KINETICS

KINETICS का साथ है तो सफ़लता का विश्वास है।

NEET

PST- 10 SET-A

KINETICS
We Nurture The Future
IIT-JEE | Medical | Foundations

Batch: AARAMBH
Date: 11/10/2024
Marks: 720
TOPIC:
PHYSICS: CIRCULAR MOTION, COM, FRICTION
CHEMISTRY: P-BLOCK, REDOX REACTION, EQUILIBRIUM, MOLE CONCEPT
BIOLOGY: morphology of Flowering plants, structural organisation in animals. Plant kingdom, Animal Kingdom

PHYSICS
SECTION-I

1. A rod ofweight W is supported by two parallel knife edges A and B and is in equilibrium in a horizontal position. The knives are at a distance d from each other. The centre of mass of the rod is at distance x from A. The normal reaction on A is

(a) $\frac{W(d-x)}{x}$ (b) $\frac{W(d-x)}{d}$

(c) $\frac{Wx}{d}$ (d) $\frac{Wd}{x}$

2. A wheel is rotating at 900 *r.p.m.* about its axis. When the power is cut-off, it comes to rest in 1 minute. The angular retardation in *radian/s*^{2} is

(a) $\pi/2$ (b) $\pi/4$

(c) $\pi/6$ (d) $\pi/8$

3. Starting from rest, a body slides down a 45° inclined plane in twice the time it takes to slide down the same distance in the absence of friction. The coefficient of friction between the body and the inclined plane is

(a) 0.33 (b) 0.25

(c) 0.75 (d) 0.80

4. A block of mass 50 *kg* can slide on a rough horizontal surface. The coefficient of friction between the block and the surface is 0.6. The least force of pull acting at an angle of 30° to the upward drawn vertical which causes the block to just slide is

(a) 29.43 *N* (b) 219.6 *N*

(c) 21.96 *N* (d) 294.3 *N*

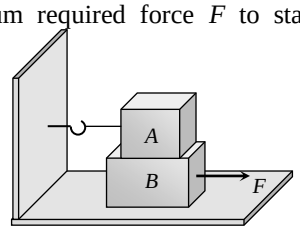
5. Two point masses m and M are separated by a distance L. The distance of the centre of mass of the system from m is

(a) $L(m/M)$ (b) $L(M/m)$

(c) $L\left(\frac{M}{m+M}\right)$ (d) $L\left(\frac{m}{m+M}\right)$

6. A block A with mass 100 *kg* is resting on another block B of mass 200 *kg*. As shown in figure a horizontal rope tied to a wall holds it. The coefficient of friction between A and B is 0.2 while coefficient of friction between B and the ground is 0.3. The minimum required force F to start moving B will be

(a) 900 *N*
(b) 100 *N*
(c) 1100 *N*
(d) 1200 *N*



7. A car of mass 1000 kg negotiates a banked curve of radius 90 m on a frictionless road. If the banking angle is 45^o, the speed of the car is

(a) $20ms^{-1}$ (b) $30ms^{-1}$

(c) $5\ ms^{-1}$ (d) $10\ ms^{-1}$

8. A 60 *kg* body is pushed with just enough force to start it moving across a floor and the same force continues to act afterwards. The coefficient of static friction and sliding friction are 0.5 and 0.4 respectively. The acceleration of the body is

(a) $6\,m/s^2$ (b) $4.9\,m/s^2$

(c) $3.92\,m/s^2$ (d) $1\,m/s^2$

9. The coefficient of friction between a body and the surface of an inclined plane at 45° is 0.5. If $g = 9.8\,m/s^2$, the acceleration of the body downwards in m/s^2 is

(a) $\frac{4.9}{\sqrt{2}}$ (b) $4.9\sqrt{2}$

(c) $19.6\sqrt{2}$ (d) 4.9

10. Two bodies of mass 1 kg and 3 kg have position vectors $\hat{\imath} + 2\hat{\jmath} + \hat{k}$ and-3 $\hat{\imath} - 2\hat{\jmath} + \hat{k}$, respectively. The centre of mass of this system has a position vector

(a)$-2\hat{\imath} - \hat{\jmath} + \hat{k}$ (b)$2\hat{\imath} - \hat{\jmath} - 2\hat{k}$

(c)$-\hat{\imath} + \hat{\jmath} + \hat{k}$ (d)$-2\hat{\imath} + 2\hat{k}$

11. Three masses are placed on the x-axis: 300 g at origin, 500 $gatx = 40$ cm and 400 g at $x =$ 70 cm. The distance of the centre of mass from the origin is

(a) 40 cm (b) 45 cm

(c) 50 cm (d) 30 cm

12. A car turns a corner on a slippery road at a constant speed of $10\,m/s$. If the coefficient of friction is 0.5, the minimum radius of the arc in meter in which the car turns is

(a) 20 (b) 10

(c) 5 (d) 4

13. A uniform rope of length *l* lies on a table. If the coefficient of friction is μ, then the maximum length l_1 of the part of this rope which can overhang from the edge of the table without sliding down is

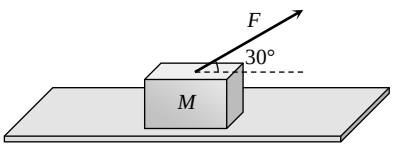
(a) $\frac{l}{\mu}$ (b) $\frac{l}{\mu + l}$

(c) $\frac{\mu l}{1+\mu}$ (d) $\frac{\mu l}{\mu - 1}$

14. A block of mass $M = 5\,kg$ is resting on a rough horizontal surface for which the coefficient of friction is 0.2. When a force $F = 40\ N$ is applied, the acceleration of the block will be $(g = 10\ m/s^2)$

(a) $5.73\ m/\sec^2$

(b) $8.0\ m/\sec^2$



(c) $3.17\ m/\sec^2$

(d) $10.0\ m/\sec^2$

15. A box is lying on an inclined plane what is the coefficient of static friction if the box starts sliding when an angle of inclination is 60^o

(a) 1.173 (b) 1.732

(c) 2.732 (d) 1.677

16. Let *F* be the force acting on a particle having position vector $\vec{r}$ and $\vec{T}$ be the torque of this force about the origin. Then

(a) $\vec{r}.\vec{T} = 0$ and $\vec{F}.\vec{T} = 0$

(b) $\vec{r}.\vec{T} = 0$ and $\vec{F}.\vec{T} \neq 0$

(c) $\vec{r}.\vec{T} \neq 0$ and $\vec{F}.\vec{T} = 0$

(d) $\vec{r}.\vec{T} \neq 0$ and $\vec{F}.\vec{T} \neq 0$

17. A body of mass 2 *kg* is being dragged with uniform velocity of 2 *m/s* on a rough horizontal plane. The coefficient of friction between the body and the surface is 0.20. The amount of heat generated in 5 sec is

$(J = 4.2\ joule/cal$ and $g = 9.8\,m/s^2)$

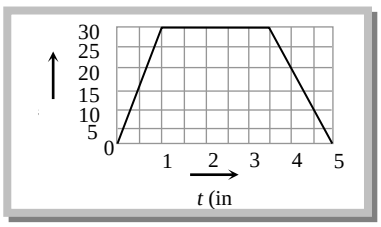
(a) 9.33 *cal* (b) 10.21 *cal*

(c) 12.67 *cal* (d) 13.34 *cal*

18. A wheel initially at rest, is rotated with a uniform angular acceleration. The wheel rotates through an angle θ_1 in first one second and through an additional angle θ_2 in the next one second. The ratio $\frac{\theta_2}{\theta_1}$ is

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

19. As a part of a maintenance inspection the compressor of a jet engine is made to spin according to the graph as shown. The number of revolutions made by the compressor during the test is



(a) 9000 (b) 16570

(c) 12750 (d) 11250

20. A vehicle of mass *m* is moving on a rough horizontal road with momentum *P*. If the coefficient of friction between the tyres and the road be μ, then the stopping distance is

(a) $\frac{P}{2\mu m g}$ (b) $\frac{P^2}{2\mu m g}$

(c) $\frac{P}{2\mu m^2 g}$ (d) $\frac{P^2}{2\mu m^2 g}$

21. A body is in pure rotation. The linear speed v of a particle, the distance r of the particle from the axis and angular velocity ω of the body are related as $\omega = \frac{v}{r}$, thus

(a) $\omega \propto \frac{1}{r}$ (b) $\omega \propto r$

(c) $\omega = 0$ (d) ω is independent of r

22. A heavy uniform chain lies on a horizontal table-top. If the coefficient of friction between the chain and table surface is 0.25, then the maximum fraction of length of the chain, that can hang over one edge of the table is

(a) 20% (b) 25%

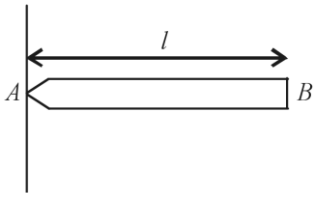
(c) 35% (d) 15%

23. A car is moving at a speed of 72 *km/hr*. the diameter of its wheels is 0.5 *m*. If the wheels are stopped in 20 rotations by applying brakes, then angular retardation produced by the brakes is

(a) – 25.5 rad/s^2 (b) – 29.5 rad/s^2

(c) – 33.5 rad/s^2 (d) – 45.5 rad/s^2

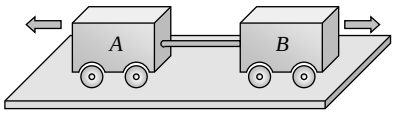
24. A uniform rod AB of length l and mass m is free to rotate about point A. The rod is released from rest in the horizontal position. Given that the moment of inertia of the rod about A is $ml^2/3$, the initial angular acceleration of the rod will be



(a) $\frac{mgl}{2}$ (b) $\frac{3}{2}gl$

(c) $\frac{3g}{2l}$ (d) $\frac{2g}{3l}$.

25. Two carts of masses 200 *kg* and 300 *kg* on horizontal rails are pushed apart. Suppose the coefficient of friction between the carts and the rails are same. If the 200 *kg* cart travels a distance of 36 *m* and stops, then the distance travelled by the cart weighing 300 *kg* is



(a) 32 *m* (b) 24 *m*

(c) 16 *m* (d) 12 *m*

26. Two objects of masses 200 *gm* and 500*gm* possess velocities $10\hat{i}$ *m/s* and $3\hat{i} + 5\hat{j}$ *m/s* respectively. The velocity of their centre of mass in *m/s* is

(a) $5\hat{i} - 25\hat{j}$ (b) $\frac{5}{7}\hat{i} - 25\hat{j}$

(c) $5\hat{i} + \frac{25}{7}\hat{j}$ (d) $25\hat{i} - \frac{5}{7}\hat{j}$

27. Which is a suitable method to decrease friction

(a) Ball and bearings (b) Lubrication

(c) Polishing (d) All the above

28. A tangential force F is applied on a disc of radius R, due to which it deflects through an angle θ from its initial position. The work done by this force would be

(a) FR (b) $F\theta$

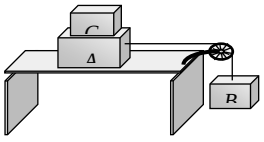
(c) $\frac{FR}{\theta}$ (d) $FR\theta$

29. A uniform chain of length L changes partly from a table which is kept in equilibrium by friction. The maximum length that can withstand without slipping is l, then coefficient of friction between the table and the chain is

(a) $\frac{l}{L}$ (b) $\frac{l}{L+l}$

(c) $\frac{l}{L-l}$ (d) $\frac{L}{L+l}$

30. Two masses A and B of 10 *kg* and 5 *kg* respectively are connected with a string passing over a frictionless pulley fixed at the corner of a table as shown. The coefficient of static friction of A with table is 0.2. The minimum mass of C that may be placed on A to prevent it from moving is



(a) 15 *kg* (b) 10 *kg*

(c) 5 kg (d) 12 kg

31. The coordinates of the positions of particles of mass 7, 4 and 10 gm are $(1, 5, -3)$, $(2, 5, 7)$ and $(3, 3, -1)\,cm$ respectively. The position of the centre of mass of the system would be

(a) $\left(-\frac{15}{7}, \frac{85}{17}, \frac{1}{7}\right)\,cm$ (b) $\left(\frac{15}{7}, -\frac{85}{17}, \frac{1}{7}\right)\,cm$

(c) $\left(\frac{15}{7}, \frac{85}{21}, -\frac{1}{7}\right)\,cm$ (d) $\left(\frac{15}{7}, \frac{85}{21}, \frac{7}{3}\right)\,cm$

32. The magnitude of torque on a particle of mass 1 kg is 2.5 Nm about the origin. If the force acting on it is 1 N and the distance of the particle from the origin is $5m$, the angle between the force and the position vector is (in radians):

(a) $\frac{\pi}{6}$ (b) $\frac{\pi}{3}$

(c) $\frac{\pi}{8}$ (d) $\frac{\pi}{4}$

33. A body B lies on a smooth horizontal table and another body A is placed on B. The coefficient of friction between A and B is μ. What acceleration given to B will cause slipping to occur between A and B

(a) μg (b) g/μ

(c) μ/g (d) $\sqrt{\mu g}$

34. Ratio of kinetic energy and rotational energy in the motion of a disc is

[CPMT 1996]

(a) 1 : 1 (b) 2 : 7

(c) 1 : 2 (d) 3 : 1

35. A cylinder of 10 kg is sliding in a plane with an initial velocity of 10 m/s. If the coefficient of friction between the surface and cylinder is 0.5 then before stopping, it will cover. $(g = 10\ m/s^2)$

(a) 2.5 m (b) 5 m

(c) 7.5 m (d) 10 m

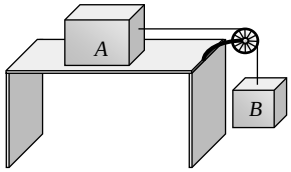
SECTION-II

36. A 60 kg weight is dragged on a horizontal surface by a rope up to 2 metres. If coefficient of friction is $\mu = 0.5$, the angle of rope with the surface is 60° and $g = 9.8\ m/\sec^2$, then work done is

(a) 294 joules (b) 315 joules

(c) 588 joules (d) 197 joules

37. The blocks A and B are arranged as shown in the figure. The pulley is frictionless. The mass of A is 10 kg. The coefficient of friction of A with the horizontal surface is 0.20. The minimum mass of B to start the motion will be



(a) 2 kg (b) 0.2 kg

(c) 5 kg (d) 10 kg

38. A lift is moving downwards with an acceleration equal to acceleration due to gravity. A body of mass m kept on the floor of the lift is pulled horizontally. If the coefficient of friction is μ, then the frictional resistance offered by the body is

(a) mg (b) μmg

(c) $2\mu mg$ (d) Zero

39. A force $\vec{F} = \alpha\hat{\imath} + 3\hat{\jmath} + 6\hat{k}$ is acting at a point $\vec{r} = 2\hat{\imath} - 6\hat{\jmath} - 12\hat{k}$. The value of α for which angular momentum about origin is conserved is

(a) zero (b) 1

(c) -1 (d) 2

40. A wheel has angular acceleration of 3.0 rad/sec2 and an initial angular speed of 2.00 rad/sec. In a time of 2 sec it has rotated through an angle (in radian) of

(a) 10 (b) 12

(c) 4 (d) 6.

41. Four particle of masses m, $2m$, $3m$ and $4m$ are arranged at the corners of a parallelogram with each side equal to a and one of the angle between two adjacent sides is 60°. The parallelogram lies in the x-y plane with mass m at the origin and $4m$ on the x-axis. The centre of mass of the arrangement will be located at

(a) $\left(\frac{\sqrt{3}}{2}a,\ 0.95a\right)$ (b) $\left(0.95a,\ \frac{\sqrt{3}}{4}a\right)$

(c) $\left(\frac{3a}{4},\ \frac{a}{2}\right)$ (d) $\left(\frac{a}{2},\ \frac{3a}{4}\right)$

42. A 20 *kg* block is initially at rest on a rough horizontal surface. A horizontal force of 75 *N* is required to set the block in motion. After it is in motion, a horizontal force of 60 *N* is required to keep the block moving with constant speed. The coefficient of static friction is

(a) 0.38 (b) 0.44

(c) 0.52 (d) 0.60

43. In rotational motion of a rigid body, all particle move with

(a) Same linear and angular velocity

(b) Same linear and different angular velocity

(c) With different linear velocities and same angular velocities

(d) With different linear velocities and different angular velocities

44. A box is placed on an inclined plane and has to be pushed down. The angle of inclination is

(a) Equal to angle of friction (b)More than angle of friction

(c) Equal to angle of repose (d)Less than angle of repose

45. Pulling force making an angle θ to the horizontal is applied on a block of weight *W* placed on a horizontal table. If the angle of friction is α, then the magnitude of force required to move the body is equal to

(a) $\frac{W\sin\alpha}{g\tan(\theta-\alpha)}$ (b) $\frac{W\cos\alpha}{\cos(\theta-\alpha)}$

(c) $\frac{W\sin\alpha}{\cos(\theta-\alpha)}$ (d) $\frac{W\tan\alpha}{\sin(\theta-\alpha)}$

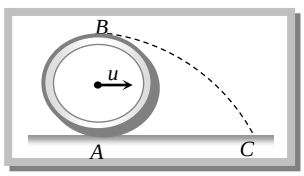
46. A wheel of radius *r* rolls without slipping with a speed *v* on a horizontal road. When it is at a point *A* on the road, a small jump of mud separates from the wheel at its highest point *B* and drops at point *C* on the road. The distance *AC* will be

(a) $v\sqrt{\frac{r}{g}}$

(b) $2v\sqrt{\frac{r}{g}}$

(c) $4v\sqrt{\frac{r}{g}}$

(d) $\sqrt{\frac{3r}{g}}$



47. If the position vector of a particle is $\vec{r}=(3\hat{i}+4\hat{j})$ meter and its angular velocity is $\vec{\omega}=(\hat{j}+2\hat{k})$ *rad/sec* then its linear velocity is (in *m/s*)

(a) $(8\hat{i}-6\hat{j}+3\hat{k})$ (b) $(3\hat{i}+6\hat{j}+8\hat{k})$

(c) $-(3\hat{i}+6\hat{j}+6\hat{k})$ (d) $(6\hat{i}+8\hat{j}+3\hat{k})$

48. A spherical ball rolls on a table without slipping. Then the fraction of its total energy associated with rotation is

(a) $\frac{2}{5}$ (b) $\frac{2}{7}$

(c) $\frac{3}{5}$ (d) $\frac{3}{7}$

49. A body is rolling without slipping on a horizontal plane. If the rotational energy of the body is 40% of the total kinetic energy, then the body might be

[CPMT 1997]

(a) Cylinder (b) Hollow sphere

(c) Solid cylinder (d) Ring

50. A body of weight 64 *N* is pushed with just enough force to start it moving across a horizontal floor and the same force continues to act afterwards. If the coefficients of static and dynamic friction are 0.6 and 0.4 respectively, the acceleration of the body will be (Acceleration due to gravity = *g*)

(a) $\frac{g}{6.4}$ (b) 0.64 *g*

(c) $\frac{g}{32}$ (d) 0.2 *g*

CHEMISTRY
SECTION-I

51. In the commercial electrochemical process for aluminium extraction, the electrolyte used is

(a) $Al(OH)_3$ in $NaOH$ solution

(b) An aqueous solution of $Al_2(SO_4)_3$

(c) A molten mixture of Al_2O_3 and Na_3AlF_6

(d) A molten mixture of $AlO(OH)$ and $Al(OH)_3$

52. The conversion of PbO_2 to $Pb(NO_3)_2$ is

(a) Oxidation

(b) Reduction

(c) Neither oxidation nor reduction

(d) Both oxidation and reduction

53. Which of the following has least mass

(a) $^{2\ g}$ atom of nitrogen (b) 3×10^{23} atoms of C

(c) 1 mole of S (d) $^{7.0\ g}$ of Ag

54. Which one of the following is correct statement

(a) The hydroxide of aluminium is more acidic than that of boron

(b) The hydroxide of boron is basic, while that of aluminium is amphoteric

(c) The hydroxide of boron is acidic, while that of aluminium is amphoteric

(d) The hydroxide of boron and aluminium are amphoteric

55. Identify the pair of reactions undergoing disproportionation from the following.

(a) $2H_2O_2 \rightarrow 2H_2O + O_2$ and $Cl_2 + 2NaOH \rightarrow NaCl + NaOCl + H_2O$

(b) $P_4 + 3NaOH + 3H_2O \rightarrow PH_3 + 3NaH_2PO_4$ and $Cl_2 + 2NO \rightarrow 2NaCl$

(c) $Cl_2 + 2KBr \rightarrow 2KCl + Br_2$ and $5Cl_2 + I_2 + 6H_2O \rightarrow 2IO_3^- + 10Cl^- + 2H^+$

(d) $Pb_3O_4 + 8HCl \rightarrow 3PbCl_2 + Cl_2 + H_2O$ and $P_4 + 3NaOH \rightarrow 3H_2O + PH_3 + 3NaH_2O_4$

56. $Zn^{2+}(aq) + 2e \rightarrow Zn(s)$. This is

(a) Oxidation (b) Reduction

(c) Redox reaction (d) None of these

57. In laboratory silicon can be prepared by the reaction

(a) By heating carbon in electric furnace

(b) By heating potassium with potassium dichromate

(c) Silica with magnesium

(d) None of these

58. The element of s^2p^2 configuration is of ..... group

(a) IV (b) III

(c) V (d) II

59. pK_a of a weak acid is defined as

(a) $\log^{10} K_a$ (b) $\frac{1}{\log_{10} K_a}$

(c) $\log^{10} \frac{1}{K_a}$ (d) $-\log^{10} \frac{1}{K_a}$

60. Silicon is an important constituent of

(a) Rocks (b) Amalgams

(c) Chlorophyll (d) Haemoglobin

61. What will be the pH of a $^{10^{-8}\ M\ HCl}$ solution

(a) 8.0 (b) 7.0

(c) 6.98 (d) 14.0

62. The number of atoms in 0.1 mol of a triatomic gas is $\left(N_A = 6.02\times10^{23} mol^{-1}\right)$

(a) 6.026×10^{22} (b) 1.806×10^{23}

(c) 3.600×10^{23} (d) 1.800×10^{22}

63. For the reaction $Fe_2N(s) + \frac{3}{2}H_2(g) \rightleftharpoons 2Fe(s) + NH_3(g)$

(a) $K_C = K_p(RT)^{1/2}$ (b) $K_C = K_p(RT)$

(c) $K_C = K_p(RT)^{3/2}$ (d) $K_C = K_p(RT)^{-1/2}$

64. The most acidic of the following compounds is

(a) P_2O_3 (b) Sb_2O_3

(c) B_2O_3 (d) As_2O_3

65. Which of the following molecules acts as a Lewis acid?

(a) $(CH_3)_2O$

(b) $(CH_3)_3P$

(c) $(CH_3)_3N$

(d) $(CH_3)_3B$ *(2009)*

66. The equivalent weight of KIO_3 in the reaction $2Cr(OH)_3 + 4OH + KIO_3 \rightarrow 2CrO_4^{2-} + 5H_2O + KI$ is

(a) Mole wt. (b) $\frac{\text{Mol. wt.}}{6}$

(c) $\frac{\text{Mol. wt.}}{2}$ (d) $\frac{\text{Mol. wt.}}{3}$

67. Suppose you have to determine the percentage of carbon dioxide in a sample of a gas available in a container. Which is the best absorbing material for the carbon dioxide

(a) Heated copper oxide

(b) Cold, solid calcium chloride

(c) Cold, solid calcium hydroxide

(d) Heated charcoal

68. The oxidation state of nitrogen in N_3H is

(a) $+\frac{1}{3}$ (b) + 3

(c) -1 (d) $-\frac{1}{3}$

69. One mole of potassium dichromate completely oxidises the following number of moles of ferrous sulphate in acidic medium

(a) 1 (b) 3
(c) 5 (d) 6

70. K_{sp} value of $Al(OH)_3$ and $Zn(OH)_2$ are 8.5×10^{-23} and 1.8×10^{-14} respectively. If NH_4OH is added in a solution of Al^{3+} and Zn^{2+}, which will precipitate earlier

(a) $Al(OH)_3$ (b) $Zn(OH)_2$
(c) Both together (d) None

71. Reaction in which yield of product will increase with increase in pressure is

(a) $H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$
(b) $H_2O_{(g)} + CO_{(g)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$
(c) $H_2O_{(g)} + C_{(s)} \rightleftharpoons CO_{(g)} + H_{2(g)}$
(d) $CO_{(g)} + 3H_{2(g)} \rightleftharpoons CH_{4(g)} + H_2O_{(g)}$

72. In the process $BCl_3 + PH_3 \rightarrow BCl_3 : PH_3$ The Lewis acid is

(a) PH_3 (b) BCl_3
(c) Both (d) None

73. Which one of the following is called amphoteric solvent

(a) Ammonium hydroxide (b) Chloroform
(c) Benzene (d) Water

74. Oxidation number of iodine varies from

(a) – 1 to +1 (b) – 1 to +7
(c) +3 to +5 (d) – 1 to +5

75. Given $P = 0.0030\,m$, $Q = 2.40m$, $R = 3000\,m$, Significant figures in P, Q and R are respectively

(a) 2, 2, 1 (b) 2, 3, 4
(c) 4, 2, 1 (d) 4, 2, 3

76. If the equilibrium constant of the reaction $2HI \rightleftharpoons H_2 + I_2$ is 0.25, then the equilibrium constant of the reaction $H_2 + I_2 \rightleftharpoons 2HI$ would be

(a) 1.0 (b) 2.0
(c) 3.0 (d) 4.0

77. Max. number of moles of electrons taken up by one mole of NO_3^- when it is reduced to

(a) NH_3 (b) NH_2OH
(c) NO (d) NO_2

78. In the reaction $H_2S + NO_2 \rightarrow H_2O + NO + S$. H_2S is

(a) Oxidised (b) Reduced
(c) Precipitated (d) None of these

79. Which among the following denotes the correct relationship between K_p and K_c for the reaction, $2A(g) \rightleftharpoons B(g) + C(g)$

(a) $K_p > K_c$ (b) $K_c > K_p$
(c) $K_c = (K_p)^2$ (d) $K_p = K_c$

80. The oxidation states of 'P' in $H_4P_2O_7, H_4P_2O_5$ and, $H_4P_2O_6$, respectively, are :

(a) 7,5 and 6 (b) 5,4 and 3
(c) 5,3 and 4 (d) 6,4 and 5

81. What weight of SO_2 can be made by burning sulphur in 5.0 moles of oxygen

(a) 640 grams (b) 160 grams
(c) 80 grams (d) 320 grams

82. $N_2 + O_2 \rightleftharpoons 2NO - Q\,cals$

In the above reaction which is the essential condition for the higher production of NO

(a) High temperature (b) High pressure
(c) Low temperature (d) Low pressure

83. In neutral or faintly alkaline medium, MnO_4^- oxidizes I^- to iodate. What is the number of moles of $KMnO_4$ required to completely convert 1 L of 0.5MKI to iodate?

(a) 0.5 (b) 4.0
(c) 2.0 (d) 1.0

84. In Hall's process, the main reagent is mixed with

(a) NaF (b) Na_3AlF_6
(c) AlF_3 (d) None of these

85. Calculate the partial pressure of carbon monoxide from the following

$CaCO_{3(s)} \xrightarrow{\Delta} CaO_{(s)} + CO_2 \uparrow$; $K_p = 8\times10^{-2}$

$CO_{2(g)} + C_{(s)} \rightarrow 2CO_{(g)}$; $K_p = 2$

(a) 0.2 (b) 0.4
(c) 1.6 (d) 4

SECTION-II

86. A reducing agent is a substance which can

(a) Accept electron (b) Donate electrons
(c) Accept protons (d) Donate protons

87. In electrolysis of aluminium oxide which of the following is added to accelerate the process

(a) Silica (b) Cryolite
(c) Nickel (d) Silicate

88. For decolourization of 1 mole of $KMnO_4$, the moles of H_2O_2 required is

(a) 1/2 (b) 3/2
(c) 5/2 (d) 7/2

89. For a reaction $A(s) \sim B(s) + C(g)$ the set of all correct statements are

(A) K is independent of [A].
(B) K is dependent on partial pressure of C at a given temperature.
(C) ΔH will be independent of temperature.
(D) ΔH is independent of the catalyst addition.

(a) A, B, C, D (b) A, B only
(c) A, B, D only (d) A, B, C only

90. Equation $H_2S + H_2O_2 \rightarrow S + 2H_2O$ represents

(a) Acidic nature of H_2O_2
(b) Basic nature of H_2O_2
(c) Oxidising nature of H_2O_2
(d) Reducing nature of H_2O_2

91. Oxidation state of chlorine in perchloric acid is

(a) – 1 (b) 0
(c) – 7 (d) + 7

92. Which one is oxidising agent in the reaction below

$2CrO_4^{2-} + 2H^+ \rightarrow Cr_2O_7^{2-} + H_2O$

(a) H^+ (b) $Cr_2O_4^-$
(c) Cr^{++} (d) None of these

93. Common alum is

(a) $K_2SO_4.Al_2(SO_4)_3.24H_2O$
(b) $K_2SO_4.Cr_2(SO_4)_3.24H_2O$
(c) $K_2SO_4.Fe_2(SO_4)_3.24H_2O$
(d) $(NH_4)_2SO_4.FeSO_4.6H_2O$

94. The number of moles of oxygen in $1\ L$ of air containing 21% oxygen by volume, in standard conditions, is

(a) 0.186 mol (b) 0.21 mol
(c) 2.10 mol (d) 0.0093 mol

95. Raising the temperature of an equilibrium system

(a) Favours the exothermic reaction only
(b) Favours the endothermic reaction only
(c) Favours both the exothermic and endothermic reactions
(d) Favours neither the exothermic nor endothermic reactions

96. For the reaction : $H_{2(g)} + CO_{2(g)} \rightleftharpoons CO_{(g)} + H_2O_{(g)}$, if the initial concentration of $[H_2] = [CO_2]$ and x moles/litre of hydrogen is consumed at equilibrium, the correct expression of K_p is

(a) $\frac{x^2}{(1-x)^2}$ (b) $\frac{(1+x)^2}{(1-x)^2}$
(c) $\frac{x^2}{(2+x)^2}$ (d) $\frac{x^2}{1-x^2}$

97. Under what conditions of temperature and pressure the formation of atomic hydrogen from molecular hydrogen will be favoured most

(a) High temperature and high pressure
(b) Low temperature and low pressure
(c) High temperature and low pressure
(d) Low temperature and high pressure

98. When Al is added to KOH solution

(a) No action takes place
(b) Oxygen is evolved
(c) Water is produced
(d) Hydrogen is evolved

99. Approximate atomic weight of an element is 26.89. If its equivalent weight is 8.9, the exact atomic weight of element would be

(a) 26.89 (b) 8.9
(c) 17.8 (d) 26.7

100. When carbon monoxide is passed over solid caustic soda heated to $200^o\ C$, it forms

(a) Na_2CO_3 (b) $NaHCO_3$
(c) $H - COONa$ (d) CH_3COONa

BIOLOGY
SECTION-I

101. The phylum name Annelida is based on

(a) Nephridia (b) Metameres / segments
(c) Parapodia (d) Antenna

102. An aggregate fruit is one which develops from

(a) Multicarpellary syncarpous gynoecium
(b) Multicarpellary apocarpous gynoecium
(c) Complete inflorescence
(d) Multicarpellary superior ovary

103. The female genital pore in earthworm is present in mid-ventral line of segment-

(a) 18th (b) 14th
(c) 12th (d) 10th

104. Life cycle of Ectocarpus and Fucus respectively are

(a) Haplontic, Diplontic
(b) Diplontic, Haplodiplontic

(c) Haplodiplontic, Diplontic
(d) Haplodiplontic, Haplontic

105. Which of the following pair is example of dense regular connective tissue?

(a) Ligament and tendon
(b) Perichondrium and pericardium
(c) Ligament and pericardium
(d) Perichondrium and tendon

106. In Pheretima, lymph glands lie in the segments –

(a) 4, 5 and 6 (b) 7, 8 and 9
(c) 14, 15 and 16 (d) 26th and behind

107. Tricarpellary, syncarpous gynoecium is found in flowers of:

(a) Liliaceae (b) Solanaceae
(c) Fabaceae (d) Poaceae

108. Male and female gametophytes are independent and free-living in

(a) Mustard (b) Castor
(c) Pinus (d) Sphagnum

109. Segment of earthworm bearing mouth is -

(a) Clitellar (b) Prostomium
(c) Peristomium (d) Deuterostomium

110. Choose the correctly matched pair: [AIPMT 2014]

(a) Inner lining of salivary ducts – Ciliated epithelium
(b) Moist surface of buccal cavity – Glandular epithelium
(c) Tubular parts of nephrons – Cuboidal epithelium
(d) Inner surface of bronchioles – Squamous epithelium

111. Which one is a wrong statement?

(a) Mucor has biflagellate zoospores
(b) Haploid endosperm is typical feature of gymnosperms
(c) Brown algae have chlorophyll a and c, and fucoxanthin
(d) Archegonia are found in Bryophyta, Pteridophyta and Gymnosperms

112. The wheat grain has an embryo with one large, shield-shaped cotyledon known as

(a) Coleorhiza (b) Scutellum
(c) Coleoptile (d) Epiblast

113. An alga which can be employed as food for human being is

(a) Ulothrix
(b) Chlorella
(c) Spirogyra
(d) Polysiphonia

114. A mature sieve tube differs from vessel in

(a) Being nearly dead (b) Lacking cytoplasm
(c) Lacking a functional nucleus (d) Absence of lignified walls

115. All the listed glands pour their secretions into ducts except

(a) salivary gland
(b) digestive glands
(c) pineal gland
(d) mammary glands

116. Birds and mammals share one of the following characteristics as a common feature

(a) Pigmented skin (b) Alimentary canal with some modification
(c) Viviparity (d) Warm blooded

117. Which of the following characteristic features always holds true for the corresponding group of animals

(a) Cartilaginous endoskeleton − Chondrichthyes
(b) Viviparous − Mammalia
(c) Possess a mouth with an upper and a lower jaw − Chordata
(d) 3-chambered heart with one incompletely divided ventricle. − Reptilia

118. Which pair of the following plants represents the condition of modification of stipules into spines?

(a) Euphorbia and Zizyphus
(b) Citrus and Euphorbia
(c) Zizyphus and Bougainvillea
(d) Bougainvillea and Citrus

119. Total number of segments (metameres) in Pheretima is -

(a)50-70 (b)300-325
(c)100-120 (d) 150

120. Planaria posses high capacity of

(a) Metamorphosis (b) Regeneration
(c) Alternation of generation (d) Bioluminescence

121. A prokaryotic autotrophic nitrogen fixing symbiont is found in

(a) Cycas (b) Cicer
(c) Pisum (d) Alnus

122. Plumule is covered by -

(a) Root cap (b) Coleorhiza
(c) Coleoptile (d) Hypocotyl

123. Mesarch xylem is common in

(a) Dicots
(b) Monocots
(c) Bryophytes
(d) Ferns

124. Phloem fibre, which is commercially used is actually

(a) Jute (b) Flax
(c) Hemp (d) All of these

125. You have discovered an animal having following characters like-
Triploblastic, bilateral symmetry coelomate, chitinous exoskeleton, head + Thorax and abdomen as body parts, jointed appendages You would like to place the animal under -

(a) Tetrapoda (b)Arthropoda
(c)Annelida (d) Hemichordata

126. Conifers are adapted to tolerate extreme environmental conditions because of

(a) Superficial stomata (b) Thick cuticle
(c) Presence of vessels (d) Broad hardy leaves

127. In some animal groups, the body is found divided into compartments with at least some organs/organ repeated. This characteristic feature is named as

(a) Segmentation (b) Metamerism
(c) Metagenesis (d) Metamorphosis

128. Which one of the following shows isogamy with non-flagellated gametes?

(a) Sargassum (b) Ectocarpus
(c) Ulothrix (d) Spirogyra

129. What will you look for to identify the sex of the following?

(a) Male frog – A copulatory pad on the first digit of the hind limb
(b) Female cockroach – Anal cerci
(c) Male shark – Claspers borne on pelvic fin
(d) Female ascaris – Sharply curved posterior end

130. Keel is the characteristic feature flower of

(a) Tulip (b) Indigofera
(c) Aloe (d) Tomato

131. The pteridophytes are mostly-

(a) Heterosporous (b) homosporous but a few are heterosporous
(c)Aquatic (d) Trees

132. Ginger is a stem which can be differentiated from root because it

(a) stores food
(b) has nodes and internodes
(c) lacks chlorophyll
(d) grows parallel to ground

133. In Arthropods respiratory organs are -

(a) Gills
(c) Book lungs or Trachea
(b) Book Gills
(d)All

134. Archegoniophore is present in

(a) Chara (b) Adiantum
(c) Funaria (d) Marchantia

135. An example of edible underground stem is

(a) Carrot (b) Groundnut
(c) Sweet potato (d) Potato

136. The 'walking fern' is named so because

(a) its spores are able to walk
(b) it is dispersed through the agency of walking animals
(c) it propagates vegetatively by its leaf tips
(d) it known how to walk by itself

137. Which one of the following is considered first terrestrial plants to be evolved having xylem and phloem?

(a) Bryophyte (b) Gymnosperms
(c) Pteridophytes (d)Angiosperms

138. Gametophytic generation in Fern is represented by

(a) sorus containing sporangia
(b) heart shaped prothallus
(c) underground rhizomatous part of the plant body
(d) main plant body

139. Which one of the following groups of animals is correctly matched with its one characteristic feature without even a single exception?

(a) Chordate – Possess a mouth provided with an upper and a lower jaw
(b) Chondrichthyes – Possess cartilaginous endoskeleton
(c) Mammalian – Give birth to young ones
(d) Reptilian – Possess 3 chambered heart with one incompletely divided Ventricle

140. Which one is blood sucker -

(a) Nereis- (b) Hirudinaria (Leech)
(c) Pheretima (Earthworm) (d)All

141. A hilum is a scar on the

(a) Seed, where funicle was attached.
(b) Fruit, where it was attached to pedicel.
(c) Fruit, where style was present.
(d) Seed, where micropyle was present.

142. Which of the following plants is used to extract the blue dye?

(a) Trifolium (b) Indigofera
(c) Lupin (d) Cassia

143. The correct floral formula of chilli is:

(a) $\oplus \varphi K_{(5)}\overset{\curvearrowleft}{C}_{(5)}A_5G_{(2)}$ (b) $\oplus \varphi K_{(5)}C_{(5)}A_{(5)}G_2$
(c) $\oplus \varphi K_5\overset{\curvearrowleft}{C}_5 A_{(5)}G_2$ (d) $\oplus \varphi K_{(5)}C_5A_5G_{(2)}$

144. Body cavity is the cavity present between body wall and gut wall. In some animals the body cavity is not lined by mesoderm. Such animals are called

(a) Acoelomate (b) Pseudocoelomate
(c) Coelomate (d) Haemocoelomate

145. Root is covered at the apex by a thimble-like structure called

(a) Root cap (b) Radicle
(c) Coleorhiza (d) Coleoptile

146. The inner surface of hollow organs are lined by

(a) columnar epithelium
(b) compound epithelium
(c) squamous epithelium
(d) ciliated epithelium

147. True coelom appear in which of the following during evolution?

(a) Echinodermata (b) Annelida
(c) Platyhelminthes (d) Aschelminthes

148. Which one of the following statements is wrong?

(a) Algin is obtained from red algae, and carrageen an from brown algae
(b) Agar-agar is obtained from Gelidium and Gracilaria
(c) Laminaria and Sargassum are used as food
(d) Algae increase the level of dissolved oxygen in the immediate environment

149. Venation is the pattern of arrangement of

(a) floral organs
(b) flower in inflorescence

(c) veins and veinlets in a lamina
(d) all of them

150. An important evolutionary character of selaginella is
(a) rhizophore
(b) strobili
(c) hetrosporous nature
(d) ligule

151. Functions of root are
(a) Absorption of water and mineral from soil
(b) Anchoring of plant in soil
(c) Storage of food material and synthesis of plant growth regulator
(d) All of these

152. Which one of the following statements is correct?
(a) The seed in grasses is not endospermic.
(b) Mango is a parthenocarpic fruit.
(c) A proteinaceous aleurone layer is present in maize grain.
(d) A sterile pistil is called a staminode.

153. How many plants in the list given below have composite fruits that develop from an inflorescence? Walnut, poppy, radish, fig, pineapple, apple, tomato, mulberry.
(a) Four (b) Five
(c) Two (d) Three

154. Whorled, simple leaves with reticulate venation are present in
(a) Calotropis (b) Neem
(c) China rose (d) Alstonia

155. The tissue which forms the basic structure of lymphoid organs, spleen etc, is :
(a) Lymphoid tissue (b) Cartilage tissue
(c) Elastic tissue (d) Areolar tissue

156. Which one of the following is responsible for peat formation?
(a) Marchantia (b) Riccia
(c) Funaria (d) Sphagnum

157. Annelids-
(a)Are aquatic (marine, freshwater), terrestrial, freeliving and sometimes parasite
(b) Have neural system which consists of paired ganglia connected by lateral nerves to double ventral nerve cord
(c)Non-segmented .
(d) a and b

158. Economically important insects are -
(a) Apis (Honey bee) (b) Bombyx (Silkworm)
(c) Laccifer(Lac insect) (d)All

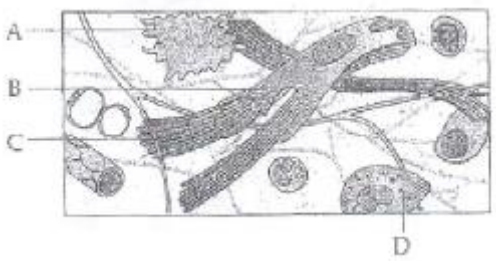
159. A prothallus is
(a) a structure in pteridophytes formed before the thallus develops.
(b) a sporophytic free living structure formed in pteridophytes.
(c) a gametophytic free living structure formed in pteridophytes.
(d) a primitive structure formed after fertilization in pteridophytes

160. Aestivation of petals in the flower of cotton is correctly shown in

161. The mature seeds of plants such as gram and pea, possess no endosperm, because
(a) These plants are not angiosperms.
(b) There is no double fertilization in them.
(c) Endosperm is not formed in them.
(d) Endosperm gets used up by the developing embryo during seed development.

162. Which of the following is not a rhizome?
(a) Colocasiav (b) Lotus
(c) Ginger (d) Turmeric

163. Given below is the diagrammatic sketch of a certain type of connective tissue identify the parts labelled A, B, C and D and select the right option about them



Options:
(a) A: Mast cell, B: Marcophage, C: Fibroblast, D: Collagen fibres
(b) A: Macrophage, B: Collagen fibres, C: Fibroblast, D: Mast cell
(c) A: Mast cell, B: Collagen fibres, C: Fibroblast, D: Macrophage
(d) A: Macrophage, B: Fibroblast, C: Collagen fibres, D: Mast cell

164. One example of animals having a single opening to the outside that serves both as mouth as well as anus is
(a) Octopus (b) Asterias
(c) Ascidia (d) Fasciola

165. Which one is not a Aschelminthes?
(a) Ascaris {Roundworm)
(b) Wuchereria (Filarial worm)
(c) Ancylostoma (Hookworm)
(d) Flatworm

166. Which of the following gametophyte is not independent free living?
(a) Funaria (b) Marchantia
(c) Pteris (d) Pinus

167. Which type of tissue correctly matches with its location?

Tissue	Location
(a) Smooth muscle	Wall of intestine
(b) Areolar tissue	Tendons
(c) Transitional epithelium	Tip of nose
(d) Cuboidal epithelium	Lining of stomach

168. In the five-kingdom classification, Chlamydomonas and Chlorella have been included in

(a) Algae (b) Plantae
(c) Monera (d) Protista

169. Match the name of the animal (column I), with one characteristics (column II), and the phylum/ class (column III) to which it belongs:

Column-I	Column-II	Column-III
(a) Petromyzon	Ectoparasite	Cyclostomata
(b) Icthyophis	Terrestrial	Reptilian
(c) Limulus	Body covered by chitinous exoskeleton	Pisces
(d) Adamsia	Radially symmetrical	Porifera

170. Phyllode is present in

(a) Asparagus (b) Euphorbia
(c) Australian Acacia (d) Opuntia

171. Corm is

(a) underground vertical stem
(b) underground root
(c) underground shoot
(d) horizontal stem

172. To which one of the following categories does the adipose tissue belong?

(a) Epithelial (b) Connective
(c) Muscular (d) Neural

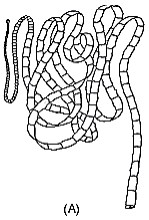
173. Which one of the following is not a connective tissue?

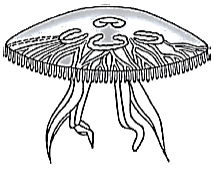
(a) Bone (b) Cartilage
(c) Blood (d) Muscles

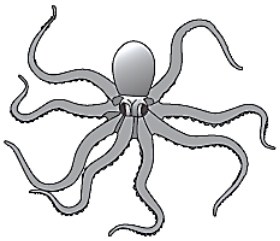
174. Which of the following shows whorled phyllotaxy?

(a) Mustard (b) China rose
(c) Alstonia (d) Calotropis

175. The figures (A-D) show four animals. Select the correct option with respect to a common characteristic of two of these animals.


(A)


(B)


(C)


(D)

(a) A and D respire mainly through body wall
(b) B and C show radial symmetry
(c) A and B have cnidoblasts for self-defence
(d) C and D have a true coelom

176. Which one is wrongly matched?

(a) Gemma cups - Marchantia
(b) Biflagellate zoospores - Brown algae
(c) Uniflagellate gametes- Polysiphonia
(d) Unicellular organism -Chlorella

177. Molluscs are -

(a) Unsegmented (b) Soft bodied
(c) Shelled (d)All of the above

178. Ventral surface of earthworm is marked by the presence of-

(a) Digestive canal (b) Blood vessel
(c) Genital pores (d) Hearts

179. How many of the following substances are secreted by exocrine glands? mucus, thyroxine, saliva, earwax, insulin, oil, milk, digestive enzymes, melatonin and adrenalin:-

(a) Four (b) Five (c) Six (d) seven

180. The giant redwood tree (Sequoia sempervirens) is a/an

(a) angiosperm
(b) free fern
(c) pteridophyte
(d) gymnosperm

SECTION-II

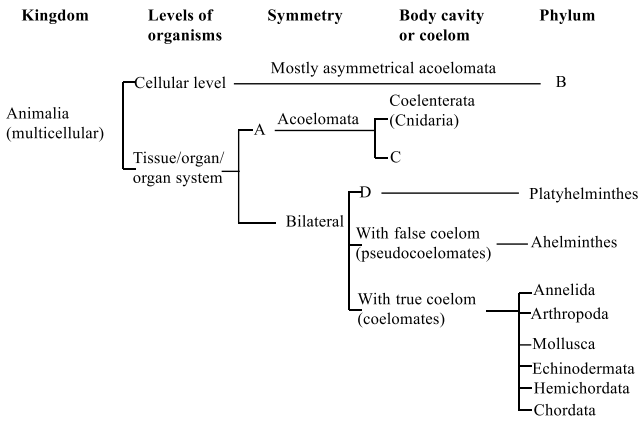
181. In pteridophyta and gymnosperms, which cells are present in place of companion cell?

(a) Sclereids (b) Albuminous cells
(c) Idioblasts (d) None of these

182. Haversian canal is situated in

(a) Glandular connective tissue
(b) Skeletal connective tissue
(c) Fibrous connective tissue
(d) Nervous tissue

183. Choose the correct label for A, B, C and D in the broad Classification of Kingdom Animalia based on common fundamental features as given below.



(a)

A	B	C	D
Bilateral	Porifera	Ctenophora	Coelomate

(b)

A	B	C	D
Radial	Porifera	Ctenophora	Acoelomate

(c)

A	B	C	D
Bilateral	Porifera	Ctenophora	Coelomate

(d)

A	B	C	D
Radial	Ctenophora	Porifera	Acoelomate

184. Which one of the following sets of animals share a four chambered heart?

(a) Amphibians, Reptiles, Birds (b) Crocodiles, Birds, Mammals

(c) Crocodiles, Lizards, Turtles (d) Lizards, Mammals, Birds

185. Select the correct statement:

(a) Gymnosperms are both homosporous and heterosporous

(b) Salvinia, ginkgo and Pinus all are gymnosperms

(c) Sequoia is one of the tallest trees

(d) The leaves of gymnosperms are not well adapted to extremes of climate

186. True coelom appeared first in the course of evolution of-

(a) Aschelminthes (b) Chordata

(c) Echinodermata (d)Annelida

187. The root region is arranged proximal to distal part in the following manner

(a) Zone of cell elongation– Zone of cell maturation – Zone of cell division

(b) Zone of cell division – Zone of cell elongation – Zone of cell maturation

(c) Zone of cell maturation– Zone of cell elongation – Zone of cell division

(d) Zone of cell maturation – Zone of cell division – Zone of cell elongation

188. Which of the following is/are the function of coelom?

(a) Absorb shock or provide hydrostatic skeleton

(b) Support shock or provide hydrostatic skeleton

(c) Allow muscles to grow independently of the body wall

(d) All of these

189. Flowers are zygomorphic in

(a) Gulmohar (b) Tomato

(c) Datura (d) Mustard

190. Roots developed from parts of the plant other than radicle are called

(a) Tap roots (b) Fibrous roots

(c) Adventitious roots (d) Nodular roots

191. Male gametophyte of Cycas differs from that of angiosperms in

(a) cutting of two vegetative cells called prothallial cells and a stalk cell in reproducing a pollen tube with a tube nucleus and two ciliated motile male gametes

(b) producing two male gametes

(c) starting its formation in site

(d) producing a pollen tube and a tube nucleus

192. Which of the following represents the correct combination without any exception?

Characteristics **Class**

(a) Mammary gland, hair on body pinnate two pairs of limbs. Mammalian

(b) Mouth ventral, gills without operculum skin with placoid scales; Chondrichthyes
persistent notochord.

(c) Sucking and circular mouth laws absent integument without scales; Cyclostomata
paired appendages.

(d) Body covered with feathers, skin most and glandular, fore limbs Aves
than wings; lungs with air sacs.

193. Choose the true statement:

(a) Animals like annelids, arthropods,aschelminthes, molluscs, helminchordates and chordates possess bilateral symmetry.

(b) Most of the animals possess bilateral symmetry.

(c) Polyhelminthes was the first phylum during evolution to exhibit bilateral symmetry.

(d) All of these

194. Isogamous condition with non-flagellated gametes is found in

(a) Chlamydomonas (b) Spirogyra

(c) Volvox (d) Fucus

195. Which is present in the vascular bundles of gymnosperms?

(a) Tracheids (b) Vessels

(c) Companion cells (d) All of these

196. Stems modified into flat green organs performing the functions of leaves are known as:

(a) Cladodes (b) Phyllodes

(c) Phylloclade's (d) Scales

197. Examine the figure given below and select the correct option giving all the four parts (A, B, C and D) correctly identified.

(a) A: Archegoniophore, B: Female thallus, C: Gemma cup, D: Rhizoids

(b) A: Archegoniophore, B: Female thallus, C: Bud, D: Food

(c) A: Seta, B: Sporophyte, C: Protonema, D: Rhizoids

(d) A: Antheridiophore, B: Male thallus, C: Globule, D: Roots

198. The inner walls of large blood vessels are formed by

(a) pseudostratified epithelium

(b) squamous epithelium

(c) ciliated epithelium

(d) columnar epithelium

199. In earthworm, genital papillae occur in segments-

(a) 16and17 (b)16and18

(c)17and18 (d)17and19

200. Identify a pair of the following plants, which show modification of axillary buds into tendrils and hooks respectively.

(I) Hugonia (II) Duranta

(III) Passiflora (IV) Dioscorea

(a) I and II (b) II and III

(c) III and I (d) IV and I