

# MEDICA POINT

TEST SERIES  
NEET-2020-21

BOOKLET NO. - 4

Duration : 3 Hours

Max. Marks : 720

*Read the following instructions carefully*

1. The test is of **3 hours** duration and Test Booklet contains **180 questions**. Each questions 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.*
2. The question paper contains three **parts A, B and C of Physics, Chemistry and Biology** respectively.
3. **Part A contains 1-45 questions from Physics section. Part B contains 46-90 Questions from Chemistry section. Part C contains 91-180 Questions from Biology.**
4. Rough work is to be done to the space provided for this purpose in the Test Booklet only.
5. On completion of the test, the candidate must handover the Answer sheet to the invigilator in the Room/Hall. The candidates are allowed to take away this Test Booklet with them.
6. Immediately fill the particulars on this page of the test booklet with blue/black ball point pen. Use of pencil is strictly prohibited.
7. *Blank papers, clipboards, log tablets, slide rules, calculators, cameras, cellulear phones, pagers and electronic gadgets are not allowed.*
8. Your are not allowed to go anywhere before the end of the test.

## SUBJECT

- PHYSICS
- CHEMISTRY
- BIOLOGY

## TOPIC

ELECTROSTATICS

THERMODYNAMICS, EQUILIBRIUM, SOLID STATE, GASSES STATICS, , CHEMICAL BONDING,

HUMAN HEALTH & DISEASE, ADOLESCENCE & DRUG/ALCOHOL ABUSE,  
TRANSPORT IN PLANTS, MINERAL NUTRITION, PHOTOSYNTHESIS IN HIGHER PLANTS,  
RISPIRATION IN PLANTS, PLANT GROWTH AND DEVELOPMENT, DIGESTION & ABSORPTION,  
BREATHING AND EXCHANGE OF GASES, EXCRETORY PRODUCTS AND THEIR,ECOSYSTEM & CELL

ELIMINATION

**PHYSICS BY:**

**A.K. TRIPATHI**

**CHEMISTRY BY:**

**P.K. KESHRI**

**BIOLOGY BY:**

**SANJAI RAI**

1. In a collinear collision, a particle with an initial speed  $v_0$  strikes a stationary particle of the same mass. If the final total kinetic energy is 50% greater than the original kinetic energy, the magnitude of the relative velocity between the two particles after collision, is

- (a)  $\frac{v_0}{4}$  (b)  $\sqrt{2} v_0$   
 (c)  $\frac{v_0}{2}$  (d)  $\frac{v_0}{\sqrt{2}}$

2. A particle of mass  $m$  moving in the  $x$ -direction with speed  $2v$  is hit by another particle of mass  $2m$  moving in the  $y$ -direction with speed  $v$ . If the collision is perfectly inelastic, the percentage loss in the energy during the collision is close to

- (a) 44% (b) 50%  
 (c) 56% (d) 62%

3. When a rubber band is stretched by a distance  $x$ , it exerts a restoring force of magnitude  $F = ax + bx^2$ , where  $a$  and  $b$  are constants. The work done in stretching the unstretched rubber band by  $L$  is

- (a)  $aL^2 + bL^3$  (b)  $\frac{1}{2} (aL^2 + bL^3)$   
 (c)  $\frac{aL^2}{2} + \frac{bL^3}{3}$  (d)  $\frac{1}{2} \left( \frac{aL^2}{2} + \frac{bL^3}{3} \right)$

4. At time  $t = 0$ , particle starts moving along the  $x$ -axis. If its kinetic energy increases uniformly with time  $t$ , the net force acting on it must be proportional to

- (a)  $\sqrt{t}$  (b) constant  
 (c)  $t$  (d)  $1/\sqrt{t}$

5. A block of mass 0.50 kg is moving with a speed of  $2.00 \text{ ms}^{-1}$  on a smooth surface. It strikes another mass of 1.00 kg and then they move together as a single body. The energy loss during the collision is

- (a) 0.16 J (b) 1.00 J  
 (c) 0.67 J (d) 0.34 J

6. The potential energy of a 1 kg particle free to move along the  $x$ -axis is given by

$$V(x) = \left( \frac{x^4}{4} - \frac{x^2}{2} \right) \text{ J}$$

The total mechanical energy of the particle is 2J. Then, the maximum speed (in  $\text{ms}^{-1}$ ) is

- (a)  $\frac{3}{\sqrt{2}}$  (b)  $\sqrt{2}$   
 (c)  $\frac{1}{\sqrt{2}}$  (d) 2

7. A bomb of mass 16 kg at rest explodes into two pieces of masses 4 kg and 12 kg. The velocity of

the 12 kg mass is  $4 \text{ ms}^{-1}$ . The kinetic energy of the other mass is

- (a) 144 J (b) 288 J  
 (c) 192 J (d) 96 J

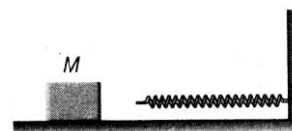
8. A mass  $m$  moves with a velocity  $v$  and collides inelastically with another identical mass. After collision, the 1<sup>st</sup> mass moves with velocity  $\frac{v}{\sqrt{3}}$  in a direction perpendicular to the initial direction of motion. Find the speed of the second mass after collision.

- (a)  $v$  (b)  $\sqrt{3} v$   
 (c)  $\frac{2}{\sqrt{3}} v$  (d)  $\frac{v}{\sqrt{3}}$

9. A body of mass  $m$  is accelerated uniformly from rest to a speed  $v$  in a time  $T$ . The instantaneous power delivered to the body as a function of time, is given by

- (a)  $\frac{mv^2}{T^2} t$  (b)  $\frac{mv^2}{T^2} t^2$   
 (c)  $\frac{1}{2} \frac{mv^2}{T^2} t$  (d)  $\frac{1}{2} \frac{mv^2}{T^2} t^2$

10. The block of mass  $M$  moving on the frictionless horizontal surface collides with the spring of spring constant  $k$  and compresses it by length  $L$ . The maximum momentum of the block after collision is



- (a)  $\sqrt{MkL}$  (b)  $\frac{kL^2}{2M}$   
 (c) zero (d)  $\frac{ML^2}{k}$

11. A uniform chain of length 2 m is kept on a table such that a length of 60 cm hangs freely from the edge of the table. The total mass of the chain is 4 kg. What is the work done in pulling the entire chain on the table?

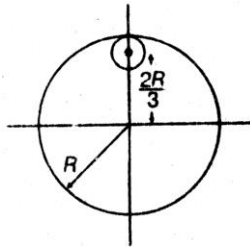
- (a) 7.2 J (b) 3.6 J  
 (c) 120 J (d) 1200 J

12. A body is moved along a straight line by a machine delivering a constant power. The distance moved by the body in time  $t$  is proportional to

- (a)  $t^{3/4}$  (b)  $t^{3/2}$   
 (c)  $t^{1/4}$  (d)  $t^{1/2}$

13. A spring of force constant 800 N/m has an extension of 5 cm. The work done in extending it from 5 cm to 15 cm is

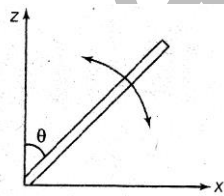
- (a) 16 J (b) 8 J  
(c) 32 J (d) 24 J
14. From a uniform circular disc of radius  $R$  and mass  $9M$ , a small disc of radius  $\frac{R}{3}$  is removed as shown in the figure. The moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through centre of disc is



- (a)  $4MR^2$  (b)  $\frac{40}{9}MR^2$   
(c)  $10MR^2$  (d)  $\frac{37}{9}MR^2$
15. The moment of inertia of a uniform cylinder of length  $l$  and radius  $R$  about its perpendicular bisector is  $I$ . What is the ratio  $l/R$  such that the moment of inertia is minimum?

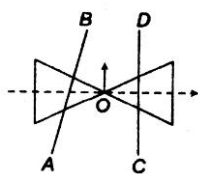
- (a)  $\frac{\sqrt{3}}{2}$  (b) 1  
(c)  $\frac{3}{\sqrt{2}}$  (d)  $\sqrt{\frac{3}{2}}$

16. A slender uniform rod of mass  $M$  and length  $l$  is pivoted at one end so that it can rotate in a vertical plane (see the figure). There is negligible friction at the pivot. The free end is held vertically above the pivot and then released. The angular acceleration of the rod when it makes an angle  $\theta$  with the vertical, is



- (a)  $\frac{2g}{3l}\sin\theta$  (b)  $\frac{3g}{2l}\cos\theta$   
(c)  $\frac{2g}{3l}\cos\theta$  (d)  $\frac{3g}{2l}\sin\theta$

17. A roller is made by joining together two corners at their vertices  $O$ . It is kept on two rails  $AB$  and  $CD$  which are placed symmetrically (see the figure), with its axis perpendicular to  $CD$  and its centre  $O$  at the centre of line joining  $AB$  and  $CD$  (see the figure). It is given a light push, so that it starts rolling with its centre  $O$  moving parallel to  $CD$  in the direction shown. As it moves, the roller will tend to



- (a) turn left (b) turn right  
(c) go straight (d) turn left and right alternately

18. Distance of the centre of mass of a solid uniform cone from its vertex is  $z_0$ . If the radius of its base is  $R$  and its height is  $h$ , then  $z_0$  is equal to

- (a)  $\frac{h^2}{4R}$  (b)  $\frac{3h}{4}$   
(c)  $\frac{5h}{8}$  (d)  $\frac{3h^2}{8R}$

19. From a solid sphere of mass  $M$  and radius  $R$ , a cube of maximum possible volume is cut. Moment of inertia of cube about an axis passing through its centre and perpendicular to one of its faces is

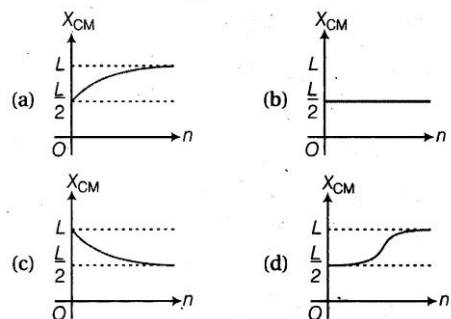
- (a)  $\frac{MR^2}{32\sqrt{2}\pi}$  (b)  $\frac{MR^2}{16\sqrt{2}\pi}$   
(c)  $\frac{4MR^2}{9\sqrt{3}\pi}$  (d)  $\frac{4MR^2}{3\sqrt{3}\pi}$

20. A thin uniform rod of length  $l$  and mass  $m$  is swinging freely about a horizontal axis passing through its end. Its maximum angular speed is  $\omega$ . Its centre of mass rises to a maximum height of

- (a)  $\frac{1}{3}\frac{l^2\omega^2}{g}$  (b)  $\frac{1}{6}\frac{l\omega}{g}$   
(c)  $\frac{1}{2}\frac{l^2\omega^2}{g}$  (d)  $\frac{1}{6}\frac{l^2\omega^2}{g}$

21. A thin rod of length  $L$  is lying along the  $x$ -axis with its ends at  $x = 0$  and  $x = L$ . Its linear density (mass/length) varies with  $x$  as  $k\left(\frac{x}{L}\right)^n$ , where  $n$

can be zero or any positive number. If the position  $x_{CM}$  of the centre of mass of the rod is plotted against  $n$ , which of the following graphs best approximates the dependence of  $x_{CM}$  on  $n$ ?

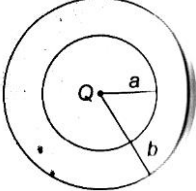
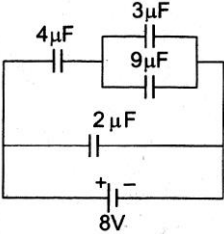


22. Consider a uniform square plate of side  $a$  and mass  $m$ . The moment of inertia of this plate about an axis perpendicular to its plane and passing through one of its corners is

- (a)  $\frac{5}{6}ma^2$  (b)  $\frac{1}{12}ma^2$   
(c)  $\frac{7}{12}ma^2$  (d)  $\frac{2}{3}ma^2$

23. A circular disc of radius  $R$  is removed from a bigger circular disc of radius  $2R$ , such that the circumference of the discs coincide. The centre of mass of the new disc is  $\frac{\alpha}{R}$  from the centre of the bigger disc. The value of  $\alpha$  is  
 (a)  $\frac{1}{3}$  (b)  $\frac{1}{2}$   
 (c)  $\frac{1}{6}$  (d)  $\frac{1}{4}$
24. Consider a two particle system with particles having masses  $m_1$  and  $m_2$ . If the first particle is pushed towards the centre of mass through a distance  $d$ , by what distance should the second particle be moved, so as to keep the centre of mass at the same position?  
 (a)  $\frac{m_2}{m_1}d$  (b)  $\frac{m_1}{m_1+m_2}d$   
 (c)  $\frac{m_1}{m_2}d$  (d)  $d$
25. Four point masses, each of value  $m$ , are placed at the corners of a square ABCD of side  $l$ . The moment of inertia of this system about an axis passing through A and parallel to BD is  
 (a)  $2ml^2$  (b)  $\sqrt{3}ml^2$   
 (c)  $3ml^2$  (d)  $ml^2$
26. The moment of inertia of uniform semi-circular disc of mass  $M$  and radius  $r$  about a line perpendicular to the plane of the disc through the centre is  
 (a)  $\frac{1}{4}Mr^2$  (b)  $\frac{2}{5}Mr^2$   
 (c)  $Mr^2$  (d)  $\frac{1}{2}Mr^2$
27. A circular disc X of radius  $R$  is made from an iron plate of thickness  $t$  and another disc Y of radius  $4R$  is made from an iron plate of thickness  $t/4$ . Then, the relation between the moment of inertia  $I_X$  and  $I_Y$  is  
 (a)  $I_Y = 32 I_X$  (b)  $I_Y = 16 I_X$   
 (c)  $I_Y = I_X$  (d)  $I_Y = 64 I_X$
28. A particle performing uniform circular motion has angular momentum  $L$ . If its angular frequency is doubled and its kinetic energy halved, then the new angular momentum is  
 (a)  $\frac{L}{4}$  (b)  $2L$   
 (c)  $4L$  (d)  $L/2$
29. Let  $F$  be the force acting on a particle having position vector  $r$  and  $\tau$  be the torque of this force about the origin. Then,  
 (a)  $r \cdot \tau = 0$  and  $F \cdot \tau \neq 0$   
 (b)  $r \cdot \tau \neq 0$  and  $F \cdot \tau = 0$

- (c)  $r \cdot \tau \neq 0$  and  $F \cdot \tau \neq 0$   
 (d)  $r \cdot \tau = 0$  and  $F \cdot \tau = 0$

30. Initial angular velocity of a circular disc of mass  $M$  is  $\omega_1$ . Then, two small spheres of mass  $m$  are attached gently to two diametrically opposite points on the edge of the disc. What is the final angular velocity of the disc?  
 (a)  $\left(\frac{M+m}{M}\right)\omega_1$  (b)  $\left(\frac{M+m}{m}\right)\omega_1$   
 (c)  $\left(\frac{M}{M+4m}\right)\omega_1$  (d)  $\left(\frac{M}{M+2m}\right)\omega_1$
31. A capacitance of  $2 \mu\text{F}$  is required in an electrical circuit across a potential difference of  $1 \text{ kV}$ . A large number of  $1 \mu\text{F}$  capacitors are available which can withstand a potential difference of not more than  $300 \text{ V}$ . The minimum number of capacitors required to achieve this is  
 (a) 16 (b) 24  
 (c) 32 (d) 2
32. The region between two concentric spheres of radii  $a$  and  $b$ , respectively (see the figure), has volume charge density  $\rho = \frac{A}{r}$ , where  $A$  is a constant and  $r$  is the distance from the centre. At the centre of the spheres is a point charge  $Q$ . The value of  $A$  such that the electric field in the region between the spheres will be constant is  
  
 (a)  $\frac{Q}{2\pi a^2}$  (b)  $\frac{Q}{2\pi(b^2 - a^2)}$   
 (c)  $\frac{2Q}{\pi(a^2 - b^2)}$  (d)  $\frac{2Q}{\pi a^2}$
33. A combination of capacitors is set-up as shown in the figure. The magnitude of the electric field, due to a point charge  $Q$  (having a charge equal to the sum of the charges on the  $4 \mu\text{F}$  and  $9 \mu\text{F}$  capacitors), at a point distance  $30 \text{ m}$  from it, would equal to  
  
 (a)  $240 \text{ N/C}$  (b)  $360 \text{ N/C}$   
 (c)  $420 \text{ N/C}$  (d)  $480 \text{ N/C}$
34. Assume that an electric field  $\mathbf{E} = 30x^2 \mathbf{i}$  exists in space. Then, the potential difference  $V_A - V_O$ , where  $V_O$  is the potential at the origin and  $V_A$  is the potential at  $x = 2 \text{ m}$ , is  
 (a)  $120 \text{ J}$  (b)  $-120 \text{ J}$   
 (c)  $-80 \text{ J}$  (d)  $80 \text{ J}$
35. Two charges each equal to  $q$ , are kept at  $x = -a$  and  $x = a$  on the  $x$ -axis. A particle of mass  $m$  and

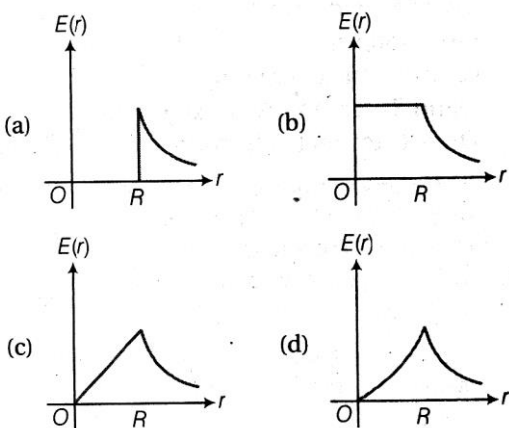
charge  $q_0 = q/2$  is placed at the origin. If charge  $q_0$  is given, a small displacement ( $y \ll a$ ) along the y-axis, the net force acting on the particle is proportional to

- (a)  $y$  (b)  $-y$  (c)  $1/y$  (d)  $-1/y$
- 36.** Combination of two identical capacitors, a resistor  $R$  and a DC voltage source of voltage  $6\text{ V}$  is used in an experiment on C-R circuit. It is found that for a parallel combination of the capacitor, the time in which the voltage of the fully charged combination reduces to half its original voltage is  $10\text{ s}$ . For series combination, the time needed for reducing the voltage of the fully charged series combination by half is
- (a)  $20\text{ s}$  (b)  $10\text{ s}$   
(c)  $5\text{ s}$  (d)  $2.5\text{ s}$

- 37.** Let  $\rho(r) = \frac{Q}{\pi R^4} r$  be the charge density distribution for a solid sphere of radius  $R$  and total charge  $Q$ . For a point  $P$  inside the sphere at distance  $r_1$  from the centre of the sphere, the magnitude of electric field is
- (a) zero (b)  $\frac{Q}{4\pi\epsilon_0 r_1^2}$   
(c)  $\frac{Q r_1^2}{4\pi\epsilon_0 R^4}$  (d)  $\frac{Q r_1^2}{3\pi\epsilon_0 R^4}$

- 38.** A parallel plate capacitor with air between the plates has a capacitance of  $9\text{ pF}$ . The separation between its plates is  $d$ . The space between the plate is now filled with two dielectrics. One of the dielectrics has dielectric constant  $K_1 = 3$  and thickness  $d/3$  while the other one has dielectric constant  $K_2 = 6$  and thickness  $2d/3$ . Capacitance of the capacitor is now
- (a)  $1.8\text{ pF}$  (b)  $45\text{ pF}$   
(c)  $40.5\text{ pF}$  (d)  $20.25\text{ pF}$

- 39.** A thin spherical shell of radius  $R$  has charge  $Q$  spread uniformly over its surface. Which of the following graphs most closely represents the electric field  $E(r)$  produced by the shell in the range  $0 \leq r < \infty$ , where  $r$  is the distance from the centre of the shell?



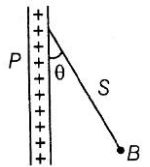
- 40.** A parallel plate condenser with a dielectric of dielectric constant  $K$  between the plates has a capacity  $C$  and is charged to a potential  $V$  volts. The dielectric slab is slowly removed from between the plates and then reinserted. The net work done by the system in this process is

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

- 41.** A battery is used to charge a parallel plate capacitor till the potential difference between the plates becomes equal to the electromotive force of the battery. The ratio of the energy stored in the capacitor and the work done by the battery will be
- (a) 1 (b) 2  
(c)  $\frac{1}{4}$  (d)  $\frac{1}{2}$

- 42.** An electric dipole is placed at an angle of  $30^\circ$  to a non-uniform electric field. The dipole will experience
- (a) a translational force only in the direction of the field  
(b) a translational force only in a direction normal to the direction of the field  
(c) a torque as well as a translational force  
(d) a torque only

- 43.** A charged ball  $B$  hangs from a silk thread  $S$ , which makes an angle  $\theta$  with a large charged conducting sheet  $P$ , as shown in the figure. The surface charge density  $\sigma$  of the sheet is proportional to

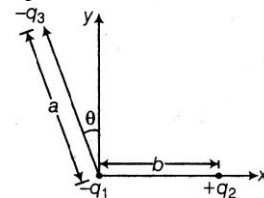


- (a)  $\cos \theta$  (b)  $\cot \theta$   
(c)  $\sin \theta$  (d)  $\tan \theta$

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

- (a)  $16 \times 10^{-32}\text{ J}$  (b)  $3.1 \times 10^{-26}\text{ J}$   
(c)  $4 \times 10^{-10}\text{ J}$  (d)  $32 \times 10^{-32}\text{ J}$

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



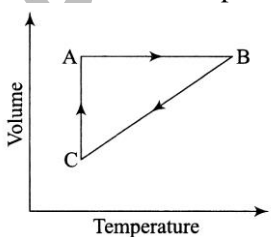
- (a)  $\frac{q_2}{b^2} - \frac{q_3}{a^2} \cos \theta$  (b)  $\frac{q_2}{b^2} + \frac{q_3}{a^2} \sin \theta$   
(c)  $\frac{q_2}{b^2} + \frac{q_3}{a^2} \cos \theta$  (d)  $\frac{q_2}{b^2} - \frac{q_3}{a^2} \sin \theta$

46. Change in internal energy when 4 kJ of work is done on the system and 1 kJ of heat is given out of the system is  
 (a) +1 kJ (b) -5 kJ  
 (c) +5 kJ (d) +3 kJ  
 (e) -3 kJ
47. Standard entropies of  $X_2$ ,  $Y_2$  and  $XY_3$  are 60, 40 and  $50 \text{ J K}^{-1}$ , respectively. For the reaction  

$$\frac{1}{2}X_2 + \frac{3}{2}Y_2 \rightarrow XY_3; \Delta H = -30 \text{ kJ}$$
 to be at equilibrium, the temperature will be  
 (a) 750 K (b) 1000 K  
 (c) 1250 K (d) 500 K
48. Consider the following reaction :  
 (i)  $H^+(aq.) + OH^-(aq.) = H_2O(l);$   

$$\Delta H = -x_1 \text{ kJ mol}^{-1}$$
  
 (ii)  $H_2(g) + \frac{1}{2} O_2(g) = H_2O(l);$   

$$\Delta H = -x_2 \text{ kJ mol}^{-1}$$
  
 (iii)  $CO_2(g) + H_2(g) = CO(g) + H_2O(l) - x_3 \text{ KJ mol}^{-1}$   
 (iv)  $C_2H_2(g) + \frac{5}{2} O_2(g) = 2CO_2(g) + H_2O(l) + x_4 \text{ kJ mol}^{-1}$   
 Enthalpy of formation of  $H_2O(l)$  is  
 (a)  $+x_1 \text{ kJ mol}^{-1}$  (b)  $-x_2 \text{ kJ mol}^{-1}$   
 (c)  $+x_3 \text{ kJ mol}^{-1}$  (d)  $-x_4 \text{ kJ mol}^{-1}$
49. The enthalpy change ( $\Delta H$ ) for the reaction  

$$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$$
 is  $-92.38 \text{ kJ}$  at 298 K. The internal energy change  $\Delta U$  at 298 K is  
 (a)  $-92.38 \text{ kJ}$  (b)  $-87.42 \text{ kJ}$   
 (c)  $-97.34 \text{ kJ}$  (d)  $-89.9 \text{ kJ}$
50. Five moles of a gas are put through a series of changes at shown below graphically in a cyclic process. The processes  
 $A \rightarrow B$ ,  $B \rightarrow C$ , and  $C \rightarrow A$  respectively, are  

- (a) isochoric, isobaric, isothermal  
 (b) isobaric, isochoric, isothermal  
 (c) isothermal, isobaric, isochoric  
 (d) isochoric, isothermal, isobaric  
 (e) isobaric, isothermal, isochoric
51. For the reaction  

$$N_2 + 3H_2 \rightleftharpoons 2NH_3; \quad \Delta H = ?$$
 (a)  $\Delta U + 2RT$  (b)  $\Delta U - 2RT$   
 (c)  $\Delta U + RT$  (d)  $\Delta U - RT$
52. 1 mol of  $H_2SO_4$  is mixed with 2 mol of NaOH. The heat evolved will be  
 (a) 57.3 kJ (b)  $2 \times 57.3 \text{ kJ}$   
 (c)  $57.3/2 \text{ kJ}$  (d) cannot be predicted
53. The work done during the expansion of a gas from a volume of  $4 \text{ dm}^3$  to  $6 \text{ dm}^3$  against a constant external pressure of 3 atm is ( $1 \text{ L atm} = 101.32 \text{ J}$ )  
 (a) -6 J (b) -608 J  
 (c) +304 J (d) -304 J
54. Heats of combustion,  $\Delta H$ , for  $C(s)$ ,  $H_2(g)$ , and  $CH_4(g)$  are -94, -68 and  $-213 \text{ kcal mol}^{-1}$ , respectively. Then  $\Delta H$  for  $C(s) + 2H_2(g) \rightarrow CH_4(g)$  is  
 (a) -17 kcal (b) -111 kcal  
 (c) -170 kcal (d) -85 kcal
55.  $C + O_2 \rightarrow CO_2; \quad \Delta H = -X$   
 $CO + \frac{1}{2} O_2 \rightarrow CO_2; \quad \Delta H = -Y$   
 Then  $\Delta_f H$  for CO will be  
 (a)  $2X + Y$  (b)  $X - Y$   
 (c)  $Y - 2X$  (d)  $Y - X$
56. The dissociation constant of a substituted benzoic acid at  $25^\circ\text{C}$  is  $1.0 \times 10^{-4}$ . The pH of a 0.01 M solution of its sodium salt is  
 (a) 10 (b) 8  
 (c) 9 (d) 7
57. 0.1 mol of  $CH_3NH_2$  ( $K_b = 5 \times 10^{-4}$ ) is mixed with 0.085 mol of HCl and diluted to one liter. What will be the  $H^+$  concentration in the solution?  
 (a)  $8 \times 10^{-11} \text{ M}$  (b)  $8 \times 10^{-2} \text{ M}$   
 (c)  $1.6 \times 10^{-11} \text{ M}$  (d)  $8 \times 10^{-5} \text{ M}$
58. The number of  $H^+$  ions present in 250 ml of lemon juice of  $\text{pH} = 3$  is  
 (a)  $1.506 \times 10^{22}$  (b)  $1.506 \times 10^{23}$   
 (c)  $1.506 \times 10^{20}$  (d)  $3.012 \times 10^{21}$   
 (e)  $2.008 \times 10^{23}$
59. 2 mol of  $N_2$  is mixed with 6 mol of  $H_2$  in a closed vessel of 1 L capacity. If 50% of  $N_2$  is converted into  $NH_3$  at equilibrium, the value of  $K_c$  for the reaction  

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$
 is  
 (a) 4/27 (b) 27/4  
 (c) 1/27 (d) 27  
 (e) 9
60. The concentration of water molecules in pure water at 298 K is  
 (a)  $10^{-7} \text{ M}$  (b) 55.5 M  
 (c) 5.55 M (d) 7.26 M
61. A given metal crystallizes out with a cubic structure having edge length of 361 pm. If there are four metal atoms in one unit cell, what is the radius of metal atom?

- (a) 108 pm (b) 40 pm  
(c) 127 pm (d) 80 pm
62. If  $a$  is the length of the side of a cube, the distance between the body centered atom and one corner atom in the cube will be:  
(a)  $\frac{2}{\sqrt{3}}a$  (b)  $\frac{4}{\sqrt{3}}a$   
(c)  $\frac{\sqrt{3}}{4}a$  (d)  $\frac{\sqrt{3}}{2}a$
63. Structure of a mixed oxide is cubic close packed (ccp). The cubic unit cell of mixed oxide is composed of oxide ions. One fourth of the tetrahedral voids are occupied by divalent metal  $A$  and the octahedral voids are occupied by a monovalent metal  $B$ . The formula of the oxide is :  
(a)  $AB_2O_2$  (b)  $ABO_2$   
(c)  $A_2BO_2$  (d)  $A_2B_3O_4$
64. The fraction of total volume occupied by the atoms present in a simple cubic is  
(a)  $\frac{\pi}{4\sqrt{2}}$  (b)  $\frac{\pi}{4}$   
(c)  $\frac{\pi}{6}$  (d)  $\frac{\pi}{3\sqrt{2}}$
65. CsCl crystallizes in body centred cubic lattice. If ' $a$ ' is its edge length then which of the following expressions is correct?  
(a)  $r_{Cs^+} + r_{Cl^-} = \frac{\sqrt{3}}{2}a$  (b)  $r_{Cs^+} + r_{Cl^-} = \sqrt{3}a$   
(c)  $r_{Cs^+} + r_{Cl^-} = 3a$  (d)  $r_{Cs^+} + r_{Cl^-} = \frac{3a}{2}$
66. What is the dominant intermolecular force or bond that must be overcome in converting liquid  $CH_3OH$  to gas?  
(a) Dipole-dipole interaction  
(b) Covalent bond  
(c) London forces (d) Hydrogen bonding
67. 4.4 g of  $CO_2$  contains how many liters of  $CO_2$  at STP?  
(a) 2.4 L (b) 2.24 L  
(c) 44 L (d) 22.4 L
68. The kinetic energy of 4 mol of nitrogen gas at  $127^\circ C$  is \_\_\_\_\_ cal ( $R = 2 \text{ cal mol}^{-1} \text{ K}^{-1}$ )  
(a) 4400 (b) 3200  
(c) 4800 (d) 1524
69. The value of van der Waals constant  $a$  for the gases  $O_2$ ,  $N_2$ ,  $NH_3$  and  $CH_4$  are 1.360, 1.390, 4.170 and  $2.253 \text{ L}^2 \text{ atm mol}^{-1}$ , respectively. The gas which can most easily be liquefied is  
(a)  $CH_4$  (b)  $N_2$   
(c)  $NH_3$  (d)  $O_2$
70. What is the kinetic energy of 1 g of  $O_2$  at  $47^\circ C$ ?  
(a)  $3.24 \times 10^2 \text{ J}$  (b)  $2.24 \times 10^2 \text{ J}$   
(c)  $1.24 \times 10^2 \text{ J}$  (d)  $1.24 \times 10^3 \text{ J}$
71. Hydrogen diffuses six times faster than gas  $A$ . The molar mass of gas  $A$  is  
(a) 36 (b) 72  
(c) 24 (d) 6
72. The ratio of the rate of diffusion of helium and methane under identical conditions of temperature and pressure will be  
(a) 2 (b) 1  
(c) 4 (d) 0.5
73. The correct order in which the O–O bond length increases in the following is  
(a)  $O_3 < H_2O_2 < O_2$  (b)  $O_2 < O_3 < H_2O_2$   
(c)  $O_2 < H_2O_2 < O_3$  (d)  $H_2O_2 < O_2 < O_3$
74. Dipole moment is shown by  
(a) 1,4-dichlorobenzene  
(b) *cis*-1,2-dichloroethene  
(c) *trans*-1,2-dichloroethene  
(d) *trans*-2,3-dichlorobut-2-ene
75. The enolic form of butanone contains  
(a) 12  $\sigma$  bonds, 1  $\pi$  bond, and 2 lone pairs of electrons  
(b) 11  $\sigma$  bonds, 1  $\pi$  bond, and 2 lone pairs of electrons  
(c) 12  $\sigma$  bonds, 1  $\pi$  bond, and 1 lone pairs of electrons  
(d) 10  $\sigma$  bonds, 2  $\pi$  bond, and 2 lone pairs of electrons  
(e) 13  $\sigma$  bonds, 1  $\pi$  bond, and 2 lone pairs of electrons
76. In  $TeCl_4$ , the central tellurium involves the hybridization  
(a)  $sp^3$  (b)  $sp^3 d$   
(c)  $sp^3 d^2$  (d)  $dsp^2$
77. The correct order of bond order values among the following  
(i)  $NO^-$  (ii)  $NO^+$   
(iii)  $NO$  (iv)  $NO^{2+}$   
(v)  $NO^{2-}$   
is  
(a) (i) < (iv) < (iii) < (ii) < (v)  
(b) (iv) = (ii) < (i) < (v) < (iii)  
(c) (v) < (i) < (iv) = (iii) < (ii)  
(d) (ii) < (iii) < (iv) < (i) < (v)  
(e) (v) < (i) < (iv) < (iii) < (ii)
78. Oxidation numbers of P in  $PO_4^{3-}$ , of S in  $SO_4^{2-}$ , and that of Cr in  $Cr_2O_7^{2-}$  are, respectively  
(a) + 3, + 6 and + 6 (b) + 5, + 6 and + 6  
(c) + 3, + 6 and + 5 (d) + 5, + 3 and + 6
79. In the balanced chemical reaction  
$$IO_3^- + aI^- + bH^+ \rightarrow cH_2O + dI_2$$
  
 $a$ ,  $b$ ,  $c$  and  $d$ , respectively, correspond to  
(a) 5, 6, 3, 3 (b) 5, 3, 6, 3  
(c) 3, 5, 3, 6 (d) 5, 6, 5, 5

80. What products are expected from the disproportionation reaction of hypochlorous acid?  
(a)  $\text{HClO}_2$  and  $\text{HClO}_4$  (b)  $\text{HClO}_3$  and  $\text{Cl}_2\text{O}$   
(c)  $\text{HCl}$  and  $\text{Cl}_2\text{O}$  (d)  $\text{HCl}$  and  $\text{HClO}_3$
81. Which of the following pairs of atomic numbers represents elements belonging to the same group?  
(a) 11 and 20 (b) 12 and 30  
(c) 13 and 31 (d) 14 and 33
82. A sudden large jump between the values of second and third ionization energies of elements would be associated with which of the following electronic configurations?  
(a)  $1s^2 2s^2 2p^6 3s^1$  (b)  $1s^2 2s^2 2p^6 3s^1 3p^1$   
(c)  $1s^2 2s^2 2p^6 3s^2 3p^2$  (d)  $1s^2 2s^2 2p^6 3s^2$
83. The ions  $\text{O}^{2-}$ ,  $\text{F}^-$ ,  $\text{Na}^+$ ,  $\text{Mg}^{2+}$  and  $\text{Al}^{3+}$  are isoelectronic. Their ionic radii show  
(a) a decrease from  $\text{O}^{2-}$  to  $\text{F}^-$  and then increase from  $\text{Na}^+$  to  $\text{Al}^{3+}$   
(b) a significant increase from  $\text{O}^{2-}$  to  $\text{Al}^{3+}$   
(c) a significant decrease from  $\text{O}^{2-}$  to  $\text{Al}^{3+}$   
(d) an increase from  $\text{O}^{2-}$  to  $\text{F}^-$  and then decrease from  $\text{Na}^+$  to  $\text{Al}^{3+}$
84. A proton is about 1840 times heavier than an electron. When it is accelerated by a potential difference of 1 kV, its kinetic energy will be  
(a) 1840 keV (b)  $1/1840$  keV  
(c) 1 keV (d) 920 keV
85. The total number of electrons present in all the  $s$  orbitals, all the  $p$  orbitals, and all the  $d$  orbitals of cesium ion are respectively  
(a) 8, 26, 10 (b) 10, 24, 20  
(c) 8, 22, 24 (d) 12, 20, 22
86. For how many orbitals are the quantum numbers  $n = 3, l = 2, m = +2$  possible?  
(a) 1 (b) 2  
(c) 3 (d) 4
87. Which among the following is the heaviest?  
(a) 1 mol of oxygen  
(b) One molecule of sulphur trioxide  
(c) 100 amu of uranium  
(d) 10 mol of hydrogen  
(e) 44 g of carbon dioxide
88. An element  $X$  has the following isotopic composition:  
 $^{200}\text{X}(90\%), ^{199}\text{X}(8.0\%), ^{202}\text{X}(2.0\%)$   
The weighted average atomic mass of the naturally occurring element  $X$  is closest to  
(a) 202 amu (b) 200 amu  
(c) 199 amu (d) 201 amu
89. The mass of carbon anode consumed (giving only carbon dioxide) in the production of 270 kg of aluminium metal from bauxite by the Hall process is  
(a) 180 kg (b) 540 kg  
(c) 270 kg (d) 90 kg
90. Number of water molecules in a drop of water, if 1 mL of water has 20 drops and  $A$  is Avogadro's number, is  
(a) 0.05 A (b) 0.5 A  
(c)  $\frac{0.05 A}{18}$  (d)  $\frac{0.5 A}{18}$

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**Rough Work**



**PART-C BIOLOGY**

91. Cu ions released from copper-releasing Intra Uterine Devices (IUDs)
- prevent ovulation
  - kill the ovum
  - increase phagocytosis sperms
  - suppress sperm motility
92. Tubectomy is a method of sterilization in which
- small part of the fallopian tube is removed or tied up
  - ovaries are removed surgically
  - small part of vas deferens is removed or tied up
  - uterus is removed surgically
93. Assisted reproductive technology, IVF involves transfer of
- Ovum into the fallopian tube
  - Zygote into the fallopian tube
  - Zygote into the uterus
  - Embryo with 16 blastomeres into the fallopian tube
94. The contraceptive 'SAHELI'
- increases the concentration of estrogen and prevents ovulation in females
  - is an IUD
  - blocks estrogen receptors in the uterus, preventing eggs from getting implanted
  - is a post-coital contraceptive
95. The difference between spermiogenesis and spermiation is
- in spermiogenesis spermatozoa are formed, while in spermiation spermatids are formed
  - in spermiogenesis spermatozoa from sertoli cells are released into the cavity of seminiferous tubules, while in spermiation spermatozoa are formed
  - in spermiogenesis spermatids are formed, while in spermiation spermatozoa are formed
  - in spermiogenesis spermatozoa are formed, while in spermiation spermatozoa are released from sertoli cells into the cavity of seminiferous tubules
96. The layers of ovum from outside to inside are
- Corona radiata, zona pellucida, vitelline membrane
  - zona pellucida, corona radiata, vitelline membrane
  - Vitelline membrane, zona pellucida, corona radiata
  - Zona pellucida, vitelline membrane, corona radiata
97. Capacitation occurs in
- rete testis
  - epididymis
  - vas deferens
  - female reproductive tract
98. The release of ovum from Graafian follicles takes place during 14<sup>th</sup> day due to high level of LH. The amount of LH is also known as
- LH surge
  - menarche
  - menstrual cycle
  - fertilization
99. Select the incorrect statement about ovaries.
- Each ovary is connected to the pelvic wall and uterus by ligaments
  - The ovarian stroma is divided into two zones: a peripheral cortex and an inner medulla
  - Each ovary is covered by thick epithelium which encloses the ovarian stroma
  - Ovaries are the primary female sex organs
100. Match the columns I and II and select right answer
- | Column-I        | Column-II   |
|-----------------|---|
| a. Parturition  | p. Attachment of zygote to endometrium            |
| b. Gestation    | q. Release of egg from Graafian follicle          |
| c. Ovulation    | r. Delivery of baby from uterus                   |
| d. Implantation | s. Duration between pregnancy and birth           |
| e. Conception   | t. Formation of zygote by fusion of egg and sperm |
|                 | u. Stoppage of ovulation and menstruation         |
- a – q, b – s, c – p, d – t, e – r
  - a – r, b – r, c – p, d – t, e – q
  - a – r, b – s, c – q, d – p, e – t
  - a – r, b – q, c – s, d – p, e – t
101. Which hormones is produced in women during pregnancy?
- Human chorionic gonadotropin (hCG)
  - Relaxin
  - Human placental lactogen (hPL)
  - All the above
102. Geitonogamy involves
- fertilization of a flower by the pollen from another flower of the same plant
  - fertilization of a flower by the pollen from the same flower
  - fertilization of a flower by the pollen from a flower of another plant in the same population
  - fertilization of a flower by the pollen from a flower of another plant belonging to a distant population
103. Non-albuminous seed is produced in
- maize
  - castor
  - wheat
  - pea
104. In angiosperms, the functional megaspore develops into
- endosperm

- (b) pollen tube, male gametophyte  
(c) embryo sac, female gametophyte  
(d) ovule
- 105.** Which of the following has proved helpful in preserving pollen as fossils?  
(a) Cellulosic intine (b) Oil content  
(c) Pollen kit (d) Sporopollenin
- 106.** Which one of the following plants shows a very close relationship with a species of moth, where none of the two can complete its life cycle without the other?  
(a) Yucca (b) Banana  
(c) Hydrilla (d) Viola
- 107.** Exclusively ovules are orthotropus seen in  
(a) all gymnosperm (b) Polygonum  
(c) Rumex (d) Brassica
- 108.** Ubisch bodies have big role in the formation of.  
(a) sporopollenin and pollen kit  
(b) intine and pollenkit  
(c) exine  
(d) pollenkit and pollinia
- 109.** Who is the discoverer of double fertilization in plants ?  
(a) Nawaschin, S (b) Strasburger, E  
(c) Amici, G. B (d) Maheshwari, P
- 110.** Match the two columns (A) and column (B)
- | Column (A)                 |           | Column (B)              |           |
|----------------------------|-----------|-------------------------|-----------|
| I. Orinithophily           |           | a. Pollination by birds |           |
| II. Parthenocarpy          |           | b. Seedless fruits      |           |
| III. Cleavage polyembryony |           | c. Nicotiana            |           |
| IV. Nuclear endosperm      |           | d. Maize                |           |
| <b>I</b>                   | <b>II</b> | <b>III</b>              | <b>IV</b> |
| (a) a                      | b         | c                       | d         |
| (b) a                      | d         | c                       | b         |
| (c) c                      | b         | a                       | d         |
| (d) a                      | b         | d                       | c         |
- 111.** Pollenkit is present in  
(a) zoophilous flowers  
(b) malacophilous flowers  
(c) entomophilous flowers  
(d) anemophilous flowers
- 112.** Strobilanthes kunthiana flowers once in  
(a) 50-100 years (b) 6 years  
(c) 12 years (d) 18 years
- 113.** When does the growth rate of a population following the logistic model equal zero? The logistic model is given as  $dN/dt = rN(1-N/K)$  :  
(a) when N nears the carrying capacity of the habitat  
(b) when  $N/K$  equal zero.  
(c) when death rate is greater then birth rate.  
(d) when  $N/K$  is exactly one
- 114.** If '+' sine is assigned beneficial interation '-' sine to detrimental and '0' sine to neutral interaction, than the population interaction represented by '+' '-' refers to  
(a) mutualism (b) amensalism  
(c) commensalism (d) parasitism
- 115.** DNA replication in bacteria occurs  
(a) during S phase  
(b) within nucleolus  
(c) prior to fission  
(d) just before transcription
- 116.** The principle of competitive exclusion was stated by  
(a) C. Darwin (b) G.F. Gause  
(c) (d) bacteria
- 117.** During translation, at the initiation step mRNA first binds to  
(a) the smaller ribosomal sub-unit  
(b) the larger ribosomal sub-unit  
(c) the whole ribosome  
(d) no such specificity exists
- 118.** In some viruses, DNA is synthesised by using RNA as template. Such a DNA is called  
(a) A-DNA (b) B-DNA  
(c) c DNA (d) r DNA
- 119.** Match the enzyme in column I with its function in column II and choose the correct option
- | Column (I)                | Column (II)   |
|---------------------------|---|
| I. $\beta$ -galactosidase | a. Joining of DNA fragments                         |
| II. Permease              | b. Peptide bond formation                           |
| III. Ligase               | c. Hydrolysis of lactose                            |
| IV. Ribozyme              | d. Increases permeability to $\beta$ -galactosidase |
| <b>I</b>                  | <b>II</b>   |
| (a) b                     | a   |
| (b) c                     | d   |
| (c) b                     | d   |
| (d) a                     | b   |
| (e) c                     | a   |
- 120.** A pea plant parent having violet-coloured flowers with unknown genotype was crossed with a plant having white-coloured flowers. In the progeny, 50% of the flowers were violet and 50% were white. The genotypic constitution of the parent having violet-coloured flowers was  
(a) homozygous (b) merozygous  
(c) heterozygous (d) hemizygous
- 121.** In the lac operon model, lactose molecules function as  
(a) inducers, which bind with the operator gene  
(b) repressors, which bind with the operator gene  
(c) inducers, which bind with the repressor protein  
(d) corepressors, which bind with repressors protein
- 122.** Study the columns and select right match.
- | Column A               | Column B            |
|------------------------|---------------------|
| I. ABO blood groups    | a. Dihybrid cross   |
| II. Law of segregation | b. Monohybrid cross |

- III. Law of independent Assortment
- IV. Gene mutation
- |          |           |            |           |
|----------|-----------|------------|-----------|
| <b>I</b> | <b>II</b> | <b>III</b> | <b>IV</b> |
| (a) b    | a         | d          | c         |
| (b) d    | a         | b          | c         |
| (c) d    | b         | a          | c         |
| (d) b    | c         | d          | a         |
123. Which are genetically-transmitted diseases?  
a. Colour-blindness      b. Haemophilia  
c. Muscular dystrophy    d. None of these  
(a) a, c and d              (b) a, b, c and d  
(c) b, c and d              (d) a, b and c
124. Test cross in *Drosophila* or plants involves crossing between  
(a) the F1 hybrid and a double recessive genotype  
(b) two genotypes with dominant trait  
(c) two genotypes with recessive trait  
(d) two F1 hybrids
125. A sexually transmitted disease caused by bacteria is  
(a) Leprosy                      (b) AIDS  
(c) Syphilis                      (d) Pertussis
126. Which disease is caused by a nematode?  
(a) Poliomyelitis              (b) Leprosy  
(c) Filariasis                      (d) Amoebiasis
127. Type of immunoglobulin present in colostrum/ only mother's milk is  
(a) IgA                              (b) IgG  
(c) IgD                              (d) IgE
128. A molecule that produces an immune response is  
(a) Antigen                      (b) Antibody  
(c) Carcinogen                  (d) Mutagen
129. Which is not correctly matched  
(a) Dengue Fever - Arbovirus  
(b) Plague – *Yersinia pestis*  
(c) Sleeping Sickness – *Trypanosoma gambiense*  
(d) Syphilis – *Trichuris trichiura*
130. Brown sugar is  
(a) Barbiturate                  (b) Heroin  
(c) LSD                              (d) Hashish
131. Opium is got from  
(a) *Thea sinensis*              (b) *Coffea arabica*  
(c) *Oryza sativa*                (d) *Papaver somniferum*
132. *Peripatus* is connecting link between  
(a) *Ctenophora* and *platyhelminthes*  
(b) *Annelida* and *arthropoda*  
(c) *Porifera* and *coelenterata*  
(d) *Mollusca* and *Echinodermata*
133. A common means of sympatric speciation is  
(a) Polyploidy  
(b) Imposition of geographic barrier  
(c) Spatial segregation of mating sites  
(d) Temporal segregation of breeding season..
134. Gas absent in the primitive atmosphere in the free state was  
(a) Hydrogen                      (b) Nitrogen  
(c) Oxygen                        (d) Methane
135. Which one gives correct example of convergent and divergent evolution :  
**Convergent**                      **Divergent**  
(a) Eyes of Octopus and mammals      Bones of vertebrate fore limbs  
(b) Thorns of Bougainvillea and tendrils of Cucurbita      Wings of Butterflies and Birds  
(c) Bones of Vertebrate for limbs      Wings of Butterflies and Birds  
(d) Thorns of Bougainvillea and tendrils of Cucurbita      Eyes of Octopus and mammals
136. Industrial melanism is  
(a) Effect of industrial pollution  
(b) Effect of mutation  
(c) Evidence of survival of fittest  
(d) Evidence in favour of natural selection
137. Analogous structures are a result of  
(a) Stabilising selection  
(b) Divergent evolution  
(c) convergent evolution  
(d) Shared ancestry
138. Which is used extensively for genetic engineering in plants ?  
(a) *Agrobacterium tumefaciens*  
(b) *Xanthomonas citri*  
(c) *Bacillus coagulans*  
(d) *Clostridium septicum*
139. T<sub>1</sub> Plasmid is obtained from  
(a) *Azotobacter*                  (b) *Agrobacterium*  
(c) Yeast                              (d) *Rhizobium*
140. Polymerase chain reaction requires  
(a) DNA ligase only      (b) DNA polymerase only  
(c) Primers and DNA ligase  
(d) Primers and DNA polymerase
141. In agarose gel electrophoresis, DNA molecules are separated on the basis of their  
(a) Charge only      (b) Size only  
(c) Charge to size ratio  
(d) All the above
142. Bacteria protect themselves from viruses by fragmenting viral DNA upon entry with  
(a) Methylene                  (b) Endonucleases  
(c) Ligases                        (d) Exonucleases
143. Bt toxin is  
(a) Intracellular lipid  
(b) Intracellular crystalline protein  
(c) Extracellular crystalline protein  
(d) Lipid
144. Transgenic Golden Rice is enriched with high  
(a) Lysine                              (b) Methionine

- (c) Glutenin (d) Vitamin A
- 145.** Which kind of therapy was given in 1990 to a four year old girl with adenosine deaminase deficiency  
 (a) Radiation therapy (b) Gene therapy  
 (c) Chemotherapy (d) Immunotherapy
- 146.** Name the nematode which infects the roots of Tobacco plants  
 (a) *Bacillus thuringiensis*  
 (b) Cry IAC  
 (c) *Meloidogyne incognita*  
 (d) Both A and B
- 147.** Maximum number of existing transgenic animals is of  
 (a) Cow (b) Pig  
 (c) Fish (d) Mice
- 148.** In RNAi, genes are silenced using  
 (a) *ss* DNA (b) *ds* DNA  
 (c) *ds* RNA (d) *ss*RNA
- 149.** Transpiration and root pressure cause water to rise in plants by :  
 (a) pushing and pulling it, respectively  
 (b) pulling it upward  
 (c) pulling and pushing it, respectively  
 (d) pushing it upward
- 150.** Which is possible for fully turgid cell?  
 (a) DPD = 10 atm, OP = 15 atm, TP = 5 atm  
 (b) DPD = 0.2 atm, OP = 0.7 atm, TP = 0.5 atm  
 (c) DPD = 0.0 atm, OP = 15 atm, TP = 15 atm  
 (d) DPD = 5 atm, OP = 12 atm, TP = 7 atm
- 151.** Stomata in grass leaf are :  
 (a) Rectangular (b) Kidney shaped  
 (c) Dumb-bell shaped (d) Barrel shaped
- 152.** Water potential determined by :  
 (a) solute potential and pressure potential  
 (b) osmotic pressure and DPD  
 (c) DP and DPD  
 (d) DP and TP
- 153.** An anti-transpirant is :  
 (a) cobalt chloride (b) potassium  
 (c) phenyl mercuric acetate  
 (d) mercury
- 154.** An element playing important role in nitrogen fixation is :  
 (a) molybdenum (b) copper  
 (c) manganese (d) zinc
- 155.** Which one of the following is correctly matched ?  
 (a) Potassium — Readily immobilization  
 (b) Bakanae of rice seedlings — F. Skoog  
 (c) Passive transport of nutrients — ATP  
 (d) Apoplast — Plasmodesmata
- 156.** Select the mismatch :  
 (a) *Rhodospirillum* — Mycorrhiza  
 (b) *Anabaena* — Nitrogen fixer  
 (c) *Rhizobium* — Alfalfa  
 (d) *Frankia* — *Alnus*
- 157.** In which of the following form nitrogen is not used by the plants?  
 (a)  $\text{NO}_3^-$  (b)  $\text{NO}_2^-$   
 (c)  $\text{NH}_4^+$  (d)  $\text{N}_2$
- 158.** If *Rhizobium* is not participate in nitrogen fixation then it is :  
 (a) free-living aerobe (b) symbiotic and anaerobe  
 (c) free-living anaerobe  
 (d) symbiotic and facultative aerobe
- 159.** Water soluble pigments found in plant cell vacuoles are :  
 (a) xanthophylls (b) chlorophylls  
 (c) carotenoids (d) anthocyanins
- 160.** Of the total incident solar radiation the proportion of PAR is :  
 (a) more than 80% (b) about 70%  
 (c) about 60% (d) less than 50%
- 161.** Electrons from excited chlorophyll molecule of photosystem II are accepted first by :  
 (a) quinone (b) ferredoxin  
 (c) cytochrome-*b* (d) cytochrome-*f*
- 162.** Splitting of water is not associated with :  
 (a) photosystem-I (b) Lumen of thylakoid  
 (c) inner surface of thylakoid membrane  
 (d) occurs when light fall below 680 nm
- 163.** The energy-releasing metabolic process in which substrate is oxidised without an external electron acceptor is called :  
 (a) glycolysis (b) fermentation  
 (c) aerobic respiration (d) photorespiration
- 164.** What is the role of  $\text{NAD}^+$  in cellular respiration ?  
 (a) It is a nucleotide source for ATP synthesis  
 (b) It functions as an electron carrier  
 (c) it functions as an enzyme  
 (d) It is the final electron acceptor for anaerobic respiration
- 165.** Protein rich legumes have RQ equal to :  
 (a) less than one (b) one  
 (c) more than one (d) zero
- 166.** Which one of the following pairs, is not correctly matched?  
 (a) IAA — Cell wall elongation  
 (b) Abscisic acid — Stomatal closure  
 (c) Gibberellic acid — Leaf fall  
 (d) Cytokinin — Cell division
- 167.** Typical growth curve in plants is :  
 (a) parabolic (b) sigmoid  
 (c) linear (d) stair-steps shaped
- 168.** Which of the following statements is not correct?  
 (a) Acini are present in the pancreas and secrete carboxypeptidase  
 (b) Brunner's glands are present in the submucosa of stomach and secrete pepsinogen  
 (c) Goblet cells are present in the mucosa of intestine and secrete mucus  
 (d) Oxyntic cells are present in the mucosa of stomach and secrete HCl

169. Which of the following terms describe human dentition?  
(a) Pleurodont, Monophyodont, Homodont  
(b) Thecodont, Diphyodont, Heterodont  
(c) Thecodont, Diphyodont, Homodont  
(d) Pleurodont, Diphyodont, Heterodont
170. Which of the following guards the opening of hepatopancreatic duct into the duodenum?  
(a) Semilunar valve (b) Ileocaecal valve  
(c) Pyloric sphincter (d) Sphincter of Oddi
171. Lungs are made up of air-filled sacs, the alveoli. They do not collapse even after forceful expiration, because of :  
(a) inspiratory reserve volume  
(b) tidal volume  
(c) expiratory reserve volume  
(d) residual volume
172. Which of the following is an occupational respiratory disorder?  
(a) Botulism (b) Silicosis  
(c) Anthracis (d) Emphysema
173. When you hold your breath, which of the following gas changes in blood would first lead to the urge to breathe?  
(a) Rising CO<sub>2</sub> and falling O<sub>2</sub> concentration  
(b) Falling O<sub>2</sub> concentration  
(c) Rising CO<sub>2</sub> concentration  
(d) Falling CO<sub>2</sub> concentration
174. Which one of the following mammalian cells is not capable of metabolizing glucose to carbon dioxide aerobically?  
(a) Red blood cells (b) White blood cells  
(c) Unstriated muscle cells (d) Liver cells
175. The hepatic portal vein drains blood to liver from:  
(a) stomach (b) kidneys  
(c) intestine (d) heart
176. Erythropoiesis starts in :  
(a) red bone marrow (b) kidney  
(c) liver (d) spleen
177. A decrease in blood pressure / volume will not cause the release of :  
(a) Atrial natriuretic factor  
(b) Aldosterone  
(c) ADH (d) Renin
178. Arteries are best defined as the vessel which :  
(a) carry blood from one visceral organ to another visceral organ  
(b) supply oxygenated blood to the different organs  
(c) carry blood away from the heart to different organs  
(d) break up into capillaries which reunite to form a vein
179. Person with blood group AB is considered as universal recipient because he has :  
(a) both A and B antigens on RBC but no antibodies in the plasma  
(b) both A and B antibodies in the plasma  
(c) no antigen on RBC and no antibody in the plasma  
(d) both A and B antigens in the plasma but no antibodies
180. Uric acid is the chief nitrogenous component of the excretory products of :  
(a) frog (b) man  
(c) earthworm (d) cockroach

*Best of Luck....*

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**Rough Work**

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