

Biological Classification — NEET Biology PYQ (2005-2021)

Class 11 Biology · 63 real NEET & AIPMT questions, year-tagged · answers checked by RankUp

NEET 2021

1. Which of the following statements is correct ?

- (A) Fusion of two cells is called Karyogamy.
- (B) Fusion of protoplasts between two motile or non-motile gametes is called plasmogamy.
- (C) Organisms that depend on living plants are called saprophytes.
- (D) Some of the organisms can fix atmospheric nitrogen in specialized cells called sheath cells.

NEET 2020 · Q57

2. Which of the following is correct about viroids?

- (A) They have RNA with protein coat.
- (B) They have free RNA without protein coat.
- (C) They have DNA with protein coat.
- (D) They have free DNA without protein coat.

NEET 2019 · Q156

3. Which of the following statements is incorrect ?

- (A) Viroids lack a protein coat.
- (B) Viruses are obligate parasites.
- (C) Infective constituent in viruses is the protein coat.
- (D) Prions consist of abnormally folded proteins.

NEET 2019 · Q159

4. Which of the following statements is incorrect ?

- (A) Morels and truffles are edible delicacies.
- (B) Claviceps is a source of many alkaloids and LSD.
- (C) Conidia are produced exogenously and ascospores endogenously.
- (D) Yeasts have filamentous bodies with long thread-like hyphae.

NEET 2019 · Q160

5. Match Column - I with Column - II.

(a) Saprophyte — (i) Symbiotic association of fungi with plant roots

(b) Parasite — (ii) Decomposition of dead organic materials

(c) Lichens — (iii) Living on living plants or animals

(d) Mycorrhiza — (iv) Symbiotic association of algae and fungi

Choose the correct answer from the options given below :

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

NEET 2018 · Q118

6. Which among the following is not a prokaryote?

- (A) Nostoc
- (B) Mycobacterium
- (C) Saccharomyces
- (D) Oscillatoria

NEET 2018 · Q131

7. Select the wrong statement:

- (A) Pseudopodia are locomotory and feeding structures in Sporozoans.
- (B) Mushrooms belong to Basidiomycetes.
- (C) Cell wall is present in members of Fungi and Plantae.
- (D) Mitochondria are the powerhouse of the cell in all kingdoms except Monera.

NEET 2018 · Q132

8. After karyogamy followed by meiosis, spores are produced exogenously in

- (A) Agaricus
- (B) Alternaria
- (C) Neurospora
- (D) Saccharomyces

NEET 2018 · Q147

9. Ciliates differ from all other protozoans in

- (A) using pseudopodia for capturing prey
- (B) having a contractile vacuole for removing excess water
- (C) using flagella for locomotion
- (D) having two types of nuclei

NEET 2018 · Q152

10. Which of the following organisms are known as chief producers in the oceans?

- (A) Cyanobacteria
- (B) Diatoms
- (C) Dinoflagellates
- (D) Euglenoids

NEET 2017 · Q53

11. Viroids differ from viruses in having:

- (A) DNA molecules with protein coat
- (B) DNA molecules without protein coat
- (C) RNA molecules with protein coat
- (D) RNA molecules without protein coat

NEET 2017 · Q62

12. Which of the following are found in extreme saline conditions?

- (A) Archaeobacteria
- (B) Eubacteria
- (C) Cyanobacteria
- (D) Mycobacteria

NEET 2017 (Gujarati paper) · Q50

13. Which of the following is not true of organisms in the kingdom Monera?

- (A) They originated at least 3.5 billion years ago.
- (B) They have prokaryotic cellular organization.
- (C) They may be autotrophic or heterotrophic in nature.
- (D) They reproduce by mitosis.

NEET 2017 (Gujarati paper) · Q67

14. Select the sac fungus:

- (A) Agaricus
- (B) Neurospora
- (C) Mucor
- (D) Albugo

NEET 2017 (Gujarati paper) · Q91

15. An example of flagellate protozoan is:

- (A) Paramoecium
- (B) Trypanosoma
- (C) Entamoeba
- (D) Plasmodium

16. The protein coat around a virus is called:

- (A) Core
- (B) Capsid
- (C) Trichome
- (D) Capsule

17. 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.

18. Methanogens belong to

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

19. 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.

20. Which of the following statements is wrong for viroids?

- (A) They lack a protein coat
- (B) They are smaller than viruses
- (C) They cause infections
- (D) Their RNA is of high molecular weight

21. One of the major components of cell wall of most fungi is:

- (A) Chitin
- (B) Peptidoglycan
- (C) Cellulose
- (D) Hemicellulose

22. Chrysophytes, Euglenoids, Dinoflagellates and Slime moulds are included in the kingdom:

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

23. 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

AIPMT 2015

24. True nucleus is absent in:

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

AIPMT 2014

25. Which of the following shows coiled RNA strand and capsomeres?

- (A) Tobacco mosaic virus
- (B) Measles virus
- (C) Retrovirus
- (D) Polio virus

AIPMT 2014

26. Which one of the following fungi contains hallucinogens?

- (A) Amanita muscaria
- (B) Neurospora sp
- (C) Ustilago sp
- (D) Morchella esculenta

AIPMT 2014

27. Archaeobacteria differ from eubacteria in:

- (A) Mode of nutrition
- (B) Cell shape
- (C) Mode of reproduction
- (D) Cell membrane structure

NEET 2013

28. Select the wrong statement:

- (A) Isogametes are similar in structure, function and behaviour
- (B) Anisogametes differ either in structure, function or behaviour
- (C) In Oomycetes female gamete is smaller and motile, while male gamete is larger and non-motile
- (D) Chlamydomonas exhibits both isogamy and anisogamy and Fucus shows oogamy

NEET 2013

29. Pigment-containing membranous extensions in some cyanobacteria are

- (A) Heterocysts
- (B) Basal bodies
- (C) Pneumatophores
- (D) Chromatophores

NEET 2013

30. Which of the following are likely to be present in deep sea water?

- (A) Archaeobacteria
- (B) Eubacteria
- (C) Blue-green algae
- (D) Saprophytic fungi

AIPMT 2012 Mains

31. How many organisms in the list given below are autotrophs ? Lactobacillus, Nostoc, Chara, Nitrosomonas, Nitrobacter, Streptomyces, Sacharomyces, Trypanosoma, Porphyra, Wolfia

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

32. Which one of the following sets of items in the options given below are correctly categorised with one exception in it?

- (A) Items: UAA, UAG, UGA; Category: Stop codons; Exception: UAG
- (B) Items: Kangaroo, Koala, Wombat; Category: Australian marsupials; Exception: Wombat
- (C) Items: Plasmodium, Cuscuta, Trypanosoma; Category: Protozoan parasites; Exception: Cuscuta
- (D) Items: Typhoid, Pneumonia, Diphtheria; Category: Bacterial diseases; Exception: Diphtheria

33. Maximum nutritional diversity is found in the group

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

34. 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

35. 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

36. Nuclear membrane is absent in

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

37. The cyanobacteria are also referred to as

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

38. The pathogen Microsporium responsible for ringworm disease in humans belongs to the same Kingdom of organisms as that of

- (A) Rhizopus, a mould
- (B) Ascaris, a round worm
- (C) Taenia, a tapeworm
- (D) Wuchereria, a filarial worm

39. Organisms called Methanogens are most abundant in a

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

40. Which one of the following is wrongly matched?

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

41. Black (stem) rust of wheat is caused by :

- (A) Alternaria solani
- (B) Ustilago nuda
- (C) Puccinia graminis
- (D) Xanthomonas oryzae

42. Select the correct combination of the statements (a-d) regarding the characteristics of certain organisms

- (a) Methanogens are Archaeobacteria which produce methane in marshy areas**
- (b) Nostoc is a filamentous blue-green alga which fixes atmospheric nitrogen**
- (c) Chemosynthetic autotrophic bacteria synthesize cellulose from glucose**
- (d) Mycoplasma lack a cell wall and can survive without oxygen**

The correct statement are

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

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

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

44. Infectious proteins are present in

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

45. Single-celled eukaryotes are included in

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

AIPMT 2009 Prelims · Q60

46. Which one is the wrong pairing for the disease and its causal organism?

- (A) Black rust of wheat – Puccinia graminis
- (B) Loose smut of wheat – Ustilago nuda
- (C) Root-knot of vegetables – Meloidogyne sp.
- (D) Late blight of potato – Alternaria solani

AIPMT 2009 Prelims · Q64

47. T.O. Diener discovered a:

- (A) Free infectious DNA
- (B) Infectious protein
- (C) Bacteriophage
- (D) Free infectious RNA

AIPMT 2009 Prelims · Q82

48. Oxygenic photosynthesis occurs in:

- (A) Oscillatoria
- (B) Rhodospirillum
- (C) Chlorobium
- (D) Chromatium

AIPMT 2008 Prelims · Q102

49. Thermococcus, Methanococcus and Methanobacterium exemplify

- (A) Bacteria that contain a cytoskeleton and ribosomes
- (B) Archaeobacteria that contain protein homologous to eukaryotic core histones
- (C) Archaeobacteria that lack any histones resembling those found in eukaryotes but whose DNA is negatively supercoiled
- (D) Bacteria whose DNA is relaxed or positively supercoiled but which have a cytoskeleton as well as mitochondria

AIPMT 2008 Prelims · Q110

50. Cellulose is the major component of cell walls of

- (A) Saccharomyces
- (B) Pythium
- (C) Xanthomonas
- (D) Pseudomonas

AIPMT 2008 Prelims · Q115

51. In the light of recent classification of living organisms into three domains of life (bacteria, archaea and eukarya), which one of the following statements is true about archaea?

- (A) Archaea completely differ from prokaryotes
- (B) Archaea resemble eukarya in all respects
- (C) Archaea have some novel features that are absent in other prokaryotes and eukaryotes
- (D) Archaea completely differ from both prokaryotes and eukaryotes

AIPMT 2007 Prelims · Q102

52. Which pair of the following belongs to Basidiomycetes?

- (A) puffballs and Claviceps
- (B) Peziza and stinkhorns
- (C) Morchella and mushrooms
- (D) bird's nest fungi and puffballs

AIPMT 2007 Prelims · Q125

53. Ergot of rye is caused by a species of

- (A) Uncinula
- (B) Ustilago
- (C) Claviceps
- (D) Phytophthora

AIPMT 2007 Prelims · Q127

54. Which one of the following is a slime mould?

- (A) Physarum
- (B) Thiobacillus
- (C) Anabaena
- (D) Rhizopus

AIPMT 2007 Prelims · Q149

55. Which one of the following statements about mycoplasma is wrong?

- (A) They are pleomorphic
- (B) They are sensitive to penicillin
- (C) They cause diseases in plants
- (D) They are also called PPLO

AIPMT 2006 Prelims · Q127

56. The thalloid body of a slime mould (Myxomycetes) is known as :

- (A) protonema
- (B) Plasmodium
- (C) fruiting body
- (D) mycelium

AIPMT 2006 Prelims · Q155

57. What is common about Trypanosoma, Noctiluca, Monocystis and Giardia ?

- (A) These are all unicellular protists
- (B) They have flagella
- (C) They produce spores
- (D) These are all parasites

AIPMT 2006 Prelims · Q158

58. Which of the following environmental conditions are essential for optimum growth of Mucor on a piece of bread ? A. Temperature of about 25°C B. Temperature of about 5°C C. Relative humidity of about 5% D. Relative humidity of about 95% E. A shady place F. A brightly illuminated place Choose the answer from the following options :

- (A) A, C and E only
- (B) A, D and E only
- (C) B, D and E only
- (D) B, C and F only

AIPMT 2006 Prelims · Q186

59. The causative agent of mad-cow disease is a :

- (A) bacterium
- (B) prion
- (C) worm
- (D) virus

AIPMT 2005 Prelims · Q107

60. There exists a close association between the alga and the fungus within a lichen. The fungus :

- (A) fixes the atmospheric nitrogen for the alga
- (B) provides protection, anchorage and absorption for the alga
- (C) provides food for the alga
- (D) releases oxygen for the alga

61. Barophilic prokaryotes :

- (A) grow slowly in highly alkaline frozen lakes at high altitudes
- (B) occur in water containing high concentrations of barium hydroxide
- (C) grow and multiply in very deep marine sediments
- (D) readily grown and divides in sea water enriched in any soluble salt of barium

62. Auxospores and hormocysts are formed, respectively, by :

- (A) several diatoms and a few cyanobacteria
- (B) several cyanobacteria and several diatoms
- (C) some diatoms and several cyanobacteria
- (D) some cyanobacteria and many diatoms

63. Which of the following unicellular organism has a macro-nucleus for trophic function and one or more micro-nuclei for reproduction ?

- (A) Euglena
- (B) Amoeba
- (C) Paramecium
- (D) Trypanosoma

Answer key and explanations

1. Answer: (B) Fusion of protoplasts between two motile or non-motile gametes is called plasmogamy.

Fusion of the protoplasm of two motile or non-motile gametes is plasmogamy, which is correct. Fusion of two nuclei (not two cells) is karyogamy, organisms on dead matter are saprophytes, and nitrogen-fixing cells of cyanobacteria are heterocysts, not sheath cells.

2. Answer: (B) They have free RNA without protein coat.

Viroids, found by T.O. Diener as the cause of potato spindle tuber disease, are free RNA molecules without any protein coat. Viruses have a protein coat, and viroid RNA is of low molecular weight, not DNA.

3. Answer: (C) Infective constituent in viruses is the protein coat.

The infective part of a virus is its nucleic acid (DNA or RNA); the protein coat (capsid) only protects it. Viroids are naked RNA without a protein coat, and prions are abnormally folded proteins.

4. Answer: (D) Yeasts have filamentous bodies with long thread-like hyphae.

Yeasts are unicellular fungi without hyphae, so describing them as filamentous is wrong. Morels and truffles are edible ascomycetes, Claviceps yields ergot alkaloids and LSD, and conidia are exogenous while ascospores form inside asci.

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

Saprophytes decompose dead organic matter, parasites live on living plants or animals, lichens are algae-fungus associations and mycorrhizae are fungus-root associations. Swapping lichens and mycorrhiza is the usual trap.

6. Answer: (C) Saccharomyces

Saccharomyces is yeast, a unicellular fungus with a true nucleus, so it is a eukaryote. Nostoc and Oscillatoria are cyanobacteria and Mycobacterium is a bacterium, all prokaryotes.

7. Answer: (A) Pseudopodia are locomotory and feeding structures in Sporozoans.

Sporozoans such as Plasmodium have no locomotory structures; pseudopodia are found in amoeboid protozoans (sarcodines). Mushrooms are basidiomycetes, fungi and plants have cell walls, and Monera lack mitochondria while all other kingdoms have them.

8. Answer: (A) Agaricus

In Agaricus (a basidiomycete) karyogamy and meiosis occur in the basidium and the four basidiospores are borne exogenously on it. In Neurospora and Saccharomyces (ascomycetes) the meiospores form endogenously in an ascus, and Alternaria is a deuteromycete with no known sexual stage.

9. Answer: (D) having two types of nuclei

Ciliates such as *Paramecium* have a large macronucleus and a small micronucleus, a feature unique to them among protozoans. Contractile vacuoles also occur in freshwater amoebae and flagellates, pseudopodia belong to amoeboid protozoans and flagella to flagellates.

10. Answer: (B) Diatoms

NCERT describes diatoms as the chief producers in the oceans. Dinoflagellates are mostly marine photosynthetic protists too, and cyanobacteria are important producers, but the textbook title of chief producers belongs to diatoms; euglenoids are mostly freshwater.

11. Answer: (D) RNA molecules without protein coat

Viroids, discovered by T.O. Diener as the cause of potato spindle tuber disease, are free low-molecular-weight RNA without any protein coat. Viruses always have a protein capsid around their nucleic acid, so a coated RNA describes a virus, not a viroid.

12. Answer: (A) Archaeobacteria

Halophiles, a group of archaeobacteria, live in extremely salty habitats; their distinctive cell wall helps them survive such conditions. Eubacteria, cyanobacteria and mycobacteria are not characteristic of extreme salinity.

13. Answer: (D) They reproduce by mitosis.

Monerans are prokaryotes without a nucleus or spindle apparatus, so they divide by binary fission, not mitosis. They are indeed the oldest life forms (about 3.5 billion years) and include both autotrophs (cyanobacteria, chemosynthetic bacteria) and heterotrophs.

14. Answer: (B) Neurospora

Sac fungi are Ascomycetes, which produce ascospores in sac-like asci; *Neurospora* is an ascomycete. *Agaricus* is a basidiomycete (club fungus), while *Mucor* and *Albugo* belong to the Phycomycetes.

15. Answer: (B) Trypanosoma

Trypanosoma, the cause of sleeping sickness, is a flagellated protozoan. *Paramecium* is ciliated, *Entamoeba* is amoeboid (moves by pseudopodia) and *Plasmodium* is a sporozoan.

16. Answer: (B) Capsid

The nucleic acid of a virus is enclosed in a protein coat called the capsid, made of subunits called capsomeres. A capsule is the slimy outer layer of some bacteria, and trichome refers to plant hairs or filaments of cyanobacteria.

17. 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.

18. 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.

19. 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.

20. Answer: (D) Their RNA is of high molecular weight

Viroids are naked, infectious RNA molecules without a protein coat and are smaller than viruses (e.g. potato spindle tuber viroid). Their RNA is of low molecular weight, so the statement about high molecular weight RNA is the wrong one.

21. Answer: (A) Chitin

Most fungal cell walls are made of chitin and polysaccharides. Peptidoglycan is the bacterial wall component and cellulose/hemicellulose are typical of plant walls.

22. Answer: (B) Protista

In Whittaker's five-kingdom system these unicellular eukaryotic groups, along with protozoans, are placed in kingdom Protista. Monera contains prokaryotes, and slime moulds are not true fungi.

23. 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.

24. 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.

25. Answer: (A) Tobacco mosaic virus

Tobacco mosaic virus is a rod-shaped virus in which a single helically coiled RNA strand is surrounded by a protein coat made of repeating capsomeres. Measles, polio and retroviruses are not the classic example of this helical coiled-RNA architecture taught for TMV.

26. Answer: (A) Amanita muscaria

Amanita muscaria (fly agaric) produces hallucinogenic compounds. Neurospora is used in genetics, Ustilago causes smut disease, and Morchella esculenta (morel) is edible.

27. Answer: (D) Cell membrane structure

Archaeobacteria differ from eubacteria in having a different cell wall and cell membrane structure, with branched-chain lipids joined by ether links, which helps them survive extreme habitats. Shape, mode of nutrition and reproduction overlap between the two groups.

28. Answer: (C) In Oomycetes female gamete is smaller and motile, while male gamete is larger and non-motile

Oomycetes are oogamous: the female gamete (egg) is large and non-motile while the male gamete is small, so the statement that the female gamete is smaller and motile is reversed and wrong. The definitions of isogametes and anisogametes are correct, and Chlamydomonas does show isogamy and anisogamy while Fucus is oogamous.

29. Answer: (D) Chromatophores

Some cyanobacteria have chromatophores, membranous extensions of the plasma membrane into the cytoplasm that contain pigments. Heterocysts are nitrogen-fixing cells and basal bodies anchor flagella, so neither is a pigment-bearing membrane.

30. Answer: (A) Archaeobacteria

Archaeobacteria live in extreme habitats, and methanogens and other archaea are common in deep-sea sediments and hydrothermal vents. Blue-green algae need light and so are restricted to surface waters.

31. Answer: (C) Six

Autotrophs make their own food: Nostoc, Chara, Porphyra and Wolffia are photosynthetic, while Nitrosomonas and Nitrobacter are chemoautotrophs, giving six. Lactobacillus, Streptomyces, Saccharomyces and Trypanosoma are heterotrophs, so counting only the photosynthetic ones (four) is the trap.

32. Answer: (C) Items: Plasmodium, Cuscuta, Trypanosoma; Category: Protozoan parasites; Exception: Cuscuta

Plasmodium and Trypanosoma are protozoan parasites, while Cuscuta is a parasitic flowering plant, so it is the true exception. UAG is itself a stop codon, the wombat is a marsupial, and diphtheria is a bacterial disease, so the 'exceptions' in the other sets are not exceptions.

33. 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.

34. 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.

35. 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.

36. 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.

37. 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.

38. Answer: (A) Rhizopus, a mould

Microsporum, which causes ringworm, is a fungus, so it shares kingdom Fungi with the mould Rhizopus. Ascaris, Taenia and Wuchereria are worms belonging to kingdom Animalia.

39. Answer: (C) Cattle yard

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

40. Answer: (C) Puccinia - Smut

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

41. Answer: (C) Puccinia graminis

Black stem rust of wheat is caused by the basidiomycete rust fungus Puccinia graminis (f. sp. tritici). Ustilago nuda causes loose smut of wheat, Alternaria solani causes early blight of potato, and Xanthomonas oryzae is the bacterium of rice blight.

42. Answer: (D) (a), (b), (d)

Methanogens are archaebacteria that produce methane in marshes, Nostoc is a filamentous cyanobacterium with heterocysts that fix nitrogen, and Mycoplasma has no cell wall and can survive without oxygen. Chemosynthetic bacteria oxidise inorganic substances such as nitrites or ammonia to get energy for making food; making cellulose from glucose is not what defines them.

43. Answer: (B) Eubacteria and archaea

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

44. Answer: (C) Prions

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

45. Answer: (B) Protista

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

46. Answer: (D) Late blight of potato - Alternaria solani

Late blight of potato is caused by the oomycete Phytophthora infestans; Alternaria solani causes early blight of potato. The other three pairings (rust by Puccinia, smut by Ustilago, root-knot by the nematode Meloidogyne) are correct.

47. Answer: (D) Free infectious RNA

In 1971 T.O. Diener discovered the viroid, the agent of potato spindle tuber disease, which is a free low-molecular-weight RNA without a protein coat. An infectious protein is a prion, not a viroid.

48. Answer: (A) Oscillatoria

Oscillatoria is a cyanobacterium with chlorophyll a and photosystem II, so it splits water and releases oxygen like plants. Rhodospirillum, Chlorobium and Chromatium are purple or green photosynthetic bacteria that use H₂S or organic donors and do not release oxygen.

49. Answer: (B) Archaebacteria that contain protein homologous to eukaryotic core histones

These genera are methanogenic and hyperthermophilic archaebacteria, and many euryarchaea such as these carry small histone proteins clearly homologous to the eukaryotic core histones (H3/H4 fold) that wrap their DNA. The statement that they lack any eukaryote-like histones is therefore wrong; hyperthermophiles like Thermococcus also tend to have relaxed or positively supercoiled DNA owing to reverse gyrase.

50. Answer: (B) Pythium

Pythium is an oomycete (traditionally a phycomycete) whose wall is made mainly of cellulose. Saccharomyces, a true fungus, has a chitin/glucan wall, while Xanthomonas and Pseudomonas are bacteria with peptidoglycan walls.

51. Answer: (C) Archaea have some novel features that are absent in other prokaryotes and eukaryotes

Archaea are prokaryotes that share some traits with bacteria and some with eukaryotes, and also have unique features such as ether-linked membrane lipids and distinctive cell walls. They neither completely differ from nor fully resemble the other groups, which rules out the absolute options.

52. Answer: (D) bird's nest fungi and puffballs

Puffballs and bird's nest fungi both produce basidiospores on basidia inside a basidiocarp, so both are Basidiomycetes. Claviceps, Peziza and Morchella are sac fungi (Ascomycetes), so every other pair mixes in an ascomycete.

53. Answer: (C) Claviceps

Ergot of rye is caused by the ascomycete *Claviceps purpurea*, which replaces grains with dark sclerotia. *Ustilago* causes smut, *Uncinula* causes powdery mildew and *Phytophthora* causes late blight.

54. Answer: (A) Physarum

Physarum is a plasmodial slime mould, a saprophytic protist that forms a multinucleate plasmodium. *Thiobacillus* is a chemosynthetic bacterium, *Anabaena* a cyanobacterium and *Rhizopus* a true fungus.

55. Answer: (B) They are sensitive to penicillin

Mycoplasma have no cell wall, and penicillin acts by blocking cell wall synthesis, so mycoplasma are resistant to it. They are pleomorphic, cause plant and animal diseases, and are known as PPLO, so those statements are true.

56. Answer: (B) Plasmodium

Slime moulds form a mass of multinucleate protoplasm without walls called a plasmodium, which can spread over long distances. Mycelium is the network of hyphae of true fungi, and protonema is the juvenile stage of mosses.

57. Answer: (A) These are all unicellular protists

Trypanosoma, *Noctiluca*, *Monocystis* and *Giardia* are all single-celled eukaryotes, i.e. protists. Not all are parasites, since *Noctiluca* is a free-living marine dinoflagellate, and *Monocystis* has no flagella.

58. Answer: (B) A, D and E only

Bread mould (*Mucor*) grows best in warm (around 25°C), very humid and shady conditions. Cold (5°C), dry air or bright light slow its growth.

59. Answer: (B) prion

Mad cow disease (bovine spongiform encephalopathy) is caused by prions, abnormally folded infectious proteins. It is not caused by a virus or bacterium.

60. Answer: (B) provides protection, anchorage and absorption for the alga

In a lichen, the algal partner (phycobiont) photosynthesises and makes food. The fungal partner (mycobiont) gives shelter, anchorage, and absorbs water and minerals for it. Food and oxygen come from the alga, not the fungus.

61. Answer: (C) grow and multiply in very deep marine sediments

'Baro' means pressure. Barophilic (piezophilic) prokaryotes thrive under the very high hydrostatic pressure of deep-sea sediments. The term has nothing to do with barium salts.

62. Answer: (A) several diatoms and a few cyanobacteria

Auxospores are formed by many diatoms to restore full cell size after repeated divisions shrink the silica frustule. Hormocysts are thick-walled, multicellular perennating filaments made by only a few filamentous cyanobacteria (such as *Westiella*). So the order is diatoms first, then cyanobacteria, and hormocysts are restricted to a few.

63. Answer: (C) Paramecium

Ciliates such as *Paramecium* have nuclear dimorphism: a large macronucleus controls everyday metabolism, and micronuclei take part in conjugation. *Euglena*, *Amoeba* and *Trypanosoma* each have a single kind of nucleus.

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