

DATE : 14/10/2020



Test Booklet Code

**W2**

**IMAIN**

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Time : 3 hrs.

# Questions & Answers

for

## NEET (UG) - 2020 (Phase-2)

Max. Marks : 720

### Important Instructions :

1. The test is of **3 hours** duration and Test Booklet contains **180** questions. Each question carries **4** marks. For each correct response, the candidate will get **4** marks. For each incorrect response, **one mark** will be deducted from the total scores. The maximum marks are **720**.
2. Use **Blue / Black Ball point Pen only** for writing particulars on this page/markings responses.
3. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
4. On completion of the test, the candidate must handover the Answer Sheet to the Invigilator before leaving the Room / Hall. *The candidates are allowed to take away this Test Booklet with them.*
5. The CODE for this Booklet is **W2**.
6. The candidates should ensure that the Answer Sheet is not folded. Do not make any stray marks on the Answer Sheet. Do not write your Roll No. anywhere else except in the specified space in the Test Booklet/Answer Sheet.
7. Each candidate must show on demand his/her Admit Card to the Invigilator.
8. No candidate, without special permission of the Superintendent or Invigilator, would leave his/her seat.
9. Use of Electronic/Manual Calculator is prohibited.
10. The candidates are governed by all Rules and Regulations of the examination with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of this examination.
11. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
12. The candidates will write the Correct Test Booklet Code as given in the Test Booklet / Answer Sheet in the Attendance Sheet.

1. The Mean Free Path  $\ell$  for a gas molecule depends upon diameter,  $d$  of the molecule as

(1)  $\ell \propto \frac{1}{d}$                       (2)  $\ell \propto \frac{1}{d^2}$   
(3)  $\ell \propto d$                       (4)  $\ell \propto d^2$

**Answer (2)**

2. An intrinsic semiconductor is converted into n-type extrinsic semiconductor by doping it with

- (1) Germanium                      (2) Phosphorous  
(3) Aluminium                      (4) Silver

**Answer (2)**

3. The half life of a radioactive sample undergoing  $\alpha$  - decay is  $1.4 \times 10^{17}$  s. If the number of nuclei in the sample is  $2.0 \times 10^{21}$ , the activity of the sample is nearly

- (1)  $10^3$  Bq                      (2)  $10^4$  Bq  
(3)  $10^5$  Bq                      (4)  $10^6$  Bq

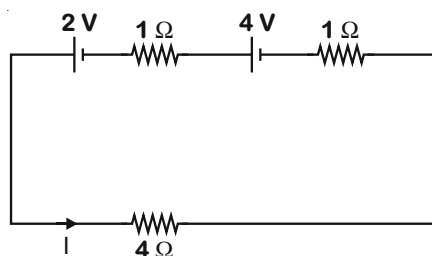
**Answer (2)**

4. The E.M. wave with shortest wavelength among the following is,

- (1) Microwaves  
(2) Ultraviolet rays  
(3) X-rays  
(4) Gamma-rays

**Answer (4)**

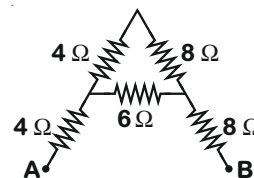
5. For the circuit shown in the figure, the current  $I$  will be



- (1) 0.5 A  
(2) 0.75 A  
(3) 1 A  
(4) 1.5 A

**Answer (3)**

6. The equivalent resistance between A and B for the mesh shown in the figure is



- (1) 4.8  $\Omega$                       (2) 7.2  $\Omega$   
(3) 16  $\Omega$                       (4) 30  $\Omega$

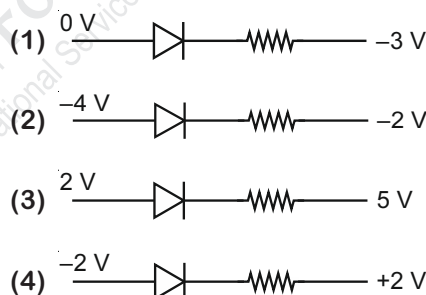
**Answer (3)**

7. A wheel with 20 metallic spokes each 1 m long is rotated with a speed of 120 rpm in a plane perpendicular to a magnetic field of 0.4 G. The induced emf between the axle and rim of the wheel will be (1 G =  $10^{-4}$  T)

- (1) 2.51 V                      (2)  $2.51 \times 10^{-4}$  V  
(3)  $2.51 \times 10^{-5}$  V                      (4)  $4.0 \times 10^{-5}$  V

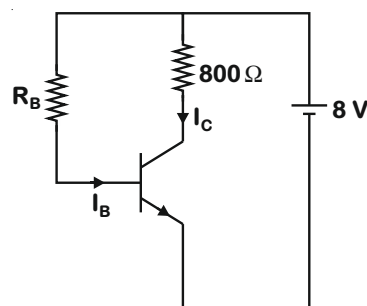
**Answer (2)**

8. Out of the following which one is a forward biased diode?



**Answer (1)**

9. A n-p-n transistor is connected in common emitter configuration (see figure) in which collector voltage drop across load resistance ( $800 \Omega$ ) connected to the collector circuit is 0.8 V. The collector current is



- (1) 0.2 mA                      (2) 2 mA  
(3) 0.1 mA                      (4) 1 mA

**Answer (4)**

10. Two solid conductors are made up of same material, have same length and same resistance. One of them has a circular cross section of area  $A_1$  and the other one has a square cross section of area  $A_2$ . The ratio  $A_1/A_2$  is

(1) 2  
(2) 1.5  
(3) 1  
(4) 0.8

**Answer (3)**

11. Two coherent sources of light interfere and produce fringe pattern on a screen. For central maximum, the phase difference between the two waves will be,

(1)  $\pi/2$  (2) Zero  
(3)  $\pi$  (4)  $3\pi/2$

**Answer (2)**

12. Time intervals measured by a clock give the following readings :

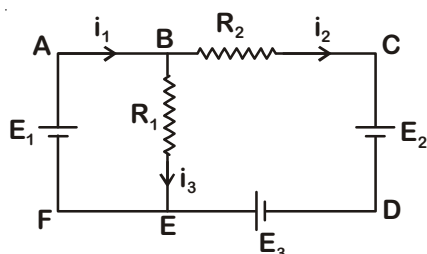
1.25 s, 1.24 s, 1.27 s, 1.21 s and 1.28 s

What is the percentage relative error of the observations?

(1) 1.6%  
(2) 2%  
(3) 4%  
(4) 16%

**Answer (1)**

13. For the circuit given below, the Kirchoff's loop rule for the loop BCDEB is given by the equation



(1)  $-i_2R_2 + E_2 + E_3 + i_3R_1 = 0$   
(2)  $-i_2R_2 + E_2 - E_3 + i_3R_1 = 0$   
(3)  $i_2R_2 + E_2 - E_3 - i_3R_1 = 0$   
(4)  $i_2R_2 + E_2 + E_3 + i_3R_1 = 0$

**Answer (3)**

14. An ideal gas equation can be written as

$$P = \frac{\rho RT}{M_0}$$

where  $\rho$  and  $M_0$  are respectively,

(1) Number density, mass of the gas  
(2) Mass density, mass of the gas  
(3) Number density, molar mass  
(4) Mass density, molar mass

**Answer (4)**

15. The magnetic flux linked with a coil (in Wb) is given by the equation

$$\phi = 5t^2 + 3t + 16$$

The magnitude of induced emf in the coil at the fourth second will be

(1) 10 V (2) 33 V  
(3) 43 V (4) 108 V

**Answer (3)**

16. The length of the string of a musical instrument is 90 cm and has a fundamental frequency of 120 Hz. Where should it be pressed to produce fundamental frequency of 180 Hz?

(1) 80 cm (2) 75 cm  
(3) 60 cm (4) 45 cm

**Answer (3)**

17. The magnetic field in a plane electromagnetic wave is given by,

$$B_y = 2 \times 10^{-7} \sin(\pi \times 10^3 x + 3\pi \times 10^{11} t) \text{ T}$$

Calculate the wavelength.

(1)  $\pi \times 10^{-3} \text{ m}$  (2)  $\pi \times 10^3 \text{ m}$   
(3)  $2 \times 10^{-3} \text{ m}$  (4)  $2 \times 10^3 \text{ m}$

**Answer (3)**

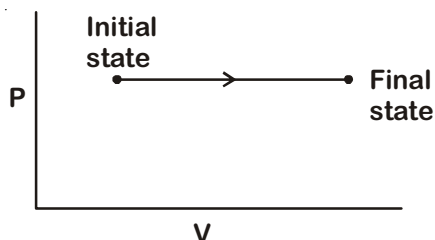
18. A barometer is constructed using a liquid (density =  $760 \text{ kg/m}^3$ ). What would be the height of the liquid column, when a mercury barometer reads 76 cm?

(density of mercury =  $13600 \text{ kg/m}^3$ )

(1) 0.76 m (2) 1.36 m  
(3) 13.6 m (4) 136 m

**Answer (3)**

19. The P-V diagram for an ideal gas in a piston cylinder assembly undergoing a thermodynamic process is shown in the figure. The process is



- (1) isothermal (2) adiabatic  
(3) isochoric (4) isobaric

**Answer (4)**

20. The efficiency of a Carnot engine depends upon
- (1) the temperature of the source only  
(2) the temperature of the sink only  
(3) the temperatures of the source and sink  
(4) the volume of the cylinder of the engine

**Answer (3)**

21. The electric field at a point on the equatorial plane at a distance  $r$  from the centre of a dipole having dipole moment  $\vec{P}$  is given by,

( $r \gg$  separation of two charges forming the dipole,  $\epsilon_0$  - permittivity of free space)

- (1)  $\vec{E} = -\frac{\vec{P}}{4\pi\epsilon_0 r^3}$  (2)  $\vec{E} = \frac{\vec{P}}{4\pi\epsilon_0 r^3}$   
(3)  $\vec{E} = \frac{2\vec{P}}{4\pi\epsilon_0 r^3}$  (4)  $\vec{E} = -\frac{\vec{P}}{4\pi\epsilon_0 r^2}$

**Answer (1)**

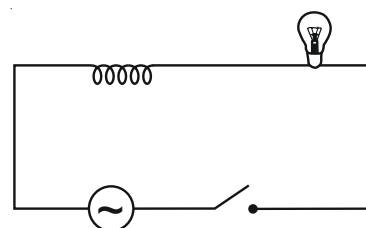
22. A liquid does not wet the solid surface if angle of contact is
- (1) zero (2) equal to  $45^\circ$   
(3) equal to  $60^\circ$  (4) greater than  $90^\circ$

**Answer (4)**

23. Three stars A, B, C have surface temperatures  $T_A$ ,  $T_B$ ,  $T_C$  respectively. Star A appears bluish, star B appears reddish and star C yellowish. Hence,
- (1)  $T_A > T_C > T_B$  (2)  $T_A > T_B > T_C$   
(3)  $T_B > T_C > T_A$  (4)  $T_C > T_B > T_A$

**Answer (1)**

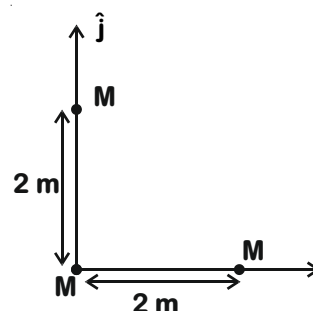
24. A light bulb and an inductor coil are connected to an ac source through a key as shown in the figure below. The key is closed and after sometime an iron rod is inserted into the interior of the inductor. The glow of the light bulb



- (1) increases  
(2) decreases  
(3) remains unchanged  
(4) will fluctuate

**Answer (2)**

25. Three identical spheres, each of mass  $M$ , are placed at the corners of a right angle triangle with mutually perpendicular sides equal to  $2m$  (see figure). Taking the point of intersection of the two mutually perpendicular sides as the origin, find the position vector of centre of mass.



- (1)  $\frac{4}{3}(\hat{i} + \hat{j})$  (2)  $2(\hat{i} + \hat{j})$   
(3)  $(\hat{i} + \hat{j})$  (4)  $\frac{2}{3}(\hat{i} + \hat{j})$

**Answer (4)**

26. The de Broglie wavelength of an electron moving with kinetic energy of 144 eV is nearly
- (1)  $102 \times 10^{-2} \text{ nm}$  (2)  $102 \times 10^{-3} \text{ nm}$   
(3)  $102 \times 10^{-4} \text{ nm}$  (4)  $102 \times 10^{-5} \text{ nm}$

**Answer (2)**

27. The angle of  $1'$  (minute of arc) in radian is nearly equal to

- (1)  $1.75 \times 10^{-2}$  rad
- (2)  $2.91 \times 10^{-4}$  rad
- (3)  $4.85 \times 10^{-4}$  rad
- (4)  $4.80 \times 10^{-6}$  rad

**Answer (2)**

28. The total energy of an electron in the  $n^{\text{th}}$  stationary orbit of the hydrogen atom can be obtained by

- (1)  $E_n = -13.6 \times n^2 \text{ eV}$
- (2)  $E_n = \frac{13.6}{n^2} \text{ eV}$
- (3)  $E_n = -\frac{13.6}{n^2} \text{ eV}$
- (4)  $E_n = -\frac{1.36}{n^2} \text{ eV}$

**Answer (3)**

29. A wire of length  $L$  metre carrying a current of  $I$  ampere is bent in the form of circle. Its magnetic moment is

- (1)  $I L^2 / 4\pi \text{ A m}^2$
- (2)  $I L^2 / 4 \text{ A m}^2$
- (3)  $I \pi L^2 / 4 \text{ A m}^2$
- (4)  $2I L^2 / \pi \text{ A m}^2$

**Answer (1)**

30. What is the depth at which the value of acceleration due to gravity becomes  $\frac{1}{n}$  times the value that at the surface of earth? (radius of earth =  $R$ )

- (1)  $\frac{R}{n}$
- (2)  $\frac{R}{n^2}$
- (3)  $\frac{R(n-1)}{n}$
- (4)  $\frac{Rn}{(n-1)}$

**Answer (3)**

31. An object is placed on the principal axis of a concave mirror at a distance of  $1.5f$  ( $f$  is the focal length). The image will be at,

- (1)  $3f$
- (2)  $-3f$
- (3)  $1.5f$
- (4)  $-1.5f$

**Answer (2)**

32. The angular speed of the wheel of a vehicle is increased from 360 rpm to 1200 rpm in 14 second. Its angular acceleration is,

- (1)  $1 \text{ rad/s}^2$
- (2)  $2\pi \text{ rad/s}^2$
- (3)  $28\pi \text{ rad/s}^2$
- (4)  $120\pi \text{ rad/s}^2$

**Answer (2)**

33. The acceleration of an electron due to the mutual attraction between the electron and a proton when they are  $1.6 \text{ \AA}$  apart is,

$$(m_e \approx 9 \times 10^{-31} \text{ kg}, e = 1.6 \times 10^{-19} \text{ C})$$

$$\left( \text{Take } \frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2 \text{ C}^{-2} \right)$$

- (1)  $10^{25} \text{ m/s}^2$
- (2)  $10^{24} \text{ m/s}^2$
- (3)  $10^{23} \text{ m/s}^2$
- (4)  $10^{22} \text{ m/s}^2$

**Answer (4)**

34. What happens to the mass number and atomic number of an element when it emits  $\gamma$ -radiation?

- (1) Mass number increases by four and atomic number increases by two.
- (2) Mass number decreases by four and atomic number decreases by two.
- (3) Mass number and atomic number remain unchanged.
- (4) Mass number remains unchanged while atomic number decreases by one.

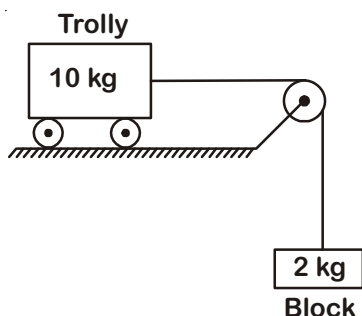
**Answer (3)**

35. If the critical angle for total internal reflection from a medium to vacuum is  $45^\circ$ , then velocity of light in the medium is,

- (1)  $3 \times 10^8$  m/s
- (2)  $1.5 \times 10^8$  m/s
- (3)  $\frac{3}{\sqrt{2}} \times 10^8$  m/s
- (4)  $\sqrt{2} \times 10^8$  m/s

**Answer (3)**

36. Calculate the acceleration of the block and trolley system shown in the figure. The coefficient of kinetic friction between the trolley and the surface is 0.05. ( $g = 10$  m/s<sup>2</sup>, mass of the string is negligible and no other friction exists).



- (1) 1.00 m/s<sup>2</sup>
- (2) 1.25 m/s<sup>2</sup>
- (3) 1.50 m/s<sup>2</sup>
- (4) 1.66 m/s<sup>2</sup>

**Answer (2)**

37. A point mass 'm' is moved in a vertical circle of radius 'r' with the help of a string. The velocity of the mass is  $\sqrt{7gr}$  at the lowest point. The tension in the string at the lowest point is

- (1) 1 mg
- (2) 6 mg
- (3) 7 mg
- (4) 8 mg

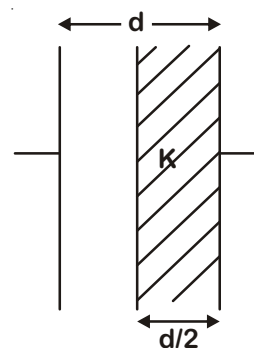
**Answer (4)**

38. A plano-convex lens of unknown material and unknown focal length is given. With the help of a spherometer we can measure the,

- (1) refractive index of the material
- (2) focal length of the lens
- (3) radius of curvature of the curved surface
- (4) aperture of the lens

**Answer (3)**

39. A parallel plate capacitor having cross-sectional area A and separation d has air in between the plates. Now an insulating slab of same area but thickness d/2 is inserted between the plates as shown in figure having dielectric constant  $K (= 4)$ . The ratio of new capacitance to its original capacitance will be,



- (1) 4 : 1
- (2) 2 : 1
- (3) 8 : 5
- (4) 6 : 5

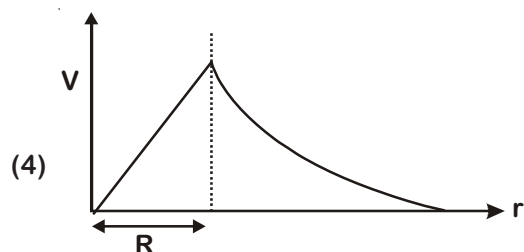
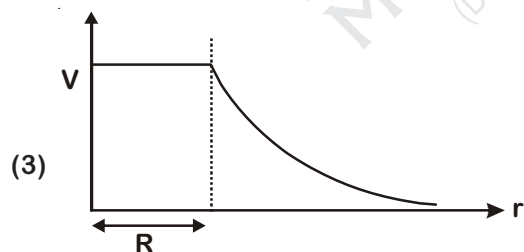
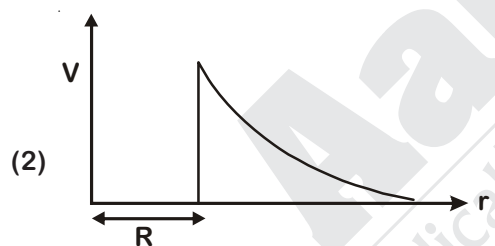
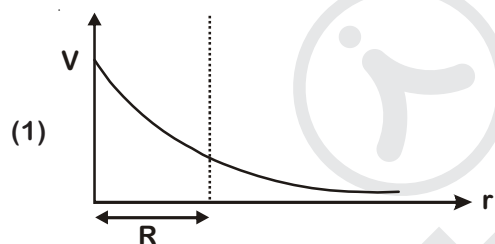
**Answer (3)**

40. The power of a biconvex lens is 10 dioptre and the radius of curvature of each surface is 10 cm. Then the refractive index of the material of the lens is,

- (1)  $\frac{3}{2}$  (2)  $\frac{4}{3}$   
(3)  $\frac{9}{8}$  (4)  $\frac{5}{3}$

**Answer (1)**

41. The variation of electrostatic potential with radial distance  $r$  from the centre of a positively charged metallic thin shell of radius  $R$  is given by the graph



**Answer (3)**

42. Which of the following gate is called universal gate ?

- (1) NOT gate  
(2) OR gate  
(3) AND gate  
(4) NAND gate

**Answer (4)**

43. Identify the function which represents a periodic motion.

- (1)  $e^{-\omega t}$   
(2)  $e^{\omega t}$   
(3)  $\log_e(\omega t)$   
(4)  $\sin \omega t + \cos \omega t$

**Answer (4)**

44. The wave nature of electrons was experimentally verified by,

- (1) Davisson and Germer  
(2) de Broglie  
(3) Hertz  
(4) Einstein

**Answer (1)**

45. A person sitting in the ground floor of a building notices through the window, of height 1.5 m, a ball dropped from the roof of the building crosses the window in 0.1 s. What is the velocity of the ball when it is at the topmost point of the window ? ( $g=10 \text{ m/s}^2$ )

- (1) 20 m/s  
(2) 15.5 m/s  
(3) 14.5 m/s  
(4) 4.5 m/s

**Answer (3)**



46. Which among the following salt solutions is basic in nature?

- (1) Sodium acetate
- (2) Ammonium chloride
- (3) Ammonium sulphate
- (4) Ammonium nitrate

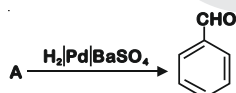
**Answer (1)**

47. If 8 g of a non-electrolyte solute is dissolved in 114 g of n-octane to reduce its vapour pressure to 80%, the molar mass (in  $\text{g mol}^{-1}$ ) of the solute is [Given that molar mass of n-octane is  $114 \text{ g mol}^{-1}$ ]

- (1) 20
- (2) 40
- (3) 60
- (4) 80

**Answer (2)**

48. Identify compound (A) in the following reaction:



- (1) Benzoic acid
- (2) Benzoyl chloride
- (3) Toluene
- (4) Acetophenone

**Answer (2)**

49. Identify the **incorrect** statement from the following :

- (1) The overall decrease in atomic and ionic radii from lanthanum to lutetium is called lanthanoid contraction
- (2) Zirconium and Hafnium have identical radii of 160 pm and 159 pm, respectively as a consequence of lanthanoid contraction
- (3) Lanthanoids reveal only +3 oxidation state
- (4) The lanthanoid ions other than the  $f^0$  type and the  $f^{14}$  type are all paramagnetic

**Answer (3)**

50. The half-life for a zero order reaction having 0.02 M initial concentration of reactant is 100 s. The rate constant (in  $\text{mol L}^{-1} \text{s}^{-1}$ ) for the reaction is

- (1)  $1.0 \times 10^{-2}$
- (2)  $1.0 \times 10^{-4}$
- (3)  $2.0 \times 10^{-4}$
- (4)  $2.0 \times 10^{-3}$

**Answer (2)**

51. Match the coordination number and type of hybridisation with distribution of hybrid orbitals in space based on Valence bond theory.

Coordination number and type of hybridisation	Distribution of hybrid orbitals in space
---	--

- |                  |                          |
|------------------|--------------------------|
| (a) 4, $sp^3$    | (i) trigonal bipyramidal |
| (b) 4, $dsp^2$   | (ii) octahedral          |
| (c) 5, $sp^3d$   | (iii) tetrahedral        |
| (d) 6, $d^2sp^3$ | (iv) square planar       |

Select the correct option :

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

**Answer (3)**

52. Match the element in column I with that in column II.

Column I	Column II
(a) Copper	(i) Non-metal
(b) Fluorine	(ii) Transition Metal
(c) Silicon	(iii) Lanthanoid
(d) Cerium	(iv) Metalloid

Identify the correct match :

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

**Answer (3)**

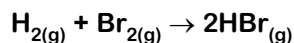
53. In collision theory of chemical reaction,  $Z_{AB}$  represents

- (1) the fraction of molecules with energies equal to  $E_a$
- (2) the fraction of molecules with energies greater than  $E_a$
- (3) the collision frequency of reactants, A and B
- (4) steric factor

**Answer (3)**



54. At standard conditions, if the change in the enthalpy for the following reaction is  $-109 \text{ kJ mol}^{-1}$ .



Given that bond energy of  $\text{H}_2$  and  $\text{Br}_2$  is  $435 \text{ kJ mol}^{-1}$  and  $192 \text{ kJ mol}^{-1}$ , respectively, what is the bond energy (in  $\text{kJ mol}^{-1}$ ) of  $\text{HBr}$ ?

- (1) 259 (2) 368  
(3) 736 (4) 518

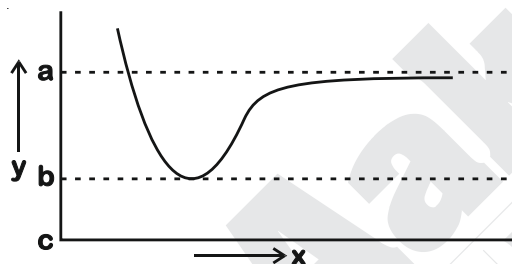
**Answer (2)**

55. The solubility product for a salt of the type  $\text{AB}$  is  $4 \times 10^{-8}$ . What is the molarity of its standard solution?

- (1)  $4 \times 10^{-4} \text{ mol/L}$  (2)  $2 \times 10^{-4} \text{ mol/L}$   
(3)  $16 \times 10^{-16} \text{ mol/L}$  (4)  $2 \times 10^{-16} \text{ mol/L}$

**Answer (2)**

56. The potential energy ( $y$ ) curve for  $\text{H}_2$  formation as a function of internuclear distance ( $x$ ) of the H atoms is shown below.



The bond energy of  $\text{H}_2$  is

- (1)  $(c - a)$  (2)  $(b - a)$   
(3)  $\frac{(c - a)}{2}$  (4)  $\frac{(b - a)}{2}$

**Answer (2)**

57. Match the elements in Column I with methods of purification in Column II.

Column I	Column II
(a) Boron	(i) Van Arkel method
(b) Tin	(ii) Mond's process
(c) Zirconium	(iii) Liquation
(d) Nickel	(iv) Zone refining
(1) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)	
(2) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)	
(3) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)	
(4) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)	

**Answer (2)**

58. A liquid compound ( $x$ ) can be purified by steam distillation only if it is

- (1) Not steam volatile, immiscible with water  
(2) Steam volatile, immiscible with water  
(3) Not steam volatile, miscible with water  
(4) Steam volatile, miscible with water

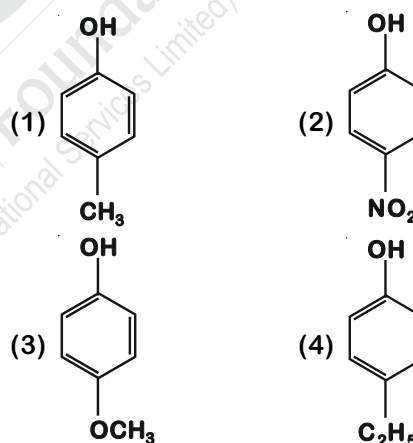
**Answer (2)**

59. What is the role of gypsum,  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  in setting of cement? Identify the correct option from the following :

- (1) to slow down the setting process  
(2) to fasten the setting process  
(3) to provide water molecules for hydration process  
(4) to help to remove water molecules

**Answer (1)**

60. Which of the following substituted phenols is the strongest acid?



**Answer (2)**

61. Deficiency of which vitamin causes osteomalacia?

- (1) Vitamin E (2) Vitamin A  
(3) Vitamin D (4) Vitamin K

**Answer (3)**

62. Which one of the following reactions does not come under hydrolysis type reaction ?

- (1)  $\text{P}_4\text{O}_{10(s)} + 6\text{H}_2\text{O}_{(l)} \rightarrow 4\text{H}_3\text{PO}_{4(aq)}$   
(2)  $\text{SiCl}_{4(l)} + 2\text{H}_2\text{O}_{(l)} \rightarrow \text{SiO}_{2(s)} + 4\text{HCl}_{(aq)}$   
(3)  $\text{Li}_3\text{N}_{(s)} + 3\text{H}_2\text{O}_{(l)} \rightarrow \text{NH}_{3(g)} + 3\text{LiOH}_{(aq)}$   
(4)  $2\text{F}_{2(g)} + 2\text{H}_2\text{O}_{(l)} \rightarrow 4\text{HF}_{(aq)} + \text{O}_{2(g)}$

**Answer (4)**

63. Which one of the following compounds shows both, Frenkel as well as Schottky defects ?

- (1) ZnS (2) AgBr  
(3) AgI (4) NaCl

**Answer (2)**

64. Which of the following is **not** true about chloramphenicol ?

- (1) It is bacteriostatic.  
(2) It inhibits the growth of only gram positive bacteria.  
(3) It is a broad spectrum antibiotic.  
(4) It is not bactericidal.

**Answer (2)**

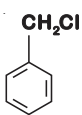
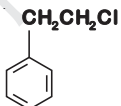
65. The oxidation number of the underlined atom in the following species

- (1)  $\text{HAuCl}_4$  is +3  
(2)  $\text{Cu}_2\text{O}$  is -1  
(3)  $\text{ClO}_3^-$  is +5  
(4)  $\text{K}_2\text{Cr}_2\text{O}_7$  is +6

Identify the incorrect option.

**Answer (2)**

66. Which of the following will **NOT** undergo  $\text{S}_\text{N}1$  reaction with  $\text{OH}^-$  ?

- (1)  (2)  $\text{CH}_2 = \text{CH} - \text{CH}_2\text{Cl}$   
(3)  $(\text{CH}_3)_3\text{CCl}$  (4) 

**Answer (4)**

67. Reaction of propanamide with ethanolic sodium hydroxide and bromine will give

- (1) Aniline (2) Ethylamine  
(3) Methylamine (4) Propylamine

**Answer (2)**

68. In which of the sols, the colloidal particles are with negative charge?

- (1) Hydrated  $\text{Al}_2\text{O}_3$  (2)  $\text{TiO}_2$   
(3) Haemoglobin (4) Starch

**Answer (4)**

69. The minimum pressure required to compress 600  $\text{dm}^3$  of a gas at 1 bar to 150  $\text{dm}^3$  at  $40^\circ\text{C}$  is

- (1) 2.5 bar (2) 4.0 bar  
(3) 0.2 bar (4) 1.0 bar

**Answer (2)**

70. The number of angular nodes and radial nodes in 3s orbital are

- (1) 0 and 1, respectively  
(2) 0 and 2, respectively  
(3) 1 and 0, respectively  
(4) 3 and 0, respectively

**Answer (2)**

71. Which of the following statement is correct about Bakelite?

- (1) It is a linear polymer  
(2) It is a cross linked polymer  
(3) It is an addition polymer  
(4) It is a branched chain polymer

**Answer (2)**

72. Among the compounds shown below which one revealed a linear structure?

- (1)  $\text{N}_2\text{O}$  (2)  $\text{NO}_2$   
(3)  $\text{HOCl}$  (4)  $\text{O}_3$

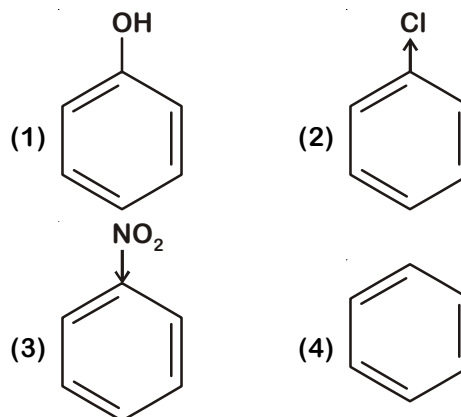
**Answer (1)**

73. The reaction of concentrated sulphuric acid with carbohydrates ( $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ ) is an example of

- (1) Sulphonation (2) Dehydration  
(3) Oxidation (4) Reduction

**Answer (2)**

74. Which of the following compound is most reactive in electrophilic aromatic substitution?



**Answer (1)**

75. In a typical fuel cell, the reactant (R) and product (P) are

- (1)  $R = H_{2(g)} \cdot N_{2(g)} : P = NH_{3(aq)}$   
 (2)  $R = H_{2(g)} \cdot O_{2(g)} : P = H_2O_{2(l)}$   
 (3)  $R = H_{2(g)} \cdot O_{2(g)} : P = H_2O_{(l)}$   
 (4)  $R = H_{2(g)} \cdot O_{2(g)} \cdot Cl_{2(g)} : P = HClO_{4(aq)}$

**Answer (3)**

76. Identify the wrongly match pair.

Molecule	Shape or geometry of molecule
(1) $NH_3$	Trigonal pyramidal
(2) $PCl_5$	Trigonal planar
(3) $SF_6$	Octahedral
(4) $BeCl_2$	Linear

**Answer (2)**

77. Which of the following statement is NOT true about acid rain?

- (1) Its pH is less than 5.6  
 (2) It is due to reaction of  $SO_2$ ,  $NO_2$  and  $CO_2$  with rain water  
 (3) Causes no damage to monuments like Taj Mahal  
 (4) It is harmful for plants

**Answer (3)**

78. Which of the following is a free radical substitution reaction?

- (1) Propene with  $HBr/(C_6H_5COO)_2$   
 (2) Benzene with  $Br_2/AlCl_3$   
 (3) Acetylene with  $HBr$   
 (4) Methane with  $Br_2/h\nu$

**Answer (4)**

79. If for a certain reaction  $\Delta_r H$  is  $30 \text{ kJ mol}^{-1}$  at 450 K, the value of  $\Delta_r S$  (in  $\text{JK}^{-1} \text{ mol}^{-1}$ ) for which the same reaction will be spontaneous at the same temperature is

- (1) -70  
 (2) 70  
 (3) -33  
 (4) 33

**Answer (2)**

80. Match the compounds of Xe in column I with the molecular structure in column II.

Column I	Column II
(a) $XeF_2$	(i) Square planar
(b) $XeF_4$	(ii) Linear
(c) $XeO_3$	(iii) Square pyramidal
(d) $XeOF_4$	(iv) Pyramidal
(1) (a)-(ii) (b)-(i) (c)-(iv) (d)-(iii)	
(2) (a)-(ii) (b)-(i) (c)-(iii) (d)-(iv)	
(3) (a)-(ii) (b)-(iv) (c)-(iii) (d)-(i)	
(4) (a)-(ii) (b)-(iii) (c)-(i) (d)-(iv)	

**Answer (1)**

81. Which of the following statement is **not** true about glucose?

- (1) It is an aldopentose.  
 (2) It is an aldohexose.  
 (3) It contains five hydroxyl groups.  
 (4) It is a reducing sugar.

**Answer (1)**

82. Identify the correct statement from the following.

- (1) Lithium chloride is deliquescent and crystallises as a hydrate,  $LiCl \cdot H_2O$ .  
 (2) The order of hydration enthalpies of alkaline earth cations  
 $Be^{2+} < Mg^{2+} < Ca^{2+} < Sr^{2+} < Ba^{2+}$   
 (3) Lithium and Magnesium show some similarities in their physical properties as they are diagonally placed in periodic table.  
 (4) Lithium is softer among all alkali metals.

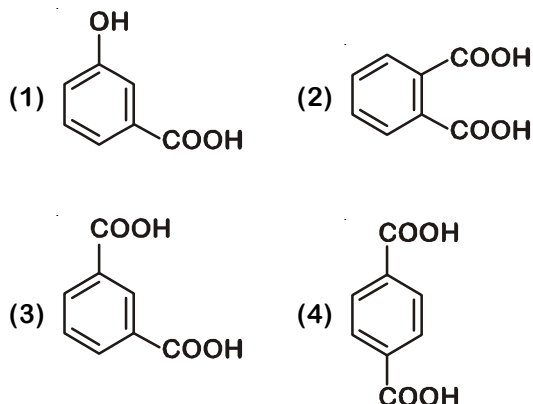
**Answer (3)**

83. Identify the reaction from following having top position in EMF series (Std. red. potential) according to their electrode potential at 298 K.

- (1)  $K^+ + 1e^- \rightarrow K_{(s)}$   
 (2)  $Mg^{2+} + 2e^- \rightarrow Mg_{(s)}$   
 (3)  $Fe^{2+} + 2e^- \rightarrow Fe_{(s)}$   
 (4)  $Au^{3+} + 3e^- \rightarrow Au_{(s)}$

**Answer (4)**

84. Which of the following acid will form an (a) Anhydride on heating and (b) Acid imide on strong heating with ammonia?



**Answer (2)**

85. One mole of carbon atom weighs 12 g, the number of atoms in it is equal to, (Mass of carbon-12 is  $1.9926 \times 10^{-23}$  g)

- (1)  $6.022 \times 10^{23}$  (2)  $1.2 \times 10^{23}$   
(3)  $6.022 \times 10^{22}$  (4)  $12 \times 10^{22}$

**Answer (1)**

86. Which of the following oxide is amphoteric in nature?

- (1)  $\text{CO}_2$  (2)  $\text{SnO}_2$   
(3)  $\text{SiO}_2$  (4)  $\text{GeO}_2$

**Answer (2)**

87. Match the following aspects with the respective metal.

- | Aspects   | Metal           |
|---|-----------------|
| (a) The metal which reveals a maximum number of oxidation states                    | (i) Scandium    |
| (b) The metal although placed in 3d block is considered not as a transition element | (ii) Copper     |
| (c) The metal which does not exhibit variable oxidation states                      | (iii) Manganese |

- (d) The metal which (iv) Zinc in +1 oxidation state in aqueous solution undergoes disproportionation

Select the correct option :

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

**Answer (3)**

88.  $\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2 \xrightarrow[\text{H}_2\text{O}, \text{H}_2\text{O}_2, \text{OH}^-]{\text{B}_2\text{H}_6} \text{Z}$ . What is Z?

- (1)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_3$   
(2)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$   
(3)  $\text{CH}_3\text{CH}_2\underset{\text{OH}}{\text{CH}}\text{CH}_3$   
(4)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CHO}$

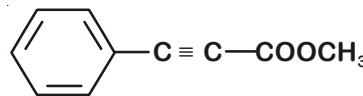
**Answer (2)**

89. Isotonic solutions have same

- (1) Boiling temperature  
(2) Vapour pressure  
(3) Freezing temperature  
(4) Osmotic pressure

**Answer (4)**

90. How many (i)  $\text{sp}^2$  hybridised carbon atoms and (ii)  $\pi$  bonds are present in the following compound?



- (1) 8, 5  
(2) 7, 5  
(3) 8, 6  
(4) 7, 6

**Answer (4)**

91. Chromosomal theory of inheritance was proposed by

- (1) Watson and Crick
- (2) Sutton and Boveri
- (3) Bateson and Punnett
- (4) T.H. Morgan

**Answer (2)**

92. Which of the following is incorrect about Cynobacteria?

- (1) They have chlorophyll A similar to green plants
- (2) They are photoautotrophs
- (3) They lack heterocysts
- (4) They often form blooms in polluted water bodies

**Answer (3)**

93. The impact of immigration on population density is

- (1) Positive
- (2) Negative
- (3) Both positive and negative
- (4) Neutralized by natality

**Answer (1)**

94. Which of the following statements is incorrect?

- (1) RuBisCO action requires ATP and NADPH
- (2) RuBisCO is a bifunctional enzyme
- (3) In  $C_4$  plants, the site of RuBisCO activity is mesophyll cell
- (4) The substrate molecule for RuBisCO activity is a 5-carbon compound

**Answer (3)**

95. Inclusion bodies of blue-green, purple and green photosynthetic bacteria are

- (1) Microtubules
- (2) Contractile vacuoles
- (3) Gas vacuoles
- (4) Centrioles

**Answer (3)**

96. Which of the following is the correct floral formula of Liliaceae?

- (1)  $\oplus \frac{\circ}{\circ} K_{(5)} \overline{C}_{(5)} \overline{A}_5 \underline{G}_{(2)}$
- (2)  $\% \frac{\circ}{\circ} C_{1+2+(2)} A_{(9)+1} \underline{G}_1$
- (3)  $\oplus \frac{\circ}{\circ} K_{(5)} \overline{C}_{(5)} \overline{A}_5 \underline{G}_{(2)}$
- (4)  $Br \oplus \frac{\circ}{\circ} P_{(3+3)} \overline{A}_{3+3} \underline{G}_{(3)}$

**Answer (4)**

97. Male and female gametophytes do not have an independent free living existence in:

- (1) Bryophytes
- (2) Pteridophytes
- (3) Algae
- (4) Angiosperms

**Answer (4)**

98. In the following in each set a conservation approach and an example of method of conservation are given

- (a) In situ conservation – Biosphere Reserve
- (b) Ex situ conservation – Sacred groves
- (c) In situ conservation – Seed bank
- (d) Ex situ conservation – Cryopreservation

Select the option with correct match of approach and method:

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

**Answer (3)**

99. Inhibitory substances in dormant seeds cannot be removed by subjecting seeds to:

- (1) Chilling conditions
- (2) Gibberellic acid
- (3) Nitrate
- (4) Ascorbic acid

**Answer (4)**

100. In some plants thalamus contributes to fruit formation. Such fruits are termed as:

- (1) Parthenocarpic fruit
- (2) False fruits
- (3) Aggregate fruits
- (4) True fruits

**Answer (2)**

101. The biosynthesis of ribosomal RNA occurs in:

- (1) Nucleolus                      (2) Ribosomes  
(3) Golgi apparatus              (4) Microbodies

**Answer (1)**

102. Match the following techniques or instruments with their usage:

- |                     |   |
|---------------------|---|
| (a) Bioreactor      | (i) Separation of DNA fragments                                 |
| (b) Electrophoresis | (ii) Production of large quantities of products                 |
| (c) PCR             | (iii) Detection of pathogen, based on antigen-antibody reaction |
| (d) ELISA           | (iv) Amplification of nucleic acids                             |

Select the correct option from following:

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

**Answer (3)**

103. Large, empty colourless cells of the adaxial epidermis along the veins of grass leaves are

- (1) Bulliform cells              (2) Lenticels  
(3) Guard cells                  (4) Bundle sheath cells

**Answer (1)**

104. In a mixture, DNA fragments are separated by

- (1) Polymerase chain reaction  
(2) Bioprocess engineering  
(3) Restriction digestion  
(4) Electrophoresis

**Answer (4)**

105. Which of the following is incorrect for wind-pollinated plants?

- (1) Pollen grains are light and non-sticky  
(2) Well exposed stamens and stigma  
(3) Many ovules in each ovary  
(4) Flowers are small and not brightly coloured

**Answer (3)**

106. In a mitotic cycle, the correct sequence of phases is

- (1) G<sub>1</sub>, G<sub>2</sub>, S, M                  (2) S, G<sub>1</sub>, G<sub>2</sub>, M  
(3) G<sub>1</sub>, S, G<sub>2</sub>, M                  (4) M, G<sub>1</sub>, G<sub>2</sub>, S,

**Answer (3)**

107. Embryological support for evolution was proposed by

- (1) Alfred Wallace  
(2) Ernst Heckel  
(3) Karl Ernst von Baer  
(4) Charles Darwin

**Answer (2)**

108. Phycoerythrin is the major pigment in

- (1) Brown algae                  (2) Red algae  
(3) Blue green algae              (4) Green algae

**Answer (2)**

109. According to Alexander von Humboldt

- (1) Species richness goes on increasing with increasing area of exploration  
(2) Species richness decreases with increasing area of exploration  
(3) Species richness increases with increasing area, but only up to limit  
(4) There is no relationship between species richness and area explored.

**Answer (3)**

110. In the polynucleotide chain of DNA, a nitrogenous base is linked to the –OH of

- (1) 1' C pentose sugar  
(2) 2' C pentose sugar  
(3) 3' C pentose sugar  
(4) 5' C pentose sugar

**Answer (1)**

111. During non-cyclic photophosphorylation, when electrons are lost from the reaction centre at PS II, what is the source which replaces these electrons?

- (1) Light                              (2) Oxygen  
(3) Water                              (4) Carbon dioxide

**Answer (3)**



112. In Recombinant DNA technology antibiotics are used
- (1) As selectable markers
  - (2) To keep medium bacteria-free
  - (3) to detect alien DNA
  - (4) To impart disease-resistance to the host plant

**Answer (2)**

113. Which of the following statements is incorrect?
- (1) Energy content gradually decreases from first to fourth trophic level
  - (2) Biomass decreases from first to fourth trophic level
  - (3) Energy content gradually increases from first to fourth trophic level
  - (4) Number of individuals decreases from first trophic level to fourth trophic level

**Answer (3)**

114. Attachment of spindle fibers to kinetochores of chromosomes becomes evident in
- (1) Metaphase
  - (2) Anaphase
  - (3) Telophase
  - (4) Prophase

**Answer (1)**

115. Correct position of floral parts over thalamus in mustard plant is
- (1) Gynoecium is situated in the centre, and other parts of the flower are located at the rim of the thalamus, at the same level.
  - (2) Gynoecium occupies the highest position, while the other parts are situated below it.
  - (3) Margin of the thalamus grows upward, enclosing the ovary completely, and other parts arise below the ovary.
  - (4) Gynoecium is present in the centre and other parts cover it partially.

**Answer (2)**

116. After about how many years of formation of earth, life appeared on this planet?
- (1) 50 billion years
  - (2) 500 billion years
  - (3) 50 million years
  - (4) 500 million years

**Answer (4)**

117. The term 'Nuclein' for the genetic material was used by
- (1) Mendel
  - (2) Franklin
  - (3) Meischer
  - (4) Chargaff

**Answer (3)**

118. Select the incorrect statement.

- (1) Elements most easily mobilized in plants from one region to another are : phosphorus, sulphur, nitrogen and potassium
- (2) Transport of molecules in phloem can be bidirectional
- (3) Movement of minerals in xylem is unidirectional
- (4) Unloading of sucrose at sink does not involve the utilization of ATP

**Answer (4)**

119. The number of contrasting characters studied by Mendel for his experiments was

- (1) 7
- (2) 14
- (3) 4
- (4) 2

**Answer (1)**

120. Vegetative propagule in Agave is termed as

- (1) Eye
- (2) Rhizome
- (3) Bulbil
- (4) Offset

**Answer (3)**

121. Identify the statement which is incorrect.

- (1) Tyrosine possesses aromatic ring in its structure
- (2) Sulphur is an integral part of cysteine
- (3) Glycine is an example of lipids
- (4) Lecithin contains phosphorus atom in its structure

**Answer (3)**

122. A species which was introduced for ornamentation but has become a troublesome weed in India :

- (1) *Trapa spinosa*
- (2) *Parthenium hysterophorus*
- (3) *Eichhornia crassipex*
- (4) *Prosopis juliflora*

**Answer (3)**



123. Pyruvate dehydrogenase activity during aerobic respiration requires :

- (1) Magnesium (2) Calcium  
(3) Iron (4) Cobalt

**Answer (1)**

124. Identify the correct features of Mango and Coconut fruits.

- (i) In both fruit is a drupe  
(ii) Endocarp is edible in both  
(iii) Mesocarp in Coconut is fibrous, and in Mango it is fleshy  
(iv) In both, fruit develops from monocarpellary ovary

Select the correct option from below :

- (1) (i) and (ii) only  
(2) (i), (iii) and (iv) only  
(3) (i), (ii) and (iii) only  
(4) (i) and (iv) only

**Answer (2)**

125. Match the items in Column I with those in Column II :

Column I	Column II
(a) Herbivores-Plants	(i) Commensalism
(b) Mycorrhiza-Plants	(ii) Mutualism
(c) Sheep-Cattle	(iii) Predation
(d) Orchid-Tree	(iv) Competition

Select the correct option from following :

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

**Answer (3)**

126. Air (Prevention and Control of Pollution) Act was amended in 1987 to include among pollutants

- (1) Particulates of size 2.5 micrometer or below  
(2) Vehicular exhaust  
(3) Allergy causing pollen  
(4) Noise

**Answer (4)**

127. In Glycine max, the product of biological nitrogen fixation is transported from the root nodules to other parts as

- (1) Ureides (2) Ammonia  
(3) Glutamate (4) Nitrates

**Answer (1)**

128. Which of the following statements about cork cambium is incorrect?

- (1) It is a couple of layers thick  
(2) It forms secondary cortex on its outside  
(3) It forms a part of periderm  
(4) It is responsible for the formation of lenticels

**Answer (2)**

129. Match the following

(a) Aquaporin	(i) Amide
(b) Asparagine	(ii) Polysaccharide
(c) Abscissic acid	(iii) Polypeptide
(d) Chitin	(iv) Carotenoids

Select the correct option

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

**Answer (2)**

130. Which of the following statements is incorrect about gymnosperms?

- (1) Their seeds are not covered  
(2) They are heterosporous  
(3) Male and female gametophytes are free living  
(4) Most of them have narrow leaves with thick cuticle

**Answer (3)**

131. Which of the following elements helps in maintaining the structure of ribosomes?

- (1) Molybdenum  
(2) Magnesium  
(3) Zinc  
(4) Copper

**Answer (2)**

132. Match the following concerning the activity/function and the phytohormone involved.

- |                    |                    |
|--------------------|--------------------|
| (a) Fruit ripener  | (i) Absciscic acid |
| (b) Herbicide      | (ii) $GA_3$        |
| (c) Bolting agent  | (iii) 2, 4-D       |
| (d) Stress hormone | (iv) Ethephon      |

Select the correct option from following

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

**Answer (4)**

133. Who coined the term 'Kinetin'?

- |              |                      |
|--------------|----------------------|
| (1) Kurosawa | (2) Skoog and Miller |
| (3) Darwin   | (4) Went             |

**Answer (2)**

134. Which of the following statements is incorrect regarding the phosphorus cycle?

- (1) It is sedimentary cycle  
 (2) Phosphates are the major form of phosphorus reservoir  
 (3) Phosphorus solubilising bacteria facilitate the release of phosphorus from organic remains  
 (4) There is appreciable respiratory release of phosphorus into atmosphere

**Answer (4)**

135. First discovered restriction endonuclease that always cuts DNA molecule at a particular point by recognising a specific sequence of six base pairs is

- (1) Hind II  
 (2) EcoR I  
 (3) Adenosine deaminase  
 (4) Thermostable DNA polymerase

**Answer (1)**

136. Which of the following is associated with decrease in cardiac output?

- (1) Adrenal medullary hormones  
 (2) Sympathetic nerves  
 (3) Parasympathetic neural signals  
 (4) Pneumotaxic centre

**Answer (3)**

137. Match the following group of organisms with their respective distinctive characteristics and select the correct option

- | Organisms           | Characteristics   |
|---------------------|---|
| (a) Platyhelminthes | (i) Cylindrical body with no segmentation                 |
| (b) Echinoderms     | (ii) Warm blooded animals with direct development         |
| (c) Hemichordates   | (iii) Bilateral symmetry with incomplete digestive system |
| (d) Aves            | (iv) Radial symmetry with indirect development            |

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

**Answer (2)**

138. Which is the basis of genetic mapping of human genome as well as DNA finger printing?

- (1) Polymorphism in RNA sequence  
 (2) Polymorphism in DNA sequence  
 (3) Single nucleotide polymorphism  
 (4) Polymorphism in hnRNA sequence

**Answer (2)**

139. The best example for pleiotropy is:

- (1) ABO Blood group  
 (2) Skin colour  
 (3) Phenylketoneuria  
 (4) Colour Blindness

**Answer (3)**

140. The total Lung Capacity (TLC) is the total volume of air accommodated in the lungs at the end of a forced inspiration. This includes:

- (1) RV (Residual Volume);  
 ERV (Expiratory Reserve Volume);  
 TV (Tidal Volume); and  
 IRV (Inspiratory Reserve Volume)  
 (2) RV; IC (Inspiratory Capacity);  
 EC (Expiratory Capacity); and ERV

- (3) RV; ERV; IC and EC  
(4) RV; ERV; VC (Vital Capacity) and FRC (Functional Residual Capacity)

**Answer (1)**

141. Hormones stored and released from neurohypophysis are  
(1) Prolactin and Vasopressin  
(2) Thyroid stimulating hormone and Oxytocin  
(3) Oxytocin and Vasopressin  
(4) Follicle stimulating hormone and Leutinizing hormone

**Answer (3)**

142. According to Central Pollution Control Board [CPCB] what size (in diameter) of particulate is responsible for causing greater harm to human health?  
(1) 3.0 micrometers (2) 3.5 micrometers  
(3) 2.5 micrometers (4) 4.0 micrometers

**Answer (3)**

143. Cyclosporin A, used as immunosuppression agent, is produced from  
(1) *Trichoderma polysporum*  
(2) *Monascus purpureus*  
(3) *Saccharomyces cerevisiae*  
(4) *Penicillium notatum*

**Answer (1)**

144. For the commercial and industrial production of Citric Acid, which of the following microbes is used?  
(1) *Clostridium butylicum*  
(2) *Aspergillus niger*  
(3) *Lactobacillus sp*  
(4) *Saccharomyces cerevisiae*

**Answer (2)**

145. All vertebrates are chordates but all chordates are not vertebrates, why?  
(1) All chordates possess notochord throughout their life.  
(2) Notochord is replaced by vertebral column in adult of some chordates  
(3) Ventral hollow nerve cord remains throughout life in some chordates.  
(4) All chordates possess vertebral column.

**Answer (2)**

146. The phenomenon of evolution of different species in a given geographical area starting from a point and spreading to other habitats is called

- (1) Adaptive radiation  
(2) Saltation  
(3) Co-evolution  
(4) Natural selection

**Answer (1)**

147. *E. Coli* has only  $4.6 \times 10^6$  base pairs and completes the process of replication within 18 minutes; then the average rate of polymerisation is approximately

- (1) 1000 base pairs/second  
(2) 2000 base pairs/second  
(3) 3000 base pairs/second  
(4) 4000 base pairs/second

**Answer (2)**

148. The size of Pleuropneumonia - like organism (PPLO) is

- (1)  $0.1 \mu\text{m}$  (2)  $0.02 \mu\text{m}$   
(3)  $1 - 2 \mu\text{m}$  (4)  $10 - 20 \mu\text{m}$

**Answer (1)**

149. Intrinsic factor that helps in the absorption of vitamin  $B_{12}$  is secreted by

- (1) Chief cells (2) Goblet cells  
(3) Hepatic Cells (4) Oxyntic cells

**Answer (4)**

150. Match the following columns with reference to cockroach and select the correct option:

- | Column-I                           | Column-II                     |
|------------------------------------|-------------------------------|
| (a) Grinding of the food particles | (i) Hepatic caecal            |
| (b) Secrete gastric juice          | (ii) 10 <sup>th</sup> segment |
| (c) 10 pairs                       | (iii) Proventriculus          |
| (d) Anal Cerci                     | (iv) Spiracles                |
|                                    | (v) Alary muscles             |

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

**Answer (2)**

151. The increase in osmolarity from outer to inner medullary interstitium is maintained due to :

- (i) Close proximity between Henle's loop and vasa recta
- (ii) Counter current mechanism
- (iii) Selective secretion of  $\text{HCO}_3^-$  and hydrogen ions in PCT
- (iv) Higher blood pressure in glomerular capillaries

- (1) (i) and (ii)                      (2) Only (ii)
- (3) (iii) and (iv)                  (4) (i), (ii) and (iii)

**Answer (1)**

152. Select the correct statement :

- (1) Reduction in Glomerular Filtration Rate activates JG cells to release renin.
- (2) Atrial Natriuretic Factor increases the blood pressure.
- (3) Angiotensin II is a powerful vasodilator.
- (4) Counter current pattern of blood flow is not observed in vasa recta.

**Answer (1)**

153. Which of the following STDs are not curable?

- (1) Gonorrhoea, Trichomoniasis, Hepatitis B
- (2) Genital herpes, Hepatitis B, HIV infection
- (3) Chlamydiasis, Syphilis, Genital warts
- (4) HIV, Gonorrhoea, Trichomoniasis

**Answer (2)**

154. Match the following columns and select the correct option :

- | Column-I                         | Column-II              |
|----------------------------------|------------------------|
| (a) Smooth endoplasmic reticulum | (i) Protein synthesis  |
| (b) Rough endoplasmic reticulum  | (ii) Lipid synthesis   |
| (c) Golgi complex                | (iii) Glycosylation    |
| (d) Centriole                    | (iv) Spindle formation |
- (1) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)
  - (2) (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)
  - (3) (a)-(iii), (b)-(i), (c)-(ii), (d)-(iv)
  - (4) (a)-(iv), (b)-(ii), (c)-(i), (d)-(iii)

**Answer (2)**

155. A Hominid fossil discovered in Java in 1891, now extinct, having cranial capacity of about 900 cc was

- (1) *Australopithecus* (2) *Homo erectus*
- (3) Neanderthal man (4) *Homo sapiens*

**Answer (2)**

156. The protolytic enzyme rennin is found in :

- (1) Pancreatic juice (2) Intestinal juice
- (3) Bile juice (4) Gastric juice

**Answer (4)**

157. Match the following columns and select the correct option :

- | Column - I                        | Column - II  |
|-----------------------------------|--|
| (a) Dragonflies                   | (i) Biocontrol agents of several plant pathogens   |
| (b) <i>Bacillus thuringiensis</i> | (ii) Get rid of Aphids and mosquitoes              |
| (c) Glomus                        | (iii) Narrow spectrum insecticidal applications    |
| (d) Baculoviruses                 | (iv) Biocontrol agents of lepidopteran plant pests |
|                                   | (v) Absorb phosphorus from soil                    |

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

**Answer (1)**

158. Select the incorrectly matched pair from following :

- (1) Osteocytes - Bone cells
- (2) Chondrocytes - Smooth muscle cells
- (3) Neurons - Nerve cells
- (4) Fibroblast - Areolar tissue

**Answer (2)**

159. The yellowish fluid "colostrum" secreted by mammary glands of mother during the initial days of lactation has abundant antibodies (IgA) to protect the infant. This type of immunity is called as :

- (1) Autoimmunity (2) Passive immunity  
(3) Active immunity (4) Acquired immunity

**Answer (2)**

160. Select the correct option of haploid cells from the following groups:

- (1) Primary spermatocyte, Secondary spermatocyte, Second polar body  
(2) Primary oocyte, Secondary oocyte, Spermatid  
(3) Secondary spermatocyte, First polar body, Ovum  
(4) Spermatogonia, Primary spermatocyte, Spermatid

**Answer (3)**

161. During Meiosis I, in which stage synapsis takes place?

- (1) Leptotene (2) Pachytene  
(3) Zygotene (4) Diplotene

**Answer (3)**

162. Select the correct statement from the following

- (1) PCR is used for isolation and separation of gene of interest  
(2) Gel electrophoresis is used for amplification of a DNA segment  
(3) The polymerase enzyme joins the gene of interest and the vector DNA  
(4) Restriction enzyme digestions are performed by incubating purified DNA molecules with the restriction enzymes of optimum conditions

**Answer (4)**

163. Spooling is

- (1) Collection of isolated DNA  
(2) Amplification of DNA  
(3) Cutting of separated DNA bands from the agarose gel  
(4) Transfer of separated DNA fragments to synthetic membranes

**Answer (1)**

164. Match the following columns and select the correct option :

Column-I	Column-II
(a) Ovary	(i) Human chorionic Gonadotropin
(b) Placenta	(ii) Estrogen & Progesterone
(c) Corpus luteum	(iii) Androgens
(d) Leydig cells	(iv) Progesterone only
(1) (a)-(ii), (b)-(i), (c)-(iv), (d)-(iii)	
(2) (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)	
(3) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)	
(4) (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)	

**Answer (1)**

165. Match the following columns and select the correct option :

Column-I	Column-II
(a) Pituitary hormone	(i) Steroid
(b) Epinephrine	(ii) Neuropeptides
(c) Endorphins	(iii) Peptides, proteins
(d) Cortisol	(iv) Biogenic amines
(1) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)	
(2) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)	
(3) (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)	
(4) (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)	

**Answer (3)**

166. The laws and rules to prevent unauthorised exploitation of bio-resources are termed as -

- (1) Biopiracy  
(2) Biopatenting  
(3) Bioethics  
(4) Bioengineering

**Answer (3)**



167. Match the following columns and select the correct option :

Column - I	Column - II
(i) Typhoid	(a) <i>Haemophilus influenzae</i>
(ii) Malaria	(b) <i>Wuchereria bancrofti</i>
(iii) Pneumonia	(c) <i>Plasmodium vivax</i>
(iv) Filariasis	(d) <i>Salmonella typhi</i>
(1) (i)-(a), (ii)-(b), (iii)-(d), (iv)-(c)	
(2) (i)-(d), (ii)-(c), (iii)-(a), (iv)-(b)	
(3) (i)-(c), (ii)-(d), (iii)-(b), (iv)-(a)	
(4) (i)-(a), (ii)-(c), (iii)-(b), (iv)-(d)	

**Answer (2)**

168. RNA interference is used for which of the following purposes in the field of biotechnology?

- (1) to reduce post harvest losses
- (2) to develop a plant tolerant to abiotic stresses
- (3) to develop a pest resistant plant against infestation by nematode
- (4) to enhance the mineral usage by the plant

**Answer (3)**

169. The rate of decomposition is faster in the ecosystem due to following factors EXCEPT :

- (1) Detritus richer in lignin and chitin
- (2) Detritus rich in sugars
- (3) Warm and moist environment
- (4) Presence of aerobic soil microbes

**Answer (1)**

170. Which of the following conditions cause erythroblastosis foetalis?

- (1) Both mother and foetus Rh<sup>+</sup>ve
- (2) Mother Rh<sup>+</sup>ve and foetus Rh<sup>-</sup>ve
- (3) Mother Rh<sup>-</sup>ve and foetus Rh<sup>+</sup>ve
- (4) Both mother and foetus Rh<sup>-</sup>ve

**Answer (3)**

171. In Human beings, at the end of 12 weeks (first trimester) of pregnancy, the following is observed :

- (1) Movement of the foetus
- (2) Eyelids and eyelashes are formed
- (3) Most of the major organ systems are formed
- (4) The head is covered with fine hair

**Answer (3)**

172. Progestogens alone or in combination with estrogens can be used as a contraceptive in the form of

- (1) Pills only
- (2) Implants only
- (3) Injections only
- (4) Pills, injections and implants

**Answer (4)**

173. Which of the following options does correctly represent the characteristic features of phylum Annelida?

- (1) Diploblastic, mostly marine and radially symmetrical.
- (2) Triploblastic, unsegmented body and bilaterally symmetrical.
- (3) Triploblastic, segmented body and bilaterally symmetrical.
- (4) Triploblastic, flattened body and acoelomate condition.

**Answer (3)**

174. Inbreeding depression is

- (1) Reduced fertility and productivity due to continued close inbreeding
- (2) Reduced motility and immunity due to close inbreeding
- (3) Decreased productivity due to mating of superior male and inferior female
- (4) Decrease in body mass of progeny due to continued close inbreeding

**Answer (1)**

175. Match the following columns and select the correct option :

Column - I	Column - II
(a) Rods and Cones	(i) Absence of photoreceptor cells
(b) Blind Spot	(ii) Cones are densely packed
(c) Fovea	(iii) Photoreceptor cells
(d) Iris	(iv) Visible coloured portion of the eye

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

Answer (2)

176. Match the following columns and select the correct option :

Column-I	Column - II
(a) Pneumotaxic Centre	(i) Alveoli
(b) O <sub>2</sub> Dissociation curve	(ii) Pons region of brain
(c) Carbonic Anhydrase	(iii) Haemoglobin
(d) Primary site of exchange of gases	(iv) R.B.C.

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

Answer (3)

177. Match the following columns and select the correct option :

Column - I	Column - II
(a) Gout	(i) Decreased levels of estrogen
(b) Osteoporosis	(ii) Low Ca <sup>++</sup> ions in the blood
(c) Tetany	(iii) Accumulation of uric acid crystals
(d) Muscular dystrophy	(iv) Auto immune disorder
	(v) Genetic disorder

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

Answer (3)

178. Match the following columns and select the correct option :

Column-I	Column-II
(a) <i>Aptenodytes</i>	(i) Flying fox
(b) <i>Pteropus</i>	(ii) Angel fish
(c) <i>Pterophyllum</i>	(iii) Lamprey
(d) <i>Petromyzon</i>	(iv) Penguin

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

Answer (4)

179. In cockroach, identify the parts of the foregut in correct sequence :

- (1) Mouth → Pharynx → Oesophagus → Crop  
 Gizzard  
 (2) Mouth → Oesophagus → Pharynx → Crop  
 Gizzard  
 (3) Mouth → Crop → Pharynx → Oesophagus  
 → Gizzard  
 (4) Mouth → Gizzard → Crop → Pharynx →  
 Oesophagus

Answer (1)

180. Match the following events that occur in their respective phases of cell cycle and select the correct option :

- |                          |   |
|--------------------------|---|
| (a) G <sub>1</sub> phase | (i) Cell grows and organelle duplication        |
| (b) S phase              | (ii) DNA replication and chromosome duplication |
| (c) G <sub>2</sub> phase | (iii) Cytoplasmic growth                        |
| (d) Metaphase in M-phase | (iv) Alignment of chromosomes                   |
- (1) (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)  
 (2) (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)  
 (3) (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)  
 (4) (a)-(iv), (b)-(i), (c)-(ii), (d)-(iii)

Answer (1)