

AIPMT 2011 Prelims — Biology Question Paper with Solutions

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

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1. The "eyes" of the potato tuber are

- (A) Axillary buds
- (B) Root buds
- (C) Flower buds
- (D) Shoot buds

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2. Organisms called Methanogens are most abundant in a

- (A) Hot spring
- (B) Sulphur rock
- (C) Cattle yard
- (D) Polluted stream

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3. Which one of the following have the highest number of species in nature?

- (A) Angiosperms
- (B) Fungi
- (C) Insects
- (D) Birds

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4. Archegoniophore is present in

- (A) Funaria
- (B) Marchantia
- (C) Chara
- (D) Adiantum

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5. Compared with the gametophytes of the bryophytes the gametophytes of vascular plants tend to be

- (A) Smaller and to have smaller sex organs
- (B) Smaller but to have larger sex organs
- (C) Larger but to have smaller sex organs
- (D) Larger and to have larger sex organs

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6. The gametophyte is not an independent, free-living generation in

- (A) Pinus
- (B) Polytrichum
- (C) Adiantum
- (D) Marchantia

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7. Important site for formation of glycoproteins and glycolipids is

- (A) Lysosome
- (B) Vacuole
- (C) Golgi apparatus
- (D) Plastid

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8. Peptide synthesis inside a cell takes place in

- (A) Ribosomes
- (B) Chloroplast
- (C) Mitochondria
- (D) Chromoplast

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9. In eubacteria, a cellular component that resembles eukaryotic cell is

- (A) Cell wall
- (B) Plasma membrane
- (C) Nucleus
- (D) Ribosomes

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10. Which one of the following also acts as a catalyst in a bacterial cell?

- (A) 23S rRNA
- (B) 5S rRNA
- (C) snRNA
- (D) hnRNA

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11. Which one of the following statements is correct?

- (A) Flower of tulip is a modified shoot
- (B) In tomato, fruit is a capsule
- (C) Seeds of orchids have oil-rich endosperms
- (D) Placentation in primrose is basal

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12. A drupe develops in

- (A) Tomato
- (B) Mango
- (C) Wheat
- (D) Pea

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13. Ground tissue includes

- (A) All tissues internal to endodermis
- (B) All tissues external to endodermis
- (C) All tissues except epidermis and vascular bundles
- (D) Epidermis and cortex

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14. In land plants the guard cells differ from other epidermal cells in having

- (A) Chloroplasts
- (B) Cytoskeleton
- (C) Mitochondria
- (D) Endoplasmic reticulum

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15. The ovary is half inferior in flowers of

- (A) Guava
- (B) Peach
- (C) Cucumber
- (D) Cotton

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16. The cork cambium, cork and secondary cortex are collectively called

- (A) Phellem
- (B) Phelloderm
- (C) Phellogen
- (D) Periderm

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17. Which one of the following is wrongly matched?

- (A) Cassia – Imbricate aestivation
- (B) Root pressure – Guttation
- (C) Puccinia – Smut
- (D) Root – Exarch protoxylem

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18. Flowers are zygomorphic in

- (A) Datura
- (B) Mustard
- (C) Gulmohur
- (D) Tomato

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19. CAM helps the plants in

- (A) Reproduction
- (B) Conserving water
- (C) Secondary growth
- (D) Disease resistance

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20. Of the total incident solar radiation the proportion of PAR is

- (A) More than 80%
- (B) About 70%
- (C) About 60%
- (D) Less than 50%

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21. A prokaryotic autotrophic nitrogen fixing symbiont is found in

- (A) Pisum
- (B) Alnus
- (C) Cycas
- (D) Cicer

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22. Nucellar polyembryony is reported in species of

- (A) Brassica
- (B) Citrus
- (C) Gossypium
- (D) Triticum

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23. Filiform apparatus is a characteristic feature of

- (A) Zygote
- (B) Suspensor
- (C) Egg
- (D) Synergid

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24. What would be the number of chromosomes of the aleurone cells of a plant with 42 chromosomes in its root tip cells?

- (A) 21
- (B) 42
- (C) 63
- (D) 84

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25. Wind pollination is common in

- (A) Orchids
- (B) Legumes
- (C) Lilies
- (D) Grasses

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26. In which one of the following pollination is autogamous?

- (A) Cleistogamy
- (B) Geitonogamy
- (C) Xenogamy
- (D) Chasmogamy

AIPMT 2011 Prelims · Q110

27. Mutations can be induced with

- (A) Gamma radiations
- (B) Infra Red radiations
- (C) I A A
- (D) Ethylene

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28. Mass of living matter at a trophic level in an area at any time is called

- (A) Standing state
- (B) Standing crop
- (C) Detritus
- (D) Humus

AIPMT 2011 Prelims · Q111

29. A collection of plants and seeds having diverse alleles of all the genes of a crop is called

- (A) Genome
- (B) Herbarium
- (C) Germplasm
- (D) Gene library

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30. Secondary sewage treatment is mainly a

- (A) Biological process
- (B) Physical process
- (C) Mechanical process
- (D) Chemical process

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31. Large woody vines are more commonly found in

- (A) Alpine forests
- (B) Temperate forests
- (C) Mangroves
- (D) Tropical rainforests

AIPMT 2011 Prelims · Q115

32. Nitrifying bacteria

- (A) Reduce nitrates to free nitrogen
- (B) Oxidize ammonia to nitrates
- (C) Convert free nitrogen to nitrogen compounds
- (D) Convert proteins into ammonia

AIPMT 2011 Prelims · Q116

33. The function of leghaemoglobin in the root nodules of legumes is

- (A) Expression of nif gene
- (B) Inhibition of nitrogenase activity
- (C) Oxygen removal
- (D) Nodule differentiation

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34. Which one of the following is not a biofertilizer?

- (A) Mycorrhiza
- (B) Agrobacterium
- (C) Rhizobium
- (D) Nostoc

AIPMT 2011 Prelims · Q117

35. Which one of the following elements in plants is not remobilised?

- (A) Sulphur
- (B) Phosphorus
- (C) Calcium
- (D) Potassium

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36. Which of the following acts as a physiological barrier to the entry of microorganisms in human body?

- (A) Skin
- (B) Epithelium of urogenital tract
- (C) Tears
- (D) Monocytes

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37. Which one of the following helps in absorption of phosphorus from soil by plants?

- (A) Anabaena
- (B) Glomus
- (C) Rhizobium
- (D) Frankia

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38. Which of the following is mainly produced by the activity of anaerobic bacteria on sewage?

- (A) Marsh gas
- (B) Laughing gas
- (C) Propane
- (D) Mustard gas

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39. Agarose extracted from sea weeds finds use in

- (A) Gel electrophoresis
- (B) Spectrophotometry
- (C) Tissue culture
- (D) PCR

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40. Maximum number of existing transgenic animals is of

- (A) Pig
- (B) Fish
- (C) Mice
- (D) Cow

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41. The process of RNA interference has been used in the development of plants resistant to

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

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42. Which one of the following organisms is not an example of eukaryotic cells

- (A) Amoeba proteus
- (B) Paramecium caudatum
- (C) Escherichia coli
- (D) Euglena viridis

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43. Which one of the following animals is correctly matched with its particular named taxonomic category?

- (A) Housefly - Musca, an order
- (B) Tiger - Tigris, the species
- (C) Cuttlefish - Mollusca, a class
- (D) Humans - Primata, the family

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44. Which of the following groups of animals is correctly matched with its one characteristic feature without even a single exception?

- (A) Mammalia : give birth to young ones
- (B) Reptilia : possess 3-chambered heart with one incompletely divided ventricle
- (C) Chordata : possess a mouth provided with an upper and a lower jaw
- (D) Chondrichthyes : possess cartilaginous endoskeleton

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45. What will you look for to identify the sex of the following?

- (A) Male shark - Claspers borne on pelvic fins
- (B) Female Ascaris - Sharply curved posterior end
- (C) Male frog - A copulatory pad on the first digit of the hind limb
- (D) Female cockroach - Anal cerci

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46. The ciliated columnar epithelial cells in humans are known to occur in

- (A) Fallopian tubes and urethra
- (B) Eustachian tube and stomach lining
- (C) Bronchioles and Fallopian tubes
- (D) Bile duct and oesophagus

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47. Select the correct option with respect to mitosis

- (A) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase
- (B) Chromatids separate but remain in the centre of the cell in anaphase
- (C) Chromatids start moving towards opposite poles in telophase
- (D) Golgi complex and endoplasmic reticulum are still visible at the end of prophase

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48. What was the most significant trend in the evolution of modern man (Homo sapiens) from his ancestors?

- (A) Increasing brain capacity
- (B) Upright posture
- (C) Shortening of jaws
- (D) Binocular vision

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49. Which one of the following conditions correctly describes the manner of determining the sex in the given example?

- (A) Homozygous sex chromosomes (XX) produce male in Drosophila
- (B) Homozygous sex chromosomes (ZZ) determine female sex in birds
- (C) XO type of sex chromosomes determine male sex in grasshopper
- (D) XO condition in humans as found in Turner Syndrome, determines female sex

AIPMT 2011 Prelims · Q134

50. Which one of the following statements is wrong in case of Bhopal tragedy?

- (A) It took place in the night of December 2/3/1984
- (B) Methyl Isocyanate gas leakage took place
- (C) Thousands of human beings died
- (D) Radioactive fall out engulfed Bhopal

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51. A person with unknown blood group under ABO system, has suffered much blood loss in an accident and needs immediate blood transfusion. His one friend who has a valid certificate of his own blood type, offers for blood donation without delay. What would have been the type of blood group of the donor friend?

- (A) Type A
- (B) Type B
- (C) Type AB
- (D) Type O

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52. What are those structures that appear as 'beads-on-string' in the chromosomes when viewed under electron microscope?

- (A) Base pairs
- (B) Genes
- (C) Nucleotides
- (D) Nucleosomes

AIPMT 2011 Prelims · Q136

53. Eutrophication is often seen in

- (A) Mountains
- (B) Deserts
- (C) Fresh water lakes
- (D) Ocean

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54. Match the source gland with its respective hormone as well as the function

- (A) Thyroid – Thyroxine – Regulates blood calcium level
- (B) Anterior pituitary – Oxytocin – Contraction of uterus muscles during child birth
- (C) Posterior pituitary – Vasopressin – Stimulates resorption of water in the distal tubules in the nephron
- (D) Corpus luteum – Estrogen – Supports pregnancy

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55. Which of the following is correctly stated as it happens in the common cockroach?

- (A) The food is ground by mandibles and gizzard
- (B) Malpighian tubules are excretory organs projecting out from the colon
- (C) Oxygen is transported by haemoglobin of blood
- (D) Nitrogenous excretory product is urea

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56. A large proportion of oxygen is left unused in the human blood even after its uptake by the body tissues. This O₂

- (A) Helps in releasing more O₂ to the epithelial tissues
- (B) Acts as a reserve during muscular exercise
- (C) Raises the pCO₂ of blood to 75 mm of Hg
- (D) Is enough to keep oxyhaemoglobin saturation at 96%

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57. Which one of the following is not a part of a renal pyramid?

- (A) Loops of Henle
- (B) Peritubular capillaries
- (C) Convolute tubules
- (D) Collecting ducts

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58. One very special feature in the earthworm Pheretima is that

- (A) It has a long dorsal tubular heart
- (B) Fertilisation of eggs occurs inside the body
- (C) The typhlosole greatly increases the effective absorption area of the digested food in the intestine
- (D) The S-shaped setae embedded in the integument are the defensive weapons used against the enemies

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59. Two friends are eating together at a dining table. One of them suddenly starts coughing while swallowing some food. This coughing would have been due to improper movement of

- (A) Tongue
- (B) Epiglottis
- (C) Diaphragm
- (D) Neck

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60. Arteries are best defined as the vessels which

- (A) Carry blood from one visceral organ to another visceral organ
- (B) Supply oxygenated blood to the different organs
- (C) Carry blood away from the heart to different organs
- (D) Break up into capillaries which reunite to form a vein

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61. 'Bundle of His' is a part of which one of the following organs in humans?

- (A) Pancreas
- (B) Brain
- (C) Heart
- (D) Kidney

62. 'Himgiri' developed by hybridisation and selection for disease resistance against rust pathogens is a variety of

- (A) Wheat
- (B) Chilli
- (C) Maize
- (D) Sugarcane

63. The purplish red pigment rhodopsin contained in the rods type of photoreceptor cells of the human eye, is a derivative of

- (A) Vitamin A
- (B) Vitamin B₁
- (C) Vitamin C
- (D) Vitamin D

64. Which of the following plasma proteins is involved in the coagulation of blood?

- (A) Fibrinogen
- (B) An albumin
- (C) Serum amylase
- (D) A globulin

65. When a neuron is in resting state i.e. not conducting any impulse, the axonal membrane is

- (A) Comparatively more permeable to K⁺ ions and nearly impermeable to Na⁺ ions
- (B) Comparatively more permeable to Na⁺ ions and nearly impermeable to K⁺ ions
- (C) Equally permeable to both Na⁺ and K⁺ ions
- (D) Impermeable to both Na⁺ and K⁺ ions

66. Which one of the following correctly explains the function of a specific part of a human nephron?

- (A) Afferent arteriole: Carries the blood away from the glomerulus towards renal vein
- (B) Podocytes: Create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule
- (C) Henle's loop: Most reabsorption of the major substances from the glomerular filtrate
- (D) Distal convoluted tubule: Reabsorption of K⁺ ions into the surrounding blood capillaries

67. Given below is an incomplete table about certain hormones, their source glands and one major effect of each on the body in humans. Identify the correct option for the three blanks A, B and C.

Gland A - Oestrogen - Maintenance of secondary sexual characters

Alpha cells of Islets of Langerhans - B - Raises blood sugar level

Anterior pituitary - C - Over secretion leads to gigantism

- (A) A: Placenta, B: Glucagon, C: Calcitonin
- (B) A: Ovary, B: Glucagon, C: Growth hormone
- (C) A: Placenta, B: Insulin, C: Vasopressin
- (D) A: Ovary, B: Insulin, C: Calcitonin

68. Uricotelic mode of passing out nitrogenous wastes is found in

- (A) Insects and Amphibians
- (B) Reptiles and Birds
- (C) Birds and Annelids
- (D) Amphibians and Reptiles

69. "Jaya" and "Ratna" developed for green revolution in India are the varieties of

- (A) Bajra
- (B) Maize
- (C) Rice
- (D) Wheat

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70. Which one of the following statements is correct regarding blood pressure?

- (A) 190/110 mmHg may harm vital organs like brain and kidney
- (B) 130/90 mmHg is considered high and requires treatment
- (C) 100/55 mmHg is considered an ideal blood pressure
- (D) 105/50 mmHg makes one very active

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71. Which one of the following statements is correct with respect to kidney function regulation?

- (A) During summer when body loses lot of water by evaporation, the release of ADH is suppressed
- (B) When someone drinks lot of water, ADH release is suppressed
- (C) Exposure to cold temperature stimulates ADH release
- (D) An increase in glomerular blood flow stimulates formation of Angiotensin II

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72. The testes in humans are situated outside the abdominal cavity inside a pouch called scrotum. The purpose served is for

- (A) Providing a secondary sexual feature for exhibiting the male sex
- (B) Maintaining the scrotal temperature lower than the internal body temperature
- (C) Escaping any possible compression by the visceral organs
- (D) Providing more space for the growth of epididymis

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73. If for some reason, the vasa efferentia in the human reproductive system get blocked, the gametes will not be transported from

- (A) Vagina to uterus
- (B) Testes to epididymis
- (C) Epididymis to vas deferens
- (D) Ovary to uterus

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74. Medical Termination of Pregnancy (MTP) is considered safe up to how many weeks of pregnancy?

- (A) Six weeks
- (B) Eight weeks
- (C) Twelve weeks
- (D) Eighteen weeks

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75. Which one of the following is categorised as a parasite in true sense?

- (A) The cuckoo (koel) lays its egg in crow's nest
- (B) The female Anopheles bites and sucks blood from humans
- (C) Human foetus developing inside the uterus draws nourishment from the mother
- (D) Head louse living on the human scalp as well as laying eggs on human hair

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76. Which one of the following statements for pyramid of energy is incorrect, whereas the remaining three are correct?

- (A) It is upright in shape
- (B) Its base is broad
- (C) It shows energy content of different trophic level organisms
- (D) It is inverted in shape

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77. Ethanol is commercially produced through a particular species of

- (A) Aspergillus
- (B) Saccharomyces
- (C) Clostridium
- (D) Trichoderma

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78. Consider the following four conditions (a-d) and select the correct pair of them as adaptation to environment in desert lizards.

- (a) Burrowing in soil to escape high temperature**
- (b) Losing heat rapidly from the body during high temperature**
- (c) Bask in sun when temperature is low**
- (d) Insulating body due to thick fatty dermis**

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

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79. Where will you look for the sporozoites of the malarial parasite?

- (A) Salivary glands of freshly moulted female Anopheles mosquito
- (B) Saliva of infected female Anopheles mosquito
- (C) Red blood corpuscles of humans suffering from malaria
- (D) Spleen of infected humans

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80. A certain patient is suspected to be suffering from Acquired Immuno Deficiency Syndrome. Which diagnostic technique will you recommend for its detection?

- (A) WIDAL
- (B) ELISA
- (C) MRI
- (D) Ultra sound

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81. At which stage of HIV infection does one usually show symptoms of AIDS?

- (A) Within 15 days of sexual contact with an infected person
- (B) When the infecting retrovirus enters host cells
- (C) When viral DNA is produced by reverse transcriptase
- (D) When HIV replicates rapidly in helper T-lymphocytes and damages large number of these

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82. Given below is a sample of a portion of DNA strand giving the base sequence on the opposite strands. What is so special shown in it?

5' ____ GAATTC ____ 3'
3' ____ CTTAAG ____ 5'

- (A) Palindromic sequence of base pairs
- (B) Replication completed
- (C) Deletion mutation
- (D) Start codon at the 5' end

83. The most common substrate used in distilleries for the production of ethanol is

- (A) Molasses
- (B) Corn meal
- (C) Soya meal
- (D) Ground gram

84. An organism used as biofertilizer for raising soyabean crop is

- (A) Nostoc
- (B) Azotobacter
- (C) Azospirillum
- (D) Rhizobium

85. There is a restriction endonuclease called EcoRI. What does "co" part in it stand for?

- (A) coli
- (B) colon
- (C) coelom
- (D) coenzyme

86. When two unrelated individuals or lines are crossed, the performance of F_1 hybrid is often superior to both its parents. This phenomenon is called

- (A) Metamorphosis
- (B) Heterosis
- (C) Transformation
- (D) Splicing

Answer key and explanations

1. Answer: (A) Axillary buds

The potato tuber is an underground stem, and each 'eye' is a node carrying an axillary bud in the axil of a scale leaf. These buds sprout into new shoots, which is why potato pieces with eyes are used for propagation. They are not root buds, since roots do not form tubers with nodes.

2. Answer: (C) Cattle yard

Methanogens are strictly anaerobic archaebacteria found in marshy areas and in the rumen of cattle, where they produce methane from cellulose breakdown products. Cattle dung is therefore rich in them, which is why it is used for biogas. Hot springs harbour thermoacidophiles, a different archaebacterial group.

3. Answer: (C) Insects

Insects account for more than 70 percent of all recorded animal species, far more than any other group. Angiosperms and fungi have far fewer described species, and birds number only around ten thousand species.

4. Answer: (B) Marchantia

Marchantia, a liverwort, bears its sex organs on stalked branches: archegonia on archegoniophores and antheridia on antheridiophores. Funaria is a moss whose sex organs sit at branch tips without such stalks, Chara is an alga and Adiantum is a fern.

5. Answer: (A) Smaller and to have smaller sex organs

Moving from bryophytes to vascular plants, the gametophyte becomes progressively reduced while the sporophyte becomes dominant. The fern prothallus is small and short-lived, and in seed plants the gametophyte is just a few cells, with sex organs reduced or absent. So both the gametophyte and its sex organs become smaller.

6. Answer: (A) Pinus

In gymnosperms such as Pinus, the male and female gametophytes develop within the pollen grain and ovule and stay dependent on the sporophyte. Mosses like Polytrichum, liverworts like Marchantia and ferns like Adiantum all have free-living gametophytes.

7. Answer: (C) Golgi apparatus

The Golgi apparatus packages and modifies proteins and lipids coming from the ER, and it is the main site where glycoproteins and glycolipids are formed. Lysosomes are digestive vesicles budded from the Golgi, not the site of glycosylation.

8. Answer: (A) Ribosomes

Peptide bonds are formed on ribosomes during translation. Chloroplasts and mitochondria do contain their own ribosomes, but the synthesis there still happens on those ribosomes, and chromoplasts are pigment-storing plastids.

9. Answer: (B) Plasma membrane

The bacterial plasma membrane is a lipid bilayer with proteins, structurally similar to the eukaryotic membrane. The bacterial cell wall is made of peptidoglycan, there is no true nucleus (only a nucleoid), and bacterial ribosomes are 70S rather than the 80S of the eukaryotic cytoplasm.

10. Answer: (A) 23S rRNA

In bacteria, the 23S rRNA of the large ribosomal subunit acts as a ribozyme, catalysing peptide bond formation (peptidyl transferase activity). snRNA and hnRNA are eukaryotic nuclear RNAs, and 5S rRNA is structural.

11. Answer: (A) Flower of tulip is a modified shoot

A flower is a modified shoot in which the axis is condensed and the floral parts are modified leaves, and the tulip flower is no exception. Tomato fruit is a berry, orchid seeds are minute and lack endosperm, and primrose shows free central placentation, not basal.

12. Answer: (B) Mango

A drupe develops from a monocarpellary superior ovary and has a stony endocarp, as in mango and coconut. Tomato is a berry, wheat is a caryopsis and pea is a legume.

13. Answer: (C) All tissues except epidermis and vascular bundles

The ground tissue system comprises all tissues except the epidermis and the vascular bundles, so it includes cortex, pericycle, pith and medullary rays in a dicot stem, and mesophyll in leaves. It is not limited to tissues on one side of the endodermis.

14. Answer: (A) Chloroplasts

Guard cells contain chloroplasts, whereas ordinary epidermal cells generally lack them. Mitochondria, ER and the cytoskeleton are present in all living epidermal cells, so they do not distinguish guard cells.

15. Answer: (B) Peach

In perigynous flowers such as peach, plum and rose, the thalamus forms a cup around the ovary at about its level, so the ovary is described as half inferior. Guava and cucumber have epigynous flowers with an inferior ovary, and cotton has a superior ovary.

16. Answer: (D) Periderm

During secondary growth the phellogen (cork cambium), phellem (cork) and phelloderm (secondary cortex) together make up the periderm. Phellem, phelloderm and phellogen are each just one component of it.

17. Answer: (C) Puccinia - Smut

Puccinia causes rust disease of wheat; smuts are caused by Ustilago, so this pair is wrongly matched. Cassia does show imbricate aestivation, guttation is caused by root pressure, and roots have exarch protoxylem.

18. Answer: (C) Gulmohur

Gulmohur (and Cassia) have zygomorphic flowers, which can be divided into two equal halves in only one plane. Datura, mustard and tomato have actinomorphic flowers that can be divided into equal halves in any radial plane.

19. Answer: (B) Conserving water

CAM plants open their stomata at night to take up CO₂, which is stored as organic acids and used for photosynthesis in the day while the stomata stay closed. This cuts transpiration loss sharply, so CAM is an adaptation for conserving water in dry habitats.

20. Answer: (D) Less than 50%

Of the total incident solar radiation, less than 50 percent is photosynthetically active radiation (PAR, 400-700 nm). Plants capture only about 2-10 percent of this PAR.

21. Answer: (C) Cycas

The coralloid roots of Cycas harbour cyanobacteria such as Anabaena, which are prokaryotic, photoautotrophic and fix nitrogen. Pisum, Cicer and Alnus have nitrogen-fixing symbionts too (Rhizobium, Frankia), but these are not autotrophic.

22. Answer: (B) Citrus

In many Citrus species, nucellar cells surrounding the embryo sac divide and grow into extra embryos, so seeds often contain several embryos. This is nucellar polyembryony, a form of apomixis.

23. Answer: (D) Synergid

The filiform apparatus is a set of finger-like wall thickenings at the micropylar tip of the synergids, which guides the pollen tube into the embryo sac. It is not found in the egg, zygote or suspensor.

24. Answer: (C) 63

Root tip cells are diploid, so $2n = 42$ and $n = 21$. The aleurone layer is the outer layer of the endosperm, which is triploid: $3n = 3 \times 21 = 63$. 42 is the diploid count and would be the trap.

25. Answer: (D) Grasses

Wind pollination is common in grasses, which have light non-sticky pollen, well-exposed stamens and large feathery stigmas. Orchids, legumes and lilies have showy flowers pollinated by insects.

26. Answer: (A) Cleistogamy

Cleistogamous flowers never open, so pollen from the anthers can only reach the stigma of the same flower: pollination is always autogamous. Geitonogamy and xenogamy involve transfer between flowers, and chasmogamous flowers are open and may be cross-pollinated.

27. Answer: (A) Gamma radiations

Mutation breeding uses mutagens such as gamma radiation to create new genetic variation. Infrared radiation is non-ionising and not mutagenic, and IAA and ethylene are plant hormones.

28. Answer: (B) Standing crop

Each trophic level holds a certain mass of living material at a given time, called the standing crop, measured as biomass or number per unit area. Standing state refers to the amount of nutrients in the soil, and detritus and humus are dead organic matter.

29. Answer: (C) Germplasm

The entire collection of plants and seeds carrying the diverse alleles of all the genes of a crop is called its germplasm collection. A herbarium is a store of pressed dried specimens, and a gene library is a set of cloned DNA fragments.

30. Answer: (A) Biological process

Secondary treatment of sewage is a biological process: the primary effluent is aerated so that aerobic microbes form flocs and consume the organic matter, reducing the BOD. Primary treatment, by contrast, is a physical removal of debris by filtration and sedimentation.

31. Answer: (D) Tropical rainforests

Large woody climbers (lianas) are a characteristic feature of tropical rainforests, where they climb trees to reach light in the dense, multilayered canopy. They are rare in alpine and temperate forests and in mangroves.

32. Answer: (B) Oxidize ammonia to nitrates

Nitrifying bacteria oxidise ammonia: Nitrosomonas converts it to nitrite and Nitrobacter converts nitrite to nitrate. Reducing nitrate to free nitrogen is denitrification, and converting free nitrogen to compounds is nitrogen fixation.

33. Answer: (C) Oxygen removal

Nitrogenase works only without oxygen, and leghaemoglobin in legume root nodules binds oxygen, acting as an oxygen scavenger that protects the enzyme. It does not inhibit nitrogenase or control nif gene expression.

34. Answer: (B) Agrobacterium

Agrobacterium tumefaciens is a plant pathogen that causes crown gall and is used as a vector in genetic engineering, not as a biofertiliser. Rhizobium and Nostoc fix nitrogen, and mycorrhiza helps phosphorus uptake.

35. Answer: (C) Calcium

Calcium is part of the structural middle lamella (calcium pectate) and cannot be moved once laid down, so its deficiency appears first in young tissues. Phosphorus, potassium and sulphur are mobile and are remobilised from older leaves.

36. Answer: (C) Tears

Physiological barriers to infection include acid in the stomach, saliva in the mouth and tears from the eyes, which prevent microbial growth. Skin and the mucus-coated epithelium of the urogenital tract are physical barriers, and monocytes are cellular barriers.

37. Answer: (B) Glomus

Fungi of the genus *Glomus* form mycorrhiza with plant roots and help absorb phosphorus from the soil. *Anabaena*, *Rhizobium* and *Frankia* are nitrogen fixers.

38. Answer: (A) Marsh gas

In sludge digesters, anaerobic bacteria (including methanogens) break down sewage and give off a gas mixture rich in methane, also called marsh gas or biogas. Laughing gas is nitrous oxide, and mustard gas is a chemical weapon.

39. Answer: (A) Gel electrophoresis

Agarose, a polysaccharide extracted from seaweeds, forms the gel matrix used in gel electrophoresis to separate DNA fragments by size. It plays no matrix role in spectrophotometry or PCR.

40. Answer: (C) Mice

Although transgenic rats, rabbits, pigs, sheep, cows and fish have been produced, more than 95 percent of all existing transgenic animals are mice.

41. Answer: (B) Nematodes

Using *Agrobacterium* vectors, nematode-specific genes were introduced into tobacco so that the plant makes dsRNA that silences a vital mRNA of the nematode *Meloidogyne incognita*. The parasite then cannot survive in the transgenic host, giving nematode-resistant plants.

42. Answer: (C) Escherichia coli

Escherichia coli is a bacterium and so has a prokaryotic cell without a nuclear membrane. *Amoeba*, *Paramecium* and *Euglena* are protists with true nuclei, so they are eukaryotes.

43. Answer: (B) Tiger - Tigris, the species

In *Panthera tigris*, the tiger, 'tigris' is the specific epithet that denotes the species. *Musca* is the genus of the housefly, *Mollusca* is a phylum, and *Primata* is an order, not a family.

44. Answer: (D) Chondrichthyes : possess cartilaginous endoskeleton

Every member of Chondrichthyes (sharks, rays) has a cartilaginous endoskeleton, with no exceptions. Not all mammals give birth (platypus lays eggs), crocodiles have a four-chambered heart, and jawless cyclostomes are chordates without jaws.

45. Answer: (A) Male shark - Claspers borne on pelvic fins

Male sharks bear claspers on their pelvic fins, used to transfer sperm. In *Ascaris* it is the male whose posterior end is sharply curved, the copulatory pad of male frogs is on the first digit of the fore limb, and anal cerci are present in both sexes of cockroach (anal styles are male-only).

46. Answer: (C) Bronchioles and Fallopian tubes

Ciliated columnar epithelium lines hollow organs such as the bronchioles and the Fallopian tubes, where the cilia move mucus or the ovum along. The stomach is lined by non-ciliated columnar epithelium and the oesophagus by stratified squamous epithelium.

47. Answer: (A) Chromosomes move to the spindle equator and get aligned along equatorial plate in metaphase

In metaphase the chromosomes move to the spindle equator and line up along the metaphase plate. Chromatids separate and move to opposite poles in anaphase, not telophase, and the Golgi complex and ER are no longer visible at the end of prophase.

48. Answer: (A) Increasing brain capacity

The most significant trend in the evolution of modern humans was the steady increase in brain capacity, from about 650–800 cc in *Homo habilis* to around 1,400 cc in *Homo sapiens*. Upright posture appeared much earlier, in the australopithecines.

49. Answer: (C) XO type of sex chromosomes determine male sex in grasshopper

In grasshoppers, males have only one X chromosome (XO) and females have XX, so the XO condition determines the male sex. In *Drosophila* XX is female, in birds ZZ is male, and in humans sex is decided by the presence or absence of the Y chromosome.

50. Answer: (D) Radioactive fall out engulfed Bhopal

The Bhopal gas tragedy on the night of 2–3 December 1984 was caused by a leak of methyl isocyanate from a pesticide plant and killed thousands. There was no radioactive fallout; that statement is the wrong one.

51. Answer: (D) Type O

Blood group O red cells carry neither the A nor the B antigen, so they are not agglutinated by the recipient's antibodies: O is the universal donor. Since the patient's group is unknown, only O blood can safely be given without delay; AB is the universal recipient, not donor.

52. Answer: (D) Nucleosomes

DNA wrapped around histone octamers forms nucleosomes, which repeat along the chromatin fibre and look like beads on a string under the electron microscope. Base pairs, nucleotides and genes are far too small or not visible as separate beads.

53. Answer: (C) Fresh water lakes

Eutrophication is the nutrient enrichment of water, mostly by nitrates and phosphates from sewage and fertiliser run-off, which causes algal blooms. It is seen most commonly in freshwater lakes, which are enclosed bodies that accumulate nutrients.

54. Answer: (C) Posterior pituitary - Vasopressin - Stimulates resorption of water in the distal tubules in the nephron

Vasopressin (ADH) is released from the posterior pituitary and acts on the distal tubule and collecting duct to increase water reabsorption. Calcium is regulated by thyrocalcitonin and parathyroid hormone, oxytocin is released from the posterior pituitary, and the corpus luteum supports pregnancy mainly through progesterone.

55. Answer: (A) The food is ground by mandibles and gizzard

In the cockroach, food is first chewed by the mandibles and then ground further in the gizzard, which has chitinous teeth. Malpighian tubules arise at the junction of the midgut and hindgut, the blood has no haemoglobin, and the excretory product is uric acid.

56. Answer: (B) Acts as a reserve during muscular exercise

Each 100 mL of oxygenated blood delivers only about 5 mL of O₂ to the tissues at rest, so venous blood remains largely saturated. This unused oxygen acts as a reserve that can be released when muscular activity increases the demand.

57. Answer: (C) Convoluted tubules

The convoluted tubules (PCT and DCT), along with Malpighian corpuscles, lie in the cortex of the kidney. Loops of Henle, collecting ducts and their capillary network dip into the medullary pyramids.

58. Answer: (C) The typhlosole greatly increases the effective absorption area of the digested food in the intestine

In Pheretima, the intestine has an internal median fold called the typhlosole, from the 26th segment onward, which greatly increases the absorptive area. The earthworm has no long tubular heart, fertilisation happens in the cocoon outside the body, and the setae help in locomotion, not defence.

59. Answer: (B) Epiglottis

During swallowing, the epiglottis closes the glottis so that food passes into the oesophagus and not the larynx. If it does not close properly, food enters the air passage and triggers a coughing reflex.

60. Answer: (C) Carry blood away from the heart to different organs

An artery is defined by the direction of flow: it carries blood away from the heart to the organs. Not all arteries carry oxygenated blood (the pulmonary artery carries deoxygenated blood), so oxygen content does not define them.

61. Answer: (C) Heart

The bundle of His (AV bundle) is part of the conducting system of the heart: it arises from the AV node, runs through the interventricular septum and divides into right and left bundle branches.

62. Answer: (A) Wheat

Himgiri is a wheat variety bred by hybridisation and selection for resistance to leaf and stripe rust and to hill bunt.

63. Answer: (A) Vitamin A

Rhodopsin consists of the protein opsin bound to retinal, an aldehyde of vitamin A. This is why vitamin A deficiency causes night blindness.

64. Answer: (A) Fibrinogen

Fibrinogen is the plasma protein converted by thrombin into fibrin threads, which form the network of a clot. Albumins maintain osmotic balance and globulins serve in defence; amylase is an enzyme, not a clotting factor.

65. Answer: (A) Comparatively more permeable to K⁺ ions and nearly impermeable to Na⁺ ions

At rest the axonal membrane is far more permeable to K⁺ ions than to Na⁺ ions and nearly impermeable to negatively charged proteins. With the Na⁺/K⁺ pump, this keeps the inside negative, giving the resting potential.

66. Answer: (B) Podocytes: Create minute spaces (slit pores) for the filtration of blood into the Bowman's capsule

Podocytes of Bowman's capsule are arranged so that minute filtration slits (slit pores) are left between them, through which blood is filtered into the capsule. The afferent arteriole brings blood to the glomerulus, most reabsorption happens in the PCT, and the DCT secretes K⁺ rather than reabsorbing it.

67. Answer: (B) A: Ovary, B: Glucagon, C: Growth hormone

Oestrogen that maintains female secondary sexual characters comes from the ovary, the α-cells of the islets of Langerhans secrete glucagon which raises blood sugar, and over-secretion of growth hormone from the anterior pituitary causes gigantism. Insulin lowers blood sugar, and calcitonin is from the thyroid.

68. Answer: (B) Reptiles and Birds

Reptiles, birds, land snails and insects excrete nitrogen mainly as uric acid, which conserves water. Amphibians are ureotelic as adults, and annelids are mostly ammonotelic.

69. Answer: (C) Rice

Jaya and Ratna are semi-dwarf rice varieties developed in India during the Green Revolution. Sonalika and Kalyan Sona are the corresponding semi-dwarf wheat varieties.

70. Answer: (A) 190/110 mmHg may harm vital organs like brain and kidney

Normal blood pressure is about 120/80 mmHg, and repeated readings of 140/90 or higher indicate hypertension. A pressure of 190/110 mmHg is severe and can damage vital organs such as the brain and kidneys. Readings like 100/55 or 105/50 are on the low side, not ideal or energising.

71. Answer: (B) When someone drinks lot of water, ADH release is suppressed

Drinking a lot of water dilutes the body fluids, so the hypothalamic osmoreceptors suppress ADH release and dilute urine is passed. Water loss in summer would stimulate ADH, and it is a fall in glomerular blood flow that triggers renin and angiotensin II formation.

72. Answer: (B) Maintaining the scrotal temperature lower than the internal body temperature

The scrotum keeps the testes about 2–2.5 °C below the internal body temperature, which is necessary for spermatogenesis. Testes that stay in the abdomen fail to produce sperm.

73. Answer: (B) Testes to epididymis

Sperms leave the seminiferous tubules through the rete testis and pass via the vasa efferentia into the epididymis. If the vasa efferentia are blocked, sperms cannot move from the testes to the epididymis.

74. Answer: (C) Twelve weeks

MTP is considered relatively safe during the first trimester, that is, up to 12 weeks of pregnancy. Second-trimester abortions are much riskier.

75. Answer: (D) Head louse living on the human scalp as well as laying eggs on human hair

The head louse lives on the host's scalp, lays its eggs on the hair and feeds on the host throughout its life, a true ectoparasite. The cuckoo is a brood parasite, the female Anopheles only visits to feed, and the foetus is not a separate parasitic organism.

76. Answer: (D) It is inverted in shape

Because energy is lost at each transfer, the energy at each trophic level is always less than at the level below. The pyramid of energy is therefore always upright with a broad base and can never be inverted.

77. Answer: (B) Saccharomyces

Ethanol is produced commercially by fermentation with the yeast *Saccharomyces cerevisiae*. *Aspergillus* is used for citric acid, *Clostridium* for butyric acid and *Trichoderma* for cyclosporin A.

78. Answer: (C) (a), (c)

Desert lizards cannot regulate body temperature physiologically, so they use behaviour: they bask in the sun when it is cold and burrow into the soil to escape midday heat. Rapid heat loss and thick fatty insulation are not their adaptations.

79. Answer: (B) Saliva of infected female Anopheles mosquito

Sporozoites, the infective stage of Plasmodium, are stored in the salivary glands of an infected female Anopheles and enter humans with her saliva when she bites. A freshly moulted mosquito has not yet fed on an infected person, and human RBCs contain merozoites and trophozoites.

80. Answer: (B) ELISA

ELISA (enzyme-linked immunosorbent assay) detects antibodies against HIV and is the widely used diagnostic test for AIDS. WIDAL is a test for typhoid, and MRI and ultrasound are imaging techniques.

81. Answer: (D) When HIV replicates rapidly in helper T-lymphocytes and damages large number of these

After infection, HIV multiplies in macrophages and later in helper T-lymphocytes; AIDS symptoms appear when the virus replicates rapidly and destroys large numbers of these cells, crippling immunity. This usually takes years, not days after contact.

82. Answer: (A) Palindromic sequence of base pairs

The sequence 5'-GAATTC-3' reads the same on the opposite strand when both are read 5'→3', so it is a palindromic sequence. This is the recognition site of EcoRI. Nothing in it indicates deletion or a start codon (AUG/ATG).

83. Answer: (A) Molasses

Molasses, the sugar-rich by-product of sugarcane processing, is the most common substrate fermented by yeast in distilleries. Corn meal can be used but needs starch hydrolysis first, and soya meal and gram are protein-rich.

84. Answer: (D) Rhizobium

Soyabean is a legume, and Rhizobium forms root nodules on legumes and fixes atmospheric nitrogen symbiotically. Azotobacter and Azospirillum are free-living or associative fixers, and Nostoc is a cyanobacterium used for paddy fields.

85. Answer: (A) coli

Restriction enzymes are named after their source: in EcoRI, 'E' is the genus Escherichia, 'co' is the species coli, 'R' is the strain RY13 and 'I' the order of isolation.

86. Answer: (B) Heterosis

When unrelated individuals or lines are crossed, the F₁ hybrid often outperforms both parents in yield and vigour; this is heterosis or hybrid vigour. Transformation is uptake of foreign DNA and splicing is removal of introns.

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.