

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. 13]

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. 13

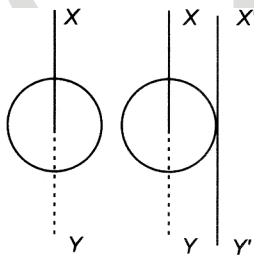
Topics of The Test

Physics	System of Particles & Rotational Motion + Gravitation.
Chemistry	Equilibrium.
Biology	Zoology : Digestion, Respiration, Circulation, Excretion, Endocrine System. Botany : Plant growth and movement.

Test No. 13

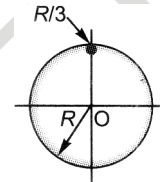
[PHYSICS]

- Identify the correct statement for the rotational motion of a rigid body.
 - Individual particles of the body do not undergo accelerated motion
 - The centre of mass of the body remains unchanged
 - The centre of mass of the body moves uniformly in a circular path
 - Individual particles and centre of mass the body undergo an accelerated motion
- A wheel has angular acceleration of 3.0 rad s^{-2} and an initial angular speed of 2.00 rad s^{-1} . In a time of 2 s it has rotated through an angle (in radian) of
 - 6
 - 10
 - 12
 - 4
- The moment of inertia of a circular disc of radius 2 m and mass 1 kg about an axis passing through the centre of mass but perpendicular to the plane of the disc is 2 kg-m^2 . Its moment of inertia about an axis parallel to this axis but passing through the edge of the disc is (see the given figure).

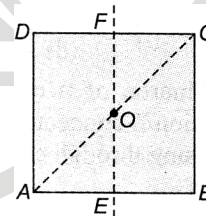


- 8 kg-m^2
- 4 kg-m^2
- 10 kg-m^2
- 6 kg-m^2

- From a circular disc of radius R and mass 9M, a small disc of radius $\frac{R}{3}$ is removed from the disc, the moment of inertia of the remaining disc about an axis perpendicular to the plane of the disc and passing through O is



- $4MR^2$
 - $\frac{40}{9}MR^2$
 - $10MR^2$
 - $\frac{37}{9}MR^2$
- Radius of gyration of disc of mass 50 g and radius 2.5 cm about an axis passing through its centre of gravity and perpendicular to the plane is
 - 6.54 cm
 - 3.64 cm
 - 1.77 cm
 - 0.88 cm
 - For the given uniform square lamina ABCD, whose centre is O



- $\sqrt{2}I_{AC} = I_{EF}$
- $I_{AD} = 3I_{EF}$
- $I_{AD} = 4I_{EF}$
- $I_{AC} = \sqrt{2}I_{EF}$

Space for Rough Work

7. Moment of inertia of a body does not depend upon its
 (A) mass (B) axis of rotation
 (C) shape (D) angular velocity
8. The instantaneous angular position of a point on a rotating wheel is given by the equation

$$Q(t) = 2t^3 - 6t^2$$

The torque on the wheel becomes zero at

- (A) $t = 0.5$ s (B) $t = 0.25$ s
 (C) $t = 2$ s (D) $t = 1$ s
9. A round disc of moment of inertia I_2 about its axis perpendicular to its plane and passing through its centre is placed over another disc of moment of inertia I_1 rotating with an angular velocity ω about the same axis. The final angular velocity of the combination of discs is

- (A) $\frac{I_2\omega}{I_1 + I_2}$ (B) ω
 (C) $\frac{I_1\omega}{I_1 + I_2}$ (D) $\frac{(I_1 + I_2)\omega}{I_1}$

10. A solid sphere is rotating about a diameter at an angular velocity ω . If it cools so that its radius reduces to $1/n$ of its original value, its angular velocity becomes

- (A) $\frac{\omega}{n}$ (B) $\frac{\omega}{n^2}$
 (C) $n\omega$ (D) $n^2\omega$

11. A uniform disc of mass M and radius R is mounted on an axle supported in frictionless bearings. A light cord is wrapped around the rim of the disc and a steady downward pull T is exerted on the cord. The angular acceleration of the disc is

- (A) $\frac{MR}{2T}$ (B) $\frac{2T}{MR}$
 (C) $\frac{T}{MR}$ (D) $\frac{MR}{T}$

12. If a sphere is rolling, then the ratio of its rotational kinetic energy to the total kinetic energy is
 (A) 1:2 (B) 2:5
 (C) 2:7 (D) 5:7

13. An object of mass m is attached to light string which passes through a hollow tube. The object is set into rotation in a horizontal circle of radius r_1 . If the string is pulled shortening the radius to r_2 , the ratio of new kinetic energy to the original kinetic energy is

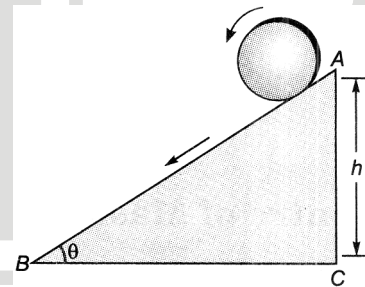
- (A) $\left(\frac{r_2}{r_1}\right)^2$ (B) $\left(\frac{r_1}{r_2}\right)^2$
 (C) $\frac{r_1}{r_2}$ (D) $\frac{r_2}{r_1}$

14. A cylinder of 10 kg is rolling in a plane with an initial velocity of 10 ms^{-1} . If the coefficient of friction between the surface and cylinder is 0.5 then before slipping, it will cover ($g = 10 \text{ ms}^{-2}$)

- (A) 2.5 m (B) 5 m
 (C) 7.5 m (D) 10 m

15. If a sphere rolling on an inclined plane with velocity v without slipping, the vertical height of the incline in terms of velocity will be

- (A) $\frac{7v}{10g}$ (B) $\frac{7v^2}{10g}$
 (C) $\frac{2v^2}{5g}$ (D) $\frac{3v}{5g}$



Space for Rough Work

16. Three equal masses of 1 kg each are placed at the vertices of an equilateral triangle PQR and a mass of 2 kg is placed at the centroid O of the triangle which is at a distance of $\sqrt{2}$ m from each of the vertices of the triangle. The force, in newton, acting on the mass of 2 kg is
 (A) 2 (B) $\sqrt{2}$
 (C) 1 (D) zero
17. The height vertically above the earth's surface at which the acceleration due to gravity becomes 1% of its value at the surface is (R is the radius of the earth)
 (A) $8R$ (B) $9R$
 (C) $10R$ (D) $20R$
18. The mass of the moon is $\frac{1}{81}$ of the earth but gravitational pull is $\frac{1}{6}$ of the earth. It is due to the fact that
 (A) the radius of the moon is $\frac{81}{6}$ of the earth
 (B) the radius of the earth is $\frac{9}{\sqrt{6}}$ of the moon
 (C) moon is the satellite of the earth
 (D) None of the above
19. The ratio of the accelerations due to gravity at the bottom of a deep mine and that on the surface of the earth is $978/980$. Find the depth of the mine if the density of the earth is uniform throughout and the radius of the earth is 6300 km.
 (A) 12.86 km (B) 13.0 km
 (C) 25.38 km (D) 90.9 km
20. Two particles of equal mass go round a circle of radius R under the action of their mutual gravitational attraction. The speed v of each particle is
 (A) $\sqrt{\left(\frac{GM}{2R}\right)}$ (B) $\frac{1}{2R}\sqrt{\left(\frac{1}{GM}\right)}$
 (C) $\frac{1}{2}\sqrt{\left(\frac{GM}{R}\right)}$ (D) $\sqrt{\left(\frac{4GM}{R}\right)}$
21. The mass of moon is 1% of mass of earth. The ratio of gravitational pull of earth on moon and that of moon on earth will be
 (A) 1:1 (B) 1:10
 (C) 1:100 (D) 2:1
22. Two planets have radii r_1 and r_2 and densities d_1 and d_2 respectively. Then the ratio of accelerations due to gravity on them is
 (A) $r_1d_1 : r_2d_2$ (B) $r_1d_2 : r_2d_1$
 (C) $r_1^2d_1 : r_2^2d_2$ (D) $r_1d_1^2 : r_2d_2^2$
23. The density of newly discovered planet is twice that of earth. The acceleration due to gravity at the surface of the planet is equal to that at the surface of the earth. If the radius of the earth is R , the radius of the planet would be
 (A) $2R$ (B) $4R$
 (C) $\frac{1}{4}R$ (D) $\frac{1}{2}R$
24. The speed of earth's rotation about its axis is ω . Its speed is increased to x times to make the effective acceleration due to gravity equal to zero at the equator. Then x is
 (A) 1 (B) 8.5
 (C) 17 (D) 34
25. The depth at which the value of acceleration due to gravity becomes $1/n$ time the value at the surface is (R be the radius of the earth)
 (A) R/n (B) R/n^2
 (C) $R\frac{(n-1)}{n}$ (D) $\frac{Rn}{(n-1)}$

Space for Rough Work

26. If both the mass and radius of earth decrease by 1%, the value of
- (I) acceleration due to gravity would increase by 1%
 - (II) acceleration due to gravity would decrease by 1%
 - (III) escape velocity from earth's surface would decrease by 1%
 - (IV) the gravitational potential energy of a body on earth's surface will remain unchanged
- (A) (I) and (III) (B) (I) and (IV)
 (C) (II) and (IV) (D) (III) and (IV)

27. If the mass of moon is $\frac{1}{90}$ of earth's mass, its radius is $\frac{1}{3}$ of earth's radius and if g is acceleration due to gravity on earth, then the acceleration due to gravity on moon is
- (A) $\frac{g}{3}$ (B) $\frac{g}{90}$
 (C) $\frac{g}{10}$ (D) $\frac{g}{9}$

28. The energy required to move a satellite of mass m from an orbit of radius $2R$ to $3R$ around earth of mass M is
- (A) $\frac{GMm}{12R}$ (B) $\frac{GMm}{R}$
 (C) $\frac{GMm}{8R}$ (D) $\frac{GMm}{2R}$

29. The change in the gravitational potential energy when a body of mass m is raised to a height nR above the surface of the Earth is (Here R is the radius of the earth)
- (A) $\left(\frac{n}{n+1}\right)mgR$ (B) $\left(\frac{n}{n-1}\right)mgR$
 (C) $nmgR$ (D) $\frac{mgR}{n}$

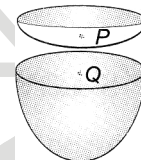
30. Two bodies of masses m_1 and m_2 are initially at rest at infinite distance apart. They are then allowed to move towards each other under mutual gravitational attraction. Their relative velocity of approach at a separation distance r between them is

(A) $\left[2G\frac{(m_1 - m_2)}{r}\right]^{1/2}$ (B) $\left[\frac{2G}{r}(m_1 + m_2)\right]^{1/2}$
 (C) $\left[\frac{r}{2G(m_1 m_2)}\right]^{1/2}$ (D) $\left[\frac{2G}{r}m_1 m_2\right]^{1/2}$

31. An asteroid of mass m is approaching earth, initially at a distance of $10R_e$ with speed v_i . It hits the earth with a speed v_f (R_e and M_e are radius and mass of earth), then

(A) $v_f^2 = v_i^2 + \frac{2Gm}{M_e R_e} \left(1 - \frac{1}{10}\right)$
 (B) $v_f^2 = v_i^2 + \frac{2GM_e}{R_e} \left(1 + \frac{1}{10}\right)$
 (C) $v_f^2 = v_i^2 + \frac{2GM_e}{R_e} \left(1 - \frac{1}{10}\right)$
 (D) $v_f^2 = v_i^2 + \frac{2Gm}{R_e} \left(1 - \frac{1}{10}\right)$

32. If a spherical shell is cut into two pieces along a chord as shown in figure and point P and Q have gravitational intensities I_p and I_Q respectively, then

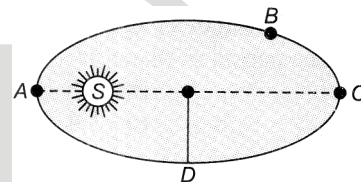


(A) $I_p > I_Q$ (B) $I_p = I_Q = 0$
 (C) $I_p = I_Q \neq 0$ (D) $I_p < I_Q$

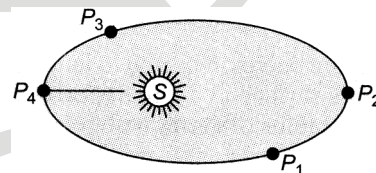
Space for Rough Work

33. Escape velocity at surface of earth is 11.2 kms^{-1} , Escape velocity from a planet whose mass is the same as that of earth and radius $1/4$ that of earth, is
 (A) 2.8 kms^{-1} (B) 15.6 kms^{-1}
 (C) 22.4 kms^{-1} (D) 44.8 kms^{-1}
34. The time period T of the moon of planet mars (mass M_m) is related to its orbital radius R (G = gravitational constant) as
 (A) $T^2 = \frac{4\pi^2 R^3}{GM_m}$ (B) $T^2 = \frac{4\pi^2 GR^3}{M_m}$
 (C) $T^2 = \frac{2\pi R^3 G}{M_m}$ (D) $T^2 = 4\pi M_m GR^3$
35. A satellite in a circular orbit of radius R has a period of 4 h. Another satellite with orbital radius $3R$ around the same planet will have a period (in hour)
 (A) 16 (B) 4
 (C) $4\sqrt{27}$ (D) $4\sqrt{8}$
36. A body is orbiting around earth at a mean radius which is two times as greater as the parking orbit of a satellite, the period of body is
 (A) 4 days (B) 16 days
 (C) $2\sqrt{2}$ days (D) 64 days
37. Suppose the gravitational force varies inversely as the n th power of the distance. The time period of a planet in circular orbit of radius R around sun will be proportional to
 (A) $R^{(n-1)/2}$ (B) $R^{(n+1)/2}$
 (C) R^{n-1} (D) R^{n+1}
38. Near earth's surface, time period of a satellite is 4 h. Find its time period at height $4R$ from the centre of earth
 (A) 32 h (B) $\left(\frac{1}{8\sqrt{2}}\right) \text{ h}$
 (C) $8\sqrt{2}$ h (D) 16 h

39. The orbital velocity of an artificial satellite in a circular orbit just above the earth's surface is v . The orbital velocity of a satellite orbiting at an altitude of half of the radius, is
 (A) $\frac{3}{2}v_0$ (B) $\frac{2}{3}v_0$
 (C) $\sqrt{\frac{2}{3}}v_0$ (D) $\sqrt{\frac{3}{2}}v_0$
40. A planet revolves in elliptical orbit around the sun. The linear speed of the planet will be maximum at



- (A) A (B) B
 (C) C (D) D
41. A geostationary satellite is revolving around the earth. To make it escape from gravitational field of earth, its velocity must be increased
 (A) 100% (B) 41.4%
 (C) 50% (D) 59.6%
42. A spaceship is launched into a circular orbit of radius R close to the surface of earth. The additional velocity to be imparted to the spaceship in the orbit to overcome the earth's gravitational pull is (g = acceleration due to gravity)
 (A) $1.414 Rg$ (B) $1.414\sqrt{Rg}$
 (C) $0.414 Rg$ (D) $0.414\sqrt{Rg}$
43. As shown in figure, a planet revolves in elliptical orbit around the sun. Where is KE of the planet maximum?



- (A) At P_4 (B) At P_1
 (C) At P_2 (D) At P_3

Space for Rough Work

44. Two satellites are in the parking orbits around the earth. If the mass of one satellite is 10 times that of the other, then the ratio of their periods of revolution is their respective orbits will be

(A) 1:1 (B) $1:\sqrt{10}$

(C) $\sqrt{10}:1$ (D) 10:1

45. If the distance between the earth and the sun were half its present value, the number of days in a year would have been

(A) 129 (B) 182.5

(C) 730 (D) 64.5

[CHEMISTRY]

46. 28 g of N_2 and 6 g of H_2 were mixed. At equilibrium 17 g NH_3 was produced. The weights of N_2 and H_2 at equilibrium are respectively

(A) 11 g, 0 g (B) 1 g, 3 g

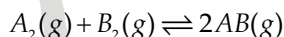
(C) 14 g, 3 g (D) 11 g, 3 g

47. At $490^\circ C$, the equilibrium constant for the synthesis of HI is 50, the value of K for the dissociation of HI will be

(A) 20.0 (B) 2.0

(C) 0.2 (D) 0.02

48. Given the reaction between two gases represented by A_2 and B_2 to give the compound $AB(g)$

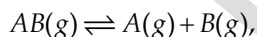


At equilibrium the concentration of $A_2 = 3.0 \times 10^{-3} M$, of $B_2 = 4.2 \times 10^{-3} M$ and of $AB = 2.8 \times 10^{-3} M$. If the reaction takes place in a sealed vessel at $527^\circ C$, then the value of K_c will be

(A) 2.0 (B) 1.9

(C) 0.62 (D) 4.5

49. For the reaction,

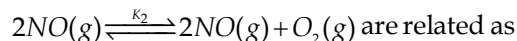
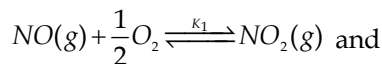


AB is 33% dissociated at a total pressure of p . Therefore, p is related to K_p by one of the following options.

(A) $p = K_p$ (B) $p = 3K_p$

(C) $p = 4K_p$ (D) $p = 8K_p$

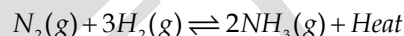
50. Equilibrium constant, K_1 and K_2 for the following equilibria,



(A) $K_2 = \frac{1}{K_1}$ (B) $K_2 = K_1^2$

(C) $K_2 = \frac{K_1}{2}$ (D) $K_2 = \frac{1}{K_1^2}$

51. For the reversible reaction,



the equilibrium shifts in forward direction

(A) by increasing the concentration of $NH_3(g)$

(B) by decreasing the pressure

(C) by decreasing the concentrations of $N_2(g)$ and $H_2(g)$

(D) by increasing pressure and decreasing temperature

52. For the equilibrium, $H_2 + I_2 \rightleftharpoons 2HI$, which of the following will affect the equilibrium constant ?

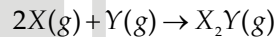
(A) Pressure change

(B) Concentration change

(C) Catalyst

(D) Temperature change

53. At the equilibrium of the reaction,



the number of moles of X_2Y at equilibrium is affected by the

(A) temperature and pressure

(B) temperature only

(C) pressure only

(D) temperature, pressure and catalyst used

54. When hydrogen molecules decomposed into its atoms, which condition gives maximum yield of H-atoms ?

(A) High temperature and low pressure

(B) Low temperature and high pressure

(C) High temperature and high pressure

(D) Low temperature and low pressure

Space for Rough Work

55. For reaction $3X + Y \rightleftharpoons X_3Y, \Delta H = +ve$, amount of X_3Y can be changed by
 (A) changing temperature
 (B) changing pressure
 (C) changing temperature and pressure
 (D) changing temperature, pressure and adding catalyst
56. The dissociation constant of two acids HA_1 and HA_2 are 3.0×10^{-4} and 1.8×10^{-5} , respectively. The relative strength of the acids is
 (A) 1 : 16 (B) 1 : 4
 (C) 4 : 1 (D) 16 : 1
57. For a weak acid, the incorrect statement is
 (A) its dissociation constant is low
 (B) its pK_a is very low
 (C) it is partially dissociated
 (D) solution of its sodium salt is alkaline in water
58. A weak acid H X has the dissociation constant 1×10^{-5} M. It forms a salt NaX on reaction with alkali. The degree of hydrolysis of 0.1 M solution of NaX is
 (A) 0.0001% (B) 0.01%
 (C) 0.1% (D) 0.15%
59. Which one of the following molecular hydrides acts as a Lewis acid ?
 (A) CH_4 (B) NH_3
 (C) H_2O (D) B_2H_6
60. 0.1 M solution of which of the following has almost unity degree of dissociation ?
 (A) Ammonium chloride
 (B) Potassium chloride
 (C) Sodium acetate
 (D) All of these
61. The strongest acid is
 (A) $CH \equiv CH$ (B) C_6H_6
 (C) C_2H_6 (D) CH_3OH
62. An acid solution of 0.005 M has a pH of 5. The degree of ionisation of acid is
 (A) 0.1×10^{-2} (B) 0.2×10^{-2}
 (C) 0.5×10^{-4} (D) 0.6×10^{-6}
63. Which of the following solvents are aprotic ?
 I. NH_3 II. SO_2
 III. CH_3CN IV. CH_3CO_2H
 (A) I, II and III (B) I, III and IV
 (C) II and III (D) I and III
64. A monoprotic acid in 1.00 M solution is 0.01% ionised. The dissociation constant of this acid is
 (A) 1×10^{-8} (B) 1×10^{-4}
 (C) 1×10^{-6} (D) 1×10^{-5}
65. If 0.1 M of a weak acid is taken and its percentage of degree of ionisation is 1.34%, then its ionisation constant will be
 (A) 0.8×10^{-5} (B) 1.79×10^{-5}
 (C) 0.182×10^{-5} (D) None of these
66. The product of molar concentrations of hydrogen ions and hydroxide ions in a 0.01 M aqueous solution of sodium chloride is known as
 (A) hydrolysis constant of salt
 (B) dissociation constant of acid
 (C) dissociation constant of base
 (D) ionic product of water
67. One mole of ammonia was completely absorbed in one litre solution each of
 I. 1 M HCl II. 1 M CH_3COOH and
 III. 1 M H_2SO_4 at 298 K
 The decreasing order for the pH of the resulting solution is (given $K_b(NH_3) = 4.74$)
 (A) II>III>I (B) I>II>III
 (C) II>I>III (D) III>II>I

Space for Rough Work

68. pH of a solution produced when an aqueous solution of pH 6 is mixed with an equal volume of an aqueous solution of pH 3 is about
 (A) 3.3 (B) 4.3
 (C) 4.0 (D) 4.5
69. What is the value of K_{sp} of $\text{Fe}(\text{OH})_3$?
 (A) s^2 (B) $4s^3$
 (C) $27s^4$ (D) $64s^4$
70. The pH of a solution obtained by mixing 100 mL of a solution of pH = 3 with 400 mL of a solution of pH = 4
 (A) $7 - \log 2.8$ (B) $4 - \log 2.8$
 (C) $5 - \log 2.8$ (D) $3 - \log 2.8$
71. 0.023 g of sodium metal is reacted with 100 cm³ of water. The pH of the resulting solution is
 (A) 10 (B) 8
 (C) 9 (D) 12
72. The pH of 10^{-3} M solution of NaOH is
 (A) 3 (B) 11
 (C) 4 (D) 12
73. Calculate the normality of 250 mL aqueous solution of H_2SO_4 having pH = 0.00.
 (A) 0.25 N (B) 0.50 N
 (C) 1 N (D) 2 N
74. Both HCOOH and CH_3COOH solutions have equal pH. If $\frac{K_1}{K_2}$ (ratio of acid ionisation constants) of these acids is 4, their molar concentration ratio will be
 (A) 2 (B) 0.5
 (C) 4 (D) 0.25
75. When equal volumes of AgNO_3 and NaCl solution are mixed, the precipitation of AgCl ($K_{sp} = 1.81 \times 10^{-10}$) will occur with
 (A) 10^{-3} M (Ag^+) and 10^{-10} M (Cl^-)
 (B) 10^{-5} M (Ag^+) and 10^{-5} M (Cl^-)
 (C) 10^{-6} M (Ag^+) and 10^{-5} M (Cl^-)
 (D) 10^{-4} M (Ag^+) and 10^{-4} M (Cl^-)
76. Number of H^+ ions present in 250 mL of lemon juice of pH = 3 is
 (A) 1.50×10^{22} (B) 1.50×10^{23}
 (C) 1.506×10^{20} (D) 3.01×10^{21}
77. Which will have the minimum value of pK_b ?
 (A) OH^- (B) CH_3COO^-
 (C) Cl^- (D) HCOO^-
78. 100 mL of 0.1 M H_2SO_4 is added to 200 mL of 0.1 M NaOH. What is the pH of the resulting mixture?
 (A) 2 (B) 7
 (C) 10 (D) 12
79. At 90°C, pure water has H_3O^+ ion concentration of 10^{-6} mol/L. The K_w at 90°C is
 (A) 10^{-6} (B) 10^{-14}
 (C) 10^{-12} (D) 10^{-8}
80. pK_a of CH_3COOH is 4.74. The pH of 0.01 M CH_3COONa will be
 (A) 3.28 (B) 2.38
 (C) 8.37 (D) 3.87
81. Solution of 0.1 N NH_4OH and 0.1 NH_4Cl has pH 9.25. Then pK_b of NH_4OH is
 (A) 9.25 (B) 4.75
 (C) 3.75 (D) 8.25
82. For preparing a buffer solution of pH = 7.0, which buffer system you will choose?
 (A) $\text{H}_3\text{PO}_4, \text{H}_2\text{PO}_4^-$ (B) $\text{H}_2\text{PO}_4^-, \text{HPO}_4^{2-}$
 (C) $\text{HPO}_4^{2-}, \text{PO}_4^{3-}$ (D) $\text{H}_3\text{PO}_4, \text{PO}_4^{3-}$
83. A basic buffer solution is formed by selecting the pair
 (A) $\text{KCN}-\text{KOH}$
 (B) $\text{CH}_3\text{COOH}-\text{NaCl}$
 (C) $\text{NH}_4\text{OH}-\text{CH}_3\text{COONH}_4$
 (D) $\text{NaCl}-\text{NaOH}$

Space for Rough Work

84. The pK_b value of NH_3 is 5. Calculate the pH of the buffer solution, 1 L of which contains 0.01 M NH_4Cl and 0.10 M NH_4OH
- (A) 4 (B) 6
(C) 8 (D) 10
85. When 10 mL of 0.1 M acetic acid ($pK_a = 5.0$) is titrated against 10 mL of 0.1 M ammonia solution ($pK_b = 5.0$), the equivalence point occurs at pH
- (A) 5.0 (B) 6.0
(C) 7.0 (D) 9.0
86. Equimolar solutions of the following substances were prepared separately. Which one will record the highest pH value?
- (A) BaCl_2 (B) AlCl_3
(C) LiCl (D) BeCl_2
87. The solution of NH_4Cl is
- (A) acidic (B) alkaline
(C) neutral (D) coloured
88. The hydrolysis of sodium carbonate involves the reaction between
- (A) sodium ion and water
(B) Na^+ and OH^-
(C) CO_3^{2-} and water
(D) CO_3^{2-} and H^+
89. Which is a basic salt?
- (A) PbS (B) $2\text{PbCO}_3 \cdot \text{Pb(OH)}_2$
(C) PbSO_4 (D) PbCO_3
90. Relation between hydrolysis constant and dissociation constant are given. Which is the correct formula for MgCl_2 ?
- (A) $K_h = \frac{K_w}{K_a}$ (B) $K_h = \frac{K_w}{K_b}$
(C) $K_h = \frac{K_w}{K_a \times K_b}$ (D) $K_w = \frac{K_h}{K_b}$

[ZOOLOGY]

91. Match the following

'A'	'B'
A. Amylase	1. Break down of sucrose
B. Pepsin	2. Break down of lipid
C. Lipase	3. Break down of protein
D. Sucrase	4. Break down of starches
E. Mouth	5. Digestion of proteins
F. Stomach	6. Egestion
G. Intestine	7. Ingestion
H. Anus	8. Digestion and absorption

The correct pairing sequence is

- (A) 4, 5, 2, 1, 3, 7, 6, 8 (B) 4, 3, 2, 1, 7, 5, 8, 6
(C) 5, 4, 1, 2, 7, 3, 8, 6 (D) None of these
92. In man, intestinal haustra are
- (A) Bulges of colon between plicae semilunares
(B) Bulges of colon between plicae circulares
(C) Bulges of colon between rectal columns
(D) Villi bearing innumerable microvilli
93. The enterochromaffin cells contain small granules which produce serotonin hormone whose function is
- (A) It helps in stimulation of gastric secretions
(B) It plays a role in the regulation of muscular movements
(C) Both (a) and (b)
(D) None of the above
94. Choose the correct equation
- (A) Total capacity of lungs = Vital capacity + Tidal air
(B) Total capacity of lungs = Vital capacity + Residual air
(C) Vital capacity of lungs = Tidal air + Complemental air
(D) Total capacity of lungs = Tidal air + Complemental air + Supplemental air

Space for Rough Work

95. Which hormone promotes the descent of testes into scrotum ?

- (A) FSH (B) Testosterone
(C) ICSH (D) Oxytocin

96. The respiratory centre leading to faster breathing is on account of

- (A) Venous blood entering the respiratory centre
(B) Arterial blood entering the respiratory centre
(C) Venous blood leaving the respiratory centre
(D) Arterial blood leaving the respiratory centre

97. Which mammal lacks true vocal cords

- (A) Monkey (B) Elephant
(C) Hippopotamus (D) Man

98. Classify the following animals as

- (A) Ammonotelic (B) Ureotelic (C) Uriotelic

- I. Amoeba II. Ascaris
III. Frogs IV. Salamander
V. Land snails VI. Cockroach

Codes

- | | A | B | C |
|-----|----------|--------|--------|
| (A) | I,II | III,IV | IV,V |
| (B) | I,II,III | V | IV,VI |
| (C) | II,III | IV | I,V,VI |
| (D) | I,II,IV | III | V,VI |

99. Match the blood vessels of human heart listed under Column-I with the functions given under Column-II; Choose the answer which gives the correct combination of the alphabets of the two columns

Column-I

(Blood vessel)

Column-II

(Function)

- | | | |
|-----------------------|----|--|
| A. Superior vena cava | p. | Carries deoxygenated blood to lungs |
| B. Inferior vena cava | q. | Carries oxygenated blood to lungs |
| C. Pulmonary artery | r. | Brings deoxygenated blood from lower parts of the body to the right atrium |
| D. Pulmonary vein | s. | Brings oxygenated blood to the left atrium |
| | t. | Brings deoxygenated blood from upper parts of the body into the right atrium |

- (A) A = t, B = p, C = r, D = q
(B) A = t, B = r, C = p, D = s
(C) A = s, B = t, C = r, D = p
(D) A = t, B = p, C = q, D = r

100. Arteries are

- (A) Thin-walled and blood flows under diminished pressure
(B) Thick-walled and blood flows under high pressure
(C) Thin-walled and blood flows under high pressure
(D) Thick-walled and blood flows under diminished pressure

Space for Rough Work

101. Excretory products of mammal's embryo are eliminated out of
 (A) Placenta (B) Amniotic fluid
 (C) Allantois (D) Ureter
102. Duct of Bellini opens on
 (A) Collecting duct (B) Ureter
 (C) Renal papilla (D) DCI
103. The absorption of Na^+ and secretion of K^+ by the nephron is under the control of hormone
 (A) ADH (B) Corticosterone
 (C) Aldosterone (D) Progesterone
104. Angiotensinogen is converted into angiotensin by
 (A) Parathyroid hormone
 (B) Androgen
 (C) Aldosterone
 (D) Renin
105. The urine of man suffering from diabetes insipidus is
 (A) Sweaty and watery
 (B) Sweaty and thick
 (C) Tasteless and watery
 (D) Tasteless and thick
106. What is true about ptyalin and amylopsin?
 (A) Ptyalin is α -amylase while amylopsin is β -amylase
 (B) Ptyalin is β -amylase while amylopsin is α -amylase
 (C) Both ptyalin and amylopsin are α -amylases
 (D) Both ptyalin and amylopsin are β -amylases
107. The filtrate passing from Malpighian corpuscles into the renal tubules in a healthy person contains
 (A) Urates, glucose and water only
 (B) Ammonia, urea, uric acid and proteins
 (C) Urea, sugar, water and ammonia
 (D) Urea, glucose, salts, amino acids and water
108. A condition of failure of kidney to form urine is called
 (A) Deamination (B) Entropy
 (C) Anuria (D) None of these
109. Polymorphonuclear leucocytes are
 (A) Monocytes (B) Lymphocytes
 (C) Granulocytes (D) Agranulocytes
110. Muscles of alimentary canal are chiefly
 (A) Striated and Neurogenic
 (B) Unstriated and Neurogenic
 (C) Striated and Myogenic
 (D) Unstriated and Myogenic
111. Hamburger phenomenon is also known as
 (A) Hydrogen shift mechanism
 (B) Chloride shift mechanism
 (C) Carbonic acid shift mechanism
 (D) Sodium-potassium pump
112. What causes the liquid part of the blood to filter out from the glomerulus into the renal tubule
 (A) Osmosis
 (B) High (hydrostatic) pressure
 (C) Diapedesis
 (D) Dialysis
113. The rarest leucocyte of human blood is
 (A) Basophil (B) Monocyte
 (C) Neutrophil (D) Eosinophil
114. Which will not coagulate?
 (A) Blood serum (B) Blood plasma
 (C) Lymph (D) Whole blood
115. Which of the following is not the reason for very high load of bilirubin in a new born?
 (A) Excessive red blood corpuscles in the new born burst, releasing bilirubin
 (B) Insoluble bilirubin in the intestine is reabsorbed by the blood
 (C) Liver of the new born is too young to cope with the heavy load of bilirubin
 (D) Mother's milk contains a high amount of bilirubin

Space for Rough Work

116. Which one of the following hormones also produces anti-inflammatory reactions in man and suppress the immune response in addition to its primary function.
 (A) Cortisol (B) Thymosin
 (C) Thyrocalcitonin (D) Erythropoietin
117. Which is correctly matched ?
 (A) Menstruation – Breakdown of myometrium and ovum not fertilized
 (B) Ovulation – LH and FSH attain peak level, sharp fall in secretion of progesterone
 (C) Development of corpus luteum – Secretary phase and increased secretion of progesterone
 (D) Proliferative phase – Rapid regeneration of myometrium and maturation of Graafian follicle
118. Emulsified fats are digested by
 (A) gastric juice and pancreatic juice
 (B) bile juice and intestinal juice
 (C) pancreatic juice and bile juice
 (D) pancreatic juice and intestinal juice
119. Which hormone level reaches peak during luteal phase of menstrual cycle ?
 (A) Luteinising hormone
 (B) Progesterone
 (C) Follicle stimulating hormone
 (D) Estrogen
120. Level of estrogen and progesterone are minimum at the time of
 (A) Follicular phase
 (B) Ovulation
 (C) Secretary phase
 (D) Onset of menstrual phase
121. In human females, menstruation can be deferred by administration of
 (A) FSH and LH
 (B) Estrogen and progesterone
 (C) FSH only
 (D) LH only
122. Diapedesis means
 (A) Movement of the food in gut
 (B) Formation of W.B.C.
 (C) The process by which lymphocytes squeeze through thin capillary wall
 (D) Formation of R.B.C.
123. Plasma has water to the extent of
 (A) 80% (B) 60%
 (C) 70% (D) 90%
124. Sperm differentiation are under the control of
 (A) FSH (B) LH
 (C) Testosterone (D) Parathyroid hormone
125. Pigmentation of skin is due to
 (A) Melanocytes (B) Leucocytes
 (C) Lymphocytes (D) Monocytes
126. Kupffer's cells are
 (A) Hormone secreting
 (B) Fat cells
 (C) Mast cells
 (D) Phagocytic
127. Second heart sound is associated with the
 (A) Lub – closure of semilunar valves
 (B) Lub – closure of tricuspid and bicuspid valves
 (C) Dupp – closure of tricuspid and bicuspid valves
 (D) Dupp – closure of semilunar valves
128. Mature erythrocyte cannot utilise glucose because they lack
 (A) Golgi complexes (B) Mitochondria
 (C) Enzymes (D) Nucleus
129. Circulatory system is absent in
 (A) Annelids (B) Arthropods
 (C) Flatworms (D) Cephalopods
130. Battery of artificial pacemaker is built of
 (A) Nickel
 (B) Lithium
 (C) Photosensitive material
 (D) Dry cadmium

Space for Rough Work

131. If heart sound recording and ECG are superimposed, the first heart sound would occur
 (A) At P-wave
 (B) Just after P-wave
 (C) Just before QRS complex
 (D) Just after QRS complex
132. Globulins contained in human blood plasma are primarily involved in
 (A) Clotting of blood
 (B) Osmotic balance of body fluids
 (C) Defence mechanism of body
 (D) Oxygen transport in blood
133. Most probable cause of heart attack is
 (A) Vasomotion
 (B) Systolic pressure of 120 mm Hg
 (C) Arteriosclerosis
 (D) High level of HDL
134. Important function of lymph is
 (A) Transport oxygen to brain
 (B) Transport CO₂ to lungs
 (C) Return RBCs to lymph nodes
 (D) Return interstitial fluid to blood
135. The following are the matching of the site of action on the given substrate, the enzyme acting upon it and the end product. Identify the correct matching among the following.
- (A) Duodenum-Triglyceride's $\xrightarrow{\text{Trypsin}}$ Monoglycerides
 (B) Small intestine-starch $\xrightarrow{\alpha\text{-amylase}}$ disaccharide(Maltose)
 (C) Small intestine-proteins $\xrightarrow{\text{Pepsin}}$ Amino Acids
 (D) Stomach-Fats $\xrightarrow{\text{Lipase}}$ Micelles
- [BOTANY]**
136. Which one of the following growth regulators is known as 'stress hormone' ?
 (A) Abscisic acid (B) Ethylene
 (C) GA₃ (D) Indole acetic acid

137. Which one of the following is a growth regulator produced by plants ?
 (A) Naphthalene acetic acid
 (B) Zeatin
 (C) 2,4-dichlorophenoxy acid
 (D) Benzyl aminopurine
138. Match the following columns.

Column I	Column II
A. Control of weeds	1. Gibberellin
B. Induction of germination	2. Cytokinin
C. Ripening of fruit	3. 2, 4-D
D. Delaying of senescence	4. Ethylene

Codes

A	B	C	D	A	B	C	D
(A) 2	4	3	1	(B) 3	1	4	2
(C) 1	2	4	3	(D) 2	4	1	4

139. Study the following columns.

Column I	Column II
A. Early seed production in conifers	1. Indole substance
B. Seed development and maturation	2. Terpene substance
C. Lateral shoot growth	3. Volatile substance
D. Root hair formation	4. Adenine derivative
	5. Carotenoid derivative

Codes

A	B	C	D	A	B	C	D
(A) 3	1	5	2	(B) 2	5	4	3
(C) 2	1	5	4	(D) 4	3	2	1

140. Apical dominance in plants means
 (A) growth of lateral buds
 (B) inhibition of the growth of lateral buds
 (C) Both (A) and (B)
 (D) None of the above

Space for Rough Work

141. During seed germination its stored food is mobilised by
 (A) ethylene (B) cytokinin
 (C) ABA (D) gibberellin
142. Compare the statement A and B.
Statement A : Ethylene is a gas which acts as growth regulator of plants.
Statement B : It is the most simple plant hormone.
 (A) Both the statements A and B are correct and B is the correct explanation of A
 (B) Both the statements A and B are correct and B is not correct explanation of A
 (C) Statement A is correct and B is incorrect
 (D) Statement A is incorrect and B is correct
143. Which one of the following generally acts as an antagonist to gibberellins ?
 (A) Zeatin (B) Ethylene
 (C) ABA (D) IAA
144. A plant hormone used for inducing morphogenesis in plant tissue culture is
 (A) ethylene (B) gibberellin
 (C) cytokinin (D) abscisic acid
145. The phytohormone that helps in germination of seed is
 (A) ABA (B) auxin
 (C) gibberellin (D) cytokinin
146. Auxanometer is used to measure
 (A) the growth in length of a plant organ
 (B) the growth in breadth of a plant organ
 (C) population of the pests attacking a plant
 (D) Both (A) and (B)
147. Bolting may be induced by
 (A) gibberellins (B) ABA
 (C) auxin (D) cytokinin
148. Natural cytokinins are synthesised in tissue that are
 (A) senescent
 (B) dividing rapidly
 (C) storing food material
 (D) differentiating
149. The rosette habit of cabbage can be changed by application of
 (A) IAA (B) GA
 (C) ABA (D) ethephon
150. On the basis of correlation, find the correct option from columns.
- | | Column I | Column II | Column III |
|-----|--------------------|----------------------|---|
| I. | Foolish plant | (p) Volatile hormone | i. Induces dormancy |
| II. | Induces senescence | (q) GA
(r) Zeatin | ii. Ripens fruits
iii. Usually sterile plant |
- (A) I-p-ii, II-r-i (B) I-r-iii, II-q-iii
 (C) I-q-iii, II-p-ii (D) I-q-i, II-r-ii
151. One of the synthetic auxin is
 (A) NAA (B) IAA
 (C) GA (D) IBA
152. Which one of the following acids is a derivative of carotenoids ?
 (A) Indole-butyric acid
 (B) Indole-3-acetic acid
 (C) Gibberellic acid
 (D) Abscisic acid
153. Which of the PGR induces parthenocarpy in tomatoes?
 (A) Auxin (B) Gibberellin
 (C) Cytokinin (D) Ethylene
154. Which of the following is the effect of a plant hormone, which is synthesised more in the absence of light?
 (A) Inhibits the development of seedless fruits
 (B) Responsible for closing of stomata
 (C) Induces the dormancy of seeds
 (D) Length of internodes increases

Space for Rough Work

155. A hormone delaying senescence is
 (A) auxin (B) cytokinin
 (C) ethylene (D) gibberellin
156. Compare the statement A with B.
Statement A : Auxins promote apical dominance by suppressing the activity of lateral buds.
Statement B : In horticulture, periodic pruning of shoot tips is done to make mulberry plants bushy.
 Select the correct option.
 (A) Both the statements A and B are correct and A is the reason for B
 (B) Both the statements A and B are correct and A is not the reason for B
 (C) Statement A is correct and B is incorrect
 (D) Statement A is correct and B is correct
157. The discovery of gibberellins is related with one of the following
 (A) blast disease of rice
 (B) rust disease of wheat
 (C) bakane disease of rice
 (D) early blight disease of potato
158. Sprouting of potato under storage condition can be prevented by
 (A) auxin (B) gibberellin
 (C) ethylene (D) cytokinin
159. Abscisic acid is primarily synthesised in
 (A) lysosomes (B) Golgi complex
 (C) chloroplast (D) ribosomes
160. The bioassay of auxin is
 (A) Avena curvature test
 (B) callus formation
 (C) culture of fungus
 (D) seed dormancy
161. Identify two of the following phytohormones, which regulate the stomatal movements ?
 I. IAA II. GA₃
 III. Zeatin IV. ABA
Codes
 (A) I and III (B) II and III
 (C) III and IV (D) II and IV
162. Genetically dwarf plants can be induced to grow tall by using
 (A) gibberellins (B) phycobillins
 (C) auxins (D) cytokinins
163. Micropropagation is done by
 (A) auxins (B) GA
 (C) cytokinin (D) Both (A) and (C)
164. Florigen is produced in the region of
 (A) leaves (B) fruit
 (C) root (D) trunk
165. The natural plant hormone isolated from corn kernels and coconut milk is
 (A) florigen (B) GA₃
 (C) free auxins (D) zeatin
166. Rapid and dramatic increase in shoot length is called
 (A) triple response growth
 (B) bolting
 (C) scarification
 (D) night break effect
167. An enzyme that can stimulate germination of barley seeds is
 (A) α -amylase (B) lipase
 (C) protease (D) invertase
168. Senescence in plants leads intoof cells.
 (A) increase in size (B) increase in number
 (C) death (D) differentiation
169. Vernalisation is dependent on exposure to
 (A) low temperature (B) high temperature
 (C) Both (A) and (B) (D) None of these
170. In flowering plants, the site of perception of light/dark duration is
 (A) stem (B) leaves
 (C) shoot apex (D) floral meristem
171. Hormone replacing the requirement of vernalisation is
 (A) ethylene (B) auxin
 (C) gibberellins (D) cytokinin
172. Vernalisation stimulates flowering in
 (A) jimikand (B) turmeric
 (C) carrot (D) ginger

Space for Rough Work

173. Photoperiodism influences
(A) seed germination
(B) vegetative growth
(C) internode elongation
(D) all of these
174. Day neutral plant relates to
(A) loss of activity during day time
(B) overactive during day time
(C) flowering in all possible photoperiods
(D) no flowering in any photoperiod
175. Which pigment involved in photoperiodic change in plants ?
(A) Phytochrome (B) Cytochrome
(C) Chlorophyll (D) Anthocyanin
176. Which of the following is a day neutral plant ?
(A) Helianthus annuus
(B) Euphorbia pulcherrima
(C) Avena sativa
(D) Beta vulgaris
177. Senescence as an active developmental cellular process in the growth and functioning of a flowering plant, is indicated in
(A) vessels and tracheid differentiation
(B) leaf abscission
(C) annual plants
(D) floral parts
178. With respect to photoperiodism, these are long day plants
(A) wheat, oat, soybean
(B) wheat, xanthium, paddy
(C) wheat, poppy, soybean
(D) wheat, poppy, beet
179. Movement of tendrils in response to touch is known as
(A) nyctinastism (B) thigmotropism
(C) seismonastism (D) haptonastism
180. The flowers open in day and close at night, such type of movement is
(A) photonasty (B) nyctinasty
(C) photoperiodism (D) seismonasitic

Space for Rough Work