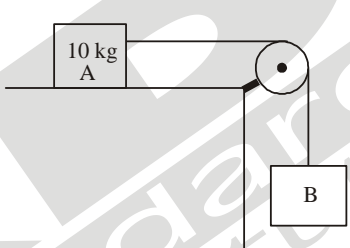


SAMPLE PAPER - 104

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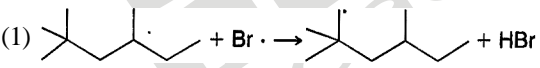
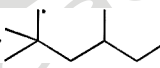
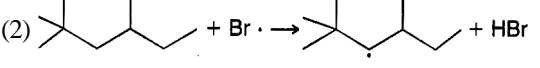
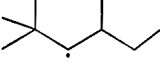
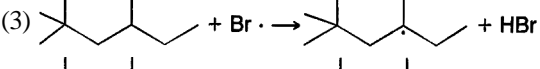
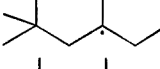
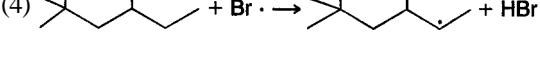
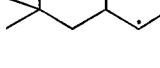
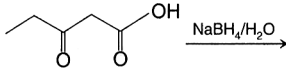
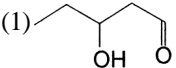
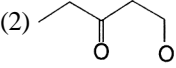
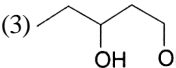
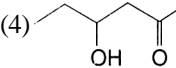
Question : 60

PHYSICS

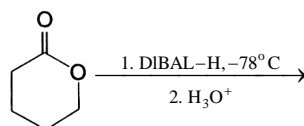
01. A positive point charge is kept at the centre of a spherical shell of metal. Then
 (1) The electric field is zero outside shell
 (2) The electric field is zero everywhere
 (3) The electric field is zero in the region inside the shell
 (4) The electric field is non-zero in both regions outside and inside the shell
02. If the potential in the region of space near the point $(-2, 4, 6\text{m})$ is $V = (80x^2 + 60)$ volt. The magnitude of electric field intensely at that point is
 (1) 320 V/m (2) 380 V/m
 (3) 80 V/m (4) zero
03. A long wire carrying a current 1 A is placed along the axis of a long hollow tube of radius 5 cm also carrying a current of 1 A in the same direction. The magnetic field intensity at a distance 2.5 cm from the axis is
 (1) 8×10^{-6} T (2) 16×10^{-6} T
 (3) 4×10^{-6} T (4) Zero
04. Which of the following properties of ferromagnetism is correct
 (1) Subshells are not completely filled
 (2) Average magnetic moment is zero
 (3) Susceptibility is positive & low
 (4) At ordinary temperature current carrying solenoid filled with Bismuth.
05. An ideal solenoid of cross-sectional area 10^{-4} m² has 500 turns per metre. At the centre of this solenoid, another coil of 100 turns is wrapped closely around it. If the current in the coil changes from 0 to 2 A in 3.14 ms, the emf developed in the second coil is
 (1) 1 mV (2) 2 mV
 (3) 3 mV (4) 4 mV
06. A ball of mass 0.2 kg moves with a velocity of 20 m s⁻¹ and stops in 0.1 s, then the force on the ball is
 (1) 40 N (2) 20 N
 (3) 4 N (4) 2 N
07. If the mass of the block A = 10 kg and the coefficient of static and kinetic friction is 0.2, then the mass of block B to start the motion is

 (1) 2 kg (2) 2.2 kg
 (3) 4.8 kg (4) 200 g
08. An iron nail is dropped from a height h from the level of a sand bed. If it penetrates through a distance x in the sand before coming to rest, then the average force exerted by the sand on the nail is
 (1) $mg\left(\frac{h}{x} + 1\right)$ (2) $mg\left(\frac{x}{h} + 1\right)$
 (3) $mg\left(\frac{h}{x} - 1\right)$ (4) $mg\left(\frac{x}{h} - 1\right)$
09. The displacement x of body of mass 1 kg on a horizontal smooth surface as a function of time t is given by $x = \frac{t^4}{4}$. The work done in the first second is
 (1) $\frac{1}{4}$ J (2) $\frac{1}{2}$ J (3) $\frac{3}{4}$ J (4) $\frac{5}{4}$ J
10. When 2 moles of O₂ and 1 mole of He are mixed together, then the ratio of C_p/C_v for the mixture is
 (1) $\frac{19}{13}$ (2) $\frac{13}{19}$ (3) $\frac{13}{6}$ (4) $\frac{6}{13}$

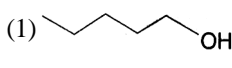
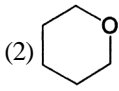
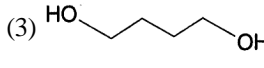
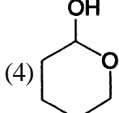

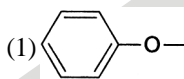
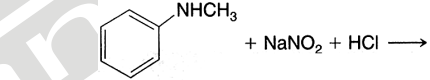
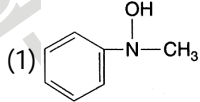
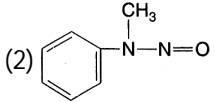
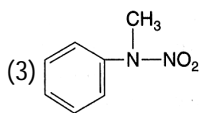
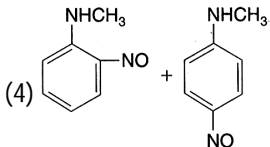
11. A Carnot engine efficiency is equal to $1/7$. If the temperature of the sink is reduced by 65 K, the efficiency becomes $1/4$. The temperature of the source and the sink in the first case are respectively
 (1) 620 K, 520 K (2) 520 K, 606.67 K
 (3) 606.67 K, 520 K (4) 520 K, 610 K
12. In photoelectric effect, the photo current
 (1) increases with increase of frequency of incident photon
 (2) decreases with increase of frequency of incident photon
 (3) does not depend on the frequency of photon but depends only on intensity of incident light
 (4) depends both on intensity and frequency of incident beam
13. If alpha, beta and gamma rays carry the same momentum, which has the longest wavelength?
 (1) Alpha rays (2) Beta rays
 (3) Gamma rays (4) None, all have the same wavelength
14. The end product of the decay of ${}_{90}\text{Th}^{232}$ is ${}_{82}\text{Pb}^{208}$. The number of α and β -particles emitted are respectively
 (1) 6, 4 (2) 3, 3
 (3) 4, 6 (4) 6, 6
15. Two deuterons undergo nuclear fusion to form a Helium nucleus. The energy released in this process is (given binding energy per nucleon for deuteron = 1.1 MeV and for helium = 7.0 MeV)
 (1) 23.6 MeV (2) 30.2 MeV
 (3) 25.8 MeV (4) 32.4 MeV

CHEMISTRY

16. Which of the following reactions would have the smallest energy of activation?
 (1)  + Br· →  + HBr
 (2)  + Br· →  + HBr
 (3)  + Br· →  + HBr
 (4)  + Br· →  + HBr
17. What is the product of the following reaction?

 (1)  (2) 
 (3)  (4) 

18. What would be the final organic product of the following reaction?



- (1)  (2) 
 (3)  (4) 
19. The following reaction is fastest when z is which group?

 (1)  (2) CH_3-
 (3) $\text{CH}_3\text{O}-$ (4) $\text{CH}_3\text{CO}-$
20. Predict the product

 (1)  (2) 
 (3)  (4) 

21. 25 ml of a solution of barium hydroxide on titration with 0.1 molar solution of hydrochloric acid gave a titre value of 35 ml. The molarity of barium hydroxide is
 (1) 0.28 (2) 0.35 (3) 0.07 (4) 0.14
22. A mixture of 50.0 mL of NH_3 and 60.0 mL of O_2 gas reacts as:
 $4\text{NH}_3(\text{g}) + 5\text{O}_2(\text{g}) \rightarrow 4\text{NO} + 6\text{H}_2\text{O}(\text{g})$
 if all the gaseous are at the same temperature and pressure, and the reaction continues until one of the gases is completely consumed, what volume of water vapour is produced?
 (1) 48 mL (2) 60.0 mL (3) 72 mL (4) 75 mL
23. One mole of ice is converted into water at 273 K. The entropies of $\text{H}_2\text{O}(\text{s})$ and $\text{H}_2\text{O}(\text{l})$ are 38.20 and 60.01 $\text{J mol}^{-1} \text{K}^{-1}$, respectively. The enthalpy change for the conversion is

- (1) 59.54 J mol⁻¹ (2) 5954 J mol⁻¹
 (3) 594.5 J mol⁻¹ (4) 320.6 J mol⁻¹

24. One mole of NaCl(s) on melting absorbed 30.5 kJ of heat and its entropy is increased by 28.8 JK⁻¹. The melting point of NaCl is

- (1) 1059 K (2) 30.5 K
 (3) 28.8 K (4) 28800 K

25. For the following three reactions 1, 2 and 3, equilibrium constants are given:

- (a) $\text{CO}_{(g)} + \text{H}_2\text{O}_{(g)} \rightleftharpoons \text{CO}_{2(g)} + \text{H}_2(g); K_1$
 (b) $\text{CH}_{4(g)} + \text{H}_2\text{O}_{(g)} \rightleftharpoons \text{CO}_{(g)} + 3\text{H}_2(g); K_2$
 (c) $\text{CH}_{4(g)} + 2\text{H}_2\text{O}_{(g)} \rightleftharpoons \text{CO}_{2(g)} + 4\text{H}_2(g); K_3$
 Which of the following equations is correct?

- (1) $K_1\sqrt{K_2} = K_3$ (2) $K_2K_3 = K_1$
 (3) $K_3 = K_1K_2$ (4) $K_2 = K_1 \times K_3$

26. The decomposition of phosgene, $\text{COCl}_2 \rightleftharpoons \text{COCl}_{(g)} + \text{Cl}_{2(g)}$ is an endothermic process. Which of the following factors will cause the equilibrium constant to increase ?

- (1) Adding Cl₂
 (2) Adding He_(g)
 (3) Decreasing the temperature
 (4) None of these

27. Which of the following solution will have pH value close to 1.0?

- (1) 100 mL of M/10 HCl + 100 mL of M/10 NaOH
 (2) 55 mL of M/10 HCl + 45 mL of M/10 NaOH
 (3) 10 mL of M/10 HCl + 90 mL of M/10 NaOH
 (4) 75 mL of M/5 HCl + 25 mL of M/5 NaOH

28. The equivalent weight of the salt $\text{KHC}_2\text{O}_4 \cdot \text{H}_2\text{C}_2\text{O}_4 \cdot 4\text{H}_2\text{O}$ used as reducing agent is

- (1) mol. wt./1 (2) mol. wt./2
 (3) mol. wt./3 (4) mol. wt./4

29. If NaCl is doped with 10⁻³ mol% SrCl₂, then the concentration of cation vacancies will be

- (1) 1 × 10⁻³ mol% (2) 2 × 10⁻³ mol%
 (3) 3 × 10⁻³ mol% (4) 4 × 10⁻³ mol%

30. The vapor pressure of a solvent decreased by 10 mm Hg when a non-volatile solute was added to the solvent. the mole fraction of solute in solution is 0.2. What would be the mole fraction of the solvent if decrease in vapor pressure is 20 mm of Hg?

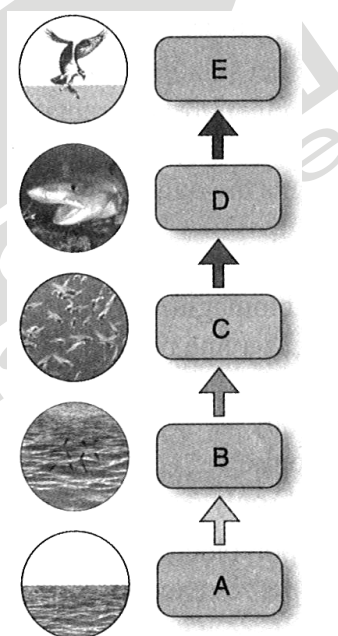
- (1) 0.8 (2) 0.6
 (3) 0.4 (4) 0.2

31. Match the items given in Column I with those in Column II and select the correct option given below:

	Column-I		Column-II
A.	Eutrophication	(i)	UV-B radiation
B.	Sanitary landfill	(ii)	Deforestation
C.	Snow blindness	(iii)	Nutrient enrichment
D.	Jhum cultivation	(iv)	Waste disposal

- (1) A-ii; B-i; C-iii; D-iv
 (2) A-iii; B-iv; C-i; D-ii
 (3) A-i; B-iii; C-iv; D-ii
 (4) A-i; B-ii; C-iv; D-iii

32. What is the concentration of DDT in stages A, B, C, D and E in the figure?



The above diagram shows the biomagnification of DDT.

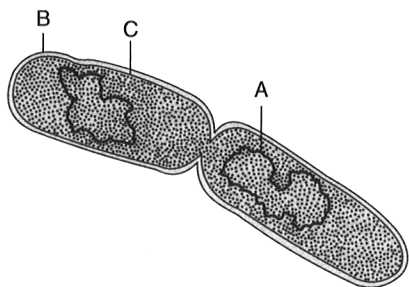
(1) A: Water (DDT 0.003 ppm), B: Fish-eating birds (DDT 25 ppm), C: Small fish (DDT 0.5 ppm), D: Large fish (DDT 2 ppm), E: Zooplankton (DDT 0.04 ppm).

(2) A: Fish-eating birds (DDT 25 ppm), B: Large fish (DDT 2 ppm), C: Small fish (DDT 0.5 ppm), D: Zooplankton (DDT 0.04 ppm), E: Water (DDT 0.003 ppb).

(3) A: Water (DDT 0.003 ppb), B: Zooplankton (DDT 0.04 ppm), C: Small fish (DDT 0.5 ppm), D: Large fish (DDT 2 ppm), E: Fish-eating birds (DDT 25 ppm).

(4) A: Small fish (DDT 0.5 ppm), B: Large fish (DDT 2 ppm), C: Zooplankton (DDT 0.04 ppm), D: Water (DDT 0.003 ppm), E: Fish-eating birds (DDT 25 ppm).

33. Identify the parts A, B and C in the given figure.

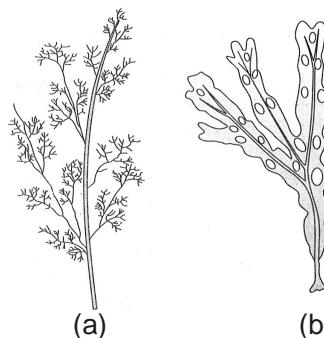


- (1) A–Cell wall, B–DNA, C–Cell membrane
 (2) A–DNA, B–Cell membrane, C–Cell wall
 (3) A–Cell membrane, B–DNA, C–Cell wall
 (4) A–DNA, B–Cell wall, C–Cell membrane
34. Contagium vivum fluidum was proposed by
 (1) D. J. Ivanovsky
 (2) M. W. Beijerinck
 (3) Stanley
 (4) Robert Hook
35. Plasmodesmata are
 (1) locomotary structures
 (2) membranes connecting the nucleus with plasmalemma
 (3) connections between adjacent cells
 (4) lignified cemented layers between cells
36. Humans knew from as early as ...A... BC that one of the causes of variation was hidden in ...B... reproduction. They exploited ...C... that were naturally present in wild population. A, B and C here refer to
 (1) A–8000–1000 BC, B–sexual, C–variations
 (2) A–8000–15000 BC, B–sexual, C–similarity
 (3) A–8000–14000 BC, B–sexual, C–similarity
 (4) A–20000–25000 BC, B–sexual, C–similarity
37. Starch synthesis gene in pea plant is the example of
 (1) single gene produce more than one effects
 (2) multiple genes produce more than one effects
 (3) two genes produce more than one effects
 (4) multiple genes produce less than one effects
38. In which year Mendel's work rediscovered
 (1) 1900 (2) 1901
 (3) 1902 (4) 1903
39. $\frac{1}{4} : \frac{1}{2} : \frac{1}{4}$ ratio of TT : Tt : tt can be depicted mathematically binomial expression as (ideally)
 (1) $(ax + by)^2$
 (2) $(ax + by)^3$
 (3) $(Ax + By)^4$
 (4) $ax + by$
40. If the bacteria don't have lactose around them, they would no longer require the synthesis of enzyme ...A.... Therefore, in simple terms it is the metabolic,

physiological or environmental condition that regulate the ...B....

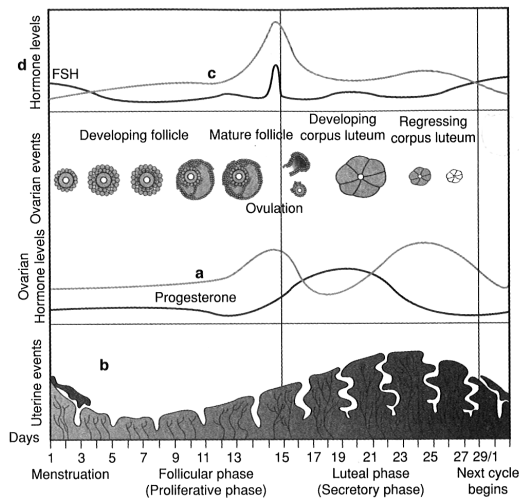
Complete the NCERT statement filling the correct option is given blanks

- (1) A– β -galactosidase; B-expression of genes
 (2) A– β -galactosidase; B-induction of genes
 (3) A– β -galactosidase; B-repression of genes
 (4) A-maltase; B-repression of genes
41. The cost required for sequencing the one base pair is ...A... than the total cost for sequencing the entire human genome is ...B.... Here A and B refers to
 (1) A–US \$=2; B-6 billion US \$
 (2) A–US \$=3; B-9 billion US \$
 (3) A–US \$=1; B-3 billion US \$
 (4) A–US \$=6; B-18 billion US \$
42. Duration to complete human genome project was years and it was completed in Here, most appropriate combination for fill is the blank is
 (1) 12; 2013 (2) 13; 2003
 (3) 10; 2000 (4) 11; 2001
43. Ulothrix and Spirogyra are
 (1) Colonial and branched
 (2) Solitary and branched
 (3) Filamentous and unbranched
 (4) Filamentous and branched
44. Bryophytes are called amphibians of the plant kingdom because
 (1) Bryophytes can live in soil but are dependent on water for sexual reproduction.
 (2) They usually occur in damp, humid and shaded area.
 (3) They play an important role in plant succession on bare rocks and soil.
 (4) All of the above.
45. Recognize the figure and find out that which type of life cycles is present in these plants.



- (1) a–Haplontic, b–Diplontic
 (2) a–Diplontic, b–Haplontic
 (3) a–Haplodiplontic, b–Diplontic
 (4) a–Diplontic, b–Haplodiplontic

46. What is indicated by 'a' in figure?



- (1) Oestrogen
- (2) Menses
- (3) Pituitary
- (4) Progesterone

47. Conjugated proteins containing carbohydrates as prosthetic group are known as

- (1) Chromoproteins
- (2) Glycoproteins
- (3) Lipoproteins
- (4) Nucleoproteins

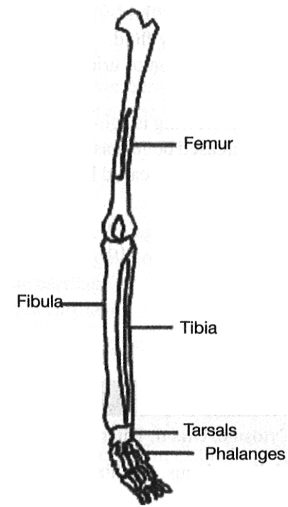
48. From the following relationships, between respiratory volumes and capacities, mark the correct option.

- (i) Inspiratory capacity (IC) = Tidal Volume + Residual Volume
- (ii) Vital Capacity (VC) = Tidal Volume (TV) + Inspiratory Reserve Volume (IRV) + Expiratory Reserve Volume (ERV)
- (iii) Residual Volume (RV) = Vital Capacity (VC) – Inspiratory Reserve Volume (IRV)
- (iv) Tidal Volume (TV) = Inspiratory Capacity (IC) – Inspiratory Reserve Volume (IRV)
- (1) (i) Incorrect, (ii) Incorrect, (iii) Incorrect, (iv) Correct
- (2) (i) Incorrect, (ii) Correct, (iii) Incorrect, (iv) Correct
- (3) (i) Correct, (ii) Correct, (iii) Incorrect, (iv) Correct
- (4) (i) Correct, (ii) Incorrect, (iii) Correct, (iv) Incorrect

49. Name the chronic respiratory disorder caused mainly by cigarette smoking:

- (1) Emphysema
- (2) Asthma
- (1) Respiratory acidosis
- (2) Respiratory alkalosis

50. Given below is a diagram of the bones of the left human hind limb as seen from front. It has certain mistakes in labelling. Two of the wrongly labelled bones are



- (1) tibia and tarsals
- (2) femur and fibula
- (3) fibula and phalanges
- (4) tarsals and femur

51. Which of the following blood plasma proteins is correctly matched with its function ?

- (1) Albumin : Maintain osmotic balance of blood
- (2) Globulin : Helps to provide antibody mediated immunity (AMI)
- (3) Fibrinogen : Helps in coagulation of blood
- (4) All of these

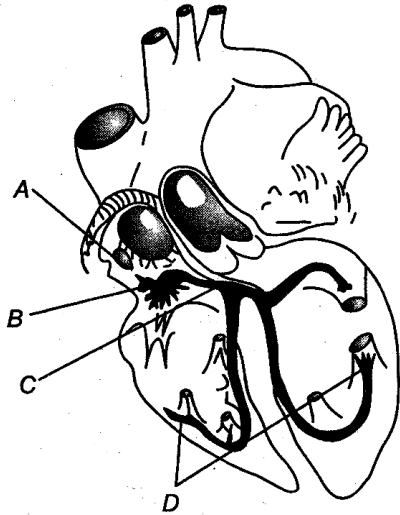
52. Which of the following is the function of lymph ?

- (1) Transport oxygen to brain
- (2) Transport carbon dioxide to lungs
- (3) Return interstitial fluid back to the blood
- (4) Contain RBC, leucocytes and more proteins as compared to blood

53. Consider the following statements and select the option stating which ones are true (T) and which ones are false (F) ?

- (A) The Anterior pituitary is under the direct neural regulation of the hypothalamus
- (B) Thyrocalcitonin is a protein hormone which regulates the blood calcium level
- (C) Catecholamines stimulate the breakdown of glycogen resulting in an increased concentration of glucose in blood
- (D) Oxytocin and Vasopressin are actually synthesised by the hypothalamus and are transported to pituitary gland through a portal circulatory system
- (1) A–T; B–F; C–T; D–F
- (2) A–T; B–F; C–F; D–T
- (3) A–T; B–T; C–T; D–F
- (4) A–F; B–T; C–T; D–F

54. Identify the correct labelling for A, B, C and D and choose the correct option accordingly.



- (1) A-Sinoauricular node, B-Atrioventricular node, C-Bundle of His, D-Purkinje fibre
 (2) A-Sinoauricular node, B-Atrioventricular node, C-, Purkinje fibre, D- Bundle of His
 (3) A-Purkinje fibre, B-Atrioventricular node, C-Bundle of His, D-Sinoauricular node
 (4) A-Purkinje fibre, B-Bundle of His, C-Sinoauricular node, D-Atrioventricular node

55. Match the hormone with its functions.

P.	Melatonin	I.	It plays an important role in the regulation of the basal metabolic rate.
Q.	Aldosterone	II.	It stimulates the reabsorption of Na^+ and water and excretion of K^+ and phosphate ions.
R.	Thyroxine	III.	It stimulates reabsorption of Ca^{+2} by the renal tubules and increases Ca^{+2} absorption from the digested food.
		IV.	It helps in maintaining the normal rhythms of the sleep-wake cycle and body temperature.
		V.	It stimulates the breakdown of glycogen resulting in an increased concentration of glucose in the blood.

- (1) P-IV, Q-I, R-II (2) P-II, Q-IV, R-V
 (3) P-IV, Q-II, R-I (4) P-II, Q-III, R-V

56. During the conduction of a nerve impulse, the action potential results from the movement of :
 (1) K^+ ions from extracellular fluid to intracellular fluid
 (2) Na^+ ions from intracellular fluid to extracellular
 (3) K^+ ions from intracellular fluid to extracellular fluid
 (4) Na^+ ions from extracellular fluid to intracellular fluid

57. The ___A___ leaves the eye and the retinal blood vessels enter it at a point medial to and slightly above the posterior pole of the eyeball. ___B___ is not present in that region and hence it is called the ___C___. At the posterior pole of the eye lateral to the ___C___, there is a yellowish pigmented spot called ___D___ with a central pit called the ___E___.

(1)	A	B	C	D	E
	Optic nerves	Photoreceptor cells	fovea	maculalutea	blind spot
(2)	A	B	C	D	E
	Optic nerves	Photoreceptor cells	macula lutea	blind spot	fovea
(3)	A	B	C	D	E
	Optic nerves	Photoreceptor cells	blind spot	macula lutea	fovea
(4)	A	B	C	D	E
	Optic nerves	Photoreceptor cells	blind spot	fovea	macula lutea

58. How many of the given animals are chordates with vertebra and jaws?
 Sea hare, Doliolum, Stingray, Petromyzon, Salpa, Ichthyophis, Macropus, Clarias, Branchiostoma, Chelone, Balanoglossus—
 (1) Five (2) Six
 (3) Seven (4) Eight
59. D.P.T. vaccine is an example of :-
 (1) Passive immunity (2) Active immunity
 (3) Both (4) Interferon
60. Skin and mucus coating form..... barriers of innate immunity :-
 (1) Physiological (2) Physical
 (3) Cellular (4) Cytokine