

AIPMT 2010 Prelims — Biology Question Paper with Solutions

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

AIPMT 2010 Prelims · Q102

1. Some hyperthermophilic organisms that grow in highly acidic (pH2) habitats belong to the two groups

- (A) Liverworts and yeasts
- (B) Eubacteria and archaea
- (C) Cyanobacteria and diatoms
- (D) Protists and mosses

AIPMT 2010 Prelims · Q103

2. Infectious proteins are present in

- (A) Satellite viruses
- (B) Gemini viruses
- (C) Prions
- (D) Viroids

AIPMT 2010 Prelims · Q104

3. Male and female gametophytes are independent and free-living in

- (A) Sphagnum
- (B) Mustard
- (C) Castor
- (D) Pinus

AIPMT 2010 Prelims · Q105

4. Single-celled eukaryotes are included in

- (A) Monera
- (B) Protista
- (C) Fungi
- (D) Archaea

AIPMT 2010 Prelims · Q106

5. One example of animals having a single opening to the outside that serves both as mouth as well as anus is

- (A) Fasciola
- (B) Octopus
- (C) Asterias
- (D) Ascidia

AIPMT 2010 Prelims · Q107

6. Which one of the following statements about all the four of Spongilla, Leech, Dolphin and Penguin is correct ?

- (A) All are bilaterally symmetrical
- (B) Penguin is homoiothermic while the remaining three are poikilothermic
- (C) Leech is a fresh water form while all others are marine
- (D) Spongilla has special collared cells called choanocytes, not found in the remaining three

AIPMT 2010 Prelims · Q108

7. Which one of the following kinds of animals are triploblastic?

- (A) Corals
- (B) Flat worms
- (C) Sponges
- (D) Ctenophores

AIPMT 2010 Prelims · Q109

8. Which one of the following statements about certain given animals is correct ?

- (A) Flat worms (Platyhelminthes) are coelomates
- (B) Round worms (Aschelminthes) are pseudocoelomates
- (C) Molluscs are acoelomates
- (D) Insects are pseudocoelomates

AIPMT 2010 Prelims · Q110

9. The plasma membrane consists mainly of

- (A) Proteins embedded in a carbohydrate bilayer
- (B) Phospholipids embedded in a protein bilayer
- (C) Proteins embedded in a phospholipid bilayer
- (D) Proteins embedded in a polymer of glucose molecules

AIPMT 2010 Prelims · Q111

10. Which one of the following structures between two adjacent cells is an effective transport pathway?

- (A) Plasmalemma
- (B) Plasmodesmata
- (C) Plastoquinones
- (D) Endoplasmic reticulum

AIPMT 2010 Prelims · Q112

11. Which one of the following has its own DNA?

- (A) Peroxisome
- (B) Mitochondria
- (C) Dictyosome
- (D) Lysosome

AIPMT 2010 Prelims · Q113

12. The main arena of various types of activities of a cell is

- (A) Nucleus
- (B) Plasma membrane
- (C) Mitochondrion
- (D) Cytoplasm

AIPMT 2010 Prelims · Q115

13. Algae have cell wall made up of

- (A) Cellulose, hemicellulose and pectins
- (B) Cellulose, galactans and mannans
- (C) Hemicellulose, pectins and proteins
- (D) Pectins, cellulose and proteins

AIPMT 2010 Prelims · Q116

14. Membrane-bound organelles are absent in

- (A) Plasmodium
- (B) Saccharomyces
- (C) Streptococcus
- (D) Chlamydomonas

AIPMT 2010 Prelims · Q117

15. The kind of epithelium which forms the inner walls of blood vessels is

- (A) Squamous epithelium
- (B) Cuboidal epithelium
- (C) Columnar epithelium
- (D) Ciliated columnar epithelium

AIPMT 2010 Prelims · Q119

16. Which one of the following cannot be explained on the basis of Mendel's Law of Dominance?

- (A) Factors occur in pairs
- (B) The discrete unit controlling a particular character is called a factor
- (C) Out of one pair of factors one is dominant, and the other recessive
- (D) Alleles do not show any blending and both the characters recover as such in F_2 generation

AIPMT 2010 Prelims · Q120

17. The genotype of a plant showing the dominant phenotype can be determined by

- (A) Back cross
- (B) Test cross
- (C) Dihybrid cross
- (D) Pedigree analysis

AIPMT 2010 Prelims · Q121

18. The one aspect which is not a salient feature of genetic code, is its being

- (A) Specific
- (B) Degenerate
- (C) Ambiguous
- (D) Universal

AIPMT 2010 Prelims · Q122

19. Satellite DNA is useful tool in

- (A) Genetic engineering
- (B) Organ transplantation
- (C) Sex determination
- (D) Forensic science

AIPMT 2010 Prelims · Q123

20. Which one of the following does not follow the central dogma of molecular biology?

- (A) HIV
- (B) Pea
- (C) Mucor
- (D) Chlamydomonas

AIPMT 2010 Prelims · Q124

21. ABO blood groups in humans are controlled by the gene I. It has three alleles- I^A , I^B and i. Since there are three different alleles, six different genotypes are possible. How many phenotypes can occur?

- (A) Two
- (B) Three
- (C) One
- (D) Four

AIPMT 2010 Prelims · Q125

22. Select the correct statement from the ones given below with respect to dihybrid cross

- (A) Tightly linked genes on the same chromosome show very few recombinations
- (B) Tightly linked genes on the same chromosome show higher recombinations
- (C) Genes far apart on the same chromosome show very few recombinations
- (D) Genes loosely linked on the same chromosome show similar recombinations as the tightly linked ones

23. Select the two correct statements out of the four (a-d) given below about lac operon.

- (a) Glucose or galactose may bind with the repressor and inactivate it
- (b) In the absence of lactose the repressor binds with the operator region
- (c) The z-gene codes for permease
- (d) This was elucidated by Francois Jacob and Jacque Monod

The correct statements are

- (A) (a) and (b)
- (B) (b) and (c)
- (C) (a) and (c)
- (D) (b) and (d)

24. Which one of the following symbols and its representation, used in human pedigree analysis is correct?

- (A) $\blacklozenge$ = male affected
- (B) $\square=\bigcirc$ = mating between relatives
- (C) $\bigcirc$ = unaffected male
- (D) $\square$ = unaffected female

25. Darwin's finches are a good example of

- (A) Convergent evolution
- (B) Industrial melanism
- (C) Connecting link
- (D) Adaptive radiation

26. The scutellum observed in a grain of wheat or maize is comparable to which part of the seed in other monocotyledons?

- (A) Plumule
- (B) Cotyledon
- (C) Endosperm
- (D) Aleurone layer

27. Which one of the following is not a micronutrient?

- (A) Boron
- (B) Molybdenum
- (C) Magnesium
- (D) Zinc

28. An element playing important role in nitrogen fixation is

- (A) Zinc
- (B) Molybdenum
- (C) Copper
- (D) Manganese

29. Which one of the following is not a lateral meristem?

- (A) Intercalary meristem
- (B) Intrafascicular cambium
- (C) Interfascicular cambium
- (D) Phellogen

AIPMT 2010 Prelims · Q133

30. C_4 plants are more efficient in photosynthesis than C_3 plants due to

- (A) Lower rate of photorespiration
- (B) Higher leaf area
- (C) Presence of larger number of chloroplasts in the leaf cells
- (D) Presence of thin cuticle

AIPMT 2010 Prelims · Q134

31. In unilocular ovary with a single ovule the placentation is

- (A) Axile
- (B) Marginal
- (C) Basal
- (D) Free Central

AIPMT 2010 Prelims · Q135

32. The chief water conducting elements of xylem in gymnosperms are

- (A) Tracheids
- (B) Vessels
- (C) Fibers
- (D) Transfusion tissue

AIPMT 2010 Prelims · Q136

33. The technical term used for the androecium in a flower of China rose (*Hibiscus rosasinensis*) is

- (A) Polyadelphous
- (B) Monadelphous
- (C) Diadelphous
- (D) Polyandrous

AIPMT 2010 Prelims · Q137

34. Ovary is half-inferior in the flowers of

- (A) Cucumber
- (B) Guava
- (C) Plum
- (D) Brinjal

AIPMT 2010 Prelims · Q138

35. Heartwood differs from sapwood in

- (A) Being susceptible to pests and pathogens
- (B) Presence of rays and fibres
- (C) Absence of vessels and parenchyma
- (D) Having dead and non-conducting elements

AIPMT 2010 Prelims · Q139

36. Keel is characteristic of the flowers of

- (A) Bean
- (B) Gulmohur
- (C) Cassia
- (D) Calotropis

AIPMT 2010 Prelims · Q140

37. One of the free-living anaerobic nitrogen-fixer is

- (A) Azotobacter
- (B) Beijernickia
- (C) Rhodospirillum
- (D) Rhizobium

38. PGA as the first CO₂ fixation product was discovered in photosynthesis of

- (A) Alga
- (B) Bryophyte
- (C) Gymnosperm
- (D) Angiosperm

39. The energy releasing metabolic process in which substrate is oxidised without an external electron acceptor is called

- (A) Photorespiration
- (B) Glycolysis
- (C) Fermentation
- (D) Aerobic respiration

40. Photoperiodism was first characterised in

- (A) Cotton
- (B) Tobacco
- (C) Potato
- (D) Tomato

41. Listed below are four respiratory capacities (a - c) and four jumbled respiratory volumes of a normal human adult

Respiratory capacities — Respiratory volumes

(a) Residual volume — 2500 mL

(b) Vital capacity — 3500 mL

(c) Inspiratory reserve volume — 1200 mL

(d) Inspiratory capacity — 4500 mL

Which one of the following is the correct matching of two capacities and volumes?

- (A) (a) 4500 mL, (b) 3500 mL
- (B) (b) 2500 mL, (c) 4500 mL
- (C) (c) 1200 mL, (d) 2500 mL
- (D) (d) 3500 mL, (a) 1200 mL

42. What is true about RBCs in humans?

- (A) They do not carry CO₂ at all
- (B) They carry about 20-25 percent of CO₂
- (C) They transport 99.5 percent of O₂
- (D) They transport about 80 percent oxygen only and the rest 20 percent of it is transported in dissolved state in blood plasma

43. If due to some injury the chordae tendinae of the tricuspid valve of the human heart is partially non-functional, what will be the immediate effect?

- (A) The flow of blood into the pulmonary artery will be reduced
- (B) The flow of blood into the aorta will be slowed down
- (C) The pacemaker will stop working
- (D) The blood will tend to flow back into the left atrium

44. Which one of the following statements in regard to the excretion by the human kidneys is correct?

- (A) Ascending limb of Loop of Henle is impermeable to electrolytes
- (B) Descending limb of Loop of Henle is impermeable to water
- (C) Distal convoluted tubule is incapable of reabsorbing HCO₃⁻
- (D) Nearly 99 percent of the glomerular filtrate is reabsorbed by the renal tubules

AIPMT 2010 Prelims · Q148

45. Low Ca^{++} in the body fluid may be the cause of

- (A) Gout
- (B) Tetany
- (C) Anaemia
- (D) Angina pectoris

AIPMT 2010 Prelims · Q149

46. If for some reason our goblet cells are non-functional this will adversely affect

- (A) Smooth movement of food down the intestine
- (B) Production of somatostatin
- (C) Secretion of sebum from the sebaceous glands
- (D) Maturation of sperms

AIPMT 2010 Prelims · Q150

47. The nerve centres which control the body temperature and the urge for eating are contained in

- (A) Thalamus
- (B) Hypothalamus
- (C) Pons
- (D) Cerebellum

AIPMT 2010 Prelims · Q152

48. The first movements of the foetus and appearance of hair on its head are usually observed during which month of pregnancy?

- (A) Third month
- (B) Fourth month
- (C) Fifth month
- (D) Sixth month

AIPMT 2010 Prelims · Q153

49. Cu ions released from copper- releasing Intra Uterine Devices (IUDs)

- (A) Prevent ovulation
- (B) Make uterus unsuitable for implantation
- (C) Increase phagocytosis of sperms
- (D) Suppress sperm motility

AIPMT 2010 Prelims · Q155

50. Which one of the following pairs is incorrectly matched?

- (A) Insulin – Diabetes mellitus (disease)
- (B) Glucagon – Beta cells (source)
- (C) Somatostatin – Delta cells (source)
- (D) Corpus luteum – Relaxin (secretion)

AIPMT 2010 Prelims · Q156

51. The principal nitrogenous excretory compound in humans is synthesised

- (A) In the liver but eliminated mostly through kidneys
- (B) In kidneys but eliminated mostly through liver
- (C) In kidneys as well as eliminated by kidneys
- (D) In liver and also eliminated by the same through bile

AIPMT 2010 Prelims · Q157

52. Injury to adrenal cortex is not likely to affect the secretion of which one of the following?

- (A) Cortisol
- (B) Aldosterone
- (C) Both Androstenedione and Dehydroepiandrosterone
- (D) Adrenaline

AIPMT 2010 Prelims · Q158

53. Which one of the following statements about human sperm is correct?

- (A) Acrosome serves no particular function
- (B) Acrosome has a conical pointed structure used for piercing and penetrating the egg resulting in fertilization
- (C) The sperm lysins in the acrosome dissolve the egg envelope facilitating fertilization
- (D) Acrosome serves as a sensory structure leading the sperm towards the ovum

AIPMT 2010 Prelims · Q159

54. Coiling of garden pea tendrils around any support is an example of

- (A) Thermotaxis
- (B) Thigmotaxis
- (C) Thigmonasty
- (D) Thigmotropism

AIPMT 2010 Prelims · Q160

55. Apomictic embryos in citrus arise from

- (A) Diploid egg
- (B) Synergids
- (C) Maternal sporophytic tissue in ovule
- (D) Antipodal cells

AIPMT 2010 Prelims · Q161

56. Wind pollinated flowers are

- (A) Small, producing nectar and dry pollen
- (B) Small, brightly coloured, producing large number of pollen grains
- (C) Small, producing large number of dry pollen grains
- (D) Large, producing abundant nectar and pollen

AIPMT 2010 Prelims · Q162

57. Phototropic curvature is the result of uneven distribution of

- (A) Auxin
- (B) Gibberellin
- (C) Phytochrome
- (D) Cytokinins

AIPMT 2010 Prelims · Q163

58. Transfer of pollen grains from the anther to the stigma of another flower of the same plant is called

- (A) Autogamy
- (B) Xenogamy
- (C) Geitonogamy
- (D) Karyogamy

AIPMT 2010 Prelims · Q164

59. Seminal plasma in human males is rich in

- (A) Ribose and potassium
- (B) Fructose and calcium
- (C) Glucose and calcium
- (D) DNA and testosterone

AIPMT 2010 Prelims · Q165

60. Sertoli cells are found in

- (A) Pancreas and secrete cholecystokinin
- (B) Ovaries and secrete progesterone
- (C) Adrenal cortex and secrete adrenaline
- (D) Seminiferous tubules and provide nutrition of germ cells

AIPMT 2010 Prelims · Q166

61. The part of Fallopian tube closest to the ovary is

- (A) Ampulla
- (B) Isthmus
- (C) Infundibulum
- (D) Cervix

AIPMT 2010 Prelims · Q167

62. In vitro fertilisation is a technique that involves transfer of which one of the following into the fallopian tube?

- (A) Zygote only
- (B) Embryo only, upto 8 cell stage
- (C) Either zygote or early embryo upto 8 cell stage
- (D) Embryo of 32 cell stage

AIPMT 2010 Prelims · Q168

63. The permissible use of the technique amniocentesis is for

- (A) Detecting any genetic abnormality
- (B) Detecting sex of the unborn foetus
- (C) Artificial insemination
- (D) Transfer of embryo into the uterus of a surrogate mother

AIPMT 2010 Prelims · Q170

64. The biomass available for consumption by the herbivores and the decomposers is called

- (A) Gross primary productivity
- (B) Net primary productivity
- (C) Secondary productivity
- (D) Standing crop

AIPMT 2010 Prelims · Q171

65. Which one of the following is one of the characteristics of a biological community?

- (A) Sex-ratio
- (B) Stratification
- (C) Natality
- (D) Mortality

AIPMT 2010 Prelims · Q172

66. Which one of the following is an example ex-situ conservation?

- (A) National park
- (B) Wildlife sanctuary
- (C) Seed bank
- (D) Sacred groves

AIPMT 2010 Prelims · Q173

67. A renewable exhaustible natural resource is

- (A) Forest
- (B) Coal
- (C) Petroleum
- (D) Minerals

AIPMT 2010 Prelims · Q174

68. The two gases making highest relative contribution to the greenhouse gases are

- (A) CO₂ and N₂O
- (B) CO₂ and CH₄
- (C) CH₄ and N₂O
- (D) CFCs and N₂O

69. Select the correct statement from the following

- (A) Activated sludge-sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria
- (B) Biogas is produced by the activity of aerobic bacteria on animal waste
- (C) Methanobacterium is an aerobic bacterium found in rumen of cattle
- (D) Biogas, commonly called gobar gas, is pure methane

70. Which two of the following changes (a-d) usually tend to occur in the plain dwellers when they move to high altitudes (3,500 m or more)?

- (a) Increase in red blood cell size**
- (b) Increase in red blood cell production**
- (c) Increased breathing rate**
- (d) Increase in thrombocyte count**

Changes occurring are

- (A) (a) and (b)
- (B) (b) and (c)
- (C) (c) and (d)
- (D) (a) and (d)

71. dB is a standard abbreviation used for the quantitative expression of

- (A) A certain pesticide
- (B) The density of bacteria in a medium
- (C) A particular pollutant
- (D) The dominant Bacillus in a culture

72. Study the four statements (a-d) given below and select the two correct ones out of them

- (a) A lion eating a deer and a sparrow feeding on grain are ecologically similar in being consumers**
- (b) Predator star fish Pisaster helps in maintaining species diversity of some invertebrates**
- (c) Predators ultimately lead to the extinction of prey species**
- (d) Production of chemicals such as nicotine, strychnine by the plants are metabolic disorders**

The two correct statements are:

- (A) (a) and (b)
- (B) (b) and (c)
- (C) (c) and (d)
- (D) (a) and (d)

73. Widal test is used for the diagnosis of

- (A) Typhoid
- (B) Malaria
- (C) Pneumonia
- (D) Tuberculosis

74. Ringworm in humans is caused by

- (A) Viruses
- (B) Bacteria
- (C) Fungi
- (D) Nematodes

75. Which one of the following is not used in organic farming?

- (A) Snail
- (B) Glomus
- (C) Earthworm
- (D) Oscillatoria

76. A common biocontrol agent for the control of plant diseases is

- (A) Trichoderma
- (B) Baculovirus
- (C) Bacillus thuringiensis
- (D) Glomus

77. Consider the following four statements (a-d) regarding kidney transplant and select the two correct ones out of these.

- a. Even if a kidney transplant is proper the recipient may need to take immunosuppressants for a long time**
- b. The cell-mediated immune response is responsible for the graft rejection**
- c. The B-lymphocytes are responsible for rejection of the graft**
- d. The acceptance or rejection of a kidney transplant depends on specific interferons**

The two correct statements are

- (A) a & b
- (B) b & c
- (C) c & d
- (D) a & c

78. Which one of the following statements is correct with respect to AIDS?

- (A) The causative HIV retrovirus enters helper T-lymphocytes thus reducing their numbers
- (B) The HIV can be transmitted through eating food together with an infected person
- (C) Drug addicts are least susceptible to HIV infection
- (D) AIDS patients are being fully cured cent per cent with proper care and nutrition

79. Select the correct statement from the ones given below

- (A) Cocaine is given to patients after surgery as it stimulates recovery
- (B) Barbiturates when given to criminals make them tell the truth
- (C) Morphine is often given to persons who have undergone surgery as a pain killer
- (D) Chewing tobacco lowers blood pressure and heart rate

80. Toxic agents present in food which interfere with thyroxine synthesis lead to the development of

- (A) Thyrotoxicosis
- (B) Toxic goitre
- (C) Cretinism
- (D) Simple goitre

81. The second maturation division of the mammalian ovum occurs

- (A) In the Graafian follicle following the first maturation division
- (B) Shortly after ovulation before the ovum makes entry into the Fallopian tube
- (C) Until after the ovum has been penetrated by a sperm
- (D) Until the nucleus of the sperm has fused with that of the ovum

AIPMT 2010 Prelims · Q190

82. Which one of the following statements about morula in humans is correct?

- (A) It has more cytoplasm and more DNA than an uncleaved zygote
- (B) It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA
- (C) It has far less cytoplasm as well as less DNA than in an uncleaved zygote
- (D) It has more or less equal quantity of cytoplasm and DNA as in uncleaved zygote

AIPMT 2010 Prelims · Q191

83. Stirred-tank bioreactors have been designed for

- (A) Availability of oxygen throughout the process
- (B) Addition of preservatives to the product
- (C) Purification of the product
- (D) Ensuring anaerobic conditions in the culture vessel

AIPMT 2010 Prelims · Q192

84. Breeding of crops with high levels of minerals, vitamins and proteins is called

- (A) Micropropagation
- (B) Somatic hybridisation
- (C) Biofortification
- (D) Biomagnification

AIPMT 2010 Prelims · Q193

85. DNA or RNA segment tagged with a radioactive molecule is called

- (A) Plasmid
- (B) Vector
- (C) Probe
- (D) Clone

AIPMT 2010 Prelims · Q194

86. Which one of the following is used as vector for cloning genes into higher organisms?

- (A) Retrovirus
- (B) Baculovirus
- (C) Salmonella typhimurium
- (D) Rhizopus nigricans

AIPMT 2010 Prelims · Q195

87. The genetically-modified (GM) brinjal in India has been developed for

- (A) Drought-resistance
- (B) Insect-resistance
- (C) Enhancing shelf life
- (D) Enhancing mineral content

AIPMT 2010 Prelims · Q196

88. Genetic engineering has been successfully used for producing

- (A) Animals like bulls for farm work as they have super power
- (B) Transgenic mice for testing safety of polio vaccine before use in humans
- (C) Transgenic models for studying new treatments for certain cardiac diseases
- (D) Transgenic Cow-Rosie which produces high fat milk for making ghee

AIPMT 2010 Prelims · Q197

89. Restriction endonucleases are enzymes which

- (A) Remove nucleotides from the ends of the DNA molecule
- (B) Make cuts at specific positions within the DNA molecule
- (C) Recognize a specific nucleotide sequence for binding of DNA ligase
- (D) Restrict the action of the enzyme DNA polymerase

90. Some of the characteristics of Bt cotton are

- (A) High yield and resistance to bollworms
- (B) Long fibre and resistance to aphids
- (C) Medium yield, long fibre and resistance to beetle pests
- (D) High yield and production of toxic protein crystals which kill dipteran pests

91. An improved variety of transgenic basmati rice

- (A) Give high yield but has no characteristic aroma
- (B) Does not require chemical fertilizers and growth hormones
- (C) Gives high yield and is rich in vitamin A
- (D) Is completely resistant to all insect pests and diseases of paddy

92. Which one of the following palindromic base sequences in DNA can be easily cut at about the middle by some particular restriction enzyme?

- (A) 5' CACGTA 3'; 3' CTCAGT 5'
- (B) 5' CGTTCG 3'; 3' ATGGTA 5'
- (C) 5' GATATG 3'; 3' CTAATA 5'
- (D) 5' GAATTC 3'; 3' CTTAAG 5'

Answer key and explanations

1. Answer: (B) Eubacteria and archaea

Only prokaryotes tolerate the combination of very high temperature and very low pH; archaeobacteria such as thermoacidophiles live in hot acidic springs, and some eubacteria also survive there. Eukaryotic groups like mosses, liverworts, yeasts and diatoms cannot survive such extreme conditions.

2. Answer: (C) Prions

Prions are abnormally folded infectious proteins that cause diseases such as BSE (mad cow disease) and CJD in humans. Viroids are the opposite case: they are free infectious RNA with no protein coat.

3. Answer: (A) Sphagnum

In bryophytes such as the moss Sphagnum, the gametophyte is the dominant, free-living, photosynthetic generation. In gymnosperms (Pinus) and angiosperms (mustard, castor), the gametophytes are greatly reduced and stay inside the sporophyte's sporangia.

4. Answer: (B) Protista

In Whittaker's five-kingdom system, Protista holds all single-celled eukaryotes. Monera and archaea are prokaryotes, and most fungi are multicellular.

5. Answer: (A) Fasciola

Platyhelminthes such as the liver fluke Fasciola have an incomplete digestive system, with one opening that works as both mouth and anus. Molluscs (Octopus), echinoderms (Asterias) and urochordates (Ascidia) have a complete gut with a separate mouth and anus.

6. Answer: (D) Spongilla has special collared cells called choanocytes, not found in the remaining three

Collar cells (choanocytes) lining the canal system are unique to sponges such as Spongilla. The homeothermy statement fails because the dolphin, a mammal, is also warm-blooded. Spongilla is a freshwater sponge and is asymmetrical, so the other two statements fail too.

7. Answer: (B) Flat worms

Triploblasty, with a mesoderm between ectoderm and endoderm, begins with the Platyhelminthes (flatworms). Corals (cnidarians) and ctenophores are diploblastic, and sponges have a cellular level of organisation without true germ layers.

8. Answer: (B) Round worms (Aschelminthes) are pseudocoelomates

Aschelminthes (roundworms) have a body cavity that is not lined by mesoderm all round (mesoderm occurs only as scattered pouches), so they are pseudocoelomates. Flatworms are acoelomate, while molluscs and arthropods such as insects are true coelomates.

9. Answer: (C) Proteins embedded in a phospholipid bilayer

According to Singer and Nicolson's fluid mosaic model, the membrane is a quasi-fluid lipid bilayer with proteins embedded in it as integral and peripheral proteins. The bilayer is made of phospholipids, not proteins or carbohydrates.

10. Answer: (B) Plasmodesmata

Plasmodesmata are cytoplasmic strands that cross the cell walls of neighbouring plant cells, connecting their cytoplasm into a continuous symplast for transport. The plasmalemma surrounds a single cell, and plastoquinone is an electron carrier in photosynthesis.

11. Answer: (B) Mitochondria

Mitochondria have their own circular double-stranded DNA and 70S ribosomes, so they are semi-autonomous. Peroxisomes, dictyosomes (Golgi) and lysosomes have no DNA of their own.

12. Answer: (D) Cytoplasm

NCERT describes the cytoplasm as the main arena of cellular activities, since most metabolic reactions take place there. The nucleus controls the cell, but most of the cell's chemical work happens in the cytoplasm.

13. Answer: (B) Cellulose, galactans and mannans

NCERT states that the algal cell wall is made of cellulose, galactans, mannans and minerals like calcium carbonate. Cellulose, hemicellulose and pectins together describe the wall of other (higher) plants.

14. Answer: (C) Streptococcus

Streptococcus is a bacterium, a prokaryote, so it has no membrane-bound organelles. Plasmodium (protist), Saccharomyces (yeast) and Chlamydomonas (alga) are eukaryotes with nuclei, mitochondria and other organelles.

15. Answer: (A) Squamous epithelium

Blood vessels are lined by a single layer of thin, flat cells (simple squamous epithelium, the endothelium), which suits diffusion and filtration. Cuboidal epithelium lines ducts and kidney tubules, not vessels.

16. Answer: (D) Alleles do not show any blending and both the characters recover as such in F₂ generation

The return of both parental traits unchanged in the F₂, without blending, is explained by the Law of Segregation (purity of gametes), not by the Law of Dominance. Paired factors and one dominant factor masking a recessive one are the ideas behind dominance.

17. Answer: (B) Test cross

In a test cross, the dominant-phenotype plant is crossed with a homozygous recessive. All dominant offspring mean it is homozygous, and a 1:1 ratio means it is heterozygous. A back cross can be made to either parent, so it does not necessarily reveal the genotype.

18. Answer: (C) Ambiguous

The genetic code is unambiguous and specific: each codon codes for only one amino acid. It is degenerate (several codons per amino acid) and nearly universal, so 'ambiguous' is the one property it lacks.

19. Answer: (D) Forensic science

Satellite DNA repeats such as VNTRs are highly polymorphic between individuals, so they form the basis of DNA fingerprinting used in forensic identification and paternity testing.

20. Answer: (A) HIV

HIV is a retrovirus: it copies its RNA genome into DNA with reverse transcriptase, which reverses the usual DNA → RNA direction of the central dogma. Pea, Mucor and Chlamydomonas are cellular organisms with DNA genomes that follow DNA → RNA → protein.

21. Answer: (D) Four

The six genotypes give four blood groups: A (I^AI^A, I^Ai), B (I^BI^B, I^Bi), AB (I^AI^B, codominance) and O (ii). The answer 'three' misses the AB group, where both alleles are expressed.

22. Answer: (A) Tightly linked genes on the same chromosome show very few recombinations

Morgan found that genes lying close together (tightly linked) rarely separate by crossing over, so they show few recombinants, as with the white-eye and yellow-body genes in *Drosophila*. Genes far apart or loosely linked show more recombination, not less.

23. Answer: (D) (b) and (d)

Without lactose, the repressor binds the operator and blocks transcription, and the lac operon was described by Jacob and Monod. The inducer that inactivates the repressor is lactose (allolactose), not glucose or galactose. The z gene codes for β -galactosidase, while permease comes from the y gene.

24. Answer: (B) $\square=\bigcirc$ = mating between relatives

In pedigree charts, a double line joining a male (square) and a female (circle) shows a consanguineous mating, that is, mating between relatives. A shaded diamond is an affected person of unspecified sex, a plain circle is an unaffected female, and a plain square is an unaffected male.

25. Answer: (D) Adaptive radiation

From an ancestral seed-eating finch, many species with different beak shapes evolved on the Galapagos Islands to use different foods. Many forms branching from one ancestor into different habitats is adaptive radiation. Convergent evolution is the reverse: unrelated lineages becoming similar.

26. Answer: (B) Cotyledon

In grasses, the single large shield-shaped cotyledon of the embryo is called the scutellum. It sits next to the endosperm and absorbs food from it, but it is not part of the endosperm or the aleurone layer.

27. Answer: (C) Magnesium

Magnesium is a macronutrient: it is needed in large amounts and is the central atom of chlorophyll. Boron, molybdenum and zinc are needed in trace amounts, so they are micronutrients.

28. Answer: (B) Molybdenum

Nitrogenase, the enzyme that reduces N_2 to ammonia, is a molybdenum-iron protein, so molybdenum is essential for nitrogen fixation. Zinc and manganese activate other enzymes (for example auxin synthesis and photolysis of water), not nitrogenase.

29. Answer: (A) Intercalary meristem

Intercalary meristem lies between mature tissues at the bases of internodes (as in grasses) and is a primary meristem, not a lateral one. Fascicular and interfascicular cambium and cork cambium (phellogen) are lateral meristems that cause growth in thickness.

30. Answer: (A) Lower rate of photorespiration

In C_4 plants, CO_2 is concentrated around RuBisCO in the bundle sheath cells, so its oxygenase activity, and with it photorespiration, is almost absent. This is why their productivity is higher. Having more chloroplasts is not the reason, and the mesophyll cells of C_4 plants do not carry out the Calvin cycle.

31. Answer: (C) Basal

In basal placentation, the placenta is at the base of a one-chambered ovary and carries a single ovule, as in sunflower and marigold. Free central placentation also has a unilocular ovary, but its ovules are many and sit on a central axis.

32. Answer: (A) Tracheids

Gymnosperms lack vessels in their xylem, so tracheids are their main water-conducting elements. Vessels are characteristic of angiosperms, and fibres provide support, not conduction.

33. Answer: (B) Monadelphous

In China rose, the filaments of all stamens fuse into one bundle, the staminal tube, around the style. This is the monadelphous condition. Diadelphous (two bundles) is seen in pea, and polyadelphous (many bundles) in citrus.

34. Answer: (C) Plum

In plum and rose, the flower is perigynous: the thalamus forms a cup at the level of the ovary, so the ovary is called half-inferior. Cucumber and guava are epigynous with inferior ovaries, and brinjal is hypogynous with a superior ovary.

35. Answer: (D) Having dead and non-conducting elements

Heartwood is the dark central secondary xylem. Its elements are dead and filled with tannins, resins, gums and similar deposits, so it no longer conducts water. These deposits make it more resistant to microbes and insects, not more susceptible.

36. Answer: (A) Bean

Bean belongs to Fabaceae, which has papilionaceous corolla with a large standard, two wings and two anterior petals fused into a keel. Gulmohur and Cassia have imbricate ascending (non-papilionaceous) corolla, so they lack a true keel.

37. Answer: (C) Rhodospirillum

Rhodospirillum is a free-living anaerobic (photosynthetic) nitrogen-fixing bacterium. Azotobacter and Beijerinckia are free-living but aerobic, and Rhizobium is symbiotic.

38. Answer: (A) Alga

Melvin Calvin traced radioactive ^{14}C in the green alga Chlorella and found that 3-phosphoglyceric acid (PGA) was the first stable product of CO_2 fixation. The C_4 pathway (OAA first) was found later in angiosperms such as sugarcane and maize.

39. Answer: (C) Fermentation

In fermentation, NADH from glycolysis is reoxidised by reducing an internal organic molecule (pyruvate or acetaldehyde), so no external electron acceptor such as O_2 is needed. Aerobic respiration uses O_2 as the final external acceptor. Glycolysis is only one stage and needs NAD^+ to be regenerated.

40. Answer: (B) Tobacco

Garner and Allard (1920) discovered photoperiodism while studying the Maryland Mammoth variety of tobacco, which flowered only when days were short.

41. Answer: (D) (d) 3500 mL, (a) 1200 mL

Inspiratory capacity = tidal volume (about 500 mL) + IRV (2500–3000 mL), which is about 3500 mL. Residual volume is about 1100–1200 mL. Vital capacity (about 4500 mL) and IRV (about 2500 mL) do not match the other options as given.

42. Answer: (B) They carry about 20-25 percent of CO_2

About 20–25% of CO_2 is carried by RBCs as carbamino-haemoglobin, about 70% as bicarbonate, and about 7% dissolved in plasma. For oxygen, about 97% travels bound to haemoglobin in RBCs and 3% dissolved, so the 99.5% and 80% figures are wrong.

43. Answer: (A) The flow of blood into the pulmonary artery will be reduced

Chordae tendineae stop the tricuspid valve from turning inside out during ventricular systole. If they fail, part of the right ventricle's blood leaks back into the right atrium, so less is pumped into the pulmonary artery. The left atrium is on the other side of the heart (the bicuspid valve), so backflow there is not the effect.

44. Answer: (D) Nearly 99 percent of the glomerular filtrate is reabsorbed by the renal tubules

About 180 L of filtrate is formed each day but only about 1.5 L of urine is passed, so nearly 99% is reabsorbed. The ascending limb is impermeable to water (not electrolytes), the descending limb is permeable to water, and the DCT does reabsorb HCO_3^- .

45. Answer: (B) Tetany

Tetany is rapid spasms (wild contractions) of muscles caused by low Ca^{2+} in body fluids, for example when parathyroid hormone is deficient. Gout is caused by uric acid crystals building up in joints.

46. Answer: (A) Smooth movement of food down the intestine

Goblet cells are unicellular glands in the columnar epithelium of the alimentary canal, and they secrete mucus. Mucus lubricates the gut lining so food moves smoothly. Somatostatin comes from delta cells, and sebum from sebaceous glands, so goblet cells play no part in either.

47. Answer: (B) Hypothalamus

The hypothalamus contains centres that control body temperature, hunger and thirst. The thalamus is mainly a relay centre for sensory signals, and the cerebellum coordinates movement and balance.

48. Answer: (C) Fifth month

NCERT states that the first movements of the foetus and the appearance of hair on the head are usually observed during the fifth month. Limbs and digits form by the end of the second month, and most major organ systems by the end of the first trimester (third month).

49. Answer: (D) Suppress sperm motility

Copper ions released by copper IUDs (CuT, Cu7, Multiload 375) suppress sperm motility and fertilising capacity. Making the uterus unsuitable for implantation is attributed to hormone-releasing IUDs, and increased phagocytosis of sperm is a general effect of IUDs, not of Cu ions specifically.

50. Answer: (B) Glucagon - Beta cells (source)

Glucagon is secreted by the alpha (α) cells of the islets of Langerhans, while beta (β) cells secrete insulin, so this pair is wrong. Delta cells secrete somatostatin, the corpus luteum secretes relaxin, and insulin deficiency causes diabetes mellitus.

51. Answer: (A) In the liver but eliminated mostly through kidneys

Humans are ureotelic: the liver turns ammonia into urea through the ornithine cycle, and the urea travels in blood to the kidneys to be excreted in urine. The kidneys filter urea but do not make it.

52. Answer: (D) Adrenaline

Adrenaline (epinephrine) is made by the adrenal medulla, so damage to the cortex leaves it unaffected. The cortex makes glucocorticoids (cortisol), mineralocorticoids (aldosterone) and adrenal androgens such as DHEA and androstenedione.

53. Answer: (C) The sperm lysins in the acrosome dissolve the egg envelope facilitating fertilization

The acrosome is a cap-like structure that comes from the Golgi apparatus. It contains hydrolytic enzymes (sperm lysins) that dissolve the egg's coverings so the sperm can enter. It works chemically, by enzymes, not by mechanically piercing the egg.

54. Answer: (D) Thigmotropism

Tendrils coiling is a directional growth response to contact with a support, which makes it a tropism to touch (thigmotropism). Taxis means movement of a whole free-moving organism or cell, and a nastic movement such as Mimosa leaf folding does not depend on the direction of the stimulus.

55. Answer: (C) Maternal sporophytic tissue in ovule

In Citrus and mango, some nucellar cells around the embryo sac (maternal sporophytic tissue) divide and grow directly into embryos, a form of apomixis called adventive embryony. They do not come from a diploid egg, synergids or antipodals.

56. Answer: (C) Small, producing large number of dry pollen grains

Wind-pollinated flowers are small and inconspicuous and make large amounts of light, dry, non-sticky pollen, because most of it is lost in transit. They give no reward to animals, so they lack nectar and bright colours.

57. Answer: (A) Auxin

Under one-sided light, auxin builds up on the shaded side of the shoot tip, and those cells elongate more, so the shoot bends towards the light. This was shown in the coleoptile experiments of Darwin and Went. Phytochrome is a light-sensing pigment linked to flowering and germination, not the growth hormone that causes the curvature.

58. Answer: (C) Geitonogamy

Geitonogamy is pollination between different flowers of the same plant. It needs a pollinating agent, as cross-pollination does, but genetically it is the same as self-pollination. Autogamy is within the same flower, and xenogamy is between flowers of different plants.

59. Answer: (B) Fructose and calcium

Seminal plasma, the secretion of the seminal vesicles, prostate and bulbourethral glands, is rich in fructose, calcium and certain enzymes. Fructose is the sperm's energy source, so glucose is not the right sugar.

60. Answer: (D) Seminiferous tubules and provide nutrition of germ cells

Sertoli cells line the seminiferous tubules together with the male germ cells and nourish them as they develop. Testosterone is made by the Leydig (interstitial) cells, not by Sertoli cells.

61. Answer: (C) Infundibulum

The funnel-shaped infundibulum, with its finger-like fimbriae, lies closest to the ovary and collects the ovum after ovulation. The order towards the uterus is infundibulum, then ampulla, then isthmus, and the cervix belongs to the uterus, not the tube.

62. Answer: (C) Either zygote or early embryo upto 8 cell stage

In ZIFT (zygote intra-fallopian transfer), the zygote or an early embryo of up to 8 blastomeres is placed in the fallopian tube. Embryos with more than 8 blastomeres are placed in the uterus instead (IUT), so the 32-cell option is wrong.

63. Answer: (A) Detecting any genetic abnormality

Amniocentesis tests foetal cells in the amniotic fluid for chromosomal or genetic disorders. Using it to find the sex of the foetus is a misuse that leads to female foeticide, and it is banned by law in India.

64. Answer: (B) Net primary productivity

Net primary productivity is gross primary productivity minus what plants lose in respiration. It is the biomass actually available to herbivores and decomposers. Standing crop is the biomass present at a given moment, not the rate of production available to consumers.

65. Answer: (B) Stratification

Stratification, the vertical layering of different species such as trees, shrubs and herbs, is a structural feature of a community. Sex ratio, natality and mortality are attributes of a single-species population.

66. Answer: (C) Seed bank

Ex-situ conservation protects species outside their natural habitat, for example in seed banks, zoos, botanical gardens and cryopreservation. National parks, wildlife sanctuaries and sacred groves protect species where they naturally live, so they are in-situ.

67. Answer: (A) Forest

Forests can regenerate, so they are renewable, but they can still be exhausted if they are cut faster than they regrow. Coal, petroleum and minerals form over geological time and are non-renewable.

68. Answer: (B) CO₂ and CH₄

The old NCERT figure puts the relative contribution to global warming at about 60% for CO₂, 20% for CH₄, 14% for CFCs and 6% for N₂O. So CO₂ and methane together contribute the most.

69. Answer: (A) Activated sludge-sediment in settlement tanks of sewage treatment plant is a rich source of aerobic bacteria

Activated sludge is the settled mass of aerobic bacterial flocs from secondary treatment, and part of it is pumped back as inoculum. Biogas is made by anaerobic methanogens such as *Methanobacterium*, and it is a mixture of mainly methane with CO₂ and H₂, not pure methane.

70. Answer: (B) (b) and (c)

At high altitude the low partial pressure of O₂ makes the body compensate by producing more RBCs (through erythropoietin) and by breathing faster. RBC size and platelet count do not rise as part of this acclimatisation.

71. Answer: (C) A particular pollutant

The decibel (dB) is the unit used to measure sound level, so it expresses noise, which is a pollutant. Sound above about 150 dB can damage the eardrum. It has nothing to do with pesticides or bacterial counts.

72. Answer: (A) (a) and (b)

The lion and the sparrow both eat other organisms, so both are consumers. When the predatory starfish *Pisaster* was removed from rocky shores, more than 10 invertebrate species disappeared, which shows it maintains diversity. Predators usually keep prey numbers in check rather than wiping them out, and nicotine and strychnine are defensive chemicals, not metabolic disorders.

73. Answer: (A) Typhoid

The Widal test detects antibodies against *Salmonella typhi* and is used to confirm typhoid fever. Malaria is diagnosed by examining blood smears for *Plasmodium*.

74. Answer: (C) Fungi

Ringworm is a skin infection caused by fungi such as *Microsporum*, *Trichophyton* and *Epidermophyton*. Despite the name, no worm (nematode) is involved.

75. Answer: (A) Snail

Glomus (a mycorrhizal fungus) and *Oscillatoria* (a cyanobacterium) are biofertilisers, and earthworms make vermicompost, so all three help organic farming. Snails have no such role and are usually crop pests.

76. Answer: (A) Trichoderma

The free-living fungus *Trichoderma* lives in the root ecosystem and controls several plant pathogens, so it is used against plant diseases. *Baculoviruses* and *Bacillus thuringiensis* are biocontrol agents against insect pests rather than diseases, and *Glomus* is a biofertiliser.

77. Answer: (A) a & b

NCERT states that graft rejection is due to the cell-mediated (T-lymphocyte) immune response, and that even after tissue and blood-group matching the patient has to take immunosuppressants for life. B-lymphocytes give humoral immunity, and graft acceptance depends on matching tissue antigens (HLA), not interferons.

78. Answer: (A) The causative HIV retrovirus enters helper T-lymphocytes thus reducing their numbers

HIV infects helper T-cells (T_H) and multiplies in them, so their number steadily falls and immunity weakens. HIV does not spread through shared food, drug addicts who share needles are at high risk, and antiretroviral therapy only prolongs life without curing AIDS.

79. Answer: (C) Morphine is often given to persons who have undergone surgery as a pain killer

Morphine is an opioid that works as a strong sedative and painkiller, and it is used for patients who have undergone surgery. Tobacco contains nicotine, which raises blood pressure and heart rate rather than lowering them. Cocaine is not used to aid recovery.

80. Answer: (D) Simple goitre

Substances in food that block thyroid hormone synthesis (goitrogens) lower thyroxine levels. The pituitary responds by releasing more TSH, so the gland enlarges into a simple (non-toxic) goitre. Thyrotoxicosis and toxic goitre are conditions of excess thyroxine.

81. Answer: (C) Until after the ovum has been penetrated by a sperm

The secondary oocyte is released at ovulation arrested in meiosis II. It completes the second meiotic division only after a sperm enters it, producing the ovum and the second polar body. This happens before the sperm and egg nuclei fuse, so the nuclear-fusion option is wrong.

82. Answer: (B) It has almost equal quantity of cytoplasm as an uncleaved zygote but much more DNA

Cleavage divisions are rapid mitoses with no growth in between, so the zygote's cytoplasm is just split among the blastomeres while every new cell receives a full copy of DNA. The morula (8–16 cells) therefore has roughly the same cytoplasm as the zygote but many times more DNA.

83. Answer: (A) Availability of oxygen throughout the process

A stirred-tank bioreactor uses a stirrer and a sparging system to mix the contents evenly and keep oxygen available throughout the culture. Purification and adding preservatives belong to downstream processing, not to the bioreactor.

84. Answer: (C) Biofortification

Biofortification is breeding crops for higher levels of vitamins, minerals, proteins or healthier fats, for example Atlas 66 wheat and vitamin-A-rich carrots. Biomagnification is the rise in toxin concentration up a food chain, which is unrelated.

85. Answer: (C) Probe

A probe is a single-stranded DNA or RNA labelled with a radioactive marker. It finds its complementary sequence by hybridisation, as in DNA fingerprinting and molecular diagnosis. A plasmid or vector carries genes but is not labelled.

86. Answer: (A) Retrovirus

Retroviruses can turn normal animal cells cancerous, but when disarmed they are used as vectors to deliver genes into animal cells. Baculoviruses are used as biocontrol agents against insects, and Salmonella and Rhizopus are not cloning vectors.

87. Answer: (B) Insect-resistance

Bt brinjal carries a *Bacillus thuringiensis* cry gene whose toxin protects the crop against the fruit and shoot borer, making it insect-resistant. Delayed ripening (longer shelf life) was the trait of the Flavr Savr tomato, not brinjal.

88. Answer: (B) Transgenic mice for testing safety of polio vaccine before use in humans

NCERT states that transgenic mice are used to test the safety of vaccines, specifically polio vaccine, before they are used in humans. Rosie's milk was enriched with human alpha-lactalbumin protein, not fat. The disease models NCERT lists are cancer, cystic fibrosis, rheumatoid arthritis and Alzheimer's, not cardiac disease.

89. Answer: (B) Make cuts at specific positions within the DNA molecule

Restriction endonucleases recognise a specific palindromic sequence and cut the DNA at specific positions within the molecule. Removing nucleotides from the ends is what exonucleases do.

90. Answer: (A) High yield and resistance to bollworms

Bt cotton expresses the cryI_{Ac} and cryII_{Ab} genes, whose toxins control cotton bollworms (lepidopteran larvae), cutting pest losses and raising yield. The cry genes in Bt cotton act on bollworms, not on dipterans such as flies and mosquitoes, aphids or beetles.

91. Answer: (C) Gives high yield and is rich in vitamin A

Transgenic rice has been engineered with genes for β -carotene (the vitamin A precursor), known as Golden Rice, so 'rich in vitamin A' is the intended answer. No crop is completely resistant to all pests, none can do without fertilisers, and losing the aroma would not count as an improvement.

92. Answer: (D) 5' GAATTC 3'; 3' CTTAAG 5'

5'-GAATTC-3' / 3'-CTTAAG-5' reads the same 5'→3' on both strands, which makes it a true palindrome. It is the EcoRI recognition site, which is cut between G and A. The other pairs are not even complementary strands, let alone palindromes.

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.