

AIPMT 2007 Prelims — Biology Question Paper with Solutions

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

AIPMT 2007 Prelims · Q101

1. ICBN stands for

- (A) International Code of Botanical Nomenclature
- (B) International Congress of Biological Names
- (C) Indian Code of Botanical Nomenclature
- (D) Indian Congress of Biological Names

AIPMT 2007 Prelims · Q102

2. Which pair of the following belongs to Basidiomycetes?

- (A) puffballs and Claviceps
- (B) Peziza and stinkhorns
- (C) Morchella and mushrooms
- (D) bird's nest fungi and puffballs

AIPMT 2007 Prelims · Q103

3. Biological organisation starts with

- (A) cellular level
- (B) organismic level
- (C) atomic level
- (D) submicroscopic molecular level

AIPMT 2007 Prelims · Q104

4. Identify the odd combination of the habitat and the particular animal concerned.

- (A) Sunderbans - Bengal Tiger
- (B) Periyar - Elephant
- (C) Rann of Kutch - Wild Ass
- (D) Dachigam National Park - Snow Leopard

AIPMT 2007 Prelims · Q105

5. If you suspect major deficiency of antibodies in a person, to which of the following would you look for confirmatory evidence?

- (A) serum globulins
- (B) fibrinogen in the plasma
- (C) haemocytes
- (D) serum albumins

AIPMT 2007 Prelims · Q107

6. The Okazaki fragments in DNA chain growth

- (A) polymerize in the 3'-to-5' direction and form replication fork
- (B) prove semi-conservative nature of DNA replication
- (C) polymerize in the 5'-to-3' direction and explain 3'-to-5' DNA replication
- (D) result in transcription

AIPMT 2007 Prelims · Q110

7. The concept of chemical evolution is based on

- (A) interaction of water, air and clay under intense heat
- (B) effect of solar radiation on chemicals
- (C) possible origin of life by combination of chemicals under suitable environmental conditions
- (D) crystallization of chemicals

AIPMT 2007 Prelims · Q111

8. Which one of the following is surrounded by a callose wall?

- (A) male gamete
- (B) egg
- (C) pollen grain
- (D) microspore mother cell

AIPMT 2007 Prelims · Q112

9. Probiotics are

- (A) cancer inducing microbes
- (B) new kind of food allergens
- (C) live microbial food supplement
- (D) safe antibiotics

AIPMT 2007 Prelims · Q113

10. One of endangered species of Indian medicinal plants is that of

- (A) Ocimum
- (B) garlic
- (C) Nepenthes
- (D) Podophyllum

AIPMT 2007 Prelims · Q114

11. What is true about Nereis, scorpion, cockroach and silver fish?

- (A) they all possess dorsal heart
- (B) none of them is aquatic
- (C) they all belong to the same phylum
- (D) they all have jointed paired appendages

AIPMT 2007 Prelims · Q115

12. The living organisms can be unexceptionally distinguished from the non-living things on the basis of their ability for

- (A) interaction with the environment and progressive evolution
- (B) reproduction
- (C) growth and movement
- (D) responsiveness to touch

AIPMT 2007 Prelims · Q116

13. A person who is on a long hunger strike and is surviving only on water, will have

- (A) less amino acids in his urine
- (B) more glucose in his blood
- (C) less urea in his urine
- (D) more sodium in his urine

AIPMT 2007 Prelims · Q117

14. The length of DNA molecule greatly exceeds the dimensions of the nucleus in eukaryotic cells. How is this DNA accommodated?

- (A) super-coiling in nucleosomes
- (B) DNase digestion
- (C) through elimination of repetitive DNA
- (D) deletion of non-essential genes

AIPMT 2007 Prelims · Q119

15. In a coal fired power plant electrostatic precipitators are installed to control emission of

- (A) NO_x
- (B) SPM
- (C) CO
- (D) SO₂

AIPMT 2007 Prelims · Q120

16. Select the wrong statement from the following.

- (A) Both chloroplasts and mitochondria have an internal compartment, the thylakoid space bounded by the thylakoid membrane
- (B) Both chloroplasts and mitochondria contain DNA
- (C) The chloroplasts are generally much larger than mitochondria
- (D) Both chloroplasts and mitochondria contain an inner and an outer membrane

AIPMT 2007 Prelims · Q121

17. Geometric representation of age structure is a characteristic of

- (A) population
- (B) landscape
- (C) ecosystem
- (D) biotic community

AIPMT 2007 Prelims · Q122

18. During transcription, RNA polymerase holoenzyme binds to a gene promoter and assumes a saddle-like structure. What is its DNA-binding sequence?

- (A) AATT
- (B) CACC
- (C) TATA
- (D) TTAA

AIPMT 2007 Prelims · Q123

19. A plant requires magnesium for

- (A) protein synthesis
- (B) chlorophyll synthesis
- (C) cell wall development
- (D) holding cells together

AIPMT 2007 Prelims · Q124

20. In the prothallus of a vascular cryptogam, the antherozoids and eggs mature at different times. As a result

- (A) there is high degree of sterility
- (B) one can conclude that the plant is apomictic
- (C) self-fertilization is prevented
- (D) there is no change in success rate of fertilization

AIPMT 2007 Prelims · Q125

21. Ergot of rye is caused by a species of

- (A) Uncinula
- (B) Ustilago
- (C) Claviceps
- (D) Phytophthora

AIPMT 2007 Prelims · Q126

22. The finches of Galapagos islands provide an evidence in favour of

- (A) evolution due to mutation
- (B) retrogressive evolution
- (C) biogeographical evolution
- (D) special creation

AIPMT 2007 Prelims · Q127

23. Which one of the following is a slime mould?

- (A) Physarum
- (B) Thiobacillus
- (C) Anabaena
- (D) Rhizopus

AIPMT 2007 Prelims · Q128

24. The population of an insect species shows an explosive increase in numbers during rainy season followed by its disappearance at the end of the season. What does this show?

- (A) the food plants mature and die at the end of the rainy season
- (B) its population growth curve is of J-type
- (C) the population of its predators increases enormously
- (D) S-shaped or sigmoid growth of this insect

AIPMT 2007 Prelims · Q129

25. Which of the following is a flowering plant with nodules containing filamentous nitrogen-fixing micro-organism?

- (A) *Crotalaria juncea*
- (B) *Cycas revoluta*
- (C) *Cicer arietinum*
- (D) *Casuarina equisetifolia*

AIPMT 2007 Prelims · Q130

26. Which one of the following is being utilized as a source of biodiesel in the Indian countryside?

- (A) beetroot
- (B) sugarcane
- (C) *Pongamia*
- (D) *Euphorbia*

AIPMT 2007 Prelims · Q131

27. For a critical study of secondary growth in plants, which one of the following pairs is suitable?

- (A) teak and pine
- (B) deodar and fern
- (C) wheat and maiden hair fern
- (D) sugarcane and sunflower

AIPMT 2007 Prelims · Q132

28. Which one of the following is a fat-soluble vitamin and its related deficiency disease?

- (A) Retinol - Xerophthalmia
- (B) Cobalamine - Beri-beri
- (C) Calciferol - Pellagra
- (D) Ascorbic acid - Scurvy

AIPMT 2007 Prelims · Q133

29. Two cells A and B are contiguous. Cell A has osmotic pressure 10 atm, turgor pressure 7 atm and diffusion pressure deficit 3 atm. Cell B has osmotic pressure 8 atm, turgor pressure 3 atm and diffusion pressure deficit 5 atm. The result will be

- (A) no movement of water
- (B) equilibrium between the two
- (C) movement of water from cell A to B
- (D) movement of water from cell B to A

AIPMT 2007 Prelims · Q134

30. In which one of the following preparations are you likely to come across cell junctions most frequently?

- (A) thrombocytes
- (B) tendon
- (C) hyaline cartilage
- (D) ciliated epithelium

AIPMT 2007 Prelims · Q135

31. If you are asked to classify the various algae into distinct groups, which of the following characters you should choose?

- (A) nature of stored food materials in the cell
- (B) structural organization of thallus
- (C) chemical composition of the cell wall
- (D) types of pigments present in the cell

AIPMT 2007 Prelims · Q136

32. About 98 percent of the mass of every living organism is composed of just six elements including carbon, hydrogen, nitrogen, oxygen and

- (A) sulphur and magnesium
- (B) magnesium and sodium
- (C) calcium and phosphorus
- (D) phosphorus and sulphur

AIPMT 2007 Prelims · Q137

33. Which one of the following statements is correct?

- (A) Both Azotobacter and Rhizobium fix atmospheric nitrogen in root nodules of plants.
- (B) Cyanobacteria such as Anabaena and Nostoc are important mobilizers of phosphates and for plant nutrition in soil
- (C) At present it is not possible to grow maize without chemical fertilizers
- (D) Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies.

AIPMT 2007 Prelims · Q138

34. In the hexaploid wheat, the haploid (n) and basic (x) numbers of chromosomes are

- (A) $n = 21$ and $x = 21$
- (B) $n = 21$ and $x = 14$
- (C) $n = 21$ and $x = 7$
- (D) $n = 7$ and $x = 21$

AIPMT 2007 Prelims · Q139

35. Passage cells are thin walled cells found in

- (A) phloem elements that serve as entry points for substance for transport to other plant parts
- (B) testa of seeds to enable emergence of growing embryonic axis during seed germination
- (C) central region of style through which the pollen tube grows towards the ovary
- (D) endodermis of roots facilitating rapid transport of water from cortex to pericycle

AIPMT 2007 Prelims · Q140

36. What is common between parrot, platypus and kangaroo?

- (A) toothless jaws
- (B) functional post-anal tail
- (C) oviparity
- (D) homoiothermy

AIPMT 2007 Prelims · Q141

37. Bowman's glands are located in the

- (A) anterior pituitary
- (B) female reproductive system of cockroach
- (C) olfactory epithelium of our nose
- (D) proximal end of uriniferous tubules

AIPMT 2007 Prelims · Q142

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

- (A) yeast - ethanol
- (B) streptomycetes - antibiotic
- (C) coliforms - vinegar
- (D) methanogens - gobar gas

AIPMT 2007 Prelims · Q143

39. Which part of ovary in mammals acts as an endocrine gland after ovulation?

- (A) stroma
- (B) germinal epithelium
- (C) vitelline membrane
- (D) Graafian follicle

AIPMT 2007 Prelims · Q145

40. Which one of the following is a matching pair of a body feature and the animal possessing it?

- (A) Ventral central nervous system - Leech
- (B) Pharyngeal gill slits absent in embryo - Chamaeleon
- (C) Ventral heart - Scorpion
- (D) Post-anal tail - Octopus

AIPMT 2007 Prelims · Q146

41. All enzymes of TCA cycle are located in the mitochondrial matrix except one which is located in inner mitochondrial membranes in eukaryotes and in cytosol in prokaryotes. This enzyme is

- (A) isocitrate dehydrogenase
- (B) malate dehydrogenase
- (C) succinate dehydrogenase
- (D) lactate dehydrogenase

AIPMT 2007 Prelims · Q147

42. The first acceptor of electrons from an excited chlorophyll molecule of photosystem II is

- (A) iron-sulphur protein
- (B) ferredoxin
- (C) quinone
- (D) cytochrome

AIPMT 2007 Prelims · Q148

43. Differentiation of organs and tissues in a developing organism, is associated with

- (A) differential expression of genes
- (B) lethal mutations
- (C) deletion of genes
- (D) developmental mutations

AIPMT 2007 Prelims · Q149

44. Which one of the following statements about mycoplasma is wrong?

- (A) They are pleomorphic
- (B) They are sensitive to penicillin
- (C) They cause diseases in plants
- (D) They are also called PPLO

AIPMT 2007 Prelims · Q150

45. Which one of the following pairs is mismatched?

- (A) *Apis indica* - honey
- (B) *Kerria lacca* - lac
- (C) *Bombyx mori* - silk
- (D) *Pila globosa* - pearl

AIPMT 2007 Prelims · Q151

46. A person is having problems with calcium and phosphorus metabolism in his body. Which one of following glands may not be functioning properly?

- (A) parotid
- (B) pancreas
- (C) thyroid
- (D) parathyroid

AIPMT 2007 Prelims · Q152

47. A genetically engineered micro-organism used successfully in bioremediation of oil spills is a species of

- (A) Trichoderma
- (B) Xanthomonas
- (C) Bacillus
- (D) Pseudomonas

AIPMT 2007 Prelims · Q153

48. In the leaves of C₄ plants, malic acid formation during CO₂ fixation occurs in the cells of

- (A) bundle sheath
- (B) phloem
- (C) epidermis
- (D) mesophyll

AIPMT 2007 Prelims · Q154

49. Flagellated male gametes are present in all the three of which one of the following sets?

- (A) Zygnema, Saprolegnia and Hydrilla
- (B) Fucus, Marsilea and Calotropis
- (C) Riccia, Dryopteris and Cycas
- (D) Anthoceros, Funaria and Spirogyra

AIPMT 2007 Prelims · Q155

50. If the mean and the median pertaining to a certain character of a population are of the same value, which of the following is most likely to occur?

- (A) a bi-modal distribution
- (B) a T-shaped curve
- (C) a skewed curve
- (D) a normal distribution

AIPMT 2007 Prelims · Q156

51. One gene-one enzyme relationship was established for the first time in

- (A) Salmonella typhimurium
- (B) Escherichia coli
- (C) Diplococcus pneumoniae
- (D) Neurospora crassa

AIPMT 2007 Prelims · Q157

52. Two genes R and Y are located very close on the chromosomal linkage map of maize plant. When RRYy and rryy genotypes are hybridized, the F₂ segregation will show

- (A) segregation in the expected 9 : 3 : 3 : 1 ratio
- (B) segregation in 3 : 1 ratio
- (C) higher number of the parental types
- (D) higher number of the recombinant types

AIPMT 2007 Prelims · Q158

53. In cloning of cattle, a fertilized egg is taken out of the mother's womb and

- (A) in the eight cell stage, cells are separated and cultured until small embryos are formed which are implanted into the womb of other cows
- (B) in the eight cell stage the individual cells are separated under electrical field for further development in culture media
- (C) from this up to eight identical twins can be produced
- (D) the egg is divided into 4 pairs of cells which are implanted into the womb of other cows

AIPMT 2007 Prelims · Q159

54. Ultrasound of how much frequency is beamed into human body for sonography?

- (A) 15 - 30 MHz
- (B) 1 - 15 MHz
- (C) 45 - 70 MHz
- (D) 30 - 45 MHz

AIPMT 2007 Prelims · Q160

55. Two plants can be conclusively said to belong to the same species if they

- (A) have more than 90 per cent similar genes
- (B) look similar and possess identical secondary metabolites
- (C) have same number of chromosomes
- (D) can reproduce freely with each other and form seeds

AIPMT 2007 Prelims · Q161

56. Inheritance of skin colour in humans is an example of

- (A) point mutation
- (B) polygenic inheritance
- (C) codominance
- (D) chromosomal aberration

AIPMT 2007 Prelims · Q162

57. When two species of different genealogy come to resemble each other as a result of adaptation, the phenomenon is termed

- (A) microevolution
- (B) co-evolution
- (C) convergent evolution
- (D) divergent evolution

AIPMT 2007 Prelims · Q163

58. Increased asthmatic attacks in certain seasons are related to

- (A) eating fruits preserved in tin containers
- (B) inhalation of seasonal pollen
- (C) low temperature
- (D) hot and humid environment

AIPMT 2007 Prelims · Q164

59. Among the human ancestors the brain size was more than 1000 CC in

- (A) Homo erectus
- (B) Ramapithecus
- (C) Homo habilis
- (D) Homo neanderthalensis

AIPMT 2007 Prelims · Q165

60. Industrial melanism as observed in peppered moth proves that

- (A) the melanic form of the moth has no selective advantage over lighter form in industrial area
- (B) the lighter-form moth has no selective advantage either in polluted industrial area or non-polluted area
- (C) melanism is a pollution-generated feature
- (D) the true black melanic forms arise by a recurring random mutation

AIPMT 2007 Prelims · Q166

61. A high density of elephant population in an area can result in

- (A) intra specific competition
- (B) inter specific competition
- (C) predation on one another
- (D) mutualism

AIPMT 2007 Prelims · Q167

62. A drop of each of the following, is placed separately on four slides. Which of them will not coagulate?

- (A) blood serum
- (B) sample from the thoracic duct of lymphatic system
- (C) whole blood from pulmonary vein
- (D) blood plasma

AIPMT 2007 Prelims · Q168

63. Which one of the following ecosystem types has the highest annual net primary productivity?

- (A) tropical deciduous forest
- (B) temperate evergreen forest
- (C) temperate deciduous forest
- (D) tropical rain forest

AIPMT 2007 Prelims · Q169

64. In human body, which one of the following is anatomically correct?

- (A) Collar bones - 3 pairs
- (B) Salivary glands - 1 pair
- (C) Cranial nerves - 10 pairs
- (D) Floating ribs - 2 pairs

AIPMT 2007 Prelims · Q170

65. Telomere repetitive DNA sequences control the function of eukaryotic chromosomes because they

- (A) are RNA transcription initiator
- (B) help chromosome pairing
- (C) prevent chromosome loss
- (D) act as replicons

AIPMT 2007 Prelims · Q171

66. Spore dissemination in some liverworts is aided by

- (A) indusium
- (B) calyptra
- (C) peristome teeth
- (D) elaters

AIPMT 2007 Prelims · Q172

67. Which one of the following elements is not an essential micronutrient for plant growth?

- (A) Zn
- (B) Cu
- (C) Ca
- (D) Mn

AIPMT 2007 Prelims · Q173

68. The overall goal of glycolysis, Krebs cycle and the electron transport system is the formation of

- (A) ATP in one large oxidation reaction
- (B) sugars
- (C) nucleic acids
- (D) ATP in small stepwise units

AIPMT 2007 Prelims · Q174

69. Adaptive radiation refers to

- (A) evolution of different species from a common ancestor
- (B) migration of members of a species to different geographical areas
- (C) power of adaptation in an individual to a variety of environments
- (D) adaptations due to geographical isolation

AIPMT 2007 Prelims · Q176

70. Select the correct statement from the following.

- (A) Fitness is the end result of the ability to adapt and gets selected by nature
- (B) All mammals except whales and camels have seven cervical vertebrae
- (C) Mutations are random and directional
- (D) Darwinian variations are small and directionless

AIPMT 2007 Prelims · Q177

71. Male gametes in angiosperms are formed by the division of

- (A) generative cell
- (B) vegetative cell
- (C) microspore mother cell
- (D) microspore

AIPMT 2007 Prelims · Q178

72. In pea plants, yellow seeds are dominant to green. If a heterozygous yellow seeded plant is crossed with a green seeded plant, what ratio of yellow and green seeded plants would you expect in F1 generation?

- (A) 9 : 1
- (B) 1 : 3
- (C) 3 : 1
- (D) 50 : 50

AIPMT 2007 Prelims · Q179

73. Which one of the following mammalian cells is not capable of metabolising glucose to carbon dioxide aerobically?

- (A) unstriated muscle cells
- (B) liver cells
- (C) red blood cells
- (D) white blood cells

AIPMT 2007 Prelims · Q180

74. A human male produces sperms with the genotypes AB, Ab, aB, and ab pertaining to two diallelic characters in equal proportions. What is the corresponding genotype of this person?

- (A) AaBB
- (B) AABb
- (C) AABB
- (D) AaBb

AIPMT 2007 Prelims · Q181

75. What is common to whale, seal and shark?

- (A) thick subcutaneous fat
- (B) convergent evolution
- (C) homoiothermy
- (D) seasonal migration

AIPMT 2007 Prelims · Q182

76. One of the important consequences of geographical isolation is

- (A) preventing speciation
- (B) speciation through reproductive isolation
- (C) random creation of new species
- (D) no change in the isolated fauna

AIPMT 2007 Prelims · Q183

77. Lysozyme that is present in perspiration, saliva and tears, destroys

- (A) certain types of bacteria
- (B) all viruses
- (C) most virus-infected cells
- (D) certain fungi

AIPMT 2007 Prelims · Q184

78. In the human female, menstruation can be deferred by the administration of

- (A) combination of FSH and LH
- (B) combination of estrogen and progesterone
- (C) FSH only
- (D) LH only

AIPMT 2007 Prelims · Q185

79. Which one of the following is not a constituent of cell membrane?

- (A) glycolipids
- (B) proline
- (C) phospholipids
- (D) cholesterol

AIPMT 2007 Prelims · Q186

80. Compared to a bull a bullock is docile because of

- (A) higher levels of cortisol
- (B) lower levels of blood testosterone
- (C) lower levels of adrenaline/noradrenaline in its blood
- (D) higher levels of thyroxine

AIPMT 2007 Prelims · Q187

81. During the transmission of nerve impulse through a nerve fibre, the potential on the inner side of the plasma membrane has which type of electric change?

- (A) first positive, then negative and continue to be positive
- (B) first negative, then positive and continue to be positive
- (C) first positive, then negative and again back to positive
- (D) first negative, then positive and again back to negative

AIPMT 2007 Prelims · Q188

82. Which one of the following pairs of organisms are exotic species introduced in India?

- (A) Lantana camara, water hyacinth
- (B) water hyacinth, Prosopis cineraria
- (C) Nile perch, Ficus religiosa
- (D) Ficus religiosa, Lantana camara

83. In gymnosperms, the pollen chamber represents

- (A) a cavity in the ovule in which pollen grains are stored after pollination
- (B) an opening in the megagametophyte through which the pollen tube approaches the egg
- (C) the microsporangium in which pollen grains develop
- (D) a cell in the pollen grain in which the sperms are formed

84. Molecular basis of organ differentiation depends on the modulation in transcription by

- (A) ribosome
- (B) transcription factor
- (C) anticodon
- (D) RNA polymerase

85. Which of the following is an example of negative feedback loop in humans?

- (A) secretion of tears after falling of sand particles into the eye
- (B) salivation of mouth at the sight of delicious food
- (C) secretion of sweat glands and constriction of skin blood vessels when it is too hot
- (D) constriction of skin blood vessels and contraction of skeletal muscles when it is too cold

86. The two polynucleotide chains in DNA are

- (A) discontinuous
- (B) antiparallel
- (C) semiconservative
- (D) parallel

87. Which one of the following pairs of structures distinguishes a nerve cell from other types of cells?

- (A) vacuoles and fibres
- (B) flagellum and medullary sheath
- (C) nucleus and mitochondria
- (D) perikaryon and dendrites

88. In maize, hybrid vigour is exploited by

- (A) crossing of two inbred parental lines
- (B) harvesting seeds from the most productive plants
- (C) inducing mutations
- (D) bombarding the seeds with DNA

89. Which one of the following is a viral disease of poultry?

- (A) coryza
- (B) Newcastle disease
- (C) pasteurellosis
- (D) salmonellosis

90. Which one of the following is not a bioindicator of water pollution?

- (A) blood-worms
- (B) stone flies
- (C) sewage fungus
- (D) sludge-worms

91. Feeling the tremors of an earthquake a scared resident of seventh floor of a multistoried building starts climbing down the stairs rapidly. Which hormone initiated this action?

- (A) adrenaline
- (B) glucagon
- (C) gastrin
- (D) thyroxine

92. "Foolish seedling" disease of rice led to the discovery of

- (A) ABA
- (B) 2, 4-D
- (C) IAA
- (D) GA

Answer key and explanations

1. Answer: (A) International Code of Botanical Nomenclature

ICBN is the International Code of Botanical Nomenclature, the internationally agreed set of rules for giving scientific names to plants. It is an international code, not an Indian one, and it deals with botanical names, not a congress on biological names.

2. Answer: (D) bird's nest fungi and puffballs

Puffballs and bird's nest fungi both produce basidiospores on basidia inside a basidiocarp, so both are Basidiomycetes. Claviceps, Peziza and Morchella are sac fungi (Ascomycetes), so every other pair mixes in an ascomycete.

3. Answer: (D) submicroscopic molecular level

The levels of biological organisation begin with biomolecules at the submicroscopic molecular level, which then build organelles, cells, tissues and organisms. Atoms are the units of chemistry rather than of biological organisation, and the cell is a higher level built from those molecules.

4. Answer: (D) Dachigam National Park - Snow Leopard

Dachigam National Park in Kashmir is known for protecting the Hangul (Kashmir stag), not the snow leopard. The Sunderbans are famous for the Bengal tiger, Periyar for elephants and the Rann of Kutch for the Indian wild ass, so those pairs are correct.

5. Answer: (A) serum globulins

Antibodies are immunoglobulins, which belong to the globulin fraction of plasma proteins, so a low serum globulin level would confirm antibody deficiency. Albumins mainly maintain osmotic balance and fibrinogen is a clotting protein, so neither reflects antibody levels.

6. Answer: (C) polymerize in the 5'-to-3' direction and explain 3'-to-5' DNA replication

DNA polymerase can add nucleotides only in the 5'->3' direction, so on the lagging strand short Okazaki fragments are made 5'->3' and later joined by DNA ligase. This explains how that strand is built overall in the 3'->5' direction. No polymerase works 3'->5', and semi-conservative replication was proved by Meselson and Stahl, not by Okazaki fragments.

7. Answer: (C) possible origin of life by combination of chemicals under suitable environmental conditions

Chemical evolution (Oparin-Haldane) proposes that life arose when simple inorganic and organic molecules combined into more complex ones under the conditions of the early Earth, as Miller's experiment imitated. Solar radiation or heat were only energy sources within this idea, not the concept itself.

8. Answer: (D) microspore mother cell

Before and during meiosis the microspore mother cell (and the tetrad it forms) lays down a temporary callose wall, which is later dissolved to release the microspores. A mature pollen grain is covered by sporopollenin exine and pectocellulosic intine, not callose.

9. Answer: (C) live microbial food supplement

Probiotics are live beneficial microbes, such as Lactobacillus, taken as food supplements to improve the balance of gut microflora. They are living organisms, not antibiotics, which are chemicals that kill or inhibit microbes.

10. Answer: (D) Podophyllum

Podophyllum (Himalayan mayapple) is a medicinal herb that has become endangered through over-harvesting of its rhizomes for drugs. Ocimum (tulsi) and garlic are widely cultivated, and Nepenthes is an insectivorous plant rather than a medicinal one.

11. Answer: (A) they all possess dorsal heart

Nereis (an annelid) has a contractile dorsal blood vessel, and arthropods such as scorpion, cockroach and silverfish have a dorsal tubular heart, so all have a dorsal heart. Nereis is a marine annelid with unjointed parapodia, so 'none is aquatic', 'same phylum' and 'jointed appendages' all fail.

12. Answer: (A) interaction with the environment and progressive evolution

NCERT points out that reproduction cannot be a defining property, since sterile organisms such as mules and worker bees do not reproduce, and growth is also seen in non-living things like crystals and mountains. Sensing and interacting with the environment (consciousness) together with the capacity to evolve is shown by every living organism, so it is the exceptionless distinction.

13. Answer: (C) less urea in his urine

Urea is made in the liver from the amino groups of dietary and body proteins. With no protein intake, far less nitrogen enters the urea cycle, so urea in urine falls. Blood glucose drops during starvation rather than rising, and normal urine has almost no amino acids anyway.

14. Answer: (A) super-coiling in nucleosomes

Negatively charged DNA wraps around positively charged histone octamers to form nucleosomes, which coil further into chromatin fibres, packing about 2.2 m of DNA into a tiny nucleus. Cells do not digest DNA or delete genes or repetitive sequences to save space.

15. Answer: (B) SPM

An electrostatic precipitator charges dust and ash particles and collects them on oppositely charged plates, removing over 99% of suspended particulate matter (SPM). It cannot remove gases such as NO_x, CO or SO₂, which need scrubbers or catalytic converters.

16. Answer: (A) Both chloroplasts and mitochondria have an internal compartment, the thylakoid space bounded by the thylakoid membrane

Thylakoids are found only in chloroplasts; mitochondria have cristae and a matrix but no thylakoid space, so this statement is wrong. Both organelles are double-membraned, contain their own DNA, and chloroplasts are generally larger than mitochondria.

17. Answer: (A) population

Age pyramids show the proportion of pre-reproductive, reproductive and post-reproductive individuals, and age distribution is an attribute of a population. A community or ecosystem contains many species, so a single age structure cannot describe it.

18. Answer: (C) TATA

RNA polymerase is positioned at the promoter by the TATA box (Pribnow box in prokaryotes), an AT-rich consensus sequence TATAAT/TATAAAA about 10-30 bases upstream of the start site. AATT and TTAA are not the recognised promoter consensus.

19. Answer: (B) chlorophyll synthesis

Magnesium is the central metal atom of the chlorophyll porphyrin ring, so it is essential for chlorophyll synthesis (it also activates enzymes of respiration and photosynthesis). Cell wall development and holding cells together (middle lamella) are roles of calcium.

20. Answer: (C) self-fertilization is prevented

When male and female gametes on the same prothallus mature at different times (dichogamy), the egg cannot be fertilised by antherozoids of the same prothallus, so self-fertilisation is prevented and cross-fertilisation is favoured. This does not cause sterility or apomixis.

21. Answer: (C) Claviceps

Ergot of rye is caused by the ascomycete Claviceps purpurea, which replaces grains with dark sclerotia. Ustilago causes smut, Uncinula causes powdery mildew and Phytophthora causes late blight.

22. Answer: (C) biogeographical evolution

Darwin's finches on the Galapagos show how one ancestral seed-eating stock spread over the islands and radiated into many forms with different beaks, which is evidence for evolution from geographical distribution (biogeography and adaptive radiation). They contradict special creation and do not show retrogressive evolution.

23. Answer: (A) Physarum

Physarum is a plasmodial slime mould, a saprophytic protist that forms a multinucleate plasmodium. Thiobacillus is a chemosynthetic bacterium, Anabaena a cyanobacterium and Rhizopus a true fungus.

24. Answer: (B) its population growth curve is of J-type

A population that grows explosively and then crashes suddenly, without levelling off at a carrying capacity, follows a J-shaped (exponential) growth curve. A sigmoid curve would slow down and plateau instead of disappearing.

25. Answer: (D) Casuarina equisetifolia

Casuarina, a flowering plant, bears root nodules containing Frankia, a filamentous actinomycete that fixes nitrogen. Crotalaria and Cicer are legumes whose nodules contain the rod-shaped bacterium Rhizobium, and Cycas is a gymnosperm whose coralloid roots have cyanobacteria.

26. Answer: (C) Pongamia

Seeds of Pongamia pinnata (karanja) contain about 30-40% non-edible oil that is used to make biodiesel in rural India. Sugarcane and beetroot are sources of sugar and ethanol rather than biodiesel.

27. Answer: (A) teak and pine

Teak (a dicot tree) and pine (a gymnosperm) both have an active vascular cambium and cork cambium, so they show clear secondary growth. Ferns, wheat and sugarcane lack cambial activity, so every other pair contains a plant without secondary growth.

28. Answer: (A) Retinol - Xerophthalmia

Retinol is vitamin A, a fat-soluble vitamin whose deficiency causes xerophthalmia and night blindness. Calciferol (vitamin D) is fat-soluble but causes rickets, not pellagra; beri-beri is due to thiamine deficiency; and ascorbic acid is water-soluble.

29. Answer: (C) movement of water from cell A to B

Water moves towards the cell with the higher diffusion pressure deficit (suction pressure). Cell B has a DPD of 5 atm and cell A only 3 atm, so water flows from A to B. Comparing osmotic pressures alone would wrongly suggest movement towards A.

30. Answer: (D) ciliated epithelium

Epithelial cells are tightly packed with little intercellular matrix, and they are held together by tight, adhering and gap junctions. Tendon and cartilage cells are scattered in abundant matrix, and platelets are free cell fragments, so junctions are rare there.

31. Answer: (D) types of pigments present in the cell

Algae are divided into Chlorophyceae, Phaeophyceae and Rhodophyceae chiefly by their major pigments (chlorophyll a and b, fucoxanthin, r-phycoerythrin), which give the green, brown and red colours. Stored food and cell wall also differ, but the primary basis of grouping is pigments.

32. Answer: (C) calcium and phosphorus

Oxygen, carbon, hydrogen, nitrogen, calcium and phosphorus together make up about 98-99% of body mass; calcium and phosphorus are abundant in bone and nucleic acids. Sulphur, sodium and magnesium are present only in much smaller amounts.

33. Answer: (D) Extensive use of chemical fertilizers may lead to eutrophication of nearby water bodies.

Fertiliser run-off adds nitrates and phosphates to lakes and ponds, causing algal blooms and eutrophication. Azotobacter is free-living and does not form root nodules, and Anabaena and Nostoc fix nitrogen rather than mobilising phosphate (that is done by mycorrhizal fungi such as Glomus).

34. Answer: (C) $n = 21$ and $x = 7$

Bread wheat is hexaploid with $2n = 6x = 42$. Its gametes carry $n = 21$ chromosomes, and the basic set is $x = 42/6 = 7$. Options that equate n and x ignore that n here contains three basic sets.

35. Answer: (D) endodermis of roots facilitating rapid transport of water from cortex to pericycle

In older roots most endodermal cells become thickened with suberin, but some opposite the protoxylem stay thin-walled; these passage cells let water pass from the cortex into the pericycle and xylem. They are not part of phloem, seed coat or style.

36. Answer: (D) homoiothermy

Birds and mammals are warm-blooded (homoiothermous), so the parrot, the platypus and the kangaroo all keep a constant body temperature. Kangaroos are viviparous and have teeth, so oviparity and toothless jaws do not fit all three.

37. Answer: (C) olfactory epithelium of our nose

Bowman's glands (olfactory glands) lie in the olfactory epithelium and secrete mucus that dissolves odour molecules. The trap is Bowman's capsule, which is at the proximal end of the nephron, not a gland.

38. Answer: (C) coliforms - vinegar

Vinegar (acetic acid) is produced by *Acetobacter aceti*, not by coliforms; coliforms are gut bacteria used as indicators of faecal contamination. Yeast makes ethanol, *Streptomyces* makes antibiotics and methanogens produce biogas, so those pairs are correct.

39. Answer: (D) Graafian follicle

After ovulation the remains of the ruptured Graafian follicle become the corpus luteum, which secretes progesterone, so it is the follicle that turns endocrine. The vitelline membrane surrounds the ovum and the germinal epithelium is a covering layer; neither secretes hormones.

40. Answer: (A) Ventral central nervous system - Leech

Leech is an annelid, and non-chordates such as annelids have a ventral, solid nerve cord. *Chamaeleon*, being a chordate, does have pharyngeal gill slits in the embryo, scorpion has a dorsal heart, and octopus has no post-anal tail.

41. Answer: (C) succinate dehydrogenase

Succinate dehydrogenase is bound to the inner mitochondrial membrane, where it also forms complex II of the electron transport chain. Lactate dehydrogenase is not a Krebs cycle enzyme at all, and the other dehydrogenases are in the matrix.

42. Answer: (C) quinone

Electrons from P680 pass to the primary acceptor of PSII and then to plastoquinone, so among the options a quinone is the first acceptor. Ferredoxin and iron-sulphur proteins accept electrons on the PSI side, and cytochromes come later in the chain.

43. Answer: (A) differential expression of genes

All cells of an organism carry the same genes; they differentiate into different tissues because different sets of genes are switched on or off in each. Mutations and gene deletions are abnormal events, not the basis of normal development.

44. Answer: (B) They are sensitive to penicillin

Mycoplasma have no cell wall, and penicillin acts by blocking cell wall synthesis, so *mycoplasma* are resistant to it. They are pleomorphic, cause plant and animal diseases, and are known as PPLO, so those statements are true.

45. Answer: (D) *Pila globosa* - pearl

Pila globosa is the apple snail and does not produce pearls; pearls come from the pearl oyster *Pinctada*. *Apis* gives honey, *Kerria* (*Laccifer*) *lacca* gives lac and *Bombyx mori* gives silk.

46. Answer: (D) parathyroid

Parathyroid hormone controls blood calcium and phosphate by acting on bone, kidney and intestine, so faulty calcium-phosphorus metabolism points to the parathyroid. Thyroid calcitonin also lowers calcium but is a minor regulator; parotid is a salivary gland.

47. Answer: (D) *Pseudomonas*

Ananda Chakrabarty engineered a *Pseudomonas putida* strain (the 'superbug') carrying plasmids that let it break down many hydrocarbons, used to clean oil spills. *Trichoderma* is a biocontrol fungus and *Bacillus thuringiensis* is a biopesticide, not oil degraders.

48. Answer: (D) mesophyll

In C_4 plants PEP carboxylase in mesophyll cells fixes CO_2 into oxaloacetate, which is turned into malic acid there before moving to the bundle sheath. In the bundle sheath, malate is broken down to release CO_2 for the Calvin cycle, so malate is not formed there.

49. Answer: (C) *Riccia*, *Dryopteris* and *Cycas*

Riccia (bryophyte) and *Dryopteris* (pteridophyte) have flagellated antherozoids, and *Cycas* is the gymnosperm whose male gametes are motile and multiciliate. Each other set includes a plant with non-motile gametes, such as *Spirogyra*, *Zygnema*, *Hydrilla* or *Calotropis*.

50. Answer: (D) a normal distribution

In a normal (bell-shaped) distribution the curve is symmetrical, so the mean, median and mode coincide. In a skewed curve the mean is pulled away from the median towards the tail.

51. Answer: (D) Neurospora crassa

Beadle and Tatum studied nutritional mutants of the mould *Neurospora crassa* and showed each gene controls one enzyme. *Diplococcus pneumoniae* was used by Griffith for transformation, and *E. coli* for lac operon and replication studies.

52. Answer: (C) higher number of the parental types

Genes lying very close together are tightly linked and rarely separated by crossing over, so the F₂ shows many more parental combinations than recombinants. The 9:3:3:1 ratio holds only for independently assorting genes.

53. Answer: (A) in the eight cell stage, cells are separated and cultured until small embryos are formed which are implanted into the womb of other cows

In embryo-splitting cloning, the early embryo is taken out at about the eight-cell stage, its cells are separated and each is grown into a small embryo that is implanted into a surrogate cow. The cells are not separated by electric fields, and the embryo is not implanted as pairs of cells.

54. Answer: (B) 1 - 15 MHz

Diagnostic ultrasound uses roughly 1-15 MHz: lower frequencies penetrate deep organs and higher ones give finer detail near the surface. Much higher frequencies would be absorbed too quickly to image internal organs.

55. Answer: (D) can reproduce freely with each other and form seeds

By the biological species concept, members of a species interbreed freely in nature and produce fertile offspring (here, viable seeds). Similar appearance, chromosome number or gene similarity can be shared by different species, so they are not conclusive.

56. Answer: (B) polygenic inheritance

Human skin colour is controlled by several genes with additive effects, giving continuous variation; this is polygenic inheritance. Codominance involves two alleles of one gene both being expressed, as in ABO blood groups.

57. Answer: (C) convergent evolution

Unrelated lineages that evolve similar features because they adapt to similar habitats show convergent evolution, producing analogous structures. Divergent evolution is the opposite, where related forms become different.

58. Answer: (B) inhalation of seasonal pollen

Seasonal asthma is an allergic reaction: pollen released in particular flowering seasons acts as an allergen, triggering IgE-mediated release of histamine and bronchial constriction. Temperature alone does not explain the seasonal pattern.

59. Answer: (D) Homo neanderthalensis

Neanderthal man had a brain of about 1400 cc. *Homo erectus* had about 900 cc and *Homo habilis* about 650-800 cc, so they fall below 1000 cc, and *Ramapithecus* was an ape-like hominid.

60. Answer: (D) the true black melanic forms arise by a recurring random mutation

Dark (melanic) moths existed before industrialisation because the melanic allele keeps arising by random mutation; soot-darkened trees only made them better camouflaged so natural selection increased their numbers. Pollution did not create melanism, and the dark form clearly had an advantage in industrial areas.

61. Answer: (A) intra specific competition

When many individuals of the same species crowd an area they compete for the same food, water and space, which is intraspecific competition. Interspecific competition involves different species, and elephants do not prey on each other.

62. Answer: (A) blood serum

Serum is plasma from which fibrinogen and other clotting factors have been removed, so it cannot clot. Plasma, whole blood and lymph still contain fibrinogen and will coagulate.

63. Answer: (D) tropical rain forest

Tropical rain forests have high temperature, abundant rainfall and year-round sunlight, giving the highest net primary productivity among terrestrial ecosystems. Deciduous and temperate forests have seasons that limit growth.

64. Answer: (D) Floating ribs - 2 pairs

The 11th and 12th pairs of ribs are not joined to the sternum and are called floating ribs, so there are 2 pairs. Humans have 1 pair of clavicles, 3 pairs of salivary glands and 12 pairs of cranial nerves.

65. Answer: (C) prevent chromosome loss

Telomeres are repetitive caps at chromosome ends that stop the ends from being degraded, fused or shortened at each replication, so they keep chromosomes stable and prevent their loss. Replication origins (replicons) and promoters are different sequences.

66. Answer: (D) elaters

In liverworts such as *Marchantia* the capsule contains hygroscopic elaters that twist with changing humidity and scatter the spores. Peristome teeth do this job in mosses, and the indusium covers sori of ferns.

67. Answer: (C) Ca

Calcium is an essential element but is needed in large amounts, so it is a macronutrient, not a micronutrient. Zinc, copper and manganese are needed only in traces and are micronutrients.

68. Answer: (D) ATP in small stepwise units

Respiration oxidises glucose in many small enzyme-controlled steps so that the released energy can be trapped as ATP gradually rather than lost as heat in one burst. These pathways break sugars down; they do not make sugars or nucleic acids.

69. Answer: (A) evolution of different species from a common ancestor

Adaptive radiation is the evolution of many different species from one ancestral form as they spread into different habitats, as in Darwin's finches or Australian marsupials. Simple migration or an individual's adaptability is not speciation.

70. Answer: (A) Fitness is the end result of the ability to adapt and gets selected by nature

NCERT describes fitness as the end result of an organism's ability to adapt and be selected by nature. Mutations are random and directionless while Darwinian variations are small and directional, and whales and camels also have seven cervical vertebrae (sloths and manatees are the exceptions).

71. Answer: (A) generative cell

The generative cell of the pollen grain divides mitotically to form the two male gametes. The vegetative cell forms the pollen tube, and the microspore mother cell divides by meiosis to form microspores.

72. Answer: (D) 50 : 50

$Yy \times yy$ gives half Yy (yellow) and half yy (green), a 1:1 or 50:50 ratio. A 3:1 ratio would need both parents to be heterozygous.

73. Answer: (C) red blood cells

Mature mammalian red blood cells lack mitochondria, so they cannot run the Krebs cycle and electron transport and depend on glycolysis to lactate. Liver, muscle and white blood cells have mitochondria and respire aerobically.

74. Answer: (D) AaBb

Four gamete types in equal proportions are produced only by a double heterozygote ($AaBb$) with independent assortment. $AaBB$ or $AABb$ would give only two gamete types, and $AABB$ only one.

75. Answer: (B) convergent evolution

Whale and seal are mammals and the shark is a fish, yet all have streamlined bodies and flippers or fins for aquatic life; this similarity in unrelated groups is convergent evolution. Shark is cold-blooded and lacks blubber, so homoiothermy and subcutaneous fat do not apply to all three.

76. Answer: (B) speciation through reproductive isolation

Geographically separated populations stop exchanging genes, accumulate different variations and eventually become reproductively isolated, forming new species (allopatric speciation). Isolation promotes rather than prevents speciation.

77. Answer: (A) certain types of bacteria

Lysozyme is an enzyme that breaks the peptidoglycan of bacterial cell walls, so it kills certain (mainly Gram-positive) bacteria as part of innate immunity. Viruses and fungi have no peptidoglycan, and virus-infected cells are killed by interferons and cytotoxic cells.

78. Answer: (B) combination of estrogen and progesterone

Menstruation follows the fall in progesterone and estrogen when the corpus luteum degenerates. Giving these two hormones keeps the endometrium intact and suppresses FSH/LH, which delays menstruation; this is also how combined oral pills work. FSH or LH would stimulate the ovary instead.

79. Answer: (B) proline

The cell membrane is built of a phospholipid bilayer with cholesterol, proteins and carbohydrate-bearing glycolipids and glycoproteins. Proline is a free amino acid; it occurs only as part of membrane proteins and is not a membrane component by itself.

80. Answer: (B) lower levels of blood testosterone

A bullock is a castrated bull; without testes it makes little testosterone, the hormone that drives aggressive male behaviour, so it is docile. Its adrenal and thyroid hormones are not the cause.

81. Answer: (D) first negative, then positive and again back to negative

At rest the inside of the axon is negative (about -70 mV); during the action potential Na^+ influx makes it positive, and K^+ efflux during repolarisation returns it to negative. It does not stay positive after the impulse passes.

82. Answer: (A) Lantana camara, water hyacinth

Lantana camara and water hyacinth (Eichhornia) were brought into India from the Americas and have become invasive alien weeds. Prosopis cineraria (khejri) and Ficus religiosa (peepal) are native Indian plants.

83. Answer: (A) a cavity in the ovule in which pollen grains are stored after pollination

In gymnosperms such as Cycas the pollen chamber is a cavity formed at the micropylar end of the nucellus of the ovule, where pollen grains land and rest after pollination before germinating. The structure in which pollen grains develop is the microsporangium (pollen sac), which is a different organ.

84. Answer: (B) transcription factor

Which genes a cell transcribes, and therefore what it becomes, is controlled by regulatory proteins (transcription factors) that bind promoters and enhancers to switch genes on or off. RNA polymerase carries out transcription in every cell but by itself does not decide which genes are expressed; ribosomes and anticodons act in translation.

85. Answer: (D) constriction of skin blood vessels and contraction of skeletal muscles when it is too cold

When body temperature falls, the hypothalamus triggers skin vasoconstriction and shivering to bring it back up, a response that opposes the change: negative feedback. The 'too hot' option is wrong because heat causes vasodilation, not constriction, while tears and salivation are simple reflexes.

86. Answer: (B) antiparallel

In the double helix one strand runs 5'→3' and its partner 3'→5', so the chains are antiparallel. 'Semiconservative' describes how DNA replicates, not how its strands are arranged.

87. Answer: (D) perikaryon and dendrites

A neuron has a cell body (perikaryon/cyton) with Nissl granules and branched dendrites, features found only in nerve cells. Nucleus and mitochondria are present in almost all cells, so they cannot distinguish a neuron.

88. Answer: (A) crossing of two inbred parental lines

Hybrid maize is produced by crossing two different inbred (homozygous) lines; the F1 shows heterosis with higher yield and vigour. Simply selecting seeds from good plants or inducing mutations does not produce hybrid vigour.

89. Answer: (B) Newcastle disease

Ranikhet (Newcastle) disease is caused by a paramyxovirus and is a major viral disease of poultry. Infectious coryza, pasteurellosis (fowl cholera) and salmonellosis are bacterial diseases.

90. Answer: (B) stone flies

Blood-worms (Chironomus larvae), sludge-worms (Tubifex) and sewage fungus thrive in organically polluted, low-oxygen water and so indicate pollution. Stonefly nymphs need clean, well-oxygenated water and disappear when water is polluted, so they indicate clean water instead.

91. Answer: (A) adrenaline

Fear triggers the sympathetic nervous system to release adrenaline from the adrenal medulla, the 'fight or flight' hormone that raises heart rate, breathing and blood glucose for quick action. Glucagon, gastrin and thyroxine do not mediate emergency responses.

92. Answer: (D) GA

Kurosawa found that rice seedlings infected by the fungus Gibberella fujikuroi grew abnormally tall (bakanae or foolish seedling disease) because of a substance later named gibberellin (GA). IAA was discovered from oat coleoptile experiments and ABA from studies of abscission and dormancy.

Questions as set in the AIPMT/NEET papers conducted by CBSE and NTA. Answers checked and explanations written by the RankUp team. RankUp is not affiliated with CBSE or NTA.