

AIPMT 2015 — Biology Question Paper with Solutions

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

AIPMT 2015

1. Leaves become modified into spines in:

- (A) Silk Cotton
- (B) Opuntia
- (C) Pea
- (D) Onion

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2. Vertical distribution of different species occupying different levels in a biotic community is known as:

- (A) Pyramid
- (B) Divergence
- (C) Stratification
- (D) Zonation

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3. Gene regulation governing lactose operon of E.coli that involves the lac I gene product is:

- (A) Feedback inhibition because excess of β -galactosidase can switch off transcription
- (B) Positive and inducible because it can be induced by lactose
- (C) Negative and inducible because repressor protein prevents transcription
- (D) Negative and repressible because repressor protein prevents transcription

AIPMT 2015 · Q3

4. Transpiration and root pressure cause water to rise in plants by:

- (A) pushing and pulling it, respectively
- (B) pulling it upward
- (C) pulling and pushing it, respectively
- (D) pushing it upward

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5. Which one of the following matches is correct?

- (A) Agaricus – Parasitic fungus – Basidiomycetes
- (B) Phytophthora – Aseptate mycelium – Basidiomycetes
- (C) Alternaria – Sexual reproduction absent – Deuteromycetes
- (D) Mucor – Reproduction by Conjugation – Ascomycetes

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6. Which of these is not an important component of initiation of parturition in humans?

- (A) Release of prolactin
- (B) Increase in estrogen and progesterone ratio
- (C) Synthesis of prostaglandins
- (D) Release of oxytocin

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7. A chemical signal that has both endocrine and neural roles is:

- (A) Cortisol
- (B) Melatonin
- (C) Calcitonin
- (D) Epinephrine

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8. Match each disease with its correct type of vaccine: (a) tuberculosis (b) Whooping cough (c) diphtheria (d) polio — (i) harmless virus (ii) inactivated toxin (iii) killed bacteria (iv) harmless bacteria

- (A) a-(i), b-(ii), c-(iv), d-(iii)
- (B) a-(ii), b-(i), c-(iii), d-(iv)
- (C) a-(iii), b-(ii), c-(iv), d-(i)
- (D) a-(iv), b-(iii), c-(ii), d-(i)

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9. Nuclear envelope is a derivative of:

- (A) Rough endoplasmic reticulum
- (B) Smooth endoplasmic reticulum
- (C) Membrane of Golgi complex
- (D) Microtubules

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10. The crops engineered for glyphosate are resistant/tolerant to:

- (A) Herbicides
- (B) Fungi
- (C) Bacteria
- (D) Insects

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11. Vascular bundles in monocotyledons are considered closed because:

- (A) Xylem is surrounded all around by phloem
- (B) A bundle sheath surrounds each bundle
- (C) Cambium is absent
- (D) There are no vessels with perforations

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12. True nucleus is absent in:

- (A) Volvox
- (B) Anabaena
- (C) Mucor
- (D) Vaucheria

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13. Which one of the following statements is not true?

- (A) Honey is made by bees by digesting pollen collected from flowers
- (B) Pollen grains are rich in nutrients, and they are used in the form of tablets and syrups
- (C) Pollen grains of some plants cause severe allergies and bronchial afflictions in some people
- (D) The flowers pollinated by flies and bats secrete foul odour to attract them

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14. A gymnast is able to balance his body upside down even in the total darkness because of:

- (A) Organ of corti
- (B) Cochlea
- (C) Vestibular apparatus
- (D) Tectorial membrane

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15. The hilum is a scar on the:

- (A) Seed, where micropyle was present
- (B) Seed, where funicle was attached
- (C) Fruit, where it was attached to pedicel
- (D) Fruit, where style was present

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16. Which one of the following is correct?

- (A) Blood = Plasma + RBC + WBC + Platelets
- (B) Plasma = Blood – Lymphocytes
- (C) Serum = Blood + Fibrinogen
- (D) Lymph = Plasma + RBC + WBC

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17. The guts of cow and buffalo possess:

- (A) Cyanobacteria
- (B) Fucus spp.
- (C) Chlorella spp.
- (D) Methanogens

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18. Which one of the following may require pollinators, but is genetically similar to autogamy?

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

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19. In sea urchin DNA, which is double stranded, 17% of the bases were shown to be cytosine. The percentages of the other three bases expected to be present in this DNA are:

- (A) G 8.5%, A 50%, T 24.5%
- (B) G 34%, A 24.5%, T 24.5%
- (C) G 17%, A 16.5%, T 32.5%
- (D) G 17%, A 33%, T 33%

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20. Capacitation refers to changes in the:

- (A) sperm after fertilization
- (B) sperm before fertilization
- (C) ovum before fertilization
- (D) ovum after fertilization

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21. Which of the following had the smallest brain capacity?

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

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22. Which of the following viruses is not transferred through semen of an infected male?

- (A) Ebola virus
- (B) Hepatitis B virus
- (C) Human immunodeficiency virus
- (D) Chikungunya virus

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23. A major characteristic of the monocot root is the presence of:

- (A) Cambium sandwiched between phloem and xylem along the radius
- (B) Open vascular bundles
- (C) Scattered vascular bundles
- (D) Vasculature without cambium

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24. Blood pressure in the mammalian aorta is maximum during:

- (A) Diastole of the right atrium
- (B) Systole of the left atrium
- (C) Diastole of the right ventricle
- (D) Systole of the left ventricle

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25. In Bt cotton, the Bt toxin present in plant tissue as pro-toxin is converted into active toxin due to:

- (A) presence of conversion factors in insect gut
- (B) alkaline pH of the insect gut
- (C) acidic pH of the insect gut
- (D) action of gut micro-organisms

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26. In an ecosystem the rate of production of organic matter during photosynthesis is termed as:

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

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27. Keel is the characteristic feature of flower of:

- (A) Tomato
- (B) Tulip
- (C) Indigofera
- (D) Aloe

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28. In which of the following gametophyte is not independent free living?

- (A) Pinus
- (B) Funaria
- (C) Marchantia
- (D) Pteris

AIPMT 2015 · Q30

29. In a ring girdled plant:

- (A) Neither root nor shoot will die
- (B) The shoot dies first
- (C) The root dies first
- (D) The shoot and root die together

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30. The structures that are formed by stacking of organized flattened membranous sacs in the chloroplasts are:

- (A) Stroma
- (B) Cristae
- (C) Grana
- (D) Stroma lamellae

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31. Which of the following does not favour the formation of large quantities of dilute urine?

- (A) Atrial-natriuretic factor
- (B) Alcohol
- (C) Caffeine
- (D) Renin

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32. DNA is not present in:

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

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33. Which of the following are the important flora rewards to the animal pollinators?

- (A) Protein pellicle and stigmatic exudates
- (B) Colour and large size of flower
- (C) Nectar and pollen grains
- (D) Floral fragrance and calcium crystals

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34. Which of the following represents the correct combination without any exception? (Characteristics - Class)

- (A) Body covered with feathers; skin moist and glandular; fore-limbs form wings; lungs with air sacs - Aves
- (B) Mammary gland; hair on body; pinnae; two pairs of limbs - Mammalia
- (C) Mouth ventral; gills without operculum; skin with placoid scales; persistent notochord - Chondrichthyes
- (D) Sucking and circular mouth; jaws absent, integument without scales; paired appendages - Cyclostomata

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35. Alleles are:

- (A) heterozygotes
- (B) different phenotype
- (C) true breeding homozygotes
- (D) different molecular forms of a gene

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36. Hysterectomy is surgical removal of:

- (A) Mammary glands
- (B) Uterus
- (C) Prostate gland
- (D) Vas deferens

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37. HIV that causes AIDS, first starts destroying:

- (A) Thrombocytes
- (B) B - Lymphocytes
- (C) Leucocytes
- (D) Helper T - Lymphocytes

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38. Which one of the following statements is wrong?

- (A) Mannitol is stored food in Rhodophyceae
- (B) Algin and carrageen are products of algae
- (C) Agar-agar is obtained from Gelidium and Gracilaria
- (D) Chlorella and Spirulina are used as space food

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39. Cryopreservation of gametes of threatened species in viable and fertile condition can be referred to as:

- (A) In situ cryoconservation of biodiversity
- (B) In situ conservation of biodiversity
- (C) Advanced ex situ conservation of biodiversity
- (D) In situ conservation by sacred groves

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40. Select the correct matching in the following pairs:

- (A) Rough ER — Oxidation of fatty acids
- (B) Smooth ER — Oxidation of phospholipids
- (C) Smooth ER — Synthesis of lipids
- (D) Rough ER — Synthesis of glycogen

AIPMT 2015 · Q41

41. The UN Conference of Parties on climate change in the year 2011 was held in:

- (A) Qatar
- (B) Poland
- (C) South Africa
- (D) Peru

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42. Secondary Succession takes place on/in:

- (A) Newly cooled lava
- (B) Bare rock
- (C) Degraded forest
- (D) Newly created pond

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43. Which of the following is not a sexually transmitted disease?

- (A) Encephalitis
- (B) Syphilis
- (C) Acquired Immuno Deficiency Syndrome (AIDS)
- (D) Trichomoniasis

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44. The movement of a gene from one linkage group to another is called:

- (A) Crossing over
- (B) Inversion
- (C) Duplication
- (D) Translocation

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45. Typical growth curve in plants is:

- (A) Parabolic
- (B) Sigmoid
- (C) Linear
- (D) Stair-steps shaped

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46. Cytochromes are found in:

- (A) Lysosomes
- (B) Matrix of mitochondria
- (C) Outer wall of mitochondria
- (D) Cristae of mitochondria

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47. Which of the following regions of the brain is incorrectly paired with its function?

- (A) Cerebrum - calculation and contemplation
- (B) Medulla oblongata - homeostatic control
- (C) Cerebellum - language comprehension
- (D) Corpus callosum - communication between the left and right cerebral cortices

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48. Which of the following characteristics is mainly responsible for diversification of insects on land?

- (A) Eyes
- (B) Segmentation
- (C) Bilateral symmetry
- (D) Exoskeleton

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49. Sliding filament theory can be best explained as:

- (A) When myofilaments slide past each other, Myosin filaments shorten while Actin filaments do not shorten
- (B) When myofilaments slide past each other, Actin filaments shorten while Myosin filaments do not shorten
- (C) Actin and Myosin filaments shorten and slide past each other
- (D) Actin and Myosin filaments do not shorten but rather slide past each other

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50. Which one of the following is not an inclusion body found in prokaryotes?

- (A) Polysome
- (B) Phosphate granule
- (C) Cyanophycean granule
- (D) Glycogen granule

AIPMT 2015 · Q51

51. Which one gives the most valid and recent explanation for stomatal movements?

- (A) Guard cell photosynthesis
- (B) Transpiration
- (C) Potassium influx and efflux
- (D) Starch hydrolysis

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52. The mass of living material at a trophic level at a particular time is called:

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

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53. Select the correct option: Column I — (a) Synapsis aligns homologous chromosomes (b) Synthesis of RNA and protein (c) Action of enzyme recombinase (d) Centromeres do not separate but chromatids move towards opposite poles; Column II — (i) Anaphase-II (ii) Zygotene (iii) G₂-phase (iv) Anaphase-I (v) Pachytene

- (A) a-(ii), b-(iii), c-(iv), d-(v)
- (B) a-(ii), b-(i), c-(iii), d-(iv)
- (C) a-(ii), b-(iii), c-(v), d-(iv)
- (D) a-(i), b-(ii), c-(v), d-(iv)

AIPMT 2015 · Q53

54. Rachel Carson's famous book "Silent Spring" is related to:

- (A) Ecosystem management
- (B) Pesticide pollution
- (C) Noise pollution
- (D) Population explosion

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55. Multiple alleles are present:

- (A) On non-sister chromatids
- (B) On different chromosomes
- (C) At different loci on the same chromosome
- (D) At the same locus of the chromosome

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56. Which is the most common mechanism of genetic variation in the population of a sexually-reproducing organism?

- (A) Recombination
- (B) Transduction
- (C) Chromosomal aberrations
- (D) Genetic drift

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57. Transmission tissue is characteristic feature of

- (A) Wet stigma
- (B) Hollow style
- (C) Solid style
- (D) Dry stigma

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58. A man with blood group 'A' marries a woman with blood group 'B'. What are all the possible blood groups of their offsprings?

- (A) O only
- (B) A and B only
- (C) A, B and AB only
- (D) A, B, AB and O

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59. Perigynous flowers are found in:

- (A) Rose
- (B) Guava
- (C) Cucumber
- (D) China rose

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60. What causes a green plant exposed to the light on only one side, to bend toward the source of light as it grows?

- (A) Auxin accumulates on the shaded side, stimulating greater cell elongation there
- (B) Green plants need light to perform photosynthesis
- (C) Green plants seek light because they are phototropic
- (D) Light stimulates plant cells on the lighted side to grow faster

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61. The chromosomes in which centromere is situated close to one end are:

- (A) Sub-metacentric
- (B) Metacentric
- (C) Acrocentric
- (D) Telocentric

AIPMT 2015 · Q61

62. Which of the following is not one of the prime health risks associated with greater UV radiation through the atmosphere due to depletion of stratospheric ozone?

- (A) Increased liver cancer
- (B) Increased skin cancer
- (C) Reduced Immune System
- (D) Damage to eyes

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63. A somatic cell that has just completed the S phase of its cell cycle, as compared to gamete of the same species, has:

- (A) four times the number of chromosomes and twice the amount of DNA
- (B) twice the number of chromosomes and twice the amount of DNA
- (C) same number of chromosomes but twice the amount of DNA
- (D) twice the number of chromosomes and four times the amount of DNA

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64. Which of the following animals is not viviparous?

- (A) Whale
- (B) Flying fox (Bat)
- (C) Elephant
- (D) Platypus

AIPMT 2015 · Q63

65. Minerals known to be required in large amounts for plant growth include:

- (A) magnesium, sulphur, iron, zinc
- (B) phosphorus, potassium, sulphur, calcium
- (C) calcium, magnesium, manganese, copper
- (D) potassium, phosphorus, selenium, boron

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66. In which of the following both pairs have correct combination?

- (A) In situ conservation: Tissue culture Ex situ conservation: Sacred groves
- (B) In situ conservation: National Park Ex situ conservation: Botanical Garden
- (C) In situ conservation: Cryopreservation Ex situ conservation: Wildlife Sanctuary
- (D) In situ conservation: Seed Bank Ex situ conservation: National Park

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67. Which body of the Government of India regulates GM research and safety of introducing GM organisms for public services?

- (A) Research Committee on Genetic Manipulation
- (B) Bio - safety committee
- (C) Indian Council of Agricultural Research
- (D) Genetic Engineering Approval Committee

AIPMT 2015 · Q66

68. Which of the following statements is not correct?

- (A) Acini are present in the pancreas and secrete carboxypeptidase
- (B) Brunner's glands are present in the submucosa of stomach and secrete pepsinogen
- (C) Goblet cells are present in the mucosa of intestine and secrete mucus
- (D) Oxyntic cells are present in the mucosa of stomach and secrete HCl

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69. Which of the following endoparasites of humans does show viviparity?

- (A) *Ascaris lumbricoides*
- (B) *Ancylostoma duodenale*
- (C) *Enterobius vermicularis*
- (D) *Trichinella spiralis*

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70. The terga, sterna and pleura of cockroach body are joined by:

- (A) Cartilage
- (B) Cementing glue
- (C) Muscular tissue
- (D) Arthrodial membrane

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71. Most animals are tree dwellers in a:

- (A) tropical rain forest
- (B) coniferous forest
- (C) thorn woodland
- (D) temperate deciduous forest

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72. Glenoid cavity articulates:

- (A) humerus with scapula
- (B) clavicle with acromion
- (C) scapula with acromion
- (D) clavicle with scapula

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73. A population will not exist in Hardy-Weinberg equilibrium if:

- (A) the population is large
- (B) individuals mate selectively
- (C) there are no mutations
- (D) there is no migration

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74. Male gametes are flagellated in:

- (A) Spirogyra
- (B) Polysiphonia
- (C) Anabaena
- (D) Ectocarpus

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75. When you hold your breath, which of the following gas changes in blood would first lead to the urge to breathe?

- (A) rising CO₂ and falling O₂ concentration
- (B) falling O₂ concentration
- (C) rising CO₂ concentration
- (D) falling CO₂ concentration

AIPMT 2015 · Q73

76. Gastric juice of infants contains:

- (A) amylase, rennin, pepsinogen
- (B) maltase, pepsinogen, rennin
- (C) nuclease, pepsinogen, lipase
- (D) pepsinogen, lipase, rennin

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77. Which of the following cells during gametogenesis is normally diploid?

- (A) Secondary polar body
- (B) Primary polar body
- (C) Spermatid
- (D) Spermatogonia

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78. In ginger vegetative propagation occurs through:

- (A) Runners
- (B) Rhizome
- (C) Offsets
- (D) Bulbils

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79. Which one of the following statements is incorrect?

- (A) The presence of the competitive inhibitor decreases the K_m of the enzyme for the substrate
- (B) A competitive inhibitor reacts reversibly with the enzyme to form an enzyme-inhibitor complex
- (C) In competitive inhibition, the inhibitor molecule is not chemically changed by the enzyme
- (D) The competitive inhibitor does not affect the rate of breakdown of the enzyme-substrate complex

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80. The active form of *Entamoeba histolytica* feeds upon:

- (A) blood only
- (B) erythrocytes; mucosa and submucosa of colon
- (C) mucosa and submucosa of colon only
- (D) food in intestine

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81. How many pairs of contrasting characters in pea plants were studied by Mendel in his experiments?

- (A) Seven
- (B) Five
- (C) Six
- (D) Eight

AIPMT 2015 · Q81

82. Which of the following enhances or induces fusion of protoplasts?

- (A) IAA and gibberellins
- (B) Sodium chloride and potassium chloride
- (C) Polyethylene glycol and sodium nitrate
- (D) IAA and kinetin

Answer key and explanations

1. Answer: (B) Opuntia

In Opuntia the leaves are reduced to spines that cut water loss, while the flattened green stem (phylloclade) does photosynthesis. Pea has leaflets modified into tendrils, onion has fleshy storage leaves and silk cotton has normal leaves with prickles on the stem.

2. Answer: (C) Stratification

Stratification is the vertical layering of species in a community, e.g. trees at the top, then shrubs, then herbs and grasses in a forest. Zonation is a horizontal change of communities along a gradient, not vertical layering within one community.

3. Answer: (C) Negative and inducible because repressor protein prevents transcription

The lac I gene codes for a repressor that binds the operator and blocks transcription, so control is negative. Lactose (allolactose) inactivates the repressor and switches the operon on, so it is inducible, not repressible.

4. Answer: (C) pulling and pushing it, respectively

Transpiration pull draws water up from the leaves by evaporation and cohesion, while root pressure pushes water up from the roots. So the correct order is pulling and pushing, respectively.

5. Answer: (C) Alternaria - Sexual reproduction absent - Deuteromycetes

Alternaria is a deuteromycete (imperfect fungus) in which only the asexual phase is known. Agaricus is a saprophytic basidiomycete, Phytophthora and Mucor have aseptate mycelium but belong to Phycomycetes, not Basidiomycetes or Ascomycetes.

6. Answer: (A) Release of prolactin

Parturition is triggered by signals from the fully developed foetus and placenta: a rising estrogen to progesterone ratio, prostaglandins and oxytocin cause strong uterine contractions. Prolactin controls milk production after birth and has no role in starting labour.

7. Answer: (D) Epinephrine

Epinephrine (adrenaline) is released into the blood by the adrenal medulla as a hormone and is also a neurotransmitter of sympathetic nerves. Cortisol, melatonin and calcitonin act only as hormones.

8. Answer: (D) a-(iv), b-(iii), c-(ii), d-(i)

BCG for tuberculosis uses harmless (attenuated) bacteria, the whooping cough vaccine uses killed bacteria, the diphtheria vaccine is a toxoid (inactivated toxin) and oral polio vaccine uses harmless (attenuated) virus. The other matchings pair diphtheria or polio with bacteria, which is wrong.

9. Answer: (A) Rough endoplasmic reticulum

The outer membrane of the nuclear envelope is continuous with the rough endoplasmic reticulum and also carries ribosomes, so it is regarded as derived from rough ER. Microtubules are protein structures, not membranes.

10. Answer: (A) Herbicides

Glyphosate is a broad-spectrum herbicide, and glyphosate-tolerant (e.g. Roundup Ready) crops survive spraying that kills weeds. Insect resistance is a different trait, given by Bt genes.

11. Answer: (C) Cambium is absent

A vascular bundle is closed when there is no cambium between xylem and phloem, so it cannot form secondary tissues. Monocot bundles lack this cambium; having a bundle sheath does not make a bundle closed.

12. Answer: (B) Anabaena

Anabaena is a cyanobacterium, a prokaryote whose DNA lies free in the cytoplasm without a nuclear membrane. Volvox and Vaucheria are algae and Mucor is a fungus, all eukaryotes with a true nucleus.

13. Answer: (A) Honey is made by bees by digesting pollen collected from flowers

Bees make honey from the nectar they collect, not by digesting pollen, so that statement is false. Pollen is used as a nutritional supplement, causes allergies in some people, and flowers pollinated by flies and bats often give out foul odours.

14. Answer: (C) Vestibular apparatus

The vestibular apparatus (semicircular canals and otolith organ) senses body position and movement and keeps balance without needing vision. The organ of Corti, cochlea and tectorial membrane are parts of the hearing mechanism.

15. Answer: (B) Seed, where funicle was attached

The hilum is the scar on the seed coat where the funicle (stalk) attached the ovule to the placenta. The micropyle is a separate small pore next to the hilum, not the scar itself.

16. Answer: (A) Blood = Plasma + RBC + WBC + Platelets

Blood is plasma plus the formed elements: RBCs, WBCs and platelets. Serum is plasma without clotting factors, and lymph has no RBCs, so the other equations are wrong.

17. Answer: (D) Methanogens

The rumen of cattle and buffalo contains methanogens such as Methanobacterium, which help break down cellulose and release methane. Cyanobacteria, Chlorella and Fucus are photosynthetic and do not live in the gut.

18. Answer: (B) Geitonogamy

In geitonogamy pollen goes to another flower of the same plant, so a pollinating agent is needed, but the pollen and ovule are genetically the same, as in self-pollination. Xenogamy brings genetically different pollen, and cleistogamy needs no pollinator at all.

19. Answer: (D) G 17%, A 33%, T 33%

By Chargaff's rule $G = C = 17\%$, so $G + C = 34\%$ and $A + T = 100 - 34 = 66\%$. Since $A = T$, each is 33%. Options with unequal A and T break the base-pairing rule.

20. Answer: (B) sperm before fertilization

Capacitation is the set of changes in sperm inside the female reproductive tract that make them able to fertilise the ovum, so it happens before fertilisation. It is a change in the sperm, not in the ovum.

21. Answer: (A) Homo habilis

Homo habilis had a brain of about 650-800 cc, smaller than Homo erectus (about 900 cc), Neanderthal man (about 1400 cc) and modern humans (about 1350-1450 cc).

22. Answer: (D) Chikungunya virus

Chikungunya virus spreads through the bite of Aedes mosquitoes and is not passed on through semen. HIV and hepatitis B are sexually transmitted, and Ebola virus can persist in and spread through semen of survivors.

23. Answer: (D) Vasculature without cambium

Monocot roots have no cambium, so they do not undergo secondary growth. Scattered vascular bundles are a feature of the monocot stem, not the root, where xylem and phloem are arranged radially.

24. Answer: (D) Systole of the left ventricle

The left ventricle pumps blood into the aorta, so aortic pressure reaches its peak (systolic pressure, about 120 mm Hg) during left ventricular systole. Atrial contraction only tops up the ventricles and does not raise aortic pressure.

25. Answer: (B) alkaline pH of the insect gut

Bt toxin is made as an inactive protoxin crystal. The alkaline pH of the insect gut dissolves the crystal and activates the toxin, which then binds the midgut cells and makes pores. An acidic gut would not activate it.

26. Answer: (C) Gross primary productivity

Gross primary productivity is the rate of production of organic matter by photosynthesis. Net primary productivity is what remains after the producers' own respiratory loss is subtracted.

27. Answer: (C) Indigofera

A keel (carina) of two fused anterior petals is part of the papilionaceous corolla of Fabaceae, to which Indigofera belongs. Tomato is Solanaceae and tulip and Aloe are Liliaceae, which do not have a keel.

28. Answer: (A) Pinus

In gymnosperms such as Pinus, the gametophytes are much reduced and stay within the ovule or pollen grain, depending on the sporophyte. Funaria and Marchantia (bryophytes) and Pteris (fern) have free-living gametophytes.

29. Answer: (C) The root dies first

Ring girdling removes the bark with the phloem, so sugars made in the leaves cannot reach the roots, while xylem still carries water upward. The starved roots die first, and the shoot dies later when water supply fails.

30. Answer: (C) Grana

Thylakoids are flattened membranous sacs that are stacked like coins to form grana. Stroma lamellae are the flat tubules joining grana, and cristae are folds of the inner mitochondrial membrane.

31. Answer: (D) Renin

Renin starts the renin-angiotensin-aldosterone pathway, which increases Na^+ and water reabsorption and so reduces urine volume. Atrial natriuretic factor, alcohol (which inhibits ADH) and caffeine all increase output of dilute urine.

32. Answer: (C) Ribosomes

Ribosomes are made of rRNA and proteins and contain no DNA. Mitochondria and chloroplasts have their own circular DNA, and the nucleus holds the chromosomal DNA.

33. Answer: (C) Nectar and pollen grains

Nectar and pollen are the usual food rewards that flowers offer to animal pollinators. Colour, size and fragrance attract pollinators but are signals, not rewards.

34. Answer: (C) Mouth ventral; gills without operculum; skin with placoid scales; persistent notochord - Chondrichthyes

NCERT describes Chondrichthyes as having a ventral mouth, gill slits without an operculum, skin with minute placoid scales and a notochord that persists throughout life, so this set holds for all members. The mammal set has exceptions: whales lack external pinnae and hind limbs. Birds have dry skin without glands, and cyclostomes lack paired appendages.

35. Answer: (D) different molecular forms of a gene

Alleles are alternative forms of the same gene at one locus, differing slightly in their DNA sequence. Heterozygotes and true-breeding homozygotes are kinds of individuals, and a phenotype is the visible trait, not the gene form.

36. Answer: (B) Uterus

Hysterectomy is surgical removal of the uterus. Removing part of the vas deferens is vasectomy, and removal of the mammary gland is mastectomy.

37. Answer: (D) Helper T - Lymphocytes

After entering the body, HIV multiplies in macrophages and then enters and destroys helper T-lymphocytes (CD4 cells), whose number falls steadily. B-lymphocytes and platelets are not its primary targets.

38. Answer: (A) Mannitol is stored food in Rhodophyceae

Mannitol (with laminarin) is the stored food of brown algae (Phaeophyceae); red algae store floridean starch, so that statement is wrong. Algin and carrageen come from algae, agar from Gelidium and Gracilaria, and Chlorella and Spirulina are used as space food.

39. Answer: (C) Advanced ex situ conservation of biodiversity

Keeping gametes of threatened species frozen and viable for long periods is cryopreservation, which is done away from the natural habitat, so it is an advanced ex situ method. In situ methods, such as sacred groves, protect species where they live.

40. Answer: (C) Smooth ER — Synthesis of lipids

Smooth ER is the main site of lipid synthesis, including steroid hormones in animal cells. Rough ER carries ribosomes and makes proteins; fatty acid oxidation happens in mitochondria and peroxisomes.

41. Answer: (C) South Africa

The 17th Conference of Parties (COP-17) of the UN climate change convention was held in 2011 at Durban, South Africa. Qatar hosted COP-18 (2012), Poland COP-19 (2013) and Peru COP-20 (2014).

42. Answer: (C) Degraded forest

Secondary succession begins in areas where a natural community has been destroyed but soil remains, such as a degraded, burnt or cut forest, so it is faster. Newly cooled lava, bare rock and a newly created pond have no previous community and undergo primary succession.

43. Answer: (A) Encephalitis

Encephalitis is inflammation of the brain, usually from mosquito-borne viruses, and is not sexually transmitted. Syphilis, AIDS and trichomoniasis are all sexually transmitted infections.

44. Answer: (D) Translocation

Translocation moves a chromosome segment, with its genes, to a non-homologous chromosome, which is a different linkage group. Crossing over only exchanges segments between homologous chromosomes of the same linkage group.

45. Answer: (B) Sigmoid

Plant growth passes through a slow lag phase, a fast exponential (log) phase and a stationary phase, giving an S-shaped or sigmoid curve when plotted against time.

46. Answer: (D) Cristae of mitochondria

Cytochromes are electron carriers of the electron transport chain, which lies in the inner mitochondrial membrane, folded into cristae. The matrix holds the Krebs cycle enzymes, not the cytochromes.

47. Answer: (C) Cerebellum - language comprehension

The cerebellum coordinates movement, posture and balance; language comprehension is a function of the cerebral cortex. The other pairings, including corpus callosum linking the two hemispheres, are correct.

48. Answer: (D) Exoskeleton

The chitinous exoskeleton prevents water loss and protects the body, which let insects colonise dry land in great variety. Segmentation and bilateral symmetry are shared with many aquatic animals and do not solve the problem of drying out.

49. Answer: (D) Actin and Myosin filaments do not shorten but rather slide past each other

In sliding filament theory, thin actin filaments slide over thick myosin filaments toward the centre of the sarcomere; the I band and H zone shorten but the filaments themselves keep their length. The options in which one or both filaments shorten are wrong.

50. Answer: (A) Polysome

Inclusion bodies in prokaryotes are stores of reserve material lying free in the cytoplasm, such as phosphate granules, cyanophycean granules and glycogen granules. A polysome is a chain of ribosomes translating one mRNA, not a storage body.

51. Answer: (C) Potassium influx and efflux

The accepted explanation of stomatal movement is active K^+ influx into guard cells, which draws in water and opens the pore, and K^+ efflux, which closes it. The older starch-sugar hydrolysis theory does not explain the observations as well.

52. Answer: (A) Standing crop

Standing crop is the mass of living material present at a trophic level at a given time. Standing state is the amount of inorganic nutrients in the soil at a given time, and productivity is a rate, not a mass.

53. Answer: (C) a-(ii), b-(iii), c-(v), d-(iv)

Synapsis of homologues occurs in zygotene, RNA and protein synthesis happen in the G_2 phase, recombinase acts during crossing over in pachytene, and in anaphase I centromeres do not split, so the two chromatids of each chromosome move together to one pole.

54. Answer: (B) Pesticide pollution

Silent Spring (1962) by Rachel Carson described how pesticides such as DDT accumulate in food chains and harm birds and other wildlife. It is about pesticide pollution, not noise or population growth.

55. Answer: (D) At the same locus of the chromosome

Multiple alleles are more than two alternative forms of one gene, so they all occupy the same locus (e.g. I^A , I^B and i of the ABO gene). Genes at different loci or on different chromosomes are different genes, not alleles.

56. Answer: (A) Recombination

In sexually reproducing organisms, crossing over and independent assortment in meiosis and random fusion of gametes recombine genes every generation, so recombination is the most common source of variation. Transduction is a bacterial process, and chromosomal aberrations are rare.

57. Answer: (C) Solid style

A solid style is filled with transmitting tissue through which the pollen tube grows to the ovary. In a hollow style the tube grows along the canal, and the type of stigma does not decide this.

58. Answer: (D) A, B, AB and O

If both parents are heterozygous ($I^A i \times I^B i$), the children can be $I^A I^B$ (group AB), $I^A i$ (group A), $I^B i$ (group B) or ii (group O). So all four groups are possible; 'A, B and AB only' would apply only if one parent were homozygous.

59. Answer: (A) Rose

In perigynous flowers the ovary is half-inferior, with sepals, petals and stamens on the rim of a cup-like thalamus, as in rose, plum and peach. Guava and cucumber are epigynous, and China rose is hypogynous.

60. Answer: (A) Auxin accumulates on the shaded side, stimulating greater cell elongation there

Auxin moves away from light to the shaded side, where it makes cells elongate more, so the shoot bends toward the light. The lighted side grows less, not faster, and 'seeking light' only names the response without explaining it.

61. Answer: (C) Acrocentric

In an acrocentric chromosome the centromere lies close to one end, giving one very short and one very long arm. A telocentric chromosome has the centromere at the very end, and a sub-metacentric one has it slightly away from the middle.

62. Answer: (A) Increased liver cancer

More UV-B reaching the earth causes skin cancer, damage to the eyes (cataract, snow blindness) and suppression of the immune system. UV does not penetrate to internal organs, so liver cancer is not a recognised risk.

63. Answer: (D) twice the number of chromosomes and four times the amount of DNA

A gamete is haploid with n chromosomes and C amount of DNA. A somatic cell after S phase still has $2n$ chromosomes but its DNA has doubled from $2C$ to $4C$, so it has twice the chromosomes and four times the DNA of the gamete.

64. Answer: (D) Platypus

The platypus is a monotreme mammal that lays eggs, so it is oviparous. Whale, bat (flying fox) and elephant give birth to live young.

65. Answer: (B) phosphorus, potassium, sulphur, calcium

Phosphorus, potassium, sulphur and calcium are all macronutrients needed in large amounts. Each other option includes micronutrients such as iron, zinc, manganese, copper or boron, or selenium, which plants do not need.

66. Answer: (B) In situ conservation: National Park Ex situ conservation: Botanical Garden

A national park protects species in their natural habitat (in situ), while a botanical garden keeps plants away from their habitat (ex situ). Tissue culture, cryopreservation and seed banks are ex situ, and sacred groves, wildlife sanctuaries and national parks are in situ, so the other pairs are swapped.

67. Answer: (D) Genetic Engineering Approval Committee

The Genetic Engineering Approval Committee (GEAC) is the Indian body that decides on the validity of GM research and the safety of releasing GM organisms for public use. The Review Committee on Genetic Manipulation and institutional bio-safety committees handle research-level oversight only.

68. Answer: (B) Brunner's glands are present in the submucosa of stomach and secrete pepsinogen

Brunner's glands lie in the submucosa of the duodenum and secrete alkaline mucus, not pepsinogen; pepsinogen comes from the chief cells of the gastric glands. Pancreatic acini do secrete carboxypeptidase, goblet cells secrete mucus and oxyntic cells secrete HCl.

69. Answer: (D) Trichinella spiralis

Trichinella spiralis is viviparous: the female releases live larvae that migrate to and encyst in muscle. Ascaris, Ancylostoma and Enterobius lay eggs.

70. Answer: (D) Arthrodial membrane

The hardened plates of the cockroach exoskeleton (tergites, sternites and pleurites) are joined by a thin, flexible arthrodial membrane that allows movement. Cartilage and muscle do not join these plates.

71. Answer: (A) tropical rain forest

Tropical rain forests have a tall, dense, many-layered canopy that provides most of the food and shelter, so most animals there are arboreal. Coniferous forests, thorn woodlands and temperate deciduous forests have more open or seasonal canopies and more ground-dwelling fauna.

72. Answer: (A) humerus with scapula

The glenoid cavity is a depression on the scapula that receives the head of the humerus, forming the shoulder joint. The clavicle articulates with the acromion process, not with the glenoid cavity.

73. Answer: (B) individuals mate selectively

Hardy-Weinberg equilibrium requires a large population, random mating, no mutation, no migration and no selection. Selective (non-random) mating changes genotype frequencies, so the population will not remain in equilibrium.

74. Answer: (D) Ectocarpus

Ectocarpus, a brown alga, produces pear-shaped gametes with two laterally attached flagella. Spirogyra and Polysiphonia have non-motile gametes, and Anabaena is a cyanobacterium with no flagellated gametes.

75. Answer: (C) rising CO₂ concentration

The chemosensitive area of the medulla responds to rising CO₂ and H⁺ in the blood, and this is the strongest drive to breathe. The fall in O₂ during breath-holding is small and has little effect at first, so it is not what first causes the urge.

76. Answer: (D) pepsinogen, lipase, rennin

The gastric juice of infants contains pepsinogen, gastric lipase and rennin, which curdles milk protein. Amylase, maltase and nucleases are not secreted in the stomach.

77. Answer: (D) Spermatogonia

Spermatogonia are diploid (2n) germ cells that divide by mitosis. The primary and secondary polar bodies and spermatids are formed by meiosis and are haploid.

78. Answer: (B) Rhizome

Ginger has an underground stem, the rhizome, with nodes and buds, and pieces of it are planted to raise new plants. Runners and offsets are creeping stems of plants like grasses and Pistia, and bulbils are seen in Agave.

79. Answer: (A) The presence of the competitive inhibitor decreases the K_m of the enzyme for the substrate

A competitive inhibitor competes with the substrate for the active site, so more substrate is needed to reach half V_{max}, i.e. the apparent K_m increases, not decreases. It binds reversibly and is not chemically changed by the enzyme.

80. Answer: (B) erythrocytes; mucosa and submucosa of colon

The trophozoite of *Entamoeba histolytica* invades the mucosa and submucosa of the colon, causing ulcers, and also ingests red blood cells. Feeding on blood alone or on gut food alone is incomplete.

81. Answer: (A) Seven

Mendel studied seven pairs of contrasting characters in pea, such as tall/dwarf stem, round/wrinkled seed and yellow/green seed.

82. Answer: (C) Polyethylene glycol and sodium nitrate

Polyethylene glycol (PEG) and sodium nitrate are chemical fusogens that make protoplasts stick together and fuse. IAA, gibberellins and kinetin are plant hormones used for growth in culture, not for fusion.

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.