

NEET 2018 BIOLOGY

1. Oxygen is not produced during photosynthesis by

- (1) *Cycas* (2) *Nostoc*
(3) Green sulphur bacteria (4) *Chara*

Solution: *Cycas* is a gymnosperm, *Nostoc* is a cyanobacteria and *Chara* is a green alga. They all perform oxygenic photosynthesis and produce oxygen. While, green sulphur bacteria use H₂S instead of water (in oxygenic photosynthesis) as hydrogen donor. Therefore, they do not evolve O₂.

Answer (3)

2. Double fertilisation is

- (1) Fusion of two male gametes with one egg
(2) Fusion of one male gamete with two polar nuclei
(3) Fusion of two male gametes of a pollen tube with two different eggs
(4) Syngamy and triple fusion

Solution: Double fertilisation is a process unique to angiosperms. It involves two types of fusions in the embryo sac:

- Fusion of sperm cell (male gamete) with egg cell (female gamete) to form a diploid zygote. This process is known as syngamy or generative fertilization.
- Fusion of the other sperm cell with two polar nuclei to form primary endosperm cell containing triploid nucleus also known as primary endosperm nucleus (PEN) in the central cell of embryo sac. This process is known as triple fusion as it involves fusion of three haploid nuclei.

Answer (4)

3. Which one of the following plants shows a very close relationship with a species of moth, where none of the two can complete its life cycle without the other?

- (1) Banana (2) *Yucca*
(3) *Hydrilla* (4) *Viola*

Solution: *Yucca* plant with *Pronuba* moths share obligate mutualism in which the lives of the plant and its pollinator become interdependent. The plant can be pollinated only by partner wasp species. The female wasp lays egg in the fruit (oviposition) and the developing larvae use the seed as source of nutrients.

Answer (2)

4. Pollen grains can be stored for several years in liquid nitrogen having a temperature of

- (1) -196°C (2) -80°C
(3) -120°C (4) -160°C

Solution: Cryopreservation is a method used to preserve pollen grains and embryos at a very low temperature of -196°C for about 10 years.

Answer (1)

5. Which of the following elements is responsible for maintaining turgor in cells?

- (1) Potassium
- (2) Sodium
- (3) Magnesium
- (4) Calcium

Solution: Potassium serves an important function in regulating the osmotic potential of cells. As an osmoregulator, it governs plant movements, such as the opening and closure of stomatal guard cells and the sleep movements, maintaining cell turgidity, daily changes in the orientation of leaves.

Answer (1)

6. What is the role of NAD⁺ in cellular respiration?

- (1) It is a nucleotide source for ATP synthesis.
- (2) It functions as an electron carrier.
- (3) It functions as an enzyme.
- (4) It is the final electron acceptor for anaerobic respiration.

Solution: The electrons removed are transferred to NAD⁺ or FAD to form reduced forms NADH and FADH₂, respectively. From these, the electrons are transferred from one electron carrier to another through an electron transport chain.

Answer (2)

7. In which of the following forms is iron absorbed by plants?

- (1) Free element
- (2) Ferrous
- (3) Ferric
- (4) Both ferric and ferrous

Solution: Iron, among all the micronutrients, is required by plants in the largest amount. It may be taken up as either as ferric (Fe³⁺) or ferrous (Fe²⁺) ion, the latter being more common due to greater solubility.

Answer (4)

8. Which of the following is commonly used as a vector for introducing a DNA fragment in human lymphocytes?

- (1) λ phase
- (2) Ti plasmid
- (3) Retrovirus
- (4) pBR 322

Solution: Retrovirus can be used as a vector for introducing a DNA fragment in human lymphocyte. One such application has been done in the gene therapy of adenosine deaminase-deficient severe combined immunodeficiency disease (ADA-SCID).

Answer (3)

9. Use of bio resources by multinational companies and organisations without authorisation from the concerned country and its people is called

- (1) Biodegradation
- (2) Biopiracy
- (3) Bio-infringement
- (4) Bio-exploitation

Solution: Biopiracy refers to unauthorized use of bioresources by companies or people without taking legal permission from the concerned country or people. In such cases, the people are also not compensated adequately.

Answer (2)

10. In India, the organisation responsible for assessing the safety of introducing genetically modified organisms for public use is

- (1) Research Committee on Genetic Manipulation (RCCGM)
- (2) Council for Scientific and Industrial Research (CSIR)
- (3) Indian Council of Medical Research (ICMR)
- (4) Genetic Engineering Appraisal Committee (GEAC)

Solution: Organisations like Genetic engineering approval committee (GEAC), are being formed by the Indian government to take decisions regarding the validity of genetic engineering research and probable safety issues arising out of the introduction of such genetically modified organisms.

Answer (4)

11. The correct order of steps in Polymerase Chain Reaction (PCR) is

- (1) Denaturation, Extension, Annealing
- (2) Annealing, Extension, Denaturation
- (3) Extension, Denaturation, Annealing
- (4) Denaturation, Annealing, Extension

Solution: The polymerase chain reaction (PCR) is a technique in which a short region of a DNA molecule is copied many times in vitro in presence of DNA polymerase enzyme. Each cycle follows three sequential steps:

- Denaturation
- Primer annealing
- Extension of primer

Answer (4)

12. Select the correct match:

- (1) T.H.Morgan – Transduction
- (2) $F_2 \times$ Recessive parent – Dihybrid cross
- (3) Ribozyme – Nucleic acid
- (4) G. Mendel – Transformation

Solution: Ribozyme is a catalytic RNA, which is nucleic acid. Transduction was discovered by Norton Zinder and Joshua Lederberg in *Salmonella*. Frederick Griffith, while studying pneumococcal infections in mice discovered bacterial transformation. Test cross, first introduced by Gregor Mendel, involves the breeding of an individual with a phenotypically recessive individual, in order to determine the zygosity of the former.

Answer (3)

13. A 'new' variety of rice was patented by a foreign company, through such varieties have been present in India for a long time. This is related to

- (1) Lerma Rojo (2) Sharbati Sonora
(3) Co-667 (4) Basmati

Solution: The Basmati rice, known for its long grains, flavour and aroma, has about 27 varieties in India. In September 1997, Rice Tec, a Texas based company was granted patent on Basmati rice lines and grains. The patent was granted for lines of Basmati, lines of Basmati-like rice and methods of selecting that rice for breeding purposes. This was considered to be a violation of Trade Related Aspects of Intellectual Property Rights (TRIPS).

Answer (4)

14. Which of the following pairs is wrongly matched?

- (1) XO type sex determination – Grasshopper
(2) ABO blood grouping – Co-dominance
(3) Starch synthesis in pea – Multiple alleles
(4) T.H. Morgan – Linkage

Solution: In pea plant, the gene responsible for expression of round or wrinkled texture of seeds also influences the phenotypic expression of starch metabolism and water absorption. Thus, starch synthesis in pea is controlled by pleiotropic gene. Pleiotropy is a phenomenon in which a gene controls multiple phenotype that are mostly unrelated. Rest of the options are (are correctly matched).

Answer (3)

15. Select the correct statement.

- (1) Spliceosomes take part in translation.
(2) Punnett square was developed by a British scientist.
(3) Franklin Stahl coined the term "linkage".
(4) Transduction was discovered by S. Altman.

Solution: Punnett square method was named after its discoverer the British geneticist, Reginald C. Punnett.

- In eukaryotes, nuclear pre-mRNAs, introns are excised on complex ribonucleoprotein structures called spliceosomes.
- The term linkage was coined by T.H. Morgan through his studies on fruit fly. Franklin Stahl proved semi-conservative mode of replication.
- Transduction was discovered by Zinder and Lederberg. Altman discovered biocatalytic activity of RNA.

Answer (2)

16. The experimental proof for semiconservative replication of DNA was first shown in a

- (1) Plant (2) Bacterium
(3) Fungus (4) Virus

Solution: The results of Matthew Meselson and Franklin Stahl's experiments on *Escherichia coli* supported the idea of semi-conservative DNA replication.

Answer (2)

17. Which of the following flowers only once in its life-time?

- (1) Mango (2) Jackfruit
(3) Bamboo species (4) Papaya

Solution: Bamboos flower only once during their lifetime. They generally flower after 50–100 years. Several bamboo shoots of a single plant produce a large number of flowers and eventually fruits and die. While, rest of the options (Jackfruit, papaya and mango) are polycarpic, that is, they produce flowers and fruits many times in their life-time.

Answer (3)

18. Offsets are produced by

- (1) Parthenocarpy (2) Mitotic divisions
(3) Meiotic divisions (4) Parthenogenesis

Solution: Offsets are the vegetative propagules, formed by mitosis. They are short and thick branches having internodes. They can grow into a new plant, if it breaks from the parent plant.

Answer (2)

19. Select the correct match.

- (1) Matthew Meselson and F. Stahl – *Pisum sativum*
(2) Alfred Hershey and Martha Chase – TMV
(3) Alec Jeffreys – *Streptococcus pneumoniae*
(4) Francois Jacob and Jacques Monod – *Lac* operon

Solution: François Jacob and Jacques Monod proposed the operon model based on their studies on the *lac* operon

- Matthew Meselson and F. Stahl discovered semiconservative DNA replication by their studies on *E. coli*.
- DNA fingerprinting was discovered in 1984 by Alec J. Jeffreys.
- Alfred Hershey and Martha Chase conducted experiments on bacteriophage to prove that DNA is the genetic material and not proteins.

Answer (4)

20. Which of the following has proved helpful in preserving pollen as fossils?

- (1) Oil content (2) Cellulosic intine
(3) Pollen kitt (4) Sporopollenin

Solution: Exine consists of sporopollenin. Sporopollenin is found in the spore walls of all plants. It is a resistant organic material made up of carotenoid units. This makes the exine hard so that it can withstand high temperature and concentrated acids and alkalis. Since it cannot be degraded easily, so pollen grains can be long-lasting in the environment and are preserved as fossils.

Answer (4)

21. Natality refers to

- (1) Number of individuals leaving the habitat (2) Birth rate
(3) Death rate (4) Number of individuals entering a habitat

Solution: Natality is the number of young individuals produced in a unit time in a population in the given area and is added to the density. It is equivalent to the birth rate. It is measured either as absolute (crude) natality rate or specific natality rate.

Answer (2)

22. World Ozone Day is celebrated on

- (1) 16th September (2) 21st April
(3) 5th June (4) 22nd April

Solution: The United Nations Organization (UNO) declared the 16th September as Ozone protection day or World Ozone day. As a detailed protocol was signed by the participant countries on this day, 1987 at Montreal, Canada. 5th June is celebrated as World Environment Day. 21st April is celebrated as National Yellow Bat Day. 22nd April is celebrated as National Earth Day.

Answer (1)

23. Which of the following is a secondary pollutant?

- (1) SO₂ (2) CO₂
(3) CO (4) O₃

Solution: Secondary pollutants are substances that are derived from primary pollutants by chemical reactions. O₃ (ozone) is a secondary pollutant. It is formed as a natural layer high in the atmosphere (stratosphere) by the effect of sunlight on normal oxygen.

Answer (4)

24. Niche is

- (1) The range of temperature that the organism needs to live
(2) The physical space where an organism lives
(3) All the biological factors in the organism's environment
(4) The functional role played by the organism where it lives

Solution: Each organism plays a special role within an ecosystem that is called a niche. In biological communities, the term niche refers to the organism's use of the biotic and abiotic resources in its environment.

Answer (4)

25. What type of ecological pyramid would be obtained with the following data?

Secondary consumer – 120g

Primary consumer – 60 g

Primary producer – 10 g

- (1) Upright pyramid of numbers (2) Pyramid of energy
(3) Inverted pyramid of biomass (4) Upright pyramid of biomass

Solution: The given data depicts the inverted pyramid of biomass. Pyramids of biomass in oceans are generally inverted, because the total biomass of consumers (fish) outweighs the biomass of producers (phytoplankton).

Answer (3)

26. In stratosphere, which of the following elements acts as a catalyst in degradation of ozone and release of molecular oxygen?

- (1) Fe (2) Cl
(3) Carbon (4) Oxygen

Solution: CFCs, CH₄ and N₂O escape into the stratosphere and cause destruction of ozone there. UV rays act on CFCs, releasing Cl atoms, chlorine reacts with ozone in sequential method converting it back into oxygen.

Answer (2)

27. The two functional groups characteristic of sugars are

- (1) Carbonyl and phosphate (2) Carbonyl and methyl
(3) Hydroxyl and methyl (4) Carbonyl and hydroxyl

Solution: Sugar is a commonly used term for carbohydrate. Carbohydrates have aldehyde or ketone group on one carbon atom and hydroxyl group on the other carbon atom, thus they have carbonyl and hydroxyl groups.

Answer (4)

28. Which among the following is not a prokaryote?

- (1) *Nostoc* (2) *Mycobacterium*
(3) *Saccharomyces* (4) *Oscillatoria*

Solution: *Saccharomyces*, belong to yeast which is a unicellular eukaryotic fungus. *Oscillatoria* and *Nostoc* are cyanobacteria and *Mycobacterium* is a bacterium. And, cyanobacteria and bacteria comes under prokaryotes.

Answer (3)

29. The Golgi complex participates in

- (1) Respiration in bacteria
(2) Formation of secretory vesicles
(3) Fatty acid breakdown

specific points by X-shaped structures, termed chiasmata. Chiasmata are formed by covalent junctions between a chromatid from one homologue and a non-sister chromatid from the other homologue.

Answer (2)

34. Stomata in grass leaf are

- (1) Rectangular
- (2) Kidney shaped
- (3) Dumb-bell shaped
- (4) Barrel shaped

Solution: Kidney or bean-shaped guard cells are characteristic feature of most dicot plants but guard cells are dumbbell shaped in monocots (e.g., grass family).

Answer (3)

35. Secondary xylem and phloem in dicot stem are produced by

- (1) Phellogen
- (2) Vascular cambium
- (3) Apical meristems
- (4) Axillary meristems

Solution: Secondary growth of the axis includes formation of secondary xylem and secondary phloem and the periderm. Vascular cambium produces secondary vascular tissues, whereas cork cambium (phellogen) forms periderm.

Answer (2)

36. Pneumatophores occur in

- (1) Carnivorous plants
- (2) Free-floating hydrophytes
- (3) Halophytes
- (4) Submerged hydrophytes

Solution: Halophytes are plants growing in salty marshy areas like mangroves. The soil in marshy area is covered with water, making aeration of root difficult, so roots grow upwards to absorb oxygen from air. The air enters through minute pores present on the tips of vertical roots, while excess carbon dioxide is given out. These minute pores are known as pneumathodes (lenticels), while the rest of the portion is covered by cork. These roots are also known as pneumatophores or breathing or respiratory roots.

Answer (3)

37. Casparian strips occur in

- (1) Cortex
- (2) Pericycle
- (3) Epidermis
- (4) Endodermis

Solution: Cells of endodermis are characterised by presence of casparian strips on radial and transverse walls. The casparian strip is band like thickening of suberin that extends completely around the cell. This casparian strip prevents wall to wall movement of substance between cortex and stele thus acting as biological check post and movement can be possible only when substance is absorbed by cytoplasm of endodermal cells.

Answer (4)

38. Plants having little or no secondary growth are

- (1) Conifers (2) Deciduous angiosperms
(3) Grasses (4) Cycads

Solution: Secondary growth can be defined as an increase in the diameter of the axis, as a result of the activities of the lateral meristem, that is, vascular cambium and cork cambium, which cuts off secondary tissues in the stelar and extrastelar region. It mostly takes place in dicots. Grasses are monocots and monocots usually do not show secondary growth.

Answer (3)

39. Sweet potato is a modified

- (1) Tap root (2) Adventitious root
(3) Stem (4) Rhizome

Solution: Tuberos adventitious roots are found in sweet potato for storage of food. Conical roots are modifications of tap roots and are found in carrot. Rhizomes are horizontal thick, fleshy underground stem.

Answer (2)

40. Which of the following statements is correct?

- (1) Horsetails are gymnosperms.
(2) *Selaginella* is heterosporous, while *Salvinia* is homosporous.
(3) Ovules are not enclosed by ovary wall in gymnosperms.
(4) Stems are usually unbranched in both *Cycas* and *Cedrus*.

Solution: Gymnosperms as the name suggest have naked ovule. Rest of the options are incorrect.

- Horsetails are pteridophytes.
- *Selaginella* and *Salvinia* both are heterosporous pteridophytes, that is, they produce two kinds of spores megaspores and microspores.
- The stems are unbranched in *Cycas*, but are profusely branched in *Cedrus*.

Answer (3)

41. Select the wrong statement:

- (1) Pseudopodia are locomotory and feeding structures in Sporozoans.
(2) Mushrooms belong to Basidiomycetes.
(3) Cell wall is present in members of Fungi and Plantae.
(4) Mitochondria are the powerhouse of the cell in all kingdoms except Monera.

Solution: Sarcodines (Amoeboid) move along and capture their food by means of pseudopodia. Sporozoans stream along as a plasmodium. The plasmodia engulf and digest bacteria, yeasts, and other small particles of organic matter as they move along.

Answer (1)

42. After karyogamy followed by meiosis, spores are produced exogenously in

(1) *Agaricus*

(2) *Alternaria*

(3) *Neurospora*

(4) *Saccharomyces*

Solution: *Agaricus* belongs to the class of basidiomycetes. It produces basidiospores or meiospores exogenously.

- *Alternaria* belongs to the class of deuteromycetes. It does not have sexual stage and thus does not produce sexual spores.
- *Neurospora* belongs to the class of ascomycetes. It produces ascospores as meiospores endogenously inside the ascus.
- *Saccharomyces* is a unicellular ascomycetes yeast. It produces ascospores, endogenously.

Answer (1)

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

Column I

Column II

(a) Herbarium

(i) It is a place having a collection of preserved plants and animals.

(b) Key

(ii) A list that enumerates methodically all the species found in an area with brief description aiding identification.

(c) Museum

(iii) Is a place where dried and pressed plant specimens mounted on sheets are kept.

(d) Catalogue

(iv) A booklet containing a list of characters and their alternates which are helpful in identification of various taxa.

- | | | | | |
|-----|-------|------|-------|------|
| | (a) | (b) | (c) | (d) |
| (1) | (ii) | (iv) | (iii) | (i) |
| (2) | (iii) | (ii) | (i) | (iv) |
| (3) | (i) | (iv) | (iii) | (ii) |
| (4) | (iii) | (iv) | (i) | (ii) |

Solution:

- Herbarium is defined as the collection of dry plants which are identified and arranged in accordance to their taxonomic status.
- Key can be defined as a printed or computer-aided device used by biologists for identification of unknown organisms or biological entities, such as plants and animal species.
- Museums have collections of skeletons of animals and preserved plants and animals.
- Catalogue is an enumerated methodical indexed arrangement of organisms found in a particular area, with brief descriptions about their genera or family for identification.

Answer (4)

44. Winged pollen grains are present in

(1) Mango

(2) *Cycas*

(3) Mustard

(4) *Pinus*

Solution: In *Pinus*, winged pollen grains are present. It is extended outer exine on two lateral sides to form the wings of pollen. It is the characteristic feature of *Pinus*. They are wind pollinated and are found hundreds of kilometers away from the parent plant.

Answer (4)

45. Which one is wrongly matched?

- (1) Gemma cups – *Marchantia*
- (2) Biflagellate zoospores – Brown algae
- (3) Uniflagellate gametes – *Polysiphonia*
- (4) Unicellular organism – *Chlorella*

Solution: *Polysiphonia* is a genus of rhodophyceae (red algae). In this, asexual reproduction is by different types of non-motile or non-flagellated spores, e.g., carospores, tetraspores, etc.

Answer (3)

46. Which of the following options correctly represents the lung conditions in asthma and emphysema, respectively?

- (1) Increased respiratory surface; Inflammation of bronchioles
- (2) Increased number of bronchioles; Increased respiratory surface
- (3) Inflammation of bronchioles; Decreased respiratory surface
- (4) Decreased respiratory surface; Inflammation of bronchioles

Solution: Asthma is a disorder characterised by chronic airway inflammation, airway hypersensitivity to a variety of stimuli and airway obstruction. Emphysema is a disorder characterised by destruction of the walls of the alveoli, producing abnormally large air spaces that remain filled with air during exhalation. With less surface area for gas exchange, O₂ diffusion across the damaged respiratory membrane is reduced.

Answer (3)

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

Column I

- (a) Tricuspid valve
- (b) Bicuspid valve
- (c) Semilunar valve

Column II

- (i) Between left atrium and left ventricle
- (ii) Between right ventricle and pulmonary artery
- (iii) Between right atrium and right ventricle

- (a) (b) (c)
- (1) (i) (ii) (iii)
- (2) (i) (iii) (ii)
- (3) (iii) (i) (ii)
- (4) (ii) (i) (iii)

Solution:

- Blood passes from the right atrium into the right ventricle through a valve that is called the tricuspid valve, as it consists of three leaflets or cusps.
- Blood passes from the left atrium into the left ventricle through the bicuspid (mitral) valve, which, as its name implies, has two cusps.

- Blood passes from the left ventricle through the aortic valve (aortic semilunar valve) into the ascending aorta.

Answer (3)

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

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

- | | | | | |
|-----|-------|-------|-------|------|
| | (a) | (b) | (c) | (d) |
| (1) | (i) | (iv) | (iii) | (ii) |
| (2) | (iii) | (i) | (iv) | (ii) |
| (3) | (iii) | (ii) | (i) | (iv) |
| (4) | (iv) | (iii) | (ii) | (i) |

Solution:

- The volume of one breath (air inspired or expired) during normal respiration is called the tidal volume (TV) and is approximately 500–550 mL.
- Inspiratory reserve volume (IRV) is the additional amount of air that can be taken in by forced inspiration after normal inspiration of 500 mL. It is about 2500–3000 mL.
- Expiratory reserve volume (ERV) is the extra amount of air that can be inspired if inspiration follows forced expiration. It is about 1000–1100 mL.
- Even after the expiratory reserve volume is expired, considerable air remains in the lungs because the sub-atmospheric intrapleural pressure keeps the alveoli slightly inflated, and some air also remains in the non-collapsible airways. This volume is called the residual volume. It amounts to about 1100 – 1200 mL.

Answer (2)

49. The transparent lens in the human eye is held in its place by

- (1) Smooth muscles attached to the iris
- (2) Ligaments attached to the iris
- (3) Ligaments attached to the ciliary body
- (4) Smooth muscles attached to the ciliary body

Solution: Extending from the ciliary process are zonular fibres (suspensory ligaments) that attach to the lens. Contraction or relaxation of the ciliary muscle changes the tightness of the zonular fibres, which alters the shape of the lens, adapting it for near or far vision.

Answer (3)

50. Which of the following is an amino acid derived hormone?

- (1) Estradiol
- (2) Ecdysone

(3) Epinephrine

(4) Estriol

Solution: Amino acid derivative hormones synthesised by decarboxylating (removing a molecule of CO_2) and otherwise modifying certain amino acids and are water-soluble. They are called amines because they retain an amino group ($-\text{NH}_2^+$). The catecholamines—epinephrine, norepinephrine, and dopamine—are synthesised by modifying the amino acid tyrosine.

Answer (3)

51. Which of the following hormones can play a significant role in osteoporosis?

(1) Estrogen and Parathyroid hormone

(2) Progesterone and Aldosterone

(3) Aldosterone and Prolactin

(4) Parathyroid hormone and Prolactin

Solution: Estrogen and testosterone stimulate osteoblast activity and inhibit osteoclast. In an ageing female osteoporosis occurs due to deficiency of estrogen. An elevated level of parathormone (PTH) causes excessive resorption of bone matrix, raising the blood levels of calcium and phosphate ions and causing osteoporosis.

Answer (1)

52. Which of the following structures or regions is incorrectly paired with its function?

(1) Hypothalamus – Production of releasing hormones and regulation of temperature, hunger and thirst.

(2) Limbic system – Consists of fibre tracts that interconnect different regions of brain; controls movement.

(3) Medulla oblongata – Controls respiration and cardiovascular reflexes.

(4) Corpus callosum – Band of fibres connecting left and right cerebral hemispheres.

Solution: Limbic system is sometimes called the emotional brain, as it plays a primary role in a range of emotions, including pain, pleasure, docility, affection, and anger. It controls all emotions in our body but not movements.

Answer (2)

53. The amnion of mammalian embryo is derived from.

(1) Mesoderm and trophoblast

(2) Endoderm and mesoderm

(3) Ectoderm and mesoderm

(4) Ectoderm and endoderm

Solution: The embryonic membranes are chorion, amnion, allantois and yolk sac. Amnion is formed from mesoderm on outer side and ectoderm on inner side. Chorion is composed of trophoblast outside and extraembryonic mesoderm inside. Allantois and yolk sac have mesoderm on outer side and endoderm on inner side.

Answer (3)

54. Hormones secreted by the placenta to maintain pregnancy are

(1) hCG, hPL, progestogens, estrogens

(2) hCG, hPL, estrogens, relaxin, oxytocin

(3) hCG, hPL, progestogens, prolactin

(4) hCG, progestogens, estrogens, glucocorticoids

Solution: The placenta acts as endocrine tissue and produces hormones such as human chorionic gonadotrophin (hCG), human placental lactogen (hPL) or human chorionic somatomammotropin (hCS), progestogen, estrogen, etc., needed to sustain the pregnancy. Relaxin hormone is also produced during later stages of pregnancy.

Answer (1)

55. The difference between spermiogenesis and spermiation is

(1) In spermiogenesis spermatozoa from sertoli cells are released into the cavity of seminiferous tubules, while in spermiation spermatozoa are formed.

(2) In spermiogenesis spermatozoa are formed, while in spermiation spermatids are formed.

(3) In spermiogenesis spermatids are formed, while in spermiation spermatozoa are formed.

(4) In spermiogenesis spermatozoa are formed, while in spermiation spermatozoa are released from sertoli cells into the cavity of seminiferous tubules.

Solution: Spermiogenesis is maturation of haploid spermatids into sperms, whereas spermiation is the release of the sperms from sertoli cells into seminiferous tubule lumen prior to their passage to the epididymis.

Answer (4)

56. The contraceptive 'SAHELI'

(1) Is an IUD.

(2) Increases the concentration of estrogen and prevents ovulation in females.

(3) Blocks estrogen receptors in the uterus, preventing eggs from getting implanted.

(4) Is a post-coital contraceptive.

Solution: Saheli is a non-steroidal contraceptive pill that is taken once a week. It contains ormeloxifene which selectively modulates estrogen receptors.

Answer (3)

57. Ciliates differ from all other protozoans in

(1) Using pseudopodia for capturing prey.

(2) Having a contractile vacuole for removing excess water.

(3) Using flagella for locomotion.

(4) Having two types of nuclei.

Solution: Almost all or parts of ciliates are covered with hair-like extensions called cilia that help them in locomotion and getting food. They have two types of nuclei showing nuclear dimorphism. The micronuclei (there may be several) function in sexual reproduction; the single macronucleus controls cell metabolism and growth.

Answer (4)

58. Identify the vertebrate group of animals characterized by crop and gizzard in its digestive system.

- (1) Aves (2) Reptilia
(3) Amphibia (4) Osteichthyes

Solution: The alimentary tract is complete in Aves. The birds use their beaks to hold, tear and crush their food. Digestive organs called crop and gizzard are also present in birds. The function of the crop is to store and soften the food. The gizzard often contains grit or stones to grind the food.

Answer (1)

59. Which of the following feature is used to identify a male cockroach from a female cockroach?

- (1) Forewing with darker tegmina
(2) Presence of caudal styles
(3) Presence of a boat shaped sternum on the 9th abdominal segment
(4) Presence of anal cerci

Solution: A pair of short, thread like anal or caudal style arise from 9th abdominal segment in male cockroach. They are absent in females.

Answer (2)

60. Which one of these animal is not a homeotherm?

- (1) *Camelus* (2) *Chelone*
(3) *Macropus* (4) *Psittacula*

Solution: Homeothermic or warm-blooded can regulate their internal body temperature by releasing energy released through metabolism. Birds and mammals are homeothermic. *Psittacula* (Parrot) is a bird. *Camelus* (Camel) and *Macropus* (kangaroo) are mammals. *Chelone* (Turtle) belongs to class Reptilia, which is Poikilotherm or cold blood animal.

Answer (2)

61. Which of the following animals does not undergo metamorphosis?

- (1) Moth (2) Tunicate
(3) Earthworm (4) Starfish

Solution: Metamorphosis refers to a process of development that involves changes in forms from larva into the adult stage. Animals that undergo metamorphosis are said to have indirect development. Arthropoda such as moth, Echinodermata such as star fish and Urochordata such as tunicates exhibit larval indirect development. In Annelids, such as earthworm direct development takes place that involves no larval stage and thus no metamorphosis.

Answer (3)

62. Which of the following organisms are known as chief producers in the oceans?

- (1) Cyanobacteria (2) Diatoms
(3) Dinoflagellates (4) Euglenoids

Solution: Diatoms are the chief producers in oceans as they contain chlorophyll *a* and *c* for photosynthesis. The reserve food is in the form of oils and polysaccharide (leucosine).

Answer (2)

63. Which one of the following population interactions is widely used in medical science for the production of antibiotics?

- (1) Parasitism (2) Mutualism
(3) Commensalism (4) Amensalism

Solution: In amensalism, one species is inhibited and the other is unaffected. The adversely affected species is called amensal and the affecting species is termed as inhibitor. Penicillin is an antibiotic produced from the fungus *Penicillium notatum* that kills the bacterium *Staphylococcus*.

Answer (4)

64. All of the following are included in 'Ex situ conservation' except

- (1) Botanical gardens (2) Sacred groves
(3) Wildlife safari parks (4) Seed banks

Solution: *Ex situ* conservation involves the conservation of genetic resources of species away from their area of origin or development. This includes off-site collection and gene banks. Collecting wild and domesticated organisms in botanical gardens, nurseries, aquaria, zoos, wildlife safari park, etc., are examples of off-site collection. *In situ* conservation refers to protecting an endangered species in its natural habitat. It includes protection of a group of ecosystems through a network of protected areas, such as biodiversity hotspots, national parks, sanctuaries, biosphere reserves and sacred groves and lakes.

Answer (2)

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

Column I	Column II
(a) Eutrophication	(i) UV-B radiation
(b) Sanitary landfill	(ii) Deforestation
(c) Snow blindness	(iii) Nutrient enrichment
(d) Jhum cultivation	(iv) Waste disposal

- (a) (b) (c) (d)
(1) (iii) (iv) (i) (ii)
(2) (i) (iii) (iv) (ii)
(3) (ii) (i) (iii) (iv)
(4) (i) (ii) (iv) (iii)

Solution:

- Eutrophication is the process in which growth of algae, plants and animals exceeds in a body of water due to development of high concentration of nutrients, such as nitrates and phosphates.
- Sanitary landfill is designed in a manner so as to concentrate and contain refuse without creating hazard to public health or safety.

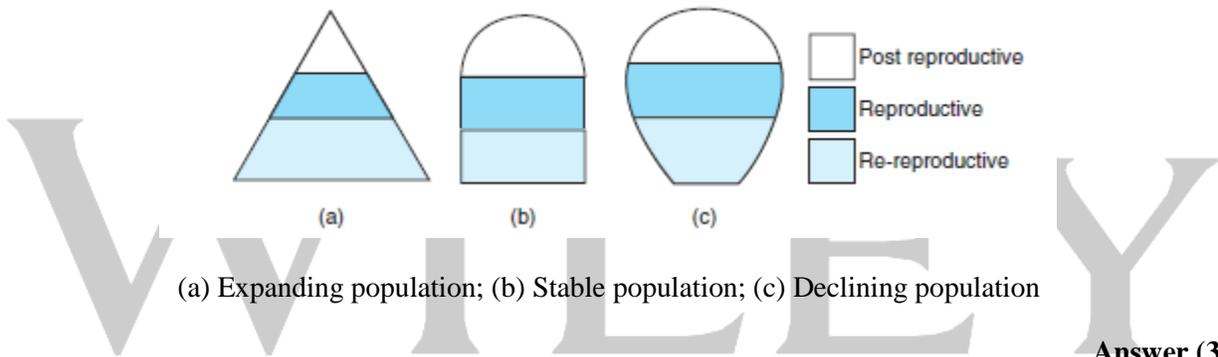
- A 5% loss of ozone may increase 10% increase of UV-B radiation that causes cataract, inflammation of cornea (snow-blindness) and skin cancer.
- Slash and burn agriculture, commonly called Jhum cultivation in North-Eastern states of India is contributing to the deforestation.

Answer (1)

66. In a growing population of a country,

- (1) Reproductive and pre-reproductive individuals are equal in number.
- (2) Reproductive individuals are less than the post-reproductive individuals.
- (3) Pre-reproductive individuals are more than the reproductive individuals.
- (4) Pre-reproductive individuals are less than the reproductive individuals.

Solution: In an expanding population, the individuals in pre-reproductive age group occur in large numbers; in a stable population all the three age groups occur in almost equal numbers and in a declining population, old or post-reproductive animals outnumber the other two age groups.



Answer (3)

67. Which part of poppy plant is used to obtain the durg “Smack”?

- (1) Roots
- (2) Latex
- (3) Flowers
- (4) Leaves

Solution: Heroin (brown sugar, smack, diacetyl morphine), an opioid is obtained from latex of poppy plant (*Papaver somniferum*). They are analgesic and act on CNS to relieve pain

Answer (2)

68. All of the following are part of an operon except

- (1) An enhancer
- (2) Structural genes
- (3) An operator
- (4) A promoter

Solution: Operon concept is for prokaryotes. A typical bacterial operon consists of structural genes, a promoter region (binding site of RNA polymerase) and an operator region (binding site of the repressor, a regulatory protein). Enhancers and silencers are long-range regulatory sequences in protein-coding genes of multicellular eukaryotes.

Answer (1)

69. A woman has an X-linked condition on one of her X chromosomes. This chromosome can be inherited by

- (1) Only grandchildren (2) Only sons
(3) Only daughters (4) Both sons and daughters

Solution: The females are homogametic with two X chromosomes, while the males are heterogametic with one X and one Y chromosome. Thus, the gametes produced by females will always have an X chromosome. Thus, chances of the X-linked condition to be inherited by her son or daughter is equal. But, if the trait is recessive it can be suppressed in her daughter, but son can be express being hemizygous for X chromosome.

Answer (4)

70. According to Hugo de Vries, the mechanism of evolution is

- (1) Phenotypic variations (2) Saltation
(3) Multiple step mutations (4) Minor mutations

Solution: Hugo de Vries observed the sudden appearance of new phenotypes in the evening primroses growing in his experimental garden. According to Darwin, evolution took place gradually but de Vries believed that it occurred suddenly and was due to a single step large mutation. He called this as saltation.

Answer (2)

71. AGGTATCGCAT is a sequence from the coding strand of gene. What will be the corresponding sequence of the transcribed mRNA?

- (1) ACCUAUGCGAU (2) UGGTUTCGCAT
(3) AGGUAUCGCAU (4) UCCAUAGCGUA

Solution: Coding strand has same sequence as that of mRNA (except uracil instead of thymine) because it is complementary to the template strand for RNA synthesis. Thus, sequence of mRNA for given coding strand will be: AGGUAUCGCAU

Answer (3)

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

Column I	Column II
(a) Proliferative Phase	(i) Breakdown of endometrial lining
(b) Secretory Phase	(ii) Follicular Phase
(c) Menstruation	(iii) Luteal Phase

- (a) (b) (c)
(1) (ii) (iii) (i)
(2) (i) (iii) (ii)
(3) (iii) (ii) (i)
(4) (iii) (i) (ii)

Solution:

- During proliferative phase, the follicles start developing, thus it is also called as follicular phase. The growing ovarian follicles liberate estrogen into the blood.
- Secretory phase is also called as luteal phase. It is the period after ovulation when the mature follicle collapses, and the basement membrane between the granulosa cells and theca interna breaks down.
- Menstruation occurs due to decline in the level of progesterone. It involves breakdown of overgrown endometrial lining.

Answer (1)

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

Column I

- (a) Glycosuria
- (b) Gout
- (c) Renal calculi
- (d) Glomerular nephritis

Column II

- (i) Accumulation of uric acid in joints
- (ii) Mass of crystallised salts within the kidney
- (iii) Inflammation in glomeruli
- (iv) Presence of glucose in urine

- | | | | | |
|-----|-------|-------|-------|-------|
| | (a) | (b) | (c) | (d) |
| (1) | (ii) | (iii) | (i) | (iv) |
| (2) | (i) | (ii) | (iii) | (iv) |
| (3) | (iii) | (ii) | (iv) | (i) |
| (4) | (iv) | (i) | (ii) | (iii) |

Solution:

- Presence of glucose in urine is called glycosuria. It usually indicates diabetes mellitus.
- Gout is a condition in which person produces excess amount of uric acid or is not able to excrete as much as normal.
- The crystals of salts present in urine occasionally precipitate and solidify into insoluble stones called renal calculi (pebbles) or kidney stone.
- Glomerular nephritis is the inflammation of the glomeruli of kidney. It is characterised by proteinuria and haematuria.

Answer (4)

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

Column I (Function)

- (a) Ultrafiltration
- (b) Concentration of urine
- (c) Transport of urine
- (d) Storage of urine

Column II (Part of Excretory System)

- (i) Henle's loop
- (ii) Ureter
- (iii) Urinary bladder
- (iv) Malpighian corpuscle
- (v) Proximal convoluted tubule

- | | | | | |
|-----|------|------|------|-------|
| | (a) | (b) | (c) | (d) |
| (1) | (v) | (iv) | (i) | (ii) |
| (2) | (iv) | (i) | (ii) | (iii) |

- (3) (iv) (v) (ii) (iii)
 (4) (v) (iv) (i) (iii)

Solution:

- The human excretory system consists of two kidneys, two ureters, one urinary bladder and one urethra. After the kidneys filter blood plasma, they return most of the water and solutes to the bloodstream. The remaining water and solutes constitute urine, which passes through the ureters and is stored in the urinary bladder until it is excreted from the body through the urethra.
- Renal corpuscle (tiny body) or Malpighian body is made up of glomerulus and the Bowman's (glomerular) capsule. Filtration membrane made up of glomerular capillaries and podocytes permits filtration of water and small solutes, but prevents filtration of most plasma proteins, blood cells and platelets into the lumen of the Bowman's capsule via a process known as ultrafiltration.
- Concentration of urine refers to water reabsorption from the glomerular filtrate because of hyperosmolarity in the medulla formed by the counter-current mechanism in the loop of Henle.

Answer (2)

75. Which of the following gastric cells indirectly help in erythropoiesis?

- (1) Goblet cells (2) Mucous cells
 (3) Chief cells (4) Parietal cells

Solution: The production of RBCs is called erythropoiesis. It occurs in the liver and spleen in the foetus and in the red bone marrow after birth. Vitamin B₁₂ and folic acid stimulate erythropoiesis. Parietal or oxyntic cells present in gastric gland of stomach produce Castle's intrinsic factor and hydrochloric acid. Intrinsic factor is needed for the absorption of vitamin B₁₂ and HCl converts iron present in diet from ferric to ferrous form so that it can be absorbed easily and used during erythropoiesis.

Answer (4)

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

Column I

- (a) Fibrinogen
 (b) Globulin
 (c) Albumin

Column II

- (i) Osmotic balance
 (ii) Blood clotting
 (iii) Defence mechanism

- (a) (b) (c)
 (1) (i) (iii) (ii)
 (2) (i) (ii) (iii)
 (3) (iii) (ii) (i)
 (4) (ii) (iii) (i)

Solution:

- Thrombin catalyses the conversion of soluble fibrinogen (another plasma protein formed by the liver) into insoluble fibrin. Fibrin forms the threads of the clot that traps red blood cells and seals the wound.

oxidation through a series of redox reactions that utilize the reducing power of NADH and FADH₂. It takes place in inner mitochondrial membrane.

Answer (4)

81. Select the incorrect match:

- (1) Submetacentric chromosomes – L-shaped chromosomes
- (2) Allosomes – Sex chromosomes
- (3) Lampbrush chromosomes – Diplotene bivalents
- (4) Polytene chromosomes – Oocytes of amphibians

Solution: Polytene chromosomes are giant chromosomes found commonly in many two-winged flies (e.g., in the salivary gland cells of *Drosophila*).

- In sub-metacentric chromosome, centromere is positioned a little above the centre giving rise to a short and a long arm of the chromosome giving it L-shape.
- An allosome is also denoted as a sex chromosome. It differs from an ordinary autosome in form, size and behaviour.
- The lampbrush chromosomes are found particularly within the oocytes (immature eggs) of most animals, other than mammals. They occur during the diplotene stage of meiosis I during cell division.

Answer (4)

82. Which of the following terms describe human dentition?

- (1) Pleurodont, Monophyodont, Homodont
- (2) Thecodont, Diphyodont, Heterodont
- (3) Thecodont, Diphyodont, Homodont
- (4) Pleurodont, Diphyodont, Heterodont

Solution: The dentition of humans has following features:

- Thecodont: In this, the tooth is embedded in the socket of the jaw bone.
- Diphyodont: Two sets of teeth erupt in their life time at different times, temporary milk or deciduous teeth are replaced by a set of permanent or adult teeth later.
- Heterodont: Dentition consists of different types of teeth that have different functions, namely incisors, canine, premolars and molars.

Answer (4)

83. Which of the following events does not occur in rough endoplasmic reticulum?

- (1) Cleavage of signal peptide
- (2) Protein glycosylation
- (3) Protein folding
- (4) Phospholipid synthesis

Solution: Rough endoplasmic reticulum (RER) is the site of protein folding which involves folding of polypeptide chains into the correct three-dimensional conformation, assembly of the polypeptides into multi-subunit proteins. Protein processing, which involves different covalent modifications of proteins such as cleavage, folding into three-dimensional structure, formation of disulphide bonds, glycosylation,

etc., also takes place in the RER. Smooth endoplasmic reticulum is the main site of fatty acids, steroids and lipid synthesis.

Answer (4)

84. Many ribosomes may associate with a single mRNA to form multiple copies of a polypeptide simultaneously. Such strings of ribosomes are termed as

- (1) Plastidome (2) Polyhedral bodies
(3) Polysome (4) Nucleosome

Solution: Polysomes or polyribosomes are chains of ribosomes connected by the mRNA being translated.

Answer (3)

85. In which disease does mosquito transmitted pathogen cause chronic inflammation of lymphatic vessels?

- (1) Ringworm disease (2) Ascariasis
(3) Elephantiasis (4) Amoebiasis

Solution: Elephantiasis or filariasis is caused by a parasitic filarial nematode (roundworm) *Wuchereria bancrofti*. It lives in lymphatic tissue. It is long and has tapering ends. The head is slightly rounded and swollen. Human is the primary host and the female *Culex* mosquito is the secondary host.

Answer (3)

86. Which of the following is not an autoimmune disease?

- (1) Alzheimer's disease (2) Rheumatoid arthritis
(3) Psoriasis (4) Vitiligo

Solution: Alzheimer's disease occurs due to deficiency of neurotransmitter acetylcholine.

- Rheumatoid arthritis is one of the most common autoimmune disease in which the T_H cells interact with the antigen at the joint to release cytokines that initiate inflammation at the joint that causes polymorphonuclear leukocytes and macrophages to damage the cartilage at the joint.
- Vitiligo is a disease in which the pigment cells of the skin, melanocytes, are destroyed in certain areas characterised as autoimmune disorder.
- Psoriasis is a skin disease that causes itchy or sore patches of thick red skin and is also autoimmune.

Answer (1)

87. Among the following sets of examples for divergent evolution, select the incorrect option:

- (1) Brain of bat, man and cheetah
(2) Heart of bat, man and cheetah
(3) Forelimbs of man, bat and cheetah
(4) Eye of octopus, bat and man

Solution: Forelimbs, brain and heart of human, bat and cheetah are derived from the same embryological tissues but they are designed to do different jobs and hence they have adapted to different needs. This type of evolution is known as divergent evolution. Eye of octopus, bat and man similar and carry out

similar functions, but do not have same embryological origin or similar anatomy, they are known as analogous structures showing convergent evolution.

Answer (4)

88. Conversion of milk to curd improves its nutritional value by increasing the amount of

- (1) Vitamin B₁₂ (2) Vitamin A
(3) Vitamin D (4) Vitamin E

Solution: The genus *Lactobacillus* is responsible for conversion of milk into curd. Production of lactic acid by the *Lactobacillus* facilitates coagulation of milk protein into curd. The milk proteins also get partially digested. The nutritional value is enhanced by increasing the quantity of vitamin B₁₂.

Answer (1)

89. The similarity of bone structure in the forelimbs of many vertebrates is an example of

- (1) Convergent evolution (2) Analogy
(3) Homology (4) Adaptive radiation

Solution: The forelimbs of human, horse, cat and bat are made up of similar bones. However, they have been modified as the wing of a bat, the leg of a horse and the arm of a human. These bones are homologous organs in the different vertebrates. In all these vertebrates, same bones are present in same relative positions. They are derived from the same embryological tissues but they are designed to do different jobs and hence they have adapted to different needs. This type of evolution is known as divergent evolution.

Answer (3)

90. Which of the following characteristics represent 'Inheritance of blood groups' in humans?

- (a) Dominance (b) Co-dominance
(c) Multiple allele (d) Incomplete dominance
(e) Polygenic inheritance
- (1) (b), (d) and (e) (2) (a), (b) and (c)
(3) (b), (c) and (e) (4) (a), (c) and (e)

Solution: The most important blood group system for blood transfusion is the ABO system. The A, B and O blood groups are controlled by three different alleles of gene *I*. These are *I^A*, *I^B* and *i*. The sugar produced by alleles *I^A* and *I^B* are slightly different, while no sugar is produced by allele *i*. For diploid organisms like human beings, each person can possess two of the three gene alleles. It has been found that *I^A* and *I^B* are completely dominant over *i* as *i* does not produce any sugar. Thus, in genotype *I^Ai*, only *I^A* expresses and in genotype *I^Bi*, only *I^B* expresses. The state of codominance arises when two equally dominant factors.

Answer (2)

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