

NEET 2016 Phase 2 — Biology Question Paper with Solutions

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

NEET 2016 Phase 2 · Q91

1. Which one of the following is wrong for fungi?

- (A) They are eukaryotic.
- (B) All fungi possess a purely cellulosic cell wall.
- (C) They are heterotrophic.
- (D) They are both unicellular and multicellular.

NEET 2016 Phase 2 · Q92

2. Methanogens belong to

- (A) Eubacteria
- (B) Archaeobacteria
- (C) Dinoflagellates
- (D) Slime moulds

NEET 2016 Phase 2 · Q93

3. Select the wrong statement.

- (A) The walls of diatoms are easily destructible.
- (B) 'Diatomaceous earth' is formed by the cell walls of diatoms.
- (C) Diatoms are chief producers in the oceans.
- (D) Diatoms are microscopic and float passively in water.

NEET 2016 Phase 2 · Q94

4. The label of a herbarium sheet does not carry information on

- (A) date of collection
- (B) name of collector
- (C) local names
- (D) height of the plant

NEET 2016 Phase 2 · Q95

5. Conifers are adapted to tolerate extreme environmental conditions because of

- (A) broad hardy leaves
- (B) superficial stomata
- (C) thick cuticle
- (D) presence of vessels

NEET 2016 Phase 2 · Q96

6. Which one of the following statements is wrong?

- (A) Algae increase the level of dissolved oxygen in the immediate environment.
- (B) Algin is obtained from red algae, and carrageenan from brown algae.
- (C) Agar-agar is obtained from Gelidium and Gracilaria.
- (D) Laminaria and Sargassum are used as food.

NEET 2016 Phase 2 · Q97

7. The term 'polyadelphous' is related to

- (A) gynoeceium
- (B) androeceium
- (C) corolla
- (D) calyx

NEET 2016 Phase 2 · Q99

8. Radial symmetry is found in the flowers of

- (A) Brassica
- (B) Trifolium
- (C) Pisum
- (D) Cassia

NEET 2016 Phase 2 · Q100

9. Free-central placentation is found in

- (A) Dianthus
- (B) Argemone
- (C) Brassica
- (D) Citrus

NEET 2016 Phase 2 · Q102

10. The balloon-shaped structures called tyloses

- (A) originate in the lumen of vessels
- (B) characterize the sapwood
- (C) are extensions of xylem parenchyma cells into vessels
- (D) are linked to the ascent of sap through xylem vessels

NEET 2016 Phase 2 · Q103

11. A non-proteinaceous enzyme is

- (A) lysozyme
- (B) ribozyme
- (C) ligase
- (D) deoxyribonuclease

NEET 2016 Phase 2 · Q104

12. Select the mismatch.

- (A) Gas vacuoles—Green bacteria
- (B) Large central vacuoles—Animal cells
- (C) Protists—Eukaryotes
- (D) Methanogens—Prokaryotes

NEET 2016 Phase 2 · Q105

13. Select the wrong statement.

- (A) Bacterial cell wall is made up of peptidoglycan.
- (B) Pili and fimbriae are mainly involved in motility of bacterial cells.
- (C) Cyanobacteria lack flagellated cells.
- (D) Mycoplasma is a wall-less microorganism.

NEET 2016 Phase 2 · Q106

14. A cell organelle containing hydrolytic enzymes is

- (A) lysosome
- (B) microsome
- (C) ribosome
- (D) mesosome

NEET 2016 Phase 2 · Q107

15. During cell growth, DNA synthesis takes place in

- (A) S phase
- (B) G₁ phase
- (C) G₂ phase
- (D) M phase

NEET 2016 Phase 2 · Q108

16. Which of the following biomolecules is common to respiration-mediated breakdown of fats, carbohydrates and proteins?

- (A) Glucose-6-phosphate
- (B) Fructose 1,6-bisphosphate
- (C) Pyruvic acid
- (D) Acetyl CoA

NEET 2016 Phase 2 · Q109

17. A few drops of sap were collected by cutting across a plant stem by a suitable method. The sap was tested chemically. Which one of the following test results indicates that it is phloem sap?

- (A) Acidic
- (B) Alkaline
- (C) Low refractive index
- (D) Absence of sugar

NEET 2016 Phase 2 · Q110

18. You are given a tissue with its potential for differentiation in an artificial culture. Which of the following pairs of hormones would you add to the medium to secure shoots as well as roots?

- (A) IAA and gibberellin
- (B) Auxin and cytokinin
- (C) Auxin and abscisic acid
- (D) Gibberellin and abscisic acid

NEET 2016 Phase 2 · Q111

19. Phytochrome is a

- (A) flavoprotein
- (B) glycoprotein
- (C) lipoprotein
- (D) chromoprotein

NEET 2016 Phase 2 · Q113

20. The process which makes major difference between C_3 and C_4 plants is

- (A) glycolysis
- (B) Calvin cycle
- (C) photorespiration
- (D) respiration

NEET 2016 Phase 2 · Q114

21. Which one of the following statements is not correct?

- (A) Offspring produced by the asexual reproduction are called clone.
- (B) Microscopic, motile asexual reproductive structures are called zoospores.
- (C) In potato, banana and ginger, the plantlets arise from the internodes present in the modified stem.
- (D) Water hyacinth, growing in the standing water, drains oxygen from water that leads to the death of fishes.

NEET 2016 Phase 2 · Q115

22. Which one of the following generates new genetic combinations leading to variation?

- (A) Vegetative reproduction
- (B) Parthenogenesis
- (C) Sexual reproduction
- (D) Nucellar polyembryony

NEET 2016 Phase 2 · Q116

23. Match Column-I with Column-II and select the correct option using the codes given below:

Column-I: a. Pistils fused together; b. Formation of gametes; c. Hyphae of higher Ascomycetes; d. Unisexual female flower

Column-II: (i) Gametogenesis; (ii) Pistillate; (iii) Syncarpous; (iv) Dikaryotic

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

NEET 2016 Phase 2 · Q117

24. In majority of angiosperms

- (A) egg has a filiform apparatus
- (B) there are numerous antipodal cells
- (C) reduction division occurs in the megaspore mother cells
- (D) a small central cell is present in the embryo sac

NEET 2016 Phase 2 · Q118

25. Pollination in water hyacinth and water lily is brought about by the agency of

- (A) water
- (B) insects or wind
- (C) birds
- (D) bats

NEET 2016 Phase 2 · Q119

26. The ovule of an angiosperm is technically equivalent to

- (A) megasporangium
- (B) megasporophyll
- (C) megaspore mother cell
- (D) megaspore

NEET 2016 Phase 2 · Q120

27. Taylor conducted the experiments to prove semiconservative mode of chromosome replication on

- (A) *Vinca rosea*
- (B) *Vicia faba*
- (C) *Drosophila melanogaster*
- (D) *E. coli*

NEET 2016 Phase 2 · Q121

28. The mechanism that causes a gene to move from one linkage group to another is called

- (A) inversion
- (B) duplication
- (C) translocation
- (D) crossing-over

NEET 2016 Phase 2 · Q122

29. The equivalent of a structural gene is

- (A) muton
- (B) cistron
- (C) operon
- (D) recon

NEET 2016 Phase 2 · Q123

30. A true breeding plant is

- (A) one that is able to breed on its own
- (B) produced due to cross-pollination among unrelated plants
- (C) near homozygous and produces offspring of its own kind
- (D) always homozygous recessive in its genetic constitution

NEET 2016 Phase 2 · Q124

31. Which of the following rRNAs acts as structural RNA as well as ribozyme in bacteria?

- (A) 5 S rRNA
- (B) 18 S rRNA
- (C) 23 S rRNA
- (D) 5.8 S rRNA

NEET 2016 Phase 2 · Q125

32. Stirred-tank bioreactors have been designed for

- (A) purification of product
- (B) addition of preservatives to the product
- (C) availability of oxygen throughout the process
- (D) ensuring anaerobic conditions in the culture vessel

NEET 2016 Phase 2 · Q126

33. A foreign DNA and plasmid cut by the same restriction endonuclease can be joined to form a recombinant plasmid using

- (A) Eco RI
- (B) Taq polymerase
- (C) polymerase III
- (D) ligase

NEET 2016 Phase 2 · Q127

34. Which of the following is not a component of downstream processing?

- (A) Separation
- (B) Purification
- (C) Preservation
- (D) Expression

NEET 2016 Phase 2 · Q128

35. Which of the following restriction enzymes produces blunt ends?

- (A) Sal I
- (B) Eco RV
- (C) Xho I
- (D) Hind III

NEET 2016 Phase 2 · Q129

36. Which kind of therapy was given in 1990 to a four-year-old girl with adenosine deaminase (ADA) deficiency?

- (A) Gene therapy
- (B) Chemotherapy
- (C) Immunotherapy
- (D) Radiation therapy

NEET 2016 Phase 2 · Q131

37. The primary producers of the deep-sea hydrothermal vent ecosystem are

- (A) green algae
- (B) chemosynthetic bacteria
- (C) blue-green algae
- (D) coral reefs

NEET 2016 Phase 2 · Q132

38. Which of the following is correct for r-selected species?

- (A) Large number of progeny with small size
- (B) Large number of progeny with large size
- (C) Small number of progeny with small size
- (D) Small number of progeny with large size

NEET 2016 Phase 2 · Q133

39. If '+' sign is assigned to beneficial interaction, '-' sign to detrimental and '0' sign to neutral interaction, then the population interaction represented by '+' '-' refers to

- (A) mutualism
- (B) amensalism
- (C) commensalism
- (D) parasitism

NEET 2016 Phase 2 · Q134

40. Which of the following is correctly matched?

- (A) Aerenchyma—Opuntia
- (B) Age pyramid—Biome
- (C) Parthenium hysterophorus—Threat to biodiversity
- (D) Stratification—Population

NEET 2016 Phase 2 · Q135

41. Red List contains data or information on

- (A) all economically important plants
- (B) plants whose products are in international trade
- (C) threatened species
- (D) marine vertebrates only

NEET 2016 Phase 2 · Q136

42. Which of the following sets of diseases is caused by bacteria?

- (A) Cholera and tetanus
- (B) Typhoid and smallpox
- (C) Tetanus and mumps
- (D) Herpes and influenza

NEET 2016 Phase 2 · Q137

43. Match Column-I with Column-II for housefly classification and select the correct option using the codes given below:

Column-I: a. Family; b. Order; c. Class; d. Phylum

Column-II: (i) Diptera; (ii) Arthropoda; (iii) Muscidae; (iv) Insecta

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

NEET 2016 Phase 2 · Q138

44. Choose the correct statement.

- (A) All mammals are viviparous.
- (B) All cyclostomes do not possess jaws and paired fins.
- (C) All reptiles have a three-chambered heart.
- (D) All Pisces have gills covered by an operculum.

NEET 2016 Phase 2 · Q139

45. Study the four statements (A-D) given below and select the two correct ones out of them:

A. Definition of biological species was given by Ernst Mayr.

B. Photoperiod does not affect reproduction in plants.

C. Binomial nomenclature system was given by R. H. Whittaker.

D. In unicellular organisms, reproduction is synonymous with growth.

The two correct statements are

- (A) B and C
- (B) C and D
- (C) A and D
- (D) A and B

NEET 2016 Phase 2 · Q140

46. In male cockroaches, sperms are stored in which part of the reproductive system?

- (A) Seminal vesicles
- (B) Mushroom glands
- (C) Testes
- (D) Vas deferens

NEET 2016 Phase 2 · Q141

47. Smooth muscles are

- (A) involuntary, fusiform, non-striated
- (B) voluntary, multinucleate, cylindrical
- (C) involuntary, cylindrical, striated
- (D) voluntary, spindle-shaped, uninucleate

NEET 2016 Phase 2 · Q142

48. Oxidative phosphorylation is

- (A) formation of ATP by transfer of phosphate group from a substrate to ADP
- (B) oxidation of phosphate group in ATP
- (C) addition of phosphate group to ATP
- (D) formation of ATP by energy released from electrons removed during substrate oxidation

NEET 2016 Phase 2 · Q143

49. Which of the following is the least likely to be involved in stabilizing the three-dimensional folding of most proteins?

- (A) Hydrogen bonds
- (B) Electrostatic interaction
- (C) Hydrophobic interaction
- (D) Ester bonds

NEET 2016 Phase 2 · Q146

50. Match the stages of meiosis in Column-I to their characteristic features in Column-II and select the correct option using the codes given below:

Column-I: a. Pachytene; b. Metaphase I; c. Diakinesis; d. Zygotene

Column-II: (i) Pairing of homologous chromosomes; (ii) Terminalization of chiasmata; (iii) Crossing-over takes place; (iv) Chromosomes align at equatorial plate

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

NEET 2016 Phase 2 · Q147

51. Which hormones do stimulate the production of pancreatic juice and bicarbonate?

- (A) Angiotensin and epinephrine
- (B) Gastrin and insulin
- (C) Cholecystokinin and secretin
- (D) Insulin and glucagon

NEET 2016 Phase 2 · Q148

52. The partial pressure of oxygen in the alveoli of the lungs is

- (A) equal to that in the blood
- (B) more than that in the blood
- (C) less than that in the blood
- (D) less than that of carbon dioxide

NEET 2016 Phase 2 · Q149

53. Choose the correct statement.

- (A) Nociceptors respond to changes in pressure.
- (B) Meissner's corpuscles are thermoreceptors.
- (C) Photoreceptors in the human eye are depolarized during darkness and become hyperpolarized in response to the light stimulus.
- (D) Receptors do not produce graded potentials.

NEET 2016 Phase 2 · Q150

54. Graves' disease is caused due to

- (A) hyposecretion of thyroid gland
- (B) hypersecretion of thyroid gland
- (C) hyposecretion of adrenal gland
- (D) hypersecretion of adrenal gland

NEET 2016 Phase 2 · Q151

55. Name the ion responsible for unmasking of active sites for myosin for cross-bridge activity during muscle contraction.

- (A) Calcium
- (B) Magnesium
- (C) Sodium
- (D) Potassium

NEET 2016 Phase 2 · Q152

56. Name the blood cells, whose reduction in number can cause clotting disorder, leading to excessive loss of blood from the body.

- (A) Erythrocytes
- (B) Leucocytes
- (C) Neutrophils
- (D) Thrombocytes

NEET 2016 Phase 2 · Q153

57. Name a peptide hormone which acts mainly on hepatocytes, adipocytes and enhances cellular glucose uptake and utilization.

- (A) Insulin
- (B) Glucagon
- (C) Secretin
- (D) Gastrin

NEET 2016 Phase 2 · Q154

58. Osteoporosis, an age-related disease of skeletal system, may occur due to

- (A) immune disorder affecting neuro-muscular junction leading to fatigue
- (B) high concentration of Ca^{++} and Na^+
- (C) decreased level of estrogen
- (D) accumulation of uric acid leading to inflammation of joints

NEET 2016 Phase 2 · Q155

59. Serum differs from blood in

- (A) lacking globulins
- (B) lacking albumins
- (C) lacking clotting factors
- (D) lacking antibodies

NEET 2016 Phase 2 · Q156

60. Lungs do not collapse between breaths and some air always remains in the lungs which can never be expelled because

- (A) there is a negative pressure in the lungs
- (B) there is a negative intrapleural pressure pulling at the lung walls
- (C) there is a positive intrapleural pressure
- (D) pressure in the lungs is higher than the atmospheric pressure

NEET 2016 Phase 2 · Q157

61. The posterior pituitary gland is not a 'true' endocrine gland because

- (A) it is provided with a duct
- (B) it only stores and releases hormones
- (C) it is under the regulation of hypothalamus
- (D) it secretes enzymes

NEET 2016 Phase 2 · Q159

62. Which of the following is hormone-releasing IUD?

- (A) LNG-20
- (B) Multiload 375
- (C) Lippes loop
- (D) Cu7

NEET 2016 Phase 2 · Q161

63. Embryo with more than 16 blastomeres formed due to in vitro fertilization is transferred into

- (A) uterus
- (B) fallopian tube
- (C) fimbriae
- (D) cervix

NEET 2016 Phase 2 · Q162

64. Which of the following depicts the correct pathway of transport of sperms?

- (A) Rete testis → Efferent ductules → Epididymis → Vas deferens
- (B) Rete testis → Epididymis → Efferent ductules → Vas deferens
- (C) Rete testis → Vas deferens → Efferent ductules → Epididymis
- (D) Efferent ductules → Rete testis → Vas deferens → Epididymis

NEET 2016 Phase 2 · Q164

65. Several hormones like hCG, hPL, estrogen, progesterone are produced by

- (A) ovary
- (B) placenta
- (C) fallopian tube
- (D) pituitary

NEET 2016 Phase 2 · Q165

66. If a colour-blind man marries a woman who is homozygous for normal colour vision, the probability of their son being colour-blind is

- (A) 0
- (B) 0.5
- (C) 0.75
- (D) 1

NEET 2016 Phase 2 · Q166

67. Genetic drift operates in

- (A) small isolated population
- (B) large isolated population
- (C) non-reproductive population
- (D) slow reproductive population

NEET 2016 Phase 2 · Q167

68. In Hardy-Weinberg equation, the frequency of heterozygous individual is represented by

- (A) p^2
- (B) $2pq$
- (C) pq
- (D) q^2

NEET 2016 Phase 2 · Q168

69. The chronological order of human evolution from early to the recent is

- (A) Australopithecus → Ramapithecus → Homo habilis → Homo erectus
- (B) Ramapithecus → Australopithecus → Homo habilis → Homo erectus
- (C) Ramapithecus → Homo habilis → Australopithecus → Homo erectus
- (D) Australopithecus → Homo habilis → Ramapithecus → Homo erectus

70. Which of the following is the correct sequence of events in the origin of life?

I. Formation of protobionts

II. Synthesis of organic monomers

III. Synthesis of organic polymers

IV. Formation of DNA-based genetic systems

(A) I, II, III, IV

(B) I, III, II, IV

(C) II, III, I, IV

(D) II, III, IV, I

Answer key and explanations

1. Answer: (B) All fungi possess a purely cellulosic cell wall.

Fungal cell walls are made mainly of chitin and polysaccharides, not purely of cellulose, so the claim of a purely cellulosic wall is wrong. Fungi are eukaryotic heterotrophs and include both unicellular forms such as yeast and multicellular filamentous forms.

2. Answer: (B) Archaeobacteria

Methanogens are archaeobacteria that live in marshy areas and the rumen of cattle and produce methane from CO₂. Their cell wall structure differs from true bacteria, so they are not placed in Eubacteria; dinoflagellates and slime moulds are protists.

3. Answer: (A) The walls of diatoms are easily destructible.

Diatom cell walls are impregnated with silica and are practically indestructible, which is why they accumulate as diatomaceous earth over billions of years. So saying the walls are easily destructible is wrong, while the other statements about diatoms being planktonic chief producers are correct.

4. Answer: (D) height of the plant

A herbarium label records the date and place of collection, the collector's name, and the botanical, family and local names of the specimen. The height of the plant is not a standard entry on the label, since the pressed specimen itself is kept on the sheet.

5. Answer: (C) thick cuticle

Conifer needles have a thick cuticle and sunken stomata, which cut water loss and let them survive cold and dry conditions. Their leaves are needle-like rather than broad, the stomata are sunken rather than superficial, and gymnosperms generally lack vessels in their xylem.

6. Answer: (B) Algin is obtained from red algae, and carrageenan from brown algae.

The sources are reversed in this statement: algin comes from brown algae and carrageenan from red algae. Agar from *Gelidium* and *Gracilaria*, the use of *Laminaria* and *Sargassum* as food, and the release of oxygen by photosynthetic algae are all correct.

7. Answer: (B) androecium

Polyadelphous describes stamens whose filaments are united into more than two bundles, as in citrus, so it is a term for the androecium. Terms for fused carpels (syncarpous) or fused petals and sepals (gamopetalous, gamosepalous) are different.

8. Answer: (A) Brassica

Brassica (mustard) has actinomorphic flowers that can be cut into two equal halves along any radial plane. Trifolium and Pisum have papilionaceous zygomorphic flowers, and Cassia flowers are also zygomorphic.

9. Answer: (A) Dianthus

In *Dianthus* and *Primrose* the ovules are borne on a central axis with no septa, which is free-central placentation. *Argemone* and *Brassica* have parietal placentation, and *Citrus* has axile placentation.

10. Answer: (C) are extensions of xylem parenchyma cells into vessels

Tyloses are balloon-like outgrowths of neighbouring xylem parenchyma cells that push into the vessel lumen through pits. They block the vessels and are typical of heartwood, not sapwood, so they stop rather than aid the conduction of sap.

11. Answer: (B) ribozyme

A ribozyme is an RNA molecule with catalytic activity, such as the 23S rRNA that acts as peptidyl transferase, so it is not a protein. Lysozyme, ligase and deoxyribonuclease are all protein enzymes.

12. Answer: (B) Large central vacuoles—Animal cells

A large central vacuole is a feature of mature plant cells; animal cells have small vacuoles or none. Gas vacuoles do occur in blue-green, purple and green photosynthetic bacteria, protists are eukaryotes and methanogens are prokaryotic archaeobacteria.

13. Answer: (B) Pili and fimbriae are mainly involved in motility of bacterial cells.

Bacterial motility comes from flagella; pili and fimbriae are surface outgrowths that help in attachment to surfaces or host tissues (and pili in conjugation), not in movement. The other statements about peptidoglycan walls, non-flagellated cyanobacteria and wall-less Mycoplasma are correct.

14. Answer: (A) lysosome

Lysosomes are membrane-bound vesicles from the Golgi that are rich in acid hydrolases such as lipases, proteases and carbohydrases. Ribosomes make proteins, mesosomes are infoldings of the bacterial membrane, and microsomes are ER fragments formed when cells are homogenised.

15. Answer: (A) S phase

DNA replication happens in the S (synthesis) phase of interphase, doubling the DNA content from 2C to 4C. G₁ and G₂ are growth phases in which the cell makes proteins and organelles but does not replicate DNA, and M phase is division.

16. Answer: (D) Acetyl CoA

Fatty acids are broken down by beta-oxidation to acetyl CoA, glucose gives pyruvate which becomes acetyl CoA, and many amino acids also enter as acetyl CoA, so it is the common entry point into the Krebs cycle. Pyruvic acid is not formed from fatty acids, and the sugar phosphates belong only to glycolysis.

17. Answer: (B) Alkaline

Phloem sap is rich in sucrose and has a slightly alkaline pH of about 7.5 to 8, while xylem sap is slightly acidic. The high sugar content gives phloem sap a high refractive index, so low refractive index or absence of sugar would point away from phloem.

18. Answer: (B) Auxin and cytokinin

In tissue culture the auxin to cytokinin ratio controls organ formation: a higher auxin ratio favours roots and a higher cytokinin ratio favours shoots, so both are needed to obtain shoots and roots. Gibberellin and abscisic acid do not drive this organ differentiation.

19. Answer: (D) chromoprotein

Phytochrome is a protein bound to a light-absorbing pigment (a linear tetrapyrrole chromophore) that switches between red and far-red absorbing forms, so it is a chromoprotein. It does not carry a flavin, sugar or lipid as its prosthetic group.

20. Answer: (C) photorespiration

C₄ plants concentrate CO₂ around RuBisCO in bundle sheath cells, so photorespiration is almost absent, while C₃ plants lose much fixed carbon to it. Glycolysis, respiration and the Calvin cycle run in both types of plant.

21. Answer: (C) In potato, banana and ginger, the plantlets arise from the internodes present in the modified stem.

In potato tubers, banana suckers and ginger rhizomes the new plantlets arise from buds at the nodes (the eyes of a potato are nodes), not from internodes. Clones, zoospores and the oxygen-draining water hyacinth are all correctly described.

22. Answer: (C) Sexual reproduction

Sexual reproduction involves meiosis with crossing over and fusion of gametes from two parents, which creates new combinations of genes. Vegetative reproduction, parthenogenesis and nucellar embryos all come from a single parent without fertilisation and give near-identical offspring.

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

Fused pistils make a syncarpous gynoecium, gamete formation is gametogenesis, the hyphae of higher ascomycetes and basidiomycetes are dikaryotic, and a unisexual female flower is pistillate. Only one code gives all four of these pairs.

24. Answer: (C) reduction division occurs in the megaspore mother cells

The diploid megaspore mother cell undergoes meiosis to form four haploid megaspores, so reduction division happens there. The filiform apparatus belongs to the synergids, the typical embryo sac has only three antipodal cells, and the central cell is the largest cell of the embryo sac.

25. Answer: (B) insects or wind

In water hyacinth and water lily the flowers rise above the water surface and are pollinated by insects or wind, as in most land plants. Water pollination is limited to plants like Vallisneria, Hydrilla and Zostera.

26. Answer: (A) megasporangium

The ovule is the megasporangium: its nucellus produces the megaspore mother cell, which forms megaspores. The carpel is the megasporophyll that bears the ovules, and the megaspore mother cell and megaspore are cells inside the ovule.

27. Answer: (B) Vicia faba

Taylor and colleagues in 1958 used radioactive thymidine on root tips of Vicia faba (faba bean) to show that chromosomes replicate semiconservatively. The E. coli experiment with heavy nitrogen was done by Meselson and Stahl and dealt with DNA, not whole chromosomes.

28. Answer: (C) translocation

In translocation a chromosome segment breaks off and joins a non-homologous chromosome, so its genes shift to a different linkage group. Crossing over exchanges segments between homologous chromosomes of the same linkage group, and inversion and duplication change order or copy number within a chromosome.

29. Answer: (B) cistron

A cistron is the segment of DNA coding for one polypeptide, which is what a structural gene is. A muton and a recon are the smallest units of mutation and recombination, and an operon is a group of structural genes with their regulatory elements.

30. Answer: (C) near homozygous and produces offspring of its own kind

A true-breeding line has been self-pollinated for generations, making it nearly homozygous, so it gives offspring with the same trait. It may be homozygous dominant or recessive, and cross-pollination among unrelated plants increases heterozygosity instead.

31. Answer: (C) 23 S rRNA

The 23S rRNA of the bacterial 50S subunit forms part of the ribosome's structure and also catalyses peptide bond formation as peptidyl transferase. 18S and 5.8S rRNAs are found in eukaryotic ribosomes, and 5S rRNA is structural only.

32. Answer: (C) availability of oxygen throughout the process

The stirrer in a stirred-tank bioreactor mixes the contents and spreads sterile air bubbles evenly, so oxygen is available throughout the culture. Purification and preservation belong to downstream processing, and the design supplies air rather than keeping conditions anaerobic.

33. Answer: (D) ligase

DNA ligase seals the sugar-phosphate backbone between the matching sticky ends of the vector and insert, forming the recombinant plasmid. EcoRI only cuts DNA, and Taq polymerase and polymerase III synthesise new strands rather than join fragments.

34. Answer: (D) Expression

Downstream processing starts after the product is made and includes separation, purification and formulation with preservatives. Expression of the gene in the host happens earlier, during the bioreactor stage, so it is not part of downstream processing.

35. Answer: (B) Eco RV

EcoRV cuts both strands at the same point in the middle of its recognition site GATATC, giving blunt ends. Sall, XhoI and HindIII make staggered cuts and leave sticky single-stranded overhangs.

36. Answer: (A) Gene therapy

In 1990 the first clinical gene therapy was given to a four-year-old girl with ADA deficiency: her lymphocytes were given a working ADA gene with a retroviral vector and returned to her body. Chemotherapy, immunotherapy and radiation therapy do not replace a missing gene.

37. Answer: (B) chemosynthetic bacteria

No sunlight reaches deep-sea vents, so the producers are chemosynthetic bacteria that oxidise hydrogen sulphide and other compounds to fix carbon. Green algae and blue-green algae need light, and coral reefs are shallow-water communities.

38. Answer: (A) Large number of progeny with small size

r-selected species such as oysters and many insects produce very many small offspring with little parental care. Producing few, large, well-cared-for offspring is the K-selected strategy.

39. Answer: (D) parasitism

In parasitism the parasite benefits (+) while the host is harmed (-). Mutualism is +/+, commensalism is +/- and amensalism is -/0; predation is also +/- but is not offered.

40. Answer: (C) Parthenium hysterophorus—Threat to biodiversity

Parthenium (carrot grass) is an invasive alien weed that spreads aggressively and threatens native species. Aerenchyma is a feature of hydrophytes, not the xerophyte *Opuntia*, age pyramids describe populations and stratification describes the vertical layering of a community.

41. Answer: (C) threatened species

The IUCN Red List records the conservation status of plant and animal species, mainly those that are threatened with extinction. It is not limited to economically important or traded plants, or to marine vertebrates.

42. Answer: (A) Cholera and tetanus

Cholera is caused by *Vibrio cholerae* and tetanus by *Clostridium tetani*, so both are bacterial. Smallpox, mumps, herpes and influenza are viral, so each other pair has at least one viral disease.

43. Answer: (A) a-(iii), b-(i), c-(iv), d-(ii)

The housefly *Musca domestica* belongs to family Muscidae, order Diptera, class Insecta and phylum Arthropoda. Only one code pairs family with Muscidae, order with Diptera, class with Insecta and phylum with Arthropoda.

44. Answer: (B) All cyclostomes do not possess jaws and paired fins.

Cyclostomes such as lampreys and hagfishes are jawless and lack paired fins. Egg-laying mammals like the platypus are not viviparous, crocodiles have a four-chambered heart, and cartilaginous fishes have gill slits without an operculum.

45. Answer: (C) A and D

Ernst Mayr gave the biological species concept, and in unicellular organisms division of the cell is both growth and reproduction, so A and D are correct. Photoperiod does affect flowering and reproduction, and binomial nomenclature was given by Linnaeus, while Whittaker proposed the five-kingdom system.

46. Answer: (A) Seminal vesicles

In the male cockroach the sperms are stored in the seminal vesicles and are glued together into spermatophores that are discharged during mating. The mushroom glands are accessory glands, the testes produce sperms and the vasa deferentia only carry them.

47. Answer: (A) involuntary, fusiform, non-striated

Smooth muscle fibres are spindle-shaped (fusiform), uninucleate, have no striations and are not under voluntary control, as in the walls of the gut and blood vessels. Voluntary, multinucleate, cylindrical and striated fibres describe skeletal muscle.

48. Answer: (D) formation of ATP by energy released from electrons removed during substrate oxidation

In oxidative phosphorylation electrons removed from substrates (as NADH and FADH₂) pass along the electron transport chain, and the energy released drives ATP synthase to make ATP from ADP and Pi. Direct transfer of a phosphate from a substrate to ADP is substrate-level phosphorylation.

49. Answer: (D) Ester bonds

The tertiary structure of proteins is held by hydrogen bonds, ionic (electrostatic) interactions, hydrophobic interactions and disulphide bridges. Ester bonds join fatty acids to glycerol in lipids and are not used to hold protein folds.

50. Answer: (A) a-(iii), b-(iv), c-(ii), d-(i)

Crossing over occurs in pachytene, bivalents align at the equator in metaphase I, chiasmata terminalise in diakinesis and homologues pair (synapsis) in zygotene. Only one code gives all four of these pairs.

51. Answer: (C) Cholecystokinin and secretin

Secretin, from the duodenum, makes the exocrine pancreas release water and bicarbonate, and cholecystokinin stimulates secretion of pancreatic enzymes and bile release. Gastrin acts on the stomach, while insulin and glucagon are endocrine pancreatic hormones that regulate blood glucose.

52. Answer: (B) more than that in the blood

Alveolar pO₂ is about 104 mm Hg, higher than the 40 mm Hg of deoxygenated blood and the 95 mm Hg of oxygenated blood, so oxygen diffuses from the alveoli into the blood. Alveolar pCO₂ is only about 40 mm Hg, so pO₂ is not less than pCO₂.

53. Answer: (C) Photoreceptors in the human eye are depolarized during darkness and become hyperpolarized in response to the light stimulus.

Rods and cones keep sodium channels open in the dark and stay depolarised; light closes these channels and hyperpolarises them. Nociceptors detect pain, Meissner's corpuscles are touch receptors, and sensory receptors do produce graded receptor potentials.

54. Answer: (B) hypersecretion of thyroid gland

Graves' disease (exophthalmic goitre) is a form of hyperthyroidism caused by excess thyroid hormone, with bulging eyes, high metabolic rate and weight loss. Too little thyroid hormone causes cretinism or myxoedema, and adrenal disorders cause Addison's disease or Cushing's syndrome.

55. Answer: (A) Calcium

Ca^{2+} released from the sarcoplasmic reticulum binds troponin, which moves tropomyosin and uncovers the myosin-binding sites on actin so cross-bridges can form. Sodium and potassium handle the action potential, and magnesium supports ATP binding but does not unmask actin.

56. Answer: (D) Thrombocytes

Thrombocytes (platelets) release factors needed for blood coagulation, so too few of them cause clotting disorders and heavy blood loss. Erythrocytes carry gases, and leucocytes, including neutrophils, are involved in defence.

57. Answer: (A) Insulin

Insulin, a peptide hormone from pancreatic beta cells, acts mainly on liver cells and fat cells to increase glucose uptake and use, lowering blood sugar. Glucagon raises blood glucose, and secretin and gastrin are gastrointestinal hormones.

58. Answer: (C) decreased level of estrogen

Osteoporosis is an age-related loss of bone mass with more fractures, commonly caused by a fall in oestrogen after menopause. An immune disorder at the neuromuscular junction describes myasthenia gravis, and uric acid crystals in joints cause gout.

59. Answer: (C) lacking clotting factors

Serum is plasma from which the clotting factors such as fibrinogen have been removed by clotting. It still has albumins and globulins, including antibodies.

60. Answer: (B) there is a negative intrapleural pressure pulling at the lung walls

The pleural space is kept below the pressure inside the lungs, and this negative intrapleural pressure pulls on the lung walls and keeps the alveoli from collapsing, so a residual volume always stays. Intrapulmonary pressure itself swings either side of atmospheric during breathing and is not permanently negative or higher.

61. Answer: (B) it only stores and releases hormones

Oxytocin and vasopressin are made by neurosecretory cells of the hypothalamus and only stored in and released from the posterior pituitary (neurohypophysis), so it makes no hormones of its own. It is ductless and secretes no enzymes, and being regulated by the hypothalamus applies to the anterior pituitary too.

62. Answer: (A) LNG-20

LNG-20 releases levonorgestrel, a progestogen, so it is a hormone-releasing IUD. Multiload 375 and Cu7 are copper-releasing IUDs, and the Lippes loop is a non-medicated IUD.

63. Answer: (A) uterus

In assisted reproduction the zygote or early embryo with up to 8 blastomeres is placed in the fallopian tube (ZIFT), while later embryos with more than 8 blastomeres are transferred into the uterus (IUT). An embryo of more than 16 cells therefore goes into the uterus.

64. Answer: (A) Rete testis → Efferent ductules → Epididymis → Vas deferens

Sperms pass from the seminiferous tubules into the rete testis, then through the vasa efferentia into the epididymis, and on into the vas deferens. Any sequence that puts the epididymis before the efferent ductules, or the vas deferens before the epididymis, reverses this path.

65. Answer: (B) placenta

During pregnancy the placenta acts as an endocrine tissue and makes hCG, hPL, oestrogens and progesterone. The ovary makes oestrogen and progesterone but not hCG or hPL, and the pituitary makes neither.

66. Answer: (A) 0

Colour blindness is X-linked recessive, and a son gets his only X chromosome from his mother. Here the mother is XX with two normal alleles and the father passes only his Y to sons, so every son is normal and the probability is 0; the daughters will be carriers.

67. Answer: (A) small isolated population

Genetic drift is a random change in allele frequency by chance, and its effect is strongest in small, isolated populations such as those formed by founder effect or bottlenecks. In large populations chance changes even out, and a non-reproducing population passes on no alleles at all.

68. Answer: (B) $2pq$

From $(p + q)^2 = p^2 + 2pq + q^2 = 1$, the heterozygote frequency is $2pq$, because the heterozygote can form in two ways. p^2 and q^2 are the frequencies of the two homozygotes, and pq on its own is only half the heterozygote frequency.

69. Answer: (B) Ramapithecus → Australopithecus → Homo habilis → Homo erectus

Ramapithecus lived about 15 million years ago, Australopithecines about 2 million years ago, then Homo habilis, followed by Homo erectus about 1.5 million years ago. Putting Australopithecus before Ramapithecus, or Homo habilis before Australopithecus, breaks this NCERT sequence.

70. Answer: (C) II, III, I, IV

Chemical evolution first formed simple organic monomers, which joined into polymers; these then gathered into protobionts (coacervates), and DNA-based genetic systems arose last after RNA-based ones. Sequences that start with protobionts, or place the DNA genetic system before protobionts, do not fit this order.

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.