

46. Option 4. a-iv, b-i, c-ii, d-iii

Column I (Function)		Column II (Part of Excretory System)	
a.	Ultrafiltration	iv.	Malpighian corpuscle
b.	Concentration of urine	i.	Henle's loop
c.	Transport of urine	ii.	Ureter
d.	Storage of urine	iii.	Urinary bladder

47. Option 3. a-iv, b-i, c-ii, d-iii.

Column I	Column II
a Glycosuria	Presence of glucose in urine
b Gout	Accumulation of uric acid in joints
c Renal calculi	Mass of crystallised salts within the kidney
d Glomerular nephritis	Inflammation in glomeruli

48. Option 2. Epinephrine

Epinephrine(Adrenaline) is the hormone secreted by the adrenal medulla. It is derivative of tyrosine amino acid. Epinephrine is also called as catecholamines.

49. Option 1. Estrogen and Parathyroid hormone

Estrogen play a key role in regulation of bone mass and strength by controlling activity of bone-forming osteoblasts and bone-resorbing osteoclasts. It promotes the activity of osteoblasts and inhibits Osteoclasts which involves normally in bone resorption. Estrogen deficiency, normally as a result of the menopause, is the commonest cause of osteoporosis.

Hyperparathyroidism, which is caused by too much parathyroid hormone, can cause osteoporosis because the excess hormone extracts calcium from your bones. It increases calcium levels in blood.

50. Option 4. Limbic System is incorrectly paired.

Limbic system or limbic lobe is made up of amygdala, hippocampus. Along with the hypothalamus, it is involved in the regulation of sexual behaviour, expression of emotional reactions (eg., excitement, pleasure, rage and fear) and motivation.

51. Option 2. Ligaments attached to the ciliary body.

The choroid layer is thin over the posterior two-thirds of the eye ball, and it becomes thick in the anterior part to form the ciliary body. The ciliary body itself continues forward to form a pigmented and opaque structure called the iris which is the visible coloured portion of the eye. The eye ball contains a transparent crystalline lens which is held in place by ligaments attached to the ciliary body.

52. Option 2. AGGUAUCGCAU

Sequence of coding strand is AGGTATCGCAT. Coding strand is actually not coding for the mRNA. Coding strand is just complimentary to the non-coding strand which actually codes for mRNA. During transcription, the RNA

polymerase binds the non-coding strand and produces mRNA transcript. So the sequence of the mRNA will be the same as the coding strand and instead of the base T, the mRNA will be having base U in that position.

53. Option 1. An enhancer.

Operator, structural genes and promoter are parts of an operon. An enhancer is not a part of an operon as it is present thousands of bases away from transcription start site and it is used to bind with transcription factors to enhance transcription.

54. Option 3. Both sons and daughters.

X-chromosome can be inherited from mother by both son as well as daughter. Thus a woman who has an X-linked condition on one of her X chromosome can be inherited both sons and daughters.

50% of sons have chance to get that X linked condition and 50% sons will be normal.

Likewise, 50% of daughters will be carriers and 50% daughters will be normal.

55. Option 1. a-ii, b-iii, c-i

Column - I	Column - II
a Proliferative Phase	Follicular Phase
b Secretory Phase	Luteal Phase
c Menstruation	Breakdown of endometrial lining

The menstrual flow results due to breakdown of endometrial lining of the uterus and its blood vessels which forms liquid that comes out through vagina.

The menstrual phase is followed by the follicular phase. During this phase, the primary follicles in the ovary grow to become a fully mature Graafian follicle and simultaneously the endometrium of uterus regenerates through proliferation.

After ovulation, it is followed by the luteal phase (secretory phase) during which the remaining parts of the Graafian follicle transform as the corpus luteum. The corpus luteum secretes large amounts of progesterone which is essential for maintenance of the endometrium.

56. Option 4. Saltation.

In the first decade of twentieth century, Hugo deVries based on his work on evening primrose brought forth the idea of mutations - large difference arising suddenly in a population. He believed that it is mutation which causes evolution and not the minor variations (heritable) that Darwin talked about. Mutations are random and directionless while Darwinian variations are small and directional. Evolution for Darwin was gradual while deVries believed mutation caused speciation and hence called it saltation (single step large mutation).

57. Option 3. Eye of Octopus, bat and man.

Analogous structures are a result of convergent evolution, the different structures evolving for the same function and hence they are having similarity. The eye of the

octopus and of mammals such as bat and man or the flippers of Penguins and Dolphins are all best examples of convergent evolution.

All the other three options are correct divergent evolution.

58. Option 2. Homology.

Homologous organs have similar structure and perform different functions.

Eg. Forelimbs of man, cheetah, whale and bat are having similar bone structures in the forelimbs and perform different functions is called homology. In these animals, the same structure developed along different directions due to adaptations to different needs. This is divergent evolution and these structures are homologous. Homology indicates common ancestry.

59. Option 1. Alzheimer's disease.

Psoriasis, Rheumatoid arthritis, Vitiligo are autoimmune diseases whereas Alzheimer's disease is not.

Alzheimer's disease is a chronic neurodegenerative disease caused by the accumulation of extra cellular amyloid proteins.

60. Option 4. **a, b and c. (Dominance, Co-dominance, Multiple allele)**

Gene type	Blood group	Reason
$I^A i$	A	I^A is dominant over i - Dominance
$I^B i$	B	I^B is dominant over i - Dominance
$I^A I^B$	AB	I^A & I^B are expressing equally - Co-dominance
I^A, I^B & i	-	Multiple Alleles

61. Option 1. Vitamin B12.

Micro-organisms such as Lactobacillus and others commonly called lactic acid bacteria (LAB) grow in milk and convert it to curd. During growth, the LAB produce acids that coagulate and partially digest the milk proteins. A small amount of curd added to the fresh milk as inoculum or starter contain millions of LAB, which at suitable temperatures multiply, thus converting milk to curd, which also improves its nutritional quality by increasing vitamin B12.

62. Option 2. Elephantiasis.

Wuchereria bancrofti and wuchereria malayi, the filarial worms cause a slowly developing chronic inflammation of the organs in which they live for many years, usually the lymphatic vessels of the lower limbs and the disease is called elephantiasis / filariasis.

63. Option 4. Sacred grooves.

Sacred grooves are a part of in situ conservation. Sacred groves can be defined as undisturbed patches of vegetation on the outskirts of villages and towns or in the plains or a part of forested areas that are dedicated to local folk deities or ancestral spirits and they are given total protection and venerated(respected). They are fine examples of in-situ conservation.

Sacred groves are found in Khasi and Jaintia Hills in Meghalaya, Aravalli Hills of Rajasthan, Western Ghat regions of Karnataka, etc.,

64. Option 1. a-iii, b-iv, c-i, d-ii.

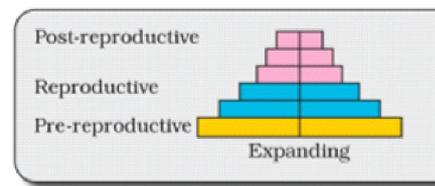
Eutrophication is the natural aging of a lake by biological enrichment of its water.

In a sanitary landfill, wastes are dumped in a depression or trench after compaction, and covered with dirt everyday. In human eye, cornea absorbs UV-B radiation, and a high dose of UV-B causes inflammation of cornea, called snow-blindness cataract, etc. Such exposure may permanently damage the cornea.

Trees are axed for timber, firewood, cattle ranching and for several other purposes. Slash and burn agriculture, commonly called as Jhum cultivation in the north-eastern states of India, has also contributed to deforestation.

65. Option 2.

For growing / expanding population of a country, the pre-reproductive individuals are more than reproductive individuals.



66. Option 4. Latex.

Opioids are the drugs, which bind to specific opioid receptors present in our central nervous system and gastrointestinal tract. Heroin, commonly called smack is chemically diacetylmorphine which is a white, odourless, bitter crystalline compound. This is obtained by acetylation of morphine, which is extracted from the latex of the poppy plant - Papaver somniferum. Generally taken by snorting and injection, heroin is a depressant and slows down body functions.

67. Option 3. Amensalism.

Amensalism is where one organism is neutral and other is affected. Antibiotic produced by one organism (neutral) harms / kills the other organism.

68. Option 2.

Saheli - the new oral contraceptive for the females contains a non-steroidal preparation. It is a 'once a week' pill with very few side effects and high contraceptive value. The contraceptive 'SAHELII' blocks estrogen receptors in the uterus, preventing eggs from getting implanted.

69. Option 2. Ectoderm and mesoderm.

The amnion is an extraembryonic membrane that surrounds an amniote embryo. The membrane is not part of the embryo itself, but derives from tissues that emerged from the embryo. The amnion is made from two germ layers: the mesoderm and the ectoderm. The ectoderm forms the inner portion of the amnion, and a thin mesoderm layer connects the amnion to the another extraembryonic membrane chorion.

70. Option 3.

In spermiogenesis spermatozoa are formed, while in

spermiation spermatozoa are released from sertoli cells into the cavity of seminiferous tubules.

71. Option 1.

The placenta is connected to the embryo through an umbilical cord which helps in the transport of substances to and from the embryo. Placenta acts as an endocrine tissue and produces several hormones like human chorionic gonadotropin (hCG), human placental lactogen (hPL), estrogens, progestogens, etc.

72. Option 2. a-iii, b-i, c-ii.

Column I	Column II
a Tricuspid valve	iii. Between right atrium and right ventricle
b Bicuspid valve	i. Between left atrium and left ventricle
c Semilunar valve	ii. Between right ventricle and pulmonary artery

73. Option 4. a-iii, b-i, c-iv, d-ii

Column I	Column II
a Tidal volume	iii. 500 - 550 mL
b Inspiratory Reserve volume	i. 2500 - 3000 mL
c Expiratory Reserve volume	iv. 1000 - 1100 mL
d Residual volume	ii. 1100 - 1200 mL

74. Option 2.

Asthma is a difficulty in breathing causing wheezing due to inflammation of bronchi and bronchioles. Emphysema is a chronic disorder in which alveolar walls are damaged due to which respiratory surface is decreased. One of the major causes of this is cigarette smoking.

75. Option 3. a-ii, b-iii, c-i.

Column-I	Column-II
a Fibrinogen	ii Blood clotting
b Globulin	iii Defence mechanism
c Albumin	i Osmotic balance

Fibrinogens are needed for clotting or coagulation of blood. Globulins primarily are involved in defense mechanisms of the body and the albumins help in osmotic balance.

76. Option 4. Silicosis.

Silicosis is an occupational respiratory disorder. Anthracis is a bacterial disease caused by Bacillus anthracis. Botulism is bacterial disease caused by Clostridium botulinum. Emphysema is caused by cigarette smoking.

77. Option 2

Calcium ions are important in skeletal muscle contraction, it is released from sarcolemma into sarcoplasm. Calcium ion binds to troponin to remove the masking of active sites on action for myosin.

78. Option 3. Parietal cells.

Parietal / oxyntic cells which secretes HCl and intrinsic

factor helps in the absorption of vitamin B12, which helps in maturation of RBCs thus helps in erythropoiesis indirectly.

79. Option 4. Chelone.

Chelone (turtle) belongs to Class Reptilia is a poikilotherm. Macropus - Kangaroo, Camelus - Camel, Psittacula - Parrot are homeotherms.

80. Option 1. Aves.

The digestive tract of birds has additional chambers, the Crop and Gizzard. Crop is temporary storage part and gizzard is used to grind the food.

81. Option 3. Having two types of nuclei.

Paramoecium [Ciliates] has macronucleus to control the activity of cell and micronucleus to control reproduction.

82. Option 2. Earthworm.

The development of earthworm is direct, i.e. there is no larva formed. Hence, no metamorphosis. The young ones resemble the adults and they are the miniatures of adults.

83. Option 4. Diatoms.

Diatom are major photosynthetic protists and so called producers of ocean

84. Option 4. Presence of caudal styles.

Male cockroaches contain dorsal anus, ventral male genital pore and gonapophysis. Males bear a pair of short, threadlike anal styles (caudal style) which are absent in females.

85. Option 3. Free ribosomes and RER.

The cell body contains cytoplasm with typical cell organelles and certain granular bodies called Nissl's granules. Dendrites also contain Nissl's granules. Nissl's bodies are mainly composed of free ribosomes and RER.

86. Option 3. Phospholipid synthesis.

The smooth endoplasmic reticulum is the major site for synthesis of lipid. In animal cells lipid-like steroidal hormones are synthesised in SER. Phospholipids are not synthesised in RER. All the other events can happen in RER.

87. Option 3.

Actually, the Oxidative phosphorylation / ETS takes place on inner mitochondrial membrane.

88. Option 4.

Human dentition is described as follows:
Thecodont - each tooth is embedded in a socket of jaw bone.
Diphyodont - human being forms two sets of teeth during their life, a set of temporary milk or deciduous teeth replaced by a set of permanent or adult teeth.
Heterodont - four different types of teeth namely: incisors, canine, premolars and molars.

89. Option 2. Polysome.

Many ribosomes on same mRNA is called polyribosome / Polysome.

90. Option 3.
Polytene chromosomes are interphase chromosome found in salivary glands of diptera insect.
They are not present in Oocytes of amphibians.
91. Option 2. Halophytes
Pneumatophores are breathing roots found in mangroves which grow in saline areas (Halophytes)
92. Option 4. Adventitious root.
Potato is modified stem but sweet potato is tuberous adventitious root.
93. Option 2.
Ovules are not enclosed by ovary wall in gymnosperms and they are naked.
94. Option 3. Endodermis.
Endodermis have Casparian strip made up of suberin. They don't allow the transport of water, so the water has to enter from apoplast pathway into the symplast pathway to cross the endodermis.
95. Option 4. Vascular cambium.
Secondary xylem & phloem are produced by vascular cambium.
Vascular cambium is the meristematic layer that is responsible for cutting off vascular tissues - xylem and phloem - is called vascular cambium. In the young stem it is present in patches as a single layer between the xylem and phloem. Later it forms a complete ring. The cambial ring becomes active and begins to cut off new cells, both towards the inner and the outer sides. The cells cut off towards pith, mature into secondary xylem and the cells cut off towards periphery mature into secondary phloem.
96. Option 1.
Pseudopodia are found in Sarcodines (Amoeba).
Pseudopodia is not present in Sporozoans.
97. Option 2. Grasses.
Grasses are monocot, they do not have cambium and so no secondary growth is present.
98. Option 2.
Starch synthesis in pea is an example of co-dominance. It is not an example of multiple alleles.
Starch synthesis in pea seeds is controlled by one gene. It has two alleles (B and b). Starch is synthesised effectively by BB homozygotes and therefore, large starch grains are produced. In contrast, bb homozygotes have lesser efficiency in starch synthesis and produce smaller starch grains. After maturation of the seeds, BB seeds are round and the bb seeds are wrinkled. Heterozygotes produce round seeds, and so B seems to be the dominant allele. But, the starch grains produced are of intermediate size in Bb seeds. So if starch grain size is considered as the phenotype, then from this angle, the alleles show incomplete dominance.
99. Option 4.
Punnett square was developed by British scientist. Reginald Punnett.
100. Option 4. Bacterium.
Semiconservative replication of DNA was first shown in E. coli bacteria.
Matthew Meselson and Franklin Stahl performed experiment in 1958.
101. Option 3.
Jacob and Monod - Discovered Lac-Operon in E. coli.
102. Option 4. Mitotic divisions.
Offsets is a type of vegetative propagation produced by mitotic division. The formation of offset structures do not involve two parents, the process involved is asexual.
103. Option 2. Bamboo species
Bamboo species flowers only once in its life-time. Generally they flower after 50-100 years, produce large number of fruits and die.
104. Option 3. Sporopollenin.
Sporopollenin is the toughest polymer of carotenoid which prevent degradation of pollen grain as fossils.
The hard outer layer called the exine is made up of sporopollenin which is one of the most resistant organic material known. It can withstand high temperatures and strong acids and alkali. No enzyme that degrades sporopollenin is so far known. Pollen grain exine has prominent apertures called germ pores where sporopollenin is absent. Pollen grains are wellpreserved as fossils because of the presence of sporopollenin.
105. Option 1. 16th September.
16th September is celebrated as world Ozone Day.
106. Option 4. Birth rate.
Natality refers to birth rate in a given area.
107. Option 2. Inverted pyramid of biomass.
When the primary producer is low and Primary consumer and secondary consumer are high, this type of ecosystem represents Inverted pyramid of biomass.
108. Option 3. O₃
Ozone is a secondary pollutant, whereas others are primary pollutants.
109. Option 3.
Niche is the functional role played by the organism where it lives.
Tropical environments, are less seasonal, relatively more constant and predictable. Such constant environments promote niche specialisation and lead to a greater species diversity.
110. Option 4. Cl.
Free Cl atom attacks the Ozone molecule and breaks it.
 $O_3 + Cl \rightarrow ClO + O_2$

111. Option 3.
The correct order in PCR are
a) Denaturation b) Annealing c) Extension
112. Option 3.
GEAC is the organisation responsible for assessing the safety of introducing genetically modified organisms for public use.
113. Option 2. Retrovirus.
Retrovirus is commonly used as a vector for introducing a DNA fragment in human lymphocytes.
114. Option 4. Biopiracy
Use of bioresources by multinational companies and organisations without authorisation from the concerned country and its people is called Biopiracy.
115. Option 3. Basmati.
A new variety of Basmati rice was patented by a foreign company in Texas called Texmati, though such varieties have been present in India for a long time.
116. Option 2.
Ribozyme is an enzyme made up of RNA (Ribonucleic acid).
117. Option 1. Potassium
Potassium is responsible for maintaining turgidity in cells. Influx of K^+ open the stomata and efflux of K^+ close the stomata.
118. Option 4. Yucca.
Tageticula moth cannot complete its life cycle without yucca plant and yucca plant has no other pollinator.
119. Option 1. -196°C .
Pollen grains can be stored for several years in liquid nitrogen having a temperature of -196°C , this is called cryo-preservation.
120. Option 3.
Double fertilization occurs in Angiosperm in which 1st male gamete fuses with egg which is known as syngamy. Whereas 2nd male gamete fuses with secondary nucleus to form PEN and the process is known as triple fusion or double fertilization.
121. Option 2.
Green sulphur bacteria releases Sulphur as the by product during photosynthesis.
122. Option 4.
 NAD^+ functions as an electron carrier in ETS.
123. Option 2.
Iron is absorbed by plants in ferric ion form.
124. Option 4.
The function of Golgi complex is to secrete the proteins out of cell through secretory vesicles.
125. Option 3.
The two functional groups characteristic of sugar are carbonyl and hydroxyl group.
126. Option 2. Saccharomyces
Saccharomyces (yeast) is a unicellular fungus (Eukaryotic organism).
127. Option 1. O_2 concentration.
 O_2 concentration doesn't affect stomatal movement.
128. Option 4. NADH
Light reaction produces ATP, NADPH and O_2 , where as NADH is not produce in light reaction.
129. Option 3.
Nucleolus is a site for active ribosomal RNA synthesis.
130. Option 4. Diplotene.
Zygotene = Synapsis
Pachytene = Crossing-over
Diplotene = Separation of homologous chromosomes
Diakinesis = Terminalisation
131. Option 2. Dumb bell shaped.
Monocot such as grasses, bamboo etc has dumb-bell shape guard cell whereas dicot has kidney shape guard cell.
132. Option 3. a-iii, b-iv, c-i, d-ii.
- | | Column I | Column II |
|---|-----------|---|
| a | Herbarium | Is a place where dried and pressed plant specimens mounted on sheets are kept. |
| b | Key | A booklet containing a list of characters and their alternates which are helpful in identification of various taxa. |
| c | Museum | It is a place having a collection of preserved plants and animals. |
| d | Catalogue | ii A list that enumerates methodically all the species found in an area with brief description aiding identification. |
133. Option 2.
Polysiphonia are red algae, in which are non-motile eggs are fertilized by non-motile sperm. Both male and female gametes are non motile.
134. Option 1. Agaricus.
Agaricus is basidiomycetes in which spores are formed exogenously.
135. Option 3. Pinus.
Winged pollen grains are found in pine tree.