

## Kerala Medical Entrance Examination 2007 Biology

1. Consider the following statements
- By the end of twentieth century, the forest cover in India was reduced to 19.4 per cent
  - National Forest Policy was implemented in the year 1988
  - The average annual production of dry grass or hay in India is about 250 million tons
  - About 10% of the world's population lives in arid or semi arid regions

Of these statements

- a and b are true
  - a, c and d are not true
  - a, b and c are true
  - c is not true
  - c and d are true
2. Which of the following group of gases cause photochemical smog ?
- O<sub>3</sub>, PAN and CO
  - HC, NO and PAN
  - O<sub>2</sub>, PAN and NO<sub>2</sub>
  - O<sub>2</sub>, PAN and NO<sub>3</sub>
  - O<sub>3</sub>, PAN and NO<sub>2</sub>
3. Match the following and choose the **correct** combination from the options given

Column - I	Column - II
a. Visible light	i. 0.1 to 1 nm
b. Ultraviolet	ii. 400 to 700 nm
c. X-Rays	iii. Longer than 740 nm
d. Infrared	iv. 100 to 400 nm
	v. < 0.1 nm

- a – i,      b – iii,      c – iv,      d – v
- a – iii,      b – ii,      c – i,      d – v
- a – iv,      b – iii,      c – ii,      d – i
- a – ii,      b – iv,      c – i,      d – iii
- a – v,      b – iv,      c – iii,      d – ii

## Kerala Medical Entrance Examination 2007: Biology

4. Some of the stages in the hydrarch are labelled as
- Marsh meadow stage
  - Reed swamp stage
  - Submerged plant stage
  - Phytoplankton stage and
  - Submerged free floating plant stage

Identify the choice that represents the correct sequence of these stages

- d, c, e, b and a
  - c, e, a, b and d
  - b, d, c, a and e
  - d, e, c, b and a
  - e, c, b, a and d
5. Choose the **wrong** pair
- Salvadora – Desert
  - Cenchrus – Savanna
  - Abies – Coniferous forest
  - Quercus – Broad leaf forest
  - Tectona – Temperate forest
6. Under Column - I, a list of gases that are known to have a 'greenhouse effect' is given. Relate them to their main source selecting from the list given under Column - II

Column - I	Column - II
a. nitrous oxide	1. secondary pollutant from car exhausts
b. chlorofluorocarbons (CFCs)	2. combustion of fossil fuels, wood, etc
c. methane	3. denitrification
d. ozone (O <sub>3</sub> )	4. refrigerators, aerosol, sprays
e. carbon dioxide	5. cattle, rice fields, toilets

- a – 3, b – 4, c – 5, d – 1, e – 2
- a – 5, b – 1, c – 3, d – 4, e – 2
- a – 4, b – 5, c – 1, d – 2, e – 3
- a – 1, b – 3, c – 4, d – 5, e – 2
- a – 2, b – 4, c – 5, d – 1, e – 3

## Kerala Medical Entrance Examination 2007: Biology

7. Blue-baby syndrome is caused by
- (A) Cadmium pollution
  - (B) Mercury poisoning
  - (C) Chronic exposure to arsenic
  - (D) Excess nitrate in drinking water
  - (E) Excess fluoride in drinking water
8. Which of the following statements regarding species interdependence are **true** ?
- a. An association of two species where one is benefitted and other remains unaffected is called mutualism
  - b. An interspecific association where both partners derive benefit from each other is called commensalism
  - c. A direct food relation between two species of animals in which one animal kills and feeds on another is referred as predation
  - d. A relationship between two species of organism where both the partners are benefitted from each other is called symbiosis
- (A) a and b only
  - (B) c and d only
  - (C) a and c only
  - (D) b and c only
  - (E) b and d only
9. Which one of the following regarding ecological pyramid is **not correct** ?
- (A) In most ecosystems, the pyramid of numbers and biomass are upright
  - (B) In tree-dominated ecosystem the pyramid of numbers is inverted
  - (C) The pyramid of energy expresses mainly the rate of food production
  - (D) In deep water ecosystem, the pyramid of biomass is upright
  - (E) The total energy flow at successive trophic level always decreases
10. The species of plants that play a vital role in controlling the relative abundance of other species in a community are called
- (A) Edge species
  - (B) Link species
  - (C) Keystone species
  - (D) Pioneer species
  - (E) Successional species

## Kerala Medical Entrance Examination 2007: Biology

11. Which of the following is **incorrectly** matched ?
- (A) Explant – Excised plant part used for callus formation  
 (B) Cytokinins – Root initiation in callus  
 (C) Somatic embryo – Embryo produced from a vegetative cell  
 (D) Anther culture – Haploid plants  
 (E) Callus – Undifferentiated mass of cells
12. Which one of the following pathogen cause canker disease ?
- (A) *Meloidogyne incognita*  
 (B) *Anguina tritici*  
 (C) *Xanthomonas citri*  
 (D) *Pseudomonas rubilineans*  
 (E) *Phytophthora infestans*
13. Find out the pairs, which are **correctly** matched
- a. Cyanobacteria – 1. Biopesticides  
 b. Mycorrhiza – 2. Solubilization of phosphate  
 c. *Bacillus thuringiensis* – 3. Cry protein  
 d. Single cell protein – 4. Rhizobia
- (A) a and 2  
 (B) b and 3  
 (C) c and 4  
 (D) a and 3  
 (E) b and 4
14. Which of the following is / are **true** ?
- a. Biowar – Biowar is the use of biological weapons against humans and or their crops and animals  
 b. Bioethics – Bioethics is the unauthorised use of bioresources and traditional knowledge related to bioresources for commercial benefits  
 c. Biopatent – Exploitation of bioresources of other nations without proper authorisation
- (A) b only  
 (B) a only  
 (C) a and b only  
 (D) c only  
 (E) b and c only

## Kerala Medical Entrance Examination 2007: Biology

15. Who discovered recombinant DNA (rDNA) technology ?
- (A) Har Gobind Khorana  
 (B) James D. Watson  
 (C) Stanley Cohen and Herbert Boyer  
 (D) Walter Sutton and Avery  
 (E) Williams Bateson and Hugo de Vries

16. Match List - I and List - II and select the correct option

List - I		List - II	
a. Biological pigments		1. Sodium chloride	
b. Chemical messengers		2. Steroids	
c. Important constituent of blood		3. Prostaglandins	
d. Four carbon rings		4. Terpenes	
(A) a - 2,      b - 4,      c - 3,      d - 1			
(B) a - 2,      b - 1,      c - 4,      d - 3			
(C) a - 3,      b - 4,      c - 2,      d - 1			
(D) a - 4,      b - 3,      c - 1,      d - 2			
(E) a - 3,      b - 4,      c - 1,      d - 2			

17. Choose the correct sequence in the hierarchy of taxonomic categories in descending order

- (A) Species - Genus - Family - Order - Class - Division  
 (B) Division - Order - Class - Family - Genus - Species  
 (C) Division - Class - Family - Order - Genus - Species  
 (D) Species - Genus - Family - Class - Order - Division  
 (E) Division - Class - Order - Family - Genus - Species

18. From which of the following algae, agar is commercially extracted ?

- a. Gracilaria                      b. Fucus                      c. Sargassum  
 d. Gelidium                      e. Turbinaria
- (A) c and e  
 (B) b and c  
 (C) d and e  
 (D) a and b  
 (E) a and d

## Kerala Medical Entrance Examination 2007: Biology

19. Match the following with correct combination

Column - I	Column - II
a. Anthoceros	1. Walking fern
b. Adiantum	2. Alga
c. Sargassum	3. Inferae
d. Prothallus	4. Gametophyte
e. Asterales	5. Hornwort
	6. Liverwort

- (A) a - 6,      b - 5,      c - 1,      d - 3,      e - 4  
 (B) a - 5,      b - 4,      c - 3,      d - 2,      e - 1  
 (C) a - 5,      b - 1,      c - 2,      d - 4,      e - 3  
 (D) a - 3,      b - 2,      c - 1,      d - 5,      e - 4  
 (E) a - 1,      b - 4,      c - 3,      d - 5,      e - 2

20. Match Column - I with Column - II and select the correct option

Column - I (Type of Chloroplast)	Column - II (Algae)
a. Cup shaped	1. Ulothrix
b. Girdle shaped	2. Oedogonium
c. Stellate	3. Chlamydomonas
d. Reticulate	4. Zygnema

- (A) a - 2,      b - 4,      c - 3,      d - 1  
 (B) a - 3,      b - 1,      c - 4,      d - 2  
 (C) a - 3,      b - 4,      c - 2,      d - 1  
 (D) a - 4,      b - 3,      c - 1,      d - 2  
 (E) a - 3,      b - 4,      c - 1,      d - 2

21. Which of the following gymnosperm is a bushy trailing shrub ?

- (A) Ephedra  
 (B) Cycas  
 (C) Pinus  
 (D) Araucaria  
 (E) Cedrus



## Kerala Medical Entrance Examination 2007: Biology

22. Which of the following **correctly** represents the type of fruits given ?



- (A) 1. Berry; 2. Caryopsis; 3. Drupe; 4. Sorosis; 5. Aggregate.  
 (B) 2. Berry; 3. Caryopsis; 4. Drupe; 1. Sorosis; 5. Aggregate.  
 (C) 2. Berry; 3. Caryopsis; 4. Drupe; 5. Legume; 1. Aggregate.  
 (D) 1. Beccate; 3. Caryopsis; 4. Drupe; 1. Sorosis; 5. Composite.  
 (E) 2. Berry; 3. Caryopsis; 4. Drupe; 1. Sorosis; 5. Legume.

23. Uniparous, biparous and multiparous systems of branching are found respectively in

- (A) Mirabilis, Datura and Vine  
 (B) Saraca, Mirabilis and Euphorbia  
 (C) Vine, Polyalthia and Saraca  
 (D) Casuarina, Saraca and Croton  
 (E) Euphorbia, Croton and Polyalthia

24. Match the items in Column - I with Column - II and choose the **correct** alternative

Column - I	Column - II
1. Tubercular storage roots	a. Tinospora
2. Pneumatophores	b. Heritiera
3. Haustoria	c. Asparagus
4. Prop-roots	d. Viscum
5. Assimilatory roots	e. Screwpine

- (A) 1 - b, 2 - c, 3 - d, 4 - e, 5 - a  
 (B) 1 - c, 2 - d, 3 - e, 4 - a, 5 - b  
 (C) 1 - c, 2 - a, 3 - b, 4 - e, 5 - d  
 (D) 1 - e, 2 - d, 3 - e, 4 - b, 5 - a  
 (E) 1 - c, 2 - b, 3 - d, 4 - e, 5 - a

## Kerala Medical Entrance Examination 2007: Biology

25. Match Column - I with Column - II and choose the **correct** answers

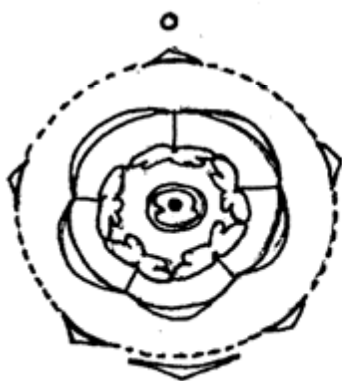
Column - I	Column - II
a. Coleorhiza	1. grapes
b. Food storing tissue	2. mango
c. Parthenocarpic fruit	3. maize
d. Single seeded fruit developing from monocarpellary superior ovary	4. radicle
e. Membranous seed coat	5. endosperm

- (A) a - 3,      b - 1,      c - 4,      d - 2,      e - 5  
 (B) a - 4,      b - 2,      c - 5,      d - 1,      e - 3  
 (C) a - 5,      b - 1,      c - 3,      d - 4,      e - 2  
 (D) a - 1,      b - 3,      c - 2,      d - 5,      e - 4  
 (E) a - 4,      b - 5,      c - 1,      d - 2,      e - 3

26. Plants with single whorl of perianth are placed under

- (A) Class: Monocot      Sub class      Monochlamydeae  
 (B) Class: Dicot      Series      Monochlamydeae  
 (C) Class: Dicot      Sub class      Monochlamydeae  
 (D) Class: Monocot      Sub class      Gamopetalae  
 (E) Class: Dicot      Series      Bicarpellatae

27.



The floral formula of above floral diagram is

- (A)  $Br \ K_{Pappus} \ C_{(5)} \ A_0 \ G_{(2)}^-$       (B)  $Br \ \overset{\circ}{\underset{\text{♀}}{\text{♀}}} \cdot K_{(5)} \ C_{(5)} \ A_{(5)} \ G(1)$   
 (C)  $Br \ \overset{\circ}{\underset{\text{♀}}{\text{♀}}} \cdot K_{Pappus} \ \overline{C_{(5)} \ A_{(5)}} \ , \ G_{(2)}^-$       (D)  $Br \ \overset{\circ}{\underset{\text{♀}}{\text{♀}}} \cdot K_{Pappus} \ \overline{C_5 \ A_5} \ , \ \underline{G_{(2)}}$   
 (E)  $Br \ \overset{\circ}{\underset{\text{♀}}{\text{♀}}} \cdot K_{Pappus} \ \overline{C_5 \ A_5} \ G_{(2)}^-$



## Kerala Medical Entrance Examination 2007: Biology

28. Which of the following is not a characteristic feature of Fabaceae ?
- (A) Descendingly imbricate, ten stamens, diadelphous, ovary superior
  - (B) Sepals five, gamosepalous, imbricate aestivation, placentation marginal
  - (C) Monocarpellary, ovary superior, style long, slightly bent at the apex
  - (D) Zygomorphic flowers, diadelphous stamens, many ovules
  - (E) Corolla five petals, polypetalous, anterior one large and outermost
29. Which of the following are floral characters of Malvaceae ?
- (A) Pedicellate, bracteate, hermaphrodite, tetramerous, actinomorphic, complete and superior ovary
  - (B) Compound spike, flowers bracteate, bracteolate, incomplete, bi or unisexual and hypogynous
  - (C) Pedicellate, hermaphrodite, zygomorphic, complete and superior ovary
  - (D) Head inflorescence, bracteate, hermaphrodite or unisexual, actinomorphic, or zygomorphic and inferior ovary
  - (E) Jointed pedicel, bracteate, bracteolate, hermaphrodite, pentamerous, actinomorphic, complete and superior ovary
30. Select the **wrong** statement
- (A) Persistent calyx is seen in *Solanaceae*
  - (B) Flowers are hypogynous in *Asteraceae*
  - (C) Santonin is obtained from *Artemisia*
  - (D) In *Poaceae*, perianth is represented by membranous scales called lodicules
  - (E) Parietal placentation is characteristic of *Brassicaceae*
31. All the following statements regarding sieve tube elements are true **except**
- (A) Their end walls have perforated sieve plates which become impregnated with lignin at maturity
  - (B) They possess a peripheral cytoplasm as well as a large vacuole
  - (C) Distinct proteinaceous inclusions, the P-proteins are seen evenly distributed throughout the lumen
  - (D) Long, slender, tube-like structures arranged in longitudinal series
  - (E) They are devoid of nucleus at maturity

## Kerala Medical Entrance Examination 2007: Biology

32. Match the items in Column - I with Column - II and choose the **correct** option

Column - I	Column - II
1. Radial Vascular Bundle	a. Cucurbita pepo
2. Collateral Vascular Bundle	b. Dracaena
3. Bicollateral Vascular Bundle	c. Roots of angiosperms
4. Amphicribal Vascular Bundle	d. Sunflower stem
5. Amphivasal Vascular Bundle	e. Fern

- (A) 1 - c, 2 - d, 3 - a, 4 - e, 5 - b  
 (B) 1 - b, 2 - c, 3 - a, 4 - e, 5 - d  
 (C) 1 - c, 2 - d, 3 - e, 4 - a, 5 - b  
 (D) 1 - d, 2 - e, 3 - a, 4 - b, 5 - c  
 (E) 1 - c, 2 - a, 3 - b, 4 - d, 5 - e

33. Which of the following statements is / are **not true** ?

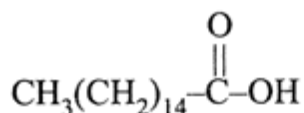
- a. Cork cambium is otherwise called phellogen  
 b. Cork is otherwise called phellem  
 c. Secondary cortex is otherwise called periderm  
 d. Cork cambium, cork and secondary cortex are collectively called phelloderm

- (A) c and d only      (B) a and b only      (C) b and c only  
 (D) b and d only      (E) a and d only

34. In meiosis I, a bivalent is an association of

- (A) Four chromatids and four centromeres  
 (B) Two chromatids and two centromeres  
 (C) Two chromatids and one centromere  
 (D) Two chromatids and four centromeres  
 (E) Four chromatids and two centromeres

- 35.



Given above is the chemical formula of

- (A) Palmitic acid      (B) Stearic acid      (C) Glycerol  
 (D) Galactose      (E) Fumaric acid

## Kerala Medical Entrance Examination 2007: Biology

36. Find out the **mis-matched** pair
- (A) Agar – polymer of glucose and sulphur containing carbohydrates
- (B) Chitin – polymer of glucosamine
- (C) Peptidoglycan – polysaccharide linked to peptides
- (D) Lipopolysaccharides – a complex of lipid and polysaccharide
- (E) Glycogen – polymer of glucose
37. Which of the following is a water soluble vitamin ?
- (A) Vitamin A (B) Vitamin B (C) Vitamin D
- (D) Vitamin E (E) Vitamin K
38. Select the **wrong** statement
- (A) The building blocks of lipids are amino acids
- (B) Majority of enzymes contain a non-protein part called the prosthetic group
- (C) The thylakoids are arranged one above the other like a stack of coins forming a granum
- (D) Crossing-over occurs at pachytene stage of meiosis I
- (E) Steroids are complex compounds commonly found in cell membranes and animal hormones
39. Which of the following element is very essential for uptake and utilization of  $\text{Ca}^{2+}$  and membrane function ?
- (A) Phosphorus
- (B) Molybdenum
- (C) Manganese
- (D) Copper
- (E) Boron
40. The cell wall of bacterium is made up of
- (A) Cellulose (B) Hemicellulose (C) Lignin
- (D) Peptidoglycan (E) Glycogen
41. Which of these is **mis-matched** ?
- (A) Amyloplasts – Store protein granules
- (B) Elaioplasts – Store oils or fats
- (C) Chloroplasts – Contain chlorophyll pigments
- (D) Chromoplasts – Contain coloured pigments other than chlorophyll
- (E) Leucoplasts – Contain colourless pigment

## Kerala Medical Entrance Examination 2007: Biology

42. Match the following with **correct** combination

Column - I	Column - II
a. Triglycerides	1. Galactose
b. Lactose	2. Glycerol
c. RNA	3. Palmitic acid
d. $\beta$ pleats	4. Uracil
e. Beewax	5. Secondary structure

- (A) a - 4,      b - 1,      c - 5,      d - 2,      e - 3  
 (B) a - 5,      b - 1,      c - 4,      d - 2,      e - 3  
 (C) a - 3,      b - 1,      c - 4,      d - 5,      e - 2  
 (D) a - 2,      b - 1,      c - 4,      d - 5,      e - 3  
 (E) a - 3,      b - 1,      c - 4,      d - 2,      e - 5

43. Which of the following statements is / are **true** ?

- The apoplastic movement of water occurs exclusively through the cell wall without crossing any membranes
- Solutes present in a cell (or in any solution) increase the free energy of water or water potential
- The symplastic movement occurs from cell to cell through the plasmodesmata
- Membrane permeability depends on the membrane composition, as well as the chemical nature of the solute

- (A) a and b only  
 (B) b and d only  
 (C) a, c and d only  
 (D) a, b and d only  
 (E) c only

44. Which of the following is produced in oxidative pentose phosphate pathway ?

- (A) Pyruvic acid  
 (B) Acetyl CoA  
 (C)  $\text{NADH}_2$   
 (D)  $\text{NAD(P)H}$   
 (E) ATP

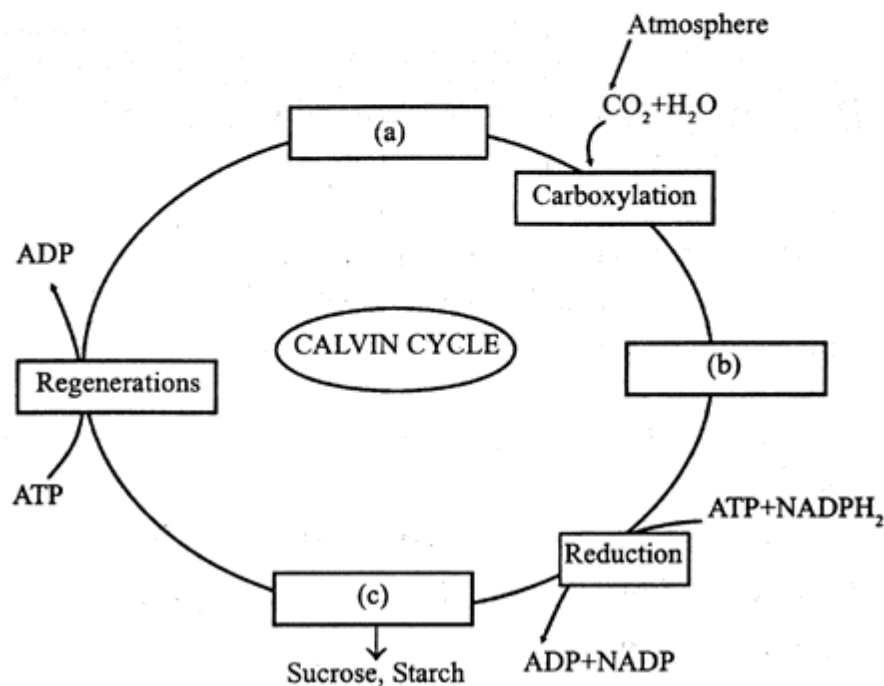
## Kerala Medical Entrance Examination 2007: Biology

45.  $N_2 + 8e^- + 8H^+ + 16ATP \longrightarrow 2NH_4 + H_2 + 16ADP + 16Pi$   
The above equation refers to  
(A) Ammonification (B) Nitrification (C) Nitrogen fixation  
(D) Denitrification (E) Reductive amination
46. Photolysis of each water molecule in light reaction will yield  
(A) 2 electrons and 4 protons  
(B) 4 electrons and 4 protons  
(C) 4 electrons and 2 protons  
(D) 2 electrons and 2 protons  
(E) 1 electron and 2 protons
47. Which one of the following statements is **wrong** ?  
(A) Water potential is the chemical potential of the water  
(B) Solute potential is always negative  
(C) Pressure potential is zero in a flaccid cell  
(D) Water potential equals solute potential in a fully turgid cell  
(E) Pressure potential is negative in a plasmolyzed cell
48. Which of the following represents the **correct** molecular formula of chlorophyll-*b* ?  
(A)  $C_{55}H_{72}O_6N_4Mg$  (B)  $C_{55}H_{72}O_5N_4Mg$   
(C)  $C_{55}H_{72}O_4N_4Mg$  (D)  $C_{55}H_{70}O_5N_4Mg$   
(E)  $C_{55}H_{70}O_6N_4Mg$
49. Match the number of carbon atoms given in List - I with that of the compounds given in List - II and select the **correct** option
- | List - I       |  | List - II                       |  |
|----------------|--|---------------------------------|--|
| a. 4C Compound |  | 1. Acetyl CoA                   |  |
| b. 2C Compound |  | 2. Pyruvate                     |  |
| c. 5C Compound |  | 3. Citric acid                  |  |
| d. 3C Compound |  | 4. $\alpha$ -keto glutaric acid |  |
|                |  | 5. Malic acid                   |  |
- (A) a - 2, b - 5, c - 3, d - 1  
(B) a - 5, b - 1, c - 4, d - 2  
(C) a - 3, b - 1, c - 4, d - 2  
(D) a - 5, b - 3, c - 1, d - 2  
(E) a - 3, b - 4, c - 1, d - 5



## Kerala Medical Entrance Examination 2007: Biology

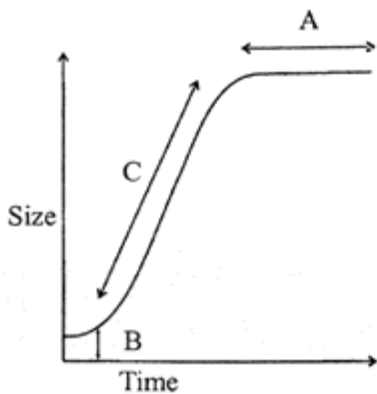
50. The primary  $\text{CO}_2$  acceptor in plants having  $\text{C}_4$  pathway is  
 (A) phosphoglyceric acid  
 (B) glyceraldehyde phosphate  
 (C) phosphoenol pyruvate  
 (D) oxaloacetic acid  
 (E) aspartic acid
51. Choose the **correct** combinations of labelling the carbohydrate molecule involved in the Calvin cycle



- |                          |                      |                      |
|--------------------------|----------------------|----------------------|
| (A) (a) RuBP             | (b) Triose phosphate | (c) PGA              |
| (B) (a) PGA              | (b) RuBP             | (c) Triose phosphate |
| (C) (a) PGA              | (b) Triose phosphate | (c) RuBP             |
| (D) (a) RuBP             | (b) PGA              | (c) Triose phosphate |
| (E) (a) Triose phosphate | (b) PGA              | (c) RuBP             |
52. The Respiratory Quotient (R. Q.) of some of the compounds are 4, 1 and 0.7. These compounds are identified respectively as  
 (A) Malic acid, palmitic acid and tripalmitin  
 (B) Oxalic acid, carbohydrate and tripalmitin  
 (C) Tripalmitin, malic acid and carbohydrate  
 (D) Palmitic acid, carbohydrate and oxalic acid  
 (E) Oxalic acid, carbohydrate and malic acid

## Kerala Medical Entrance Examination 2007: Biology

53.



Given above is a graph drawn on the parameters of growth versus time. A, B, C respectively represent

- (A) exponential phase, log phase and steady state phase
- (B) steady state phase, lag phase and log phase
- (C) slow growing phase, lag phase and steady state phase
- (D) lag phase, steady state phase and logarithmic phase
- (E) log phase, lag phase and steady state phase

54. Identify the **wrong** statements regarding post-fertilisation development

- (A) The ovary wall develops into pericarp
- (B) The outer integument of the ovule develops into tegmen
- (C) The fusion nucleus (triple nucleus) develops into endosperm
- (D) The ovule develops into seed
- (E) The ovary develops into fruit

55. Match the items in Column - I with Column - II and choose the **correct** option

Column - I	Column - II
1. Human urine	a. Cytokinin
2. Gibberella fujikuroi	b. Auxin
3. Herring fish DNA	c. Ethylene
4. Ripening fruits	d. Abscisic acid
5. Aged leaves of plants	e. Gibberellins

- (A) 1 - b, 2 - e, 3 - a, 4 - c, 5 - d
- (B) 1 - b, 2 - c, 3 - d, 4 - e, 5 - a
- (C) 1 - a, 2 - e, 3 - b, 4 - d, 5 - c
- (D) 1 - e, 2 - d, 3 - c, 4 - b, 5 - a
- (E) 1 - c, 2 - b, 3 - a, 4 - e, 5 - d

## Kerala Medical Entrance Examination 2007: Biology

56. The natural plant hormone isolated from corn kernels and coconut milk is  
(A) Florigen  
(B)  $GA_3$   
(C) Free auxins  
(D) Zeatin  
(E) Indole acetic acid
57. When pollen is transferred from anther of a flower to stigma of another flower of the same plant it is referred to as  
(A) Allogamy  
(B) Xenogamy  
(C) Geitonogamy  
(D) Autogamy  
(E) Cross pollination
58. 6-furfuryl amino purine, 2- 4-dichlorophenoxy acetic acid and indole -3 acetic acid are examples respectively for  
(A) synthetic auxin, kinetin and natural auxin  
(B) gibberellin, natural auxin and kinetin  
(C) natural auxin, kinetin and synthetic auxin  
(D) kinetin, synthetic auxin and natural auxin  
(E) natural auxin, gibberellin and kinetin
59. In a pyramid of numbers, in a grassland ecosystem, the largest population is that of  
(A) Producers  
(B) Tertiary consumers  
(C) Secondary consumers  
(D) Primary consumers  
(E) Herbivores
60. Black-foot disease is caused due to groundwater contaminated with excess of  
(A) nitrate  
(B) fluoride  
(C) arsenic  
(D) sulphur  
(E) mercury

## Kerala Medical Entrance Examination 2007: Biology

61. The diversity of the habitats over the total geographical area is called
- (A) Alpha diversity
  - (B) Beta diversity
  - (C) Gamma diversity
  - (D) Delta diversity
  - (E) Omega diversity
62. The psychological disorder, which is characterized by sadness, hopelessness, low self-esteem, decline in interest, energy, concentration and changes in sleep pattern and appetite is called
- (A) Anxiety disorder
  - (B) Obsessive-compulsive disorder
  - (C) Attention deficit disorder
  - (D) Mood disorder
  - (E) Borderline personality disorder
63. Identify the **wrong** statements
- (a) The tumour of haematopoietic cells is called leukemia
  - (b) Cancer arising from the epithelial tissues of internal organs and glands is referred as melanoma
  - (c) Sarcoma is a type of cancer where bone and cartilages are involved
  - (d) Only benign tumours are called as true cancer or neoplasm
- (A) a and b only
  - (B) b and c only
  - (C) b and d only
  - (D) a and c only
  - (E) c and d only
64. Chancroid is a sexually transmitted disease caused by
- (A) Treponema
  - (B) Haemophilus
  - (C) Nisseria
  - (D) Chlamydia
  - (E) Trichomonas
65. The function of IgE is
- (A) Mediate in allergic response
  - (B) Activation of B-cells
  - (C) Protection from inhaled and ingested pathogens
  - (D) Stimulation of complement system, passive immunity to foetus
  - (E) Present on lymphocyte surface as receptors

## Kerala Medical Entrance Examination 2007: Biology

66. Select the **wrong** pair
- (A) Haldane – Hot dilute soup
  - (B) Oparin – Protobiont
  - (C) Fox – Coacervates
  - (D) Spallanzani – Abiogenesis
  - (E) Francisco Redi – Biogenesis
67. When two related populations occupy geographically or spatially separate areas, they are called
- (A) Allopatric population
  - (B) Quantum population
  - (C) Saltational population
  - (D) Parapatric population
  - (E) Sympatric population
68. Which one of the following groups are not analogous organs ?
- (A) Wings of birds and wings of butterfly
  - (B) Eye of octopus and eye of mammals
  - (C) Flippers of penguin and flippers of dolphin
  - (D) Thorns of bougainvillea and tendril of cucurbita
  - (E) Tuberos root of sweet potato and stem tuber of potato
69. The radial symmetry is observed in
1. Platyhelminthes
  2. Coelenterates
  3. Aschelminthes
  4. Annelids
  5. Echinoderms
- (A) 2, 3 & 5 only
  - (B) 1, 2, 3, & 5 only
  - (C) 2, 3 & 5 only
  - (D) 1, 3 & 5 only
  - (E) 2 & 5 only



## Kerala Medical Entrance Examination 2007: Biology

70. Match the following

- |                |   |                          |
|----------------|---|--------------------------|
| a. Euplectella | - | 1. Sea pen               |
| b. Physalia    | - | 2. Pinworm               |
| c. Pennatula   | - | 3. Venus flower basket   |
| d. Enterobius  | - | 4. Midwife toad          |
| e. Alytes      | - | 5. Portuguese man of war |

- (A) a - 5,      b - 4,      c - 3,      d - 2,      e - 1  
 (B) a - 5,      b - 3,      c - 4,      d - 2,      e - 1  
 (C) a - 4,      b - 5,      c - 1,      d - 2,      e - 3  
 (D) a - 3,      b - 5,      c - 1,      d - 2,      e - 4  
 (E) a - 2,      b - 1,      c - 3,      d - 4,      e - 5

71. Which one of the following is not a characteristic feature of the sub phylum Vertebrata ?

- (A) Dorsal tubular nerve cord  
 (B) Ventral muscular heart  
 (C) Presence of notochord in the adult  
 (D) Presence of kidneys  
 (E) Two pairs of lateral appendages, fins or limbs

72. Which one of the following is **correctly** paired ?

- (A) Trygon      -      Monitor  
 (B) Ichthyophis      -      Crow  
 (C) Varanus      -      Stingray  
 (D) Corvus      -      Limbless amphibian  
 (E) Pristis      -      Sawfish

73. The excretory organ in cockroach is

- (A) Malpighian corpuscle  
 (B) Malpighian tubules  
 (C) Hepatic caecae  
 (D) Metanephridia  
 (E) Green glands

74. Which one of the following is **correctly** matched regarding earthworm ?

- (A) Buccal cavity      -      1st to 5th segment  
 (B) Stomach      -      11th to 12th segment  
 (C) Typhlosole      -      26th to 95th segment  
 (D) Testes      -      10th to 14th segment  
 (E) Gizzard      -      6th to 8th segment

## Kerala Medical Entrance Examination 2007: Biology

75. The male cockroach can be identified by the presence of
- (A) collateral gland
  - (B) green gland
  - (C) broad abdomen
  - (D) anal cercus
  - (E) anal style
76. In mammals the teeth are
- (i) of different types
  - (ii) embedded in the cup-like socket of the jaw bones
  - (iii) only two sets, present throughout life
- These conditions are referred as
- (A) Heterodont, thecodont and diphyodont
  - (B) Thecodont, heterodont and diphyodont
  - (C) Diphyodont, thecodont and heterodont
  - (D) Heterodont, diphyodont and thecodont
  - (E) Thecodont, diphyodont and heterodont
77. The type of tissue lining the nasal passage, bronchioles and fallopian tubes is
- (A) Columnar ciliated epithelium
  - (B) Cuboidal epithelium
  - (C) Neurosensory epithelium
  - (D) Germinal epithelium
  - (E) Stratified columnar epithelium
78. Find out the **wrongly** matched pair
- (A) Squamous epithelium – skin of frog
  - (B) Columnar epithelium – peritonium of body cavity
  - (C) Ciliated epithelium – bronchioles
  - (D) Stratified cuboidal epithelium – oesophagus
  - (E) Glandular epithelium – salivary gland
79. Chromosome theory of inheritance was proposed by
- (A) Gregor Mendel
  - (B) Hugo de Vries
  - (C) Bridges
  - (D) Sutton & Boveri
  - (E) Bateson & Punnet

## Kerala Medical Entrance Examination 2007: Biology

80. Which of the chromosomal formulation is responsible for the expression of meta-male character in *Drosophila* ?
- (A)  $2A + 3X$   
 (B)  $3A + 3X$   
 (C)  $4A + 3X$   
 (D)  $3A + XY$   
 (E)  $2A + XY$
81. The process that involves inter-genic suppression or the masking effect which one gene locus has upon the expression of another is called
- (A) Epistasis  
 (B) Dominance  
 (C) Incomplete dominance  
 (D) Recessive  
 (E) Pleiotropy
82. Gynaecomastia is a condition seen in
- (A) Down's syndrome  
 (B) Turner's syndrome  
 (C) Klinefelter's syndrome  
 (D) Patau's syndrome  
 (E) Edward's syndrome
83. Cri-du-chat syndrome is caused by
- (A) Para centric inversion  
 (B) Duplication  
 (C) Translocation  
 (D) Deletion  
 (E) Pericentric inversion
84. Match the genetic phenomena with their respective ratios
- |                              |                    |
|------------------------------|--------------------|
| a. Inhibitory gene ratio     | 1. $9 : 3 : 4$     |
| b. Complementary gene ratio  | 2. $1 : 1 : 1 : 1$ |
| c. Recessive epistasis ratio | 3. $12 : 3 : 1$    |
| d. Dihybrid test cross ratio | 4. $13 : 3$        |
| e. Dominant epistasis ratio  | 5. $9 : 7$         |
- (A) a - 5, b - 4, c - 3, d - 2, e - 1  
 (B) a - 4, b - 5, c - 1, d - 2, e - 3  
 (C) a - 1, b - 2, c - 4, d - 3, e - 5  
 (D) a - 2, b - 1, c - 4, d - 5, e - 3  
 (E) a - 5, b - 4, c - 1, d - 2, e - 3

## Kerala Medical Entrance Examination 2007: Biology

85. In regulation of gene expression in prokaryotes
- I Lactose acts as the suppressor for gene expression
  - II Tryptophan acts as the inducer for gene expression
  - III Regulator gene is the one that produces the repressor molecule
- (A) I alone correct  
 (B) II alone correct  
 (C) III alone correct  
 (D) II & I are correct  
 (E) II & III are correct

86. Match the items in Column - I with Column - II and choose the **correct** alternative

Column - I	Column - II
1. Sickle-cell anemia	a. 7th chromosome
2. Phenylketonuria	b. 4th chromosome
3. Cystic fibrosis	c. 11th chromosome
4. Huntington's disease	d. X-chromosome
5. Colour blindness	e. 12th chromosome

- (A) 1 - a, 2 - c, 3 - d, 4 - b, 5 - e  
 (B) 1 - b, 2 - c, 3 - d, 4 - e, 5 - a  
 (C) 1 - b, 2 - a, 3 - c, 4 - e, 5 - d  
 (D) 1 - d, 2 - e, 3 - c, 4 - b, 5 - a  
 (E) 1 - c, 2 - e, 3 - a, 4 - b, 5 - d
87. Find out the **correct** statement
- (A) Monosomy and nullisomy are the two types of euploidy
  - (B) Polyploidy is more common in animals than in plants
  - (C) Polyploids occur due to the failure in complete separation of sets of chromosomes
  - (D)  $2n-1$  condition results in trisomy
  - (E) Non-homologous chromosomal duplication results in autopolyploidy
88. Which of the following is **not relevant** to the structure of double helical DNA ?
- (A) The helix makes one complete spiral turn every  $34\text{\AA}$
  - (B) The diameter of the helix is  $20\text{\AA}$
  - (C) The distance between adjacent nucleotide is  $3.4\text{\AA}$
  - (D) Each strand of helix has a backbone made up of alternating ribose sugar and phosphate
  - (E) The two adjacent sugar molecules joined with phosphate by phosphodiester bond

## Kerala Medical Entrance Examination 2007: Biology

89. Down's syndrome and Turner's syndrome occur in human beings due to
- (A) monosomic and nullisomic conditions respectively
  - (B) monosomic and trisomic conditions respectively
  - (C) trisomic and monosomic conditions respectively
  - (D) trisomic and tetrasomic conditions respectively
  - (E) nullisomic and monosomic conditions respectively
90. Which is the initial step in m-RNA maturation process ?
- (A) Polyadenylation
  - (B) 5' capping
  - (C) Splicing
  - (D) Endonucleolytic cleavage
  - (E) Sealing by ligase
91. Statements
1. The four nucleotide bases are not necessarily present in DNA in exact equal proportions
  2. The total amount of purines are equal to the total amount of pyrimidines
  3. DNA ligase enzyme act to hydrolyse or breakdown a polynucleotide chain into its component nucleotides
  4. Nuclease enzymes are capable of restoring an intact DNA duplex
- Of the above statements
- (A) 2 is correct but 1, 3 and 4 are wrong
  - (B) 1 and 2 are wrong but 3 and 4 are correct
  - (C) 1, 2 and 3 are correct but 4 is wrong
  - (D) 1 and 2 are correct but 3 and 4 are wrong
  - (E) 2, 3 and 4 are correct but 1 is wrong
92. Which of the following group of codons code for amino acid serine
- (A) CUU, CUC, CUA and CUG
  - (B) UAU, UAC, UGU and UGC
  - (C) UCU, UCC, UCA and UCG
  - (D) UGU, UGC, UGA and UAG
  - (E) GUU, GUC, GCU and GCC



## Kerala Medical Entrance Examination 2007: Biology

93. Choose the **wrong** statement in the process of protein synthesis
- (A) After uncoiling of DNA molecule, one strand acts as a template for the formation of m-RNA
  - (B) In the presence of DNA polymerase enzyme the m-RNA is formed based on the triplet codes
  - (C) The m-RNA that leaves nucleus reaches cytoplasm and gets attached with 30S ribosomal subunit
  - (D) The amino acids are transferred from the intra-cellular amino acid pool to the active ribosomes by the t-RNA
  - (E) Translation is the process in which proteins are synthesized from the RNA

94. Match the items in Column - I with Column - II and choose the **correct** alternative

Column - I	Column - II
1. Calcitonin	a. Treatment of viral infections
2. Gonadotropin	b. Treatment of rickets
3. Erythropoitin	c. Enhancement of immune action
4. Interferon	d. Formation of erythrocytes
5. Interleukine	e. Treatment of infertility

- (A) 1 - c, 2 - a, 3 - d, 4 - b, 5 - e
- (B) 1 - c, 2 - b, 3 - a, 4 - e, 5 - d
- (C) 1 - d, 2 - c, 3 - b, 4 - a, 5 - e
- (D) 1 - b, 2 - c, 3 - d, 4 - e, 5 - a
- (E) 1 - b, 2 - e, 3 - d, 4 - a, 5 - c

95. Find out the **wrong** statement
- (A) Mobile genetic elements, transposons were visualized by Barbara McClintock
  - (B) Udder cell, a somatic cell is used to produce the cloned sheep by nuclear transplantation method
  - (C) In pedigree analysis, a person immediately affected by an action is called propositus
  - (D) Dr. Ian Wilmut produced a cloned sheep called Dolly
  - (E) DNA ligases are used to cleave a DNA molecule
96. The genome of *Caenorhabditis elegans* consists of
- (A) 3 billion base pairs and 30,000 genes
  - (B) 180 million base pairs and 13,000 genes
  - (C) 4.7 million base pairs and 4,000 genes
  - (D) 97 million base pairs and 18,000 genes
  - (E) 12 million base pairs and 6,000 genes

## Kerala Medical Entrance Examination 2007: Biology

97. Consider the following statements
- I The anti pellagra vitamin is nicotinamide present in milk, yeast, meat and leafy vegetables
  - II Crypts of Lieberkuhn are present in the liver
  - III Steapsin is the pancreatic amylase
- (A) I & II correct (B) II & III correct  
 (C) I & III incorrect (D) I & III correct  
 (E) II & III incorrect
98. Cod and shark liver oil is a source of
- (A) energetic nutrients (B) constructive nutrients  
 (C) energetic and constructive nutrients (D) protective nutrients  
 (E) protective and constructive nutrients
99. Find out the **correct** match
- |                         |                           |
|-------------------------|---------------------------|
| a. Hepatic lobule       | 1. Sub mucosal glands     |
| b. Brunner's glands     | 2. Bases of villi         |
| c. Crypts of Lieberkuhn | 3. Glisson's capsule      |
| d. Sphincter of Oddi    | 4. Gallbladder            |
| e. Cystic duct          | 5. Hepato-pancreatic duct |
|                         | 6. Serous glands          |
- (A) a - 3, b - 6, c - 2, d - 5, e - 4  
 (B) a - 5, b - 2, c - 3, d - 6, e - 1  
 (C) a - 3, b - 1, c - 2, d - 5, e - 4  
 (D) a - 4, b - 6, c - 5, d - 2, e - 1  
 (E) a - 4, b - 2, c - 6, d - 5, e - 3
100. Consider the following statements
- I Flame cells are excretory structures in flatworms
  - II Green glands are excretory organs in annelids
  - III Columns of Bertini are the conical projections of renal pelvis into renal medulla between the renal pyramids
- (A) I & II correct (B) II & III incorrect  
 (C) I & III correct (D) I, II & III correct  
 (E) I, II & III incorrect

## Kerala Medical Entrance Examination 2007: Biology

101. Find out the correctly matched pair

- (A) Pepsinogen – Zymogenic cells  
 (B) HCl – Goblet cells  
 (C) Mucous – Oxyntic cells  
 (D) Pancreatic juice – Salivary gland  
 (E) Ptyalin – Acinar cells

102. Vital capacity of the lung includes

- (A) IRV + TV + ERV  
 (B) ERV + RV  
 (C) ERV + TV  
 (D) IRV + TV  
 (E) RV + ERV + TV + IRV

103. Consider the following statements

- I In man, vertebral column has 33 bones organized as 28 bones  
 II Pelvic girdle is made up of two fused bones only  
 III Osteoporosis is characterized by microarchitectural deterioration of the bone
- (A) I alone is correct  
 (B) II alone is correct  
 (C) III alone is correct  
 (D) I alone is incorrect  
 (E) II alone is incorrect

104. Match the items in Column - I with Column - II and choose the correct option

Column - I	Column - II
1. Tidal volume	a. 2500 to 3000 ml of air
2. Inspiratory reserve volume	b. 1000 ml of air
3. Expiratory reserve volume	c. 500 ml of air
4. Residual volume	d. 3400 to 4800 ml of air
5. Vital capacity	e. 1200 ml of air

- (A) 1 - c, 2 - d, 3 - b, 4 - a, 5 - e  
 (B) 1 - c, 2 - a, 3 - b, 4 - e, 5 - d  
 (C) 1 - c, 2 - a, 3 - d, 4 - e, 5 - d  
 (D) 1 - c, 2 - d, 3 - b, 4 - a, 5 - b  
 (E) 1 - d, 2 - c, 3 - b, 4 - a, 5 - e

## Kerala Medical Entrance Examination 2007: Biology

105. Which of the following statements is **not true** ?
- (A) The partial pressure of oxygen in deoxygenated blood is 40 mm Hg  
 (B) The partial pressure of oxygen in oxygenated blood is 95 mm Hg  
 (C) The partial pressure of oxygen in the alveolar air is 104 mm Hg  
 (D) The partial pressure of carbon dioxide in the alveolar air is 40 mm Hg  
 (E) The partial pressure of carbon dioxide in deoxygenated blood is 95 mm Hg
106. Which one of following statements is **false** ?
- (A) Presence of albumin in urine is albuminuria  
 (B) Presence of glucose in urine is glycosuria  
 (C) Presence of ketose sugar in urine is ketonuria  
 (D) Presence of excess urea in blood is uremia  
 (E) Presence of hemoglobin in urine is hemoglobinuria
107. Statements
1. Plasma constitutes 45% of the human blood
  2. Albumin is a plasma protein which helps in osmotic balance
  3. Factors responsible for the blood clotting process are present in the blood
  4. Plasma without clotting factors is called serum
  5. Minerals are not generally found in blood
- Of the above statements
- (A) only 5 is wrong and all others 1 to 4 are correct  
 (B) 1 and 2 are correct and 3, 4 and 5 are wrong  
 (C) 2 and 4 are correct and 1, 3 and 5 are wrong  
 (D) 1 and 5 are correct and 2, 3 and 4 are wrong  
 (E) 2, 3 and 4 are correct and 1 and 5 are wrong
108. The globular protein molecule, which masks the active sites on the F-actin is
- (A) Troponin                      (B) Tropomyosin                      (C) Myosin  
 (D) Light meromyosin (E) Heavy meromyosin
109. Choose the **correct** pathway of the transmission of impulses in the heart beat
- (A) AV node → SA node                      → Bundle of His                      → Purkinje fibres  
 (B) SA node → AV node                      → Bundle of His                      → Purkinje fibres  
 (C) SA node → Bundle of His                      → AV node                      → Purkinje fibres  
 (D) AV node → Bundle of His                      → SA node                      → Purkinje fibres  
 (E) SA node → Purkinje fibres → Bundle of His → AV node

## Kerala Medical Entrance Examination 2007: Biology

110. Find out the **correct order** of number of bones in the parts of skull such as cranial bone, facial bone, hyoid bone and middle ear bone respectively
- (A) 14, 8, 1 and 3
  - (B) 3, 8, 14 and 1
  - (C) 14, 8, 3 and 1
  - (D) 8, 3, 14 and 1
  - (E) 8, 14, 1 and 3
111. In an ECG, the depolarization of atria is indicated by
- (A) P - wave
  - (B) Q - wave
  - (C) R - wave
  - (D) S - wave
  - (E) T - wave
112. Which of the following prevents internal reflection of light within the eye ?
- (A) Cornea
  - (B) Choroid
  - (C) Sclera
  - (D) Conjunctiva
  - (E) Ciliary body
113. The region of the nephron found in the renal medulla is
- (A) Malpighian corpuscle
  - (B) Proximal convoluted tubule
  - (C) Distal convoluted tubule
  - (D) Henle's loop
  - (E) Glomerulus
114. Which of the following statements are **false / true** ?
- a. Calcitonin regulates the metabolism of calcium
  - b. Oxytocin stimulates contraction of uterine muscles during birth
  - c. Grave's disease is caused by malfunctioning of adrenal gland
  - d. ADH stimulates absorption of water and increase the urine production
- (A) a and c are true, b and d are false
  - (B) a and b are true, c and d are false
  - (C) a and d are false, b and c are false
  - (D) a, b and c are true, d only false
  - (E) a only true, b, c and d are false



## Kerala Medical Entrance Examination 2007: Biology

## 115. Statements

1. A-bands of the muscle is dark and contain myosin
2. I-bands are the light bands and contain actin
3. During muscle contraction the A-band contracts
4. The part between the two Z-lines is called as sarcomere
5. The central part of thin filament, not overlapped by thick filament is called H-zone

Of the above statements

- (A) 1, 2 and 3 are correct while 4 and 5 are incorrect
- (B) 1, 3, 5 are correct while 2, 4 are incorrect
- (C) 1 and 2 are correct while 3, 4 and 5 are incorrect
- (D) 1, 2, 3 and 5 are correct while 4 is incorrect
- (E) 1, 2 and 4 are correct while 3 and 5 are incorrect

116. Identify the **correct** sequence of organs / regions in the organization of human ear as an auditory mechanoreceptor organ

- (A) Pinna - Cochlea - Tympanic membrane - Auditory canal - Malleus - Stapes - Incus - Auditory nerve
- (B) Pinna - Tympanic membrane - Auditory canal - Incus - Malleus - Stapes - Cochlea - Auditory nerve
- (C) Pinna - Malleus - Incus - Stapes - Auditory canal - Tympanic membrane - Cochlea - Auditory nerve
- (D) Pinna - Tympanic membrane - Auditory canal - Cochlea - Malleus - Incus - Stapes - Auditory nerve
- (E) Pinna - Auditory canal - Tympanic membrane - Malleus - Incus - Stapes - Cochlea - Auditory nerve

## 117. Which of the following animal is having longitudinal binary fission ?

- (A) Euglena
- (B) Plasmodium
- (C) Planaria
- (D) Paramecium
- (E) Hydra

## Kerala Medical Entrance Examination 2007: Biology

118. Find out the **wrong** statement

- (A) Amnion is the outer layer containing amniotic fluid that acts as shock absorber to the soft embryo
- (B) Yolk sac is a foetal membrane that helps in the nourishment of the embryo in general
- (C) In mammals allantois is not excretory in function
- (D) Chorion allantoic membrane develops villi and contribute much to the development of placenta
- (E) Amnion and chorion develop as upward projecting folds of somatopleure called amniotic folds

119. Match the items in Column - I with Column - II and choose the **correct** alternatives

Column - I (Animal)	Column - II (Max. Life Span)
1. Carp	a. 102 years
2. Cobra	b. 47 years
3. Turtle	c. 152 years
4. Giant Tortoise	d. 28 years
5. Swan	e. 123 years

- (A) 1 - b, 2 - d, 3 - e, 4 - c, 5 - a
- (B) 1 - a, 2 - d, 3 - c, 4 - e, 5 - b
- (C) 1 - b, 2 - c, 3 - d, 4 - e, 5 - a
- (D) 1 - a, 2 - c, 3 - b, 4 - e, 5 - d
- (E) 1 - c, 2 - d, 3 - e, 4 - b, 5 - a

120. Match the numbers of genes given in Column - I with names of organisms in Column - II and choose the **correct** alternatives

Column - I	Column - II
1. 450 to 700 genes	a. <i>Escherichia coli</i>
2. 4000 genes	b. <i>Drosophila melanogaster</i>
3. 13,000 genes	c. <i>Mycoplasma</i>
4. 32,000 to 50,000 genes	d. <i>Homo sapiens</i>
5. 35,000 to 45,000 genes	e. <i>Oryza sativa</i>

- (A) 1 - b, 2 - a, 3 - e, 4 - c, 5 - d
- (B) 1 - c, 2 - a, 3 - b, 4 - e, 5 - d
- (C) 1 - c, 2 - b, 3 - a, 4 - e, 5 - d
- (D) 1 - b, 2 - c, 3 - a, 4 - e, 5 - d
- (E) 1 - a, 2 - c, 3 - b, 4 - e, 5 - d