

MENIIT

NEET | IIT-JEE | FOUNDATION

Corporate Office: 44-A/1, Kalu Sarai, New Delhi 110016 | Web: www.meniit.com

Maximum Marks: 720

Time : 3 Hours

Paper Code

S

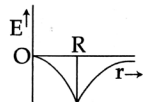


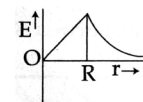
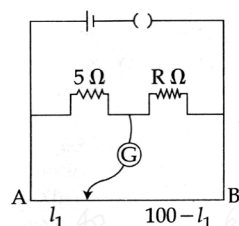
NEET (UG) – 2014

Important Instructions

1. The Answer Sheet is inside the Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars on **side-1** and **side-2** carefully with blue/ black ball point pen only.
2. 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**.
3. Use **Blue/Black Ball Point Pen only** for writing particulars on this page / marking responses.
4. Rough work is to be done on the space provided for this purpose in the Test Booklet only.
5. **On completion of the test, the candidate must handover the Answer Sheet to the invigilator in the Room/Hall. The candidate are allowed to take away this Test Booklet with them.**
6. The CODE for this Booklet is **S**. Make sure that the CODE printed on **Side-2** of the Answer Sheet is the same as that on this Booklet. In case of discrepancy, the candidate should immediately report the matter to the invigilator for replacement of both the Test Booklet and the Answer Sheet.
7. 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.
8. Use of white fluid for correction is NOT permissible on the Answer Sheet.
9. Each candidate must show on demand his/her Admission Card to the Invigilator.
10. No candidates, without special permission of the Superintendent or Invigilator would leave his/her seat.
11. The candidates should not leave the Examination Hall without handing over their Answer Sheet to the Invigilator on duty and sign the Attendance Sheet twice. Cases where a candidate has not signed the Attendance Sheet the second time will be deemed not to have handed over Answer Sheet and dealt with as an unfair means case.
12. Use of Electronic / Manual Calculator is prohibited
13. The candidates are governed by all Rules and Regulations of the Board with regard to their conduct in the Examination Hall. All cases of unfair means will be dealt with as per Rules and Regulations of the Board.
14. No part of the Test Booklet and Answer Sheet shall be detached under any circumstances.
15. The candidates will write the Correct Test Booklet Code as given in the Test Booklet / Answer Sheet in the Attendance Sheet.

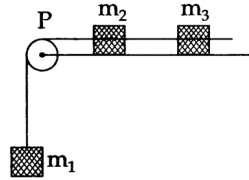
SECTION - I (PHYSICS)

180 MARKS

1. The mean free path of molecules of gas, (radius 'r') is inversely proportional to:
 (1) r (2) \sqrt{r} (3) r^3 (4) r^2
2. A particle is moving such that its position coordinates (x, y) are (2m, 3m) at time t = 0, (6m, 7m) at time t = 2 s and (13m, 14m) at time t = 5s. Average velocity vector (\vec{V}_{av}) from t = 0 to t = 5 s is :
 (1) $2(\hat{i} + \hat{j})$ (2) $\frac{11}{5}(\hat{i} + \hat{j})$ (3) $\frac{1}{5}(13\hat{i} + 14\hat{j})$ (4) $\frac{7}{3}(\hat{i} + \hat{j})$
3. Dependence of intensity of gravitational field (E) of earth with distance (r) from centre of earth is correctly represented by:
 (1)  (2)  (3)  (4) 
4. When the energy of the incident radiation is increased by 20%, the kinetic energy of the photoelectrons emitted from a metal surface increased from 0.5 eV to 0.8 eV. The work function of the metal is :
 (1) 1.3 eV (2) 1.5 eV (3) 0.65 eV (4) 1.0 eV
5. In an ammeter 0.2% of main current passes through the galvanometer. If resistance of galvanometer is G, the resistance of ammeter will be :
 (1) $\frac{1}{500}G$ (2) $\frac{500}{499}G$ (3) $\frac{1}{499}G$ (4) $\frac{499}{500}G$
6. A balloon with mass 'm' is descending down with an acceleration 'a' (where a < g). How much mass should be removed from it so that it starts moving up with an acceleration 'a'?
 (1) $\frac{ma}{g+a}$ (2) $\frac{ma}{g-a}$ (3) $\frac{2ma}{g+a}$ (4) $\frac{2ma}{g-a}$
7. The Binding energy per nucleon of ${}^7_3\text{Li}$ and ${}^4_2\text{He}$ nuclei are 5.60 MeV and 7.06 MeV, respectively. In the nuclear reaction ${}^7_3\text{Li} + {}^1_1\text{H} \rightarrow {}^4_2\text{He} + {}^4_2\text{He} + Q$, the value of energy Q released is:
 (1) 8.4 MeV (2) 17.3 MeV (3) 19.6 MeV (4) -2.4 MeV
8. The angle of a prism is 'A'. One of its refracting surfaces is silvered. Light rays falling at an angle of incidence 2A on the first surface returns back through the same path after suffering reflection at the silvered surface. The refractive index μ , of the prism is :
 (1) $\frac{1}{2}\cos A$ (2) $\tan A$ (3) $2\sin A$ (4) $2\cos A$
9. The resistances in the two arms of the meter bridge are 5Ω and $R\Omega$ respectively. When the resistance R is shunted with an equal resistance, the new balance point is at $1.6 l_1$. The resistance 'R', is :

 (1) 20Ω (2) 25Ω (3) 10Ω (4) 15Ω
10. Two cities are 150 km apart. Electric power is sent from one city to another city through copper wires. The fall of potential per km is 8 volt and the average resistance per km is 0.5Ω . The power loss in the wire is :

- (1) 19.2 J (2) 12.2 kW (3) 19.2 W (4) 19.2 kW

11. A system consists of three masses m_1 , m_2 and m_3 connected by a string passing over a pulley P. The mass m_1 hangs freely and m_2 and m_3 are on rough horizontal table (the coefficient of friction = μ). The pulley is frictionless and of negligible mass. The downward acceleration of mass m_1 is : (Assume $m_1 = m_2 = m_3 = m$)



- (1) $\frac{g(1-2\mu)}{3}$ (2) $\frac{g(1-2\mu)}{2}$ (3) $\frac{g(1-g\mu)}{9}$ (4) $\frac{2g\mu}{3}$

12. If the kinetic energy of the particle is increased to 16 times its previous value, the percentage change in the de-Broglie wavelength of the particle is :

- (1) 60 (2) 50 (3) 25 (4) 75

13. A beam of light of $\lambda = 600$ nm from a distant source falls on a single slit 1 mm wide and the resulting diffraction pattern is observed on a screen 2m away. The distance between first dark fringes oneither side of the central bright fringe is :

- (1) 2.4 cm (2) 2.4 mm (3) 1.2 cm (4) 1.2 mm

14. A black hole is an object whose gravitational field is so strong that even light cannot escape from it. To what approximate radius would earth (mass = 5.98×10^{24} kg) have to be compressed to be a black hole?

- (1) 10^{-2} m (2) 100m (3) 10^{-9} m (4) 10^{-6} m

15. The oscillation of a body on a smooth horizontal surface is represented by the equation,

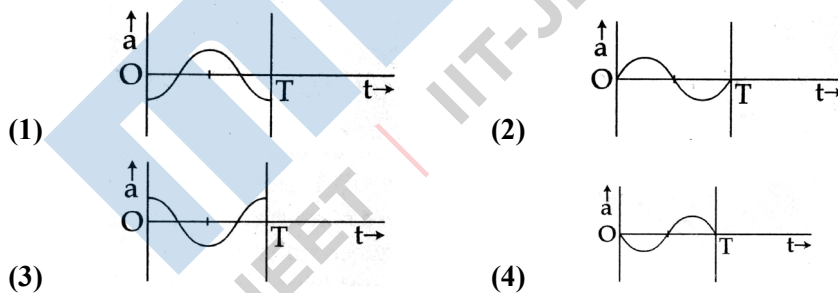
$$X = A \cos (\omega t)$$

Where

X = displacement at time t

ω = frequency of oscillation

Which one of the following graphs shows correctly the variation 'a' with 't'?



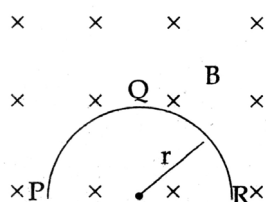
16. A solid cylinder of mass 50 kg and radius 0.5 m is free to rotate about the horizontal axis. A massless string is wound round the cylinder with one end attached to it and other hanging freely. Tension in the string required to produce an angular acceleration of 2 revolutions s^{-2} is :

- (1) 78.5 N (2) 157 N (3) 25 N (4) 50 N

17. The ratio of the accelerations for a solid sphere (mass 'm' and radius 'R') rolling down an incline of angle ' θ ' without slipping and slipping down the incline without rolling is:

- (1) 2:5 (2) 7 : 5 (3) 5 : 7 (4) 2 : 3

18. A thin semicircular conducting ring (PQR) of radius 'r' is falling with its plane vertical in a horizontal magnetic field B, as shown in figure. The potential difference developed across the ring when its speed if v, is :



- (1) $\pi r B v$ and R is at higher potential (2) $2r B v$ and R is at higher potential
 (3) Zero (4) $B v \pi r^2 / 2$ and P is at higher potential
19. In the Young's double slit experiment, the intensity of light at a point on the screen where the path difference is λ is K, (λ being the wave length of light used). The intensity at a point where the path difference is $\lambda/4$, will be
 (1) $K/2$ (2) Zero (3) K (4) $K/4$
20. A radio isotope 'X' with a half life 1.4×10^9 years decays to 'Y' which is stable. A sample of the rock from a cave was found to contain 'X' and 'Y' in the ratio 1 : 7. The age of the rock is:
 (1) 4.20×10^9 years (2) 8.40×10^9 years
 (3) 1.96×10^9 years (4) 3.92×10^9 years
21. Light with an energy flux of $25 \times 10^4 \text{ Wm}^{-2}$ falls on a perfectly reflecting surface at normal incidence. If the surface area is 15 cm^2 , the average force exerted on the surface is :
 (1) $1.20 \times 10^{-6} \text{ N}$ (2) $3.0 \times 10^{-6} \text{ N}$ (3) $1.25 \times 10^{-6} \text{ N}$ (4) $2.50 \times 10^{-6} \text{ N}$
22. Certain quantity of water cools from 70°C to 60°C in the first 5 minutes and to 54°C in the next 5 minutes. The temperature of the surroundings is :
 (1) 42°C (2) 10°C (3) 45°C (4) 20°C
23. A monoatomic gas at a pressure P, having a volume V expands isothermally to a volume 2V and then adiabatically to a volume 16V. The final pressure of the gas is : (take $\gamma = 5/3$)
 (1) $P/64$ (2) $16P$ (3) $64P$ (4) $32P$
24. A projectile is fired from the surface of the earth with a velocity of 5 ms^{-1} and angle θ with the horizontal. Another projectile fired from another planet with a velocity of 3 ms^{-1} at the same angle follows a trajectory which is identical with the trajectory of the projectile fired from the earth. The value of the acceleration due to gravity on the planet is (in ms^{-2}) is: (given $g = 9.8 \text{ ms}^{-2}$)
 (1) 16.3 (2) 110.8 (3) 3.5 (4) 5.9
25. In a region, the potential is represented by $V(x,y,z) = 6x - 8xy - 8y + 6yz$, where V is in volts and x, y, z are in meters. The electric force experienced by a charge of 2 coulomb situated at point (1, 1, 1) is
 (1) 24 N (2) $4\sqrt{35} \text{ N}$ (3) $6\sqrt{5} \text{ N}$ (4) 30 N
26. Hydrogen atom in ground state is excited by a monochromatic radiation of $\lambda = 975 \text{ \AA}$. Number of spectral lines in the resulting spectrum emitted will be
 (1) 6 (2) 10 (3) 3 (4) 2
27. The barrier potential of a p-n junction depends on:
 (a) type of semi conductor material (b) amount of doping
 (c) temperature
 Which one of the following is correct?
 (1) (b) and (c) only (2) (a), (b) and (c) (3) (a) and (b) only (4) (b) only
28. If n_1 , n_2 and n_3 are the fundamental frequencies of three segments into which a string is divided, then the original fundamental frequency n of the string is given by:
 (1) $\sqrt{n} = \sqrt{n_1} + \sqrt{n_2} + \sqrt{n_3}$ (2) $n = n_1 + n_2 + n_3$

(3) $\frac{1}{n} = \frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3}$ (4) $\frac{1}{\sqrt{n}} = \frac{1}{\sqrt{n_1}} + \frac{1}{\sqrt{n_2}} + \frac{1}{\sqrt{n_3}}$

29. If force (F), velocity (V) and time (T) are taken as fundamental units, then the dimensions of mass are
 (1) $[FV^{-1}T^{-1}]$ (2) $[FV^{-1} T]$ (3) $[F V T^{-1}]$ (4) $[F V T^{-2}]$

30. If the focal length of objective lens is increased then magnifying power of:
 (1) microscope and telescope both will decrease.
 (2) microscope will decrease but that of telescope will increase.
 (3) microscope will increase but that of telescope decrease.
 (4) microscope and telescope both will increase.

31. A potentiometer circuit has been set up for finding the internal resistance of a given cell. The main battery, used across the potentiometer wire, has an emf of 2.0 V and a negligible internal resistance. The potentiometer wire itself is 4 m long. When the resistance, R, connected across the given cell, has values of

(i) infinity (ii) 9.5 Ω
 the 'balancing lengths', on the potentiometer wire are found to be 3 m and 2.85 m, respectively. The value of internal resistance of the cell is :

(1) 0.5 Ω (2) 0.75 Ω (3) 0.25 Ω (4) 0.95 Ω

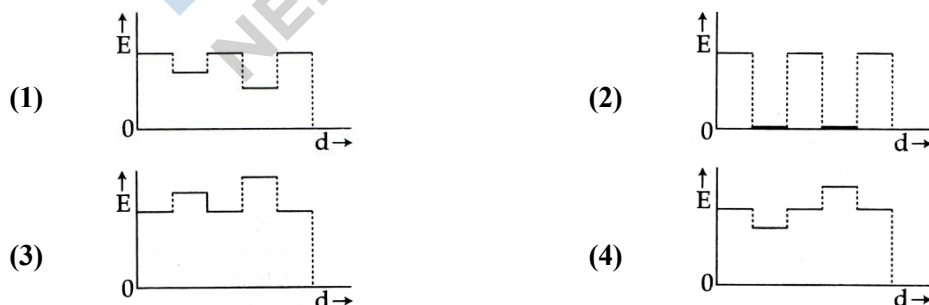
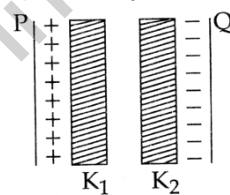
32. Copper of fixed volume 'V' is drawn into wire of length 'l'. When this wire is subjected to a constant force 'F', the extension produced in the wire is 'A'. Which of the following graphs is a straight line?

(1) Δl versus $1/l^2$ (2) Δl versus l (3) Δl versus $1/l$ (4) Δl versus l^2

33. Two identical long conducting wires AOB and COD are placed at right angle to each other, with one above other such that 'O' is their common point for the two. The wires carry I_1 and I_2 currents, respectively. Point 'P' is lying at distance 'd' from 'O' along a direction perpendicular to the plane containing the Wires. The magnetic field at the point 'P' will be :

(1) $\frac{\mu_0}{2\pi d}(I_1^2 - I_2^2)$ (2) $\frac{\mu_0}{2\pi d}(I_1^2 + I_2^2)^{1/2}$ (3) $\frac{\mu_0}{2\pi d}(I_1 / I_2)$ (4) $\frac{\mu_0}{2\pi d}(I_1 + I_2)$

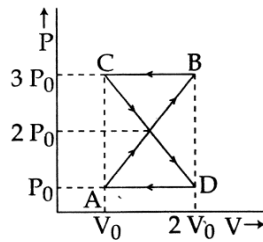
34. Two thin dielectric slabs of dielectric constants K_1 and K_2 ($K_1 < K_2$) are inserted between plates of a parallel plate capacitor, as shown in the figure. The variation of electric field 'E' between the plates with distance 'd' as measured from plate P is correctly shown by:



35. The number of possible natural oscillations of air column in a pipe closed at one end of length 85 cm whose frequencies lie below 1250 Hz are: (velocity of sound = 340 ms^{-1})

(1) 7 (2) 6 (3) 4 (4) 5

36. A thermodynamic system undergoes cyclic process ABCDA as shown in Fig. The work done by the system in the cycle is :



- (1) $\frac{P_0 V_0}{2}$ (2) Zero (3) $P_0 V_0$ (4) $2P_0 V_0$

37. A transformer having efficiency of 90% is working on 200 V and 3 kW power supply. If the current in the secondary coil is 6 A, the Voltage across the secondary coil and the current in the primary coil respectively are :

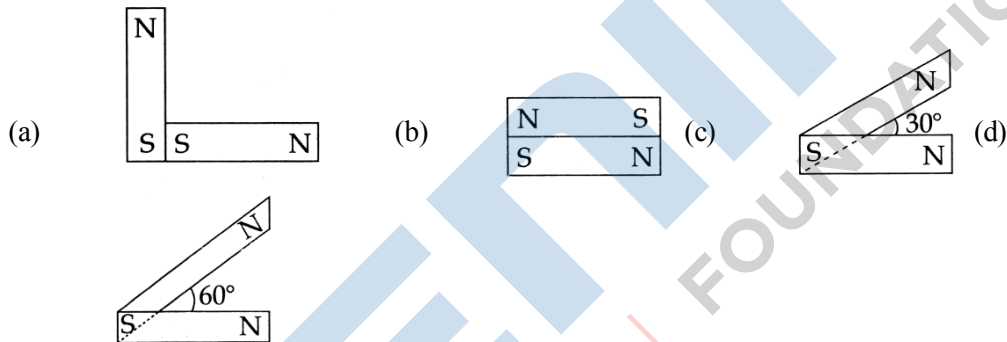
- (1) 450 V, 13.5 A (2) 600 V, 15 A (3) 300 V, 15 A (4) 450 V, 15 A

38. Steam at 100°C is passed into 20 g of water at 10°C. When water acquires a temperature of 80°C, the mass of Water present will be:

[Take specific heat of Water = 1 cal g⁻¹ °C⁻¹ and latent heat of steam = 540 cal g⁻¹]

- (1) 42.5 g (2) 22.5 g (3) 24 g (4) 31.5 g

39. Following figures show the arrangement of bar magnets in different configurations. Each magnet has magnetic dipole moment \vec{m} . In which configuration has highest net magnetic dipole moment?



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

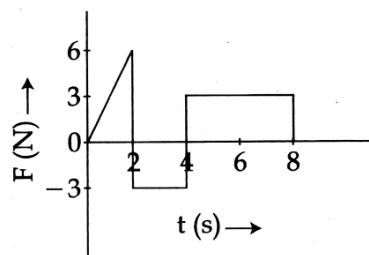
40. A conducting sphere of radius R is given a charge Q. The electric potential and the electric field at the centre of the sphere respectively are :

- (1) $\frac{Q}{4\pi\epsilon_0 R}$ and $\frac{Q}{4\pi\epsilon_0 R^2}$ (2) Both are zero
 (3) Zero and $\frac{Q}{4\pi\epsilon_0 R^2}$ (4) $\frac{Q}{4\pi\epsilon_0 R}$ and zero

41. A body of mass (4m) is lying in x-y plane at rest. It suddenly explodes into three pieces. Two pieces, each of mass (m) move perpendicular to each other with equal speeds (U). The total kinetic energy generated due to explosion is:

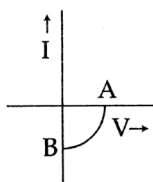
- (1) $2mv^2$ (2) $4mv^2$ (3) mv^2 (4) $\frac{3}{2}mv^2$

42. The force 'F' acting on a particle of mass 'm' is indicated by the force-time graph shown below. The change in momentum of the particle over the time interval from zero to 8 s is:



- (1) 12 Ns (2) 6 Ns (3) 24 Ns (4) 20 Ns

43. A speeding motorcyclist sees traffic jam ahead of him. He slows down to 36 km/ hour. He finds that traffic has eased and a car moving ahead of him at 18 km/ hour is honking at a frequency of 1392 Hz. If the speed of sound is 343 m/ s , the frequency of the honk as heard by him will be :
 (1) 1412 Hz (2) 1454 Hz (3) 1332 Hz (4) 1372 Hz
44. A certain number of spherical drops of a liquid of radius 'r' coalesce to form a single drop of radius 'R' and volume 'V'. If 'T' is the surface tension of the liquid then :
 (1) energy = $3VT\left(\frac{1}{r} - \frac{1}{R}\right)$ is released (2) energy is neither released nor absorbed
 (3) energy = $4VT\left(\frac{1}{r} - \frac{1}{R}\right)$ is released (4) energy = $3VT\left(\frac{1}{r} + \frac{1}{R}\right)$ is absorbed
45. The given graph represents V – I characteristic for a semiconductor device .



Which of the following statement is correct?

- (1) It is for a photodiode and points A and B represent open circuit voltage and current, respectively.
 (2) It is for a LED and points A and B represent open circuit voltage and short circuit current, respectively.
 (3) It is V – I characteristic for solar cell where, point A represent open circuit voltage and point B short circuit current.
 (4) It is for a solar cell and points A and B represent open circuit voltage and current, respectively.

SECTION - II (BIOLOGY)

360 MARKS

46. *Planaria* possess high capacity of:
 (1) alternation of generation (2) bioluminescence
 (3) metamorphosis (4) regeneration
47. An example of *ex situ* conservation is
 (1) Wildlife Sanctuary (2) Sacred Grove
 (3) National Park (4) Seed Bank
48. To obtain virus - free healthy plants from a diseased one by tissue culture technique, which part/ parts of the diseased plant will be taken?
 (1) Both apical and axillary meristems (2) Epidermis only
 (3) Apical meristem only (4) Palisade parenchyma
49. The motile bacteria are able to move by:
 (1) cilia (2) pili (3) fimbriae (4) flagella
50. A marine cartilaginous fish that can produce electric current is:
 (1) *Trygon* (2) *Scoliodon* (3) *Pristis* (4) *Torpedo*
51. You are given a fairly old piece of dicot stem and a dicot root. Which of the following anatomical structures will you use to distinguish between the two?
 (1) Protoxylem (2) Cortical cells (3) Secondary xylem (4) Secondary phloem
52. In a population of 1000 individuals 360 belong to genotype AA, 480 to Aa and the remaining 160 to aa. Based on this data, the frequency of allele A in the population:

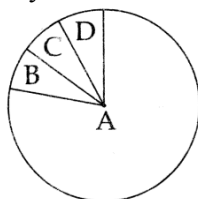
- (1) 0.6 (2) 0.7 (3) 0.4 (4) 0.5
53. Fructose is absorbed into the blood through mucosa cells of intestine by the process called:
 (1) simple diffusion (2) co-transport mechanism
 (3) active transport (4) facilitated transport
54. Which of the following causes an increase in sodium reabsorption in the convoluted tubule?
 (1) Decrease in aldosterone levels (2) Decrease in antidiuretic hormone levels
 (3) Increase in aldosterone levels (4) Increase in antidiuretic hormone levels
55. A few normal seedlings of tomato were kept in a dark room. After a few days they were found to have become white-coloured like albionos. Which of the following terms will you use to describe them ?
 (1) Etiolated (2) Defoliated (3) Mutated (4) Embolised
56. Stimulation of a muscle fiber by a motor neuron occurs at:
 (1) the myofibril (2) the sacroplasmic reticulum
 (3) the neuromuscular junction (4) the transverse tubules
57. In vitro clonal propagation is characterized by:
 (1) Electrophoresis and HPLC (2) Microscopy
 (3) PCR and RAPD (4) Northern blotting
58. Deficiency symptoms of nitrogen and potassium are visible first in:
 (1) Roots (2) Buds (3) Senescent leaves (4) Young leaves
59. Fight-or-flight reactions cause activation of:
 (1) the adrenal medulla, leading to increased secretion of epinephrine and norepinephrene.
 (2) the pancreas leading to a reduction in the blood sugar levels.
 (3) the parathyroid glands, leading to increased metabolic rate.
 (4) the kidney, leading to suppression of rennin-angiotensin-aldosterone pathway.
60. If 20J of energy is trapped at producer level, then how much energy will be available to peacock as food in the following chain?
 plant → mice → snake → peacock
 (1) 0.2J (2) 0.0002 J (3) 0.02 J (4) 0.002 J
61. Male gametophyte 'With least number of cells is present in:
 (1) Lilium (2) Pinus (3) Pteris (4) Funariu
62. A scrubber in the exhaust of a chemical industrial plant removes:
 (1) gases like ozone and methane
 (2) particulate matter of the size 2.5 micrometer or less
 (3) gases like sulphur dioxide
 (4) particulate matter of the size 5 micrometer or above
63. Fruit colour in squash is an example of
 (1) Complementary genes (2) Inhibitory genes
 (3) Recessive epistasis (4) Dominant epistasis
64. A location with luxuriant growth of lichens on the trees indicates that the:
 (1) location is highly polluted (2) location is not polluted
 (3) trees are very healthy (4) trees are heavily infested
65. At which stage of HIV infection does one usually show symptoms of AIDS?
 (1) When HIV damages large number of helper T - Lymphocytes.
 (2) When the viral DNA is produced by reverse transcriptase.
 (3) Within 15 days of sexual contact with an infected person.

- (4) When the infected retro virus enters host cells.
66. The first human hormone produced by recombinant DNA technology is:
 (1) Thyroxin (2) Progesterone (3) Insulin (4) Estrogen
67. The main function of mammalian' corpus luteum is to produce:
 (1) human chorionic gonadotropin (2) relaxin only
 (3) estrogen only (4) progesterone
68. In which one of the following processes CO₂ is not released?
 (1) Alcoholic fermentation (2) Lactate fermentation
 (3) Aerobic respiration in plants (4) Aerobic respiration in animals
69. The zone of atmosphere in which the ozone layer is present is called
 (1) Stratosphere (2) Troposphere (3) Ionosphere (4) Mesosphere
70. Transformation was discovered by
 (1) Griffith (2) Watson and Crick
 (3) Meselson and Stahl (4) Hershey and Chase
71. Select the option which is not correct with respect to enzyme action :
 (1) A non - competitive inhibitor binds the enzyme at a site distinct from that which binds the substrate.
 (2) Malonate is a competitive inhibitor of succinic dehydrogenase.
 (3) Substrate binds with enzyme at its active site
 (4) Addition of lot of succinate does not reverse the inhibition of succinic dehydrogenase by malonate.
72. Which one of the following is **wrongly** matched?
 (1) Repressor protein - Binds to operator to stop enzyme synthesis.
 (2) Operon - Structural genes, operator and promoter
 (3) Transcription - Writing information from DNA to t-RNA.
 (4) Translation - Using information in m-RNA to make protein.
73. Which one of the following statements is not correct?
 (1) Retinal is a derivative of Vitamin C.
 (2) Rhodopsin is the purplish red protein present in rods only.
 (3) Retinal is the light absorbing portion of visual photo pigments.
 (4) In retina the rods have the photopigment rhodopsin while cones have three different photopigments.
74. During which phases of each cell cycle, amount of DNA in a cell remains at 4C level if the initial amount is denoted as 2C?
 (1) Only G₂ (2) G₂ and M (3) G₀ and G₁ (4) G₁ and S
75. Non-albuminous seed is produced in:
 (1) Wheat (2) Pea (3) Maize (4) Castor
76. Select the Taxon mentioned that represents marine and fresh water species:
 (1) Cephalochordate (2) Cnidaria (3) Echinoderms (4) Ctenophora
77. Five kingdom system of classification suggested by R.H. Whittaker is not based on:
 (1) Mode of nutrition (2) Complexity of body organization
 (3) Presence or absence of a well defined nucleus
 (4) Mode of reproduction
78. Select the correct option:

	Direction of RNA synthesis	Direction of reading of the template DNA strand
--	-----------------------------------	--

(1)	5'-----3'	5'-----3'
(2)	3'-----5'	3'-----5'
(3)	5'-----3'	3'-----5'
(4)	5'-----3'	5'-----3'

79. Given below is the representation of the extent of global diversity of invertebrates. What groups the four portions (A-D) represent respectively?



Options:

	A	B	C	D
(1)	Molluscs	Other animal groups	Crustaceans	Insects
(2)	Insects	Molluscs	Crustaceans	Other animal groups
(3)	Insects	Crustaceans	Other animal groups	Molluscs
(4)	Crustaceans	Insects	Molluscs	Other animal groups

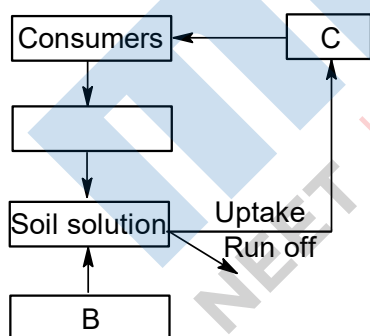
80. An analysis of chromosomal DNA using the Southern hybridization technique does not use:
 (1) Autoradiography (2) PCR (3) Electrophoresis (4) Blotting
81. Which is the particular type of drug that is obtained from the plant whose one flowering branch is shown below?



- (1) Stimulant (2) Pain – killer (3) Hallucinogen (4) Depressant
82. Assisted reproductive technology, of involves transfer of:
 (1) Zygote into the uterus
 (2) Embryo with 16 blastomeres into the fallopian tube.
 (3) Ovum into the fallopian tube. (4) Zygote into the fallopian tube
83. Which of the following is responsible for peat formation?
 (1) *Funaria* (2) *Sphagnum* (3) *Marchantia* (4) *Riccia*
84. Select the correct option describing gonadotropin activity in a normal pregnant female:
 (1) High level of hCG stimulates the synthesis of estrogen and progesterone.
 (2) High level of hCG stimulates the thickening of endometrium.
 (3) High level of FSH and LH stimulates the thickening of endometrium.
 (4) High level of FSH and LH facilitate implantation of the embryo.
85. Tubectomy is a method of sterilization in which:
 (1) small part of vas deferens is removed or tied up.
 (2) uterus is removed surgically
 (3) small part of the fallopian tube is removed or tied up.
 (4) ovaries are removed surgically.
86. Dr. F. Went noted that if coleoptile tips were removed and placed on agar for one hour, the agar would produce a bending when placed on one side of freshly-cut coleoptiles stumps. Of what significance is this experiment?

- (1) It supports the hypothesis that IAA is auxin.
 (2) It demonstrated polar movement of auxins.
 (3) It made possible the isolation and exact identification of auxin.
 (4) It is the basis for quantitative determination of small amounts of growth-promoting substances.
87. Person with blood group AB is considered as universal recipient because he has:
 (1) no antigen on RBC and no antibody in the plasma.
 (2) both A and B antigens in the plasma but no antibodies.
 (3) both A and B antigens on RBC but no antibodies in the plasma.
 (4) both A and B antibodies in the plasma.
88. Function of filiform apparatus is to:
 (1) Produce nectar (2) Guide the entry of pollen tube
 (3) Recognize the suitable pollen at stigma (4) Stimulate division of generative cell
89. Injury localized to the hypothalamus would most likely disrupt:
 (1) executive functions, such as decision making.
 (2) regulation of body temperature.
 (3) short - term memory.
 (4) co-ordination during locomotion.
90. Which one of the following living organisms completely *lacks* a cell wall?
 (1) *Saccharomyces* (2) Blue - green algae
 (3) Cyanobacteria (4) Sea - fan (*Gorgonia*)
91. Which of the following is a hormone releasing Intra Uterine Device (IUD)?
 (1) Cervical cap (2) Vault (3) Multiload 375 (4) LNG – 20
92. Archaeobacteria differ from eubacteria in:
 (1) Cell shape (2) Mode of reproduction
 (3) Cell membrane structure (4) Mode of nutrition
93. Tracheids differ from other tracheary elements in:
 (1) lacking nucleus (2) being lignified
 (3) having casparian strips (4) being imperforate
94. Which one of the following shows isogamy with non-flagellated gametes?
 (1) *Ulothrix* (2) *Spirogyra* (3) *Sargassum* (4) *Ectocarpus*
95. A species facing extremely high risk of extinction the immediate figure is called:
 (1) Critically Endangered (2) Extinct
 (3) Vulnerable (4) Endemic
96. Viruses have:
 (1) Single chromosome (2) Both DNA and RNA as
 (3) DNA enclosed in a protein coat (4) Prokaryotic nucleus
97. Anoxygenic photosynthesis is characteristic of:
 (1) *Chlamydomonas* (2) *Ulva* (3) *Rhodospirillum* (4) *Spirogyra*
98. Commonly used vectors for human genome sequencing are:
 (1) Expression Vectors (2) T/ A Cloning Vectors
 (3) T-DNA A (4) BAC and YAC
99. Which one of the following fungi contain hallucinogens?
 (1) *Neurospora sp.* (2) *Ustilago sp.*
 (3) *Morchella esculenta* (4) *Amamitamuscaria*

100. Which structures perform the function of mitochondria in bacteria?
 (1) Cell wall (2) Mesosomes (3) Nucleoid (4) Ribosomes
101. In 'S' phase of the cell cycle:
 (1) chromosome number is increased. (2) amount of DNA is reduced to-half in each cell.
 (3) amount of DNA doubles in each cell. (4) amount of DNA remains same in each cell.
102. When the margins of sepals or petals overlap one another without any particular direction, the condition is termed as:
 (1) Twisted (2) Valvate (3) Vexillary (4) Imbricate
103. A man whose father was colourblind marries a woman who had a colour blind mother and normal father. What percentage of male children of this couple will be colour blind?
 (1) 50% (2) 75% (3) 25% (4) 0%
104. Which one of the following is a non-reducing carbohydrate?
 (1) Lactose (2) Ribose 5-phosphate
 (3) Maltose (4) Sucrose
105. Forelimbs of cat, lizard used in walking; forelimbs of whale used in swimming and forelimbs of bats used in flying are an example of:
 (1) Homologous organs (2) Convergent evolution
 (3) Analogous organs (4) Adaptive radiation
106. Which one of the following statements is **correct**?
 (1) A proteinaceous aleurone layer is present in maize grain.
 (2) A sterile pistil is called a staminode
 (3) The seed in grasses is not endospermic. (4) Mango is a parthenocarpic fruit.
107. Pollen tablets are available in the market for:
 (1) Supplementing food (2) *Ex situ* conservation
 (3) In vitro fertilization (4) Breeding programmes
108. Given below is a simplified model of phosphorus cycling in a terrestrial ecosystem with four blanks (A-D). Identify the blanks.



	A	B	C	D
(1)	Detritus	Rock minerals	Producer	Litter fall
(2)	Producers	Litter fall	Rock minerals	Detritus
(3)	Rock minerals	Detritus	Litter fall	Producers
(4)	Litter fall	Producers	Rock minerals	Detritus

109. Match the following and select the **correct** answer:
- | | |
|-----------------|-----------------------------------|
| (a) Centriole | (i) Infoldings in mitochondria |
| (b) Chlorophyll | (ii) Thylakoids |
| (c) Cristate | (iii) Nucleic acids |
| (d) Ribozymes | (iv) Basal body cilia or flagella |
- (a) (b) (c) (d)

- (1) (i) (iii) (ii) (iv)
- (2) (iv) (iii) (i) (ii)
- (3) (iv) (ii) (i) (iii)
- (4) (i) (ii) (iv) (iii)

110. Which one of the following is **wrong** about *Chara*?
- (1) Upper antheridium and lower oogonium
 - (2) Globule is male reproductive structure
 - (3) Upper oogonium and lower round antheridium
 - (4) Globule and nucule present on the same plant.
111. The initial step in the digestion of milk in humans is carried out by?
- (1) Rennin (2) Pepsin (3) Lipase (4) Trypsin
112. The shared terminal duct of the reproductive and urinary system in the human male is:
- (1) Vas deferens (2) Vasa efferentia (3) Urethra (4) Ureter
113. An example of edible underground stem is:
- (1) Sweet potato (2) Potato (3) Carrot (4) Groundnut
114. An aggregate fruit is one which develops from:
- (1) Complete inflorescence (2) Multicarpellary superior ovary
 - (3) Multicarpellary syncarpous gynoecium (4) Multicarpellary apocarpous gynoecium
115. Which one of the following growth regulators is known as 'stress hormone'?
- (1) GA₃ (2) Indole acetic acid
 - (3) Abscissic acid (4) Ethylene
116. Which of the following shows coiled RNA strand and capsomeres?
- (1) Measles virus (2) Retrovirus
 - (3) Polio virus (4) Tobacco mosaic virus
117. An alga which can be employed as food for human being is:
- (1) *Spirogyra* (2) *Polysiphonia* (3) *Ulothrix* (4) *Chlorella*
118. Choose the correctly matched pair:
- (1) Areolar tissue – Loose connective tissue (2) Cartilage – Loose connective tissue
 - (3) Tendon – Specialized connective tissue (4) Adipose tissue – Dense connective tissue
119. Which one of the following are analogous structures?
- (1) Thorns of *Bougainvillea* and Tendrils of *Cucurbita*
 - (2) Flippers of Dolphin and Legs of Horse
 - (3) Wings of Bat and Wings of Pigeon. (4) Gills of Prawn and Lungs of Man.
120. Approximately seventy percent of carbon-dioxide absorbed by the blood will be transported to the lungs:
- (1) by binding to R.B.C. (2) as carbamino – haemoglobin
 - (3) as bicarbonate ions (4) in the form of dissolved gas molecules
121. The osmotic expansion of a cell kept in water is chiefly regulated by:
- (1) Plastids (2) Ribosomes (3) Mitochondria (4) Vacuoles
122. Placenta and pericarp are both edible portions in:
- (1) Tomato (2) Potato (3) Apple (4) Banana
123. Match the following and select the **correct** option:
- | | |
|-----------------------|---------------------|
| (a) Earth worm | (i) Pioneer species |
| (b) Succession | (ii) Detritivore |
| (c) Ecosystem service | (iii) Natality |
| (d) Population growth | (iv) Pollination |
- (1) (a) (b) (c) (d)
 - (2) (iii) (ii) (iv) (i)

- (2) (ii) (i) (iv) (iii)
 (3) (i) (ii) (iii) (iv)
 (4) (iv) (i) (iii) (ii)

124. The organization which publishes the Red List of species is:
 (1) UNEP (2) WWF (3) ICFRE (4) IUCN
125. What gases are produced in anaerobic sludge digesters?
 (1) Methane, Hydrogen Sulphide and O₂ (2) Hydrogen Sulphide and CO₂
 (3) Methane and CO₂ only (4) Methane, Hydrogen Sulphide and CO₂
126. Just as a person moving from Delhi to Shimla to escape the heat for the duration of hot summer, thousands of migratory birds from Siberia and other extremely cold northern regions move to:
 (1) Corbett National Park (2) Keolado national Park
 (3) Western Ghat (4) Meghalaya
127. Choose the correctly matched pair:
 (1) Tubular parts of nephrons – Cuboidal epithelium
 (2) Inner surface of bronchioles – squamous epithelium
 (3) Inner lining of salivary ducts – Ciliated epithelium
 (4) Moist surface of buccal cavity – Glandular epithelium
128. Geitonogamy involves:
 (1) fertilization of a flower by the pollen from a flower of another plant in the same population.
 (2) fertilization of a flower by the pollen from a flower of another plant belonging to a distant population.
 (3) fertilization of a flower by the pollen from another flower of the same plant.
 (4) fertilization of a flower by the pollen from the same flower.
129. A human female with Turner's syndrome:
 (1) exhibits male characters. (2) is able to produce children with normal husband.
 (3) has 45 chromosomes with XO. (4) has one additional X chromosome.
130. The enzyme recombinase is required at which state of meiosis:
 (1) Diplotene (2) Diakinesis (3) Pachytene (4) Zygotene
131. Identify the hormone with its correct matching of source and function:
 (1) Progesterone – corpus-luteum, stimulation of growth and activities of female secondary sex organs.
 (2) Atrial natriuretic factor – ventricular wall increases the blood pressure.
 (3) Oxytocin – posterior pituitary, growth and maintenance of mammary glands.
 (4) Melatonin – pineal gland, regulates the normal rhythm of sleepwakes cycle.
132. The solid linear cytoskeletal elements having a diameter of 6 nm and made up of a single type of monomer are known as:
 (1) Intermediate filaments (2) Lamins
 (3) Microtubules (4) Microfilaments
133. How do parasympathetic neural signals affect the working of the heart?
 (1) Both heart rate and cardiac output increase.
 (2) Heart rate decreases but cardiac output increases.
 (3) Reduce both heart rate and cardiac output.
 (4) Heart rate is increased without affecting the cardiac output.
134. Select the correct matching of the type of the joint with the example in human skeletal system:
- | Type of joint | Example |
|-----------------|---------------------------------------|
| (1) Hinge joint | - between humerus and pectoral girdle |

- (2) Gliding joint - between carpals
 (3) Cartilaginous joint - between frontal and parietal
 (4) Pivot joint - between third and fourth cervical vertebrae

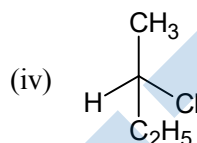
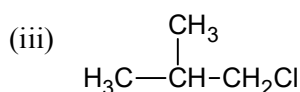
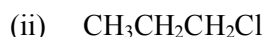
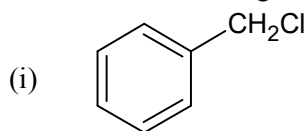
135. Which vector can clone only a small fragment of DNA?

- (1) Plasmid (2) Cosmid
 (3) Bacterial artificial chromosome (4) Yeast artificial chromosome

SECTION - III (CHEMISTRY)

180 MARKS

136.^M Which of the following compounds will undergo racemization when solution of KOH hydrolyses?



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

137.^E Which of the following statement is correct for the spontaneous adsorption of a gas?

- (1) ΔS is positive and, therefore, ΔH should be negative.
 (2) ΔS is positive and, therefore, ΔH should also be highly positive.
 (3) ΔS is negative and, therefore, ΔH should be highly positive.
 (4) ΔS is negative and therefore, ΔH should be highly negative.

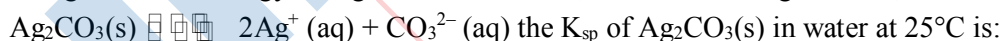
138.^E For the reversible reaction:



The equilibrium shifts in forward direction:

- (1) by decreasing the concentrations of N₂(g) and H₂(g)
 (2) by increasing pressure and decreasing temperature
 (3) by increasing the concentration of NH₃(g)
 (4) by decreasing the pressure

139.^E Using the Gibbs energy change, ΔG° = +63.3 kJ, for the following reaction,



(R = 8.314 JK⁻¹mol⁻¹)

- (1) 2.9 × 10⁻³ (2) 7.9 × 10⁻² (3) 3.2 × 10⁻²⁶ (4) 8.0 × 10⁻¹²

140.^E Magnetic moment 2.83 BM is given by which of the following ions?

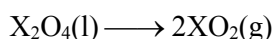
(At. no. Ti = 22, Cr = 24, Mn = 25, Ni = 28)

- (1) Cr³⁺ (2) Mn²⁺ (3) Ti³⁺ (4) Ni²⁺

141.^E Which one of the following is **not** a common component of Photochemical Smog?

- (1) Peroxyacetyl nitrate (2) Chlorofluorocarbons
 (3) Ozone (4) Acrolein

142.^E For the reaction:



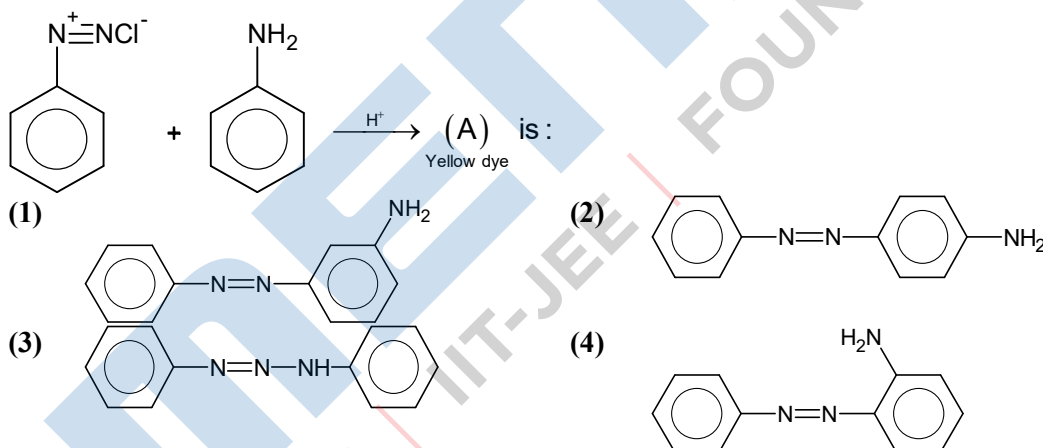
ΔU = 2.1 kcal, ΔS = 20 cal K⁻¹ at 300 K. Hence, ΔG is:

- (1) 9.3 kcal (2) -9.3 kcal (3) 2.7 kcal (4) -2.7 kcal

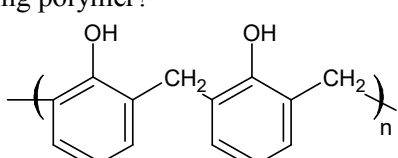
143.^E Which one of the following species has plane triangular shape?


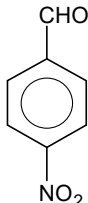


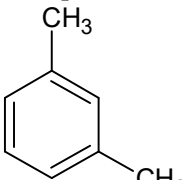
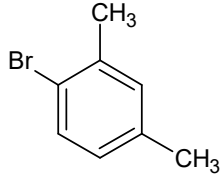
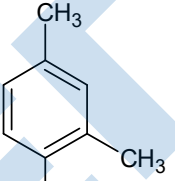
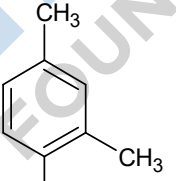
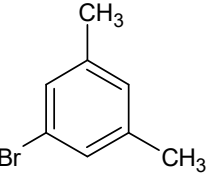
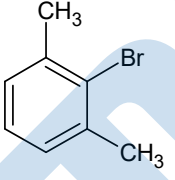
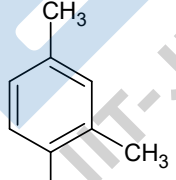
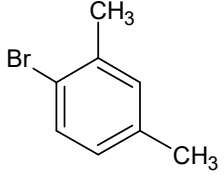
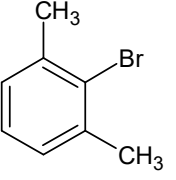
- (1) NO₂⁻ (2) CO₂ (3) N₃⁻ (4) NO₃⁻

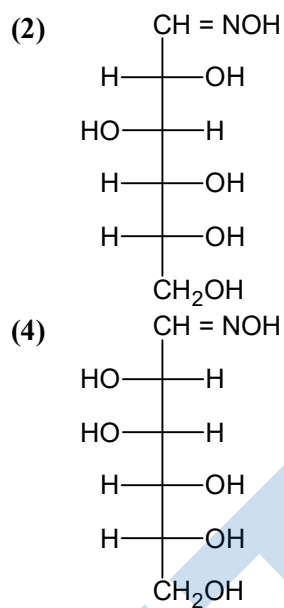
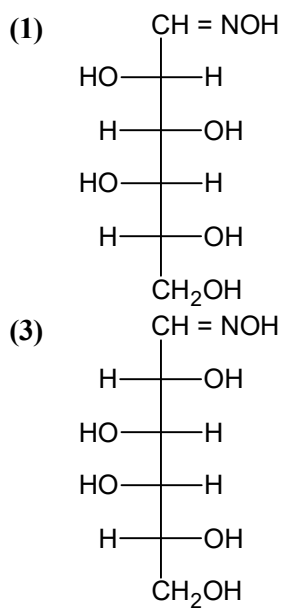
- 144.^E Which of the following organic compounds polymerizes to form the polyester Dacron?
- (1) Terephthalic acid and ethylene glycol
 - (2) Benzoic acid and para HO — (C₆H₄) — OH
 - (3) Propylene and para HO — (C₆H₄) — OH
 - (4) Benzoic acid and ethanol
- 145.^M Among the following complexes the one which shows **Zero** crystal field stabilization energy (CFSE) is:
- (1) [Co(H₂O)₆]²⁺
 - (2) [Co(H₂O)₆]³⁺
 - (3) [Mn(H₂O)₆]³⁺
 - (4) [Fe(H₂O)₆]³⁺
- 146.^E Acidity of diprotic acids in aqueous solutions increases in the order:
- (1) H₂Te < H₂S < H₂Se
 - (2) H₂Se < H₂Te < H₂S
 - (3) H₂S < H₂Se < H₂Te
 - (4) H₂Se < H₂S < H₂Te
- 147.^E When 0.1 mol MnO₄²⁻ is oxidized the quantity of electricity required to completely oxidize MnO₄²⁻ to MnO₄⁻ is:
- (1) 9650 C
 - (2) 96.50 C
 - (3) 96500 C
 - (4) 2 × 96500 C
- 148.^M 1.0 g of magnesium is burnt with 0.56 g O₂ in closed vessel. Which reactant is left in excess and how much? (At. wt. Mg = 24; O = 16)
- (1) Mg, 0.44g
 - (2) O₂, 0.28g
 - (3) Mg, 0.16g
 - (4) O₂, 0.16 g
- 149.^E Which property of colloids is **not** dependent on the charge on colloidal particles?
- (1) Electro – osmosis
 - (2) Tyndall effect
 - (3) Coagulation
 - (4) Electrophoresis
- 150.^E In the following reaction, the product (A)



- 151.^M Identity Z in the sequence of reactions:
- $$\text{CH}_3\text{CH}_2\text{CH}=\text{CH}_2 \xrightarrow{\text{HBr}/\text{H}_2\text{O}_2} \text{Y} \xrightarrow{\text{C}_2\text{H}_5\text{ONa}} \text{Z}$$
- (1) CH₃(CH₂)₄-O-CH₃
 - (2) CH₃CH₂-CH(CH₃)-O-CH₂CH₃
 - (3) CH₃-(CH₂)₃-O-CH₂CH₃
 - (4) (CH₃)₂CH₂-O-CH₂CH₃
- 152.^E Which of the following salts will give highest pH in water?
- (1) Na₂CO₃
 - (2) CuSO₄
 - (3) KCl
 - (4) NaCl
- 153.^E Which of the following molecules has the maximum dipole moment?
- (1) NH₃
 - (2) NF₃
 - (3) CO₂
 - (4) CH₄
- 154.^M For a given exothermic reaction, K_p and K_p' are the equilibrium constants at temperatures T₁ and T₂ respectively. Assuming that heat of reaction is constant in temperature range between T₁ and T₂, it is readily observed that:
- (1) K_p = K_p'
 - (2) K_p = $\frac{1}{K_p'}$
 - (3) K_p > K_p'
 - (4) K_p < K_p'

- 155.^E Be^{2+} is iso-electronic with which of the following ions?
 (1) Na^+ (2) Mg^{2+} (3) H^+ (4) Li^+
- 156.^E What is the maximum number of orbitals that can be identified with the following quantum numbers?
 $n = 3, \ell = 1$ and $m = 0$.
 (1) 3 (2) 4 (3) 1 (4) 2
- 157.^E Which of the following hormones is produced under the condition of stress which stimulates glycogenolysis in the liver of human beings?
 (1) Adrenaline (2) Estradiol (3) Thyroxin (4) Insulin
- 158.^E Which of the following orders of ionic radii is correctly represented?
 (1) $\text{O}^{2-} > \text{F}^- > \text{Na}^+$ (2) $\text{Al}^{+3} > \text{Mg}^{2+} > \text{N}^{3-}$ (3) $\text{H}^- > \text{H}^+ > \text{H}$ (4) $\text{Na}^+ > \text{F}^- > \text{O}^{2-}$
- 159.^E Which of the following complexes is used to be as an anticancer agent?
 (1) $\text{cis-K}_2[\text{PtCl}_2 \text{Br}_2]$ (2) Na_2CoCl_4
 (3) $\text{mer-}[\text{Co}(\text{NH}_3)_3 \text{Cl}_3]$ (4) $\text{cis-}[\text{Pt Cl}_2 (\text{NH}_3)_2]$
- 160.^E Reason of lanthanoid contraction is:
 (1) Decreasing nuclear charge (2) Decreasing screening effect
 (3) Negligible screening effect of 'f' orbitals
 (4) Increasing nuclear charge
- 161.^E (a) $\text{H}_2\text{O}_2 + \text{O}_3 \rightarrow \text{H}_2\text{O} + 2\text{O}_2$
 (b) $\text{H}_2\text{O}_2 + \text{Ag}_2\text{O} \rightarrow 2\text{Ag} + \text{H}_2\text{O} + \text{O}_2$
 Role of hydrogen peroxide in the above reactions is respectively:
 (1) reducing in (a) and (b) (2) oxidizing in (a) and (b)
 (3) oxidizing in (a) reducing in (b) (4) reducing in (a) and oxidizing in (b)
- 162.^E Calculate the energy in joule corresponding to light of wavelength 45 nm: (Planck's constant $h = 6.63 \times 10^{-34} \text{Js}$; speed of light $c = 3 \times 10^8 \text{ms}^{-1}$)
 (1) 4.42×10^{-15} (2) 4.42×10^{-18} (3) 6.67×10^{15} (4) 6.67×10^{11}
- 163.^E Which of the following is an example of a thermosetting polymer?
 (1) $\left(\text{N} \begin{array}{c} \text{H} \\ | \\ \text{---} \end{array} (\text{CH}_2)_6 \text{---} \text{N} \begin{array}{c} \text{H} \\ | \\ \text{---} \end{array} \text{C} \begin{array}{c} \text{O} \\ || \\ \text{---} \end{array} (\text{CH}_2)_4 \text{---} \text{C} \begin{array}{c} \text{O} \\ || \\ \text{---} \end{array} \right)_n$ (2) 
 (3) $\left(\text{CH}_2 \text{---} \underset{\text{Cl}}{\text{C}} = \text{CH} \text{---} \text{CH}_2 \right)_n$ (4) $\left(\text{CH}_2 \text{---} \underset{\text{Cl}}{\text{CH}} \right)_n$
- 164.^M Equal masses of H_2 , O_2 and methane have been taken in a container of volume V at temperature 27°C in identical conditions. The ratio of the volumes of gases $\text{H}_2 : \text{O}_2 : \text{methane}$ would be:
 (1) 16 : 1 : 2 (2) 8 : 1 : 2 (3) 8 : 16 : 1 (4) 16 : 8 : 1
- 165.^M The weight of silver (at wt. = 108) displaced by a quantity of electricity which displaces 5600 mL of O_2 at STP will be:
 (1) 54.0 g (2) 108.0 g (3) 5.4 g (4) 10.8 g
- 166.^E Of the following 0.10 m aqueous solutions, which one will exhibit the largest freezing point depression?
 (1) $\text{Al}_2(\text{SO}_4)_3$ (2) K_2SO_4 (3) KCl (4) $\text{C}_6\text{H}_{12}\text{O}_6$
- 167.^E Which of the following will not be soluble in sodium hydrogen carbonate?
 (1) o-Nitrophenol (2) Benzenesulphonic acid
 (3) 2, 4, 6-trinitrophenol (4) Benzoic acid
- 168.^E Which of the following will be most stable diazonium salt RN_2^+X^- ?
 (1) $\text{CH}_3\text{CH}_2\text{N}_2^+\text{X}^-$ (2) $\text{C}_6\text{H}_5\text{CH}_2\text{N}_2^+\text{X}^-$ (3) $\text{CH}_3\text{N}_2^+\text{X}^-$ (4) $\text{C}_6\text{H}_5\text{N}_2^+\text{X}^-$

- 169.^M The pair of compounds that can exist together is:
 (1) $\text{FeCl}_2, \text{SnCl}_2$ (2) FeCl_3, KI (3) $\text{FeCl}_3, \text{SnCl}_2$ (4) $\text{HgCl}_2, \text{SnCl}_2$
- 170.^E Which of the following organic compounds has same hybridization as its combustion product ($-\text{CO}_2$)?
 (1) Ethene (2) Ethanol (3) Ethane (4) Ethyne
- 171.^M In the Kjeldahl's method for estimation of nitrogen present in a soil sample, ammonia evolved from 0.75 g of sample neutralized 10 mL of 1M H_2SO_4 . The percentage of nitrogen in the soil is:
 (1) 35.33 (2) 43.33 (3) 37.33 (4) 45.33
- 172.^E Which one is most reactive towards Nucleophilic addition reaction?
 (1)  (2) 
 (3)  (4) 
- 173.^M What products are formed when the following compound is treated with Br_2 in the presence of FeBr_3 ?

 (1)  and  (2)  and 
 (3)  and  (4)  and 
- 174.^M Among the following sets of reactants which one produces anisole?
 (1) $\text{C}_6\text{H}_5\text{OH}$; neutral FeCl_3 (2) $\text{C}_6\text{H}_5-\text{CH}_3$; CH_3COCl ; AlCl_3
 (3) CH_3CHO ; RMgX (4) $\text{C}_6\text{H}_5\text{OH}$; NaOH ; CH_3I
- 175.^E When 22.4 litres of $\text{H}_2(\text{s})$ is mixed with 11.2 litres of $\text{Cl}_2(\text{g})$, each at S.T.P., the moles of $\text{HCl}(\text{g})$ formed is equal to:
 (1) 0.5 mol of $\text{HCl}(\text{g})$ (2) 1.5 mole of $\text{HCl}(\text{g})$
 (3) 1 mol of $\text{HCl}(\text{g})$ (4) 2 mol of $\text{HCl}(\text{g})$
- 176.^E The reaction of aqueous KMnO_4 with H_2O_2 in acidic conditions gives:
 (1) Mn^{2+} and O_3 (2) Mn^{4+} and MnO_2 (3) Mn^{4+} and O_2 (4) Mn^{2+} and O_2
- 177.^E In acidic medium, H_2O_2 changes $\text{Cr}_2\text{O}_7^{2-}$ to CrO_5 which has two ($-\text{O}-\text{O}-$) bonds. Oxidation state of Cr in CrO_5 is:
 (1) +6 (2) -10 (3) +5 (4) +3
- 178.^E Artificial sweetener which is stable under cold conditions **only** is:
 (1) Aspartame (2) Alitame (3) Saccharin (4) Sucralose
- 179.^M D(+) glucose reacts with hydroxyl amine and yields an oxime. The structure of the oxime would be:



180.^E If a is the length of the side of a cube, the distance between the body centered atom and one corner atom in the cube will be:

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

ANSWER KEY

PHYSICS		BIOLOGY		CHEMISTRY			
1.	(4)	46.	(4)	91.	(4)	136.	(3)
2.	(2)	47.	(4)	92.	(3)	137.	(4)
3.	(3)	48.	(1)	93.	(4)	138.	(2)
4.	(4)	49.	(4)	94.	(2)	139.	(4)
5.	(1)	50.	(4)	95.	(1)	140.	(4)
6.	(3)	51.	(1)	96.	(1)	141.	(2)
7.	(2)	52.	(1)	97.	(3)	142.	(4)
8.	(4)	53.	(4)	98.	(4)	143.	(4)
9.	(4)	54.	(3)	99.	(4)	144.	(1)
10.	(4)	55.	(1)	100.	(2)	145.	(4)
11.	(1)	56.	(3)	101.	(3)	146.	(3)
12.	(4)	57.	(3)	102.	(4)	147.	(1)
13.	(2)	58.	(3)	103.	(1)	148.	(3)
14.	(1)	59.	(1)	104.	(4)	149.	(2)
15.	(1)	60.	(3)	105.	(1)	150.	(2)
16.	(2)	61.	(1)	106.	(1)	151.	(3)
17.	(3)	62.	(3)	107.	(1)	152.	(1)
18.	(2)	63.	(4)	108.	(1)	153.	(1)
19.	(1)	64.	(2)	109.	(3)	154.	(3)
20.	(1)	65.	(1)	110.	(1)	155.	(4)
21.	(4)	66.	(3)	111.	(1)	156.	(3)
22.	(3)	67.	(4)	112.	(3)	157.	(1)
23.	(1)	68.	(2)	113.	(2)	158.	(1)
24.	(3)	69.	(1)	114.	(4)	159.	(4)
25.	(2)	70.	(1)	115.	(3)	160.	(3)
26.	(3)	71.	(4)	116.	(4)	161.	(1)
27.	(2)	72.	(3)	117.	(4)	162.	(2)
28.	(3)	73.	(1)	118.	(1)	163.	(2)
29.	(2)	74.	(1)	119.	(4)	164.	(1)
30.	(2)	75.	(2)	120.	(3)	165.	(2)
31.	(1)	76.	(2)	121.	(4)	166.	(1)
32.	(4)	77.	(4)	122.	(1)	167.	(1)
33.	(2)	78.	(3)	123.	(2)	168.	(4)
34.	(1)	79.	(2)	124.	(4)	169.	(1)
35.	(2)	80.	(2)	125.	(4)	170.	(4)
36.	(2)	81.	(3)	126.	(2)	171.	(3)
37.	(4)	82.	(4)	127.	(1)	172.	(2)
38.	(2)	83.	(2)	128.	(3)	173.	(3) & (4)
39.	(1)	84.	(1)	129.	(3)	174.	(4)
40.	(4)	85.	(3)	130.	(3)	175.	(3)
41.	(4)	86.	(4)	131.	(4)	176.	(4)
42.	(1)	87.	(3)	132.	(4)	177.	(1)
43.	(1)	88.	(2)	133.	(3)	178.	(1)
44.	(1)	89.	(2)	134.	(2)	179.	(2)
45.	(3)	90.	(4)	135.	(1)	180.	(2)

HINTS and SOLUTION

PHYSICS

1. (4)

2. (2)

$$\vec{v}_{av} = \frac{\vec{r}_C - \vec{r}_A}{t_c - t_A} = \frac{11\hat{i} + 11\hat{j}}{5 - 0} = \frac{11}{5}(\hat{i} + \hat{j})$$

3. (3)

4. (4)

$$\text{K.E.} = E - \phi$$

$$0.5 = E - \phi \quad \dots (i)$$

$$0.8 = 1.2 E - \phi \quad \dots (ii)$$

Solving (i) and (ii) we get,

$$\phi = 1 \text{ eV.}$$

5. (1)

$$0.002 \text{ IG} = 0.998 \text{ IS} \Rightarrow S = \frac{G}{499}$$

$$\frac{1}{R} = \frac{1}{G} + \frac{1}{S} \Rightarrow R = \frac{G}{500}$$

6. (3)

$$Mg - F_b = ma \quad \dots (i)$$

$$F_b - (m - m')g = (m - m')a \quad \dots (ii)$$

Solving (i) and (ii), we get

$$m' = \frac{2m}{g + a}$$

7. (2)

$$\begin{aligned} Q &= 8 \times 7.06 - 7 \times 5.6 \\ &= 56.48 - 39.2 \\ &= 17.28 \text{ MeV.} \end{aligned}$$

8. (4)

$$\mu = \frac{\sin 2A}{\sin A} = 2 \cos A$$

9. (4)

$$\frac{5}{R} = \frac{l_1}{100 - l_1} \quad \dots (i)$$

$$\frac{5}{R/2} = \frac{1.6l_1}{100 - 1.6l_1} \quad \dots (ii)$$

$$\text{Dividing (i) by (ii)} \quad \frac{1}{2} = \frac{100 - 1.6l_1}{1.6(100 - l_1)} \Rightarrow l_1 = \frac{20}{0.8} = 25$$

$$(i) \Rightarrow \frac{5}{R} = \frac{25}{75} \Rightarrow R = 15 \Omega.$$

10. (4)

$$V = 8 \times 150 = 1200 \text{ Volt}$$

$$R = 150 \times 0.5$$

$$= 75 \Omega$$

$$P = \frac{V^2}{R} = \frac{1200 \times 1200}{75} = 19200 \text{ W} = 19.2 \text{ kW.}$$

11. (1)

$$a = \frac{m_1 g - \mu(m_2 g + m_3 g)}{m_1 + m_2 + m_3}$$

$$a = \frac{g(1 - 2\mu)}{3} \quad (\because m_1 = m_2 = m_3 = m)$$

12. (4)

$$\lambda = \frac{h}{p} = \frac{h}{\sqrt{2mK}}$$

$$\lambda' = \frac{h}{\sqrt{2m \times 16K}} = \frac{1}{4} \lambda$$

$$\% \text{ change} = \left(\frac{\lambda - \frac{\lambda}{4}}{\lambda} \right) \times 100$$

$$= \frac{3}{4} \times 100 = 75\%$$

13. (2)

$$\omega = \frac{2\lambda D}{d} = \frac{2 \times 600 \times 10^{-9} \times 2}{1 \times 10^{-3}}$$

$$= 2.4 \times 10^{-3} = 2.4 \text{ mm.}$$

14. (1)

$$V_e = \sqrt{\frac{2GM}{R'}} \Rightarrow c^2 = \frac{2GM}{R'}$$

$$R' = \frac{2GM}{c^2} = \frac{2gR^2}{c^2} = \frac{2 \times 10 \times (6400 \times 10^3)^2}{9 \times 10^{16}} \approx 10^{-2} \text{ m.}$$

15. (1)

$$X = A \cos \omega t$$

$$V = -A \omega \sin \omega t$$

$$a = -A \omega^2 \cos \omega t$$

16. (2)

$$TR = \frac{1}{2} MR^2 \alpha$$

$$T = \frac{MR\alpha}{2} = \frac{50 \times 0.5 \times 4\pi}{2}$$

$$T = 157.00 \text{ N}$$

17. (3)

$$a_R = \frac{g \sin \theta}{1 + \frac{I}{MR^2}}$$

$$a_S = g \sin \theta$$

$$\frac{a_R}{a_S} = \frac{1}{1 + \frac{I}{MR^2}} = \frac{1}{1 + \frac{2}{5}} = \frac{5}{7}$$

18. (2)

19. (1)

$$I_2 = I_0 \cos^2 \frac{\phi}{2}$$

$$\phi_1 = \frac{2\pi}{\lambda} \lambda = 2\pi$$

$$\therefore I_1 = I_0 = K$$

$$\phi_2 = \frac{2\pi}{\lambda} \times \frac{\lambda}{4} = \frac{\pi}{2}$$

$$I_2 = I_0 \cos^2 \frac{\phi}{2} = \frac{I_0}{2} = \frac{K}{2}$$

20. (1)

$$X = \frac{N_0}{2^n}$$

$$Y = N_0 \left(1 - \frac{1}{2^n}\right)$$

$$\frac{X}{Y} = \frac{1}{7} = \frac{1}{2^n \left(1 - \frac{1}{2^n}\right)} \Rightarrow n = 3$$

$$\therefore t = 3t_{1/2} = 3 \times 1.4 \times 10^9 = 4.2 \times 10^9 \text{ yr.}$$

21. (4)

$$P = \frac{2I}{C} = \frac{2 \times 25 \times 10^4}{3 \times 10^8} = \frac{50}{3} \times 10^{-4} \text{ Pa}$$

$$F = P \times A = \frac{50}{3} \times 10^{-4} \times 15 \times 10^{-4} = 2.5 \times 10^{-6} \text{ N}$$

22. (3)

$$\frac{dT}{dt} \propto \Delta T$$

$$\frac{10}{5} = k(65 - T_0) \dots (i)$$

$$\frac{6}{5} = k(57 - T_0) \dots (ii)$$

$$\text{Dividing (i) by (ii)} \quad \frac{10}{6} = \frac{65 - T_0}{57 - T_0} \Rightarrow T_0 = 45^\circ\text{C.}$$

23. (1)

$$PV = P' \times 2V$$

$$P' = \frac{P}{2}$$

$$P'V'^{\gamma} = P''V''^{\gamma}$$

$$\frac{P}{2} \times (2V)^{5/3} = P''(16V)^{5/3}$$

$$P'' = \frac{P}{2} \left(\frac{2V}{16V}\right)^{5/3} \Rightarrow P'' = \frac{P}{64}$$

24. (3)

$$y = x \tan \theta - \frac{1}{2} \frac{gx^2}{u^2 \cos^2 \theta}$$

$$y = x \tan \theta - \frac{1}{2} \times \frac{9.8x^2}{25 \cos^2 \theta} \quad (\text{for earth})$$

$$y = x \tan \theta - \frac{1}{2} \frac{g'x^2}{9 \cos^2 \theta} \quad (\text{for planet})$$

Since trajectory is same

$$\frac{9.8}{25} = \frac{g'}{9} \Rightarrow g' = 3.5 \text{ m/s}^2$$

25. (2)

$$\vec{E} = -\frac{\partial V}{\partial x} \hat{i} - \frac{\partial V}{\partial y} \hat{j} - \frac{\partial V}{\partial z} \hat{k}$$

$$\vec{E} = -(6-8y)\hat{i} - (-8x-8+6z)\hat{j} - (6y)\hat{k}$$

$$\vec{E} = 2\hat{i} + 10\hat{j} - 6\hat{k}$$

$$E = \sqrt{4+100+36} = \sqrt{140} = 2\sqrt{35} \text{ N/C}$$

$$F = qE = 4\sqrt{35} \text{ N.}$$

26. (3)

$$n = \sqrt{\frac{13.6}{13.6-E}} \approx 4$$

since there is single atom, number of spectral lines will be $n-1=3$

27. (2)

28. (3)

$$n_1 = \frac{v}{2l_1} \Rightarrow l_1 = \frac{v}{2n_1}$$

$$l_2 = \frac{v}{2n_2}, l_3 = \frac{v}{2n_3}$$

$$l_1 + l_2 + l_3 = \frac{v}{2} \left(\frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3} \right)$$

$$n = \frac{v}{2l} = \frac{v}{v \left(\frac{1}{n_1} + \frac{1}{n_2} + \frac{1}{n_3} \right)}$$

29. (2)

$$[M] = [F^a V^b T^c]$$

$$[M] = [MLT^{-2}]^a [LT^{-1}]^b [T]^c$$

$$a = 1$$

$$a + b = 0 \Rightarrow b = -1$$

$$-2a - b + c = 0$$

$$-2 + 1 + c = 0 \Rightarrow c = 1$$

$$\therefore [M] = [FV^{-1}T]$$

30. (2)

31. (1)

$$\phi = \frac{2}{4} = 0.5 \text{ V/m}$$

$$E = \phi l_1 = 0.5 \times 3 = 1.5 \text{ Volt}$$

$$\frac{ER}{R+r} = \phi l_2$$

$$3 = 2.85 + 0.3 \Omega$$

$$0.3r = 0.15$$

$$r = 0.5 \Omega$$

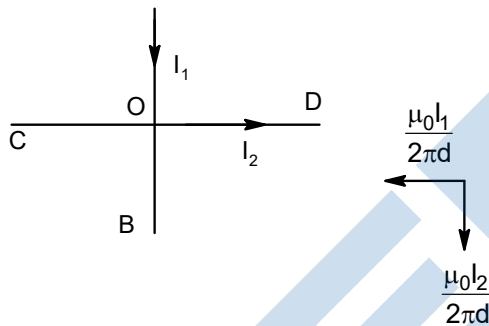
32. (4)

$$A = \frac{V}{l}, Y = \frac{Fl}{A \times \Delta l}$$

$$Y = \frac{Fl}{\frac{V}{l} \times \Delta l} \Rightarrow Y = \frac{Fl^2}{V \Delta l}$$

$$\Delta l = \left(\frac{F}{YV} \right) l^2$$

33. (2)



$$B_p = \frac{\mu_0}{2\pi d} \sqrt{I_1^2 + I_2^2}$$

34. (1)

35. (2)

$$f = \frac{v}{4l} = 100 \text{ Hz}$$

$$f_n = \frac{(2n-1)v}{4l}$$

$$n = 1, 2, 3, 4, 5, 6.$$

36. (2)

37. (4)

$$V_p = 200 \text{ V}$$

$$P_p = 3000 \text{ W}$$

$$I_p = \frac{3000}{200} = 15 \text{ A}$$

$$I_s = 6 \text{ A}$$

$$P_s = 3000 \times 0.9 = 2700 \text{ W}$$

$$V_s = \frac{2700}{6} = 450 \text{ V}$$

38. (2)

$$m \times 540 + m \times 1 \times (100 - 80)$$

$$= 20 \times 1 (80 - 10)$$

$$540 \text{ m} + 20 \text{ m} = 1400$$

$$560 \text{ m} = 1400$$

$$m = \frac{1400}{560} = 2.5 \text{ gm}$$

$$\text{Total mass} = 20 + 2.5 = 22.5 \text{ gm.}$$

39. (1)

40. (4)

41. (4)

$$V = \frac{v}{\sqrt{2}}$$

$$K = \frac{1}{2}mv^2 \times 2 + \frac{1}{2} \times 2m \times \frac{v^2}{2}$$

$$= mv^2 + \frac{1}{2}mv^2 = \frac{3}{2}mv^2$$

42. (1)

$$\Delta p = 6 - 6 + 12$$

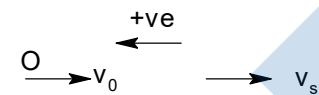
$$= 12 \text{ Ns}$$

43. (1)

$$v_0 = 36 \text{ km/hr} = 10 \text{ m/s}$$

$$V_s = 18 \text{ km/hr} = 18 \times \frac{5}{18} = 5 \text{ m/s}$$

$$V = 343 \text{ m/s}$$



$$f' = \left(\frac{v + v_0}{v + v_s} \right) f = \left(\frac{343 + 10}{343 + 5} \right) \times 1392 = \frac{353}{348} \times 1392 = 1412 \text{ Hz.}$$

44. (1)

$$V = \frac{4}{3}\pi R^3 = n \frac{4}{3}\pi r^3$$

$$\therefore n = \frac{R^3}{r^3}$$

$$\Delta A = 4\pi R^2 - n \times 4\pi r^2$$

$$\Delta A = 4\pi \left(R^2 - r^2 \times \frac{R^3}{r^3} \right) = -4\pi R^3 \left(\frac{1}{r} - \frac{1}{R} \right)$$

Energy released (because area is decreasing) = $T \Delta A$

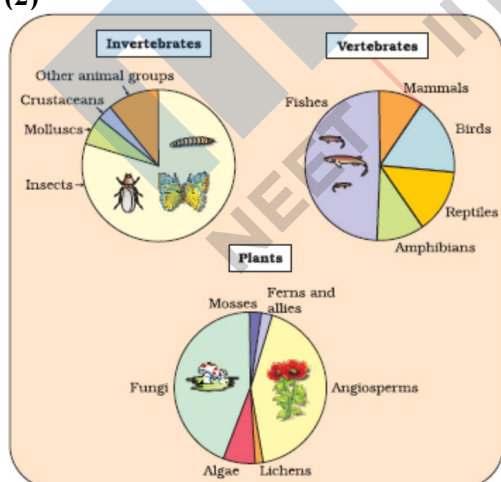
$$= 3TV \left(\frac{1}{r} - \frac{1}{R} \right)$$

45. (3)

BIOLOGY

46. (4)
Planaria is a flatworm and member of phylum Platyhelminthes. It has excellent power of regeneration.
47. (4)
 In ex situ conservation, threatened animals and plants are taken out from their natural habitat and placed in special setting where they can be protected and given special care.
48. (1)
 Although the plant is infected with a virus, the meristems (apical and axillary) is free of virus.
49. (4)
 Flagella of bacteria helps in locomotion besides flagella, Pili and Fimbriae are also surface structures of the bacteria and do not play a role in motility.
50. (4)
Torpedo is electric ray. Its electric organs are modified muscle cells.
51. (1)
 In a stem condition of vascular endarch and in root it is exarch.
52. (1)
 According to Hardy Weinberg Equilibrium
 $p + q = 1$
 $p^2 + 2pq + q^2 = 1$
 $A^2/p^2 = 360$
 $P = 0.6 ; q = 0.4$
 $2Pq = 2(0.6)(0.4) = 0.48$
53. (4)
 Fructose is absorbed into the blood through mucosa cells of intestine by facilitated transport.
54. (3)
 Aldosterone is a mineralocorticoid secreted by adrenal cortex gland. It is also called salt retaining hormone. It acts on DCT of nephron and increases reabsorption of Na^+ .
55. (1)
 When the plant is kept in dark it turns pale. This is known as etiolation
56. (3)
 Neuromuscular junction (NMJ) is the junction between a motor neuron and the muscle fibre supplied by it. Release of neurotransmitter acetylcholine occurs at NMJ. [NCERT CLASS XI PAGE NO 307]
57. (3)
58. (3)
 Nitrogen and Potassium are mobile elements. Their deficiency effect old leaves.
59. (1)
 Adrenal medulla is also called emergency gland. It secretes catecholamines (epinephrine and nor epinephrine) which prepare the body to fight with stress.
60. (3)
 20J PLANT \longrightarrow $^{2.0J}$ MICE \longrightarrow $^{0.02J}$ SNAKE \longrightarrow $^{0.002J}$ PEACOCK
61. (1)
 Liliaceae is an angiosperms. In angiosperm the male gametophyte is most reduced.
62. (3)
 A scrubber can be used to remove gas like sulphurdioxide. In scrubber the exhaust is passed through spray of water or lime.
63. (4)
 Fruit colour in squash is of three types :
 (i) yellow \rightarrow yy (ii) white \rightarrow (iii) green \rightarrow
64. (2)
 Lichens fails to grow in \oplus of SO_2
65. (1)
 HIV uses macrophages as factory and then it attacks helper-T cells and drastically reduces their number. The patient shows symptoms of AIDS When HIV damages large number of helper T-Lymphocytes. [NCERT CLASS XII PAGE NO 156]

66. (3)
The first human hormone produced by recombinant DNA technology is insulin.
67. (4)
Corpus luteum acts as a temporary endocrine gland after ovulation and is the main source of progesterone hormone. So the main function of mammalian corpus luteum is to produce progesterone.
68. (2)
Lactate fermentation is homofermentation.
69. (1)
Stratosphere layer is rich in ozone. Therefore it is also K/A stratosphere.
70. (1)
Griffith performed transformation in *Diplococcus pneumoniae* and *streptococcus pneumoniae*.
71. (4)
Competitive inhibition can be overcome by increasing the amount of substrate, so addition of lot of succinate reverses the inhibition of succinic dehydrogenase.
72. (3)
Transcription is conversation of information from DNA to m-RNA.
73. (1)
Retinal is aldehyde derivative of vitamin A & not vitamin C. [NCERT CLASS XI PAGE NO 324]
74. (1)
 G_1 phase corresponds to the interval between mitosis and initiation of DNA replication. During G_1 phase the cell is metabolically active and continuously grows but does not replicate its DNA. S or synthesis phase marks the period during which DNA synthesis or replication takes place. During this time the amount of DNA per cell doubles. If the initial amount of DNA is denoted as $2C$ then it increases to $4C$. However, there is no increase in the chromosome number.
75. (2)
Non-albuminous seeds have no residual endosperm as it is completely consumed during embryo development (e.g., pea, groundnut).
76. (2)
Phylum Cnidaria has fresh water (eg., *Hydra*) as well as marine species (eg. *Obelia*).
77. (4)
RH whittaker five kingdom system of classification is based upon:
(1) cell type (2) cell wall (3) nuclear membrane (4) body organization (5) mode of nutrition
78. (3)
Templates strand reads in direction $3' \rightarrow 5'$. While h-RNA synthesis takes place in $5' \rightarrow 3'$ direction.
79. (2)

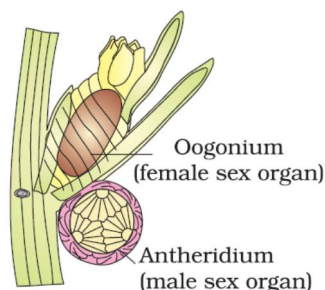


80. (2)
An analysis of chromosomal DNA using the Southern hybridization technique does not use PCR.
81. (3)
The given diagram is of flowering branch of *Datura*. The drug obtained from this plant acts as Hallucinogen.
82. (4)

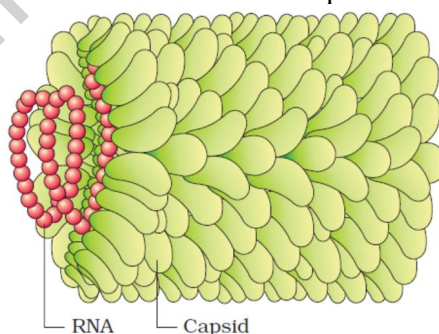
- Assisted reproductive technology, IVF involves transfer of zygote into the fallopian tube. (or early embryos with upto 8 blastomeres)
83. (2)
Sphagnum is responsible for peat formation.
84. (1)
High level of hCG stimulates the synthesis of estrogen and progesterone.
85. (3)
Tubectomy is a method of sterilization in which small part of the fallopian tube is removed or tied up.
86. (4)
The degree of curvature of the coleoptiles was directly proportional to the concentration of the chemical influence in the agar block. Went named this 'chemical influence' responsible for the phototropic response as auxin (derived from a greek word 'auxein' = to increase or to grow).
87. (3)
Person with blood group AB is considered as universal recipient because he has both A and B antigens on RBC but no antibodies in the plasma.
88. (2)
Filiform apparatus guide the entry of pollen tube.
89. (2)
Hypothalamus is thermostat of body or temperature regulating centre of body. So injury localized to the hypothalamus would most likely disrupt regulation of body temperature.
90. (4)
Sea-fan (*Gorgonia*) is animal belonging to phylum cnidaria.
91. (4)
LNG-20 is hormone releasing IUCD. [NCERT CLASS XII PAGE NO 60]
92. (3)
Archaeobacteria differ from Eubacteria in their cell membrane structure.
93. (4)
Tracheids are intact structure where as vessels are perforated.
94. (2)
Ulothrix has flagella and Sargassum and Ectocarpus are brown algae which have laterally inserted flagella
95. (1)
A species facing extremely high risk of extinction in the immediate future is called critically endangered.
96. (1)
Nucleoid it represents the viral chromosome. Nucleoid or viral chromosome is made of a single molecule of nucleic acid. It may be linear or viral chromosome is of coiling. Nucleiod is the infective part of virus. The nucleic acid is either DNA or RNA.
97. (3)
Rhodospirillum is bacteria. It performs an oxygenic photosynthesis. Rest all perform oxygenic photosynthesis.
98. (4)
Commonly used vectors for human genome sequencing are BAC and YAC.
99. (4)
Amanita muscaria is noted for its **hallucinogenic** properties, with its main psychoactive constituent being the compound **muscimol**.
100. (2)
Mesosomes are infolding of plasma membrane respiratory enzymes in bacteria are present along the innerside of plasma membrane.
101. (3)
In 'S' phase of the cell cycle amount of DNA doubles in each cell.
102. (4)
If the margins of sepals or petals overlap one another but not in any particular direction as in Cassia and gulmohur, the aestivation is called imbricate. In pea and bean flowers, there are five petals, the largest (standard) overlaps the two lateral petals (wings) which in turn overlap the two smallest anterior petals (keel); this type of aestivation is known as vexillary or papilionaceous.
103. (1)

XY X^cX
 X^cY, XX, X^cY, XY

104. (4)
 Sucrose is a non-reducing carbohydrate.
105. (1)
 These are examples of homologous organs. These have similar fundamental structure and perform different function.
106. (1)
 A sterile stamen is staminode.
107. (1)
 Pollen table are used as food supplement. Pollen grains are rich in nutrients, it has become a fashion in the recent years to use pollen tablets as food supplementary. [NCERT CLASS XII PAGE NO 24].
108. (1)
109. (3)
 Centriole → Basal body cilia or flagella
 Chlorophyll → Thylakoids
 Cristate → Mitochondria
 Ribozymes → Nucleic acids
110. (1)



111. (1)
 Rennin is a proteolytic enzyme found in gastric juice infants and helps in digestion milk proteins.
112. (3)
 The shared terminal duct of reproductive and urinary system in human male is Urethra.
113. (2)
 Sweet potato and carrot are modified root where as ground root is fruit.
114. (4)
115. (3)
 Abscissic acid is called stress hormone.
116. (4)
 Tobaccor mosaic virus shows coiled RNA strand and capsomeres.



117. (4)
Chlorella and *Spirulina* are unicellular algae, rich in proteins and are used as supplements even by space travelers.
118. (1)
 Areolar connective tissue is a type of loose connective tissue. Adipose tissue is also an example of loose connective tissue. Tendon is an example of dense connective tissue. [NCERT CLASS XI PAGE NO 103]

119. (4)
Gills of prawn and lungs of man are analogous structures. These are different in structure but have similar function.
120. (3)
Approximately seventy percent of carbon-dioxide absorbed by the blood is transported to lungs as bicarbonate ions. [NCERT CLASS XI PAGE NO 274]
121. (4)
Vacuoles help to maintain osmotic balance.
122. (1)
123. (2)
Earthworm → Detritivore ; Succession → Pioneer species ; Ecosystem service → Pollination
Population growth → Natality.
124. (4)
IUCN publishes the Red List of species.
125. (4)
During this digestion bacteria produced mixture of gases such as methane, hydrogen sulphide and carbon dioxide.
126. (2)
Keolado National Park is the site of thousands of migratory birds from Siberia and other extremely cold northern regions.
127. (1)
Cuboidal epithelium is composed of single layer of cube like cells. This is commonly found in ducts of glands and tubular parts of nephrons in kidneys [NCERT CLASS XI PAGE 101].
128. (3)
Geitonogamy is transfer to pollen grains from the anther to the stigma of another flower of the same plant. Although geitonogamy is functionally cross-pollination involving a pollinating agent, genetically it is similar to autogamy since the pollen grains come from the same plant.
129. (3)
In Turner syndrome there is absence of one of the X chromosomes, i.e., 45 with X0, such females are sterile as ovaries are rudimentary besides other features including lack of other secondary sexual characters.
130. (3)
The enzyme recombinase is required at Pachytene stage. It helps in crossing over.
131. (4)
Melatonin is produced by pineal gland and regulates normal rhythm of sleep wake cycle. Oxytocin is released from posterior pituitary and it acts on uterine smooth muscles and stimulates uterine contractions. Atrial natriuretic factor is released by wall of atria.
132. (4)
Microfilaments are solid cytoskeletal elements where as microtubules are hollow.
133. (3)
Parasympathetic neural signals reduce both heart rate and cardiac output.
134. (2)
Gliding joint is present between carpals. Between humerus and pectoral girdle ball and socket joint is present. Pivot joint is present between atlas (first cervical vertebra and axis (second cervical vertebra).
135. (1)

CHEMISTRY

136. (3)
137. (4)
 $\Delta G = \Delta H - T\Delta S$
 $\Delta S = \text{negative (entropy decreases)}$
Since $\Delta G < 0 \Rightarrow \Delta H$ must be highly negative.
138. (2)
According to Le-Chatelier principle.
139. (4)

$$\Delta G^\circ = -2.303 RT \log K_{sp}$$

$$63.3 \times 10^3 = -2.303 \times 8.314 \times 298 \log K_{sp}$$

$$\log K_{sp} = 11.09$$

$$\Rightarrow K_{sp} \approx 8 \times 10^{-12}$$

140.

(4)

$$2.83 = \sqrt{n(n+2)} \text{ where } n \text{ is number of unpaired electrons.}$$

$$\Rightarrow n = 2$$

$$Ni^{2+} = 1s^2 2s^2 2p^6 3s^2 3p^6 4s^0 3d^8.$$

141.

(2)

The common components of photochemical smog are ozone, nitric oxide, acrolein, formaldehyde and peroxyacetyl nitrate (PAN)

142.

(4)

$$\Delta G = \Delta H - T\Delta S$$

$$\text{Also } \Delta H = \Delta U + \Delta n_g RT$$

$$= 2.1 + 2 \times 2 \times 10^{-3} \times 300$$

$$= 2.1 + 1.2$$

$$\Delta H = 3.3 \text{ K cal.}$$

$$\Delta G = 3.3 - 300 \times 20 \times 10^{-3}$$

$$= 3.3 - 6$$

$$\Delta G = -2.7 \text{ K cal.}$$

143.

(4)

According to VSEPR theory.

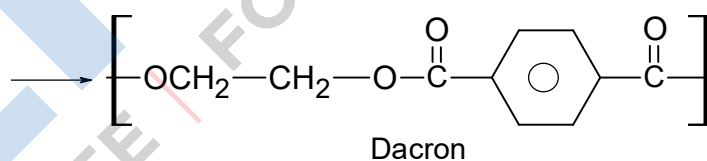
144.

(1)



Ethylene Glycol

Terephthalic Acid

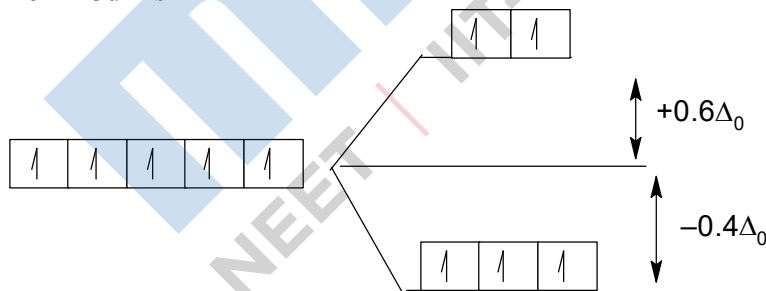


Dacron

145.

(4)

$$Fe^{3+} = 3d^5 4s^0$$



$$C.S.F.E = 3(-0.4)\Delta_0 + 2(0.6)\Delta_0 = 0$$

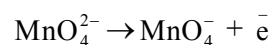
146.

(3)

Going down the group, acidity increases because bond enthalpy for dissociation of H-E bond decreases going down the group.

147.

(1)



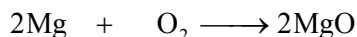
$$0.1 \text{ mole } MnO_4^{2-} = 0.1 \text{ mole } e^- \text{ charge}$$

$$= 0.1 \times 96500 \text{ C}$$

$$= 9650 \text{ C.}$$

148.

(3)



$$\text{Initial moles } \frac{1}{24} \quad \frac{0.56}{32}$$

$$= 0.042 \quad = 0.0175$$

1 mole O₂ reacts with 2 moles of Mg

0.0175 moles O₂ react with 2 × 0.0175

= 0.0350 moles of Mg.

Hence amount of Mg left

$$= 0.042 - 0.035$$

$$= 0.007 \text{ moles}$$

$$= 0.007 \times 24$$

$$= 0.168 \text{ gm.}$$

149. (2)

150. (2)

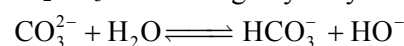
It is example of coupling reaction of aniline.

151. (3)



152. (1)

Na₂CO₃ will undergo hydrolysis reaction



153. (1)

CO₂ and CH₄ have zero dipole moment

NH₃ has higher dipole moment than NF₃

154. (3)

Taking T₂ > T₁

$$\text{From } \log \frac{K_p'}{K_p} = \frac{\Delta H}{2.303R} \left[\frac{1}{T_1} - \frac{1}{T_2} \right]$$

$$\log \frac{K_p'}{K_p} = \text{negative since } \Delta H = \text{Negative}$$

$$\Rightarrow K_p' < K_p.$$

155. (4)

156. (3)

$$n = 3, \ell = 1, m = 0$$

⇒ Either 3p_x or 3p_y or 3p_z.

157. (1)

Adrenaline is one of the neurotransmitters that plays a role in mood changes. It is produced by Adrenal medulla. During emergency, it causes glycogenolysis.

158. (1)

Symbol **Ionic radii**

$$\text{F}^- \quad 133 \text{ pm}$$

$$\text{O}^{2-} \quad 140 \text{ pm}$$

$$\text{Na}^+ \quad 102 \text{ pm}$$

Hence ionic radii order

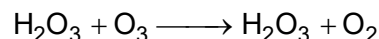
$$\text{O}^{2-} > \text{F}^- > \text{Na}^+$$

159. (4)

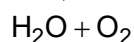
Cis – platin (cis – [PtCl₂(NH₃)₂]) is used an anticancer agent.

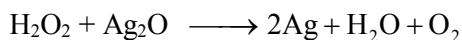
160. (3)

161. (1)



Trioxidane





Hydrogen peroxide acts as reducing agent in both of the reactions.

162. (2)

Energy of photon

$$E = \frac{hc}{\lambda} = \frac{6.63 \times 10^{-34} \times 3 \times 10^8}{45 \times 10^{-9}}$$

$$= 4.42 \times 10^{-18} \text{ Joule.}$$

163. (2)

Novolac is a thermosetting Polymer.

It is formed by phenol and formaldehyde.

164. (1)

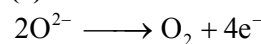
$$V = \frac{nRT}{P} = \frac{WnRT}{MP}$$

$$\therefore V_{\text{H}_2} : V_{\text{O}_2} : V_{\text{CH}_4} = \frac{1}{M_{\text{H}_2}} : \frac{1}{M_{\text{O}_2}} : \frac{1}{M_{\text{CH}_4}}$$

$$\frac{1}{2} : \frac{1}{32} : \frac{1}{16}$$

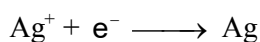
$$= 16 : 1 : 2$$

165. (2)



22400 ml $\text{O}_2 = 4$ Faraday charge

$$5600 \text{ ml } \text{O}_2 = \frac{4}{22400} \times 5600 = 1 \text{ Farady charge}$$



$\Rightarrow 1$ Faraday charge = 108 gm Ag.

166. (1)

$\text{Al}_2(\text{SO}_4)_3$ will dissociate to give highest number of particles.

167. (1)

o-nitrophenol is weak acid hence it will not be soluble in NaHCO_3 .

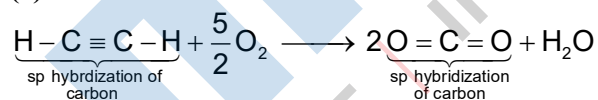
168. (4)

Aryl diazonium salts are most stable.

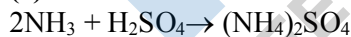
169. (1)

FeCl_2 , SnCl_2 contain Fe^{2+} and Sn^{2+} ions. Both cannot under go redox reaction mutually together.

170. (4)



171. (3)



10 ml, 1 M $\text{H}_2\text{SO}_4 = 10$ millimoles of H_2SO_4

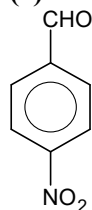
$= 20$ millimoles of NH_3

$= 20$ m moles of N

Hence weight of N $= 20 \times 10^{-3} \times 14 = 0.280$ gm

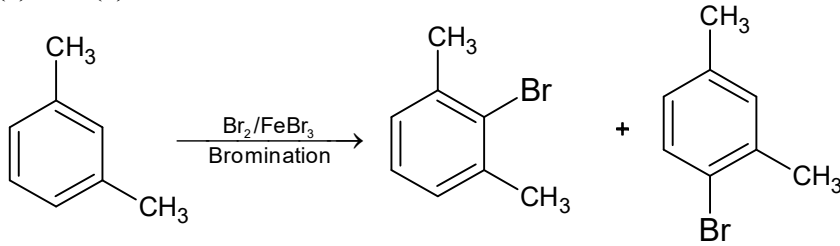
$$\text{Hence \% of Nitrogen} = \frac{0.28}{0.75} \times 100 = 37.33.$$

172. (2)

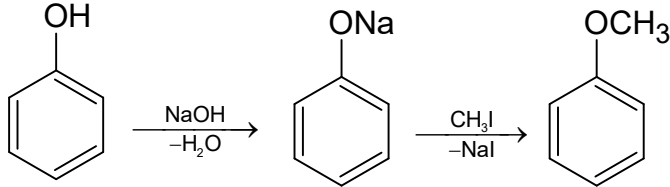


Carbonyl carbon is most reactive for nucleophilic addition due to $-I$ and $-R$ effect exerted by NO_2 group.

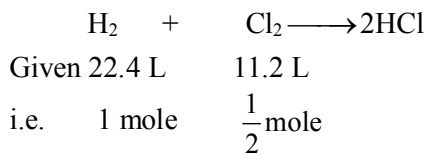
173. (3) and (4)



174. (4)

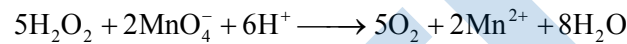


175. (3)



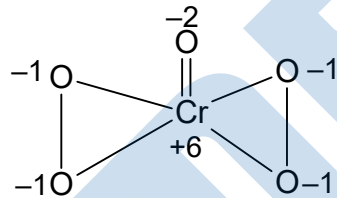
Cl_2 is limiting reagent,
By the balanced chemical equation, it is seen that 1 mole of Cl_2 gives 2 moles of HCl.
So $\frac{1}{2}$ mole will produce 1 mole of HCl.

176. (4)



177. (1)

CrO_5

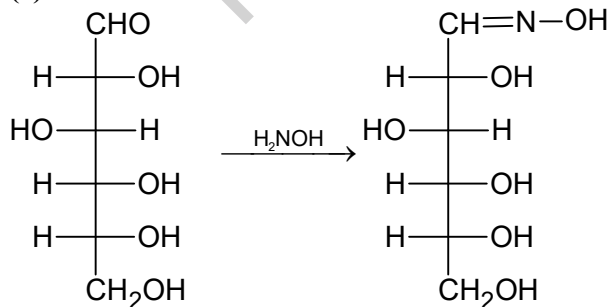


Oxidation state of Cr in CrO_5 is +6.

178. (1)

Aspartame is roughly 100 times as sweet as can sugar. Its use is limited to cold foods P soft drinks because it is unstable at working temperature others i.e., Alitame, Saccharine and Sucralose are stable at working temperature.

179. (2)



180. (2)

The length of body diagonal is $\sqrt{3}a$ where a is the side of the unit cell.

Hence distance between body centre atom and corner atom is $\frac{\sqrt{3}a}{2}$.