

HORIZON ACADEMY[®] Since 2003

Medical | IIT-JEE | Foundations

(Divisions of Horizon Study Circle Pvt. Ltd.)

Name.:

Date :

Test No.:

Subject Code.:

Time : 3 Hrs.

M.M. : 720

HORIZON TEST SERIES for Medical Entrance Exam. 2016

[Test No. 14]

INSTRUCTIONS FOR STUDENTS

1. Read each question carefully.
2. It is mandatory to use Blue/Black Ball Point Pen to darken the appropriate circle in the answer sheet.
3. Mark should be dark and should complete fill the circle.
4. Rough work must be done on the Question Paper, no additional sheet will be provided for this purpose.
5. Do not use white-fluid or any other rubbing material on answer sheet. No change in the answer once marked.
6. Student cannot use log tables and calculators or any other material in the examination hall.
7. Before attempting the question paper, student should ensure that the test paper contains all pages and no page is missing.
8. Each correct answer carries four marks. One mark will be deducted for each incorrect answer from the total score.
9. Before handing over the answer sheet to the invigilator, candidate should check the particulars have been filled and marked correctly.
10. Immediately after the prescribed examination time is over, the answer sheet to be returned to the invigilator.
11. Use of Calculator and other Electronic device is not permitted.

Test No. 14

Topics of The Test

Physics	Physical world, Units and measurements, Motion in a straight line, Motion in a plane, Laws of motion, Work, Energy and power, System of particles and rotational motion, Gravitation.
Chemistry	Some basic concepts of chemistry, States of matter, Atomic structure, Chemical bonding, Classification of elements, Redox reaction, Equilibrium.
Biology	Zoology : Animal reproduction, Reproduction in organism, Animal Physiology (Digestion, Respiration, Circulation, Excretion, Endocrine, Movement and Locomotion), Cockroach. Botany : Genetics (Molecular basis of inheritance and principles of inheritance) and Plant Physiology (Respiration, Photosynthesis, Plant water relation, Mineral nutrition, Plant growth).

Test No. 14

[PHYSICS]

1. If the magnetic flux is represented in weber, then the unit of magnetic induction will be

(A) $\frac{Wb}{m^2}$	(B) $Wb \times m$
(C) $Wb \times m^2$	(D) $\frac{Wb}{m}$
2. Density of liquid in CGS system is 0.625 gcm^{-3} . What is its magnitude in SI system ?

(A) 0.625	(B) 0.0625
(C) 0.00625	(D) 625
3. If $p = \frac{RT}{V-b} e^{-\alpha V/RT}$, then dimensional formula of α is

(A) p	(B) R
(C) T	(D) V
4. The velocity v (in cm/s) of a particle is given in terms of time t (in second) by the equation

$$v = at + \frac{b}{t+c}$$
 The dimensions of a , b and c are

a	b	c
(A) $[L^2]$	$[T]$	$[LT^2]$
(B) $[LT^2]$	$[LT]$	$[L]$
(C) $[LT^{-2}]$	$[L]$	$[T]$
(D) $[L]$	$[LT]$	$[T^2]$
5. The values of two resistors are $R_1 = (6 \pm 0.3) \text{ k}\Omega$ and $R_2 = (10 \pm 0.2) \text{ k}\Omega$. The percentage error in the equivalent resistance when they are connected in parallel is

(A) 5.125%	(B) 2%
(C) 3.87%	(D) 7%
6. A car starts from rest and accelerates uniformly to a speed of 180 km/h in 10 s. The distance covered by the car in this time interval is

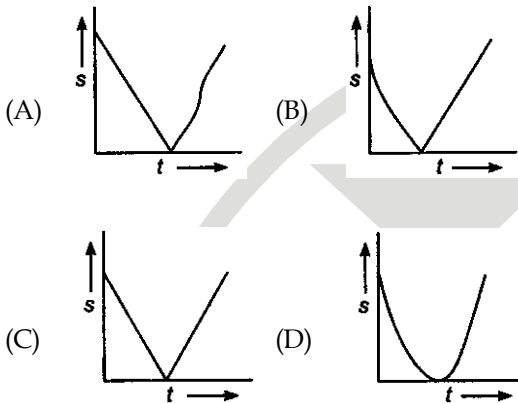
(A) 500 m	(B) 250 m
(C) 100 m	(D) 200 m
7. A particle moving along X-axis has acceleration f , at time t , given by $f = f_0 \left(1 - \frac{t}{T}\right)$, where f_0 and T are constants. The particle at $t = 0$ has zero velocity. In the time interval between $t = 0$ and the instant when $f = 0$, the particle's velocity (v_x) is

(A) $f_0 T$	(B) $\frac{1}{2} f_0 T^2$
(C) $f_0 T^2$	(D) $\frac{1}{2} f_0 T$
8. A body is released from a great height falls freely towards the earth. Another body is released from the same height exactly a second latter. Then the separation between two bodies, 2 s after the release of the second body is, nearly

(A) 15 m	(B) 20 m
(C) 25 m	(D) 30 m

Space for Rough Work

9. A ball is thrown vertically upwards. Which of the following plots represents the speed-time graph of the ball during its flight if the air resistance is not ignored ?



10. A stone of mass m is tied to a string and is moved in a vertical circle of radius r making n rev/min. The total tension in the string when the stone is at the lowest point is :

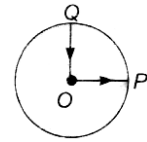
- (A) mg (B) $m(g + \pi nr^2)$
 (C) $m(g + nr)$ (D) $m\left[g + \frac{\pi^2 n^2 r}{900}\right]$

11. A string is wound round the rim of a mounted flywheel of mass 20 kg and radius 20 cm. A steady pull of 25 N is applied on the cord. Neglecting friction and mass of the string, the angular acceleration of the wheel is

- (A) 50 s^{-2} (B) 25 s^{-2}
 (C) 12.5 s^{-2} (D) 6.25 s^{-2}

12. A cyclist starts from the centre O of a circular park of radius 1 km, reaches the edge P of the park, then cycles along the circumference and returns to the centre along QO as shown in the figure. If the round trip takes 10 min, the net displacement and average speed of the cyclist (in metre and kilometre per hour) are

- (A) 0, 1
 (B) $\frac{\pi+4}{2}, 0$
 (C) $21.4, \frac{\pi+4}{2}$
 (D) 0, 21.4



13. Two wires of the same material and same length but diameters in the ratio 1 : 2 are stretched by the same force. The potential energy per unit volume of the two wires will be in the ratio

- (A) 1 : 2 (B) 4 : 1
 (C) 2 : 1 (D) 16 : 1

14. A billiards player hits a stationary ball by an identical ball to pocket the target ball in a corner pocket that is at an angle of 35° with respect to the direction of motion of the first ball. Assuming the collision as elastic and that frictional and rotational motions are not important, the angle made by the target ball with respect to the incoming ball is

- (A) 35° (B) 50°
 (C) 55° (D) 60°

15. The height y and the distance x along the horizontal plane of a projectile on a certain planet (with no surrounding atmosphere) are given by $y = (8t - 5t^2)m$ and $x = 6t$ metre, where t is in second. The velocity of projection is

- (A) 8 ms^{-1}
 (B) 6 ms^{-1}
 (C) 10 ms^{-1}
 (D) Not obtained from the data

16. Two projectiles are fired at different angles with the same magnitude of velocity, such that they have the same range. At what angles they might have been projected ?

- (A) 25° and 65° (B) 35° and 75°
 (C) 10° and 50° (D) None of these

Space for Rough Work

17. At what angle must the two forces $(x + y)$ and $(x - y)$ act so that the resultant may be $\sqrt{x^2 + y^2}$?

(A) $\cos^{-1}\left[-\frac{x^2 + y^2}{2(x^2 - y^2)}\right]$ (B) $\cos^{-1}\left[-\frac{2(x^2 - y^2)}{x^2 + y^2}\right]$

(C) $\cos^{-1}\left[-\frac{(x^2 + y^2)}{(x^2 - y^2)}\right]$ (D) $\cos^{-1}\left[-\frac{(x^2 - y^2)}{(x^2 + y^2)}\right]$

18. Which of the following is incorrect ?

(A) $\mathbf{a} \cdot (\mathbf{b} + \mathbf{c}) = \mathbf{b} \cdot \mathbf{a} + \mathbf{a} \cdot \mathbf{c}$

(B) $\mathbf{a} \times (\mathbf{b} + \mathbf{c}) = (\mathbf{a} \times \mathbf{c}) + (\mathbf{a} \times \mathbf{b})$

(C) $\mathbf{a} \times (\mathbf{b} \cdot \mathbf{c}) = (\mathbf{a} \times \mathbf{b}) \cdot (\mathbf{a} \times \mathbf{c})$

(D) $(\mathbf{b} \cdot \mathbf{c})\mathbf{a} = \mathbf{a}(\mathbf{c} \cdot \mathbf{b})$

19. The vectors from origin to the points A and B are $\mathbf{A} = 3\hat{i} - 6\hat{j} + 2\hat{k}$ and $\mathbf{B} = 2\hat{i} + \hat{j} - 2\hat{k}$ respectively. The area of the triangle OAB is

(A) $\frac{5}{2}\sqrt{17}$ (B) $\frac{2}{5}\sqrt{17}$

(C) $\frac{3}{5}\sqrt{17}$ (D) $\frac{5}{3}\sqrt{17}$

20. A and B are two vectors and θ is the angle between them, if $|\mathbf{A} \times \mathbf{B}| = \sqrt{3}(\mathbf{A} \cdot \mathbf{B})$ the value of θ is

(A) 60° (B) 45°

(C) 30° (D) 90°

21. A monkey of mass m kg slides down a light rope attached to a fixed spring balance, with an acceleration a . The reading of this balance is w kg. Which of the following is wrong? (g = acceleration due to gravity)

(A) $m = \frac{wg}{g - a}$ (B) $m = w\left(1 + \frac{a}{g}\right)$

(C) the force of friction exerted by the rope on the monkey is $m(g - a)$ Newton

(D) the tension in the rope is wg Newton

22. An object of mass 10 kg moves at a constant speed 10 ms^{-1} . A constant force, that acts for 4 s on the object gives it a speed 2 ms^{-1} in opposite direction. The force acting on the object is

(A) -3 N (B) -30 N

(C) 3 N (D) 30 N

23. A body of mass 0.1 kg attains a velocity of 10 ms^{-1} in 0.1 s. The force acting on the body is

(A) 10 N (B) 0.01 N

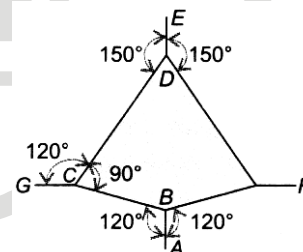
(C) 0.1 N (D) 100 N

24. A rocket of mass 1000 kg is to be projected vertically upwards. The gases are exhausted vertically downwards with velocity 100 ms^{-1} with respect to the rocket. What is the minimum rate of burning of fuel, so as to just lift the rocket upwards against the gravitational attraction? (Take $g = 10 \text{ ms}^{-2}$)

(A) 50 kgs^{-1} (B) 100 kgs^{-1}

(C) 200 kgs^{-1} (D) 400 kgs^{-1}

25. The adjacent figure is the part of a horizontally stretched net. Section AB is stretched with a force of 10 N. The tensions in the sections BC and BF are



(A) 10 N, 11 N

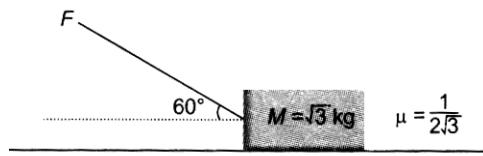
(B) 10 N, 6 N

(C) 10 N, 10 N

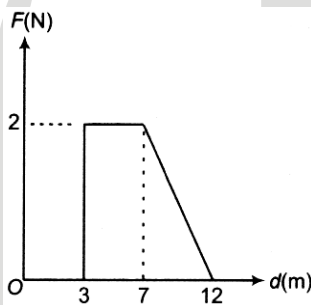
(D) can't be calculated due to insufficient data

Space for Rough Work

26. What is the maximum value of force F such that the block, shown in the arrangement does not move ?



- (A) 20 N (B) 10 N
(C) 12 N (D) 15 N
27. Force F on a particle moving in a straight line varies with distance d as shown in the figure. The work done on the particle during its displacement of 12 m is



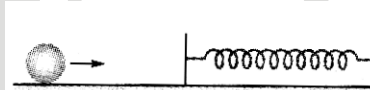
- (A) 21 J (B) 26 J
(C) 13 J (D) 18 J
28. A ball of mass m moves with speed v and strikes a wall having infinite mass and it returns with same speed, then the work done by the ball on the wall is
(A) zero (B) mv joule
(C) m/v joule (D) v/m joule
29. An open water tight railway wagon of mass 5×10^3 kg coasts at an initial velocity of 1.2 m/s without friction on a railway track. Rain falls vertically downwards into the wagon. What change occurs in kinetic energy of the wagon, when it has collected 10^3 kg of water ?

- (A) 900 J (B) 300 J
(C) 1560 J (D) 1200 J

30. A particle moves in a straight line with retardation proportional to its displacement. Its loss of kinetic energy for any displacement x is proportional to

- (A) x^2 (B) e^x
(C) x (D) $\log_e x$

31. A mass of 0.5 kg moving with a speed of 1.5 ms^{-1} on a horizontal smooth surface, collides with a nearly weightless spring of force constant $k = 50 \text{ Nm}^{-1}$. The maximum compression of the spring would be



- (A) 0.15 m (B) 0.12 m
(C) 1.5 m (D) 0.5 m

32. A body of mass m strikes another body at rest of mass $\frac{m}{9}$. Assuming the impact to be perfectly inelastic the fraction of the initial kinetic energy transformed into heat during the contact is

- (A) 0.1 (B) 0.2
(C) 0.5 (D) 0.64

33. A body of mass M moves with velocity v and collides elastically with another body of mass m ($M \gg m$) at rest, then the velocity of the body of mass m is

- (A) v (B) $2v$
(C) $v/2$ (D) 0

34. A small disc of radius 2 cm is cut from a disc of radius 6 cm. If the distance between their centres is 3.2 cm, what is the shift in the centre of mass of the disc ?

- (A) 0.4 cm (B) 2.4 cm
(C) 1.8 cm (D) 1.2 cm

Space for Rough Work

35. A constant torque of 3.14 Nm is exerted on a pivoted wheel. If the angular acceleration of the wheel is $4\pi \text{ rad s}^{-2}$, then the moment of inertia of the wheel is
 (A) 0.25 kg-m^2 (B) 2.5 kg-m^2
 (C) 4.5 kg-m^2 (D) 25 kg-m^2
36. The moment of inertia of a rod about an axis through its centre and perpendicular to it is $\frac{1}{12}ML^2$ (where M is the mass and L the length of the rod). The rod is bent in the middle so that the two halves make an angle of 60° . The moment of inertia of the bent rod about the same axis would be
 (A) $\frac{1}{48}ML^2$ (B) $\frac{1}{12}ML^2$
 (C) $\frac{1}{24}ML^2$ (D) $\frac{ML^2}{8\sqrt{3}}$
37. A particle of mass $m = 5$ units is moving with a uniform speed $v = 3\sqrt{2}$ units in the XOY plane along the line $y = x + 4$. The magnitude of the angular momentum of the particle about the origin is
 (A) 60 unit (B) $40\sqrt{2}$ unit
 (C) zero (D) 7.5 unit
38. Two bodies have their moments of inertia I and $2I$ respectively about their axis of rotation. If their kinetic energies of rotation are equal, their angular momenta will be in the ratio
 (A) 1 : 2 (B) $\sqrt{2} : 1$
 (C) 2 : 1 (D) $1 : \sqrt{2}$
39. A drum of radius R and mass M, rolls down without slipping along an inclined plane of angle θ . The frictional force
 (A) converts translational energy to rotational energy
 (B) dissipates energy as heat
 (C) decreases the rotational motion
 (D) decreases the rotational and translational motion
40. Two particles, initially at rest move towards each other under the effect of gravitational force of attraction. At the instant when their relative velocity is $3v$ where, v is the velocity of the slower particle, then the speed of the centre of mass of two given particles is
 (A) $1v$ (B) $2v$
 (C) $3v$ (D) zero
41. If g is the acceleration due to gravity on the surface of the earth, the gain in potential energy of an object of mass m raised from the earth's surface to a height equal to the radius R of the earth is
 (A) $\frac{mgR}{4}$ (B) $\frac{mgR}{2}$
 (C) mgR (D) $2mgR$
42. A particle of mass 10 g is kept on the surface of a uniform sphere of mass 100 kg and radius 10 cm. Find the work to be done against the gravitational force between them, to take the particle far away from the sphere (you may take $G = 6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$)
 (A) $13.34 \times 10^{-10} \text{ J}$ (B) $3.33 \times 10^{-10} \text{ J}$
 (C) $6.67 \times 10^{-9} \text{ J}$ (D) $6.67 \times 10^{-10} \text{ J}$
43. The satellite of mass m revolving in a circular orbit of radius r around the earth has kinetic energy E . Then its angular momentum will be
 (A) $\sqrt{\frac{E}{mr^2}}$ (B) $\frac{E}{2mr^2}$
 (C) $\sqrt{2Emr^2}$ (D) $\sqrt{2Emr}$

Space for Rough Work

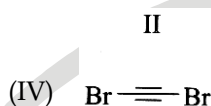
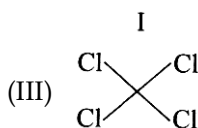
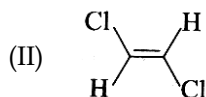
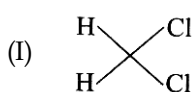
44. The earth revolves around the sun in one year. If distance between them becomes double, the new time period of revolution will be
 (A) $4\sqrt{2}$ years (B) $2\sqrt{2}$ years
 (C) 4 years (D) 8 years
45. A satellite is revolving around the earth in a circular orbit of radius 4 times that of the geosynchronous orbit. The time period of the satellite is
 (A) 16 days (B) 2 days
 (C) 4 days (D) 8 days
- [CHEMISTRY]**
46. The system that contains the maximum number of atoms is
 (A) 4.25 g of NH_3 (B) 8 g of O_2
 (C) 2 g of H_2 (D) 4 g of He
47. An element
 (A) is one type of atom
 (B) is two or more types of atom
 (C) has constant boiling point
 (D) has constant melting point
48. The mass of one mole of electron is
 (A) 9.1×10^{-28} g (B) 0.55 mg
 (C) 9.1×10^{-24} g (D) 6×10^{-12} g
49. What is the equivalent weight of SnCl_2 in the following reaction?
 $\text{SnCl}_2 + \text{Cl}_2 \longrightarrow \text{SnCl}_4$ (Mol. wt. of $\text{SnCl}_2 = 190$)
 (A) 95 (B) 45
 (C) 60 (D) 30
50. 10 g of a mixture of BaO and CaO requires 100 cm^3 of 2.5 M HCl to react completely. The percentage of calcium oxide in the mixture is approximately (given, molar mass of BaO = 153)
 (A) 52.6 (B) 55.1
 (C) 44.9 (D) 47.4
51. If the density of water is 1 g cm^{-3} then the volume occupied by one molecule of water is approximately
 (A) 18 cm^3 (B) 22400 cm^3
 (C) $6.02 \times 10^{-23} \text{ cm}^3$ (D) $3.0 \times 10^{-23} \text{ cm}^3$
52. Number of moles of MnO_4^- required to oxidise one mole of ferrous oxalate completely in acidic medium will be
 (A) 0.6 mol (B) 0.4 mol
 (C) 7.5 mol (D) 0.2 mol
53. If equal volumes of 1 M KMnO_4 and 1 M $\text{K}_2\text{Cr}_2\text{O}_7$ solutions are allowed to oxidise Fe(II) to Fe(III) in acidic medium then Fe(II) oxidised will be
 (A) more by KMnO_4
 (B) more by $\text{K}_2\text{Cr}_2\text{O}_7$
 (C) equal in both the cases
 (D) cannot be determined
54. The emission spectrum of hydrogen discovered first and the region of the electromagnetic spectrum in which it belongs, respectively are
 (A) Lyman, ultraviolet
 (B) Lyman, visible
 (C) Balmer, ultraviolet
 (D) Balmer, visible
55. The velocity of electron in second shell of hydrogen atom is
 (A) $10.94 \times 10^6 \text{ ms}^{-1}$
 (B) $18.88 \times 10^6 \text{ ms}^{-1}$
 (C) $1.888 \times 10^6 \text{ ms}^{-1}$
 (D) $1.094 \times 10^6 \text{ ms}^{-1}$
56. What is the wave number of 4th line in Balmer series of hydrogen spectrum? ($R = 1,09,677 \text{ cm}^{-1}$)
 (A) $24,630 \text{ cm}^{-1}$ (B) $24,360 \text{ cm}^{-1}$
 (C) $24,730 \text{ cm}^{-1}$ (D) $24,372 \text{ cm}^{-1}$

Space for Rough Work

57. Which of the following does not represent the mathematical expression for the Heisenberg's uncertainty principle?
- (A) $\Delta x \cdot \Delta p \geq h/(4\pi)$
 (B) $\Delta x \cdot \Delta v \geq h/(4\pi m)$
 (C) $\Delta E \cdot \Delta t \geq h/(4\pi)$
 (D) $\Delta E \cdot \Delta x \geq h/(4\pi)$
58. What is the frequency of a light wave whose period is 2.0×10^{-10} s ?
- (A) 5×10^9 s (B) 4×10^9 s
 (C) $5 \times 10^9 \text{ s}^{-1}$ (D) $4 \times 10^9 \text{ s}^{-1}$
59. The quantum of light energy is called
- (A) photon (B) neutron
 (C) electron (D) proton
60. The orbital angular momentum of a p-electron is given as
- (A) $\frac{h}{\sqrt{2\pi}}$ (B) $\frac{\sqrt{3}h}{2\pi}$
 (C) $\sqrt{\frac{2}{2}} \frac{h}{\pi}$ (D) $\frac{\sqrt{6}h}{2\pi}$
61. Which of the following sets of quantum numbers represents the 19th electron in chromium? ($Z = 24$ for Cr)
- (A) 4, 0, 0, 1/2 (B) 4, 1, -1, 1/2
 (C) 3, 2, 2, 1/2 (D) 3, 2, -2, 1/2
62. The only liquid non-metal present in periodic table is
- (A) chlorine (B) mercury
 (C) bromine (D) fluorine
63. Amongst the elements with following electronic configurations, which one of them may have the highest ionisation energy?
- (A) $[\text{Ne}]3s^2, 3p^3$
 (B) $[\text{Ne}]3s^2, 3p^2$
 (C) $[\text{Ar}]3d^{10}, 4s^2, 4p^3$
 (D) $[\text{Ne}]3s^2, 3p^1$
64. An atom has electronic configuration $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^3, 4s^2$, you will place it in
- (A) fifth group (B) fifteenth group
 (C) second group (D) third group
65. Which one of the following is the correct order of the size of the ions ?
- (A) $\text{Na}^+ > \text{Mg}^{2+} > \text{F}^- > \text{O}^{2-}$
 (B) $\text{O}^{2-} > \text{F}^- > \text{Na}^+ > \text{Mg}^{2+}$
 (C) $\text{Mg}^{2+} > \text{Na}^+ > \text{F}^- > \text{O}^{2-}$
 (D) $\text{O}^{2-} > \text{F}^- > \text{Mg}^{2+} > \text{Na}^+$
66. The electron affinity of Be is similar to
- (A) He (B) B
 (C) Li (D) Na
67. Which of the following is correct ?
- (A) Radius of $\text{Ca}^{2+} < \text{Cl}^- < \text{S}^{2-}$
 (B) Radius of $\text{Cl}^- < \text{S}^{2-} < \text{Ca}^{2+}$
 (C) Radius of $\text{S}^{2-} < \text{Cl}^- = \text{Ca}^{2+}$
 (D) Radius of $\text{S}^{2-} < \text{Cl}^- < \text{Ca}^{2+}$
68. Bond polarity of diatomic molecule is because of
- (A) difference in electron affinities of two atoms
 (B) difference in electronegativities of two atoms
 (C) difference in ionisation potentials
 (D) all of the above
69. Out of $\text{N}_2\text{O}, \text{SO}_2, \text{I}_3^+, \text{I}_3^-, \text{H}_2\text{O}, \text{NO}_2^-$ and N_3^- , the linear species are
- (A) $\text{NO}_2^-, \text{I}_3^+, \text{H}_2\text{O}$ (B) $\text{N}_2\text{O}, \text{I}_3^+, \text{N}_3^-$
 (C) $\text{N}_2\text{O}, \text{I}_3^-, \text{N}_3^-$ (D) $\text{N}_3^-, \text{I}_3^+, \text{SO}_2$

Space for Rough Work

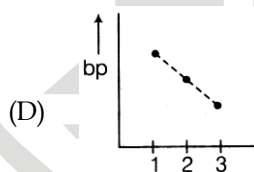
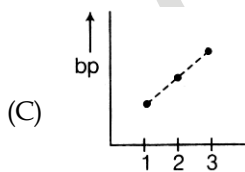
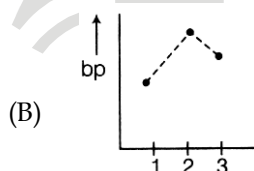
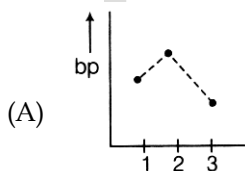
70. The compound that will have a permanent dipole moment among the following is



- (A) I (B) II
(C) III (D) IV

71. Hydrogen bonding is maximum in
(A) ethyl chloride (B) triethyl amine
(C) ethanol (D) diethyl ether

72. Which one of the following graphs represent the correct order of boiling points (b.p.) of ethane (1), ethyl alcohol (2) and acetic acid (3) ?



73. The number of nodal planes present in σ^* s anti-bonding orbitals is
(A) 1 (B) 2
(C) 0 (D) 3

74. Density of carbon monoxide is maximum at
(A) 2 atm and 600 K
(B) 0.5 atm and 273 K
(C) 6 atm and 1092 K
(D) 4 atm and 500 K

75. If p, V, M, T and R are the symbols of pressure, volume, molecular weight, temperature and gas constant respectively, what is the equation of density of ideal gas?

- (A) $\frac{RT}{pM}$ (B) $\frac{p}{RT}$
(C) $\frac{M}{V}$ (D) $\frac{pM}{RT}$

76. Dalton's law of partial pressure is applicable to which one of the following systems?

- (A) $\text{NH}_3 + \text{HCl}$ (B) $\text{NO} + \text{O}_2$
(C) $\text{H}_2 + \text{Cl}_2$ (D) $\text{CO} + \text{H}_2$

77. Equal weights of CH_4 and H_2 are mixed in a container at 25°C . Fraction of total pressure exerted by methane is

- (A) $\frac{1}{2}$ (B) $\frac{1}{3}$
(C) $\frac{1}{9}$ (D) $\frac{8}{9}$

78. At what temperature will the RMS velocity of SO_2 be the same as that of O_2 at 303 K

- (A) 403 K (B) 303 K
(C) 606 K (D) 273 K

79. Different gases at the same temperature must have

- (A) same volume
(B) same pressure
(C) same average KE
(D) same van der Waal's constant

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80. van der Waals' equation for n mole of a gas is
- (A) $\left(p + \frac{n^2 a}{V^2}\right)(V - nb) = nRT$
- (B) $\left(p + \frac{na}{V^2}\right)(V - nb) = RT$
- (C) $\left(p + \frac{a}{V^2}\right)(V - b) = nRT$
- (D) $\left(p + \frac{an^2}{V^2}\right)(V - b) = RT$
81. During the evaporation of liquid
- (A) the temperature of the liquid will rise
- (B) the temperature of the liquid will fall
- (C) may rise or fall depending on the nature
- (D) the temperature remains unaffected
82. In the reaction, $H_2(g) + Cl_2(g) \rightleftharpoons 2HCl(g)$
- (A) $K_p \neq K_c$ (B) $K_p = K_c$
- (C) $K_p > K_c$ (D) $K_p < K_c$
83. The reaction favoured at low pressure is
- (A) $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$
- (B) $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$
- (C) $N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$
- (D) $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$
84. Which of the following molecules acts as Lewis acid ?
- (A) $(CH_3)_3B$ (B) $(CH_3)_2O$
- (C) $(CH_3)_3P$ (D) $(CH_3)_3N$
85. How many litres of water must be added to 1 L of an aqueous solution with a pH of 1 to create an aqueous solution of pH of 3 ?
- (A) 49 L (B) 99 L
- (C) 79 L (D) 59 L
86. 100 mL of HCl + 35 mL of NaOH, colour of methyl orange in the solution will be
- (A) red
- (B) yellow
- (C) can't be predicted
- (D) methyl orange is not suitable indicator
87. Which of the following salts does not get hydrolysed in water ?
- (A) $KClO_4$ (B) NH_4Cl
- (C) CH_3COONa (D) None of these
88. Given the reaction for the discharge of a cobalt-cadmium battery
- $$2Co(OH)_3 + Cd + 2H_2O \longrightarrow 2Co(OH)_2 + Cd(OH)_2$$
- What species is oxidised during the discharge of the battery?
- (A) Co^{3+} (B) Co^{2+}
- (C) Cd (D) Cd^{2+}
89. The equivalent mass of $KMnO_4$ in the following reaction is
- $$MnO_4^- + 5Fe^{2+} + 8H^+ \longrightarrow Mn^{2+} + 5Fe^{2+} + 4H_2O$$
- (M = Molecular mass)
- (A) $\frac{M}{2}$ (B) $\frac{M}{3}$
- (C) $\frac{M}{4}$ (D) $\frac{M}{5}$
90. Which of the following is the most powerful oxidising agent ?
- (A) F_2 (B) O_2
- (C) Br_2 (D) I_2

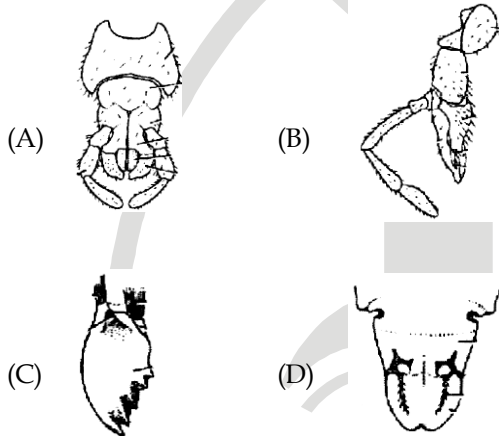
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[ZOOLOGY]

91. About how many times does the nymph of the *Periplaneta americana* undergo moulting before becoming an adult?

- (A) 4 (B) 2
(C) 17 (D) 13

92. Which of the following figures shows the mandible of cockroach?



93. In cockroach, the ootheca is formed by the secretion of

- (A) phallic gland
(B) collateral gland
(C) mushroom gland
(D) conglobate gland

94. Which of the following correctly depicts the dental formula of a child?

- (A) $\frac{2112}{2112}$ (B) $\frac{2120}{2120}$
(C) $\frac{2123}{2123}$ (D) $\frac{2111}{2111}$

95. Which of the following statements is correct?

- (A) Paneth cells secrete pepsinogen
(B) Parietal cells secrete hydrochloric acid

(C) Argentaffin cells secrete mucus

(D) Chief cells secrete gastrin

96. Brunner's gland is present in

- (A) liver (B) duodenum
(C) oesophagus (D) stomach

97. Crypts of Lieberkuhn are present in

- (A) pancreas and secrete pancreatic juice
(B) small intestine and secrete digestive enzymes
(C) stomach and secrete dilute HCl
(D) stomach and secrete trypsin.

98. Point out the wrong enzymatic reaction.

- (A) Sucrose $\xrightarrow{\text{Invertase}}$ Glucose + Fructose
(B) Lactose $\xrightarrow{\text{Lactase}}$ Glucose + Fructose
(C) Pepsinogen $\xrightarrow{\text{HCl}}$ Pepsin
(D) Maltose $\xrightarrow{\text{Maltase}}$ Glucose + Glucose

99. Which of the following is not the function of large intestine?

- (A) Absorption of water
(B) Nutrient absorption
(C) Secretion of mucus to lubricate faeces
(D) Temporary storage of faeces in rectum

100. Which structure of man is similar to spiracle of cockroach?





- (A) Nostril (B) Bronchiole
(C) Lungs (D) Alveoli

101. A person breathing normally at rest, takes in and expels approximately half a litre of air during each respiratory cycle. This is called

- (A) inspiratory reserve volume
(B) tidal volume
(C) expiratory reserve volume
(D) vital capacity

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102. The ventilation movements of the lungs in mammals are governed by
 (A) muscular walls of lung
 (B) diaphragm
 (C) coastal muscles
 (D) both (B) and (C)
103. Consider the following four statements (i - iv) and select the correct option stating which ones are true (T) and which ones are false (F).
 (i) Vital capacity is a measure of maximum inspiration.
 (ii) During gaseous exchange the gases diffuse from high partial pressure to low partial pressure.
 (iii) Carbon dioxide cannot be transported with haemoglobin
 (iv) Earthworm respire through parapodia.
- | | | | |
|------------|-------------|--------------|-------------|
| (i) | (ii) | (iii) | (iv) |
| (A) T | F | T | F |
| (B) F | F | T | F |
| (C) T | T | F | F |
| (D) F | T | F | F |
104. The partial pressure of oxygen is maximum in
 (A) alveolar air (B) arterial blood
 (C) venous blood (D) expired air
105. Visiting high mountains may cause altitude sickness in men living in plain areas. Prime cause of this is
 (A) excess of CO₂ in blood
 (B) decreased efficiency of haemoglobin
 (C) decreased partial pressure of oxygen
 (D) decreased proportion of oxygen in air.
106. Blood does not clot inside blood vessels due to the presence of
 (A) heparin (B) fibrinogen
 (C) vitamin K (D) thrombin

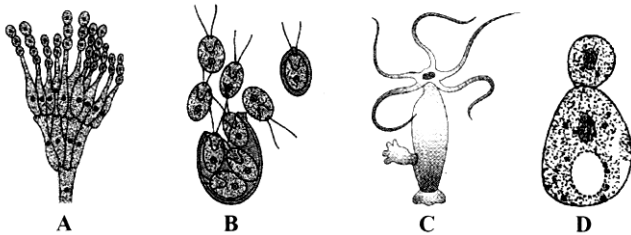
107. Which of the following match is correct ?
- | Structure | Percentage | Function |
|--|------------|---------------------------------|
| (A)  | 0.3 - 0.5 | Phagocytic |
| (B)  | 0.5 - 1.0 | Secrete histamine and serotonin |
| (C)  | 30 - 40 | Defence against parasites |
| (D)  | 30 - 40 | Allergic reactions |
108. Prothrombin required for blood clotting is produced in
 (A) stomach (B) liver
 (C) spleen (D) pancreas
109. In which one of the following pairs, two terms represent the same thing?
 (A) Lymphocyte - Leucocyte
 (B) Plasma - Serum
 (C) Mitral valve - Bicuspid valve
 (D) Atrioventricular node - pacemaker
110. An adult human with average health has systolic and diastolic pressure as
 (A) 120 mm Hg and 80 mm Hg
 (B) 50 mm Hg and 80 mm Hg
 (C) 80 mm Hg and 80 mm Hg
 (D) 70 mm Hg and 120 mm Hg
111. The rate of heart beat is regulated by the integrated activity of inhibiting and accelerating effects occurring in which part of the brain ?
 (A) Cerebellum
 (B) Diencephalon
 (C) Medulla oblongata
 (D) Pons Varolii

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112. Which of the following pairs of organisms are uricotelic?
 (A) Cartilaginous fish and mammals
 (B) Reptiles and mammals
 (C) Birds and insects
 (D) Bony fish and lizards
113. Which one of the following does not constitute a part of single uriniferous tubule?
 (A) Distal convoluted tubule
 (B) Collecting duct
 (C) Bowman's capsule
 (D) Loop of Henle
114. The dotted appearance of cortex of kidney is due to
 (A) ducts of Bellini (B) convoluted parts
 (C) loop of Henle (D) collecting tubes
115. Of the total nephrons, juxtamedullary nephrons constitute
 (A) 15% (B) 45%
 (C) 65% (D) 85%
116. Which of the following is removed from the filtration at loop of Henle?
 (A) Amino acids (B) Hormones
 (C) Water (D) Glucose
117. The function of renin is
 (A) stimulation of corpus luteum
 (B) vasodilation
 (C) to reduce blood pressure
 (D) conversion of angiotensinogen to angiotensin-I
118. Passage of ova through female reproductive tract is facilitated by
 (A) ciliary movement
 (B) amoeboid movement
 (C) flagellar movement
 (D) cyclosis.
119. Microfilaments are involved in
 (A) amoeboid movement
 (B) ciliary movement
 (C) muscular movement
 (D) both (A) and (B)
120. Dark bands are
 (A) A-band (B) B-band
 (C) I-band (D) Z-line
121. The type of muscle fibre present in the wall of alimentary canal is
 (A) smooth muscle fibre
 (B) striped muscle fibre
 (C) cardiac muscle fibre
 (D) both (A) and (B)
122. Endocrine glands have _____ to carry their secretions to the specific organ.
 (A) capillaries (B) tubules
 (C) no ducts (D) ducts
123. Which of the following hormones is not a polypeptide?
 (A) LH (B) FSH
 (C) Insulin (D) Thyroxine
124. Which one of the following endocrine glands stores its secretion in the extracellular space before discharging it into the blood?
 (A) Testis (B) Thyroid
 (C) Pancreas (D) Adrenal
125. Epinephrine is
 (A) hormone of the adrenal gland
 (B) nephrostomal part of mesoderm
 (C) clusters of glomeruli in mammalian kidney
 (D) frontal lobe of nephridia
126. Which of the following is called emergency gland of the body?
 (A) Testis (B) Adrenal
 (C) Thymus (D) Pituitary

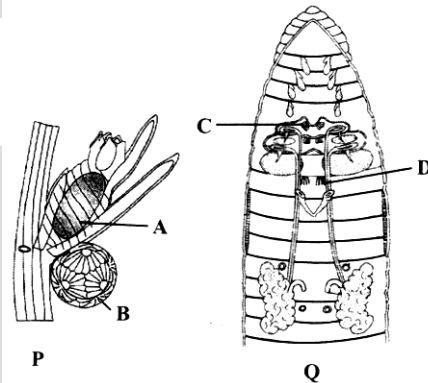
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127. Reabsorption of Na^+ is controlled by which one of the following hormones?
 (A) Aldosterone (B) Estrogen
 (C) Glucocorticoids (D) Testosterone
128. Which one of the following is termed temporary gland?
 (A) Pineal (B) Thymus
 (C) Pancreas (D) Kidney
129. Melatonin is secreted by
 (A) pineal body (B) skin
 (C) pituitary gland (D) thyroid
130. Which one of the following hormone never reaches to cytoplasm?
 (A) Estrogen (B) FSH
 (C) Progesterone (D) Testosterone
131. Estrogen and testosterone are steroid hormones, and most likely bind to
 (A) membrane ion channels
 (B) enzyme-linked membrane receptors
 (C) G-protein coupled membrane receptors
 (D) cytoplasmic receptors
132. Refer the given figures and select the correct option.



- (A) C and D reproduce by budding that includes nuclear division only
 (B) All of these reproduce by the asexual mode of reproduction
 (C) B represents multiple fission in an alga
 (D) A shows spore formation in a moneran

133. Figure P represents the reproductive organs of plant Chara and figure Q represents the reproductive organs of animal earthworm. Select the option which correctly identifies male reproductive organs of the two organisms.



- (A) A and D (B) B and C
 (C) A and C (D) B and D
134. Which of the following options is correct ?
- | Haploid | Diploid |
|----------------------------|------------------------|
| (A) Secondary oocyte | Primary spermatocyte |
| (B) Secondary spermatocyte | Secondary oocyte |
| (C) Primary oocyte | Secondary spermatocyte |
| (D) Ovum | Spermatid |
135. The structures derived from ectoderm are
 (i) Pituitary gland
 (ii) Cornea
 (iii) Kidneys
 (iv) Notochord
 (A) (i) and (iii) (B) (ii) and (iii)
 (C) (i) and (ii) (D) (ii) and (iv)

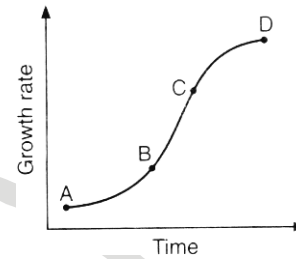
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[BOTANY]

136. When a cell is kept in 0.5 M solution of sucrose, its volume does not change. If the same cell is placed in 0.5 M solution of NaCl, the volume of cell will :
- (A) Increase
(B) Decrease
(C) Cell will be plasmolysed
(D) No change
137. Root pressure is measured by :
- (A) potometer
(B) Barometer
(C) Manometer
(D) Auxanometer
138. In hypertonic solution, a cell's water potential :
- (A) Increases
(B) Decreases
(C) First increases and then decreases
(D) Remains unchanged
139. All the following involves osmosis except:
- (A) Movement of water from soil to root
(B) Movement of water from root hairs to endodermis and pericycle
(C) Movement of water between xylem elements
(D) Movement of water from xylem to mesophyll cells of leaves
140. Water absorption through roots can be increased by :
- (A) Increased transpiration
(B) Increased rate of photosynthesis
(C) Decreased transpiration
(D) Decreased absorption of ions
141. What happens when a formalin preserved filament of Spirogyra is placed in a hypertonic sugar solution ?
- (A) It loses turgidity
(B) It gains turgidity
(C) It is plasmolysed
(D) Nothing happens
142. Fully opened stomata of leaf occupies what % of leaf area?
- (A) 0.5% (B) 5%
(C) 10% (D) 1-2%
143. Guttation is phenomenon.
- (A) Controlled
(B) Uncontrolled
(C) Both (A) and (B)
(D) Not known
144. 'Plastocyanin' (PC) contains :
- (A) Mo (B) Mn
(C) Fe (D) Cu
145. Minerals are absorbed by a plant from the soil by a process :
- (A) Independent of water absorption
(B) Dependent on water absorption
(C) Dependent on strength of solutions
(D) Dependent on osmosis
146. EDTA is much used in tissue cultures, it is a :
- (A) Hormone (B) Vitamin
(C) Buffer (D) Nutrient
147. Phosphorus works as carrier of :
- (A) Cobalt (B) Zinc
(C) Magnesium (D) Copper
148. Photolysis of water is caused by :
- (A) PS-I (B) PS-II
(C) PS-I and PS-II (D) none of these
149. 'Wreath anatomy' is feature of :
- (A) Temperate grasses
(B) Tropical grasses
(C) Both (A) and (B)
(D) None of these
150. The increase in photosynthesis occurs till CO₂ concentration is increased upto :
- (A) 300 ppm (B) 600 ppm
(C) 4000 ppm (D) 6000 ppm
151. During day light hours, the rate of photosynthesis is higher than that of respiration and the ratio of O₂ produced to consumed is :
- (A) 1 : 1 (B) 10 : 1
(C) 50 : 1 (D) 5 : 1
152. Two pigments common in all groups of algae are:
- (A) Chlorophyll-a and b
(B) Chlorophyll-b and phycocyanin
(C) Phycocyanin and carotene
(D) Carotene and chlorophyll-a

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153. Chlorophyll absorbs :
 (A) Red light only
 (B) Blue light only
 (C) Blue as well as red light
 (D) Green light
154. Ganong's respirometer is used to measure :
 (A) Rate of aerobic respiration
 (B) Rate of anaerobic respiration
 (C) R.Q.
 (D) None of the above
155. Which is associated with the enzyme aconitase in Krebs' cycle ?
 (A) Mn (B) Fe
 (C) Zn (D) Cu
156. In the process of respiration, 180 g of glucose and 192 g of O_2 produce :
 (A) 132 g of CO_2 + 54 g of H_2O
 (B) 264 g CO_2 + 108 g H_2O
 (C) 528 g CO_2 + 216 g H_2O
 (D) only CO_2
157. Translocation of carbohydrates in flowering plants occurs in the form of :
 (A) Glucose (B) Sucrose
 (C) Starch (D) Maltose
158. Which is correct sequence in Krebs' cycle?
 (A) Iso-citric acid \rightarrow Oxalosuccinic acid \rightarrow α -ketoglutaric acid
 (B) Oxalosuccinic acid \rightarrow iso-citric acid \rightarrow α -ketoglutaric acid
 (C) α -ketoglutaric acid \rightarrow iso-citric acid \rightarrow oxalosuccinic acid
 (D) Iso-citric acid \rightarrow α -ketoglutaric acid \rightarrow oxalosuccinic acid
159. The R.Q. of $C_{39}H_{72}O_6$ is :
 (A) 2.71 (B) 1.34
 (C) 0.718 (D) 3.250
160. The net gain of energy from one molecule of sucrose in aerobic respiration is :
 (A) 8 ATP (B) 38 ATP
 (C) 40 ATP (D) 80 ATP
161. The portion 'BC' of curve represents phase of growth.



- (A) Log phase (B) Lag phase
 (C) Steady phase (D) None of these
162. 'Triple response' is important bioassay of :
 (A) ABA (B) Auxins
 (C) GA (D) Ethylene
163. What is the site of vernalization?
 (A) Stem (B) Leaves
 (C) Roots (D) Apical meristem
164. The classical experiments on phototropism were performed by :
 (A) Darwin and Lamarck
 (B) Lamarck and Boysen-Jensen
 (C) Boysen-Jensen and Darwin
 (D) de Vries and Paal
165. A dwarf pea plant was treated with GA, it grew as the pure tall plant. If this treated plant was crossed with a pure tall plant the phenotypic ratio of the F_2 is likely to be :
 (A) All tall
 (B) 50% tall, 50% dwarf
 (C) 75% tall, 25% dwarf
 (D) All dwarf
166. Cytokinin was first of all separated from :
 (A) Nicotiana
 (B) Cocos
 (C) Sperms of Herring fish
 (D) Zea mays
167. Auxin (IAA) was isolated by Thimann in 1935 from :
 (A) Bryophytes (B) Algae
 (C) Fungi (D) Pteridophytes
168. Which is called soluble RNA?
 (A) m-RNA (B) t-RNA
 (C) r-RNA (D) None of these

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169. The nucleic acid as the infective part of viruses was proved by :
 (A) Hershey and Chase
 (B) Fraenkel Conrat
 (C) Khorana
 (D) Kornberg
170. If DNA is heated at 80°C for 15 minutes, what will happen ?
 (A) Nucleotides separate
 (B) H-bonds between two chains (strands) break
 (C) Breaks into thousands of pieces
 (D) Nothing will happen
171. How many nucleotides are present in a molecule of DNA having 120 adenine and 120 guanine bases ?
 (A) 240 (B) 480
 (C) 60 (D) 120
172. How many out of 64 possible triplet codons, code for amino acids ?
 (A) 63 (B) 64
 (C) 62 (D) 61
173. Nobel prize of Dr. H.G. Khorana was given for :
 (A) Artificial synthesis of gene for alanyl t-RNA
 (B) DNA-ligase discovery
 (C) Telling base sequence of alanine t-RNA
 (D) All of the above
174. Ambiguous codon in nature is :
 (A) UAG (B) UGA
 (C) UAA (D) UUU
175. Which one of the following is not a part of transcription unit in DNA ?
 (A) The inducer (B) A terminator
 (C) A promoter (D) The structural gene
176. Read the following four statements (I - IV):
 (I) In transcription, adenine pairs with uracil
 (II) Regulation of lac operon by repressor is referred to as positive regulation
 (III) The human genome has approximately 50,000 genes
 (IV) Haemophilia is a sex-linked recessive disease
- How many of the above statements are right ?
 (A) Two (B) Three
 (C) Four (D) One
177. What is it that forms the basis of DNA fingerprinting?
 (A) The relative proportions of purines and pyrimidines in DNA
 (B) The relative difference in the DNA occurrence in blood, skin and saliva
 (C) The relative amount of DNA in the ridges and grooves of the fingerprints
 (D) Satellite DNA occurring as highly repeated short DNA segments.
178. In F₂ progeny of dihybrid cross, the expected genotypic proportions of individuals homozygous for both dominant characters is :
 (A) 3/16 (B) 9/16
 (C) 12/16 (D) 1/16
179. Which is called a 'pleiotropic gene'
 (A) Control characters of human beings only
 (B) Control a character of plants
 (C) Control one character in association with other
 (D) Control more than one character
180. Lethal factors were reported in plants by :
 (A) Cuenot (B) Baur
 (C) Bateson (D) Morgan

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