

SAMPLE PAPER

2019 NEET

BIOLOGY

SET-2

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ANSWER AND SOLUTION

1. (c)

Statement I and IV are correct. The correct from of II and III are as follows:

(II) Photoperiod does affect the reproduction in plants.

(III) Binomial nomenclature was given by Carolus Linnaeus.

2. (b)

Eugenics refers to improvement of human race by modifying fertility or employing the hereditary principles.

3. (a)

Disease	Causing Organism
Leaf blight of rice	Xanthomonas oryzae
Red strip of sugar	Pseudomonas cane rubrilineans
Fire blight of apple	Erwinia amylovora
Early blight of potato	Alternaria solani

4. (a)

Bacteria reproduces asexually by transverse binary fission, conidia, budding cyst and sporulation. No true sexual reproduction (involving formation of gametes, their fusion and meiosis) is known to occur in bacteria. However, in bacteria.



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However, in bacteria the transfer of genetic material from donor to recipient cell to bring genetic recombinations/variations is reported that occurs not through gametes/sex cells, but by other methods like conjugation, transduction and transformation. It does not result in any multiplication of cells.

5. (d)

Entamoeba coli is the common parasitic genera of phylum – Protozoa. It harbours the upper part of large intestine (colon) and very often in the liver, brain and testes and causes constipation.

6. (a)

Trypanosoma is an obligate parasite, it is digenetic polymorphic (*Trypanosoma* is adult form in human whereas, crithidial and leptomonal are development forms in tse-tse fly).

7. (a)

Strains of *Saccharomyces cerevisiae* are extensively used for leavening of bread. During fermentation, the yeasts produce alcohol and CO₂ which leaves the bread porous.

8. (b)

Puccinia graminis tritici (fungus) causes black rust of wheat. It forms Urediospores (uredia) and teleutospores (telia) on wheat leaves.

9. (d)

Peat is mainly an accumulation of partially decayed vegetation or organic matter and *Sphagnum* accumulations can store water, since both living and dead plants can hold large quantities of water and living matter (like meat) hence, it is responsible for peat formation.

10. (b)

The tendency towards seed formation is called seed habit. It was developed in fossil gymnosperm of group Cycadofilicales (pteridosperms), i.e. seed ferns, e.g. *Lyginopteris* which bears characters of cycads and ferns both. Seed habit is shown by few pteridophytes like *Selaginella*, *Marselia*, *Isoetes*, etc. which exhibit heterospory.

11. (a)

Option (a) is incorrect because molluscs are bilaterally symmetrical, triploblastic, coelomate, soft bodies animals. Their soft body is covered by calcareous shell and is unsegmented with a distinct head, muscular foot and visceral hump.
e.g. *Pila* (apple snail), *Sepia* (cuttle fish), *Pinctada* (pearl oyster), etc.

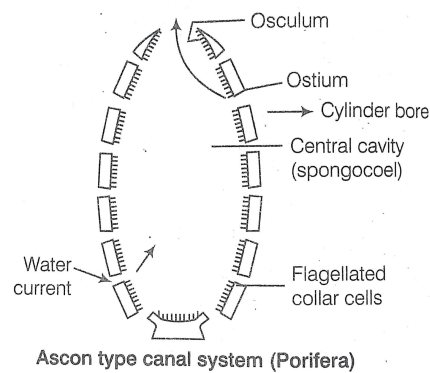


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12. (a)

The simplest type of canal system in Porifera is ascon type.



13. (b)

Bird vertebrae are heterocoelous or saddle shaped.

14. (d)

Germination of seeds inside the fruit which is still attached to the parent tree is called vivipary. It is a special type of seed germination occurring in plants growing in sea coasts and salt lakes, (e.g. man-groves). These seeds lack any dormant period.

15. (d)

Tomato and tobacco are the members of family-Solanaceae, with floral formula

$\text{Br} \oplus \overset{\text{♂}}{\text{K}}_{(5)} \text{C}_{(5)} \text{A}_5 \text{G}_{(2)}$.

16. (c)

Sieve tubes are food conducting elements of phloem. They possess nucleus in the young stage but disappears in mature ones. The central part of sieve tube has an organised and differentiated cellular structure with a network of cytoplasmic strands, through the peripheral cytoplasm is thin and tonoplast is absent.

17. (a)

Sclereids are broad sclerenchyma cells which may be oval, spherical cylindrical, or stellate in structure. Sclereids develop from sclerenchyma cells, occur singly or in groups to provide stiffness. These may be of different types, such as brachysclereids (stone cells) found in grit of pear, apple, macrosclereids (columnar), e.g. legume seeds, astrosclereids (star shaped), eg. tea leaves, etc.

18. (c)

Sieve tubes function as the food conducting elements of phloem which are elongated tubular channels formed by end to end union of numerous cells. Sieve tubes have broader lumen, thin walls. Septa present between sieve tube cells are called sieve plates, they possess a number of perforations called sieve pores or sieve pits.



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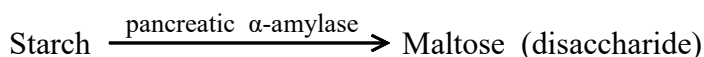
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19. (d)
The cells of epithelial tissues rest upon a thin layer composed of protein bound mucopolysaccharides and glycoproteins, both secreted by epithelial cells (hence, product of epithelial cell) along with a layer of collagen fibres of the underlying connective tissue.
20. (a)
Smooth muscle fibres are spindle-shaped, thick in the middle and thin at either ends, uninucleated, no sarcolemma, contraction is slow, involuntary under the control of autonomous nervous system. These muscles are also known as visceral muscles, non-striated, non-skeletal or involuntary muscles.
21. (b)
Statement (b) is incorrect because flip-flop or transmembrane movement is due to the migration of lipid molecules from one lipid monolayer to other monolayer of lipid bilayer.
22. (c)
Plasma membrane is living, quasifluid, trilaminar membrane, usually consists of proteins (44-76%), lipids (20-53%), water (20%) and carbohydrates (1-8%).
23. (b)
Bloor (1943) first time used the term '**lipid**'. These are the compounds of C, H, O but the ratio of H and O is more than 2 : 1 that is the ratio of oxygen is lesser as compared to carbohydrates. Lipids are insoluble in water but soluble in non-polar solvents such as benzene, chloroform, etc. Common lipid occurring in a cell is phospholipid. It contains hydrophilic (polar) head and a hydrophobic (non-polar tail).
24. (b)
A competitive inhibitor competes with substrate molecular for occupying the active site of an enzyme. These inhibitors have structural resemblance with substrate molecules due to which they easily bind with active site of an enzyme and form an enzyme-inhibitor complex.
- $$\begin{array}{ccccccc} \text{E} & + & \text{I} & \rightarrow & \text{EI Complex} \\ \text{(enzyme)} & & \text{(Inhibitor)} & & \end{array}$$
25. (a)
Deoxyribo Nucleic Acid (DNA) is helically coiled macromolecule, made up of two antiparallel polydeoxyribonucleotide chains held together by hydrogen bonds.
26. (c)
In metaphase of mitosis, spindle fibres attach to kinetochore of chromosomes. Chromosomes are moved to spindle equator and get aligned along metaphasic plate through spindle fibres to both pole.

27. (d)
Polytene chromosomes/salivary gland chromosomes was reported by Balbiani (1881) from cells of salivary glands of *Chironomus* larva (insect of Diptera group). The polytene chromosomes become giant due to the endoduplication, i.e. repeated replication of chromatids without their separation and cytokinesis. In fact, each polytene chromosome is formed by pairing of two somatic homologous chromosomes which undergo repeated endomitosis to form numerous strands attached to a common large chromocentre.
28. (c)
guttation refers to the exudation of droplets of liquid water from the margins and tip of leaves through a group of cells called hydathodes. Guttation depends on root pressure.
29. (d)
Water in land plants is mainly absorbed through the roots, especially at the tips in the region of root hairs. Therefore, root system in a plant is well developed, for increasing absorption of water.
30. (a)
The four most common elements in living organisms are H, C, O, N. These are also called as framework element.
31. (c)
Nitrogen is the constituent of amino acids, proteins, nucleic acids, nucleotides, coenzymes, hexosamines etc. Deficiency of nitrogen rapidly inhibits the plant growth and yellowing of the leaves (chlorosis) magnesium has the specific role in the activation of enzymes, taking part in photosynthesis and respiration. It also forms a part of the ring structure of the chlorophyll molecule. Deficiency of Mg causes chlorosis, i.e. yellowing of leaves.
Thus a plant growing in magnesium-deficient soil would show chlorosis in spite of being sprayed with urea (nitrogen).
32. (c)
Cytochromes (Keilin; 1925) are the electron transport intermediates containing heme (or related prosthetic groups) in which the iron undergoes valency changes during electron transfer and produces energy (ATP) in both photosynthesis and respiration.
33. (b)
Photorespiration is the oxidation of photosynthetic intermediate without production of CO_2 , ATP and NADH_2 . The substrate for photorespiration is a 2-carbon compound glycolic acid (glycolate).



34. (a)
Photosynthetic pigments are those pigments which occur on photosynthetic thylakoids of chloroplasts and absorb light energy for the purpose of photosynthesis. These are mainly of two types – chlorophylls and carotenoids.
35. (d)
Succinate dehydrogenase enzyme is present on inner membrane of mitochondria and catalyses the oxidation of succinate to fumarate.
36. (c)
A total of 38 molecules of ATP are produced during aerobic respiration of one molecule of glucose
Summary of ATP Synthesis
8 ATP from glycolysis.
6 ATP from acetyl Co-A
24 ATP from krebs' cycle
Total = 38
37. (b)
Continuous exposure to red light causes (a) conversion of P_r - P_{fr} which is rapidly destroyed, (b) inhibition of synthesis of P_r . Thus, total amount of phytochrome is decreased.
38. (c)
Leaves of monocots are characterised as isobilateral (equally green on both the surfaces), amphistomatic (stomata on both surface), dumb bell-shaped guard cells. The upper epidermis possesses groups of larger sized thin walled vacuolate cells called bulliform or motor cells. Bulliform cells help in rolling of leaves during water stress or drought.
39. (b)
In small intestine food meets with the pancreatic juice containing α -amylase, which converts starch into maltose, isomaltose and α -dextrins in small intestine. in small intestine.



The pancreatic juice also contains proenzymes trypsinogen, chymotrypsinogen and procarboxypeptidase. The trypsinogen is converted to active trypsin in intestine by enterokinase of intestinal juice. The trypsin converts proteins into large peptides and the large peptides are converted to dipeptide and amino acids by carboxypeptidase.



40. (c)
The parietal cells (oxyntic cells) are large and most numerous on the side walls of gastric glands. These secrete hydrochloric acid and castle intrinsic factor. The peptic cells (zymogen) of gastric glands secrete gastric digestive enzymes as proenzymes-pepsinogen and prorennin and small amount of gastric amylase and gastric lipase. The hydrochloric acid maintains a strongly acidic pH of about 1.5-2.5 in the stomach. HCl converts pepsinogen and prorennin to pepsin and rennin respectively.
41. (d)
Main part of hyoid apparatus is a broad, flat and squarish plate, also called basilingual plate, because it provides attachment and support to the tongue.
42. (a)
To maintain electrostatic neutrality of plasma, many chloride ions diffuse from plasma into RBCs and bicarbonate ions pass out.
The chloride content of RBCs increases when oxygenated blood becomes deoxygenated. This is termed as chloride shift or Hamburger shift.
43. (c)
At high altitude there is low O₂ concentration, so RBCs increase in number, i.e. O₂ supply can be maintained to organs.
44. (b)
Antigens (Ag) are foreign particles present on the surface of cell and when introduced in the blood they initiate a specific immune response against themselves.
45. (a)
In blood of 'O' group, no antigens are present on red blood cells, but both anti-a and anti-b antibodies are present in plasma.
Blood group A has antigen 'A' and antibody 'b'
Blood group B has antigen 'B' and antibody 'a'.
Blood group AB has antigens 'A' and 'B' but not antibody in plasma.
46. (c)
In annelids like Nereis, earthworm, leech, etc., the tubular coiled structures called nephridia are excretory organs. In phylum-Arthropoda, insects centipedes, milipedes and arachnides possess Malpighian tubules as their principal excretory organ. Analogous organs have almost similar appearance and perform the same function but develop in totally different groups and are totally different in their basic structure and developmental origin, e.g. wings of butterfly, birds, bats.
The homologous organs have common origin, perform different type of functions and have different appearance, e.g. thorns of *Bougainvillea* and tendrils of *Cucurbita*.
Vestigial organs are useless remnants, which might have been large and functional in the ancestors e.g. nictitating membrane, vermiform appendix, etc.



47. (b)
Ammonia is the main nitrogenous waste. It is soluble in water and highly toxic. A large amount of water is required for its excretion. Tadpole is aquatic and lives in plenty of water so, nitrogenous wastes in tadpole are eliminated as ammonia. Frog being amphibious, excretes its nitrogenous wastes as urea.
48. (d)
Pterygoid is a small bone articulated with the palatine. In human it becomes the pterygoid processes of the sphenoid bone.
49. (a)
The kinesin, myosin and dynein proteins of skeletal muscle involve ATPase activity. This activity causes the contraction of skeletal muscles, propelling action of cilia and flagella and the intracellular transport of organelles.
50. (d)
Peristalsis of the intestine is related with autonomous nervous system whereas, knee-jerk response, pupillary reflex and swallowing of food are related to reflex action.
51. (c)
Sympathetic nerves arise from thoracic and lumbar spinal segments.
52. (b)
Cornea is non-vascular, i.e. no blood supply so, its transplantation is outstandingly successful.
53. (d)
The endocrine part of testis is formed of groups of cells, called interstitial cells or **Leydig's cells**, scattered in connective tissue between the sperm producing seminiferous tubules of the testis.
These cells are stimulated to produce male sex hormones, called androgens by ICSH of anterior pituitary. Testosterone is main androgen and it is a steroid hormone.
54. (a)
Epinephrine is synthesised from amino acid tyrosine. While oestrogen and progesterone are modified steroids and prostaglandins are basically fat.
55. (a)
The correctly matched pair is onion-bulb. Onion is a simple tunicated layered bulb while ginger is a straggling rhizome having uniparous cyme branching with sympodial axis. While yeast reproduces by budding and *Chlamydomonas* by zoospores.



56. (c)

The sexual reproduction brings about variation through genetic recombination. First of all genetic recombination occurs in non-homologous chromosomes during crossing over of pachytene stage is meiotic cell division.

Secondly, the random union of gametes also contributes in forming combinations of characters. Other options (a), (b) and (d) do not contribute in the formation of progenies with new variations.

57. (c)

Embryo sac occurs in ovule. Megaspore mother cell is developed inside the nucellus of the ovule and by a meiotic division it forms four megaspores, out of which three degenerate. The functional megaspore divides mitotically to form embryo sac.

58. (a)

A plant and its pollinator have a mutualistic relationship. The plant uses its pollinator to ensure cross-pollination while pollinator uses the plant as food.

59. (d)

Pollination through air is known as anemophily e.g. coconut.

In *Salvia*, the pollination is taken place by insects (entomophily).

In *Vallisneria*, the pollination occurs through water (hydrophily).

In bottle brush (*Callistemon*) the pollination occurs through birds (ornithophily).

60. (d)

The testes in humans are situated outside the abdominal cavity in scrotal sacs. This is because the temperature of scrotal sacs is 2-2.5°C which is less than internal body temperature.

61. (b)

Penetration of human sperm is a chemical mechanism. In this, acrosome of sperm undergoes acrosomal reaction and release certain sperm lysins, which dissolve the egg envelope locally and make the path for the penetration of sperm. Sperm lysine are acidic proteins.

These sperm lysins contain a lytic enzyme hyaluronidase (that dissolves the hyaluronic acid polymers in the intercellular spaces, which holds the granulosa cells of corona radiata together) corona penetrating enzyme and acrosin.

62. (b)

The Fallopian tubes, uterus and vagina constitute the female accessory ducts. Each Fallopian tube extends from the periphery of each ovary to the uterus. The part closer to the ovary is funnel-shaped infundibulum, which help in collection of the ovum after ovulation.



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63. (d)

Though India is very crowded and over populated country but still human population can be regulated by following the National programme of family planning.

64. (a)

Hormone releasing IUD (Intra Uterine Devices) is LNG-20. The IUD's are ideal contraceptive methods used by females to prevent pregnancy. The hormone releasing IUD's make the uterus unsuitable for implantation and the cervix hostile to the sperms. Hence option (a) is correct.

Concept Enhancer Lippes loop is a non-medicated IUD whereas Cu-7 and Multiload-375 are copper releasing IUDs.

65. (c)

Haemophilia, a hereditary (recessive X-linked) disease is caused due to fault in genes controlling the factor VIII and IX, located on X-chromosome, other sex chromosome carries no genes for blood clotting, so the condition is usually seen only in males where the condition is usually seen only in males where only one faulty chromosome is needed.

While a female with one faulty X-chromosome will be carrier. So, in females two faulty X-chromosomes are needed to cause the disease.

66. (d)

In the given pedigree chart, squares are representing males and circles females. In F_1 -generation, 1-male and 1-female are diseased and in next generation only male is diseased. This shows the inheritance of a recessive sex-linked disease like haemophilia.

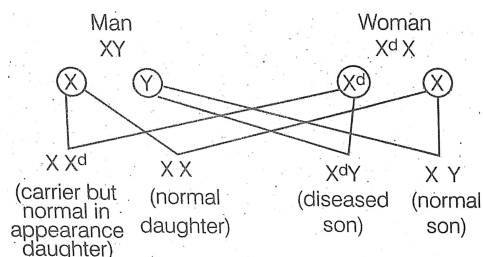
67. (d)

In given problem, disease is the result of sex-linked recessive genes. As neither man nor woman shows signs of disease it means woman would be carrier for disease. In their children none of the daughters suffer from disease, while the sons were suffered, it means daughters are also carrier (i.e. X-linked recessive).

Suppose, genotype of man = $X Y$

Genotype of woman = $X^d X$

(d-disease causing gene)



For each delivery the probability for each combination is 25%. So, among seven children 2 normal daughter, 3 diseased sons and 2 normal sons are possible.



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68. (a)
DNA fingerprinting refers to molecular analysis of DNA samples. Alec Jeffreys (1985, 86) discovered this technique for the first time.
69. (c)
Ribozymes are catalytically active RNA molecules discovered in 1980's. These are self-splicing introns indicating their possible role as intermediates in the evolution of biological systems from abiotic substances.
70. (c)
Nucleotide is the basic unit of nucleic acids (DNA and RNA). It is composed of nucleoside (nitrogenous base + pentose sugar) and phosphate group.
71. (b)
Though living organisms tend to multiply geometrically, the number of individuals of a species tend to remain constant over a long period of time. Out of heterogeneous population (due to the variation) best adapted individuals are selected by nature.
72. (c)
Vestigial organs are non-functional, degenerate and rudimentary organs that correspond to fully developed and functional organs of related organisms, e.g. nictitating membranes, muscles of ear pinna and third molar (wisdom tooth), mammary gland in males, coccyx (caudal vertebrae), vermiform appendix etc.
73. (b)
Cancer may be curable in next two decades. The completion of the human genome is causing profound changes in thinking and direction of biomedical research. Cancer is caused by malfunctioning of genes, either through activation of cancer causing oncogenes (proto-oncogenes) or through inactivation of tumor suppressor genes. By comparing the active genes in the tumor to that of normal cells, the genes causing the cancer can be determined. Side by side there is a huge progress in the field of genetic engineering and biotechnology. All these aspects give us hope that cancer may be curable in next two decades.
74. (b)
Retroviruses are implicated as a cause of cancer in humans because they may carry cellular proto-oncogenes gets converted into oncogenes due to some physical, chemical or biological agents they cause cancer.
75. (b)
Vivipary is the condition when seeds are germinated on the plant. It is an undesirable character for annual crop plants because germinated seeds cannot be stored under normal conditions for the next season.

76. (a)
Most of our crop plants are autopolyploid in origin.
77. (a)
Out of the following statement (a) is correct as eutrophication is caused by run off water from fertilised fields, sub-urban lawns, feed lots and detergent rich sewage. It is phenomenon of nutrient enrichment of a water body.
78. (b)
Anabaena azollae, a cyanobacterium living in the cavities of fern *Azolla*, fixes atmospheric nitrogen and release it into the leaf cavity of the fern. Farmers have reported over 50% higher yields by using *Azolla pinnata*.
79. (a)
Restriction endonuclease recognises a specific DNA base sequence (recognition sequence or recognition site, restriction sequence or restriction site) and cleaves both the strands of DNA at or near that site. The enzyme cuts the DNA, generating restriction fragments with overhanging ends or blunt ends.
80. (a)
Plasmid is a piece of circular DNA molecule (mostly in bacteria but in yeast also) which is not part of the normal chromosomal DNA of a cell, and is a capable of replicating independently.
81. (d)
Genetic engineering is the manipulation of genetic material of an organism using enzyme restriction endonulclease. Jackson, Symons and Paul Berg (1972) successfully generated recombinant DNA molecules in *vitro*.
82. (c)
Bacillus thruingiensis forms crystals containing a toxic insecticidal protein. *Bt* toxin protein exists as inactive protein but once an insect ingests the inactive toxin, it is converted into an active form of toxin due to the alkaline pH of the gut, which solubulise the crystals.
The activated toxin binds to the surface of midgut epithelial cells and creates pores that cause cell swelling and lysis and eventually cause death of the insect. Specific *Bt* toxin genes were isolated from *B. thurigiensis* and incorporated into the several plants such as cotton.
The toxin is coded by a gene named cry. There are a number of them. e.g. the proteins encoded by the genes cry I Ac and cry II Ab control the cotton bollworms, that of cry I Ab control corn borers.
83. (b)
Production of human protein in bacteria by genetic engineering is possible because the

genetic code is universal as a codon codes for the same amino acid in all the organisms.

84. (c)

Pneumatophores are specialised roots which grow vertically upwards into the air from roots embedded in the mud. Since, they are loosely constructed, these make gaseous exchange possible for submerged roots. These are found in plants growing in marshes or saline swamps.

85. (b)

Dark colour of soil is due to accumulation of leached organic substance and organic matter which serves as a reservoir of nutrients and water in the soil, aids in reducing compacting and surface crusting and increase water infiltration into the soil.

86. (c)

If the forest cover is reduced to half than it will lead to desertification (formation of desert) of that area in long term.

87. (c)

The rate of total capture of energy or the rate of total production of organic material is gross primary productivity while the balance or biomass remaining after meeting the cost of respiration of producers is net primary productivity. Hence, gross productivity has highest value in grassland ecosystem.

88. (a)

The Lemurs are the inhabitants of Madagascar and the Comoro Islands.

89. (d)

Endangered species are those species whose population have been reduced to a critical level. So they are near to extinction in near future. Approximately 300 species and sub-species of mammals are considered as endangered by the International Union for the **Conservation of Nature and Natural Resources (IUCN)**. **Red panda** is an endangered species because it is facing a very high risk of extinction in near future.

90. (d)

A lake near a village suffered heavy mortality of fishes within a few days, because lots of urea and phosphate fertilizer were used in the crops in the vicinity and the area was sprayed with DDT by an aircraft. Inorganic phosphorus and nitrogen are responsible for the growth of algae. In polluted water these increase due to which algae increase greatly at the surface of water forming water bloom. Due to death of these/algae their organic matter gets decomposed due to which oxygen gets depleted and aquatic animals die.