

AIPMT 2012 Prelims — Biology Question Paper with Solutions

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

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1. Removal of introns and joining of exons in a defined order during transcription is called

- (A) Splicing
- (B) Looping
- (C) Inducing
- (D) Slicing

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2. Common cold differs from pneumonia in that

- (A) Pneumonia pathogen infects alveoli whereas the common cold affects nose and respiratory passage but not the lungs
- (B) Pneumonia is a communicable disease whereas the common cold is a nutritional deficiency disease
- (C) Pneumonia can be prevented by a live attenuated bacterial vaccine whereas the common cold has no effective vaccine
- (D) Pneumonia is caused by a virus while the common cold is caused by the bacterium *Haemophilus influenzae*

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3. Which one of the following is not a property of cancerous cells whereas the remaining three are?

- (A) They show contact inhibition
- (B) They compete with normal cells for vital nutrients
- (C) They do not remain confined in the area of formation
- (D) They divide in an uncontrolled manner

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4. How many plants in the list given below have composite fruits that develop from an inflorescence? Walnut, poppy, radish, fig, pineapple, apple, tomato, mulberry.

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

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5. An organic substance that can withstand environmental extremes and cannot be degraded by any enzyme is

- (A) Cellulose
- (B) Cuticle
- (C) Sporopollenin
- (D) Lignin

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6. Both, autogamy and geitonogamy are prevented in

- (A) Maize
- (B) Papaya
- (C) Cucumber
- (D) Castor

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7. Water containing cavities in vascular bundles are found in

- (A) Pinus
- (B) Sunflower
- (C) Maize
- (D) Cycas

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8. Which one of the following is a case of wrong matching ?

- (A) Callus - Unorganised mass of cells produced in tissue culture
- (B) Somatic hybridization - Fusion of two diverse cells
- (C) Vector DNA - Site for t-RNA synthesis
- (D) Micropropagation - In vitro production of plants in large numbers

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9. Which one of the structures given below correctly represents the structural formula of the basic amino acid?

- (A) $\text{HOCH}_2\text{-CH}_2\text{-CH}_2\text{-NH}_2$
- (B) $\text{H}_2\text{N-CH(COOH)-CH}_2\text{-CH}_2\text{-CH}_2\text{-CH}_2\text{-NH}_2$
- (C) $\text{H}_2\text{N-CH(COOH)-CH}_2\text{-CH}_2\text{-COOH}$
- (D) $\text{H}_2\text{N-CH(COOH)-CH}_2\text{-OH}$

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10. A patient brought to a hospital with myocardial infarction is normally immediately given

- (A) Statins
- (B) Penicillin
- (C) Streptokinase
- (D) Cyclosporin-A

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11. Ribosomal RNA is actively synthesized in

- (A) Ribosomes
- (B) Lysosomes
- (C) Nucleolus
- (D) Nucleoplasm

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12. Which one of the following does not differ in E. coli and Chlamydomonas?

- (A) Cell membrane
- (B) Ribosomes
- (C) Chromosomal Organization
- (D) Cell wall

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13. Which one is the most abundant protein in the animal world ?

- (A) Insulin
- (B) Trypsin
- (C) Haemoglobin
- (D) Collagen

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14. Consumption of which one of the following foods can prevent the kind of blindness associated with vitamin 'A' deficiency?

- (A) Bt-Brinjal
- (B) 'Flavr Savr' tomato
- (C) Canola
- (D) Golden rice

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15. Which one of the following options gives one correct example each of convergent evolution and divergent evolution?

- (A) Convergent: Thorns of Bougainvillea and tendrils of Cucurbita; Divergent: Eyes of octopus and mammals
- (B) Convergent: Eyes of octopus and mammals; Divergent: Bones of forelimbs of vertebrates
- (C) Convergent: Thorns of Bougainvillea and tendrils of Cucurbita; Divergent: Wings of butterflies and birds
- (D) Convergent: Bones of forelimbs of vertebrates; Divergent: Wings of butterfly and birds

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16. The gynoecium consists of many free pistils in flowers of

- (A) Michelia
- (B) Aloe
- (C) Tomato
- (D) Papaver

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17. Evolution of different species in a given area starting from a point and spreading to other geographical areas is known as

- (A) Divergent evolution
- (B) Adaptive radiation
- (C) Natural selection
- (D) Migration

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18. A single strand of nucleic acid tagged with a radioactive molecule is called

- (A) Probe
- (B) Vector
- (C) Selectable marker
- (D) Plasmid

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19. Measuring Biochemical Oxygen Demand (BOD) is a method used for

- (A) Working out the efficiency of RBCs about their capacity to carry oxygen
- (B) Estimating the amount of organic matter in sewage water
- (C) Working out the efficiency of oil driven automobile engines
- (D) Measuring the activity of *Saccharomyces cerevisiae* in producing curd on a commercial scale

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20. Yeast is used in the production of

- (A) Cheese and butter
- (B) Citric acid and lactic acid
- (C) Lipase and pectinase
- (D) Bread and beer

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21. Pheretima and its close relatives derive nourishment from

- (A) Small pieces of fresh fallen leaves of maize, etc.
- (B) Sugarcane roots
- (C) Decaying fallen leaves and soil organic matter
- (D) Soil insects

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22. Maximum nutritional diversity is found in the group

- (A) Plantae
- (B) Fungi
- (C) Animalia
- (D) Monera

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23. Which one of the following is common to multicellular fungi, filamentous algae and protonema of mosses ?

- (A) Multiplication by fragmentation
- (B) Diplontic life cycle
- (C) Members of kingdom Plantae
- (D) Mode of Nutrition

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24. In which one of the following options the two examples are correctly matched with their particular type of immunity?

- (A) Mucus coating of epithelium lining the urinogenital tract and the HCl in stomach – Physiological barriers
- (B) Polymorpho-nuclear leukocytes and monocytes – Cellular barriers
- (C) Anti-tetanus and anti-snake bite injections – Active immunity
- (D) Saliva in mouth and tears in eyes – Physical barriers

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25. Which one of the following pairs of hormones are the examples of those that can easily pass through the cell membrane of the target cell and bind to a receptor inside it (mostly in the nucleus)?

- (A) Cortisol, testosterone
- (B) Insulin, glucagon
- (C) Thyroxine, insulin
- (D) Somatostatin, oxytocin

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26. Closed vascular bundles lack

- (A) Pith
- (B) Ground tissue
- (C) Conjunctive tissue
- (D) Cambium

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27. Which one of the following is a correct statement ?

- (A) Origin of seed habit can be traced in pteridophytes
- (B) Pteridophyte gametophyte has a protonemal and leafy stage
- (C) In gymnosperms female gametophyte is free-living
- (D) Antheridiophores and archegoniophores are present in pteridophytes

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28. Widal test is carried out to test

- (A) Typhoid fever
- (B) Malaria
- (C) Diabetes mellitus
- (D) HIV/AIDS

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29. The maximum amount of electrolytes and water (70 - 80 percent) from the glomerular filtrate is reabsorbed in which part of the nephron ?

- (A) Descending limb of loop of Henle
- (B) Ascending limb of loop of Henle
- (C) Distal convoluted tubule
- (D) Proximal convoluted tubule

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30. The Test-tube Baby Programme employs which one of the following techniques ?

- (A) Zygote intra fallopian transfer (ZIFT)
- (B) Intra cytoplasmic sperm injection (ICSI)
- (C) Intra uterine insemination (IUI)
- (D) Gamete intra fallopian transfer (GIFT)

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31. Identify the possible link "A" in the following food chain: Plant → insect → frog → "A" → Eagle

- (A) Parrot
- (B) Rabbit
- (C) Wolf
- (D) Cobra

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32. The human hind brain comprises three parts, one of which is

- (A) Hypothalamus
- (B) Spinal cord
- (C) Corpus callosum
- (D) Cerebellum

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33. PCR and Restriction Fragment Length Polymorphism are the methods for

- (A) Genetic Fingerprinting
- (B) Study of enzymes
- (C) Genetic transformation
- (D) DNA sequencing

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34. Which one of the following areas in India, is a hotspot of biodiversity ?

- (A) Western Ghats
- (B) Eastern Ghats
- (C) Gangetic Plain
- (D) Sunderbans

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35. Phyllode is present in

- (A) Opuntia
- (B) Asparagus
- (C) Euphorbia
- (D) Australian Acacia

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36. The highest number of species in the world is represented by

- (A) Lichens
- (B) Fungi
- (C) Mosses
- (D) Algae

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37. Motile zygote of Plasmodium occurs in

- (A) Human liver
- (B) Gut of female Anopheles
- (C) Salivary glands of Anopheles
- (D) Human RBCs

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38. Select the correct statement regarding the specific disorder of muscular or skeletal system

- (A) Gout-inflammation of joints due to extra deposition of calcium
- (B) Muscular dystrophy-age related shortening of muscles
- (C) Osteoporosis-decrease in bone mass and higher chances of fractures with advancing age
- (D) Myasthenia gravis-Auto immune disorder which inhibits sliding of myosin filaments

AIPMT 2012 Prelims · Q74

39. In an area where DDT had been used extensively, the population of birds declined significantly because

- (A) Many of the birds eggs laid, did not hatch
- (B) Birds stopped laying eggs
- (C) Earthworms in the area got eradicated
- (D) Cobras were feeding exclusively on birds

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40. Vexillary aestivation is characteristic of the family

- (A) Brassicaceae
- (B) Fabaceae
- (C) Asteraceae
- (D) Solanaceae

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41. Which one of the following is an example of carrying out biological control of pests/diseases using microbes ?

- (A) Lady bird beetle against aphids in mustard
- (B) Trichoderma sp. against certain plant pathogens
- (C) Nucleopolyhedrovirus against white rust in Brassica
- (D) Bt-cotton to increase cotton yield

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42. The extinct human who lived 1,00,000 to 40,000 years ago, in Europe, Asia and parts of Africa, with short stature, heavy eye brows, retreating foreheads, large jaws with heavy teeth, stocky bodies, a lumbering gait and stooped posture was

- (A) Ramapithecus
- (B) Homo habilis
- (C) Neanderthal human
- (D) Cro-Magnon humans

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43. A normal-visioned man whose father was colour-blind, marries a woman whose father was also colour-blind. They have their first child as a daughter. What are the chances that this child would be colour-blind ?

- (A) 50%
- (B) 100%
- (C) Zero percent
- (D) 25%

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44. Best defined function of Manganese in green plants is

- (A) Water absorption
- (B) Photolysis of water
- (C) Calvin cycle
- (D) Nitrogen fixation

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45. Even in absence of pollinating agents seed-setting is assured in

- (A) Fig
- (B) Commelina
- (C) Zostera
- (D) Salvia

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

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

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47. Which one of the following is a wrong statement?

- (A) Nitrosomonas and Nitrobacter are chemoautotrophs
- (B) Anabaena and Nostoc are capable of fixing nitrogen in free-living state also
- (C) Root nodule forming nitrogen fixers live as aerobes under free-living conditions
- (D) Phosphorus is a constituent of cell membranes, certain nucleic acids and all proteins

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48. The most abundant prokaryotes helpful to humans in making curd from milk and in production of antibiotics are the ones categorised as

- (A) Heterotrophic bacteria
- (B) Cyanobacteria
- (C) Archaeobacteria
- (D) Chemosynthetic autotrophs

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49. A person entering an empty room suddenly finds a snake right in front on opening the door. Which one of the following is likely to happen in his neuro-hormonal control system ?

- (A) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal cortex
- (B) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal medulla
- (C) Neurotransmitters diffuse rapidly across the cleft and transmit a nerve impulse
- (D) Hypothalamus activates the parasympathetic division of brain

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50. Which one single organism or the pair of organisms is correctly assigned to its or their named taxonomic group?

- (A) Nostoc and Anabaena are examples of protista
- (B) Paramecium and Plasmodium belong to the same kingdom as that of Penicillium
- (C) Lichen is a composite organism formed from the symbiotic association of an alga and a protozoan
- (D) Yeast used in making bread and beer is a fungus

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51. In a normal pregnant woman, the amount of total gonadotropin activity was assessed. The result expected was

- (A) High level of circulating HCG to stimulate estrogen and progesterone synthesis
- (B) High level of circulating FSH and LH in the uterus to stimulate implantation of the embryo
- (C) High level of circulating HCG to stimulate endometrial thickening
- (D) High levels of FSH and LH in uterus to stimulate endometrial thickening

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52. The Leydig cells as found in the human body are the secretory source of

- (A) Androgens
- (B) Progesterone
- (C) Intestinal mucus
- (D) Glucagon

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53. Which one of the following is not a part of a transcription unit in DNA ?

- (A) The structural gene
- (B) The inducer
- (C) A terminator
- (D) A promoter

AIPMT 2012 Prelims · Q89

54. Which one of the following is a wrong statement ?

- (A) Eutrophication is a natural phenomenon in freshwater bodies
- (B) Most of the forests have been lost in tropical areas
- (C) Ozone in upper part of atmosphere is harmful to animals
- (D) Greenhouse effect is a natural phenomenon

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55. Cycas and Adiantum resemble each other in having

- (A) Vessels
- (B) Seeds
- (C) Motile sperms
- (D) Cambium

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56. A certain road accident patient with unknown blood group needs immediate blood transfusion. His one doctor friend at once offers his blood. What was the blood group of the donor ?

- (A) Blood group A
- (B) Blood group B
- (C) Blood group AB
- (D) Blood group O

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57. Compared to those of humans, the erythrocytes in frog are

- (A) Nucleated and without haemoglobin
- (B) Without nucleus but with haemoglobin
- (C) Nucleated and with haemoglobin
- (D) Very much smaller and fewer

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58. A nitrogen-fixing microbe associated with Azolla in rice fields is

- (A) Tolypothrix
- (B) Spirulina
- (C) Anabaena
- (D) Frankia

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59. What is correct to say about the hormone action in humans ?

- (A) FSH stimulates the secretion of estrogen and progesterone
- (B) Glucagon is secreted by β -cells of Islets of Langerhans and stimulates glycogenolysis
- (C) Secretion of thymosins is stimulated with aging
- (D) In females, FSH first binds with specific receptors on ovarian cell membrane

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60. Cymose inflorescence is present in

- (A) Brassica
- (B) Solanum
- (C) Sesbania
- (D) Trifolium

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61. Which one of the following is correctly matched ?

- (A) Yeast – Zoospores
- (B) Onion – Bulb
- (C) Ginger – Sucker
- (D) Chlamydomonas – Conidia

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62. What is true about ribosomes ?

- (A) These are self - splicing introns of some RNAs
- (B) The prokaryotic ribosomes are 80S, where “S” stands for sedimentation coefficient
- (C) These are composed of ribonucleic acid and proteins
- (D) These are found only in eukaryotic cells

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63. A process that makes important difference between C₃ and C₄ plants is

- (A) Photorespiration
- (B) Transpiration
- (C) Glycolysis
- (D) Photosynthesis

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64. Placentation in tomato and lemon is

- (A) Axile
- (B) Parietal
- (C) Free central
- (D) Marginal

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65. Select the correct statement from the following regarding cell membrane

- (A) Fluid mosaic model of cell membrane was proposed by Singer and Nicolson
- (B) Na⁺ and K⁺ ions move across cell membrane by passive transport
- (C) Proteins make up 60 to 70% of the cell membrane
- (D) Lipids are arranged in a bilayer with polar heads towards the inner part

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66. For transformation, micro-particles coated with DNA to be bombarded with gene gun are made up of

- (A) Gold or Tungsten
- (B) Silver or Platinum
- (C) Platinum or Zinc
- (D) Silicon or Platinum

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67. Which one is a true statement regarding DNA polymerase used in PCR ?

- (A) It remains active at high temperature
- (B) It is used to ligate introduced DNA in recipient cells
- (C) It serves as a selectable marker
- (D) It is isolated from a virus

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68. The upright pyramid of number is absent in

- (A) Grassland
- (B) Pond
- (C) Forest
- (D) Lake

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69. Signals for parturition originate from

- (A) Fully developed foetus only
- (B) Both placenta as well as fully developed foetus
- (C) Oxytocin released from maternal pituitary
- (D) Placenta only

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70. The common bottle cork is a product of

- (A) Vascular Cambium
- (B) Dermatogen
- (C) Phellogen
- (D) Xylem

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71. Nuclear membrane is absent in

- (A) Nostoc
- (B) Penicillium
- (C) Agaricus
- (D) Volvox

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72. The cyanobacteria are also referred to as

- (A) Blue green algae
- (B) Protists
- (C) Golden algae
- (D) Slime moulds

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73. Which one of the following microbes forms symbiotic association with plants and helps them in their nutrition ?

- (A) Trichoderma
- (B) Azotobacter
- (C) Aspergillus
- (D) Glomus

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74. Which one of the following is not a functional unit of an ecosystem?

- (A) Stratification
- (B) Energy flow
- (C) Decomposition
- (D) Productivity

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75. During gamete formation, the enzyme recombinase participates during

- (A) Prophase-II
- (B) Metaphase-I
- (C) Anaphase-II
- (D) Prophase-I

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76. Removal of RNA polymerase III from nucleoplasm will affect the synthesis of

- (A) rRNA
- (B) tRNA
- (C) hnRNA
- (D) mRNA

AIPMT 2012 Prelims · Q112

77. Which part would be most suitable for raising virus-free plants for micropropagation ?

- (A) Node
- (B) Bark
- (C) Vascular tissue
- (D) Meristem

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78. In which one of the following, the genus name, its two characters and its phylum are not correctly matched, whereas the remaining three are correct ?

- (A) *Periplaneta* – (a) jointed appendages, (b) chitinous exoskeleton – Arthropoda
- (B) *Pila* – (a) body segmented, (b) mouth with radula – Mollusca
- (C) *Asterias* – (a) spiny skinned, (b) water vascular system – Echinodermata
- (D) *Sycon* – (a) pore bearing, (b) canal system – Porifera

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79. Select the correct statement from the ones given below with respect to *Periplaneta americana*

- (A) Grinding of food is carried out only by the mouth parts
- (B) Nervous system located dorsally, consists of segmentally arranged ganglia joined by a pair of longitudinal connectives
- (C) Males bear a pair of short thread like anal styles
- (D) There are 16 very long Malpighian tubules present at the junctions of midgut and hindgut

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80. Cirrhosis of liver is caused by the chronic intake of

- (A) Cocaine
- (B) Opium
- (C) Alcohol
- (D) Tobacco (Chewing)

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81. *Monascus purpureus* is a yeast used commercially in the production of

- (A) Blood cholesterol lowering statins
- (B) Ethanol
- (C) Streptokinase for removing clots from the blood vessels
- (D) Citric acid

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82. The coconut water and the edible part of coconut are equivalent to

- (A) Embryo
- (B) Endosperm
- (C) Endocarp
- (D) Mesocarp

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83. Companion cells are closely associated with

- (A) Guard cells
- (B) Sieve elements
- (C) Vessel elements
- (D) Trichomes

84. Which one of the following is not a gaseous biogeochemical cycle in ecosystem ?

- (A) Carbon cycle
- (B) Sulphur cycle
- (C) Phosphorus cycle
- (D) Nitrogen cycle

85. Anxiety and eating spicy food together in an otherwise normal human, may lead to

- (A) Vomiting
- (B) Indigestion
- (C) Jaundice
- (D) Diarrhoea

Answer key and explanations

1. Answer: (A) Splicing

Splicing is the removal of introns from the primary transcript (hnRNA) and joining of exons in a defined order. Slicing is a distractor that sounds similar but is not the term for this process.

2. Answer: (A) Pneumonia pathogen infects alveoli whereas the common cold affects nose and respiratory passage but not the lungs

Pneumonia, caused by bacteria such as *Streptococcus pneumoniae*, infects the alveoli of the lungs, whereas the common cold (rhinovirus) affects the nose and respiratory passages but not the lungs. The common cold is an infectious viral disease, not a nutritional deficiency, and it is not caused by *Haemophilus*.

3. Answer: (A) They show contact inhibition

Cancer cells have lost contact inhibition, so they keep dividing even when touching neighbouring cells. Uncontrolled division, spreading from the site of origin (metastasis) and competing with normal cells for nutrients are all true of cancer cells.

4. Answer: (A) Three

Composite (multiple) fruits develop from a whole inflorescence: fig (syconus), pineapple (sorosis) and mulberry (sorosis), which makes three. Walnut, poppy, radish, apple and tomato develop from a single flower.

5. Answer: (C) Sporopollenin

Sporopollenin in the exine of pollen grains is one of the most resistant organic materials; it withstands high temperatures and strong acids and alkalis, and no known enzyme degrades it. Lignin and cellulose are both broken down by microbial enzymes.

6. Answer: (B) Papaya

Papaya is dioecious (male and female flowers on separate plants), so neither autogamy nor geitonogamy is possible. Maize, castor and cucumber are monoecious, which prevents autogamy but still allows geitonogamy.

7. Answer: (C) Maize

In monocot stems such as maize, the protoxylem breaks down to leave water-containing cavities (lysigenous cavities) in each vascular bundle. Sunflower is a dicot, and Pinus and Cycas are gymnosperms that do not show this feature.

8. Answer: (C) Vector DNA - Site for t-RNA synthesis

A vector DNA (such as a plasmid) carries the foreign gene into the host cell and lets it replicate; it is not a site of tRNA synthesis. Callus, somatic hybridisation and micropropagation are all correctly described.

9. Answer: (B) $\text{H}_2\text{N}-\text{CH}(\text{COOH})-\text{CH}_2-\text{CH}_2-\text{CH}_2-\text{NH}_2$

Lysine, $\text{H}_2\text{N}-\text{CH}(\text{COOH})-(\text{CH}_2)_4-\text{NH}_2$, carries an extra amino group in its side chain, which makes it a basic amino acid. The structure with an extra $-\text{COOH}$ in the side chain is glutamic acid (acidic), the one with $-\text{CH}_2\text{OH}$ is serine (neutral), and $\text{HOCH}_2-\text{CH}_2-\text{CH}_2-\text{NH}_2$ is not an amino acid at all.

10. Answer: (C) Streptokinase

Streptokinase, produced by *Streptococcus* and modified by genetic engineering, is a clot buster that dissolves blood clots in the coronary arteries of myocardial infarction patients. Statins lower blood cholesterol and cyclosporin A is an immunosuppressant used in organ transplants.

11. Answer: (C) Nucleolus

The nucleolus is the site of active ribosomal RNA synthesis. Ribosomes are made of rRNA but do not synthesise it, and lysosomes are digestive vesicles.

12. Answer: (A) Cell membrane

Both the prokaryote *E. coli* and the eukaryotic alga *Chlamydomonas* have a similar lipid-protein plasma membrane. Their ribosomes (70S versus 80S cytoplasmic), chromosome organisation (naked circular DNA versus chromatin) and cell wall chemistry (peptidoglycan versus cellulose) all differ.

13. Answer: (D) Collagen

Collagen is the most abundant protein in the animal world. RuBisCO is the most abundant protein in the whole biosphere, but it is a plant protein; haemoglobin, insulin and trypsin are far less abundant.

14. Answer: (D) Golden rice

Golden rice is genetically engineered to make β -carotene (provitamin A), so eating it helps prevent the night blindness caused by vitamin A deficiency. Bt-brinjal is pest resistant and Flavr Savr tomato has delayed ripening.

15. Answer: (B) Convergent: Eyes of octopus and mammals; Divergent: Bones of forelimbs of vertebrates

Eyes of octopus and mammals are analogous structures that evolved independently (convergent evolution), while the forelimb bones of vertebrates are homologous structures from a common ancestor (divergent evolution). Thorns of *Bougainvillea* and tendrils of *Cucurbita* are homologous, not convergent, and wings of butterflies and birds are analogous, not divergent.

16. Answer: (A) Michelia

Michelia has a multicarpellary apocarpous gynoecium, with many free pistils on an elongated thalamus. Papaver, tomato and Aloe have syncarpous ovaries with fused carpels.

17. Answer: (B) Adaptive radiation

Adaptive radiation is the evolution of different species from a single ancestral point, radiating into other geographical areas and habitats, as in Darwin's finches. Divergent evolution describes homologous structures in general, not this pattern of spread.

18. Answer: (A) Probe

A probe is a single-stranded DNA or RNA tagged with a radioactive (or fluorescent) molecule that hybridises with its complementary sequence and is detected by autoradiography. Vectors and plasmids carry genes into hosts, and selectable markers identify transformants.

19. Answer: (B) Estimating the amount of organic matter in sewage water

BOD is the amount of oxygen consumed if all the organic matter in one litre of water were oxidised by bacteria, so it measures the organic matter in sewage. It has nothing to do with RBC oxygen carrying, engines, or curd making, which is in any case done by *Lactobacillus* and not yeast.

20. Answer: (D) Bread and beer

Saccharomyces cerevisiae (baker's/brewer's yeast) is used to make bread by fermenting dough and to brew beer. Cheese and butter depend on bacteria, citric acid comes from *Aspergillus*, and lactic acid from *Lactobacillus*.

21. Answer: (C) Decaying fallen leaves and soil organic matter

Pheretima (earthworm) is a detritivore that feeds on decaying fallen leaves and organic matter mixed with soil. It does not eat fresh leaves, sugarcane roots or soil insects.

22. Answer: (D) Monera

Monera (bacteria) show the widest range of nutrition: photoautotrophs, chemoautotrophs and many kinds of heterotrophs (saprophytes, parasites, symbionts). Plantae are mostly autotrophic and Fungi and Animalia are heterotrophic.

23. Answer: (A) Multiplication by fragmentation

Multicellular fungi, filamentous algae and the filamentous protonema of mosses all multiply vegetatively by fragmentation. They differ in life cycle and nutrition, and fungi are not members of kingdom Plantae.

24. Answer: (B) Polymorpho-nuclear leukocytes and monocytes - Cellular barriers

Polymorphonuclear leukocytes (neutrophils) and monocytes are cellular barriers of innate immunity. Mucus coating is a physical barrier, HCl, saliva and tears are physiological barriers, and anti-tetanus and anti-snake venom injections give passive, not active, immunity.

25. Answer: (A) Cortisol, testosterone

Cortisol and testosterone are lipid-soluble steroid hormones that pass through the cell membrane and bind to intracellular (mostly nuclear) receptors. Insulin, glucagon, somatostatin and oxytocin are peptide hormones that bind to membrane receptors; thyroxine enters the cell but insulin does not.

26. Answer: (D) Cambium

A closed vascular bundle has no cambium between xylem and phloem, so it cannot form secondary tissue (as in monocots). Pith, ground tissue and conjunctive tissue are not parts of the bundle itself.

27. Answer: (A) Origin of seed habit can be traced in pteridophytes

Heterospory in some pteridophytes such as *Selaginella* and *Salvinia*, with the megaspore retained on the parent, is a precursor to the seed habit. Protonema and leafy stages belong to moss gametophytes, antheridiophores and archegoniophores occur in *Marchantia* (a liverwort), and the female gametophyte of gymnosperms is retained within the ovule, not free-living.

28. Answer: (A) Typhoid fever

The Widal test detects antibodies against *Salmonella typhi* and confirms typhoid fever. Malaria is diagnosed from blood smears, diabetes by blood sugar, and HIV by ELISA.

29. Answer: (D) Proximal convoluted tubule

The proximal convoluted tubule reabsorbs nearly 70–80 percent of the electrolytes and water from the glomerular filtrate. The loop of Henle and the distal tubule handle much smaller amounts.

30. Answer: (A) Zygote intra fallopian transfer (ZIFT)

In the test-tube baby programme, ova are fertilised in vitro and the zygote or early embryo is transferred into the fallopian tube (ZIFT). GIFT transfers unfertilised gametes and IUI places semen in the uterus, so neither involves fertilisation in a test tube.

31. Answer: (D) Cobra

A cobra eats frogs and is in turn eaten by an eagle, so it fits between them. A parrot and a rabbit are herbivores that do not eat frogs, and a wolf is not normally preyed on by an eagle.

32. Answer: (D) Cerebellum

The hindbrain consists of the pons, cerebellum and medulla oblongata. The hypothalamus is part of the forebrain (diencephalon), the corpus callosum connects the cerebral hemispheres, and the spinal cord is not part of the brain.

33. Answer: (A) Genetic Fingerprinting

DNA (genetic) fingerprinting uses PCR to amplify DNA and RFLP (restriction digestion and hybridisation with probes) to compare banding patterns between individuals. These methods are not used to study enzymes or to transform cells.

34. Answer: (A) Western Ghats

The Western Ghats (with Sri Lanka) is one of the global biodiversity hotspots in India, alongside the Himalaya and Indo-Burma. The Eastern Ghats, Gangetic plain and Sunderbans are not hotspots.

35. Answer: (D) Australian Acacia

In Australian *Acacia* the petiole becomes flat, green and leaf-like (a phyllode) and takes over photosynthesis. *Opuntia* has a phylloclade (flattened stem), *Asparagus* has cladodes, and *Euphorbia* has a fleshy stem.

36. Answer: (B) Fungi

Of the groups listed, fungi have by far the most described species; they are the largest group after insects in the global species count. Algae, mosses and lichens each have far fewer species.

37. Answer: (B) Gut of female Anopheles

Gametes of *Plasmodium* fuse in the gut of the female *Anopheles* mosquito to form a motile zygote (ookinete), which then forms an oocyst on the gut wall. Sporozoites are found in the salivary glands, while the liver and RBCs host the asexual stages in humans.

38. Answer: (C) Osteoporosis-decrease in bone mass and higher chances of fractures with advancing age

Osteoporosis is an age-related loss of bone mass that raises the chance of fractures. Gout is caused by uric acid crystals (not calcium) in joints, muscular dystrophy is a genetic degeneration of muscle, and myasthenia gravis is an autoimmune disorder of the neuromuscular junction.

39. Answer: (A) Many of the birds eggs laid, did not hatch

DDT accumulates through biomagnification in fish-eating birds and disturbs their calcium metabolism, so egg shells become thin and break before hatching; many eggs laid therefore did not hatch. Birds did not stop laying eggs altogether.

40. Answer: (B) Fabaceae

Vexillary (papilionaceous) aestivation, with a large standard petal overlapping two wings that overlap the keel, is characteristic of Fabaceae such as pea and bean. Brassicaceae, Asteraceae and Solanaceae show other types.

41. Answer: (B) Trichoderma sp. against certain plant pathogens

Trichoderma is a free-living fungus used as a biocontrol agent against several plant pathogens, so it is microbial biocontrol. A ladybird beetle is an insect, not a microbe; nucleopolyhedrovirus is used against insect pests, not white rust; and Bt-cotton is a transgenic crop, not biocontrol.

42. Answer: (C) Neanderthal human

The Neanderthal man lived about 1,00,000 to 40,000 years ago in Europe, Asia and parts of Africa, with short stocky bodies, heavy brow ridges, retreating foreheads and large jaws. Cro-Magnon was a later modern human, and Ramapithecus and Homo habilis are much older.

43. Answer: (C) Zero percent

The man has normal vision, so his X chromosome carries the normal allele; every daughter receives this X from him. The woman, whose father was colour-blind, is a carrier, but the daughter can be at most a carrier, so her chance of being colour-blind is zero.

44. Answer: (B) Photolysis of water

Manganese is part of the water-splitting (oxygen-evolving) complex of photosystem II and is essential for photolysis of water. It does not have a primary role in water absorption, the Calvin cycle or nitrogen fixation (which needs molybdenum).

45. Answer: (B) Commelina

Commelina produces cleistogamous flowers that never open and self-pollinate, so seed set is assured even without pollinators. Salvia needs insects, fig depends on fig wasps, and Zostera is water-pollinated.

46. Answer: (D) Increasing cranial capacity

The most significant trend in human evolution was the increase in cranial capacity (brain size), from about 650–800 cc in Homo habilis to about 1400 cc in Homo sapiens. Upright posture and binocular vision appeared earlier and are shared with other hominids or primates.

47. Answer: (D) Phosphorus is a constituent of cell membranes, certain nucleic acids and all proteins

Phosphorus is a constituent of cell membranes (phospholipids), all nucleic acids and certain proteins, not all proteins, so the statement given is wrong. Nitrosomonas and Nitrobacter are chemoautotrophs, Anabaena and Nostoc fix nitrogen when free-living, and Rhizobium lives as an aerobe when free-living.

48. Answer: (A) Heterotrophic bacteria

Heterotrophic bacteria are the most abundant bacteria in nature; Lactobacillus turns milk into curd and Streptomyces produces antibiotics. Cyanobacteria and chemosynthetic autotrophs make their own food, and archaeobacteria live in extreme habitats.

49. Answer: (B) Sympathetic nervous system is activated releasing epinephrine and norepinephrine from adrenal medulla

In a fright response the sympathetic nervous system stimulates the adrenal medulla to release epinephrine and norepinephrine (fight-or-flight). These hormones come from the medulla, not the adrenal cortex, and the parasympathetic division is not activated in an emergency.

50. Answer: (D) Yeast used in making bread and beer is a fungus

Yeast used in bread and beer is a fungus (Saccharomyces). Nostoc and Anabaena are Monera, Paramecium and Plasmodium are Protista while Penicillium is a fungus, and a lichen is an alga plus a fungus, not a protozoan.

51. Answer: (A) High level of circulating HCG to stimulate estrogen and progesterone synthesis

During pregnancy the placenta secretes large amounts of hCG, which maintains the corpus luteum so that it keeps secreting oestrogen and progesterone. FSH and LH are suppressed in pregnancy and in any case act on the ovary, not the uterus.

52. Answer: (A) Androgens

Leydig (interstitial) cells lying between the seminiferous tubules secrete androgens, mainly testosterone. Progesterone comes from the corpus luteum, intestinal mucus from goblet cells, and glucagon from α -cells of the pancreas.

53. Answer: (B) The inducer

A transcription unit consists of a promoter, a structural gene and a terminator. An inducer (such as lactose in the lac operon) is a small molecule that regulates expression; it is not a stretch of DNA.

54. Answer: (C) Ozone in upper part of atmosphere is harmful to animals

Ozone in the upper atmosphere (stratosphere) absorbs ultraviolet radiation and protects living organisms, so calling it harmful is wrong. Eutrophication and the greenhouse effect are natural phenomena (accelerated by humans), and most forest loss has been in the tropics.

55. Answer: (C) Motile sperms

Cycas (a gymnosperm) and Adiantum (a fern) both have motile, multiflagellate male gametes. Adiantum has no seeds, neither has vessels, and the fern lacks cambium.

56. Answer: (D) Blood group O

Blood group O has no A or B antigens on its RBCs, so it can be given to a patient of any ABO group; O is the universal donor. Group AB is the universal recipient, not donor.

57. Answer: (C) Nucleated and with haemoglobin

Frog erythrocytes are nucleated and contain haemoglobin, unlike the enucleate RBCs of mammals. They are also larger, not smaller, than human RBCs.

58. Answer: (C) Anabaena

The cyanobacterium *Anabaena azollae* lives in the leaf cavities of the water fern *Azolla* and fixes nitrogen, so *Azolla* is used as a biofertiliser in rice fields. *Frankia* forms nodules on non-legumes like *Alnus*, and *Spirulina* is grown as single-cell protein.

59. Answer: (D) In females, FSH first binds with specific receptors on ovarian cell membrane

FSH is a glycoprotein hormone, so in females it first binds to specific receptors on the membrane of ovarian cells. FSH stimulates follicle growth and oestrogen secretion but not progesterone, glucagon comes from α -cells (not β -cells), and thymosin secretion falls with age.

60. Answer: (B) Solanum

Solanum (Solanaceae) bears a cymose inflorescence, where the main axis ends in a flower. *Brassica*, *Sesbania* and *Trifolium* have racemose inflorescences with indefinite growth of the main axis.

61. Answer: (B) Onion - Bulb

Onion is a bulb, an underground stem with fleshy scale leaves. Ginger is a rhizome, yeast reproduces by budding, and *Chlamydomonas* forms zoospores; conidia are formed by *Penicillium*.

62. Answer: (C) These are composed of ribonucleic acid and proteins

Ribosomes are made of ribosomal RNA and proteins. Prokaryotic ribosomes are 70S (not 80S), ribosomes occur in both prokaryotes and eukaryotes, and they are not introns.

63. Answer: (A) Photorespiration

Photorespiration occurs in C_3 plants, where RuBisCO also acts as an oxygenase, but is almost absent in C_4 plants because CO_2 is concentrated around RuBisCO in the bundle sheath. Both types carry out photosynthesis, transpiration and glycolysis.

64. Answer: (A) Axile

Tomato and lemon have axile placentation: a multilocular ovary with ovules attached to the central axis. Parietal placentation is seen in mustard, free central in *Dianthus* and marginal in pea.

65. Answer: (A) Fluid mosaic model of cell membrane was proposed by Singer and Nicolson

The fluid mosaic model of the cell membrane was proposed by Singer and Nicolson in 1972. Na^+ and K^+ are moved by active transport (Na^+/K^+ pump), proteins form about half (not 60–70%) of the human RBC membrane, and lipid polar heads face outwards with the tails inside.

66. Answer: (A) Gold or Tungsten

In biolistics (gene gun), DNA is coated onto high-velocity microparticles of gold or tungsten and fired into plant cells. Silver, platinum, zinc and silicon are not used.

67. Answer: (A) It remains active at high temperature

The DNA polymerase used in PCR is Taq polymerase from the bacterium *Thermus aquaticus*, which stays active at the high temperatures used to denature DNA. It is isolated from a bacterium, not a virus, and it does not ligate DNA or act as a selectable marker.

68. Answer: (C) Forest

In a forest, a few large trees support many herbivores (insects, birds), so the pyramid of numbers is inverted or spindle-shaped rather than upright. Grassland, pond and lake ecosystems have upright pyramids of numbers.

69. Answer: (B) Both placenta as well as fully developed foetus

The signals for parturition come from the fully developed foetus and the placenta; they cause mild uterine contractions (the foetal ejection reflex), which then trigger oxytocin release from the maternal pituitary. Oxytocin is a response to the signal, not its origin.

70. Answer: (C) Phellogen

Commercial bottle cork is phellem (cork) produced by the phellogen (cork cambium) of the cork oak, *Quercus suber*. Vascular cambium produces secondary xylem and phloem, and dermatogen forms the epidermis.

71. Answer: (A) Nostoc

Nostoc is a cyanobacterium, a prokaryote without a nuclear membrane. Penicillium and Agaricus (fungi) and Volvox (green alga) are eukaryotes with a true nucleus.

72. Answer: (A) Blue green algae

Cyanobacteria are also called blue-green algae because of their pigments and photosynthesis like algae, though they are prokaryotes. Golden algae are chrysophytes and slime moulds are protists.

73. Answer: (D) Glomus

Glomus is a fungus that forms mycorrhiza with plant roots and helps absorb phosphorus from the soil. Azotobacter is a free-living nitrogen fixer and Trichoderma is a free-living biocontrol fungus, not a symbiont.

74. Answer: (A) Stratification

Stratification is the vertical layering of species, a structural feature of an ecosystem. Productivity, decomposition, energy flow and nutrient cycling are the functional aspects.

75. Answer: (D) Prophase-I

Recombinase catalyses crossing over between non-sister chromatids of homologous chromosomes during pachytene of prophase I of meiosis. There is no crossing over in metaphase I or in meiosis II.

76. Answer: (B) tRNA

In eukaryotes, RNA polymerase III transcribes tRNA, 5S rRNA and snRNAs, so removing it stops tRNA synthesis. RNA polymerase I makes most rRNA, and RNA polymerase II makes hnRNA (the precursor of mRNA).

77. Answer: (D) Meristem

The apical and axillary meristems are free of viruses even in an infected plant, so meristem culture is used to raise virus-free plants. Nodes, bark and vascular tissue can carry the virus.

78. Answer: (B) Pila - (a) body segmented, (b) mouth with radula - Mollusca

Pila (apple snail) is a mollusc with a radula, but its body is unsegmented, so the pair given for it is wrong. Periplaneta (jointed appendages, chitinous exoskeleton), Asterias (spiny skin, water vascular system) and Sycon (pores, canal system) are correctly matched.

79. Answer: (C) Males bear a pair of short thread like anal styles

Male cockroaches bear a pair of short, thread-like anal styles, which females lack. The nerve cord is ventral, food is also ground in the gizzard, and there are about 100-150 thin Malpighian tubules, not 16.

80. Answer: (C) Alcohol

Chronic heavy intake of alcohol damages liver cells and leads to cirrhosis. Cocaine, opium and chewing tobacco cause other harmful effects but are not the classic cause of cirrhosis.

81. Answer: (A) Blood cholesterol lowering statins

The yeast *Monascus purpureus* produces statins, which lower blood cholesterol by competitively inhibiting the enzyme that synthesises cholesterol. Streptokinase comes from *Streptococcus*, citric acid from *Aspergillus niger* and ethanol from *Saccharomyces*.

82. Answer: (B) Endosperm

Coconut water is free-nuclear endosperm and the white edible kernel is cellular endosperm. The embryo is small, and the fibrous husk and hard shell are the mesocarp and endocarp.

83. Answer: (B) Sieve elements

Companion cells are connected to sieve tube elements by pit fields and help maintain their pressure gradient. Guard cells surround stomata, and vessel elements belong to xylem.

84. Answer: (C) Phosphorus cycle

The phosphorus cycle is a sedimentary cycle with the rock reservoir and no significant gaseous phase. Carbon, nitrogen and sulphur cycles all have important atmospheric (gaseous) reservoirs.

85. Answer: (B) Indigestion

Anxiety and spicy food together can cause indigestion (dyspepsia), a feeling of fullness due to inadequate enzyme secretion and overeating or spicy food. Jaundice is a liver disorder, and vomiting and diarrhoea are not the usual result.

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.