)
$$-\frac{H}{2.303 R}$$

(c) $\frac{H}{2.303 R}$
(d) $-\frac{\Delta H}{R}$

- **85.** OsO_4 is highly toxic volatile substance. It is 518 times more soluble in CCl_4 than in water. Product obtained on reaction of cyclopentene with osmium tetraoxide at 25°C followed by reaction with Na_2SO_3 is (a) *cis* pentan-1, 2-diol (b) *trans* pentan-1, 3-diol (c) *trans* pentan-1, 2-diol (d) *cis* pentan-1, 3-diol
- 86. Which of the following statements is not correct for zero order reactions?(a) ln [*R*] vs *t* is straight line plot(b) [*R*] vs *t* is straight line plot
 - (c) $kt = [R]_0 [R]$ (d) $t_{1/2} = [R]_0/2k$

(c) 1

2

3 4

- 87. When MnO₂ is fused with KOH, a purple coloured compound is formed. The compound is
 (a) Mn₂O₄
 (b) KMnO₄
 (c) K₂MnO₄
 (d) Mn₂O₃
- **88.** Match Column I with Column II and identify correct answer by using the code given below.

	Co [Re	lumn eactio	I n Nar	me]			C [F	olum Produc	n II ct]		
А.	Etard reaction					1.	С	nnam	nic ac	id	
В.	Reformatsky reaction					2. Benzaldehyde					
C.	Friedel-Craft's acylation					3.	D	benz	oketc	ne	
D.	Perkin reaction					4.	α	, β-un	satur	ated	ester
Cod	les										
	A	В	С	D			А	В	С	D	
(a)	2	4	3	1		(b)	3	4	1	2	

(d) 4 3 2 1

89. If the last electron (i.e. the differentiating electron) occupies 5f-orbital, the element is said to belong 5f-series. In this series, ions having $5f^0$, $5f^7$ and $5f^{14}$ are colourless. The colour of U³⁺ is red which is due to

(a) $d - d$ transition	(b) $f - f$ transition
(c) crystal defect	(d) $L \rightarrow M$ charge transfer

90. Which of the following correctly represents the molecular formula of dithionic acid?
(a) H₂S₂O₇ (b) H₂S₂O₅ c. H₂S₂O₄ d. H₂S₂O₆

PART C BIOLOGY

- **91.** Which of the following variations in chromosome number is not correctly paired?
 - (a) An euploidy $-2n \pm 1$ chromosomes
 - (b) Monosomy -2n 1 chromosomes
 - (c) Trisomy -2n + 1 chromosomes
 - (d) Tetrasomy -2n + 4 chromosomes
- **92.** Which of the following represents a random change in allele frequencies over the generation?
 - (a) Bottleneck effect (b) Sewall Wright effect
 - (c) Hardy-Weinberg effect (d) Ernst Mayr effect
- **93.** Match the following columns and choose the correct option from the codes given below.

	C	Colum	n I	Column II							
А.	(Chlam	ydosp	1.	Formed in lower group of fungi of Phycomycetes					o of s	
Β.	Z	loosp	ores		2.	Non-motile structures					
C.	A	Aplanospores				Exogenous spores					
D.	(Conidia				Res und	istaı er u	nt spo nfavo	ores f urabl	ormeo e con	d ditions
Cod	es										
/	Ą	В	С	D			А	В	С	D	
(a)	1	2	3	4		(b)	4	3	2	1	
(C)	1	2	4	3		(d)	4	1	2	3	

- **94.** Which of the following statements regarding the transport of CO_2 is not true?
 - (a) CO_2 is carried by haemoglobin as carbaminohaemoglobin (b) ρCO_2 is high and ρO_2 is low in the tissues
 - (c) In the tissues, pCO_2 is high and it diffuses into blood and forms CO_2 and H_2O
 - (d) Every 100 mL of deoxygenated blood delivers approximately 4 mL of CO₂ to the alveoli
- **95.** Discolouration of toe nails, finger nails and lips to blue colour is called as

(a) lathyrism	(b) paraplegia
(c) cyanosis	(d) leukaemia

- 96. Consider the following statements.
 - I. Phenylketonuria is an autosomal recessive trait.
 - II. Thalassemia is an autosomal recessive trait.
 - III. Down's syndrome is due to the trisomy of chromosome number 21.
 - IV. Turner's syndrome is caused due to the absence of one of the Y-chromosomes.

The incorrect statement is

(a) Only I	(b) Only II
(c) Only III	(d) Only IV

- **97.** Identify correct statement with regard to different types of spores present in plants.
 - (a) In Chlorophyceae and Phaeophyceae, motile and flagellated zoospores are produced
 - (b) During unfavourable conditions, some unicellular, uninucleate, non-motile and thin-walled spores called aplanosporers are produced
 - (c) In red algae, non-motile spores known as tetraspores are produced
 - (d) All are correct
- **98.** Name the antibiotic which inhibits the formation of cell wall in bacterial cells.

(a) Terramycin	(b) Aureomycir
(c) Penicillin	(d) Clavicin

- **99.** Consider the following statements.
 - I. Back cross is the cross of the hybrids of F_1 -generation with either of its parents.
 - II. Test cross is the cross of the individuals with its heterozygous dominant parent.
 - III. Reciprocal cross is the cross that could be made either way or independent of the sex of parents.

The incorrect statement(s) is/are (a) Only I (b) Only II (c) Only III

100. The physical location of a gene in relation to other genetic material may influence its expression. This is called as

(a) penetrance	(b) expressivity
(c) position effect	(d) epigenetics

101. Match the following columns and choose the correct option from the codes given below.

	Сс	olumr	n I		Colun	nn II			
Α.	Plantigrade			1.	Cat				
Β.	Ur	ngulig	rade	2.	Man				
C.	Di	gitigr	ade	3.	Horse				
Cod	des								
	А	В	С				А	В	
(a)	3	1	2			(b)	1	2	
(C)	2	1	3			(d)	2	3	

- 102. The type of endosperm in which the first division of the nucleus is followed by wall formation, but further nuclear divisions are free divisions is

 (a) nuclear type
 (b) helobial type
 (c) ruminate type
 (d) mosaic type
- **103.** Presence of four long and two short stamens can be associated with family

(a) Asteraceae	(b) Liliaceae
(c) Brassicaceae	(d) Fabaceae



(d) I and II

С

3

- **104.** Identify the incorrect statement(s).
 - I. Diseases or infections transmitted through sexual intercourse are called venereal diseases.
 - II. AIDS is completely curable if detected early and treated properly.
 - III. There can be many reasons for infertility including psychological.

Choose the correct option.

(a) I and III	(b) II and II
(c) Only II	(d) Only I

- (d) Only I
- **105.** Which of the following statements is true about members of family Cucurbitaceae?
 - I. The pollen grain produces only one pollen tube, i.e. monosiphonous.
 - II. The pollen grain produces many pollen tubes, i.e. polysiphonous.
 - III. The pollen tube enters the ovule through integument.
 - IV. The pollen tube enters the ovule through the funicle.

Choose the correct option.

(a) Only II	(b) Both II and III
(c) Both I and III	(d) Both II and IV

- **106.** Which among the following statements are correct regarding heartwood?
 - (a) It represents the central wood of the plant
 - (b) Living cells are absent
 - (c) Tracheids and vessels plugged by tyloses
 - (d) All of the above
- **107.** Which of the following statements are incorrect?
 - I. Hemichordates are exclusively marine organisms.
 - II. Hemichordates are bilaterally symmetrical and diploblastic.
 - III. They reproduce asexually as sexes are not separate.

IV. Fertilisation is internal.

Choose the correct option	n.
(a) II and III	(b) III and IV
(c) I, II and III	(d) II, III and IV

- **108.** Which of the following is not a human X-linked trait?
 - (a) Hunter syndrome
 - (b) Duchenne muscular dystrophy
 - (c) G-6-PD deficiency
 - (d) Pattern baldness
- **109.** Which of the following amino acids has the greatest number of codons? (a) aspartic acid (b) tryptophan

(c) leucine	(d) proline



- **110.** Consider the following statements about lytic phase of virus reproduction.
 - I. During lytic phase, viral genome does not integrate with host DNA.
 - II. The host DNA is not hydrolysed during lytic phase.
 - III. The host cell does not get lysed.
 - IV. A number of virus particles is liberated during lytic phase.

Which of the above statements are incorrect? (a) II and III (b) I and III (c) II and IV (d) III and IV

111. In the question given below, identify what the letters '*x*' and '*y*' stand for.



Proteins \longrightarrow Proteoses + 'y'

(a) Propepsin, Dipeptides(b) Pepsinogen, Peptones(c) Pepsinogen, Amino acids(d) Propepsin, Amino acids

- **112.** Which among the following statements is incorrect regarding α -1 Antitrypsin (AAT)?
 - (a) It is a human protein made in the liver and found in the blood
 - (b) It is an inhibitor of protease enzymes like trypsin and elastase
 - (c) Inhibition of protease enzymes leads to lung disease emphysema
 - (d) AAT can be extracted from blood donations in large amounts
- 113. If the location of food source is towards the sun, a honeybee will wag its tail in which pattern?
 (a) Vertically downward
 (b) Right angle towards left
 (c) Vertically upward
 (d) Right angle towards right
- 114. Name the leucocytes which is the largest in all types of leucocytes and constitute 2-10% of blood leucocytes.(a) Neutrophils(b) N-K cells
 - (d) Both (b) and (c)

115. Consider the following matches.

- I. Ectoparasites—Human body lice
- II. Endoparasites—Rat flea
- III. Facultative parasites—Oyster prawn and pea crab
- IV. Brood parasitism-Cuckoo

The incorrect match is

- (a) Only I (b) Only II (c) Only III (d) Only IV
- **116.** Allochemicals are

(c) Monocytes

- (a) chemicals produced by a species which affects other species
- (b) sex hormones
- (c) produced by epiphytes
- (d) a positive interaction

- **117.** Identify the incorrect statements.
 - I. Bowman's capsule acts as filtering apparatus of blood.
 - II. Kidneys help in excretion and osmoregulation.
 - III. Urethra stores about 0.5 to 1 L of urine.
 - IV. The main role of loop of Henle is ultrafiltration.

Choose the correct option.

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

- **118.** Which one of the following pairs of cells and their secretions is correctly matched?(a) Mucous neck cells—HCl
 - (b) Oxyntic cells—Mucus
 - (b) Oxyrillic cells—Mucus
 - (c) Crypts of Lieberkuhn —Succus entericus
 - (d) $\beta\text{-cells}$ of islets of Langerhans—Secretion that increases blood sugar level
- **119.** Which statement is false regarding the flagellum of bacteria?
 - (a) The flagellum is made up of flagellin protein
 - (b) Each flagellum arises from a basal granule called blepharoplast
 - (c) Flagella are organs of motility
 - (d) 9 + 2 pattern of flagellum structure is present
- **120.** The following hormones are released from the adenohypophysis except
 - (a) adrenocorticotropic hormone
 - (b) growth hormone
 - (c) somatotropin
 - (d) prolactin release inhibiting hormone
- **121.** Find the odd one out with reference to their sexual cycles.

(a) Bear, fox	(b) Mouse, horse
(c) Cat, pig	(d) Sheep, cow

122. Which among the following statements is incorrect regarding opening of stomata?

(a) Glucose collects in the guard cells causing an increase in concentration of the cell sap

- (b) Guard cells become flaccid
- (c) The outer wall stretches more than thick inner wall due to turgor pressure

(d) Increase in the rate of gaseous exchange and transpiration

- **123.** The dicotyledonous stem hypodermis comprises of
(a) collenchyma(b) sclerenchyma(c) parenchyma(d) aerenchyma
- **124.** For proper coordination of the body, cell to cell communication is must and it is facilitated by one of the following structures.
 - (a) Gap junction(b) Tight junction(c) Desmosomes(d) Adhering junction

- 125. In plant, apical dominance is a condition where
 (a) foliar buds are inhibited by gibberellin
 (b) accessory buds are inhibited by cytokinin
 (c) axillary buds are inhibited by auxin
 (d) extra axillary buds are inhibited by abscisic acid
- **126.** Where does the maximum amount of carbon dioxide fixation take place through the process of photosynthesis?
 - (a) Tropical rainforests(b) Crop fields(c) Oceans(d) Savanna
- **127.** Which of the following cannot be classified as a mental disorder?
 - (a) Cirrhosis(b) Neurosis(c) Psychosis(d) Epilepsy
- **128.** Identify the incorrect statement.
 - (a) Some photosynthetic pigments absorb light of a particular wavelength at a greater strength, while very less at other wavelength
 - (b) Chlorophyll-a absorbs blue-violet and red colour wavelength at a greater strength, while carotenoids absorb light of blue and green region
 - (c) Action spectrum is a graph which shows the degree of absorption of light by a pigment as a function of wavelength
 - (d) Plant leaves appear green due to high amount of chlorophyll in plant, which reflects green colour
- **129.** The figure given below shows stalked particles on a region of mitochondrial cristae membrane.



Identify the process which occurs in the numbered regions.

	1	2	3
(a)	Glycolysis	ADP synthesis	Krebs cycle
(b)	ATP synthesis	Krebs cycle	Electron transport chain
(c)	Krebs cycle	Oxidative phosphorylation	ATP synthesis
(d)	Electron transport chain	Glycolysis	Oxidative phosphorylation

MODULE 2

- **130.** Modern synthetic theory of evolution involves
 - I. Gene mutation
 - II. Changes in chromosome structure and number
 - III. Genetic recombination
 - IV. Natural selection

The correct terms are

(a) I and II (b) III and IV (c) I, II and III (d) All of these

- **131.** Identify the incorrectly matched pair.
 - (a) Eusporangiate-Selaginella
 - (b) Leptosporangiate—*Dryopteris*
 - (c) Both (a) and (b)
 - (d) None of the above
- **132.** Which of the following is a pair of alarm chemicals?
 - (a) Opsonin and histones(b) Opsonin and dopamine(c) Interferons and dopamine(d) Histamine and kinins
- **133.** The function of glycocalyx in bacteria is
 - (a) protection from phagocytosis
 - (b) prevention of desiccation
 - (c) enable them to adhere to the surfaces
 - (d) All of the above
- **134.** Arrange the steps in development of new varieties in correct order.
 - I. Selection of the desirable characteristics.
 - II. Creation of genetic variation.
 - III. Evaluation of selected strains or lines or populations.
 - IV. Multiplication of evaluated lines.

Choose the correct option.

 $\begin{array}{ll} (a) \ | \rightarrow | | \rightarrow | | | \rightarrow | V \\ (c) \ | \mid \rightarrow | \rightarrow | | | \rightarrow | V \\ \end{array} \\ \begin{array}{ll} (b) \ | \rightarrow | | | \rightarrow | V \\ (d) \ | | \rightarrow | V \rightarrow | \rightarrow | | \end{array}$

135. Electronic smog refers to

(a) invisible electromagnetic radiations

- (b) it causes harm to eyes
- (c) it affects brain cells of man
- (d) All of the above
- **136.** The sarcoplasmic reticulum of skeletal muscle is a (a) form of smooth endoplasmic reticulum
 - (b) site where calcium is released during muscle relaxation
 - (c) site of calcium binding protein storage
 - (d) Both (a) and (c)
- **137.** Consider the following statements.
 - I. Habitat is the place or set of environmental conditions, in which a particular organism lives.
 - II. Habitat can have number of niches.
 - III. Niche have many species.
 - IV. Niche is profession of an organism.
 - The incorrect statement is
 - (a) Only I (b) Only II (c) Only III (d) Only IV

(MODULE 2)

138. Which portion of endometrium is shed during menstrual phase?(a) Myometrium (b) Antrum

(d) Stratum functionale

- **139.** Control of gene expression in eukaryotes includes all of following given below except
 - (a) methylation of DNA

(c) Serosa

- (b) feedback inhibition of enzyme activity *via* allosteric modification
- (c) transcription factors activity
- (d) alternative splicing of RNA transcripts
- **140.** Match the items given in column I with those in Column II and select the correct option from the codes given below.

	(Column I						С	olum	n II		
A	. 7	Trichoderma polysporum					1.	Ci	tric a	acid		
B	. /	Aspergillus niger					2.	Ly	/sine			
C	. /	Pseudomonas denitrificans					3.	С	yclos	porin	-A	
D	. <i>E</i>	Enterobacter aerogens				4.	С	yano	cobal	amir	ı	
Cod	des	;										
	А	В	С	D			А	В	С	D		
(a)	3	1	4	2		(b)	1	2	3	4		
(C)	4	3	2	1		(d)	2	4	1	3		

141. The two important types of secondary structures of proteins are

(a) motifs and domains
(b) α-helix, β-pleated sheet
(c) peptide bond, hydrogen bond
(d) *R* group, amino group

- **142.** The major disadvantage of cosmids is (a) inability to accept more than 40-50 kbp of DNA (b) allow the packaging of DNA in phage *in vitro* (c) also perpetuate in bacteria (d) can produce a complete genome library of 10⁸
- **143.** HIV virus destroys which of the following T-cells?(a) Helper T-cells(b) Cytotoxic T-cells(c) Killer T-cells(d) Suppressor T-cells
- **144.** Which among the following statements is/are incorrect regarding secondary growth in dicot stem?
 - (a) The vascular cambial ring develops as a circular ring since beginning
 - (b) Annual rings or growth rings occur quite commonly
 - (c) Both (a) and (b)
 - (d) None of the above
- **145.** Which of these nitrogen-fixing bacteria does not live in symbiotic association with host plant?

(a) Rhizobium	(b) Azotobacter
(c) Frankia	(d) Xanthomonas

146. Procumbent is

- (a) the stem that totally creeps on the ground
- (b) woody perennial climbers
- (c) the stem that grows vertically
- (d) the stem that has a long internode

147. Identify correct statement about protocells.

- (a) Protocells were first organic molecules formed from water before the origin of life
- (b) Protocells were first RNA molecules having enzymatic properties
- (c) Protocells were first protein-lipid microspheres enclosing **RNA** molecules
- (d) Protocells were first cell-like organisms, formed during origin of life
- 148. A plant hormone which allows the seeds to ignore environmental conditions and germinate is
 - (b) ethylene (a) abscisic acid
 - (c) cytokinin (d) gibberellins
- **149.** Given below is a stage of meiosis in an animal cell.



Identify the stage being represented by this figure along with structure labelled A.

	Structure A	Stage
(a)	Meiotic spindle	Telophase-I
(b)	Centrioles	Anaphase-I
(c)	Centromere	Metaphase-I
(d)	Microtubules	Telophase-II

150. In which phase of the cell cycle does synthesis of histone proteins take place?

(a) Anaphase-I (b) S-phase (c) G₁-phase (d) G₂-phase

- **151.** Chlamydomonas yellowstonensis is a (a) thermophyte (b) cryophyte (c) symbiotic (d) parasitic
- 152. In date palm, maturity time as well as size of fruits can be changed by using different pollens. This effect is technically known as

(b) metaxenia (c) ruminate (a) xenia (d) mosaic

- **153.** Identify the incorrectly matched pair.
 - (a) I-131 Causes thyroid cancer
 - (b) Sr-90 Causes bone cancer
 - (c) Radon Causes lung cancer
 - (d) None of the above
- **154.** In *Najas* and *Zostera*, the type of pollination is called hypohydrophily because in these plants, (a) the pollination occurs by a whirlpool created in water
 - (b) the pollination occurs in submerged plants
 - (c) the pollination occurs in floating plant
 - (d) Both (a) and (c)

- **155.** The species which is susceptible to extinction has (a) large body size
 - (b) low reproductive rate
 - (c) In food chain, occupies the highest trophic level
 - (d) All of the above
- **156.** Match the items given in Column I (types of RNA polymerase) with those in Column II (function).

	Colu	umn l		Colu	umr	n II
А.	RNA	a polymerase l	1.	Prec synt	urs hes	ors of <i>r</i> RNA are ised except 5S <i>r</i> RNA
В.	RNA	a polymerase II	2.	Synt gene	thes es	sises <i>hn</i> RNA coding
C.	RNA	a polymerase III	3.	Synt tRN/	thes A, 5	sises precursors of S <i>r</i> RNA and S <i>n</i> RNA
Code	es					
A	В	С		А	В	С
(a) 1	2	3	(b) 3	2	1
(c) 1	3	2	(d) 2	3	1

- **157.** The initiation codon for translation to start is AUG, it is the codon for (a) methionine (b) valine (c) leucine (d) isoleucine
- 158. Ductus choledochus and main pancreatic duct join together to form (a) hepatopancreatic duct (b) avatia duat

lic duci	(D) Cystic duct
	(d) duct of Santorini

159. Which type of food chain is depicted in the following examples?

Dead leaves \longrightarrow Wood louse \longrightarrow Black bird (b) Grazing food chain (a) Detritus food chain (d) None of these (c) Both (a) and (b)

- **160.** High myoglobin content and intermediate glycolytic enzyme activity are the characteristics of which of the following? (a) White fibres type of muscles (b) Fast oxidative or aerobic muscles
 - (c) Cross-bridge structure
 - (d) None of the above

(c) bile canaliculi

- **161.** Phylogenetic system brings about groupings or association according to (a) reproductive similarities (b) morphological characters
 - (c) increasing complexity of body organisation
 - (d) evolutionary trends
- **162.** Oligotrophic lakes have (a) low plankton density

(c) poor in nutrients

- (b) low primary productivity (d) All of these
- **163.** Upon exposure to light, the endosperm becomes chlorophyllous in (a) Raphanus (b) Mathiola
 - (d) None of these (c) Both (a) and (b)

MODULE 2

- **164.** Identify the incorrect match of a water pollutant with its effect (disease).
 - (a) Nitrate Black foot disease
 - (b) Mercury Minamata disease
 - (c) Cadmium Itai Itai disease
 - (d) Fluoride Fluorosis
- **165.** Stem cuttings of grapes, sugarcane, etc., are dipped in which solution prior to being sowed?
 - (a) IBA (b) GA3 (c) ABA (d) Ethylene

166. In pest-resistant legumes,

- (a) a gene for an enzyme that synthesises a chemical toxic to weevils has been transferred
- (b) Bt toxins are thousands of times more powerful
- (c) these crops increase the use of chemical pesticides
- (d) more resistant to viral attack

167. A patient with the deficiency of vitamin- B_1 , should

- avoid intake of alcohol because,
- (a) alcohol has bad effect on brain tissues(b) alcohol makes the person loose control over his reflexes
- (c) alcohol interferes with the metabolism of vitamin-B₁ in liver
- thus causes brain related diseases
- (d) alcohol increases the respiratory quotient which may cause restlessness
- **168.** Which among the following is not the characteristic feature of DNA probes?
 - (a) Probes are always single-stranded
 - (b) They can be made of DNA or RNA
 - (c) The universal DNA probe is made up of repeated GATA sequence
 - (d) It is the DNA which is transferred from one organism into another
- **169.** Transcription or RNA synthesis is terminated by (a) sigma factor (b) rho factor (c) alpha factor (d) beta factor
- **170.** Match the items in Column I with Column II and select the correct option from the codes given below.

	Column I		Column II
Α.	DNA ligase	1.	Endonuclease that digests ss or ds DNA
Β.	DNase I	2.	Unpackaging DNA strands
C.	DNA topoisomerase	3.	Catalyses the covalent bonds of segments of an interrupted sugar phosphate strand in <i>ds</i> DNA
D.	DNA helicase	4.	Produces single or <i>ds</i> breaks in DNA during replication to release tension brought about by DNA uncoiling

Codes

	А	В	С	D
(a)	1	2	3	4
(b)	4	3	2	1
(C)	3	1	4	2
(d)	2	4	1	3

- **171.** A person suffering from long-sightedness is wearing spectacles with convex lenses. If he removes the glasses the image of the near objects will be formed
 - (a) on the yellow spot
 - (b) behind the retina
 - (c) in front of the retina
 - (d) on the blind spot
- **172.** Which among the following is not an objection to root pressure theory?
 - (a) The rapidly transpiring plants do not show any root pressure
 - (b) Root pressure has been found in all plants
 - (c) Water continues to rise even in the absence of roots
 - (d) It is seen only during the most favourable periods of growth like spring or rainy season
- **173.** The aleurone layer secretes some hydrolytic enzymes which cause breakdown of starch and protein. Their secretion is stimulated by
 - (a) cytokinin 'zeatin', released in endosperm
 - (b) triple fusion instigates the secretion of these enzymes
 - (c) gibberellins, released by the embryo
 - (d) embryo scutellum
- **174.** Which among the following helps in attachment with other cells?
 - (a) Pili
 - (b) Flagella
 - (c) Fimbriae
 - (d) Cell wall
- **175.** Condensation (ATP dependent) A B

The above reaction is successfully accomplished by enzymes of class

- (a) Oxidoreductase Alcohol dehydrogenase
- (b) Lyases Aldolase
- (c) Ligases Glutamine synthetase
- (d) Transferases Hexokinase

176. In plants, Golgi apparatus is not found in

- (a) male gametes of pteridophytes
- (b) male gametes of bryophytes
- (c) cells of sieve tube
- (d) All of the above

- **177.** Injury to adrenal cortex is not likely to affect the secretion of which one of the following?
 - (a) Cortisol
 - (b) Adrenaline
 - (c) Aldosterone
 - (d) Both androstenedione and dehydroepiandrosterone
- 178. The cell wall of bacteria comprises of

(a) NAG	(b) NAM
(c) peptidoglycan	(d) All of these

- **179.** A cell will not enter M-phase if (a) cell is not sufficiently large (b) there is lack of nutrients (c) mitotic cyclin is overexpressed (d) replication of DNA is not complete
- 180. Which of the following organisms have the richest blood in the animal kingdom?
 (a) Reptiles
 (b) Amphibians
 (c) Birds
 (d) Mammals

Answer Sheet

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

EXPLANATIONS

PHYSICS

1. Acceleration with which the cylinder rolls down.

$$a = \frac{g \sin \theta}{1 + \frac{l}{MR^2}} = \frac{g \sin \theta}{1 + \frac{\frac{l}{2}MR^2}{MR^2}}$$
$$= \frac{2}{3}g \sin \theta$$
$$= \frac{2}{3} \times 9.8 \times \frac{1}{20}$$
$$= 0.326 \,\mathrm{ms}^{-2}$$
first equation of motion

$$v = u + at = 0 + 0.326 \times 5$$

= 1.63 ms⁻¹

- 2. Work done is maximum, when process involved is isobaric.
- **3.** As, $F = q(\mathbf{v} \times \mathbf{B}) \Rightarrow F = qvB\sin\theta$

At $\theta = 0^\circ, F = 0$ At $\theta = 90^\circ$, F = qvBAt $\theta = 180^{\circ}, F = 0$ So, for non-zero force angle between v and **B** can have any value other than zero or 180°.

4. Let the depth of Indian ocean is x cm

$$\therefore p_1 V_1 = p_2 V_2 (tdg + xdg) \left(\frac{4}{3}\pi r^3\right) \\ = tdg \left[\frac{4}{3}\pi (18r)^3\right] \\ (t + x) = t \cdot 18^3 \\ 18^3 t - t = x \\ \text{So, } x = t 5831 \text{ cm} = 5831 t \text{ cm} \end{cases}$$

5. Output power will be maximum, if internal resistance of battery is equal to external resistance or load resistance, hence $r = 5\Omega$.

6. For air, $\rho = 1.10 \text{ kgm}^{-3}$, $K = 1.32 \times 10^5 \text{ Nm}^{-2}$ Speed of sound in air.

$$v = \sqrt{\frac{K}{\rho}}$$
$$= \sqrt{\frac{1.32 \times 10^5}{1.10}}$$
$$= 3.46 \times 10^2$$
$$= 346 \,\mathrm{ms}^{-1}$$

(MODULE 2)

$$v = \frac{v}{4L} = \frac{346}{4 \times L}$$
$$L = \frac{346}{4 \times 3} \approx 29 \,\mathrm{m}$$

7. Fall in temperature of brass sphere, $\Delta T = 500 - 0 = 500^{\circ} C$

Heat loss by sphere, $Q = ms\Delta T = 5 \times 500 \times 500$ = 1250 kJ

Heat for melting m_2 kg of ice, 36

$$Q_2 = m_2 L = m_2 \times 33$$

 \Rightarrow

From principle of calorimetry,

$$= 1250 \text{ kJ} = m_2 \times 336$$
$$m_2 = \frac{1250}{336} = 3.72 \text{ kg}$$

8. The semi-maj tical orbit around the sun is given by

$$r = \frac{r_1 + r_2}{r_1 + r_2}$$

According to Kepler's third law, $\tau^2 \propto r^3$

$$\Rightarrow \qquad T^2 \propto \left(\frac{r_1 + r_2}{2}\right)^3$$

or
$$\qquad T \propto \left(\frac{r_1 + r_2}{2}\right)^{3/2}$$

or
$$T \propto (r_1 + r_2)^{3/2}$$
.

9. Heat produced in the resistor
= Energy of capacitor =
$$\frac{1}{2}CV^2$$

$$= \frac{1}{2} \times 6 \times 10^{-6} \times 360 \times 360$$
$$= 0.39 \text{ J}$$

11. Total energy =
$$E_1 + E_2 = 1050 \text{ J}$$

As,
$$E = \frac{p^2}{2m} \Rightarrow \frac{E_1}{E_2} = \frac{m_2}{m_1} = \frac{4}{0.2} = 20$$

where, $m_1 = \text{mass of shell}$
and $m_2 = \text{mass of gun.}$
 $\Rightarrow \qquad E_2 = \frac{E_1}{20}$
 $\Rightarrow \qquad E_1 + \frac{E_1}{20} = 1050$

 $E_1 = 1000 \text{ J}$ \therefore KE = $\frac{1}{2}m_1v_1^2 = 1000$ $v_1 = \sqrt{10000} = 100 \,\mathrm{ms}^{-1}$ \Rightarrow 12. Let a be the acceleration of each block, then $T_3 = (m_1 + m_2 + m_3)a$... (i) $T_2 = (m_1 + m_2)a$... (ii) and From Eqs. (i) and (ii), we get $T_2 = \left(\frac{m_1 + m_2}{m_1 + m_2 + m_3}\right) \times T_3$ $=\left(\frac{10+6}{10+6+4}\right)\times 40$ = 32 N 13. Induced emf is given by $E_{\rm ind} = \frac{\Delta \phi}{\Delta t}$ Current, $i = \frac{Q}{Q}$ Λt $=\frac{\Delta\phi}{\Delta t}\times\frac{1}{R}$ $Q = \frac{\Delta \phi}{\Delta \phi}$ **14.** $A \rightarrow Q$; $B \rightarrow R$; $C \rightarrow P$ 15. The maximum acceleration for SHM is given by $a_{\max} = \omega^2 A = (2\pi v)^2 A = 4\pi^2 v^2 A$ The block will remains in contact with the piston, if $a_{\max} \le g$ or $4\pi^2 v^2 A < g$... Maximum amplitude of piston will be $A_{\max} = \frac{g}{4\pi^2 v^2}$ $= \frac{9.8}{4\pi^2 (0.5)^2} = 0.99 \,\mathrm{m}$ **16.** Energy = $\frac{1}{2}Fl = \frac{1}{2}\frac{F^2L}{AY}$ $\left[\because Y = \frac{FL}{Al}\right]$ $= \frac{1}{2} \times \frac{(100)^2 \times 40 \times 10^{-2}}{4 \times 10^{-4} \times 4 \times 10^{10}}$ $= 1.25 \times 10^{-4} \text{ J}$

17. The value of resultant electric field at y = 0 $E = \frac{q}{4\pi\varepsilon_0} \left[\frac{1}{2^2} + \frac{1}{4^2} + \frac{1}{8^2} + .. \infty \right]$

$$r = \frac{r_1 + r_2}{2}$$

Г 1

$$= 6 \times 10^{-6} \times 9 \times 10^{9} \left[\frac{\frac{1}{4}}{1 - \frac{1}{4}} \right]$$

$$= 54 \times 10^{3} \times \frac{1}{3}$$

$$= 1.8 \times 10^{4} \text{ N/C}$$
18. The distance of *A* is given by
$$30 \text{ ms}^{-1} \qquad 10 \text{ ms}^{-1}$$

$$A \qquad B \qquad S_{\text{min}} \qquad B \qquad 10 \text{ ms}^{-1}$$

$$A \qquad B \qquad S_{\text{min}} \qquad B \qquad 10 \text{ ms}^{-1}$$

$$A \qquad B \qquad S_{\text{min}} \qquad B \qquad 10 \text{ ms}^{-1}$$

$$A \qquad B \qquad S_{\text{min}} \qquad B \qquad 10 \text{ ms}^{-1}$$

$$A \qquad B \qquad S_{\text{min}} \qquad B \qquad 10 \text{ ms}^{-1}$$

$$A \qquad B \qquad S_{\text{min}} \qquad B \qquad 10 \text{ ms}^{-1}$$

$$A \qquad B \qquad S_{\text{min}} \qquad B \qquad S_{\text{min}} \qquad$$

$$(10^{\circ})$$

= 10⁻² rad s⁻¹

the

$$P \xrightarrow{2\Omega} 3V & 6V & 4\Omega \\ r_1 & r_2 \\ r_1 & r_2 \\ 10 \Omega \\ -4l + 6 - 3 - 2l - 10l = 0 \\ -16l = -3 \\ l = \frac{3}{16}A$$

• Potential difference across
$$PQ = \frac{3}{16} \times 10$$

$$= \frac{15}{8} \vee$$
21. $\Delta U_X = \Delta U_Y$ (For cyclic process)
So, $\Delta W_X = \Delta Q_X$ and $\Delta W_Y = \Delta Q_Y$
As from figure, $\Delta W_X > \Delta W_Y$
So, $\Delta Q_X > \Delta Q_Y$
22. Force on the charged particle in
magnetic field is
$$F = q(v \hat{\mathbf{j}} \times B \hat{\mathbf{i}}) = qvB(-\hat{\mathbf{k}})$$
which is -Z-axis.
23. End correction = $\frac{L_2 - 3L_1}{2}$

$$= \frac{112.9 - 3 \times 32.5}{2}$$

$$= \frac{15.4}{2} = 7.7 \text{ cm}$$
Speed of sound in air,
$$v = 2v(L_2 - L_1)$$

$$= 2 \times 256 \times (1.129 - 0.325)$$

$$= 411.65 \text{ ms}^{-1}$$
24. From second law of motion,
$$mg - T = ma$$
and
$$T = \frac{25}{100}mg = \frac{1}{4}mg$$

$$\Rightarrow mg - \frac{1}{4}mg = ma \Rightarrow a = \frac{3}{4}g$$
25. New fringe width is
$$\beta' = \frac{\beta}{\mu}$$

26. Net magnetic flux through a closed surface is always zero.

 $=\frac{0.5}{5/3}=0.3$ mm

27. Charged particle moves on circular path in magnetic field with uniform speed. Force on charged particle is always perpendicular to speed, hence work done is zero. Due to change in velocity of particle on circular path, momentum changes.

28. As,
$$l = \frac{-dV}{dr}$$

 $\Rightarrow \quad dV = -ldr$
So, $\int_{0}^{V} dV = \int_{0}^{x} -ldr = \int_{0}^{x} -kr^{-3} dr$
 $\Rightarrow \quad V = -k\left(\frac{r^{-3+1}}{-3+1}\right)_{0}^{x}$
 $= \frac{k}{2x^{2}}$

Power factor = $\frac{R}{\sqrt{R^2 + (X_L - X_C)^2}}$ $=\frac{60}{\sqrt{60^2 + (100 - 20)^2}} = 0.6$ 30. Moment of inertia of a cylinder about its centre and parallel to its length = $\frac{MR^2}{2}$. Moment of inertia about its centre and perpendicular to its length $= M \left(\frac{L^2}{12} + \frac{R^2}{4} \right).$ Equating both values, we get $\frac{MR^2}{2} = \frac{ML^2}{12} + \frac{MR^2}{4}$ $\frac{1}{4}R^2 = \frac{1}{12}L^2$ $\sqrt{3}R = L$ \Rightarrow $L = \sqrt{3}R$ or **31.** When an object is placed in front of such a lens, the rays first of all refracted from the convex surface, then reflect from the polished plane surface and again refracts from convex surface. If f_l and f_m be the focal lengths of lens (convex surface) and mirror (plane polished surface) respectively, then effective focal length F is given by

29. $R = 40 + 20 = 60 \Omega$

$$\frac{1}{F} = \frac{1}{f_{f}} + \frac{1}{f_{m}} + \frac{1}{f_{f}}$$
$$= \frac{2}{f_{f}} + \frac{1}{f_{m}} = \frac{2}{f_{f}} \left(\because f_{m} = \frac{R}{2} = \infty \right)$$
Now,
$$\frac{1}{f_{f}} = (\mu - 1) \left(\frac{1}{R} \right)$$
$$\therefore \qquad \frac{1}{F} = \frac{2(\mu - 1)}{R}$$
or
$$F = \frac{R}{2(\mu - 1)}$$
As,
$$R = 2F = \frac{R}{(\mu - 1)}$$
32. Equivalent circuit is shown below

0

$$A \xrightarrow{1 \Omega} C \xrightarrow{2 \Omega} K \xrightarrow{6 \Omega} 2 \Omega$$

$$B \xrightarrow{1 \Omega} D \xrightarrow{2 \Omega} R_{CD} = 2 + 2 + 2$$

$$= 6 \Omega$$
So,
$$R_{AB} = 1 + 1 + \left(\frac{6 \times 6}{6 + 6}\right)$$

$$= 5 \Omega$$

33. According to given question, $r = 60^{\circ} = i$ Given, condition satisfies Brewster's law,

$$\mu = \tan i_{\rho} \quad (i_{\rho} = i)$$
$$= \tan 60^{\circ} = \sqrt{3}$$
$$= 1.73$$

34. Given, square wire of side = 2 cm,

$$u = -20 \text{ cm}, f = -10 \text{ cm},$$
Area of second wire = ?

$$\therefore \qquad \frac{1}{v} + \frac{1}{u} = \frac{1}{f}$$

$$\Rightarrow \qquad \frac{1}{v} + \frac{1}{(-20)} = \frac{1}{-10}$$

$$\Rightarrow \qquad \frac{1}{v} = -\frac{1}{10} + \frac{1}{20}$$

$$\Rightarrow \qquad v = -20 \text{ cm}$$
We know that, $m = -\frac{v}{u}$

$$= \frac{-(-20)}{-20} = -1$$

$$\therefore \qquad \frac{\text{Area of image}}{\text{Area of object}} = m^2$$

$$\Rightarrow \qquad \frac{A_i}{A_o} = (-1)^2$$

$$= \frac{A_i}{2 \times 2} = 1$$

$$A_i = 4 \text{ cm}^2$$

- **35.** Electrons are emitted from metal surface only when maximum wavelength is equal to or less than threshold wavelength.
- **36.** Given, $v = -a \hat{j}$

 \Rightarrow

 $\therefore \mathbf{E} \times \mathbf{B} = \mathbf{v}, \text{ which satisfies,} \\ (-\hat{\mathbf{k}} E \times B \hat{\mathbf{i}}) = -a \hat{\mathbf{j}}$

i.e., direction of oscillating electric field of electromagnetic wave will be along negative *z* -direction.

- **37.** In *p n* junction, the diffusion of majority carriers takes place when junction is forward biased and drifting of minority carrier takes place across the junction when reverse biased.
- **38.** From given figure, As inductors are in paralled, so

Voltage across
$$L_1$$
 and L_2 is same.
i.e., $e_1 = e_2$
 $L_1 \frac{di_1}{dt} = L_2 \frac{di_2}{dt}$
or $L_1 i_1 = L_2 i_2$
 $\frac{i_1}{i_2} = \frac{L_2}{L_1}$
39. We know that, $\frac{N}{N_0} = \frac{1}{2(\frac{t}{T_1/2})}$
 $\Rightarrow \frac{1}{64} = \frac{1}{2(\frac{30}{T_1/2})}$
 $\Rightarrow \frac{1}{2^6} = \frac{1}{2^{30/T_{1/2}}}$
 $\Rightarrow 6 = \frac{30}{T_{1/2}}$
 $\Rightarrow 7_{1/2} = 5$ days
 $\therefore \frac{1}{128} = \frac{1}{\frac{x}{2^5}}$
 $\Rightarrow x = 35$ days
40. If I_0 is the intensity after closing one
edit then it extinction

40. If I_0 is the intensity after closing one slit, then it satisfies $I_0 \propto a^2$ (where, a = amplitude of light wave)

When both slits open, then intensity $\therefore I \propto (2a)^2 = 4a^2$ $\Rightarrow I_0 = I/4$

41. Angular momentum,

$$L = \frac{nh}{2\pi} = \frac{3 \times 6.6 \times 10^{-34}}{2 \times 3.14}$$
$$= 3.15 \times 10^{-34} \text{ J} - \text{s}$$

42. The temperature coefficient of resistance of semiconductors is negative that is their electrical resistance decreases with rise in temperature.



43. Time,
$$t = \frac{1}{\sin \theta} \sqrt{\frac{2h}{g} \left(1 + \frac{k^2}{R^2}\right)}$$

$$\therefore \frac{t_{\text{sphere}}}{t_{\text{disc}}} = \sqrt{\frac{1 + \left(\frac{k^2}{R^2}\right)_{\text{sphere}}}{1 + \left(\frac{k^2}{R^2}\right)_{\text{disc}}}}$$

$$= \sqrt{\frac{1 + \frac{2}{5}}{1 + \frac{1}{2}}}$$

$$= \sqrt{\frac{7/5}{3/2}} = \sqrt{\frac{14}{15}}$$
or
 $\sqrt{14} : \sqrt{15}$
44. Given, $h = 1600 \text{ km} = 1.6 \times 10^6 \text{ m}$,
 $R = 6 \cdot 4 \times 10^6 \text{ m and}$
 $g = 9.8 \text{ ms}^{-2}$
The distance of satellite from earth's centre is
 $r = R + h$
 $= 6.4 \times 10^6 + 1.6 \times 10^6$
 $= 8 \times 10^6 \text{ m}$
Centripetal force, $F = \frac{mv^2}{r}$
 \therefore Centripetal acceleration,
 $a = \frac{F}{m}$
 $= \frac{v^2}{r} = \frac{(\sqrt{gR^2/r})^2}{r}$
 $= 9.8 \times \frac{(6.4 \times 10^6)^2}{(8 \times 10^6)^2}$
 $= 6.272 \text{ ms}^{-2}$
45. Efficiency, $\eta = \frac{81.2}{1 + r_1/r_2}\%$
So, $\eta_{\text{max}} = 81.2\% \cong 81\%$
where, r_1 = forward bias diode resistance
and r_2 = load resistance.
For maximum efficiency, $r_2 \gg r_1$

:..

46. Α- $\rightarrow P$ Initially 0 а After time, t a - xх a – <u>a</u> а After t_{1/4} Λ 4 For first order reaction, $k = \frac{2.303}{t} \log \left(\frac{a}{a - x} \right)$ $k = \frac{2.303}{t_{1/4}} \log \frac{a}{\frac{3a}{4}}$ $t_{1/4} = \frac{2.303}{k} \log \frac{4}{3}$ \Rightarrow $t_{1/4} = \frac{0.29}{1.5}$ *:*..

47. Ultra pure metals, are prepared by the van-Arkel method. Arkel method is used to purify oxide of titanium metal. Ti is heated with iodine to about 500 K to form volatile compound. The Til₄ is reheated at 1700 K, when it decomposes to give pure Ti.

$$\mathsf{Ti} + 2\mathsf{I}_2 \xrightarrow{500\mathsf{K}} \mathsf{Ti}\mathsf{I}_4 \xrightarrow[\operatorname{compound}]{1700\mathsf{K}} \mathsf{Ti} + 2\mathsf{I}_2$$

48. Presence of electron withdrawing group on ring or aromatic nucleus increases its acidic strength by decreasing electron density.



On the other hand, electron donating group present on aromatic nucleus (here) decreases acidic strength due to increase in acidic strength around nucleus.



Also, we know that carboxylic acid is more acidic than phenol due to formation of more stable conjugate base of benzoic acid.



52.
$$CH_3NH_2 + HONO \xrightarrow{HCl} CH_3 \overset{\oplus}{N_2} \overset{\ominus}{Cl} + 2H_2O$$

 $\xrightarrow{\text{Unstable}} \overset{\oplus}{\downarrow} \overset{\oplus}{CH_3 + N_2 + Cl^{\ominus}}$
 $\xrightarrow{\text{Unstable}} \overset{\oplus}{\downarrow} \overset{\oplus}{CH_3 + N_2 + Cl^{\ominus}}$
 $\xrightarrow{\text{UHONO}} CH_3OCH_3 + CH_3ONO + CH_3OH + H^{\oplus}$
53. $CH_3NH_2 \xrightarrow{CHCl_3 + 3KOH} R \longrightarrow R \xrightarrow{} C$
 $\xrightarrow{\text{reagent}} + 3KCl + 3H_2O$
This reaction is known as carbylamine reaction.
54. Leaving group ability depends upon

54. Leaving group ability depends upon basicity of group. The weaker the base, the greater is its leaving group ability. Alternatively, the stronger is conjugate acid, the greater the leaving group ability of the base.

The strength of conjugate acid is $HOSO_2CE_2 > HOSO_2ME > HOAC > HOME.$

5

5.
$$H_3C$$
—CHO + HCN \longrightarrow H_3C —CH—OH

Optically active Hence, (a) is the correct answer.

56. Number of open chain isomers possible for C_4H_8 are 4. These are as follows:

Hence, correct answer is 4.

57. An exothermic reaction is a chemical reaction that releases energy in the form of light or heat.

The given reaction is an exothermic reaction, hence lowering the temperature and increasing pressure will favour forward reaction.

58. We know that at equilibrium, $\Delta G = 0$ for given reaction $H_2O(l) \longrightarrow H_2O(v)$ At equilibrium, $\Delta G = 0$ $\Delta G = \Delta H - T\Delta S = 0$

$$\Delta H = T\Delta S$$

$$T = \frac{\Delta H}{\Delta S}$$

$$= \frac{40.73 \text{ kJ mol}^{-1}}{0.109 \text{ kJ mol}^{-1} \text{ K}^{-1}}$$

$$= 373 \text{ K}$$
59. We know that,

$$\Delta G = -2.303RT \log K$$

$$= -2.303 \times 8.314 \times 298 \log 50$$

$$= -9694 \text{ J} = -9.694 \text{ kJ}$$
60. Work done in isothermal compression can be calculated as follows:

$$W = -nRT \ln \frac{V_2}{V_1}$$

$$= -5 \times 8.314 \times 300 \times 2.303 \log \frac{40}{200}$$

$$= -1500 \times 8.314 \times 2.303 \times (-\log5)$$

$$= + 20.1 \text{ kJ}$$
61. Using formula, $\Delta E = h_C R_H \left[\frac{1}{n_1^2} - \frac{1}{n_2^2} \right]$
For lowest energy of the spectral line in Lyman series $n_1 = 1, n_2 = 2$.
62. Structure of IF₇ is determined by using hybridisation as follows:

$$H = \frac{V + M - C + A}{2}$$

$$= \frac{7 + 7}{2} = 7$$
Hybridisation = sp^3d^3
Structure = Pentagonal bipyramidal
$$\int_{V_1}^{V_1} \int_{V_2}^{V_1} \int_{V_1}^{V_2} \int_{V_1}^{V_$$

electrons in *s*-orbital gives the number of oxidation states (OS) exhibited by *d*-block elements. Therefore, (a) $3d^3$, $4s^2 \Rightarrow OS = 3 + 2 = 5$ (b) $3d^5$, $4s^1 \Rightarrow OS = 5 + 1 = 6$ (c) $3d^5$, $4s^2 \Rightarrow OS = 5 + 2 = 7$ (d) $3d^2$, $4s^2 \Rightarrow OS = 2 + 2 = 4$ Hence, elements with $3d^54s^2$ configuration exhibits largest number of oxidation states.

64. $M_A = a$ and $M_B = 4a$ $W_A = W_B = m$ (say)

$$\chi_B = \frac{m/4a}{m/4a + m/a}$$
$$= \frac{1}{5} = \frac{p}{5}$$

MODULE 2

65. KO_2 is a very good oxidising agent KO_2 . It is even more good oxidising agent than K_2O_2 .

66.



- **67.** Ozone is found in stratosphere, which is depleted by CFC and hence the thickness of ozone is reduces.
- 68. According to valency concept, 3Fe²⁺ will be replaced by 2Fe³⁺. Total loss of iron from one mole of FeO

= 1 - 0.93 = 0.07

Total Fe^{3+} present in one molecule of FeO is

 $2 \times 0.07 = 0.14$ Total number of Fe (II) and Fe (III) present in one molecule of FeO = 0.93 014

Percentage of Fe (III) = $\frac{0.14}{0.93} \times 100$ = 15.05%

69. According to first law of electrolysis, Mass of metal deposited (*w*) atomic weight

$$0.415 = \frac{\text{atomic weight}}{3 \times 96500} \times 2 \times 965$$

hus, atomic weight
=
$$\frac{0.415 \times 3 \times 96500}{2 \times 965}$$
 = 62.25 g

70.
$$n_{\text{u rea}} = \frac{3}{60} = 0.05 \implies n_{\text{H}_2\text{O}} = \frac{45}{18} = 2.5$$

 $\left[\dots n_{\text{u rea}} = \frac{45}{18} + 2.5 \right]$

Т

$$\frac{\Delta \rho}{\rho^{\circ}} = \chi_{\text{urea}}$$

$$=\frac{0.05}{2.5+0.5}=0.0196=0.02$$

- 71. Ethyne molecule is a linear molecule which consists of one C—C σ-bonds, two C—H σ-bonds and two
 C—C π-bonds. Electron cloud between two C-atoms is cylindrically symmetrical about the internuclear axis.
- **72.** + *M* effect of $-NH_2 > + M$ of -OHgroup that disperse the charge of carbocation. Hence, increases the stability $-CH_3$ group shows + *I* effect, so it will disperse the charge less than $-NH_2$, -OH group whereas $-NO_2$ group shows -M/-I effect due to which the positive charge on the carbocation increases. Hence, stability decreases.

73.
$$M = \frac{M_1 V_1 + M_2 V_2}{V_1 + V_2}$$
$$= \frac{0.6 \times 800 + 1 \times 200}{1000}$$
$$= \frac{480 + 200}{1000}$$
$$= \frac{680}{1000}$$
$$= 0.68 \text{ M}$$

- **74.** Except hydrophobic effect, all the given are involved in the tertiary structure of proteins.
- **75.** When stearic acid reacts with polyethylene glycol, then the product formed belongs to a class of non-ionic detergent. The reaction is as follows:

HO(CH₂CH₂O)_nCH₂CH₂OH Polyethylene glycol

-H20

- CH₃(CH₂)₁₆COO(CH₂CH₂O)_nCH₂CH₂OH 'Non-ionic detergent'
- **76.** Compound $A(C_7H_9N)$ is benzylamine (CH₃CH₂NH₂) as it reacts with NaNO₂/HCl at 0°C to form benzyl alcohol and N₂ gas.

$$(A) \xrightarrow{CH_2NH_2} \xrightarrow{CH_2OH} + N_2$$

Benzyl amine shows following five isomers.



- 77. (A) has tetrahedral structure, (B) has square planar structure.
- 78. Greater the stability of the carbocation intermediate formed, greater will be the hydration. Substituted alkenes are more hydrated than less substituted. Thus, the order of rate of hydration is | < || < |||.
- **79.** In *cis* $[Co(NH_3)_4Cl_2]^+$, Co is d^2sp^3 hybridised because NH₃ is a strong field ligand thus, pair up the $3d^6$ electrons of Co.

 $Co^{3+} = 3d^6 4s^0$ $[Co(NH_3)_4Cl_2]^+ =$ 3d 4p 49 11 ×× 1 11 XX XX NH3 NH3 NH3 NH3 ČI ČI

It is d^2sp^3 hybridised.

80. Concentrated nitric acid upon long standing turns yellow brown. This is due to the formation of brown coloured gas (NO₂).

 $4HNO_3 \longrightarrow 2H_2O + 4NO_2 + O_2$

81. The complex, $[Co(NH_3)_5NO_2]^{2+}$ exhibits linkage isomerism as NO₂ group being an ambidentate ligand can bind to a metal atom either through N or O-atom and hence two different isomers are formed. These are $[Co(ONO)(NH_3)_5]^{2+}$ and $[Co(NO_2)(NH_3)_5]^{2+}$. NH_3 .ONO





-Cl

MODULE 2

- **91.** The option (d) is not correctly paired. In aneuploidy, an organism gains or loses one or more chromosomes but not a complete set. In tetrasomy (2n + 2), there is gain of 2 chromosomes. Aneuploid condition 2n 1 is called monosomic. The aneuploid 2n + 1 is called trisomic.
- **92.** Genetic drift is also called as Sewall Wright effect. Also known as allelic drift. Genetic drift is the change in the frequency of an existing gene variant (allele) in a population.

The evolutionary biologist Ernst Mayr proposed biological species concept. Hardy-Weinberg law is the fundamental law of population genetics. The attractions and loss of genetic variability has been termed as bottle neck effect.

- 93. Chlamydospores are resistant spores formed under unfavourable conditions.
 Zoospores are formed in lower group of fungi of Phycomycetes.
 Aplanospores are non-motile structures.
 Conidia are exogenous spores.
- **94.** The statement (c) is incorrect. CO_2 is trapped as bicarbonates at the tissue site and is transported to the alveoli where it is released out as CO_2 . Carbon dioxide is immediately converted into H_2CO_3 after entering into the blood. This H_2CO_3 forms bicarbonates.
- **95.** Cyanosis is bluish colouration of skin and mucous membranes due to excessive deoxygenated haemoglobin in blood.

Leukemia is a cancer of blood. Lathyrism is characterised by tremors. Paraplegia is due to spinal cord injury which results in paralysis of lower limbs.

- 96. The statement IV is incorrect. It is corrected as follows
 Turner's syndrome is caused due to the absence of one of the X-chromosomes, i.e. 45 with XO.
 Such persons are sterile females who have rudimentary ovaries and undeveloped breasts.
- **97.** All the given statements are correct about spores found in plants. Motile, flagellated zoospores are produced in Chlorophyceae and Phaeophyceae from zoosporangia during favourable conditions. Aplanospores are produced during unfavourable conditions. Tetraspores, non-motile spores are found in red algae.



BIOLOGY

- **98.** Penicillin was discovered by Alexander Fleming in 1928. It is derived from *Penicillium* fungi. *Penicillium* have a β -lactam ring, which is responsible for their antibacterial activity. The β -lactam ring interacts with proteins in the bacterial cell responsible for the final step in the assembly of the cell wall and inhibits the synthesis of peptidoglycan.
- 99. The statement II is incorrect. It is corrected as follows
 Test cross is the cross of the individuals with its homozygous recessive parent. In other words, it is a

recessive parent. In other words, it is a specialised back cross of F_1 hybrid with its homozygous recessive parent.

100. If a gene is relocated near genetically inert regions like heterochromatin, its normal expression may be modified. This is called position effect.

Gene penetrance is the ability of a gene to extpress itself in an individual that carries it.

Expressivity of a gene is the ability to express itself uniformly in all the individuals with same genotype.

Epigenetics refers to the study of heritable phenotype changes. It does not involve DNA alternations.

101						
101.	Feet of mammals	No. of toes				
	Plantigrade	5 digits (man)				
	Unguligrade	1 digit (horse)				
	Digitigrade	4 digits (cat)				

Humans are plantigrade because they walk on the entire soles of the foot. Horse is called unguligrade because it walks on its hooves. Cats are digitigrade because they walk on their digits.

102. Helobial type of endosperms are found mostly in monocots. Here the first division of primary endosperm is followed by the formation of wall forming two chambers. Further divisions in both chambers are free nuclear division.

In nuclear endosperm, primary endosperm nucleus cell divides by free nuclear divisions, which are not followed by the cell wall formation. In mosaic endosperm, the tissue of endosperm is not homogeneous. Mature endosperm with any degree of irregularity and unevenness in its surface is called ruminate endosperm.

103. In plants of family – Brassicaceae, stamens are 6, arranged in two whorls,

outer two stamens are short and inner four stamens are long (i.e. 2 + 4).

- **104.** The statement II is incorrect. Venereal diseases are the sexually transmitted infections. AIDS can be transmitted by infected sexual fluids, infected blood transfusion and from mother to her baby. It is not completely curable even if it gets detected early and treated properly.
- **105.** In members of Cucurbitaceae, many pollen tubes are produced (polysiphonous) and the pollen tube enters the ovule through its middle part, i.e. through integument, which is also called mesogamy.
- **106.** All the statements are correct regarding heartwood. It represents the central wood of the plants. It is also called duramen.

Living cells are absent in heartwood. Tracheids and vessels are plugged by tyloses. Tyloses are outgrowths on parenchyma cells of xylem vessels of heartwood.

- **107.** The statements II, III and IV are incorrect. Hemichordates are triploblastic, they reproduce sexually as their sexes are separate and the fertilisation is external. Sexes are usually separate, but sexual dimorphism not visible.
- **108.** Pattern baldness is a autosomal trait in humans. The trait may be displayed by both males and females, but the expression of these genes is dependent on the hormonal constitution of the individual.

Muscular dystrophy is a genetic disorder characterised by progressive skeletal muscle weakness. It involves mutated X –chromosome gene. G-6-PD deficiency syndrome and Hunter syndrome are also due to X –linked inheritance.

- **109.** Amino acid, leucine has 6 codons UUA, UUG, CUU, CUC, CUA, CUG. It has the greatest number of codons.
- **110.** The statements II and III are incorrect. The host DNA is not hydrolysed during lysogenic phase whereas the host DNA often gets hydrolysed along with the host cell in the lytic phase. In lysogenic phase, the host cell does not get lysed.
- **111.** Proenzyme pepsinogen on exposure to HCI gets converted to pepsin. Pepsin converts proteins into proteoses and peptones.
- 112. The statement (d) is incorrect regarding α-1 Antitrypsin (AAT). The condition of emphysema can be treated by inhaling an

aerosolspray containing AAT, so that it reaches the alveoli and inhibits the elastase activity there. AAT for this treatment can be extracted from blood donations, but only in very small amounts.

- 113. Tail wagging dance is a method of communication used by honeybees to convey the location of food.
 By performing this dance, honeybee shares information about the direction and distance of food. If it moves vertically upward, the direction of food source is directly towards the sun.
- **114.** Monocytes are the largest of all types of leucocytes and amoeboid in shape. Monocytes constitute 2-10% of blood leucocytes. They generally change into macrophages after entering tissue spaces. Neutrophils constitute about 65% of blood leucocytes. NK cells are natural killer cells.
- **115.** Endoparasites are parasites, which live within the host's body as in the digestive tract, body cavities, various organs, or blood or other tissues of the host, e.g. *Plasmodium malariae*.

Rat flea is an ectoparasite. These are the parasites, which live on the outside of host body.

- **116.** Allochemicals are chemicals produced by a species which affects other species, e.g. *Chlorella*, a common alga, produces a bacteriocide that not only kills bacteria but also retards the growth of *Daphnia*, which feeds on *Chlorella*.
- **117.** The statement III and IV are incorrect. Urethra serves as a common passage for semen and urine. Storage of urine is a function of urinary bladder. The loop of Henle plays a major role in conserving water.
- 118. The option (c) is correctly matched. Mucous neck cells and oxyntic cells present in the gastric glands secrete mucus and HCl, respectively. β-cells of the islets of Langerhans secrete insulin which reduces the blood sugar level.
- 119. The statement (d) is false regarding the flagella of bacteria and is corrected as 9 + 2 pattern of flagellum structure is absent.

Flegellum is a single-stranded structure similar to microtubular fibre, but with (9 + 0) arrangement.

120. Prolactin release inhibiting hormone is a polypeptide hormone produced in the hypothalamus.

Growth or somatotropin hormone and adrenocorticotropic hormone is secreted by adenohypophysis.

- **121.** Bear and fox are monoestrous whereas all the others are polyestrous. Monoestrous species have only one breeding season per year.
- **122.** The statement (b) is incorrect regarding opening of stomata. It is corrected as

Guard cells become turgid during the opening of stomata.

The movement of stomata is shown in response to entry or exit of water from the guard cells.

- 123. The dicotyledonous stem hypodermis comprises of collenchyma. The monocotyledonous stem hypodermis comprises of sclerenchyma.
- **124.** The cells of epithelial tissues are very closely packed. Neighbouring cells are held together by cell junctions.
 - (i) Gap junction facilitates cells to communicate by connecting the cytoplasm of adjoining cells.
 - (ii) Tight junction helps to store substances from leaking across a tissue.
 - (iii) Adhering junction performs cementing of cells.

Desmosomes are cell structure specialised for cell to cell adhesion. These mechanically integrate cells within tissues and function to resist mechanical stress.

- **125.** Apical dominance is a condition where, axillary buds are inhibited by auxin produced by apical meristem. When apical meristem is removed, the axillary bud becomes free from hormone inhibition and like apical meristem, it develops into a stem or flower.
- **126.** The oceans cover around 70% of the earth's surface. Phytoplanktons present in the ocean obtain energy through photosynthesis. Hence, maximum amount of carbon dioxide fixation through the process of photosynthesis takes place in oceans.
- 127. Cirrhosis of liver is caused by the chronic intake of alcohol.Neurosis is a class of mental disorders

involving chronic distress but neither delusions nor hallucinations.

Psychosis is an abnormal condition of the mind. The patient experiences disconnection from reality, e.g. schizophrenia.

Epilepsy is mental disorder which occurs as a result of brain injury, stroke, brain tumours. It is characterised by seizures. **128.** The statement (c) is incorrect. The graph showing degree of absorption of light by a pigment as a function of wavelength is called absorption spectrum.

Action spectrum on the other hand, shows the degree to which different wavelengths affect the rate of photosynthesis.

129. At position,

- The proton motive force is generated, powering ATP synthesis.
- 2- Krebs cycle occurs oxidising two molecules of acetyl Co-A.
- 3 Electron transport chain occurs coupled to proton transport across the inner membrane.
- **130.** Modern synthetic theory of evolution involves gene mutation, changes in chromosome structure and number, genetic recombination and natural selection.

Gene mutations are changes in chromosome structure and number. Genetic recombination provides the

genetic variability without which changes cannot take place.

Natural selection guides populations of organisms for adaptation.

131. Eusporangiate is the sporangium which is developed from a superficial group of cells, e.g. *Selaginella*.

Leptosporangiate is the sporangium which is developed from a single superficial cell, e.g. *Dryopteris*.

132. Histamine and kinin are alarm chemicals which may cause inflammation at the spot of insect bite.

Interferons are proteins secreted by virus-infected cells that inhibit neighbouring cells from making new viruses. Dopamine is a neurotransmitter. Opsonin are antibodies which make microbes more susceptible to phagocytosis.

- **133.** The function of glycocalyx in bacteria is protection from phagocytosis and prevention of desiccation. It also enables them to adhere to the surfaces. Glycocalyx is made up of gelatinous, polysaccharide or polypeptide.
- **134.** The development of new variety involves a series of inter-related and largely interdependent activities as in following steps

First step is the creation of genetic variation. Second step involves selection of desirable characteristics. Third and fourth steps include evaluation of selected strains or lines or populations and multiplication of these evaluated lines.





NEET Test Drive

- **135.** Electronic smog refers to invisible electromagnetic radiations. It causes harm to eyes and also affects brain cells of man. These electromagnetic radiations are emitted from computers, televisions, etc.
- **136.** The sarcoplasmic reticulum is a modified smooth ER that serves alternatively a storage site for cellular calcium, which are necessary for muscle contraction.
- **137.** The statement III is incorrect. It is corrected as follows Niche have only one species. It is a

functional description of the role, a species plays in a community.

138. Stratum functionale is 2/3rd superficial of endometrium supplied with spiral arteries which is shed during menstruation. The thick membranous myometrium is composed of smooth muscle layers.

Antrum is a fluid-filled space in the follicle.

- **139.** Except option (b), all other strategies are used for controlling the expression of genes in eukaryotes. Feedback inhibition *via* allosteric modification controls the enzyme activity.
- 140. The correct matches are as follows *Trichoderma polysporum* – Cyclosporin-A *Aspergillus niger* – Citric acid *Pseudomonas denitrificans* -Cyanocobalamin

Enterobacter aerogens – Lysine

141. The two important types of secondary structures of proteins are α-helix and β-pleated sheet. β-sheets consist of β-strands connected laterally by atleast two or three backbone H-bonds, forming a generally twisted, pleated sheet. A β-strand is a stretch of polypeptide chain, 3-10 amino acids long with backbone in an extended conformation.

In α -helix, the chain is spirally coiled, generally in a right-handed manner. This structure is formed through H-bonding in single amino acid chain only.

- **142.** The major disadvantage of cosmids is their inability to accept more than 40-50 kbp of DNA. Cosmids are the vectors, which can accommodate DNA segments upto 45 kbp.
- **143.** HIV virus attaches to CD4 receptor site of helper T-cells with the help of GP 120 present on the protein coat of the virus. The decrease in number of TH cells results in decline of immune capacity.

(MODULE 2)

144. Both the statements are correct regarding secondary growth in dicot stem. The vascular cambial ring develops as a circular ring since beginning.

Annual rings or growth rings occur quite commonly.

- **145.** Azotobacter, a free-living nitrogen-fixing bacterium does not form any association with the host plant. *Rhizobium, Frankia, Xanthomonas* are symbiotic nitrogen-fixing bacteria that live in a mutualistic association with the host plant. These live in small knob-like protuberances known as nodules.
- **146.** Procumbent is the stem that creeps on the ground totally, e.g. *Tribulus, Convolvulus microphyllus.*
- 147. Generally, it is considered that before the origin of life, some organic molecules were formed from water and some components from primordial earth's atmosphere. These molecules probably included nucleic acids, amino acids, proteins and lipids. By chance some molecules of RNA may have enzymatic properties, catalysing the assembly of copies of themselves. Protein-lipid microspheres enclosing these RNA molecules may have formed the first cell-like organisms called protocells.
- **148.** Gibberellins break the dormancy of seeds due to environmental conditions and promote germination. Seed dormancy sets in the seeds to overcome the unfavourable conditions for seedling and germination.
- **149.** The structure *A* is centriole, which helps in assemblage of meiotic spindle fibres at both ends. The stage of cell division is Anaphase-I. Here the homologous chromosomes separate, with sister chromatids remaining attached to each other.
- **150.** Synthesis of the DNA and the histone proteins takes place during the S-phase (synthetic phase) of interphase in cell cycle.

In this phase, the cell synthesises a replica of its genome by the process of DNA replication. Thus, DNA content becomes doubled.

151. Chlamydomonas yellowstonensis is a cryophyte. These are the plants (algae) that grow on snow.

Parasites are those organisms which feed on another organism called host. Symbionts are those organisms which live in close physical association with each other. Thermophytes are plants which can tolerate high temperature,

152. Term metaxenia is used for denoting the effect of pollens on structure outside endosperm.

Xenia refers to the effect of pollen on seeds and fruit in a fertilised plant.

- **153.** I-131 causes thyroid cancer Sr-90 causes bone cancer Radon causes lung cancer All are the components of radioactive pollution. Hence, all the options are correctly matched.
- **154.** Plants which occur below the water level are called submerged plants. When pollination occurs in these plants, it is called hypohydrophily. where pollination occurs by agency of water.
- **155.** The species which is susceptible to extinction has large body size, low reproductive rate and occupies the highest trophic level in food chain. Generally, larger the body size of an animal, the longer it lives and the fewer offsprings it produces each year. Relatively large animals also tend to have relatively low population densities. Large animals due to their low population densities are at increased risk of extinction.
- **156.** Eukaryotic nuclei contain three distinct types of RNA polymerases that differ in RNA they synthesise.

The correct match is given by option (a).

- **157.** The genetic code is triplet, the order of base pairs along DNA molecule controls the kind and order of amino acids found in the proteins of an organism. The start codon is the first codon of an *m*RNA transcript translated by ribosome. The most common start codon is AUG which codes for methionine.
- **158.** Ductus choledochus combines with pancreatic duct or duct of Wirsung to form common hepatopancreatic duct. This hepatopancreatic duct then opens into the duodenum.
- **159.** The given example is of detritus food chain Dead leaves \longrightarrow Wood louse

(Producer)

	(Primary consumer)						
\longrightarrow	Black bird						
	(Secondary consumer)						

Detritus food chain begins from dead organic matter. It is made up of microbes (fungi, bacteria) and then to detritus-feeding organisms (detritivores) and their predators.

Grazing food chain starts from green plants and ends at carnivores by passing through the herbivores. **160.** Myoglobin content and number of mitochondria are high in some muscles. They are called red muscle fibres. The high myoglobin content in them facilitates production of ATP by oxidative phosphorylation. They also have a moderate ability to generate ATP through glycolytic pathway. In white muscle fibres, there is

accumulation of low or no myoglobin.

- **161.** In phylogenetic system of classification, organisms are classified according to the evolutionary trends and genetic affinities. This system is also called cladistics.
- **162.** Oligotrophic lakes have low plankton (producers) density. As a result, they have low primary productivity and are poor in nutrients.
- **163.** Cells of endosperm are generally non-green or non-chlorophyllous. But in *Raphanus, Viscum* and *Mathiola,* etc., chlorophyllous endosperm is present (when exposed to light).
- **164.** All the options are correct except (a). The presence of nitrate in water body, causes blue baby syndrome when consumed. This is because the body turns bluish in colour. Arsenic causes black foot disease.
- **165.** IBA or Indole-3 butyric acid, is a plant hormone in auxin family. It is an ingredient in many commercial horticulture plant rooting products because stem cuttings of some plants do not produce roots readily and have to be treated with a root promoting hormone such as IAA, IBA, etc.
- **166.** In pest-resistant legumes, a gene for an enzyme that synthesises a chemical toxic to weevils has been transferred from *Bacillus* bacteria to the *Rhizobium* bacteria that live in the root nodules of these plants.
- **167.** Alcohol interferes with the metabolism of thiamine in liver. Thus, intake of alcohol by people with

SCORE CHART

No. of Correct Answers : A Total Marks : $x = (A \times 4) - (B \times 1)$ vitamin-B₁ deficiency may cause brain related diseases like Wernike's syndrome.

168. The option (d) is not the characteristic feature of DNA probes.

Passenger DNA is the DNA which is transferred from one organism into another by combining it with the vehicle DNA.

DNA probes are used to identify and label DNA fragments that contain a specific sequence.

- **169.** In some prokaryotes, rho factor helps in dissociating RNA from polymerase and template DNA, terminating transcription. This type of transcriptional termination is called rho-dependent termination.
- **170.** The correct matches are given by option (c).

DNA ligase joins the ends of DNA segments. It catalyses the covalent bonds of segments of an interrupted sugar phosphate strands in *ds* DNA. DNase I is an endonuclease that

digests *ds* or *ss* DNA.

DNA topoisomerse relieves torque or strain.

DNA helicase unwinds the double helix.

- **171.** The person suffering from hypermetropia or long-sightedness has difficulty in seeing objects near to him. In this condition, the eyeball becomes too short and the light rays fall on a point of focus behind the retina.
- **172.** Root pressure is a positive hydrostatic pressure developed in xylem vessels due to the metabolic activities of roots. The root pressure has not been found in all plants.

Rest all the statements are correct regarding the objections to root pressure theory.

173. Aleurone layer secretes amylase and protease enzyme which cause breakdown of starch and protein to

simpler substances to be utilised during germination. Gibberellins released by embryo stimulate amylase and protease secretion at aleurone layer.

- **174.** Pili help in the formation of conjugation tube during conjugation in bacteria. It also helps in attachment with other cells which is also known as agglutination or clump formation. Flagellum is a singlestranded structure and performs rotation movement. Fimbriae are small bristle-like fibres sprouting from cell surface. Cell wall of bacteria prevents the cell from bursting.
- **175.** Ligases are enzymes catalysing the synthetic reactions where two molecules are joined together utilising ATP, e.g. glutamine synthetase.
- **176.** In plants, Golgi apparatus is not found in male gametes of pteridophytes, male gametes of bryophytes and cells of seive tube. The Golgi apparatus packages proteins into membrane bound vesicles inside the cell before the vesicles are sent to their destination.
- **177.** Adrenaline hormone is released by adrenal medulla. Adrenal cortex releases hormones mineralocorticoids and glucocorticoids. Aldosterone is mineralocorticoid and cortisol is glucocorticoid. So, secretion of adrenaline will not be affected in case there is injury to adrenal cortex.
- **178.** The cell wall of bacteria comprises of NAG, NAM and peptidoglycan. NAG, NAM (N-acetyl glucosamine and N-acetyl muramic acid) are the two important sugar derivatives. The cell wall comprises of peptidoglycan

in which NAG and NAM ore joined by short peptide chains.

- **179.** A cell will not enter M-phase if replication of DNA is not complete. DNA replication takes place in the S-phase. Doubling of chromosomes is necessary before the cell division takes place.
- **180.** Birds have more RBCs per cubic mm of blood than in any other organisms. Thus, they have the richest blood in the animal kingdom.

No. of Incorrect Answers : B

Scores and Expected Rank : If the score lies above 665, then rank will be in between 1-50. For other scores, rank estimations are given below

Score	Rank
664 - 642	51 - 150
641 – 636	151 - 250
635 – 630	251 - 400
629 – 625	401 - 500