

AIPMT 2009 Prelims — Biology Question Paper with Solutions

95 Biology questions as set in the paper · answers checked by RankUp

AIPMT 2009 Prelims · Q51

1. Which one of the following is correct pairing of a body part and the kind of muscle tissue that moves it?

- (A) Biceps of upper arm – Smooth muscle fibres
- (B) Abdominal wall – Smooth muscle
- (C) Iris – Involuntary smooth muscle
- (D) Heart wall – Involuntary unstriated muscle

AIPMT 2009 Prelims · Q52

2. The epithelial tissue present on the inner surface of bronchioles and fallopian tubes is:

- (A) Glandular
- (B) Ciliated
- (C) Squamous
- (D) Cuboidal

AIPMT 2009 Prelims · Q54

3. Manganese is required in:

- (A) Plant cell wall formation
- (B) Photolysis of water during photosynthesis
- (C) Chlorophyll synthesis
- (D) Nucleic acid synthesis

AIPMT 2009 Prelims · Q55

4. Polyethylene glycol method is used for:

- (A) Biodiesel production
- (B) Seedless fruit production
- (C) Energy production from sewage
- (D) Gene transfer without a vector

AIPMT 2009 Prelims · Q56

5. The floral formula $\oplus \text{ } \overline{\text{K}}_{(5)} \text{ C}_{(5)} \text{ A}_5 \text{ G}_{(2)}$ is that of:

- (A) Soybean
- (B) Sunnhemp
- (C) Tobacco
- (D) Tulip

AIPMT 2009 Prelims · Q57

6. Which one of the following groups of animals is bilaterally symmetrical and triploblastic?

- (A) Aschelminthes (round worms)
- (B) Ctenophores
- (C) Sponges
- (D) Coelenterates (Cnidarians)

AIPMT 2009 Prelims · Q58

7. Which one of the following is commonly used in transfer of foreign DNA into crop plants?

- (A) *Meloidogyne incognita*
- (B) *Agrobacterium tumefaciens*
- (C) *Penicillium expansum*
- (D) *Trichoderma harzianum*

8. Which one of the following is the correct matching of the events occurring during menstrual cycle?

- (A) Proliferative phase : Rapid regeneration of myometrium and maturation of Graafian follicle.
- (B) Development of corpus luteum : Secretory phase and increased secretion of progesterone.
- (C) Menstruation : breakdown of myometrium and ovum not fertilised.
- (D) Ovulation : LH and FSH attain peak level and sharp fall in the secretion of progesterone.

9. Which one is the wrong pairing for the disease and its causal organism?

- (A) Black rust of wheat – Puccinia graminis
- (B) Loose smut of wheat – Ustilago nuda
- (C) Root-knot of vegetables – Meloidogyne sp.
- (D) Late blight of potato – Alternaria solani

10. Global agreement in specific control strategies to reduce the release of ozone depleting substances, was adopted by:

- (A) The Montreal Protocol
- (B) The Kyoto Protocol
- (C) The Vienna Convention
- (D) Rio de Janeiro Conference

11. What is true about Bt toxin?

- (A) Bt protein exists as active toxin in the Bacillus.
- (B) The activated toxin enters the ovaries of the pest to sterilise it and thus prevent its multiplication.
- (C) The concerned Bacillus has antitoxins.
- (D) The inactive protoxin gets converted into active form in the insect gut.

12. Peripatus is a connecting link between:

- (A) Mollusca and Echinodermata
- (B) Annelida and Arthropoda
- (C) Coelenterata and Porifera
- (D) Ctenophora and Platyhelminthes

13. T.O. Diener discovered a:

- (A) Free infectious DNA
- (B) Infectious protein
- (C) Bacteriophage
- (D) Free infectious RNA

14. Seminal plasma in humans is rich in:

- (A) fructose and calcium but has no enzymes
- (B) glucose and certain enzymes but has no calcium
- (C) fructose and certain enzymes but poor in calcium
- (D) fructose, calcium and certain enzymes

15. A fruit developed from hypanthodium inflorescence is called:

- (A) Sorosis
- (B) Syconus
- (C) Caryopsis
- (D) Hesperidium

AIPMT 2009 Prelims · Q67

16. The cell junctions called tight, adhering and gap junctions are found in:

- (A) Connective tissue
- (B) Epithelial tissue
- (C) Neural tissue
- (D) Muscular tissue

AIPMT 2009 Prelims · Q68

17. What will happen if the stretch receptors of the urinary bladder wall are totally removed?

- (A) Micturition will continue
- (B) Urine will continue to collect normally in the bladder
- (C) There will be no micturition
- (D) Urine will not collect in the bladder

AIPMT 2009 Prelims · Q69

18. If a live earthworm is pricked with a needle on its outer surface without damaging its gut, the fluid that comes out is:

- (A) coelomic fluid
- (B) haemolymph
- (C) slimy mucus
- (D) excretory fluid

AIPMT 2009 Prelims · Q70

19. The most popularly known blood grouping is the ABO grouping. It is named ABO and not ABC, because O in it refers to having:

- (A) overdominance of this type on the genes for A and B types
- (B) one antibody only – either anti-A or anti-B on the RBCs
- (C) no antigens A and B on RBCs
- (D) other antigens besides A and B on RBCs

AIPMT 2009 Prelims · Q71

20. One of the synthetic auxin is:

- (A) IAA
- (B) GA
- (C) IBA
- (D) NAA

AIPMT 2009 Prelims · Q72

21. A person likely to develop tetanus is immunised by administering:

- (A) Preformed antibodies
- (B) Wide spectrum antibiotics
- (C) Weakened germs
- (D) Dead germs

AIPMT 2009 Prelims · Q73

22. Alzheimer disease in humans is associated with the deficiency of:

- (A) glutamic acid
- (B) acetylcholine
- (C) gamma aminobutyric acid (GABA)
- (D) dopamine

AIPMT 2009 Prelims · Q74

23. Biochemical Oxygen Demand (BOD) in a river water:

- (A) has no relationship with concentration of oxygen in the water.
- (B) gives a measure of salmonella in the water.
- (C) increases when sewage gets mixed with river water.
- (D) remains unchanged when algal bloom occurs.

AIPMT 2009 Prelims · Q75

24. The genetic defect - adenosine deaminase (ADA) deficiency may be cured permanently by:

- (A) administering adenosine deaminase activators.
- (B) introducing bone marrow cells producing ADA into cells at early embryonic stages.
- (C) enzyme replacement therapy.
- (D) periodic infusion of genetically engineered lymphocytes having functional ADA cDNA.

AIPMT 2009 Prelims · Q76

25. Compared to blood our lymph has:

- (A) plasma without proteins
- (B) more WBCs and no RBCs
- (C) more RBCs and less WBCs
- (D) no plasma

AIPMT 2009 Prelims · Q77

26. Sickle cell anemia is:

- (A) caused by substitution of valine by glutamic acid in the beta globin chain of haemoglobin
- (B) caused by a change in a single base pair of DNA
- (C) characterized by elongated sickle like RBCs with a nucleus
- (D) an autosomal linked dominant trait

AIPMT 2009 Prelims · Q78

27. Which of the following plant species you would select for the production of bioethanol?

- (A) Zea mays
- (B) Pongamia
- (C) Jatropha
- (D) Brassica

AIPMT 2009 Prelims · Q79

28. When breast feeding is replaced by less nutritive food low in proteins and calories; the infants below the age of one year are likely to suffer from:

- (A) Rickets
- (B) Kwashiorkor
- (C) Pellagra
- (D) Marasmus

AIPMT 2009 Prelims · Q80

29. A young infant may be feeding entirely on mother's milk which is white in colour but the stools which the infant passes out is quite yellowish. What is this yellow colour due to?

- (A) Bile pigments passed through bile juice
- (B) Undigested milk protein casein
- (C) Pancreatic juice poured into duodenum
- (D) Intestinal juice

AIPMT 2009 Prelims · Q81

30. Which one of the following has maximum genetic diversity in India?

- (A) Mango
- (B) Wheat
- (C) Tea
- (D) Teak

AIPMT 2009 Prelims · Q82

31. Oxygenic photosynthesis occurs in:

- (A) Oscillatoria
- (B) Rhodospirillum
- (C) Chlorobium
- (D) Chromatium

AIPMT 2009 Prelims · Q83

32. There is no DNA in:

- (A) Mature RBCs
- (B) A mature spermatozoan
- (C) Hair root
- (D) An enucleated ovum

AIPMT 2009 Prelims · Q85

33. Tiger is not a resident in which one of the following national park?

- (A) Sunderbans
- (B) Gir
- (C) Jim Corbett
- (D) Ranthambhor

AIPMT 2009 Prelims · Q86

34. Which one of the following statements is true regarding digestion and absorption of food in humans?

- (A) Fructose and amino acids are absorbed through intestinal mucosa with the help of carrier ions like Na^+ .
- (B) Chylomicrons are small lipoprotein particles that are transported from intestine into blood capillaries.
- (C) About 60% of starch is hydrolysed by salivary amylase in our mouth.
- (D) Oxyntic cells in our stomach secrete the proenzyme pepsinogen.

AIPMT 2009 Prelims · Q87

35. Synapsis occurs between:

- (A) mRNA and ribosomes
- (B) spindle fibres and centromere
- (C) two homologous chromosomes
- (D) a male and a female gamete

AIPMT 2009 Prelims · Q89

36. What is not true for genetic code?

- (A) It is nearly universal
- (B) It is degenerate
- (C) It is unambiguous
- (D) A codon in mRNA is read in a non-contiguous fashion

AIPMT 2009 Prelims · Q90

37. Which one of the following plants is monoecious?

- (A) Pinus
- (B) Cycas
- (C) Papaya
- (D) Marchantia

AIPMT 2009 Prelims · Q91

38. Cyclic photophosphorylation results in the formation of

- (A) ATP and NADPH
- (B) ATP, NADPH and O_2
- (C) ATP
- (D) NADPH

39. The letter T in T-lymphocyte refers to:

- (A) Thalamus
- (B) Tonsil
- (C) Thymus
- (D) Thyroid

40. Foetal ejection reflex in human female is induced by:

- (A) release of oxytocin from pituitary
- (B) fully developed foetus and placenta
- (C) differentiation of mammary glands
- (D) pressure exerted by amniotic fluid

41. Anatomically fairly old dicotyledonous root is distinguished from the dicotyledonous stem by

- (A) Absence of secondary phloem
- (B) Presence of cortex
- (C) Position of protoxylem
- (D) Absence of secondary xylem

42. Plasmodesmata are:

- (A) Locomotary structures
- (B) Membranes connecting the nucleus with plasmalemma
- (C) Connections between adjacent cells
- (D) Lignified cemented layers between cells

43. Removal of introns and joining the exons in a defined order in a transcription unit is called:

- (A) Tailing
- (B) Transformation
- (C) Capping
- (D) Splicing

44. Phylogenetic system of classification is based on:

- (A) Morphological features
- (B) Chemical constituents
- (C) Floral characters
- (D) Evolutionary relationships

45. Which part of human brain is concerned with the regulation of body temperature?

- (A) Cerebellum
- (B) Cerebrum
- (C) Hypothalamus
- (D) Medulla Oblongata

46. Semiconservative replication of DNA was first demonstrated in:

- (A) Escherichia coli
- (B) Streptococcus pneumoniae
- (C) Salmonella typhimurium
- (D) Drosophila melanogaster

AIPMT 2009 Prelims · Q100

47. Which one of the following pairs of animals comprises jawless fishes?

- (A) Mackerals and Rohu
- (B) Lampreys and hag fishes
- (C) Guppies and hag fishes
- (D) Lampreys and eels

AIPMT 2009 Prelims · Q101

48. Which of the following is a pair of viral diseases?

- (A) Common Cold, AIDS
- (B) Dysentery, Common Cold
- (C) Typhoid, Tuberculosis
- (D) Ringworm, AIDS

AIPMT 2009 Prelims · Q102

49. Aerobic respiratory pathway is appropriately termed:

- (A) Parabolic
- (B) Amphibolic
- (C) Anabolic
- (D) Catabolic

AIPMT 2009 Prelims · Q104

50. Cytoskeleton is made up of:

- (A) Callose deposits
- (B) Cellulosic microfibrils
- (C) Proteinaceous filaments
- (D) Calcium carbonate granules

AIPMT 2009 Prelims · Q105

51. An example of axile placentation is:

- (A) Dianthus
- (B) Lemon
- (C) Marigold
- (D) Argemone

AIPMT 2009 Prelims · Q106

52. Which one of the following has haplontic life cycle?

- (A) Polytrichum
- (B) Ustilago
- (C) Wheat
- (D) Funaria

AIPMT 2009 Prelims · Q107

53. Steps taken by the Government of India to control air pollution include:

- (A) compulsory PUC (Pollution Under Control) certification of petrol driven vehicles which tests for carbon monoxide and hydrocarbons.
- (B) permission to use only pure diesel with a maximum of 500 ppm sulphur as fuel for vehicles.
- (C) use of non-polluting Compressed Natural Gas (CNG) only as fuel by all buses and trucks.
- (D) compulsory mixing of 20% ethyl alcohol with petrol and 20% biodiesel with diesel.

AIPMT 2009 Prelims · Q108

54. Which one of the following is considered important in the development of seed habit?

- (A) Heterospory
- (B) Haplontic life cycle
- (C) Free-living gametophyte
- (D) Dependent sporophyte

AIPMT 2009 Prelims · Q109

55. The annular and spirally thickened conducting elements generally develop in the protoxylem when the root or stem is:

- (A) elongating
- (B) widening
- (C) differentiating
- (D) maturing

AIPMT 2009 Prelims · Q110

56. The correct sequence of plants in a hydrosere is:

- (A) Volvox → Hydrilla → Pistia → Scirpus → Lantana → Oak
- (B) Pistia → Volvox → Scirpus → Hydrilla → Oak → Lantana
- (C) Oak → Lantana → Volvox → Hydrilla → Pistia → Scirpus
- (D) Oak → Lantana → Scirpus → Pistia → Hydrilla → Volvox

AIPMT 2009 Prelims · Q112

57. A health disorder that results from the deficiency of thyroxine in adults and characterised by (i) a low metabolic rate, (ii) increase in body weight and (iii) tendency to retain water in tissues is:

- (A) simple goitre
- (B) myxoedema
- (C) cretinism
- (D) hypothyroidism

AIPMT 2009 Prelims · Q113

58. Mannitol is the stored food in:

- (A) Porphyra
- (B) Fucus
- (C) Gracilaria
- (D) Chara

AIPMT 2009 Prelims · Q114

59. Which one of the following pairs is wrongly matched?

- (A) Alcohol – nitrogenase
- (B) Fruit juice – pectinase
- (C) Textile – amylase
- (D) Detergents – lipase

AIPMT 2009 Prelims · Q115

60. Which of the following is not used as a biopesticide?

- (A) Trichoderma harzianum
- (B) Nuclear Polyhedrosis Virus (NPV)
- (C) Xanthomonas campestris
- (D) Bacillus thuringiensis

AIPMT 2009 Prelims · Q116

61. Which one of the following is a vascular cryptogam?

- (A) Ginkgo
- (B) Marchantia
- (C) Cedrus
- (D) Equisetum

AIPMT 2009 Prelims · Q117

62. In a standard ECG which one of the following alphabets is the correct representation of the respective activity of the human heart?

- (A) S – start of systole
- (B) T – end of diastole
- (C) P – depolarisation of the atria
- (D) R – repolarisation of ventricles

AIPMT 2009 Prelims · Q118

63. Uric acid is the chief nitrogenous component of the excretory products of:

- (A) Earthworm
- (B) Cockroach
- (C) Frog
- (D) Man

AIPMT 2009 Prelims · Q119

64. Guard cells help in:

- (A) Transpiration
- (B) Guttation
- (C) Fighting against infection
- (D) Protection against grazing

AIPMT 2009 Prelims · Q120

65. Montreal Protocol aims at:

- (A) Biodiversity conservation
- (B) Control of water pollution
- (C) Control of CO₂ emission
- (D) Reduction of ozone depleting substances

AIPMT 2009 Prelims · Q121

66. DDT residues are rapidly passed through food chain causing biomagnification because DDT is:

- (A) moderately toxic
- (B) non-toxic to aquatic animals
- (C) water soluble
- (D) lipo soluble

AIPMT 2009 Prelims · Q122

67. Vegetative propagation in mint occurs by:

- (A) Offset
- (B) Rhizome
- (C) Sucker
- (D) Runner

AIPMT 2009 Prelims · Q123

68. Select the incorrect statement from the following:

- (A) Galactosemia is an inborn error of metabolism
- (B) Small population size results in random genetic drift in a population
- (C) Baldness is a sex-limited trait
- (D) Linkage is an exception to the principle of independent assortment in heredity

AIPMT 2009 Prelims · Q124

69. Cotyledons and testa respectively are edible parts in:

- (A) walnut and tamarind
- (B) french bean and coconut
- (C) cashew nut and litchi
- (D) groundnut and pomegranate

AIPMT 2009 Prelims · Q125

70. Which one of the following statements is correct?

- (A) Benign tumours show the property of metastasis.
- (B) Heroin accelerates body functions.
- (C) Malignant tumours may exhibit metastasis.
- (D) Patients who have undergone surgery are given cannabinoids to relieve pain.

71. The correct sequence of spermatogenetic stages leading to the formation of sperms in a mature human testis is:

- (A) spermatogonia → spermatocyte → spermatid → sperms
- (B) spermatid → spermatocyte → spermatogonia → sperms
- (C) spermatogonia → spermatid → spermatocyte → sperms
- (D) spermatocyte → spermatogonia → spermatid → sperms

72. Use of anti-histamines and steroids give a quick relief from:

- (A) Nausea
- (B) Cough
- (C) Headache
- (D) Allergy

73. Chipko movement was launched for the protection of:

- (A) Forests
- (B) Livestock
- (C) Wet lands
- (D) Grasslands

74. Which one of the following is the most likely root cause why menstruation is not taking place in regularly cycling human female?

- (A) maintenance of the hypertrophical endometrial lining
- (B) maintenance of high concentration of sex hormones in the blood stream
- (C) retention of well-developed corpus luteum
- (D) fertilisation of the ovum

75. Globulins contained in human blood plasma are primarily involved in:

- (A) osmotic balance of body fluids
- (B) oxygen transport in the blood
- (C) clotting of blood
- (D) defence mechanisms of body

76. Palisade parenchyma is absent in leaves of:

- (A) Mustard
- (B) Soybean
- (C) Gram
- (D) Sorghum

77. In barley stem vascular bundles are:

- (A) closed and scattered
- (B) open and in a ring
- (C) closed and radial
- (D) open and scattered

78. Which one of the following is the correct matching of three items and their grouping category?

- (A) ilium, ischium, pubis – coxal bones of pelvic girdle
- (B) actin, myosin, rhodopsin – muscle proteins
- (C) cytosine, uracil, thiamine – pyrimidines
- (D) malleus, incus, cochlea – ear ossicles

79. Somaclones are obtained by

- (A) Plant breeding
- (B) Irradiation
- (C) Genetic engineering
- (D) Tissue culture

80. In the case of peppered moth (*Biston betularia*) the black-coloured form became dominant over the light-coloured form in England during industrial revolution. This is an example of:

- (A) appearance of the darker coloured individuals due to very poor sunlight
- (B) protective mimicry
- (C) inheritance of darker colour character acquired due to the darker environment
- (D) natural selection whereby the darker forms were selected

81. Transgenic plants are the ones:

- (A) generated by introducing foreign DNA into a cell and regenerating a plant from that cell.
- (B) produced after protoplast fusion in artificial medium.
- (C) grown in artificial medium after hybridization in the field.
- (D) produced by a somatic embryo in artificial medium.

82. Which one of the following pairs of food components in humans reaches the stomach totally undigested?

- (A) Starch and fat
- (B) Fat and cellulose
- (C) Starch and cellulose
- (D) Protein and starch

83. A change in the amount of yolk and its distribution in the egg will affect:

- (A) Pattern of cleavage
- (B) Number of blastomeres produced
- (C) Fertilization
- (D) Formation of zygote

84. Middle lamella is composed mainly of:

- (A) Muramic acid
- (B) Calcium pectate
- (C) Phosphoglycerides
- (D) Hemicellulose

85. Elbow joint is an example of:

- (A) hinge joint
- (B) gliding joint
- (C) ball and socket joint
- (D) pivot joint

86. Which of the following is a symbiotic nitrogen fixer?

- (A) *Azotobacter*
- (B) *Frankia*
- (C) *Azolla*
- (D) *Glomus*

AIPMT 2009 Prelims · Q142

87. Whose experiments cracked the DNA and discovered unequivocally that a genetic code is a triplet?

- (A) Hershey and Chase
- (B) Morgan and Sturtevant
- (C) Beadle and Tatum
- (D) Nirenberg and Mathaei

AIPMT 2009 Prelims · Q143

88. Which one of the following types of organisms occupy more than one trophic level in a pond ecosystem?

- (A) Fish
- (B) Zooplankton
- (C) Frog
- (D) Phytoplankton

AIPMT 2009 Prelims · Q144

89. Which one of the following acids is a derivative of carotenoids?

- (A) Indole-3-acetic acid
- (B) Gibberellic acid
- (C) Abscissic acid
- (D) Indole butyric acid

AIPMT 2009 Prelims · Q145

90. The bacterium *Bacillus thuringiensis* is widely used in contemporary biology as:

- (A) Insecticide
- (B) Agent for production of dairy products
- (C) Source of industrial enzyme
- (D) Indicator of water pollution

AIPMT 2009 Prelims · Q146

91. An example of a seed with endosperm, perisperm, and caruncle is:

- (A) coffee
- (B) lily
- (C) castor
- (D) cotton

AIPMT 2009 Prelims · Q147

92. Reduction in vascular tissue, mechanical tissue and cuticle is characteristic of:

- (A) Mesophytes
- (B) Epiphytes
- (C) Hydrophytes
- (D) Xerophytes

AIPMT 2009 Prelims · Q148

93. Point mutation involves:

- (A) Change in single base pair
- (B) Duplication
- (C) Deletion
- (D) Insertion

AIPMT 2009 Prelims · Q149

94. Which one of the following correctly describes the location of some body parts in the earthworm *Pheretima*?

- (A) Four pairs of spermathecae in 4 – 7 segments.
- (B) One pair of ovaries attached at intersegmental septum of 14th and 15th segments.
- (C) Two pairs of testes in 10th and 11th segments.
- (D) Two pairs of accessory glands in 16 – 18 segments.

95. The kind of tissue that forms the supportive structure in our pinna (external ears) is also found in:

- (A) nails
- (B) ear ossicles
- (C) tip of the nose
- (D) vertebrae

Answer key and explanations

1. Answer: (C) Iris - Involuntary smooth muscle

The muscles of the iris that change pupil size are smooth, involuntary muscles. The abdominal wall is moved by skeletal (striated, voluntary) muscles, so pairing it with smooth muscle is wrong; the biceps is also skeletal and the heart wall is striated cardiac muscle.

2. Answer: (B) Ciliated

NCERT states that ciliated epithelium lines hollow organs such as bronchioles and fallopian tubes, where the beating cilia move mucus or the ovum in one direction. Squamous epithelium lines blood vessels and air sacs, not these tubes.

3. Answer: (B) Photolysis of water during photosynthesis

Manganese is a component of the water-splitting (oxygen-evolving) complex of photosystem II, so it is needed for photolysis of water and release of oxygen. Calcium (not manganese) is used in the middle lamella of the cell wall, and magnesium/iron are linked to chlorophyll synthesis.

4. Answer: (D) Gene transfer without a vector

Polyethylene glycol (PEG) makes plant protoplast membranes permeable or fuse, so naked DNA can be taken up directly; it is a vectorless (direct) gene transfer method. It has nothing to do with biodiesel or seedless fruits.

5. Answer: (C) Tobacco

The formula shows an actinomorphic bisexual flower with five fused sepals, five fused petals, five epipetalous stamens and a bicarpellary syncarpous superior ovary, which is the Solanaceae formula (tobacco). Soybean and sunnhemp (Fabaceae) are zygomorphic with a monocarpellary pistil, and tulip (Liliaceae) has a trimerous perianth.

6. Answer: (A) Aschelminthes (round worms)

Roundworms (Aschelminthes) are bilaterally symmetrical, triploblastic pseudocoelomates. Ctenophores and cnidarians are radially symmetrical and diploblastic, and sponges have no true tissue layers.

7. Answer: (B) Agrobacterium tumefaciens

Agrobacterium tumefaciens naturally transfers a piece of its Ti plasmid (T-DNA) into dicot plant cells, and the disarmed Ti plasmid is used as a vector to deliver genes into crop plants. Meloidogyne incognita is a nematode pest and Trichoderma is a biocontrol fungus, not a vector.

8. Answer: (B) Development of corpus luteum : Secretory phase and increased secretion of progesterone.

After ovulation the ruptured follicle becomes the corpus luteum, which secretes large amounts of progesterone during the luteal (secretory) phase. The proliferative phase and menstruation involve the endometrium, not the myometrium, so those pairings are wrong.

9. Answer: (D) Late blight of potato - Alternaria solani

Late blight of potato is caused by the oomycete Phytophthora infestans; Alternaria solani causes early blight of potato. The other three pairings (rust by Puccinia, smut by Ustilago, root-knot by the nematode Meloidogyne) are correct.

10. Answer: (A) The Montreal Protocol

The Montreal Protocol (1987) is the international treaty that set specific controls to phase out ozone-depleting substances such as CFCs. The Kyoto Protocol deals with greenhouse gas emissions, and the Vienna Convention was only a framework agreement without specific control measures.

11. Answer: (D) The inactive protoxin gets converted into active form in the insect gut.

Bacillus thuringiensis makes Bt toxin as an inactive protoxin crystal; the alkaline pH of the insect gut solubilises and activates it, and it binds the midgut epithelium, creating pores that kill the insect. It is not active inside the bacterium, which is why the bacterium is unharmed, and it does not act on the ovaries.

12. Answer: (B) Annelida and Arthropoda

Peripatus (Onychophora) has annelid features such as nephridia and a soft segmented body along with arthropod features such as tracheae, claws and a haemocoel, so it links Annelida and Arthropoda.

13. Answer: (D) Free infectious RNA

In 1971 T.O. Diener discovered the viroid, the agent of potato spindle tuber disease, which is a free low-molecular-weight RNA without a protein coat. An infectious protein is a prion, not a viroid.

14. Answer: (D) fructose, calcium and certain enzymes

NCERT states that secretions of the seminal vesicles, prostate and bulbourethral glands form seminal plasma, which is rich in fructose, calcium and certain enzymes. So the option saying it is poor in calcium is wrong.

15. Answer: (B) Syconus

A hypanthodium (as in fig) is a hollow fleshy receptacle with tiny flowers inside, and the composite fruit formed from it is a syconus. Sorosis develops from a spike or spadix (mulberry, pineapple), while caryopsis and hesperidium are simple fruits.

16. Answer: (B) Epithelial tissue

NCERT describes tight, adhering and gap junctions as the special junctions that hold epithelial cells together and link them structurally and functionally. Connective tissue cells are scattered in a matrix and do not form such sheets.

17. Answer: (C) There will be no micturition

Micturition is a reflex: stretch receptors in the filling bladder send signals to the CNS, which then sends motor messages to contract the bladder muscle and relax the sphincter. Without stretch receptors, the reflex cannot start, so there will be no micturition. Urine would still reach the bladder from the ureters, but voluntary/reflex emptying would fail.

18. Answer: (A) coelomic fluid

The earthworm has a true coelom filled with coelomic fluid lying between the body wall and the gut, so a needle prick through the body wall releases coelomic fluid. Haemolymph is found in arthropods with an open circulation, while the earthworm has a closed blood system.

19. Answer: (C) no antigens A and B on RBCs

Group O red cells carry neither antigen A nor antigen B on their surface, so 'O' stands for the absence (zero) of these antigens. The O allele is recessive, not overdominant, and antibodies are in the plasma, not on the RBCs.

20. Answer: (D) NAA

NCERT states that IAA and IBA have been isolated from plants, whereas NAA (naphthalene acetic acid) and 2,4-D are synthetic auxins. GA is a gibberellin, not an auxin.

21. Answer: (A) Preformed antibodies

When a quick immune response is needed, as in a person at risk of tetanus after an injury, NCERT says preformed antibodies or antitoxin are injected directly; this is passive immunisation. Weakened or dead germs give active immunity, which takes too long to protect someone already exposed.

22. Answer: (B) acetylcholine

Alzheimer disease involves loss of cholinergic neurons, causing a deficiency of the neurotransmitter acetylcholine and memory loss. Dopamine deficiency is linked to Parkinson disease, not Alzheimer.

23. Answer: (C) increases when sewage gets mixed with river water.

BOD is the amount of oxygen consumed when microbes oxidise the organic matter in a litre of water; sewage adds a lot of organic matter, so BOD rises. BOD is about oxygen use by microbes in general, not a count of Salmonella.

24. Answer: (B) introducing bone marrow cells producing ADA into cells at early embryonic stages.

NCERT notes that if the gene from bone marrow cells producing ADA is introduced into cells at early embryonic stages, it could be a permanent cure. Infusing engineered lymphocytes is not permanent because lymphocytes are not immortal and the infusion must be repeated; enzyme replacement is also only a treatment.

25. Answer: (B) more WBCs and no RBCs

Lymph is tissue fluid drained into lymphatic vessels; it has no RBCs and is rich in lymphocytes (WBCs). It does contain plasma with fewer proteins, so 'plasma without proteins' and 'no plasma' are wrong.

26. Answer: (B) caused by a change in a single base pair of DNA

Sickle cell anaemia results from a single base substitution (GAG to GUG) in the β -globin gene, a point mutation, so glutamic acid at the sixth position is replaced by valine, not the other way round. The trait is autosomal recessive and mature RBCs have no nucleus.

27. Answer: (A) Zea mays

Bioethanol is made by fermenting sugars or starch, and maize (Zea mays) starch is a major feedstock for it. Jatropha, Pongamia and Brassica are oil-seed plants whose oils are used for biodiesel, not ethanol.

28. Answer: (D) Marasmus

Marasmus results from a combined deficiency of proteins and calories and is seen in infants below one year when mother's milk is replaced too early by food poor in both. Kwashiorkor is mainly protein deficiency (with adequate calories) and occurs in children over one year.

29. Answer: (A) Bile pigments passed through bile juice

Bile carries the pigments bilirubin and biliverdin, formed from haemoglobin breakdown, into the intestine, and their products colour the faeces yellow. Pancreatic and intestinal juices carry enzymes, not pigments.

30. Answer: (A) Mango

NCERT gives genetic diversity examples for India: more than 50,000 strains of rice and about 1,000 varieties of mango. Of the listed plants, mango is the one cited for very high genetic diversity in India; wheat is not given as an example.

31. Answer: (A) Oscillatoria

Oscillatoria is a cyanobacterium with chlorophyll a and photosystem II, so it splits water and releases oxygen like plants. Rhodospirillum, Chlorobium and Chromatium are purple or green photosynthetic bacteria that use H_2S or organic donors and do not release oxygen.

32. Answer: (A) Mature RBCs

Mature human (mammalian) RBCs lose their nucleus and have no mitochondria, so they contain no DNA. An enucleated ovum still has mitochondrial DNA, and a sperm and hair root cells have nuclei.

33. Answer: (B) Gir

Gir National Park in Gujarat is the home of the Asiatic lion and has no resident tigers. Sunderbans, Jim Corbett and Ranthambhore are tiger reserves.

34. Answer: (A) Fructose and amino acids are absorbed through intestinal mucosa with the help of carrier ions like Na^+ .

Old NCERT states that fructose and some amino acids are absorbed with the help of carrier ions like Na^+ (facilitated transport). Chylomicrons go into the lymph vessels (lacteals), not blood capillaries; salivary amylase hydrolyses about 30% of starch; and oxyntic cells secrete HCl, while chief cells secrete pepsinogen.

35. Answer: (C) two homologous chromosomes

Synapsis is the pairing of homologous chromosomes during zygotene of prophase I of meiosis, aided by the synaptonemal complex. Spindle fibres attach to kinetochores, which is a different event.

36. Answer: (D) A codon in mRNA is read in a non-contiguous fashion

The genetic code is read in a contiguous way, codon after codon without punctuation, so a 'non-contiguous' reading is false. It is indeed nearly universal, degenerate (several codons per amino acid) and unambiguous (one codon codes for one amino acid).

37. Answer: (A) Pinus

In Pinus both male and female cones are borne on the same tree, so it is monoecious. Cycas, papaya and Marchantia have separate male and female plants (dioecious).

38. Answer: (C) ATP

In cyclic photophosphorylation only PS I works and electrons return to the same reaction centre, so only ATP is made. NADPH and O_2 come from the non-cyclic pathway, which involves PS II and water splitting.

39. Answer: (C) Thymus

T-lymphocytes arise in the bone marrow but mature and become immunocompetent in the thymus, hence the letter T. Tonsils and thyroid are not sites of T-cell maturation.

40. Answer: (B) fully developed foetus and placenta

NCERT states that the signals for parturition originate from the fully developed foetus and the placenta, which induce mild uterine contractions called the foetal ejection reflex. This reflex then triggers oxytocin release, so oxytocin is a result, not the initial inducer.

41. Answer: (C) Position of protoxylem

Even after secondary growth, a dicot root keeps exarch protoxylem (towards the periphery), whereas the stem has endarch protoxylem (towards the centre). Both old root and stem have secondary xylem and phloem, so their presence or absence cannot distinguish them.

42. Answer: (C) Connections between adjacent cells

Plasmodesmata are cytoplasmic strands passing through the cell walls that connect the cytoplasm of neighbouring plant cells. The cementing layer between cells is the middle lamella, made of calcium pectate, not lignin.

43. Answer: (D) Splicing

In eukaryotes the primary transcript (hnRNA) has introns, which are removed and the exons joined in order by splicing. Capping adds methyl guanosine at the 5' end and tailing adds a poly-A tail at the 3' end; neither removes introns.

44. Answer: (D) Evolutionary relationships

Phylogenetic classification groups organisms according to their evolutionary relationships, assuming members of a taxon share a common ancestor. Systems based mainly on morphology or floral characters are artificial or natural systems.

45. Answer: (C) Hypothalamus

The hypothalamus contains centres that control body temperature, hunger and thirst. The cerebellum coordinates movement and balance, and the medulla controls breathing and heart rate.

46. Answer: (A) Escherichia coli

Meselson and Stahl (1958) grew *E. coli* in ^{15}N and then ^{14}N medium and showed by CsCl density gradient centrifugation that DNA replicates semiconservatively. *Streptococcus pneumoniae* was used by Griffith for transformation, not replication.

47. Answer: (B) Lampreys and hag fishes

Lampreys (*Petromyzon*) and hagfishes (*Myxine*) are cyclostomes, the jawless vertebrates (Agnatha). Eels, guppies, mackerel and rohu are bony fishes with jaws.

48. Answer: (A) Common Cold, AIDS

Common cold is caused by rhinoviruses and AIDS by HIV, so both are viral. Typhoid and tuberculosis are bacterial, dysentery is bacterial or protozoan, and ringworm is fungal.

49. Answer: (B) Amphibolic

NCERT calls the respiratory pathway amphibolic because it breaks down substrates (catabolism) and also supplies intermediates for synthesis of fatty acids, amino acids etc. (anabolism). Calling it only catabolic misses this dual role.

50. Answer: (C) Proteinaceous filaments

The cytoskeleton is a network of protein filaments — microtubules (tubulin), microfilaments (actin) and intermediate filaments — in the cytoplasm. Cellulose microfibrils are part of the plant cell wall, outside the cytoplasm.

51. Answer: (B) Lemon

In lemon (like china rose and tomato) the ovules are attached to a central axis in a multilocular ovary, which is axile placentation. *Dianthus* has free central, *Argemone* parietal and marigold (sunflower family) basal placentation.

52. Answer: (B) Ustilago

In fungi like *Ustilago* the dominant phase is haploid and the only diploid stage is the zygote nucleus, which undergoes meiosis, giving a haplontic pattern. Mosses like *Funaria* and *Polytrichum* are haplo-diplontic, and wheat is diplontic.

53. Answer: (A) compulsory PUC (Pollution Under Control) certification of petrol driven vehicles which tests for carbon monoxide and hydrocarbons.

PUC certification, which checks the emission of carbon monoxide and hydrocarbons from vehicles, is a compulsory measure in India. The other options overstate the rules: CNG was mandated for public transport in Delhi, not all buses and trucks nationwide, sulphur limits were lowered far below 500 ppm, and 20% blending was not compulsory.

54. Answer: (A) Heterospory

NCERT notes that heterospory, as in *Selaginella* and *Salvinia*, with the female gametophyte retained on the parent sporophyte, is a precursor to the seed habit. A free-living gametophyte is the opposite of what happens in seed plants.

55. Answer: (A) elongating

Protoxylem forms in regions that are still elongating, and its annular and spiral wall thickenings allow the vessels to stretch with the growing organ without breaking. Metaxylem, with reticulate and pitted thickenings, forms later when the organ has stopped elongating and is maturing.

56. Answer: (A) Volvox → Hydrilla → Pistia → Scirpus → Lantana → Oak

A hydrosere begins with phytoplankton (Volvox), then submerged plants (Hydrilla), floating plants (Pistia), reed-swamp plants (Scirpus), shrubs (Lantana) and finally a forest climax (Oak). Sequences starting with Oak run backwards from the climax.

57. Answer: (B) myxoedema

Myxoedema is the specific adult form of thyroxine deficiency, with low BMR, weight gain and puffy water-retaining tissues. Cretinism is thyroxine deficiency in children, and simple goitre is thyroid enlargement due to iodine shortage.

58. Answer: (B) Fucus

Brown algae (Phaeophyceae) such as Fucus store food as laminarin or mannitol. Porphyra and Gracilaria are red algae storing floridean starch, and Chara is a green alga storing starch.

59. Answer: (A) Alcohol - nitrogenase

Alcohol is produced by yeast fermentation using zymase enzymes; nitrogenase is the nitrogen-fixing enzyme and has no role in alcohol production. Pectinases clarify fruit juices, lipases are used in detergents and amylases are used for desizing textiles.

60. Answer: (C) Xanthomonas campestris

Xanthomonas campestris is a plant pathogen (black rot of crucifers) and is used commercially for xanthan gum, not as a biopesticide. Trichoderma, nucleopolyhedroviruses and Bacillus thuringiensis are all NCERT examples of biocontrol agents.

61. Answer: (D) Equisetum

Pteridophytes like Equisetum have xylem and phloem but no seeds or flowers, so they are vascular cryptogams. Marchantia is a bryophyte without vascular tissue, and Ginkgo and Cedrus are seed-bearing gymnosperms.

62. Answer: (C) P - depolarisation of the atria

In an ECG the P-wave represents electrical excitation (depolarisation) of the atria, leading to atrial contraction. The QRS complex is ventricular depolarisation and the T-wave is ventricular repolarisation, so R is not repolarisation.

63. Answer: (B) Cockroach

Insects such as the cockroach are uricotelic: they excrete nitrogen mainly as uric acid to save water. Frog and man are ureotelic, and earthworm excretes mostly urea and ammonia.

64. Answer: (A) Transpiration

Guard cells open and close the stomatal pore and so regulate transpiration and gaseous exchange. Guttation happens through hydathodes, not stomata.

65. Answer: (D) Reduction of ozone depleting substances

The Montreal Protocol (1987) is an international treaty to cut down the emission of ozone-depleting substances such as CFCs. Control of CO₂ emissions is the aim of the Kyoto Protocol.

66. Answer: (D) lipo soluble

DDT is fat-soluble and cannot be metabolised or excreted, so it accumulates in fatty tissues and its concentration increases at each trophic level (biomagnification). A water-soluble substance would be excreted rather than accumulate.

67. Answer: (C) Sucker

Mint propagates by suckers: lateral branches arise from the underground base of the stem, grow horizontally under the soil and then turn upward to form new leafy shoots. Runners are found in grasses and Oxalis, and offsets in aquatic plants like Pistia and Eichhornia.

68. Answer: (C) Baldness is a sex-limited trait

Baldness is a sex-influenced trait (expressed more often in males because of hormones), not a sex-limited trait, which is expressed in only one sex. The other statements are correct: galactosemia is an inborn error, genetic drift is strong in small populations, and linked genes do not assort independently.

69. Answer: (D) groundnut and pomegranate

In groundnut we eat the fleshy cotyledons of the seed, and in pomegranate the juicy outer seed coat (testa). In litchi the edible part is the aril and in coconut it is the endosperm, so those pairs fail.

70. Answer: (C) Malignant tumours may exhibit metastasis.

Malignant tumours shed cells that travel through blood to form secondary tumours elsewhere; this is metastasis. Benign tumours stay confined to their site, and heroin is a depressant that slows body functions.

71. Answer: (A) spermatogonia → spermatocyte → spermatid → sperms

Spermatogonia divide by mitosis and grow into primary spermatocytes, which undergo meiosis to form secondary spermatocytes and then spermatids; spermatids change into sperms by spermiogenesis.

Spermatids come after spermatocytes, so any sequence placing spermatid earlier is wrong.

72. Answer: (D) Allergy

In allergy, mast cells release histamine and serotonin, so antihistamines, adrenalin and steroids quickly reduce the symptoms. They are not the standard treatment for nausea or headache.

73. Answer: (A) Forests

In the Chipko movement (Garhwal Himalayas, 1974) local women hugged trees to stop contractors from felling them, so it aimed to protect forests.

74. Answer: (D) fertilisation of the ovum

Absence of menstruation in a regularly cycling woman is most likely due to pregnancy, which starts with fertilisation of the ovum. The retained corpus luteum, high hormone levels and thick endometrium are consequences of fertilisation, not its root cause.

75. Answer: (D) defence mechanisms of body

NCERT states that globulins are primarily involved in the defence mechanisms of the body (antibodies are gamma globulins). Albumins maintain osmotic balance and fibrinogen helps in clotting.

76. Answer: (D) Sorghum

Sorghum is a monocot with an isobilateral leaf whose mesophyll is not differentiated into palisade and spongy layers. Mustard, soybean and gram are dicots with dorsiventral leaves that have palisade parenchyma.

77. Answer: (A) closed and scattered

Barley is a monocot, and monocot stems have many conjoint, closed (no cambium) vascular bundles scattered in the ground tissue. Open bundles arranged in a ring are typical of dicot stems.

78. Answer: (A) ilium, ischium, pubis – coxal bones of pelvic girdle

Each coxal (hip) bone of the pelvic girdle is formed by fusion of the ilium, ischium and pubis. Rhodopsin is a visual pigment, thiamine is a vitamin (thymine is the pyrimidine) and the cochlea is part of the inner ear, not an ossicle.

79. Answer: (D) Tissue culture

Plants regenerated from somatic cells through tissue culture (micropropagation) are genetically identical to the source plant and are called somaclones. Irradiation and genetic engineering are used to create variation, not clones.

80. Answer: (D) natural selection whereby the darker forms were selected

On soot-darkened tree trunks the dark moths were less visible to predatory birds and survived and reproduced more, so their frequency increased; NCERT uses this industrial melanism as an example of natural selection. It is camouflage, not mimicry of another species, and not inheritance of acquired characters.

81. Answer: (A) generated by introducing foreign DNA into a cell and regenerating a plant from that cell.

Transgenic (GM) plants carry a foreign gene that was introduced into a cell, from which a whole plant is regenerated. Protoplast fusion produces somatic hybrids, not transgenic plants.

82. Answer: (B) Fat and cellulose

Saliva contains salivary amylase that starts starch digestion in the mouth but has no fat-digesting enzyme in humans, and cellulose is never digested by human enzymes. So fat and cellulose reach the stomach unchanged, while starch is already partly digested.

83. Answer: (A) Pattern of cleavage

Yolk slows down cleavage furrows, so the amount and distribution of yolk decide whether cleavage is holoblastic or meroblastic, equal or unequal. Fertilisation and zygote formation do not depend on yolk distribution.

84. Answer: (B) Calcium pectate

NCERT states that the middle lamella is a layer mainly of calcium pectate that holds neighbouring plant cells together. Muramic acid is found in bacterial cell walls, and hemicellulose is part of the primary wall.

85. Answer: (A) hinge joint

The elbow (like the knee) allows movement in one plane only, so it is a hinge joint. The shoulder is a ball and socket joint, and the joint between atlas and axis is a pivot joint.

86. Answer: (B) Frankia

Frankia is an actinomycete that fixes nitrogen in root nodules of non-leguminous plants such as *Alnus*, a symbiotic association. *Azotobacter* is free-living, *Azolla* is a fern that hosts the nitrogen-fixer *Anabaena*, and *Glomus* is a mycorrhizal fungus that helps phosphorus uptake.

87. Answer: (D) Nirenberg and Mathaei

Nirenberg and Matthaai used cell-free protein synthesis with synthetic RNA (poly-U giving polyphenylalanine), which helped decode the codons and confirm the triplet code. Hershey and Chase proved DNA is the genetic material, not the nature of the code.

88. Answer: (A) Fish

Fish in a pond may feed on plants or algae (primary consumer) as well as on zooplankton or smaller fish (secondary or higher consumer), so they occupy several trophic levels. Phytoplankton are only producers and zooplankton are mainly primary consumers.

89. Answer: (C) Absciscic acid

Absciscic acid is a sesquiterpene formed from the breakdown of carotenoids (xanthoxin pathway). IAA and IBA are indole compounds derived from tryptophan, and gibberellic acid is a diterpene not derived from carotenoids.

90. Answer: (A) Insecticide

Bacillus thuringiensis spores and its Bt toxin genes are used to kill insect larvae such as caterpillars, making it a biological insecticide. Dairy products are made with lactic acid bacteria, not Bt.

91. Answer: (C) castor

Castor seed is endospermic and has a caruncle, a spongy outgrowth near the micropyle; a thin remnant of nucellus (perisperm) is also reported. Cotton seeds bear hairs, not a caruncle.

92. Answer: (C) Hydrophytes

Water plants are supported by water and absorb water over their whole surface, so they have poorly developed xylem, little mechanical tissue and a thin or absent cuticle. Xerophytes show the opposite: thick cuticle and well-developed mechanical tissue.

93. Answer: (A) Change in single base pair

A point mutation is a change in a single base pair of DNA, as in sickle cell anaemia. Duplication and larger deletions or insertions alter segments of chromosomes or DNA rather than a single base.

94. Answer: (C) Two pairs of testes in 10th and 11th segments.

Pheretima has two pairs of testes in the 10th and 11th segments. The four pairs of spermathecae lie in segments 6-9, the single pair of ovaries is at the septum between segments 12 and 13, and the two pairs of accessory glands are in segments 17 and 19.

95. Answer: (C) tip of the nose

The pinna is supported by cartilage, which NCERT says is also present in the tip of the nose, the outer ear joints and between adjacent vertebrae. Ear ossicles and vertebrae themselves are bone, and nails are keratin.

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