# RSAT-2019
Ranker Scholar Aptitude Test

# RSAT-2019 Examination Model Paper for Agriculture, Science & Paramedical

1) A lift ascends with an upward acceleration of 0.2m/s^2. At the instant its upward speed is 3m/s, a loose bolt 5m high from the floor drops from the ceiling of the lift. The time taken by the bolt to strike the floor is
1) 1.0sec   2) 1.2sec 3) 1.5sec 4) 1.7sec

2) When a slow neutron is captured by U^{235} nucleus, each fission releases an energy of 200MeV. The number of fissions required to occur per second to produce a power of 1 KW is
1) 6.2×10^{16} 2) 6.2×10^{15}
3) 1.56×10^{16} 4) 3.12×10^{13}

3) A doubly ionized He^{+2} atom travels at right angles to a magnetic field of induction 0.4τ at a velocity of 10^5 m/s describing a circle of radius r. A proton travelling with same speed in the same direction in the same field will describe a circle of radius,

1) $\dfrac{r}{4}$ 2) $\dfrac{r}{2}$ 3) r   4) 2r

4) A particle executing SHM in a straight line travels a distance 'a' is the first t sec and $2a$ in the next t seconds in the same direction. If the particle starts initially from rest, its
1) time period is 6t   2) time period is 8t
3) amplitude is 3a   4) amplitude is 4a

5) A resistance is made by connecting two wires in series of same material and of cross sectional radii 2mm and 5mm and length 8cm and 5cm respectively. If a potential difference of 22V is applied across them, the potential drop across the longer wire is
1) 15V   2) 18V   3) 16V   4) 20V

6) A crown glass prism of angle 5° is to be combined with a flint glass prism in such a way that the resulting dispersion is zero. The angle of flint glass prism is (Refractive indices for violet and red lights are 1.523 and 1.514 respectively for crown glass and 1.632 and 1.614 for flint glass)
1) 10°   2) 2.5°   3) 2°   4) 5.45°

7) The velocity of water in a river is 18 km/hr near the surface. If the river is 5m deep, the shearing stress between the horizontal layers of water is (The co-efficient of viscosity of water=10^{-2} poise).
1) 10^{-1}N/m^2 2) 10^{-2}N/m^2
3) 10^{-3}N/m^2 4) 10^{-3}N/m^2

8) A capacitor is made of two plates separated by a sheet of insulating material 3mm thick and of relative permittivity 4. The distance between the plates is increased to allow the insertion of a second sheet 5mm thick and of relative permittivity K. If the capacitance of the capacitor so formed is half of the original capacitance, the value of K is
1) 3.33   2) 6.67   3) 4.4   4) 5.5

9) The velocity of water waves is found to be proportional to $l^{a} r^{b} g^{c}$ where l is wave length, ρ is density and g is acceleration due to gravity. The values of a, b and c are respectively,
1) 1, 0, 1   2) ½,1,0 3) ½,0,1/2 4) ½,0,1

10) On a horizontal rough surface, the force required to create an acceleration of 1ms^{-2} in a body of mass 100kg is 200N. If a force of 300N is applied in the same direction, the acceleration becomes double this value. The coefficient of kinetic friction between the body and the horizontal surface is (g=10ms^{-2})
1) 0.1   2) 0.001 3) 0.2   4) 0.3

11) The position of a projectile (launched from the origin at $t = 0$ at time $t=2$s is given by the equation $\vec{r} = \left(40\hat{i} + 50\hat{j}\right)m$. If the projectile was launched at an angle θ from the horizontal, the value of θ is equal to (take g=10 ms^{-2})

1) $\tan^{-1}\dfrac{2}{3}$ 2) $\tan^{-1}\dfrac{3}{2}$

3) $\tan^{-1}\dfrac{7}{4}$ 4) $\tan^{-1}\dfrac{4}{5}$

12) Two spherical bodies A (radius 6cm) and B (radius 18cm) are at temperatures T_1 and T_2 respectively. The maximum intensity in the emission spectrum of A is at 500 nm and in that of B is at 1500nm. Considering them to be black bodies, the ratio of the rate of thermal energy radiated by A to that of B is

1) 1 : 9   2) 9 : 1   3) 1 : 4   4) 4 : 1

13) A body of mass 1kg is suspended from a weightless spring having force constant 600N/m. Another body of mass 0.5kg moving vertically upwards hits the suspended body with a velocity of 3m /s and gets embeded in it. The frequency of oscillations and amplitude of motion are respectively

1) $\dfrac{5}{\pi}Hz, 5m$ 2) $\dfrac{10}{\pi}Hz, 20cm$

3) $\dfrac{10}{\pi}Hz, 5cm$ 4) $\dfrac{\pi}{5}Hz, 20m$

14) A capillary tube of internal radius 2×10^{-3}m immersed vertically in a beaker containing a liquid. If the weight of the liquid rising in the capillary tube is 9×10^{-5} kg, the surface tension of the liquid is
1) 70 N.m^{-1} 2) 1.40 N.m^{-1}
3) 14 N.m^{-1} 4) 0.07 N.m^{-1}

15) A galvanometer of 25Ω resistance can read a maximum current of 6mA. It can be used as a voltmeter to measure maximum of 6V by connecting a resistance to the galvanometer. Identify the correct choice in the given answers.
1) 1025Ω in series 2) 1025Ω in parallel
3) 975Ω in series   4) 975Ω in parallel

16) A circular disc of diameter 6m and mass 400kg rotates about an axis passing through the centre and perpendicular to the plane of the disc with angular velocity of 100 revolutions per minute. The torque applied when the velocity decreases to 50 revolutions per minute in 20 seconds is
1) 17200 N-m   2) 17500 N-m
3) 471.0 N-m   4) 16500 N-m

17) Two spheres of different materials, one with double the radius and $\dfrac{1}{4}$ wall thickness of the other, are filled with ice at 0°C. If the time taken for complete melting of ice in the larger radius one is 25 minutes and that for smaller one is 16 minutes, the ratio of thermal conductivities of the material of larger sphere to smaller sphere is

1) 1 : 4   2) 4 : 7   3) 8 : 25   4) 6 : 23

18) A particle starts from rest and moves with uniform acceleration. It covers a displacement $\left(y^2 - x^2\right)$ in the first 10 sec and $\left(y^2 + x^2\right)$ in the next 10 seconds. Then
1) $x = \sqrt{2}y$ 2) $x = 3y$
3) $y = 3x$ 4) $y = \sqrt{2}x$

19) Using a certain concave mirror, the magnification is found to be 4 times as great when the object was 25cm from the mirror as it was when the object at 40cm from the mirror. The magnification being real in each case. The focal length of the mirror is
1) 20cm   2) 46.6cm 3) 12cm 4) 5cm

20) A force $F = Ay^2 + By + c$ acts on a body in the Y- direction. The work done by this force during it's displacement from y = –a to y = a is
1) $\dfrac{2Aa^3}{3}$ 2) $\dfrac{2Aa^3}{3} + 2Ca$

3) $\dfrac{2Aa^3}{3} + \dfrac{Ba^2}{2} + Ca$ 4) Zero

21) Electrons are accelerated through a potential difference V and protons are accelerated through a potential difference 4V. The De-Broglie wavelengths are λ_e and λ_p for electrons and protons respectively. The ratio of $\dfrac{\lambda_e}{\lambda_p}$ is: (Given that m_e is mass of electron and m_p is mass of proton).

1) $\dfrac{\lambda_e}{\lambda_p} = \sqrt{\dfrac{m_p}{m_e}}$ 2) $\dfrac{\lambda_e}{\lambda_p} = \sqrt{\dfrac{m_e}{m_p}}$

3) $\dfrac{\lambda_e}{\lambda_p} = \dfrac{1}{2}\sqrt{\dfrac{m_e}{m_p}}$ 4) $\dfrac{\lambda_e}{\lambda_p} = 2\sqrt{\dfrac{m_p}{m_e}}$

22) A small object of uniform density rolls up a curved surface with an initial velocity V. It reaches up to a maximum height $\dfrac{3V^2}{4g}$ with respect to initial position. The object is a
1) ring
2) solid sphere
3) hollow sphere
4) disc
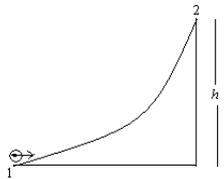
23) Three particles of masses 2 kg each are placed such that 1st one lies on –ve X-axis, 2nd one lies on -ve Y-axis and the 3rd one lies on +ve Z- axis at a distance of 2m, 3m and 1m respectively from the origin. The square of distance of centre of mass of the system from the origin is

1) $\dfrac{14}{9}m^2$ 2) $\sqrt{\dfrac{14}{9}}m^2$

3) $\dfrac{14}{9}m$ 4) $1.25 m^2$

24) An artificial satellite is moving in a circular orbit around the earth with a speed equal to half the escape velocity from the earth. If the satellite is stopped suddenly in its orbit and allowed to fall freely on to the earth, the speed with which it hits the earth is
(g=10 m/s^2, radius of earth=R= 6400km)
1) 7.92 km/s   2) 8 km/s
3) 11.2 km/s   4) 2.48km/s

25) An open pipe resonates to a frequency n_0 and a closed pipe to a frequency n_c. If they are joined to form a longer tube, it will resonate to a frequency of

1) $\dfrac{n_0 n_c}{2n_c + n_0}$ 2) $\dfrac{n_0 n_c}{2n_0 + n_c}$

3) $\dfrac{2n_0 + n_c}{n_0 n_c}$ 4) $\dfrac{2n_c + n_0}{n_0 n_c}$

26) One metal rod of length 25 cm and coefficient of linear expression $2 \times 10^{-5} / °C$ is joined end to end with another metal rod of length 50cm and coefficient of linear expansion $1 \times 10^{-5} / °C$. The coefficient of volume expansion of composite rod is
1) 5×10^{-5}/°C   2) 4×10^{-5}/°C
3) $\dfrac{4}{3} \times 10^{-5} / °C$ 4) $\dfrac{5}{3} \times 10^{-5} / °C$

27) The length of a potentiometer wire is 4m and its resistance is $8\,\Omega$. A battery of internal resistance $2\,\Omega$ and emf 2V is connected in series with the wire. A cell in the secondary circuit get balanced at $2.5m$ length of wire. On drawing the current of 0.2A from this cell, the null point obtained at $2m$. The internal resistance of cell in secondary circuit is
   1) $0.5\,\Omega$ 2) $1\,\Omega$ 3) $1.5\,\Omega$ 4) $2\,\Omega$

28) The output 'Q' of the gate circuit shown in the figure is
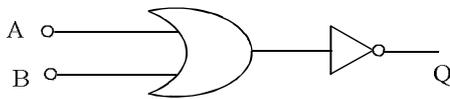
   1) $\bar{A}+\bar{B}$ 2) $\overline{\bar{A}+\bar{B}}$
   3) $\overline{A+B}$ 4) A + B

29) Velocity of a car as function of time is given by $V_x(t)=\alpha+\beta t^2$ where α=3.00m/s and β=0.100m/s^3.
   The average acceleration for the time interval $t=0$ to $t=5s$ is
   1) 1 m/s^2 2) 0.5 m/s^2
   3) 0.7 m/s^2 4) 1.25 m/s^2

30) In the given circuit, each one of the diodes D$_1$ and D$_2$ has forward resistance of 40 ohm and infinite backward resistance. Each one of the ammeters A$_1$, A$_2$ and A$_3$ has internal resistance 5ohm. The readings of A$_1$, A$_2$ and A$_3$ are respectively.
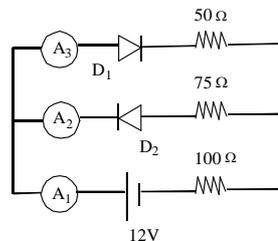
   1) 0.06A, Zero, 0.04A
   2) Zero, 0.08A, 0.03A
   3) 0.06A, Zero, 0.06A
   4) 0.03A, 0.08A, Zero

31) Steel ruptures when a shear of $3.5\times10^8\,Nm^{-2}$ is applied. The force needed to punch a 1 cm diameter hole in a steel sheet 0.3 cm thick is nearly:
   1) $1.4\times10^4\,N$ 2) $2.7\times10^4\,N$
   3) $3.3\times10^4\,N$ 4) $1.1\times10^4\,N$

32) In an experiment of single slit diffraction pattern, first minimum for red light coincides with first maximum of some other wavelength. If wavelength of red light is 6600A°, then wavelength of other light will be
   1) 3300A°   2) 4400 A°
   3) 5500 A°   4) 6600 A°

33) For a transistor $x=\dfrac{1}{a}$ and $y=\dfrac{1}{b}$ where a and b are current gains in common base and common emitter configuration respectively.
   1) x + y = 1   2) x – y = 1
   3) $2x=1-y$ 4) x + y = 0

34) A projectile is projected with a speed u at an angle θ with the horizontal. The speed of projectile when its direction of motion makes an angle $\dfrac{\theta}{2}$ with the horizontal is
   1) $\dfrac{u\cos\theta}{2}$ 2) $u\cos\theta$
   3) $u\left(2\cos\dfrac{\theta}{2}-\sec\dfrac{\theta}{2}\right)$ 4) $u\left(\cos\dfrac{\theta}{2}-\sec\dfrac{\theta}{2}\right)$

35) A cubic vessel (with faces horizontal + vertical) contains an ideal gas at N.T.P. The vessel is being carried by a rocket which is moving at a speed of 500 ms^{-1} in vertical direction. The pressure of the gas inside the vessel as observed by us on the ground
   1) remains the same because 500 ms^{-1} is very much smaller than V$_{rms}$ of the gas molecules.
   2) remains the same because motion of the vessel as a whole does not affect the relative motion of the gas molecules and the walls.
   3) will increase by a factor equal to $\left[V_{rms}^2 + (500)^2\right]/V_{rms}^2$ was the original mean square velocity of the gas molecules
   4) will be different on the top wall and bottom wall of the vessel.

36) A heat engine operates between 2100K and 700K. Its actual efficiency is 40%. The percentage of maximum possible efficiency of this engine is

   1) 33.33%   2) 66.67%
   3) 60%   4) 40%

37) A long solenoid has 1000 turns per meter and carries a current of 1 A. It has a soft iron core of $\mu_r = 1000$. The core is heated beyond the Curie temperature, T$_C$.
   a) The magnetic field intensity $\bar{H}$ in the solenoid is (nearly) unchanged but the magnetic induction $\bar{B}$ decreases drastically.
   b) The $\bar{H}$ and $\bar{B}$ in the solenoid are nearly unchanged.
   c) The magnetization in the core reverses its direction.
   d) The magnetization in the core diminishes by a factor of about 10^8.
   1) a and d are correct
   2) a, b and c are correct
   3) b and c are correct
   4) b, c and d are correct

38) In a compound microscope, the objective and eye-piece have focal lengths of 0.95 cm and 5cm respectively, and are kept at a separation of 20cm. The last image is formed at a distance of 25cm from eye piece. The total magnification of the microscope is
   1) 95   2) 94   3) 94/6   4) 84/6

39) To reduce the resonant frequency in an L-C-R series circuit with a generator,
   1) the generator frequency should be reduced.
   2) another capacitor should be added in parallel to the first.
   3) the iron core of the inductor should be removed.
   4) dielectric in the capacitor should be removed.

40) An EM wave of intensity I falls on a surface kept in vacuum and exerts radiation pressure P on it.
   a) Radiation pressure is $\dfrac{I}{c}$ if the wave is totally absorbed
   b) Radiation pressure is $\dfrac{I}{c}$ if the wave is totally reflected
   c) Radiation pressure is $\dfrac{2I}{c}$ if the wave is totally reflected
   d) Radiation pressure in the range $\dfrac{I}{c} < P < \dfrac{2I}{c}$ for real surfaces
   1) a and d are correct   2) a, b, c are correct
   3) a, c and d are correct   4) all are correct

41) The relation between internal energy U, pressure P and volume V for a gas is given by U = 3 +2 PV. The adiabatic exponent of gas is

   1) $\dfrac{4}{3}$ 2) $\dfrac{5}{3}$ 3) $\dfrac{3}{2}$ 4) $\dfrac{7}{5}$

42) When a nucleus in an atom undergoes a radioactive decay, the electronic energy levels of the atom.
   1) do not change for any type of radioactivity
   2) change for α and β-radioactivity but not for γ-radioactivity
   3) change for α-radioactivity but not for others
   4) change for β-radioactivity but not for others

43) A square of side L metres lies in the xy-plane in a region, where the magnetic field is given by $\vec{B} = B_0\left(2\hat{i} + 3\hat{j} + 4\hat{k}\right)T$, ($B_0$ is a constant). The magnetic flux passing through the square is
   1) $2B_0L^2$Wb
   2) $3B_0L^2$Wb
   3) $4B_0L^2$Wb
   4) $\sqrt{29}B_0L^2Wb$

44) The simple Bohr model cannot be directly applied to calculate the energy levels of an atom with many electrons. This is because of
   1) the electrons not being subject to a central force
   2) the electrons colliding with each other
   3) screening effects of inner orbit electrons.
   4) the force between the nucleus and an electron will no longer be given by Coulomb's law.

45) A spherical conductor of radius 2m is charged to a potential of 120V. It is now placed inside another hollow spherical conductor of radius 6m. The potential of bigger sphere after the smaller sphere is made to touch the bigger sphere by a metal wire is
   1) 120V   2) 60V   3) 80V   4) 40V

46) The chemical name of artificial sweetener saccharin is ……
   1) Para-sulphobenzimide
   2) Ortho-sulphobenzamide
   3) Para-sulphobenzamide
   4) Ortho-sulphobenzimide

47) Which of the following undergoes aldol condensation and also gives haloform test?
   1) CH_3CH_2CHO
   2) $C_6H_5 - \underset{\underset{O}{\|}}{C} - CH_3$
   3) $CH_3CH_2COCH_2CH_3$
   4) $HCHO$

48)

49) Which of the following bleaches by reduction in presence of moisture?
   1) O_3 2) SO_2 3) H_2O_2 4) Cl_2

50) Which of the following pairs of ions have same magnetic moment?
   1) Cr^{+3}, Ni^{+2}
   2) Mn^{+2}, Fe^{+3}
   3) Cu^{+1}, Cr^{+1}
   4) Co^{+3}, Ni^{+3}

51) The products obtained by the hydrolysis of ClF_3 are ……
   1) $HCl + HOF$
   2) $HF + HOCl$
   3) $HF + HClO_2$
   4) $HF + HClO_3$

52) Which of the following suggested De Broglie's wave lengths, is not possible for an electron in a Bohr's orbit of H–atom
   1) 33.30 A°
   2) 4.98 A°
   3) 9.99 A°
   4) 19.98 A°

53) In which of the following transformations maximum energy is absorbed.

1) $N_{(g)} - e^- \rightarrow N_{(g)}^+$ 2) $O_{(g)} - e^- \rightarrow O_{(g)}^+$

3) $S_{(g)} + e^- \rightarrow S_{(g)}^-$ 4) $O_{(g)} + e^- \rightarrow O_{(g)}^-$

54) Which of the following is paramagnetic with two unpaired $e^- s$ in π_{2p} bonding molecular orbitals?

1) B_2 2) C_2 3) N_2 4) O_2

55) The pH of 0.08M weak monobasic acid, if it is 10% ionized is

1) 2.0970   2) 1.6031
3) 0.0970   4) 1.0970

56) The unstable carbonate which readily decomposes to give CO_2 at room temperature is

1) Na_2CO_3 2) Li_2CO_3
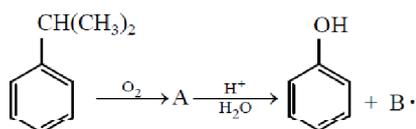3) $CaCO_3$ 4) $BaCO_3$

57) One molar solution of $K_x[Fe(CN)_6]$ is isotonic with 4 molar urea solution. If the degree of dissociation of the complex is one, then the value of 'x' is

1) 4   2) 3   3) 2   4) 1

58) Number of configurational isomers for
$(CH_3)_2 CH.CH.Cl.CH = CHCl$
$(CH_3)_2 CH.CH.Cl.CH = CHCl$

1) 2   2) 3   3) Zero   4) 4

59)

CH(CH₃)₂ benzene ring $\xrightarrow{O_2} A \xrightarrow[H_2O]{H^+}$ OH benzene ring + B·

'B' in the above sequence of reaction is

1) CH_3CHO 2) CH_3COCH_3
3) CH_3COOH 4) $CH_3CHOHCH_3$

60) Grignard reagent
$+ CdCl_2 \longrightarrow A + MgCl_2$
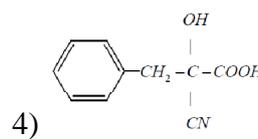$A + B \longrightarrow$ butanone $+ CdCl_2$
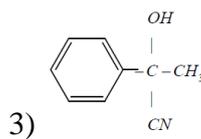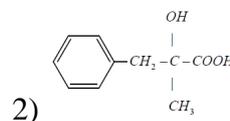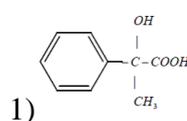$A + B \longrightarrow$ ↓ ⌘ ↑ $+ CdCl_2$
A and B are respectively

1) $(CH_3)_2Cd$ & C_2H_5COCl
2) CH_3MgCl & C_2H_5Cl
3) $(C_2H_5)_2Cd$ & CH_3Cl
4) CH_3COCl & $(C_2H_5)_2Cd$

61) $CH_3COOH \xrightarrow{SOCl_2} A \xrightarrow[anhyd.AlCl_3]{Benzene} B \xrightarrow{HCN} C \xrightarrow{H_2O} D$

In the following sequence of reactions, acetic acid yields D. The structure of 'D' is

1) phenyl-$C(OH)(COOH)CH_3$

2) phenyl-$CH_2-C(OH)(COOH)CH_3$

3) phenyl-$C(OH)(CH_3)CN$

4) phenyl-$CH_2-C(OH)(COOH)CN$

62) The molecular formula of carbon compound 'X' is $C_4H_{10}O$. It liberates hydrogen gas with Na metal and gives turbidity immediately with Lucas Reagent. If the vapours of 'X' are passed over hot copper the product obtained is

1) $CH_3 - CH_2 - O - CH_2 - CH_3$

2) $CH_3CH_2 - CH_2 - CHO$

3) $CH_3 - \underset{O}{\overset{\|}{C}} - CH_2 - CH_3$

4) $CH_3 - \underset{CH_3}{\overset{|}{C}} = CH_2$

63) The weight of chlorine gas that undergoes oxidation when excess of chlorine gas is sent into 6 moles of hot concentrated NaOH solution is
1) 35.5   2) 106.5 3) 71   4) 142

64) In which of the following molecules/ions are all the bonds not equal?
1) XeF_4 2) BF_4^- 3) SF_4 4) SiF_4

65) A colloidal solution is subjected to an electrical field. The particles move towards anode. The coagulation of same sol is studied using NaCl, $BaCl_2$ and $AlCl_3$ solutions. Their coagulating power should be
1) $NaCl > BaCl_2 > AlCl_3$
2) $BaCl_2 > AlCl_3 > NaCl$
3) $AlCl_3 > BaCl_2 > NaCl$
4) $BaCl_2 > NaCl > AlCl_3$

66) Chormite ore $(X) \xrightarrow[fuse]{Na_2CO_3/air} (Y)$. X and Y are
1) Cr_2O_3 and $Na_2Cr_2O_7$
2) $FeO.Cr_2O_3$
3) $FeO.Cr_2O_3$ and Na_2CrO_4
4) Cr_2O_3 and Na_2CrO_4
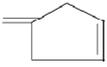
67) Ozonolysis of (using Zn/H_2O) produces
1) $HCHO + OHC - CH_2 - CH_2 - CH_2 - CHO$
2) $HCHO + OHC - CH_2 - \overset{\overset{O}{\|}}{C} - CH_2 - CHO$
3) $CO_2 + H_2O + OHC - CH_2 - CH_2 - CH_2CHO$
4) $H_2O + CO_2 + OHC - CH_2 - \overset{\overset{O}{\|}}{C} - CH_2 - CHO$

68) Choose the incorrect statement
1) Adenine and Guanine are purines
2) Thymine, cytosine and uracil are pyrimidines
3) Thymine is present in RNA and uracil is present in DNA
4) In DNA chain, Adenine is linked to thymine and Guanine is linked to cytosine

69) Which of the following on reaction with NaOH does not liberate hydrogen gas?
1) Zn   2) P_4 3) Si   4) Al

70) ClO^- disproportionates into
1) Cl^- and O 2) Cl^- and ClO_3^-
3) Cl and O 4) Cl^- and O^-

71) In which of the following arrangements, the sequence is not strictly according to the property written against it?
1) $CO_2 < SiO_2 < SnO_2 < PbO_2$:
   Increasing oxidising power
2) $HF < HCl < HBr < HI$:
   Increasing acid strength
3) $NH_3 > PH_3 < AsH_3 < SbH_3$:
   Increasing basic strength
4) $B < C < O < N$:
   Increasing first ionisation enthalpy

72) Lactose (Milk Sugar) is chemically
1) β-(D) Galactopyranosyl (D)-Glucopyanose
2) α-(D) Galactopyranosyl (D)-Glucopyanose
3) α-(D) Glucopyanosyl (D)-Galactopyranose
4) β-(D) Glucopyanosyl (D)-Galactopyranose

73)
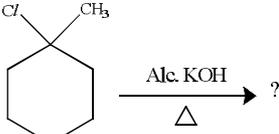
The major product obtained in this reaction is ………..
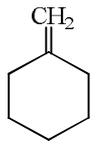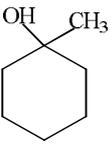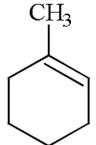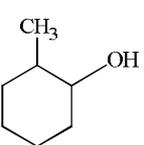
74) $B_2H_6 + H_2O \rightarrow X + H_2$;
$X \xrightarrow{100°C} Y + H_2O$. The colour of cobalt salt of 'Y' is

1) Yellow   2) Violet
3) Blue   4) Green

75) Which of the following exhibits intra molecular hydrogen bonding?
   1) p-nitrophenol
   2) o-nitrophenol
   3) o-chlorotoluene
   4) p-hydroxy benzoic acid

76) Which of the following property is a state function and an extensive property?
   1) Work
   2) Enthalpy
   3) Molar heat capacity
   4) Molar volume

77) When a mixture containing PCl_3 and PCl_5 is heated with 4 moles of ethyl alcohol, a total of 4 moles of ethyl chloride is formed. Then the mole ratio of PCl_3 and PCl_5 in the mixture is
   1) 3:1   2) 1:1   3) 1:3   4) 2:1

78) The reagent used to identify a primary Alcoholic group in glucose is
   1) Tollen's reagent
   2) HI + Red Phosphorous
   3) NH_2OH
   4) $Conc.HNO_3$

79) For an elementary reaction $2A + B \longrightarrow A_2B$, if the volume of vessel is quickly reduced to half of its original volume then rate of reaction
   1) Doesn't change
   2) Increases four times
   3) Increases eight times
   4) Decreases eight times

80) Which of the following statement is correct?
   If $E^0_{Cu^{2+}/Cu} = 0.34V$ and
   $E^0_{Sn^{2+}/Sn} = -0.136V$, $E^0_{H+/H_2} = 0V$
   1) Cu^{+2} ions can be reduced by $H_2(g)$
   2) Cu can be oxidized by H^+
   3) Sn^{2+} ions can be reduced by H_2
   4) Sn^{2+} can oxidize Cu

81) Which of the following is an oxidizing agent?
   1) $Mn(CO)_5$ 2) $Fe(CO)_5$
   3) $Mn_2(CO)_{10}$ 4) $Ni(CO)_4$

82) Leaching of Ag_2S is carried out by heating it with a dilute solution of:
   1) $NaCN$ Only   2) HCl
   3) $NaOH$
   4) $NaCN$ in presence of O_2

83) The pH of a solution obtained by mixing 100ml of 0.01M NH_4OH and 100ml of 0.05M $(NH_4)_2SO_4$ is... $(pKa\ NH_4^+ = 9.2)$
   1) 9.9   2) 4.8   3) 5.5   4) 9.2

84) At 400K, the RMS velocity of a gas 'X' (mol.wt = 40) is equal to the most probable speed of gas 'Y' at 60K. Then the molecular weight of gas (Y) is
   1) 4 g/mole   2) 8 g/mole
   3) 32 g/mole   4) 2 g/mole

85) Silver ions are added to a solution with $[Br^-] = [Cl^-] = [CO_3^{2-}] = [AsO_4^{3-}] = 0.1M$. Which compound will precipitate with lowest $[Ag^+]$?
   $0.1M\ [Br^-] = [Cl^-] = [CO_3^{2-}] = [AsO_4^{3-}]$
   1) $AgBr(K_{sp} = 5 \times 10^{-13})$
   2) $AgCl(K_{sp} = 1.8 \times 10^{-10})$
   3) $Ag_2CO_3(K_{sp} = 8.1 \times 10^{-12})$
   4) $Ag_3AsO_4(K_{sp} = 1 \times 10^{-22})$

86) When two mole of an ideal gas $\left(C_{p,m} = \dfrac{5}{2}R\right)$ heated from 300K to 600K at constant pressure. The change in entropy of gas (ΔS) is:
   1) $\dfrac{3}{2}R\ ln\ 2$ 2) $\dfrac{-3}{2}R\ ln\ 2$
   3) $5R\ ln2$ 4) $\dfrac{5}{2}R\ ln\ 2$

87) Match the items of column I with the items of column II and assign the correct code.
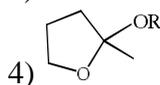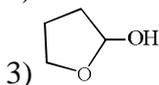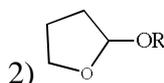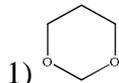
Column-I	Column-II
(a) Terylene	(i) Thermo plastic
(b) Nylon–6, 6	(ii) Polyester
(c) PVC	(iii) Elastomer
(d) Buna - S	(iv) Thermosetting polymer
	(v) Polyamide

1) a-(i); b- (ii); c- (iii); d- (iv)
2) a- (ii); b- (v); c- (i); d- (iii)
3) a- (iii); b- (iv); c- (i); d- (ii)
4) a- (iv); b- (i); c- (iii); d- (ii)

88) Which of the following is an acetal of a Ketone?

1) 2) 3) 4)

89) Number of stereo isomers possible for the given compounds are
1) 2   2) 4   3) 16   4) 8

90) In which of the following crystals all tetrahedral voids are occupied?
1) NaCl   2) ZnS   3) CsCl   4) Na_2O

91) If the following food chain if plants have 1000 joules of energy available from the Sun, Calculate the amount of energy available to Lion.

Sun
|
1000 joules of Light energy
↓
Plants ⟶ Deer ⟶ Lion
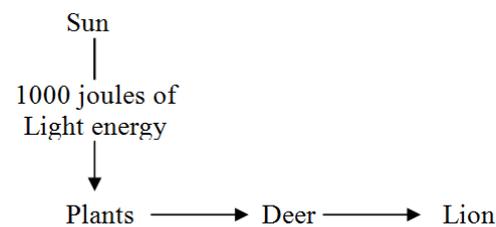
1) 10 joules   2) 100 joules
3) 0.1 joule   4) 1 joule

92) Read the following statements and find out the incorrect one
1) In mosses the sporangia are intermixed with paraphyses
2) In Basidiomycetes members karyogamy and meiosis occur in basidium
3) In eusporangiate pteridophytes sporangium develops from a group of superficial cells
4) In plants with diplontic life cycle sporophyte is dominant, photosynthetic and independent

93) Morphology of tendrils in cucumber, grape vine and pisum respectively are
1) Terminal buds, Axillary buds and terminal leaflets
2) Axillary buds, terminal buds and lower leaflets
3) Axillary buds, terminal buds and terminal leaflets
4) Leaves, Axillary buds and terminal part of petiole

94) Read the following lists

List – I	List – II
I) Hypogynous flower with parietal placentation	A) Citrus
II) Zygomorphic flower with imbricate aestivation	B) Marigold
III) Epigynous flower with basal placentation	C) Cassia
IV) Hypogynous androecium flower with polyadelphous	D) Mustard
	E) Datura

The correct match is

	I	II	III	IV			I	II	III	IV
1)	D	C	A	E		2)	D	C	B	A
3)	C	D	A	B		4)	B	A	C	D

	I	II	III	IV			I	II	III	IV
1)	D	C	A	E		2)	D	C	B	A
3)	C	D	A	B		4)	B	A	C	D

95) Broccoli has evolved from the following by artificial selection
1) Kohlrabi   2) Kale
3) Cauliflower   4) Wild Cabbage

96) Read the following statements
   I) Cells active in protein synthesis contain larger and more numerous nucleoli
   II) Translation occurs in mitochondria and chloroplast
   III) Forming face of golgi is concave and called as 'Cis' face
   IV) Neutral solutes can move across the cell membrane by simple diffusion.
   The number of correct statements are
   1) 2   2) 1   3) 3   4) 4

97) The codon for the aminoacid tryptophan
   1) GUG   2) UGG   3) GGG   4) CUC

98) The ratio of xylem and phloem strips present in a vascular bundle of stem of Cucurbita
   1) 1:1   2) 1:2   3) 2:1   4) 1:3

99) The viability of seeds is tested by
   1) 2, 3, 5 triphenyl tetrazolium chloride
   2) 2, 4 – D
   3) 2, 6 dichlorophenol indophenols
   4) Agent Orange

100) Which of the following are true
   I) RNA polymerase I transcribes rRNA
   II) RNA polymerase II transcribes heterogeneous nuclear RNA
   III) RNA polymerase III transcribes snRNA
   1) I & II only   2) II & III only
   3) I & III only   4) I, II, III

101) Satellite of Chromosome is
   1) Rich in proteins
   2) Rich in RNA and deficient in DNA
   3) Rich in DNA and deficient in RNA
   4) Rich in proteins and lacks RNA

102) Match the following

List - I	List – II
I) Mn	A) Carboxy peptidase
II) Malonic acid	B) Catalase
III) Zn	C) IAA oxidase
IV) Haem	D) Competitive inhibition

   The correct match is

	I	II	III	IV		I	II	III	IV
1)	C	B	D	A	2)	B	A	C	D
3)	A	B	D	C	4)	C	D	A	B

103) Pressure potential of plasmolysed cell is usually
   1) Zero   2) Highest
   3) Positive
   4) Positive or negative

104) When glucose is completely oxidized in aerobic respiration how many ATP are produced through ETS.
   1) 32   2) 34   3) 36   4) 28

105) Whip tail disease is due to deficiency of
   1) Mo   2) Cu   3) Zn   4) Mn

106) The restriction sites found in ampicillin resistant gene of PBR 322 vector
   1) Bam HI   2) Hind III
   3) Pst-I and Pvu I   4) Sal I and Pvu II

107) Genotypic and phenotypic ratios are same in
   1) Co-dominance
   2) Incomplete dominance
   3) Dominance
   4) 1 and 2

108) Read the following table

Variety	Crop	Resistant to
I) Pusa gaurav	Mastard	Aphids
II) Pusa Komal	Cow pea	Bacterial blight
III) Pusa swarnim	Brassica	White rust
IV) Pusa shubhra	Cauliflower	Black rot

   Find the correct combinations
   1) I & II   2) I, III, IV
   3) II, III, IV   4) I, II, III, IV

109) Find the incorrect pair
   1) Alfered Sturtwent-Chromosome maps
   2) Taylor-Semi-conservative replication of DNA
   3) Stanley Cohen – Method to remove plasmids from bacterial cells
   4) William Goud – Father of Green revolution

110) If pollen tube can't pass through micropyle, it is helped by
   1) Caruncle   2) Obturator
   3) Suspensor   4) Aril

111) If 'y' gene of Lac operon shows non-sense mutation the enzymes produced are
1) β - Galactosidase   2) Permease
3) 1 & 2
4) β-Galactosidase and transacetylase

112) Which of the following are found in complex IV of ETS
1) cyt 'b' and cyt 'C'   2) cyt b_6 and cyt 'f'
3) cyt 'a' and cyt a_3 4) cyt 'c' and cyt a_3

113) T.S. of stem of sunflower can be identified from the T.S. of Cucurbita by the presence of?
1) Cambium in the vascular bundles
2) Conjoint, collateral and open vascular bundle
3) Scattered vascular bundles
4) Conjoint bicollateral and open vascular bundles

114) Which of the following options correctly represent the figures (A), (B) and (C) respectively?
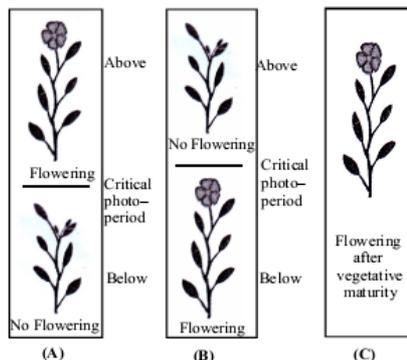
1) Long day plant
Short day plant
Day neutral plant
2) Short day plant
Long day plant
Day neutral plant
3) Day neutral plant
Short day plant
Long day plant
4) Day neutral plant
Long day plant
Short day plant

115) In C_4 Plants:
1) Initial CO_2 fixation occurs in mesophyll cells by *Rubis* CO
2) Final CO_2 fixation occurs in bundle sheath cells by PEPcase.
3) Final CO_2 fixation occurs in mesophyll cells by PEPcase
4) Initial CO_2 fixation occurs in mesophyll cells by PEPcase

116) Which of the following statements are correct for the pathway, that is common in both aerobic and anaerobic respiration?
(a) Partial oxidation of glucose forms two molecules of acetyl CoA
(b) ATP is utilised at two steps
(c) Decarboxylation occurs at two steps
(d) Reduction of coenzyme occurs during the process
1) a and b   2) b and d
3) a and d   4) b and c

117) Rotenones are natural insecticides obtained from
1) Roots of Derris   2) Leaves of Datura
3) Stem of Lonchocarpus
4) Flowers of Chrysanthemum

118) Semi-dwarf varieties of rice used in Green revolution were developed from the following variety
1) Jaya   2) taipei
3) IR-8   4) TN-I

119) Which part of the reproductive structure produces both enzyme and hormone?
1) Archegonium   2) Middle layer
3) Tapetum   4) Endothecium

120) Cladodes are found in
1) Pea, Bean   2) Momordica
3) Asparagus, Ruscus 4) Trapa

121) Pollinia are found in which of the following plant family?
1) Asteraceae   2) Liliaceae
3) Malvaceae   4) Asclepiadaceae

122) In moss meiosis occurs in
   1) Spore mother cells
   2) Microspores
   3) Megaspores
   4) Gamete mother cell

123) $^{m}G_{ppp}$ cap is present on:
   1) mRNA in prokaryotes
   2) mRNA in Eukaryotes
   3) Transfer RNA
   4) $16s$ rRNA in prokaryotes

124) Which of the following is not correctly matched?
   1) Inulin - Polymer of fructose
   2) Arachidonic acid - Unsaturated fatty acid with 20 carbon atoms
   3) GLUT-4 - Protein which enables glucose transport into cells
   4) Linolenic acid - Essential saturated fatty acid

125) The floral formula $A_{(9)+1}$ $\underline{G}_1$ is related to?
   1) Ashwagandha (withania)
   2) Crotolaria
   3) Arachis
   4) Pisum

126) Viscum is
   1) Total stem parasite
   2) Total root parasite
   3) Partial stem parasite
   4) Partial root parasite

127) Which one of the following is not considered as part of the endomembrane system?
   1) Endoplasmic reticulum
   2) Golgi body
   3) Peroxisome
   4) Vacuoles

128) The outline of some events of mitotic cell division is given below in random manner-
   (I) Condensation of Chromosomes is completed
   (ii) Chromosomes lost their identity as discrete elements
   (iii) Sister chromatids separate
   (iv) Initiation of the assembly of mitotic spindle
   The correct order or steps for cell division is
   1) i→iv→iii→ii   2) iv→i→iii→ii
   3) ii→i→iv→iii   4) iv→iii→i→ii

129) Some common diseases caused by bacteria are:
   1) Measles, mumps and malaria
   2) Tetanus, typhoid, small pox
   3) Tuberculosis, syphilis, gonorrhea
   4) Pneumonia, poliomyelitis, rabies

130) Which fungal extract was extensively used in treating wounded American soldiers in world war-II?
   1) Streptomycin   2) Cyclosporin A
   3) Penicillin   4) Statin

131) Barley endosperm test is a bioassay for?
   1) Kinetin   2) ABA
   3) Auxin   4) GA

132) Propionibacterium sharmanii is used in the ripening of which cheese?
   1) Camembert cheese
   2) Swiss cheese
   3) Roquefort cheese
   4) Limburger cheese

133) Farmers have reported over 50% higher yields of rice by using of the following bio fertilizer
   1) Cyanobacteria   2) Azolla pinnata
   3) Mycorrhiza   4) Rhizobium

134) Which of the following is not related to biofortification?
1) Development of maize hybrids with high lysine and tryptophan content
2) Atlas 66 used as donor for improving cultivated wheat
3) Development of vegetable corps rich in vitamins and minerals
4) Induction of mutation in mungbean to develop resistance to yellow mosaic virus

135) A plant with features of low transpiration and efficient photosynthesis having somewhat xerophytic nature may be a
1) C_3 plant   2) C_4 plant
3) CAM plant   4) None

136) Study the following and choose the correct option
A) Vinblastin from Vinca rosea is an anticancer drug.
B) Digitalin from fox glove plant is used to treat cardiac problems.
C) Reserpine extracted from Rauwolfia is used to treat low blood pressure.
D) Morphine extracted from Cannabis is used in relieving pain after surgery.
1) A and B are correct
2) C and D are correct
3) A and C are correct
4) B and C are correct

137) Indian one horned Rhinoceros is protected in
1) Keoladeo Ghana national park
2) Kaziranga wild life sanctuary
3) Corbett national park
4) Periyar wild life sanctuary

138) A species, whose distribution is restricted to a small geographical region due to the presence of a competitively superior species, is found to expand its range of distribution when the competing species is removed is called
1) Competitive interference
2) Competitive exclusion
3) Competitive release
4) Co-Existence.

139) Physiological adaptation in a person living at high altitude is
1) Leucocytosis   2) Polycythaemia
3) Erythropenia   4) Leucopenia

140) Transitional epithelium occurs in
1) Blood vessels   2) Trachea
3) Kidney   4) Urinary bladder

141) Read the following statements and find out incorrect statement about Earthworm
1) Setae are present in all the segments of earthworm
2) Nephridia are present in all the segments except first two
3) Intestine is present only in the post clitellar segments
4) The epidermis is made up of single layer of cells

142) 'Glass snake' is a
1) Pit viper   2) Lizard
3) Blind snake   4) Worm

143) The equation for the population growth depicted in the following graph is
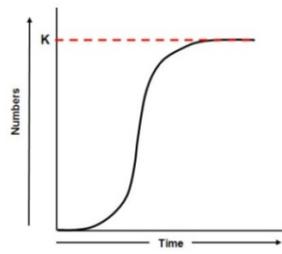
1) $\dfrac{dN}{dt} = rN$ 2) $\dfrac{dN}{dt} = rN\left(\dfrac{K\text{-}N}{K}\right)$

3) $Nt = N0ert$ 4) $\dfrac{dN}{dt} = rN\left(\dfrac{K\text{-}N}{N}\right)$

144) Examples of sauropsids which do not have copulatory organs
1) Tortoise, Peacock, Kiwi
2) Ostrich, Cobra, Wall lizard
3) Parrot, Sphenodon, Sparrow
4) Tinamou, Sphenodon, Alligator

145) The sexually transmitted disease caused by bacterium among the following is
1) Kala-azar
2) Syphyllis
3) African sleeping sickness
4) Trichomoniasis

146) BCG vaccine provides protection against
1) Measles   2) Tuberculosis
3) Cholera   4) Small pox

147) Tongue of cockroach is called
1) Hypopharynx   2) labium
3) Glossa   4) Ligula

148) Colleterial galnds of cockroach are useful in
1) Producing Pheromones
2) Formation of spermatophore
3) Transferring spermatophore
4) Formation of oothca

149) Recognise the figure and find out the correct matching with respect to green house gases.
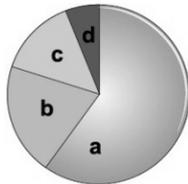
1) b–CFCs, a–N_2O, d–CO_2, c–CH_4
2) a–CO_2, b–CH_4, c–CFCs, d–N_2O
3) b–CFCs, a–N_2O, c–CO_2, dvCH_4
4) a–CFCs, b–N_2O, d–CO_2, c–CH_4

150) Study the following and Choose the Correct Option

Column - I	Column - II
A) Montreal protocol	i) Conservation of Biodiversity
B) Kyoto protocol	ii) Peroxyacetyl nitrate
C) Earth summit	iii) Algal blooms
D) Photochemical smog	iv) Protection of Ozone layer
E) Terror of Bengal	v) Green house effect

1) A- v, B-iv, C- i, D- ii, E-iii
2) A-v, B-iv, C-ii, D- i, E-iii
3) A-iv, B-v, C-i, D-ii, E-iii
4) A-iv, B-v, C-ii, D-iii, E-i

151) Stool of person is whitish grey due to malfunction of which of the following organ?
1) Pancreas   2) Spleen
3) Kidney   4) Liver

152) Pernicious anaemia in which there is delay in maturation of erythrocytes is due to deficiency of
1) Folic acid   2) Biotin
3) Cyanocobalamine 4) Thiamine

153) Match the columns

Column I	Column II
a) IC	1) TV+IRV+ERV
b) EC	2) RV+VC
c) FRC	3) TV+IRV
d) VC	4) ERV+RV
e) TLC	5) TV+ERV

1) a-3, b-5, c-4, d-1, e-2
2) a-5, b-2, c-3, d-5, e-4
3) a-4, b-3, c-1, d-5, e-2
4) a-3, b-5, c-2, d-4, e-1

154) When trochlear nerve is damaged.
1) Shape of lens in eye cannot be altered
2) Amount of light that enters into eye cannot be altered
3) Normal movements of eye ball are not possible
4) Sharp central vision is completely failed

155) Recognize the figure and find out the correct matching
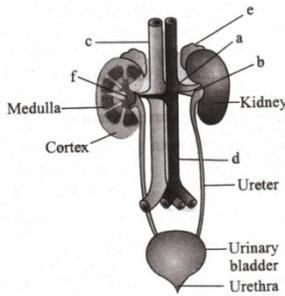
1) f-pelvis, e-adrenal gland, a –dorsal aorta, b-renal artery, c-inferior vena cava, d-renal vein

2) e-pelvis, f-adrenal gland, c-dorsal aorta, a-renal artery, d-inferior vena cava, b-renal vein

3) f-pelvis, e-adrenal gland, d-dorsal aorta, a-renal artery, c-inferior vena cava, b-renal vein

4) e-pelvis, f-adrenal gland, b-dorsal aorta, d-renal artery, a-inferior vena cava, c-renal vein

156) In human, renal organs are situated between the levels of
1) Last lumbar and fifth sacral vertebra
2) Last cervical and third thoracic vertebra
3) Fifth lumbar and first sacral vertebra
4) Last thoracic and third lumbar vertebra

157) Study the following about a resting muscle fibre and choose the correct option
   i) Troponin-C has binding sites for calcium.
   ii) Troponin-I partially covers actin binding sites on myosin.
   iii) Tropomyosin partially covers myosin binding sites on actin
   iv) Head of myosin has a pocket for ATP and a slit for actin
1) i &ii are correct
2) ii&iii are correct
3) i, ii &iv are correct
4) i,iii&iv are correct

158) The bone which bears acromian process is
1) Clavicle   2) Scapula
3) Ilium   4) Mandible

159) **Statement-I**: In an axon, ionic gradients across the resting membrane are maintained by the active transport of ions by the Na^+–K^+ pump.

Statement-II: The axolemma is comparatively more permeable to K^+ and nearly impermeable to Na^+ when neuron is not conducting any impulse.
1) Both I and II statements are correct
2) Both I and II statements are wrong
3) Statement-I correct but II is wrong
4) Statement-I wrong but II is correct

160) If a person is thirsty the part of brain which responds is
1) Medulla oblongata
2) Diencephalon
3) Cerebellum
4) Pons

161) In the ear the membranes directly involved in the process of hearing are
1) Reissner's and tectorial membranes
2) Reissner's and basilar membranes
3) Basilar and tectorial membranes
4) Basilar, tectorial and reissner's membranes.

162) The cranial nerves that control eyeball movements are
1) Optic, Oculomotor and Trigeminal
2) Optic, Trochlear and Abducens
3) Oculomotor, Trochlear and Abducens
4) Oculomotor, Abducens and Glossopharyngeal

163) Foetal membrane that provides the first blood corpuscles for circulation in embryo is
1) Yolk sac   2) Trophoblast
3) Amnion   4) Chorion

164) Which of the following gives the correct action of a birth control method?
1) Vasectomy-Prevents spermatogenesis but not fertilization
2) Spermicidal creams-Prevent implantation but not conception
3) Cervical caps-Prevent conception but not ovulation
4) Oral contraceptives-Prevent pregnancy but not ovulation

165) Heart sound 'lub' is a
1) Systolic sound, produced when semilunar valves are closed
2) Systolic sound, produced when atrio-ventricular valves are closed
3) Diastolic sound produced when semilunar valves are closed
4) Diastolic sound produced when atrio-ventricular valves are closed

166) Which of the following is the correct sequence in the menstrual cycle
1) Menstrual phase, Ovulatory phase, Luteal phase, Follicular phase.
2) Menstrual phase, Follicular phase, Ovulatory phase, Luteal phase.
3) Menstrual phase, Luteal phase, Follicular phase, Ovulatory phase.
4) Menstrual phase, Follicular phase, Luteal phase, Ovulatory phase.

167) Estrogen and Testosterone are steroid hormones and most likely bind to
1) Membrane ion channels
2) Enzyme linked membrane receptor
3) G-protein coupled membrane receptor
4) Intra cellular receptors

168) During prolonged fasting, the sequence of organic compounds used by the body is
1) Proteins, lipids, carbohydrates
2) Fats, carbohydrates, proteins
3) Carbohydrates, proteins, lipids
4) Carbohydrates, fats, proteins

169) The following pedigree chart shows the inheritance of a genetically inherited disorder in human beings. What is the most likely mode of inheritance of the disorder?
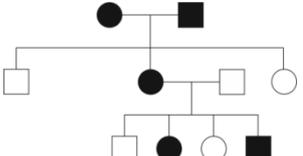
1) Autosomal dominant
2) Autosomal recessive
3) X-linked dominant
4) X-linked recessive

170) If a man heterozygous for baldness marries a woman who is also heterozygous for non baldness then what percentage of their progeny are affected
1) 50% of sons and 50% of daughters
2) 75% of sons and 25% of daughters
3) 25% of sons and 75% of daughters
4) 50% of sons and 25% of daughters

171) In a population of 1000 individuals, 360 individuals with genotype AA, 480 with Aa and remaining 160 with aa. Based on this data, the frequency of allele A in the population is
1) 0.6   2) 0.5   3) 0.7   4) 0.4

172) The immunoglobulin present in Colostrum' is
1) Ig A   2) Ig E   3) Ig M   4) Ig G

173) Which one of the following is considered as poor man's cow
1) Sheep   2) Goat
3) Camel   4) Lama

174) In man hyper secretion of Glucocorticoids causes
1) Diabetes insipidus
2) Cushing syndrome
3) Addison's disease
4) Goitre

175) Arrange the various steps in DNA finger printing in the correct order
   (i) Seperation of DNA fragments by electrophoresis
   (ii) Digestion of DNA by restriction endonucleases
   (iii) Hybridization using labeled DNA probes
   (iv) Isolation of DNA
   (v) Detection of hybridized DNA fragments by auto radiography.
   (vi) Transferring the separated DNA fragments to nitrocellulose membrane

   1) (iv), (ii), (i), (vi), (iii), (v)
   2) (iv), (i), (ii), (iii), (vi), (v)
   3) (ii), (i), (iv), (iv), (iii), (v)
   4) (iii), (v), (iv), (ii), (i), (iv)

176) Hisardale breed of sheep is produced by crossing
   1) Marino ram and Bikaneri ewe
   2) White leghorn sire and New Hampshire dam
   3) Bikaneri Ram and Marino ewe
   4) Plymouth rock sire and Sussex dam

177) Following are the steps in MOET programmes for herd improvement in which a cow has been administered hormones with FSH like activity
   A) Transfer to surrogate mother
   B) It is either mated with an elite bull or artificially inseminated
   C) Fertilised eggs at 32 cell stage are recovered non-surgically
   D) It produces 6-8 eggs instead of one egg which they normally yield per cycle
   1) B, D, C, A   2) D, B, C, A
   3) A, D, C, B   4) A, B, C, D

178) Speciation due to geographical isolation is called
   1) Allopatric speciation
   2) Sympatric speciation
   3) Parapatric speciation
   4) Convergent evolution

179) Most of the cave paintings discovered are associated with
   1) Cro-magnon man   2) Homo sapiens
   3) Neanderthal man   4) Dryopithecus

180) A man with certain disease marries a normal woman. They have eight children (three daughters and five sons). All the daughters suffer from their father's disease, but none of the sons are affected. Which of the following mode of inheritance do you suggest for this disease?
   1) Sex-limited recessive
   2) Autosomal dominant
   3) Sex-linked dominant
   4) Sex-linked recessive