

NEET 2020 Paper



Date: 13thSeptember 2020

Time: 02:00 pm – 05:00 pm

Subject: Biology

1. Presence of which of the following conditions in urine are indicative of Diabetes Mellitus ?

- a) Ketonuria and Glycosuria
- b) Renal calculi and Hyperglycaemia
- c) Uremia and Ketonuria
- d) Uremia and Renal Calculi

Answer: a

Solution:

Diabetes mellitus leads to a complex disorder called prolonged hyperglycemia, which is associated with loss of glucose through urine known as glycosuria and when the cell are unable to utilize carbohydrates for energy instead they use fats & proteins, and degradation of these fats produces ketone bodies. The presence of these ketone bodies in urine is known as ketonuria.

2. Match the following columns and select the correct option

	Column I		Column II
(a)	Placenta	(i)	Androgens
(b)	Zona pellucida	(ii)	Human Chorionic Gonadotropin hCG
(c)	Bulbo-urethral glands	(iii)	Layer of the ovum
(d)	Leydig cells	(iv)	Lubrication of the penis

- (a) (b) (c) (d)
- a) (iii) (ii) (iv) (i)
- c) (iv) (iii) (i) (ii)

- (a) (b) (c) (d)
- b) (ii) (iii) (iv) (i)
- d) (i) (iv) (ii) (iii)

Answer: b

Solution:

- (a) Placenta also acts as an endocrine tissue and produces several hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progestogens, etc.
- (b) The secondary oocyte forms a new membrane called zona pellucida surrounding it.
- (c) The male accessory glands include paired seminal vesicles, a prostate and paired bulbourethral glands. Secretions of these glands constitute the seminal plasma which is rich in fructose, calcium and certain enzymes. The secretions of bulbourethral glands also helps in the lubrication of the penis.
- (d) The regions outside the seminiferous tubules called interstitial spaces, contain small blood vessels and interstitial cells or Leydig cells. Leydig cells synthesise and secrete testicular hormones called androgens.



3. Match the following columns and select the correct option.

	Column I		Column II
(a)	Bt cotton	(i)	Gene therapy
(b)	Adenosine deaminase deficiency	(ii)	Cellular defence
(c)	RNAi	(iii)	Detection of HIV infection
(d)	PCR	(iv)	Bacillus thuringiensis

- | | | | | |
|----|-------|-------|-------|-------|
| | (a) | (b) | (c) | (d) |
| a) | (ii) | (iii) | (iv) | (i) |
| b) | (i) | (ii) | (iii) | (iv) |
| c) | (iv) | (i) | (ii) | (iii) |
| d) | (iii) | (ii) | (i) | (iv) |

Answer: c

Solution:

- (a) Bt toxin is produced by a bacterium called *Bacillus thuringiensis* (Bt for short). Bt toxin gene has been cloned from the bacteria and been expressed in plants to provide resistance to insects without the need for insecticides; in effect created a bio-pesticide. Examples are Bt cotton, Bt corn, rice, tomato, potato and soyabean etc.
- (b) The first clinical gene therapy was given in 1990 to a 4-year old girl with adenosine deaminase (ADA) deficiency.
- (c) RNAi (RNA interference) is a biological process in which RNA molecules inhibit gene expression or translation, by neutralizing targeted mRNA molecules and takes place in all eukaryotic organisms as a method of cellular defense.
- (d) Polymerase chain reaction can be used in detection of HIV infection as it detects the genetic material of HIV i.e. its RNA

4. The sequence that controls the copy number of the linked DNA in the vector, is termed

- | | |
|-------------------------|---------------------|
| a) Palindromic sequence | b) Recognition site |
| c) Selectable marker | d) Ori site |

Answer: d

Solution:

NEET 2020 Paper



Origin of replication (ori): This is a sequence from where replication starts and any piece of DNA when linked to this sequence can be made to replicate within the host cells. This sequence is also responsible for controlling the copy number of the linked DNA.

5. Match the following columns and select the correct option.

	Column I		Column II
(a)	6-15 pairs of gill slits	(i)	Trygon
(b)	Heterocercal caudal fin	(ii)	Cyclostomes
(c)	Air bladder	(iii)	Chondrichthyes
(d)	Poison sting	(iv)	Osteichthyes

- (a) (b) (c) (d)
a) (iv) (ii) (iii) (i)
c) (ii) (iii) (iv) (i)

- (a) (b) (c) (d)
b) (i) (iv) (iii) (ii)
d) (iii) (iv) (i) (ii)

Answer: c

Solution:

- (a) Cyclostomata that belongs to agnatha which comprises the living jawless vertebrates.
(b) Chondrichthyes consists of the cartilaginous fishes (eg. shark), a typical member of which has heterocercal (two unequal lobes) caudal fins.
(c) **Osteichthyes** consists of the bony fishes in which air bladder is present which regulates buoyancy.
(d) **Chondrichthyes** : poison sting (e.g., Trygon, whose common name is sting ray).

6. In which of the following techniques, the embryos are transferred to assist those females who cannot conceive?

- a) ICSI and ZIFT
b) GIFT and ICSI
c) ZIFT and IUT
d) GIFT and ZIFT

Answer: c

Solution:

When females cannot conceive then embryo transfer is done by using ZIFT and IUT technique. In this method ova from female & sperms from male is collected and are induced in laboratory under simulated conditions to form zygote. The zygote with upto 8 blastomeres is transferred into fallopian tube through ZIFT or embryo with more than 8 blastomeres are transferred into uterus through IUT.

7. Select the correct events that occur during inspiration.

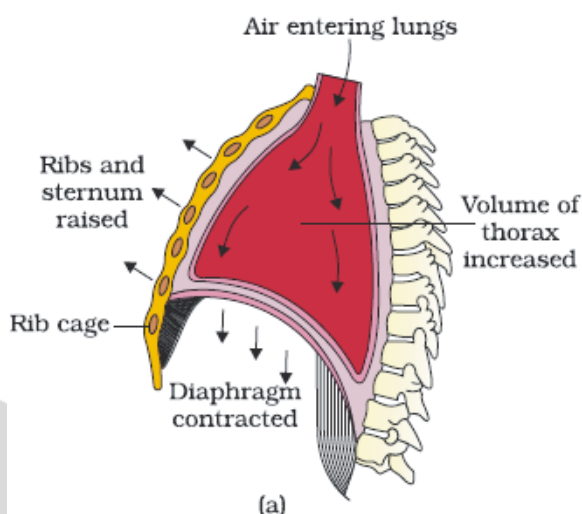
- (a) Contraction of diaphragm
(b) Contraction of external inter costal muscles
(c) Pulmonary volume decreases
(d) Intra pulmonary pressure increases
a) (a),(b) and (d)
b) Only (d)

- c) (a) and (b)
- d) (c) and (d)

Answer: c

Solution:

Inspiration is initiated by contraction of diaphragm which increases volume of thoracic chamber in antero-posterior axis and contraction of external inter-costal muscles which lifts up the ribs and sternum causing increases in volume of thoracic chamber in dorso-ventral axis.



8. The QRS complex in a standard ECG represents :

- a) Depolarisation of ventricles
- b) Repolarisation of ventricles
- c) Repolarisation of auricles
- d) Depolarisation of auricles

Answer: a

Solution:

The QRS complex represents the depolarisation of the ventricles, which initiates the ventricular contraction. The contraction starts shortly after Q and marks the beginning of the systole.

9. The enzyme enterokinase helps in conversion of :

- a) Caseinogen into casein
- b) Pepsinogen into pepsin
- c) Protein into polypeptides
- d) Trypsinogen into trypsin

Answer: d

**Solution:**

Trypsinogen is present in inactive form in pancreatic juice. So enterokinase enzyme converts inactive trypsinogen to active trypsin. This in turn activates the other enzymes in the pancreatic juice.

10. Identify the correct statement with reference to human digestive system.

- a) Ileum is a highly coiled part
- b) Vermiform appendix arises from duodenum
- c) Ileum opens into small intestine
- d) Serosa is the innermost layer of the alimentary canal.

Answer: a

Solution:

- (a) Small intestine is distinguishable into three regions, a 'U' shaped duodenum, a long coiled middle portion jejunum and a highly coiled ileum.
- (b) A narrow finger-like tubular projection, the vermiform appendix which is a vestigial organ, arises from the caecum.
- (c) Ileum opens into the large intestine.
- (d) The wall of alimentary canal possesses four layers from outer to inner namely serosa, muscularis, submucosa and mucosa. Serosa is the outermost layer and mucosa is the innermost layer.

11. Ray florets have :

- a) Hypogynous ovary
- b) Half inferior ovary
- c) Inferior ovary
- d) Superior ovary

Answer: c

Solution :

Ray florets have inferior ovary and the reason is that the other parts of the flower are attached above the level of ovary. Example of such an ovary is ray florets of sunflower.

12. Which of the following is put into Anaerobic sludge digester for further sewage treatment ?

- a) Effluents of primary treatment
- b) Activated sludge
- c) Primary sludge
- d) Floating debris

Answer: b

Solution:

Major portion of activated sludge is pumped into large tanks called anaerobic sludge digesters. So, here other kinds of bacteria which grow anaerobically, digest the fungi and bacteria of the sludge.

13. The number of substrate level phosphorylations in one turn of citric acid cycle is :

- a) Two
- b) Three



- c) Zero
- d) One

Answer:d

Solution :

During Krebs' or citric acid cycle, succinyl-CoA is acted upon by enzyme succinyl-CoA synthetase to form succinate (a 4C compound). The reaction releases sufficient energy to form ATP (in plants) or GTP (in animals) by substrate-level phosphorylation. GTP can then be used to form ATP.

14. Identify the correct statement with regard to G_1 phase (Gap I) of interphase

- a) Cell is metabolically active, grows but does not replicate its DNA
- b) Nuclear division takes place
- c) DNA synthesis or replication takes place
- d) Reorganisation of all cell components takes place

Answer: a

Solution:

G_1 Phase is metabolically active stage of cell cycle. Different type of amino acid RNA, Protein synthesis take place in G_1 phase but DNA replication does not take place, (Note :- DNA replication occur in S-Phase)

15. Which of the following pairs is of unicellular algae ?

- a) Anabaena and volvox
- b) Chlorella and spirulina
- c) Laminaria and Sargossum
- d) Gelidium and Gracilaria

Answer: b

Solution:

Chlorella and spirulina are unicellular algae, rich in proteins is used as food supplement even by space travellers. These algae also produce a nutritional biomass that astronauts could eat.

16. Identify the wrong statement with reference to immunity :

- a) Active immunity is quick and gives full response
- b) Foetus receives some antibodies from mother, it is an example for passive immunity
- c) When exposed to antigen (living or dead) antibodies are produced in the host's body. It is called "Active immunity"
- d) When ready made antibodies are directly given , it is called "Passive immunity".

Answer: a

Solution:

Active immunity is slow and takes time to give its full effective response. Foetus receiving some antibodies from their mother, through the placenta during pregnancy is an example of



passive immunity. Active immunity is the immunity in which when host is exposed to antigens either living or dead, antibodies produces in the host body. In passive immunity readymade antibodies are directly given to protect the body against foreign agents

17. Match the following columns and select the correct option

	Column I		Column II
(a)	Floating ribs	(i)	Located between second and seventh ribs
(b)	Acromion	(ii)	Head of the Humerus
(c)	Scapula	(iii)	Clavicle
(d)	Glenoid cavity	(iv)	Do not connect with the sternum

(a) (b) (c) (d)

- a) (iii) (ii) (iv) (i)
 b) (iv) (iii) (i) (ii)
 c) (ii) (iv) (i) (iii)
 d) (i) (iii) (ii) (iv)

Answer: b

Solution:

- (a) There are 12 pairs of ribs. Each rib is a thin flat bone connected dorsally to the vertebral column and ventrally to the sternum. Last 2 pairs (11th and 12th) of ribs are not connected ventrally and are therefore, called floating ribs.
- (b) & (c) Scapula is a large triangular flat bone situated in the dorsal part of the thorax between the second and the seventh ribs. The dorsal, flat, triangular body of scapula has a slightly elevated ridge called the spine which projects as a flat, expanded process called the acromion. The clavicle (collar bone) articulates with this.
- (d) Below the acromion is a depression called the glenoid cavity which articulates with the head of the humerus to form the shoulder joint.

18. Identify the basic amino acid from the following

- a) Lysine
 b) Valine
 c) Tyrosine
 d) Glutamic acid

Answer: a

Solution:

Lysine is the basic amino acid. Valine is neutral amino acid. Tyrosine is aromatic amino acid. Glutamic acid is acidic amino acid.

19. The plant parts which consist of two generations one within the other :

- (a) Pollen grains inside the anther
 (b) Germinated pollen grain with two male gametes



- (c) Seed inside the fruit
- (d) Embryo sac inside the ovule
- a) (c) and (d)
- b) (a) and (d)
- c) (a) only
- d) (a) only

Answer: b

Solution:

- (a) Pollen grain inside the anther (2n).
- (d) Embryosac inside ovule female gametophyte (2n).

20. Identify the wrong statement with reference to transport of oxygen.

- a) Higher H^+ conc. in alveoli favours the formation of oxyhaemoglobin
- b) Low pCO_2 in alveoli favours the formation of oxyhaemoglobin
- c) Binding of oxygen with haemoglobin is mainly related to partial pressure of O_2
- d) Partial pressure of CO_2 can interfere with O_2 binding with haemoglobin.

Answer: a

Solution:

The Oxygen dissociation curve is highly useful in studying the effect of factors like pCO_2 , H^+ concentration, etc., on binding of O_2 with haemoglobin. In the alveoli, where there is high pO_2 , low pCO_2 , lesser H^+ concentration and lower temperature, the factors are all favourable for the formation of oxyhaemoglobin. In the tissues, where low pO_2 , high pCO_2 , high H^+ concentration and higher temperature exist, the conditions are favourable for dissociation of oxygen from the oxyhaemoglobin.

21. Match the following columns and select the correct option.

	Column I		Column II
(a)	Organ of Corti	(i)	Connects middle ear and pharynx
(b)	Cochlea	(ii)	Coiled part of the labyrinth
(c)	Eustachian tube	(iii)	Attached to the oval window
(d)	Stapes	(iv)	Located on the basilar membrane

- | | | | | | | | |
|------------|------------|------------|------------|------------|------------|------------|------------|
| (a) | (b) | (c) | (d) | (a) | (b) | (c) | (d) |
| a) (iv) | (ii) | (i) | (iii) | b) (i) | (ii) | (iv) | (iii) |
| c) (ii) | (iii) | (i) | (iv) | d) (iii) | (i) | (iv) | (ii) |

Answer: a



Solution:

- (a) Organ of corti is a structure located on the basilar membrane which contains hair cells that act as auditory receptors.
- (b) Cochlea is the coiled portion of the labyrinth (fluid filled inner ear)
- (c) Eustachian tube connects the middle ear cavity with the pharynx and helps in equalizing pressure of ear drums.
- (d) Stapes is one of the ossicle of middle ear and is attached to oval window of cochlea.
22. Name the plant growth regulators which upon spraying on sugarcane crop, increases the length of stem, thus increasing the yield of sugarcane crop.
- a) Ethylene
 - b) Absciscic acid
 - c) Cytokinin
 - d) Gibberellin

Answer: d

Solution:

Gibberellin hormone regulates the growth, elongation of stem. It is able to promote the internode elongation because of which the size of sugarcane increases.

23. The roots that originate from the base of the stem are:
- a) Prop roots
 - b) Lateral roots
 - c) Fibrous roots
 - d) Primary roots

Answer: c

Solution:

Roots that originate from the base of stem constitute the fibrous root system as seen in the monocots example wheat plant.

24. If the head of cockroach is removed, it may live for few days because:
- a) the head holds a small proportion of a nervous system while the rest is situated along the ventral part of its body.
 - b) the head holds a $\frac{1}{3}^{\text{rd}}$ of a nervous system while the rest is situated along the dorsal part of its body.
 - c) the supra-oesophageal ganglia of the cockroach are situated in ventral part of abdomen.
 - d) the cockroach does not have nervous system.

Answer: a

Solution:



Nervous system consists of nerve ring and ventral double nerve cord. Nerve ring is situated oesophageal area. Head contain only branches of ganglia so there is no major part of nervous system in head region.

25. Strobili or cones are found in:

- a) Marchantia
- b) Equisetum
- c) Salvinia
- d) Pteris

Answer: b

Solution:

Strobilus is structure present on many land plant species consisting of sporangia bearing structure densely aggregated along a stem. Equisetum produces strobili.

26. Dissolution of the synaptonemal complex occurs during:

- a) Diplotene
- b) Leptotene
- c) Pachytene
- d) Zygotene

Answer: a

Solution:

Dissolution of the synaptonemal complex occurs at diplotene phase of prophase I in meiosis

27. Match the following diseases with the causative organism and select the correct option.

Column-I		Column-II	
(a) Typhoid		(i) Wuchereria	
(b) Pneumonia		(ii) Plasmodium	
(c) Filariasis		(iii) Salmonella	
(d) Malaria		(iv) Haemophilus	
(a)	(b)	(c)	(d)
a) (ii)	(i)	(iii)	(iv)
b) (iv)	(i)	(ii)	(iii)
c) (i)	(iii)	(ii)	(iv)
d) (iii)	(iv)	(i)	(ii)

Answer: d

Solution:

Salmonella typhi is a pathogenic bacterium which causes typhoid fever in human beings. Bacteria like Streptococcus pneumoniae and Haemophilus influenzae are responsible for the disease pneumonia in humans which infects the alveoli (air filled sacs) of the lungs. Wuchereria the filarial worms cause a slowly developing chronic inflammation Plasmodium are responsible for different types of malaria.

28. The first phase of translation is:

- a) Aminoacylation of tRNA
- b) Recognition of an anti-codon
- c) Binding of mRNA to ribosome



d) Recognition of DNA molecule

Answer: a

Solution:

In translation the first phase is activation of amino acids in the presence of ATP. The activated amino acids are then linked to their cognate tRNAs, a process commonly called as charging of tRNA or aminoacylation of tRNAs.

29. Match the following columns and select the correct option.

Column-I

- (a) *Clostridium butylicum*
- (b) *Trichoderma polysporum*
- (c) *Monascus purpureus*
- (d) *Aspergillus niger*

Column-II

- (i) Cyclosporin-A
- (ii) Butyric Acid
- (iii) Citric Acid
- (iv) Blood cholesterol lowering agent

- | | (a) | (b) | (c) | (d) |
|----|-------|-------|------|-------|
| a) | (i) | (ii) | (iv) | (iii) |
| b) | (iv) | (iii) | (ii) | (i) |
| c) | (iii) | (iv) | (ii) | (i) |
| d) | (ii) | (i) | (iv) | (iii) |

Answer: d

Solution:

Clostridium butylicum is (a bacterium) of butyric acid. Cyclosporin A which is used as an immunosuppressive agent in organ-transplant patients, is produced by the fungus *Trichoderma polysporum*. *Monascus purpureus* is not a blood cholesterol lowering agent, statins produced by it are been commercialised as blood-cholesterol lowering agents. *Aspergillus niger* is (a fungus) of citric acid.

30. The oxygenation activity of RuBisCo enzyme in photorespiration leads to the formation of:

- a) 1 molecule of 6-C compound
- b) 1 molecule of 4-C compound and 1 molecule of 2-C compound
- c) 2 molecules of 3-C compound
- d) 1 molecule of 3-C compound

Answer: d

Solution:

Photorespiration is the light dependent process. At high temperature, RuBP carboxylase functions as oxygenase and instead of fixing carbon dioxide (C_3 cycle), oxidises ribulose 1, 5-biphosphate to produce a 3-carbon phosphoglyceric acid and a 2-carbon phosphoglycolate.

31. Match the following concerning essential elements and their functions in plants:

Column-I

- (a) Iron
- (b) Zinc

Column-II

- (i) Photolysis of water
- (ii) Pollen germination



- (c) Boron (iii) Required for chlorophyll biosynthesis
(d) Manganese (iv) IAA biosynthesis

Select the **correct** option:

- | | (a) | (b) | (c) | (d) |
|----|------------|------------|------------|------------|
| a) | (iii) | (iv) | (ii) | (i) |
| b) | (iv) | (i) | (ii) | (iii) |
| c) | (ii) | (i) | (iv) | (iii) |
| d) | (iv) | (iii) | (ii) | (i) |

Answer: a

Solution:

- | | |
|---------------|---|
| (a) Iron | - (iii) Required for chlorophyll biosynthesis |
| (b) Zinc | - (iv) IAA (auxin) biosynthesis |
| (c) Boron | - (ii) Pollen germination |
| (d) Magnanese | - (i) Photolysis of water |

32. Name the enzyme that facilitates opening of DNA helix during transcription.

- a) DNA polymerase
- b) RNA polymerase
- c) DNA ligase
- d) DNA helicase

Answer: b

Solution:

RNA polymerase holoenzyme binds to the promoter, unwinds DNA (open complex) and form phosphodiester links between the initating nucleotides. DNA polymerase, DNA ligase & DNA helicase are involved in the process of replication and not transcription.

33. From his experiments, S.L. Miller produced amino acids by mixing the following in a closed flask:

- a) $\text{CH}_4, \text{H}_2, \text{NH}_3$ and water vapor at 600°C
- b) $\text{CH}_3, \text{H}_2, \text{NH}_3$ and water vapor at 600°C
- c) $\text{CH}_4, \text{H}_2, \text{NH}_3$ and water vapor at 800°C
- d) $\text{CH}_3, \text{H}_2, \text{NH}_4$ and water vapor at 800°C

Answer: c

Solution:

S.L. Miller conducted an experiment to prove the theory of chemical origin. In their experiment, the conditions of primitive earth were created in the laboratory. The electric discharge was stimulated into a closed flask containing $\text{CH}_4, \text{H}_2, \text{NH}_3$ and water vapour at 800°C . This proved that life originates from non-living components.

34. Goblet cells of alimentary canal are modified from:

- a) Chondrocytes
- b) Compound epithelial cells



- c) Squamous epithelial cells
- d) Columnar epithelial cells

Answer: d

Solution:

Goblet cells are modified columnar epithelial cells. It is found in the lining of organs like respiratory tract and intestine

35. Cuboidal epithelium with brush border of microvilli is found in:

- a) proximal convoluted tubule of nephron
- b) eustachian tube
- c) lining of intestine
- d) ducts of salivary glands

Answer: a

Solution:

The cuboidal epithelium is composed of a single layer of cube-like cells. This is commonly found in ducts of glands and tubular parts of nephrons in kidneys and its main functions are secretion and absorption.

36. In light reaction, plastoquinone facilitates the transfer of electrons from:

- a) PS-I to NADP+
- b) PS-I to ATP synthase
- c) PS-II to Cyt_b₆f complex
- d) Cyt_b₆ complex to PS-I

Answer: c

Solution:

In non cyclic photophosphorylation, Plastoquinone obtained from PS-II transfer to cyt b_6 -f complex.

37. If the distance between two consecutive base pairs is 0.34 nm and the total number of base pairs of a DNA double helix in a typical mammalian cell is 6.6×10^9 dp, then the length of the DNA is approximately.

- a) 2.2 meters
- b) 2.7 meters
- c) 2.0 meters
- d) 2.5 meters

Answer: a

Solution:

The diploid content of human genome is 6.6×10^9 base pairs. The distance between two consecutive base pairs is 0.34 nm (0.34×10^{-9} m), so the length of DNA double helix in a typical mammalian cell is around 6.6×10^9 bp \times 0.34×10^{-9} m/bp = 2.2 metres.



38. Which is the important site of formation of glycoproteins and glycolipids in eukaryotic cells?

- a) Golgi bodies
- b) Polysomes
- c) Endoplasmic reticulum
- d) Peroxisomes

Answer: a

Solution:

Proteins and lipids are formed in the endoplasmic reticulum and some of them are modified to form glycoproteins and glycolipids in the Golgi apparatus.

39. Which of the following statements is **not** correct?

- a) The functional insulin has A and B chains linked together by hydrogen bonds.
- b) Genetically engineered insulin is produced in E-Coli.
- c) In man insulin is synthesised as a proinsulin.
- d) The proinsulin has an extra peptide called C-peptide.

Answer: a

Solution:

The functional insulin molecule has two chains A and chain B, that are linked together by disulphide bridges and not hydrogen bonds.

40. Identify the **incorrect** statement.

- a) Sapwood is the innermost secondary xylem and is lighter in colour.
- b) Due to deposition of tannins, resins, oils etc., heart wood is dark in colour.
- c) Heart wood does not conduct water but gives mechanical support.
- d) Sapwood is involved in conduction of water and minerals from root to leaf.

Answer: a

Solution:

In a large tree, only the outer secondary xylem (sapwood) serves in water conduction, while the inner part (heartwood) is composed of dead but structurally strong secondary xylem and is darker in colour due to desposition of tannins, resins and oils.

41. Floridean starch has structure similar to:

- a) Mannitol and algin
- b) Laminarin and cellulose
- c) Starch and cellulose
- d) Amylopectin and glycogen

Answer: d

Solution:

Floridean starch is the storage substance found in red algae (Rhodophyta). The structure of this compound is similar to amylopectin and glycogen.



42. Match the following with respect to meiosis:

Column-I

- (a) Zygotene
- (b) Pachytene
- (c) Diplotene
- (d) Diakinesis

Column-II

- (i) Terminalization
- (ii) Chiasmata
- (iii) Crossing over
- (iv) Synapsis

Select the **correct** option from the following:

- | | (a) | (b) | (c) | (d) |
|----|-------|-------|-------|-------|
| a) | (i) | (ii) | (iv) | (iii) |
| b) | (ii) | (iv) | (iii) | (i) |
| c) | (iii) | (iv) | (i) | (ii) |
| d) | (iv) | (iii) | (ii) | (i) |

Answer: d

Solution:

Terminalization – It is the stage in which chromosomes condense further. Sites of crossing over entangle together with effective overlapping which makes chiasmata clearly visible.

Chiasmata :- It is the region where crossing over occurs.

Crossing over :- Crossing over or chromosomal crossover occurs in the pachytene stage in which non sister chromatids of homologous chromosomes may exchange segments over regions of homology.

Synapsis :- Synapsis of homologous chromosomes takes place in the zygotene stage.

43. Match the following columns and select the correct option.

Column-I

- (a) Eosinophils
- (b) Basophils
- (c) Neutrophils
- (d) Lymphocytes

Column-II

- (i) Immune response
- (ii) Phagocytosis
- (iii) Release histaminases, destructive Enzymes
- (iv) Release granules containing histamine

- | | (a) | (b) | (c) | (d) |
|----|-------|------|-------|-------|
| a) | (i) | (ii) | (iv) | (iii) |
| b) | (ii) | (i) | (iii) | (iv) |
| c) | (iii) | (iv) | (ii) | (i) |
| d) | (iv) | (i) | (ii) | (iii) |

Answer: c

Solution:

Eosinophils release mediators like histaminases during type I hypersensitivity or allergic reaction.

Basophils are granulocytes i.e. they contain large cytoplasmic granules in the cell nucleus and it stores histamine, a vasodilator and anticoagulant heparin.

Neutrophils are phagocytic in nature and are able to engulf foreign substance (like bacteria)

Lymphocytes have receptors on their surface and they produce antibodies so responsible for immune response.



44. The process of growth is maximum during :

- a) Senescence
- b) Dormancy
- c) Log phase
- d) Lag phase

Answer: c

Solution:

Period of growth characterized by the number of cells increasing at an exponential rate.

45. Match the following :

- | | |
|-------------------------------------|---------------|
| (a) Inhibitor of catalytic Activity | (i) Ricin |
| (b) Possess peptide bonds | (ii) malonate |
| (c) Cell wall material in fungi | (iii) Chitin |
| (d) Secondary metabolite | (iv) Collagen |

Choose the correct option from the following :

- | | (a) | (b) | (c) | (d) |
|----|-------|-------|-------|------|
| a) | (iii) | (iv) | (i) | (ii) |
| b) | (ii) | (iii) | (i) | (iv) |
| c) | (ii) | (iv) | (iii) | (i) |
| d) | (iii) | (i) | (iv) | (ii) |

Answer: c

Solution:

Malonate resembles succinate in structure. Succinate is the substrate of the enzyme succinate dehydrogenase. Hence malonate acts as a competitive inhibitor of this enzyme. Collagen is a protein, and hence has peptide bonds. Cell wall of fungi is made of chitin.

Ricin, a toxin is a secondary metabolite.

46. Some dividing cells exit the cell cycle and enter vegetative inactive stage. This is called quiescent stage (G_0). This process occurs at the end of :

- a) S phase
- b) G_2 Phase
- c) M phase
- d) G_1 phase

Answer: c

Solution:

In M-Phase, some cells do not divide further exist G_1 phase to enter an inactive stage called quiescent stages (G_0) of the cell cycle.

47. Which of the following would help in prevention of diuresis?

- a) Atrial natriuretic factor causes vasoconstriction
- b) Decrease in secretion of renin by JG cells
- c) More water reabsorption due to undersecretion of ADH
- d) Reabsorption of Na^+ and water from renal tubules due to aldosterone

Answer: d



Solution:

- ANF acts on the kidney to increase Na^+ excretion and GFR also inhibit rennin secretion.
- Due to decrease in secretion of renin, it reduced concentration of angiotensin I & II.
- ADH stimulates water reabsorption by stimulating insertion of water channels or aquaporins into the membranes of kidney tubules.
- Reabsorption of Na^+ and water from renal tubules due to aldosterone help in prevention of diuresis.

48. Which of the following is correct about viroids ?

- a) They have DNA with protein coat.
- b) They have free DNA without protein coat.
- c) They have RNA with protein coat.
- d) They have free RNA without protein coat.

Answer: d

Solution:

Viroids have free RNA without protein coat, found in viruses named viroid. Potato spindle tuber disease is a disease caused by a viroids.

49. The infectious stage of plamodium that enters the human body is :

- a) Female gametocytes
- b) Male gametocytes
- c) Trophozoites
- d) Sporozoites

Answer: d

Solution:

The life cycle of plasmodium that infect humans follows three stages: (i) infection of a human with sporozoites ; (ii) asexual reproduction and (iii) sexual reproduction. The two first take place exclusively into the human body, while the third one starts in the human body and is completed into the mosquito organism. The human infection begins when an infected female anopheles mosquito bites a person and injects infected with sporozites saliva into the blood circulation i.e., the first life stage of plasmodium (stage of infection).

50. Which of the following statements is correct ?

- a) Adenine pairs with thymine through three H-bonds.
- b) Adenine does not pair with thymine.
- c) Adenine pairs with thymine through two H-bonds.
- d) Adenine pairs with thymine through one H-bond.

Answer: c

Solution:



Adenine pairs with thymine in DNA through two hydrogen bonds.

51. Flippers of Penguins and Dolphins are examples of :

- a) Industrial melanism
- b) Natural selection
- c) Adaptive radiation
- d) Convergent evolution

Answer: d

Solution:

Analogous organs have similar functions but different origins. Flippers of penguin and dolphin have a similar function (helps in swimming). However, Penguin and dolphin are not closely related to each other, and hence their flippers have different origins and are called analogous organs. This phenomenon is called convergent evolution.

52. Montreal protocol was signed in 1987 for control of :

- a) Release of Green House gases
- b) Disposal of e-wastes
- c) Transport of Genetically modified organisms from one country to another
- d) Emission of ozone depleting substances

Answer: d

Solution:

Montreal Protocol, is an international treaty designed to protect the ozone layer by phasing out the production of numerous substances that are responsible for ozone depletion.

53. Identify the wrong statement with regard to restriction enzymes.

- a) They are useful in genetic engineering.
- b) Sticky ends can be joined by using DNA ligases.
- c) Each restriction enzyme functions by inspecting the length of a DNA sequence.
- d) They cut the strand of DNA at palindromic sites.

Answer: b

Solution:

- (a) Genetic engineering or recombinant DNA technology can be accomplished only if we have the key tools, i.e., restriction enzymes, polymerase enzymes, ligases, vectors and the host organism.
- (b) The sticky ends in DNA that result from the action of restriction endonucleases cannot be joined by the restriction enzymes, but by DNA ligases. So, this statement does not apply to restriction enzymes and hence is the correct option for the question.
- (c) Restriction enzymes begin their action by first scanning the length of the DNA sequence and then recognising a specific sequence. This specific base sequence is known as the recognition sequence.
- (d) Each restriction endonuclease recognises a specific palindromic nucleotide sequence in the DNA.



54. By which method was a new breed 'Hisardale' of sheep formed by using Bikaneri ewes and Marino rams ?

- a) Cross breeding
- b) Inbreeding
- c) Out crossing
- d) Mutational breeding

Answer: a

Solution:

Cross-breeding is the process where the breeding between the two individuals of different species takes place. "Hisardale" is a new breed of sheep developed by crossing Bikaneri ewes and Marino rams in Punjab.

55. Which of the following refer to correct example(s) of organisms which have evolved due to changes of environment brought about by anthropogenic action ?

- (a) Darwin's Finches of Galapagos islands.
 - (b) Herbicide resistant weeds
 - (c) Drug resistant eukaryotes.
 - (d) Man-created breeds of domesticated animals like dogs.
- a) (b), (c) & (d)
 - b) only (d)
 - c) only (a)
 - d) (a) & (c)

Answer: a

Solution:

Evolution by Anthropogenic action is because of the interference by human beings. Anthropogenic shows herbicide resistant weeds, drug resistant eukaryotes and man-created breeds of domesticated animals like dogs and Darwin's Finches of Galapagos islands is an example of natural selection.

56. Meiotic division of the secondary oocyte is completed :

- a) After zygote formation
- b) At the time of fusion of a sperm with an ovum
- c) Prior to ovulation
- d) At the time of copulation

Answer: b

Solution:

When sperm enters into the secondary oocyte, it provides the anaphase promoting factor that induces the completion of meiosis in the secondary oocyte.

57. In relation to Gross primary productivity and Net primary productivity of an ecosystem. Which one of the following statements is correct ?

- a) Gross primary productivity and Net primary productivity are one and same.
- b) There is no relationship between Gross primary productivity and Net primary productivity



- c) Gross primary productivity is always less than Net primary productivity.
- d) Gross primary productivity is always more than Net primary productivity.

Answer: d

Solution:

The gross primary productivity of an ecosystem is the rate of production of organic matter during photosynthesis. Some of this organic matter is lost because of the respiration of plants. The remaining primary productivity is the net primary productivity.

58. Identify the wrong statement with reference to the gene 'I' that controls ABO blood groups.
- a) When I^A and I^B are present together, they express same type of sugar.
 - b) Allele 'i' does not produce any sugar.
 - c) The gene (I) has three alleles.
 - d) A person will have only two of the three alleles.

Answer: a

Solution:

When I^A and I^B are present together they both express their own types of sugars, because of co-dominance. Hence red blood cells have both A and B types of sugars.

59. Match the following columns and select the correct option.

Column-I

- (a) Pituitary gland
- (b) Thyroid gland
- (c) Adrenal gland
- (d) Pancrease

Column-II

- (i) Grave's disease
- (ii) Diabetes mellitus
- (iii) Diabetes insipidus
- (iv) Addison's disease

- | | (a) | (b) | (c) | (d) |
|----|------------|------------|------------|------------|
| a) | (iii) | (i) | (iv) | (ii) |
| b) | (ii) | (i) | (iv) | (iii) |
| c) | (iv) | (iii) | (i) | (ii) |
| d) | (iii) | (ii) | (i) | (iv) |

Answer: a

Solution:

The antidiuretic hormone released by the pituitary gland stimulates reabsorption of water by the kidneys. The deficiency of this hormone causes increased urine production, a condition called diabetes insipidus. Graves disease is an immune system disorder that results in the overproduction of thyroid hormones. Addison's disease is caused by a deficiency of the hormones secreted by the adrenal cortex. Pancreas is a composite gland which acts as both exocrine and endocrine gland. The deficiency of insulin, a hormone secreted by the pancreas, causes a complex disorder called diabetes mellitus which is associated with loss of glucose through urine and formation of harmful compounds known as ketone bodies.



60. According to Robert May, the global species diversity is about

- a) 50 million
- b) 7 million
- c) 1.5 million
- d) 20 million

Answer: b

Solution:

Robert May was a theoretical ecologist the established, who field of theoretical ecology and population biology. According to him the global species diversity is about 7 million.

61. The body of the ovule is fused within the funicle at

- a) Nucellus
- b) Chalaza
- c) Hilum
- d) Micropyle

Answer: c

Solution:

The body of the ovule fuses with the funicle in the region called the hilum. The funicle is a stalk through which the ovule is attached to the placenta.

62. Match the following columns and select the correct option –

Column - I

- (a) Gregarious polyphagous pest
- (b) Adult with radial symmetry and larva with bilateral symmetry
- (c) Book lungs
- (d) Bioluminescence

Column - II

- (i) *Asterias*
- (ii) Scorpion
- (iii) *Ctenoplana*
- (iv) Locusta

- | | (a) | (b) | (c) | (d) |
|----|------------|------------|------------|------------|
| a) | (iii) | (ii) | (i) | (iv) |
| b) | (ii) | (i) | (iii) | (iv) |
| c) | (i) | (iii) | (ii) | (iv) |
| d) | (iv) | (i) | (ii) | (iii) |

Answer: d

Solution:

- (a) Locust is a gregarious pest
- (b) In Echinodermata, adult are radially symmetrical and larva are bilaterally symmetrical. For example: *Asterias*.
- (c) In Arthropoda, scorpion respire through book lungs.
- (d) Bioluminescence (the property of a living organism to emit light) is well marked in ctenophores. For example : *Ctenoplana*.

63. Embryological support for evolution was disapproved by:



- a) Charles Darwin
- b) Oparin
- c) Karl Ernst von Baer
- d) Alfred wallace

Answer: c

Solution:

Karl ernst von baer proposed four rules to explain the observed pattern of embryonic development in different species.

64. Match the organism with its use in biotechnology.

- | | |
|--------------------------------------|--|
| (a) <i>Bacillus Thuringiensis</i> | (i) Cloning vector |
| (b) <i>Thermus aquaticus</i> | (ii) Construction of first rDNA Molecule |
| (c) <i>Agrobacterium tumefaciens</i> | (iii) DNA polymerase |
| (d) <i>Salmonella typhimurium</i> | (iv) Cry proteins |

Select the correct option from the following

- | | (a) | (b) | (c) | (d) |
|----|-------|-------|-------|------|
| a) | (iii) | (ii) | (iv) | (i) |
| b) | (iii) | (iv) | (i) | (ii) |
| c) | (ii) | (iv) | (iii) | (i) |
| d) | (iv) | (iii) | (i) | (ii) |

Answer: d

Solution:

- (a) *Bacillus thuringiensis* produces the cry proteins, which are Bt toxins and have insecticidal properties.
- (b) The highly thermostable DNA polymerase from *Thermus aquaticus* is ideal for both manual and automated DNA sequencing because it is fast & highly processive and remain active during the high temperature induced denaturation of double stranded DNA.
- (c) The tumor-inducing (Ti) plasmid of *Agrobacterium tumifaciens* has been modified into a cloning vector. It is used to deliver required genes into plants.
- (d) *Salmonella typhimurium* is the first recombinant DNA that cut the piece of DNA from a plasmid carrying antibiotic resistance gene in the bacterium and linked it to the plasmid of E.coli.

65. Which of the following is not an inhibitory substance governing seed dormancy ?

- a) Phenolic acid
- b) Para - ascorbic acid
- a) Gibberellic acid
- b) Absciscic acid

Answer: c

Solution:

Gibberellins are involved in the natural process of breaking dormancy and other aspects of germination. Gibberellic acid, one of the gibberellins, stimulates the cells of germinating seeds to produce mRNA molecules that code for hydrolytic enzymes.



66. Which of the following statements about inclusion bodies is incorrect ?

- a) They lie free in the cytoplasm
- b) These represent reserve material in cytoplasm.
- c) They are not bound by any membrane.
- d) These are involved in ingestion of food particles.

Answer: d

Solution:

Inclusions bodies are distinct granules that may occupy a substantial part of the cytoplasm. Inclusion, granules are usually reserve material of some sort. And for food particles ingestion the cell membrane helps in this process. So option 4 is wrong

67. The ovary is half inferior in :

- a) Sunflower
- b) Plum
- c) Brinjal
- d) Mustard

Answer: b

Solution:

Plum/peach belongs to the family Rosaceae and it shows half-inferior ovary. So the flowers are perigynous. Sunflower have inferior ovary Plum/peach flowers have a half-inferior ovary. Brinjal (Solanaceae) has a superior ovary. Mustard have superior ovary

68. Match the trophic levels with their correct species examples in grassland ecosystem.

- | | |
|--------------------------|--------------|
| (a) Fourth trophic level | (i) Crow |
| (b) second trophic level | (ii) Vulture |
| (c) First trophic level | (iii) Rabbit |
| (d) Third trophic level | (iv) Grass |

Select the correct option:

- | | (a) | (b) | (c) | (d) |
|----|------------|------------|------------|------------|
| a) | (iv) | (iii) | (ii) | (i) |
| b) | (i) | (ii) | (iii) | (iv) |
| c) | (ii) | (iii) | (iv) | (i) |
| d) | (iii) | (ii) | (i) | (iv) |

Answer: c

Solution:

- | | |
|--------------------------|----------------|
| (a) Fourth trophic level | - (ii) Vulture |
| (b) Second trophic level | -(iii) Rabbit |
| (c) First trophic level | - (iv) Grass |
| (d) Third trophic level | - (i) Crow |

69. The process responsible for facilitating loss of water in liquid form from the tip of grass blades at night and in early morning is :

- a) Imbibition
- b) Plasmolysis
- c) Transpiration
- d) Root Pressure



Answer: d

Solution:

root pressure (positive pressure) can be responsible for pushing up water to small heights in the stem. It is also observable at night and early morning when evaporation is low, and excess water collects in the form of droplets around special openings of veins near the tip of grass blades, and leaves of many herbaceous parts. Such water loss in its liquid phase is known as guttation. Imbibition is the adsorption leading to absorption of water by hydrophilic substances. Plasmolysis is the shrinking of the cell membrane and cytoplasm when a cell is undergoing exosmosis. The loss of water in the form of water vapor from the aerial parts of the plant is called transpiration.

70. Choose the correct pair from the following

- | | | |
|-----------------|---|--|
| a) Nucleases | - | Separate the two strands of DNA |
| b) Exonucleases | - | Make cuts at specific positions within DNA |
| c) Ligases | - | Join the two DNA molecules |
| d) Polymerases | - | Break the DNA into fragments |

Answer: c

Solution:

DNA ligase is an enzyme which can connect two strands of DNA together by forming a bond between the phosphate group of one strand and the deoxyribose group on another. Nucleases cleave the phosphodiester bonds of nucleic acids and may be endo or exo, DNases or RNases, topoisomerases, recombinases, ribozymes, or RNA splicing enzymes. Exonucleases make cuts at the ends of the DNA strand. Polymerases help in the polymerization of a DNA or RNA molecule. DNA polymerases and RNA polymerases are the enzymes that perform this function.

71. The transverse section of a plant shows following anatomical features :

- (a) Large number of scattered vascular bundles surrounded by bundle sheath.
- (b) Large conspicuous parenchymatous ground tissue.
- (c) Vascular bundles conjoint and closed.
- (d) Phloem parenchyma absent.

Identify the category of plant and its part :

- a) Dicotyledonous stem
- b) Dicotyledonous root
- c) Monocotyledonous stem
- d) Monocotyledonous root

Answer: c

Solution:

All anatomical features showing that plant is monocotyledonous stem so option 3 is correct. The monocot stem has vascular bundles near the outside edge of stem. Vascular bundles are scattered in parenchymatous ground tissue. There is no pith region in monocots. The vascular bundles are closed as they do not have cambium in it.



72. Experimental verification of the chromosomal theory of inheritance was done by :

- a) Boveri
- b) Morgan
- c) Mendel
- d) Sutton

Answer: b

Solution:

Thomas Hunt Morgan, who studied fruit flies, provided the first strong confirmation of the chromosome theory. "Morgan discovered a mutation that affected fly eye color. The chromosome theory of inheritance states that genes are found at specific locations on chromosomes, and that the behavior of chromosomes during meiosis can explain Mendel's laws of inheritance.

73. Bt cotton variety that was developed by the introduction of toxin gene of *Bacillus thuringiensis* (Bt) is resistant to :

- a) Plant nematodes
- b) Insect predators
- c) Insect pests
- d) Fungal diseases

Answer: c

Solution:

B. thuringiensis forms protein crystals during a particular phase of their growth. These crystals contain a toxic insecticidal protein. Bt cotton is an insect-resistant transgenic crop designed to combat the bollworm.

74. Select the correct statement.

- a) Insulin acts on pancreatic cells and adipocytes.
- b) Insulin is associated with hyperglycemia.
- c) Glucocorticoids stimulate gluconeogenesis.
- d) Glucagon is associated with hypoglycemia.

Answer: c

Solution:

- (a) Insulin acts mainly on hepatocytes and adipocytes (cells of adipose tissue), and enhances cellular glucose uptake and utilisation.
- (b) Glucagon acts mainly on the liver cells (hepatocytes) and stimulates glycogenolysis resulting in an increased blood sugar (hyperglycemia).
- (c) Glucocorticoids stimulate, gluconeogenesis, lipolysis and proteolysis; and inhibit cellular uptake and utilisation of amino acids.
- (d) Glucagon hormone stimulates the process of gluconeogenesis which also contributes to hyperglycemia.

75. The specific palindromic sequence which is recognized by EcoRI is :

- a) 5'- CTTAAG -3', 3'GAATTC - 5'
- b) 5'- GGATCC - 3', 3'- CCTAGG - 5'

- c) 5'- GAATTC - 3', 3' -CTTAAG - 5'
 d) 5' - GGAACC - 3', 3' - CCTTGG - 5'

Answer: c

Solution:

EcoR I is the restriction enzyme which recognises 6 basepair palindromic sequence and cuts both the strands of DNA at



76. Identify the substances having glycosidic bond and peptide bond, respectively in their structure.

- a) Cellulose, lecithin
 b) Inulin, Insulin
 c) Chitin, cholesterol
 d) Glycerol, trypsin

Answer: b

Solution:

Inulin is a polysaccharide have glycosidic bond, insulin is a polypeptide which is composed of two peptide chains.

77. The product(s) of reaction catalyzed by nitrogenase in root nodules of leguminous plant is / are.

- a) Ammonia and oxygen
 b) Ammonia and hydrogen
 c) Ammonia alone
 d) Nitrate alone

Answer: b

Solution:

Nitrogenase enzyme are responsible for the reduction of N_2 to ammonia the product of reaction catalyzed by nitrogenase in root nodule of leguminous plants are ammonia and hydrogen

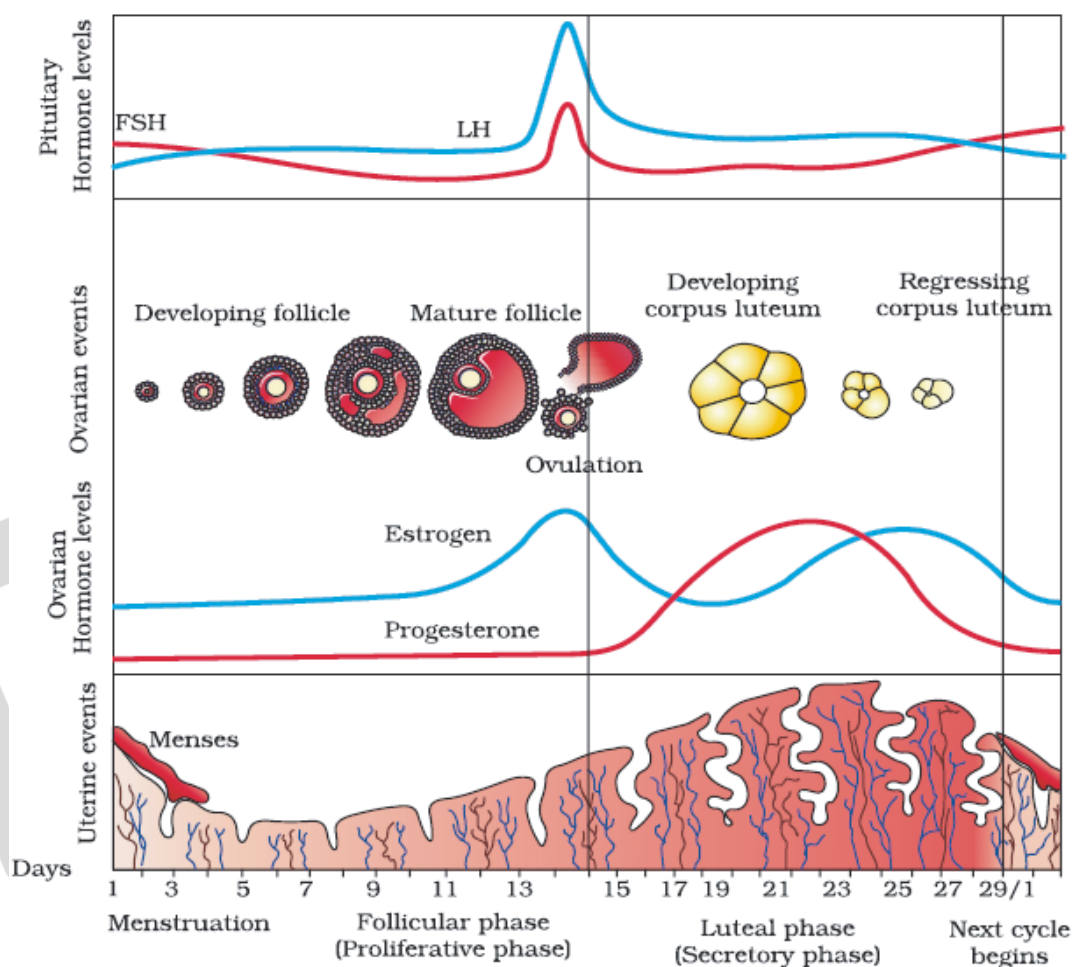
78. Which of the following hormone levels will cause release of ovum (ovulation) from the graffian follicle ?

- a) Low concentration of LH
 b) Low concentration of FSH
 c) High concentration of Estrogen
 d) High concentration of Progesterone

Answer: c

Solution:

LH (Leutenizing hormone) is produced by pituitary gland in the brain. It triggers ovulation & promotes the development of corpus luteum by rupture of graafian follicle. Which high concentration of estrogen is released by moture graafian follicle



79. Which of the following statements are true for the phylum - chordata?

- (a) In urochordata notochord extends from head to tail and it is present throughtout their life.
 - (b) In Vertebrata notochord is present during the embryonic period only.
 - (c) Central nervous system is dorsal and hollow.
 - (d) Chordata is divided into 3 subphyla: Hemichordata, Tunicata and Cephalochordata.
- a) (a) and (b)
 b) (b) and (c)
 c) (d) and (c)
 d) (c) and (a)



Answer: b

Solution:

- (a) In Urochordata, notochord is present only in larval tail, while in Cephalochordata, it extends from head to tail region and is persistent throughout their life.
- (b) Vertebrata possess notochord during the embryonic period. The notochord is replaced by a cartilaginous or bony vertebral column in the adult.
- (c)

S.No.	Chordates	Non-chordates
1.	Notochord present.	Notochord absent.
2.	Central nervous system is dorsal, hollow and single.	Central nervous system is ventral, solid and double.
3.	Pharynx perforated by gill slits.	Gill slits are absent.
4.	Heart is ventral.	Heart is dorsal (if present).
5.	A post-anal part (tail) is present.	Post-anal tail is absent.

- (d) Phylum Chordata is divided into three subphyla: Urochordata or Tunicata, Cephalochordata and Vertebrata.

80. Bilaterally symmetrical and acoelomate animals are exemplified by :

- a) Aschelminthes
- b) Annelida
- c) Ctenophora
- d) Platyhelminthes

Answer: d

Solution:

Flatworms are bilaterally symmetrical, triploblastic and acoelomate animals with organ level of organisation. Aschelminthes is triploblastic, bilaterally symmetrical and pseudocoelomate. Annelida is triploblastic, bilaterally symmetrical and coelomate. Ctenophora is radially symmetrical, diploblastic.

81. Which of the following regions of the globe exhibits highest species diversity ?

- a) Himalayas
- b) Amazon forests
- c) Western Ghats of India
- d) Madagascar

Answer: b

Solution:

Species diversity is the number of different species that are represented in a given community. Amazon forest is the richest ecosystem on earth. It containing millions of species of plants, insects, birds and other forms of life, many still unrecorded by science.



82. Select the correct match

- | | | |
|------------------------|---|--|
| a) Sickle cell anaemia | - | Autosomal recessive trait, chromosome - 11 |
| b) Thalassemia | - | X linked |
| c) Haemophilia | - | Y linked |
| d) Phenylketonuria | - | Autosomal dominant trait |

Answer: a

Solution:

This is an autosome linked recessive trait that can be transmitted from parents to the offspring

when both the partners are carrier for the gene (or heterozygous). The disease is controlled by a single pair of allele, HbA and HbS. on chromosome -11,

The defect is caused by the substitution of Glutamic acid (Glu) by Valine (Val) at the sixth position of the beta globin chain of the haemoglobin molecule. The substitution of amino acid in the globin protein results due to the single base substitution at the sixth codon of the beta globin gene from GAG to GUG. Thalassemia is caused by mutations in the DNA of cells that make hemoglobin — the substance in red blood cells that carries oxygen throughout your body. This is an autosomal inheritance. Hemophilia is caused by a mutation or change, in one of the genes, that provides instructions for making the clotting factor proteins needed to form a blood clot. This change or mutation can prevent the clotting protein from working properly or to be missing altogether. These genes are located on the X chromosome. Phenylketonuria or PKU is inherited in families in an autosomal recessive pattern. A birth defect that causes an amino acid called phenylalanine to build up in the body.

83. Which one of the following is the most abundant protein in the animals ?

- a) Lectin
- b) Insulin
- c) Haemoglobin
- d) Collagen

Answer: d

Solution:

Collagen is the most abundant protein in animal world and Ribulose biphosphate Carboxylase-Oxygenase (RUBISCO) is the most abundant protein in the whole of the biosphere. Insulin is the hormone that helps in controlling the level of sugar(glucose) in the blood. Haemoglobin is the iron bound protein molecule (pigment) in the blood that helps to transport oxygen.

84. Select the option including all sexually transmitted diseases.

- a) AIDS, Malaria, filaria
- b) Cancer, AIDS, syphilis
- c) Gonorrhoea, Syphilis, Genital Herpes
- d) Gonorrhoea, Syphilis, Genital Herpes

Answer: c

Solution:

Diseases or infections which are transmitted through sexual intercourse are collectively called sexually transmitted diseases (STD) or venereal diseases (VD) or reproductive tract



infections (RTI). Gonorrhoea, syphilis, genital herpes, chlamydiasis, genital warts, trichomoniasis, hepatitis-B. Malaria, Filariasis are caused by the transmission of the parasite through the mosquitoes which act as a vector. AIDS is a disease caused by HIV virus and can be transmitted by several methods (through bodily fluids). Cancer is the uncontrollable cell division which leads to the formation of tumors and the causes can be several factors.

such as physical, chemical and biological factors called carcinogens.

85. In water hyacinth and water lily, pollination takes place by :

- a) wind and water
- b) insects and water
- c) insects or wind
- d) water currents only

Answer: c

Solution:

In a majority of aquatic plants such as water hyacinth and water lily, the flowers emerge above the level of water and are pollinated by insects or wind as in most of the land plants. Their stem part which is above the thalamus is not in the water. The pollen grains are in the upper part of thalamus so pollination can't be done by water. That's why it is done by insects and wind.

86. In gel electrophoresis, separated DNA fragments can be visualized with the help of :

- a) acetocarmine in UV radiation
- b) ethidium bromide in infrared radiation
- c) acetocarmine in bright blue light
- d) ethidium bromide in UV radiation

Answer: d

Solution:

The separated DNA fragments can be visualised only after staining the DNA with a compound known as ethidium bromide followed by exposure to UV radiation (you cannot see pure DNA fragments in the visible light and without staining). You can see bright orange coloured bands of DNA in an ethidium bromide stained gel exposed to UV light.

87. Secondary metabolites such as nicotine, strychnine and caffeine are produced by plants for their

- a) defence action
- b) effect on reproduction
- c) nutritive value
- d) growth response

Answer: a

Solution:



Secondary plant metabolites are several chemical compounds produced by the plant cell through metabolic pathways obtained from the primary metabolic pathways. Primary metabolites include small molecules such as sugars, amino acids, tricarboxylic acids, or Krebs cycle intermediates, proteins, nucleic acids and polysaccharides. Many secondary metabolites are toxic or repellant to herbivores and microbes and help defend plants producing them.

Secondary metabolism produces a large number of specialized compounds that do not aid in the growth and development of plants but are required for the plant to survive in its environment.

88. How many true breeding pea plant varieties did mendel select as pairs, which were similar except in one character with contrasting traits ?

- a) 14
- b) 8
- c) 4
- d) 2

Answer: a

Solution:

A true breeding line refers to the plant that has been self pollinated continuously and produced generations that were stable in the inheritance of the character.

Mendel selected 14 true-breeding pea plant varieties, as pairs which were similar except for one character with contrasting traits.

89. Which of the following is not an attribute of a population?

- a) Mortality
- b) Species interaction
- c) Sex ratio
- d) Natality

Answer: b

Solution:

Species interaction refers to direct and indirect interrelationship between different organisms, while on the other hand population attributes include population size, population density, population spacing, and age structure. Mortality is the ratio of deaths in an area to the population of that area; expressed per 1000 per year.

Sex ratio is the ratio of males to females in a population.

Natality is defined as the birth rate which is the total number of live births per 1000 in a given population during a given time period or a year

90. Snow - blindness in Antarctic region is due to :

- a) High reflection of light from snow
- b) Damage of retina caused by infra -red rays



- c) Freezing of fluids in the eye by low temperature
- d) Inflammation of cornea due to high dose of UV - B radiation

Answer: d

Solution:

In human eye, cornea absorbs UV-B radiation, and a high dose of UV-B causes inflammation of cornea, called snow-blindness. It is a painful eye condition caused by overexposure to ultraviolet (UV) light. Cornea sunburn results due to the effects of UV light on the cornea.