



QUESTION BANK FOR COMMON ENTRANCE EXAM **EMBCET** (2024-2025)



Microscopy

1. Which of the following is NOT a type of microscopy?

- A. Optical microscopy
- B. Electron microscopy
- C. Tunneling microscopy
- D. Infrared spectroscopy

ANS: D. Infrared spectroscopy

2. What is the primary use of a microscope?

- A. To measure temperature
- B. To magnify small objects
- C. To weigh small objects
- D. To determine the chemical composition

ANS: B. To magnify small objects

3. Which part of the microscope is used to adjust the focus?

- A. Eyepiece
- B. Objective lens
- C. Fine adjustment knob
- D. Stage

ANS: C. Fine adjustment knob

4. What is the function of the objective lens in a microscope?

- A. To hold the specimen in place
- B. To illuminate the specimen
- C. To magnify the specimen
- D. To adjust the focus

ANS: C. To magnify the specimen

5. Which type of microscope uses visible light to view specimens?

- A. Electron microscope
- B. Scanning tunneling microscope
- C. Optical microscope
- D. Atomic force microscope

ANS: C. Optical microscope

6. Which part of the microscope holds the slides?

- A. Stage
- B. Arm
- C. Base
- D. Condenser

ANS: A. Stage

7. What is the term for the ability of a microscope to distinguish two close objects as separate?

- A. Magnification
- B. Resolution
- C. Contrast
- D. Brightness

ANS: B. Resolution

8. Which of the following increases the contrast of the image in a light microscope?

- A. Coarse adjustment knob
- B. Fine adjustment knob
- C. Diaphragm

- D. Eyepiece

ANS: C. Diaphragm

9. In electron microscopy, what is used to illuminate the specimen?

- A. Visible light
- B. Ultraviolet light
- C. X-rays
- D. Electron beam

ANS: D. Electron beam

10. Which microscope is best for viewing the surface details of a specimen?

- A. Transmission electron microscope
- B. Scanning electron microscope
- C. Light microscope
- D. Fluorescence microscope

ANS: B. Scanning electron microscope

11. Which part of the microscope adjusts the amount of light that reaches the specimen?

- A. Objective lens
- B. Condenser
- C. Diaphragm
- D. Stage clips

ANS: C. Diaphragm

12. What is the purpose of staining in microscopy?

- A. To increase resolution
- B. To fix the specimen
- C. To kill the specimen
- D. To enhance contrast

ANS: D. To enhance contrast

13. Which type of microscope uses a beam of electrons that pass through the specimen?

- A. Light microscope
- B. Scanning electron microscope
- C. Transmission electron microscope
- D. Fluorescence microscope

ANS: C. Transmission electron microscope

14. The lens closest to the eye when using a microscope is called the:

- A. Objective lens
- B. Condenser lens
- C. Eyepiece lens
- D. Diaphragm

ANS: C. Eyepiece lens

15. What is the maximum magnification typically achievable with a light microscope?

- A. 100x
- B. 400x
- C. 1000x
- D. 2000x

ANS: C. 1000x

16. Which of the following is NOT a common type of light microscopy?

- A. Brightfield microscopy
- B. Darkfield microscopy

- C. Phase contrast microscopy
- D. Gamma-ray microscopy

ANS: D. Gamma-ray microscopy

17. In a compound microscope, which lens provides the primary magnification?

- A. Ocular lens
- B. Objective lens
- C. Condenser lens
- D. Diaphragm lens

ANS: B. Objective lens

18. What is the term for the smallest distance between two points that can still be distinguished as separate entities?

- A. Magnification
- B. Contrast
- C. Resolution
- D. Depth of field

ANS: C. Resolution

19. What type of microscopy would you use to view live cells without staining?

- A. Brightfield microscopy
- B. Phase contrast microscopy
- C. Electron microscopy
- D. Fluorescence microscopy

ANS: B. Phase contrast microscopy

20. Which part of the microscope is responsible for gathering and focusing light from the specimen?

- A. Eyepiece
- B. Objective lens
- C. Condenser
- D. Stage

ANS: C. Condenser

21. Which type of electron microscope provides a 3D view of the specimen?

- A. Transmission electron microscope
- B. Scanning electron microscope
- C. Compound microscope
- D. Phase contrast microscope

ANS: B. Scanning electron microscope

22. What does SEM stand for in microscopy?

- A. Scanning Electron Microscopy
- B. Surface Electron Microscopy
- C. Specimen Electron Microscopy
- D. Stereoscopic Electron Microscopy

ANS: A. Scanning Electron Microscopy

23. In fluorescence microscopy, what causes the specimen to emit light?

- A. Transmission of electrons
- B. Absorption of X-rays
- C. Absorption of light and re-emission at a longer wavelength
- D. Reflection of light

ANS: C. Absorption of light and re-emission at a longer wavelength

24. Which component of the microscope helps to change the magnification?

- A. Stage
- B. Nosepiece
- C. Diaphragm
- D. Light source

ANS: B. Nosepiece

25. Why is immersion oil used with some objective lenses?

- A. To clean the lens
- B. To increase the working distance
- C. To increase the numerical aperture and resolution
- D. To protect the specimen

ANS: C. To increase the numerical aperture and resolution

26. What is the primary function of a microscope?

- A) To magnify small objects
- B) To project large images
- C) To detect radiation
- D) To measure temperature
- Answer: A) To magnify small objects

27. Which part of the microscope holds the objective lenses?

- A) Stage
- B) Arm
- C) Nosepiece
- D) Base
- Answer: C) Nosepiece

28. What is the purpose of the coarse adjustment knob?

- A) To rotate the objective lenses
- B) To focus on the specimen
- C) To move the stage left and right
- D) To change the light intensity
- Answer: B) To focus on the specimen

29. Which type of microscope uses visible light to illuminate the specimen?

- A) Electron microscope
- B) Fluorescence microscope
- C) Light microscope
- D) Atomic force microscope
- Answer: C) Light microscope

30. What is the magnifying power of the eyepiece typically used in a light microscope?

- A) 4x
- B) 10x
- C) 40x
- D) 100x

- Answer: B) 10x

31. Which part of the microscope adjusts the amount of light that reaches the specimen?

- A) Condenser
- B) Diaphragm
- C) Objective lens
- D) Eyepiece

- Answer: B) Diaphragm

32. What is the highest magnification typically achieved by a light microscope?

- A) 100x
- B) 400x
- C) 1000x
- D) 2000x

- Answer: C) 1000x

33. Which microscope technique is used to view living cells without staining?

- A) Phase-contrast microscopy
 - B) Electron microscopy
 - C) Confocal microscopy
 - D) Polarized light microscopy
- Answer: A) Phase-contrast microscopy

34. What is the main advantage of using an electron microscope over a light microscope?

- A) Higher magnification and resolution
 - B) Easier sample preparation
 - C) Lower cost
 - D) Simpler operation
- Answer: A) Higher magnification and resolution

35. Which of the following is NOT a type of electron microscope?

- A) Scanning electron microscope (SEM)
 - B) Transmission electron microscope (TEM)
 - C) Confocal electron microscope
 - D) Cryo-electron microscope
- Answer: C) Confocal electron microscope

36. What is the purpose of using immersion oil with a microscope?

- A) To preserve the specimen
 - B) To increase resolution by reducing light refraction
 - C) To clean the lenses
 - D) To stain the specimen
- Answer: B) To increase resolution by reducing light refraction

37. In which type of microscopy is a beam of electrons scanned across a specimen to produce an image?

- A) Light microscopy

- B) Transmission electron microscopy
- C) Scanning electron microscopy
- D) Fluorescence microscopy
- Answer: C) Scanning electron microscopy

38. Which of the following components is NOT part of a typical compound microscope?

- A) Stage
- B) Condenser
- C) Prism
- D) Arm
- Answer: C) Prism

39. What is the purpose of staining in microscopy?

- A) To kill bacteria
- B) To enhance contrast of the specimen
- C) To adjust the focus
- D) To increase magnification
- Answer: B) To enhance contrast of the specimen

40. Which part of the microscope is used to hold the slide in place?

- A) Arm
- B) Stage clips
- C) Objective lens
- D) Eyepiece
- Answer: B) Stage clips

41. What type of lens is used to magnify the image in a microscope?

- A) Convex lens
- B) Concave lens
- C) Planar lens
- D) Diverging lens
- Answer: A) Convex lens

42. Which of the following microscopes can visualize specimens in three dimensions?

- A) Transmission electron microscope (TEM)
- B) Light microscope
- C) Scanning electron microscope (SEM)
- D) Phase-contrast microscope
- Answer: C) Scanning electron microscope (SEM)

43. What is the typical wavelength range of visible light used in light microscopy?

- A) 10-400 nm
- B) 400-700 nm
- C) 700-1000 nm
- D) 1000-1400 nm
- Answer: B) 400-700 nm

44. Which part of the microscope can be adjusted to change the field of view?
- A) Objective lens
 - B) Diaphragm
 - C) Eyepiece
 - D) Stage
 - Answer: B) Diaphragm
45. What is the function of the condenser lens in a light microscope?
- A) To magnify the image
 - B) To focus light onto the specimen
 - C) To adjust the brightness
 - D) To hold the specimen slide
 - Answer: B) To focus light onto the specimen
46. Which type of microscopy uses fluorescent dyes to label structures within a cell?
- A) Light microscopy
 - B) Electron microscopy
 - C) Confocal microscopy
 - D) Fluorescence microscopy
 - Answer: D) Fluorescence microscopy
47. What is the advantage of using a phase-contrast microscope?
- A) High magnification
 - B) High resolution
 - C) Viewing living cells without staining
 - D) Viewing specimens in 3D
 - Answer: C) Viewing living cells without staining
48. Which type of electron microscope provides detailed images of the surface of a specimen?
- A) Transmission electron microscope (TEM)
 - B) Scanning electron microscope (SEM)
 - C) Confocal electron microscope
 - D) Atomic force microscope
 - Answer: B) Scanning electron microscope (SEM)
49. What is the magnifying power of an objective lens labeled 40x?
- A) 4x
 - B) 10x
 - C) 40x
 - D) 100x
 - Answer: C) 40x
50. In a compound microscope, what does the total magnification equal?
- A) The sum of the eyepiece and objective lens magnifications
 - B) The product of the eyepiece and objective lens magnifications
 - C) The difference between the eyepiece and objective lens magnifications

- D) The ratio of the eyepiece to objective lens magnifications
- Answer: B) The product of the eyepiece and objective lens magnifications

51. What is the purpose of the fine adjustment knob?

- A) To initially focus the specimen
- B) To precisely focus the specimen
- C) To change the objective lenses
- D) To move the stage up and down
- Answer: B) To precisely focus the specimen

52. Which type of microscopy is used to view detailed internal structures of cells?

- A) Light microscopy
- B) Scanning electron microscopy (SEM)
- C) Transmission electron microscopy (TEM)
- D) Fluorescence microscopy
- Answer: C) Transmission electron microscopy (TEM)

53. Which part of the microscope is the flat platform where the slide is placed?

- A) Stage
- B) Arm
- C) Base
- D) Diaphragm
- Answer: A) Stage

54. What is a key characteristic of confocal microscopy?

- A) Use of polarized light
- B) Use of a single focal plane
- C) Use of fluorescent dyes
- D) Use of multiple focal planes
- Answer: D) Use of multiple focal planes

55. What is the role of the diaphragm in a light microscope?

- A) To magnify the image
- B) To focus light on the specimen
- C) To control the amount of light reaching the specimen
- D) To hold the slide in place
- Answer: C) To control the amount of light reaching the specimen

56. What type of microscopy uses a laser to illuminate a single point on the specimen?

- A) Light microscopy
- B) Electron microscopy
- C) Confocal microscopy
- D) Polarized light microscopy
- Answer: C) Confocal microscopy

57. What is the primary function of a microscope?

- A) To magnify small objects

- B) To record videos
- C) To calculate measurements
- D) To produce sound
- Answer: A) To magnify small objects

58 Which type of microscope uses light to view specimens?

- A) Electron microscope
- B) Scanning probe microscope
- C) Light microscope
- D) Atomic force microscope
- Answer: C) Light microscope

59. What is the magnification power of an objective lens marked "40x"?

- A) 4 times
- B) 40 times
- C) 400 times
- D) 4000 times
- Answer: B) 40 times

60. Which part of the microscope is used to focus light on the specimen?

- A) Eyepiece
- B) Objective lens
- C) Condenser
- D) Stage
- Answer: C) Condenser

61. What does the term "resolution" in microscopy refer to?

- A) The ability to distinguish two points as separate
- B) The degree of magnification
- C) The brightness of the image
- D) The color of the image
- Answer: A) The ability to distinguish two points as separate

62. Which type of electron microscope provides detailed surface images?

- A) Transmission electron microscope (TEM)
- B) Scanning electron microscope (SEM)
- C) Light microscope
- D) Compound microscope
- Answer: B) Scanning electron microscope (SEM)

63. Which microscope part is responsible for adjusting the focus?

- A) Eyepiece
- B) Diaphragm
- C) Coarse and fine adjustment knobs
- D) Stage clips
- Answer: C) Coarse and fine adjustment knobs

64. In fluorescence microscopy, what is used to illuminate the specimen?

- A) Visible light
- B) Ultraviolet light
- C) Infrared light
- D) X-rays
- Answer: B) Ultraviolet light

65. Which part of the microscope holds the slide in place?

- A) Stage
- B) Base
- C) Arm
- D) Nosepiece
- Answer: A) Stage

66. What is the term for the lens you look through on a microscope?

- A) Objective lens
- B) Condenser lens
- C) Eyepiece or ocular lens
- D) Iris diaphragm
- Answer: C) Eyepiece or ocular lens

67. Which of the following is NOT a type of light microscope?

- A) Compound microscope
- B) Stereoscope
- C) Phase-contrast microscope
- D) Scanning tunneling microscope
- Answer: D) Scanning tunneling microscope

68. What does the term "numerical aperture" refer to in microscopy?

- A) The magnification power of the lens
- B) The ability of the lens to gather light
- C) The diameter of the lens
- D) The weight of the microscope
- Answer: B) The ability of the lens to gather light

69. Which microscope is best suited for viewing living cells?

- A) TEM
- B) SEM
- C) Phase-contrast microscope
- D) Simple microscope
- Answer: C) Phase-contrast microscope

70. Which technique in microscopy enhances contrast in unstained cells?

- A) Bright-field microscopy
- B) Dark-field microscopy
- C) Phase-contrast microscopy

- D) Fluorescence microscopy
- Answer: C) Phase-contrast microscopy

71. What is the purpose of immersion oil in microscopy?

- A) To clean the lenses
- B) To enhance resolution
- C) To stain the specimen
- D) To protect the slide
- Answer: B) To enhance resolution

72. What is the purpose of the diaphragm on a microscope?

- A) To hold the slide
- B) To adjust the amount of light
- C) To change the objective lens
- D) To clean the lenses
- Answer: B) To adjust the amount of light

73. Which of the following is a scanning probe microscope?

- A) SEM
- B) TEM
- C) AFM (Atomic Force Microscope)
- D) Fluorescence microscope
- Answer: C) AFM (Atomic Force Microscope)

74. Which microscope part moves the objective lenses up and down?

- A) Stage
- B) Base
- C) Coarse adjustment knob
- D) Arm
- Answer: C) Coarse adjustment knob

75. In electron microscopy, what replaces light as the source of illumination?

- A) X-rays
- B) Electrons
- C) Neutrons
- D) Protons
- Answer: B) Electrons

76. Which staining technique is commonly used in light microscopy to enhance contrast?

- A) Gram staining
- B) Wright's staining
- C) Hematoxylin and eosin (H&E) staining
- D) All of the above
- Answer: D) All of the above

77. What type of lens is used in the eyepiece of a microscope?

- A) Convex lens

- B) Concave lens
- C) Cylindrical lens
- D) Biconcave lens
- Answer: A) Convex lens

78. Which microscopy technique is used to observe the fine structure of cells and viruses?

- A) Light microscopy
- B) Transmission electron microscopy (TEM)
- C) Fluorescence microscopy
- D) Dark-field microscopy
- Answer: B) Transmission electron microscopy (TEM)

79. What does "parfocal" mean in the context of microscopes?

- A) Lenses that have the same focal length
- B) Objectives that stay in focus when magnification is changed
- C) Lenses that are easy to clean
- D) Microscopes that can switch between different light sources
- Answer: B) Objectives that stay in focus when magnification is changed

80. Which microscopy technique allows the observation of specimens without staining?

- A) Bright-field microscopy
- B) Phase-contrast microscopy
- C) SEM
- D) TEM
- Answer: B) Phase-contrast microscopy

81. What is the maximum practical magnification for a light microscope?

- A) 100x
- B) 400x
- C) 1000x
- D) 2000x
- Answer: C) 1000x

82. Which of the following is a primary safety rule in a biology lab?

- A. Eating and drinking are allowed
- B. Always wear appropriate personal protective equipment (PPE)
- C. Use any equipment without training
- D. Perform experiments alone
- Answer: B. Always wear appropriate personal protective equipment (PPE)

83. What is the purpose of using a biological safety cabinet?

- A. To store chemicals safely
- B. To protect against electrical hazards
- C. To provide a sterile environment for handling biological materials
- D. To increase room temperature
- Answer: C. To provide a sterile environment for handling biological materials

84. Which of the following methods is commonly used to sterilize laboratory equipment?

- A. Autoclaving
- B. Drying
- C. Freezing
- D. Dehydrating
- Answer: A. Autoclaving

85. Why is it important to properly label all samples and reagents in a biology lab?

- A. To enhance the appearance of the lab
- B. To avoid contamination and ensure accurate results
- C. To meet financial auditing requirements
- D. To reduce storage space
- Answer: B. To avoid contamination and ensure accurate results

86. Which of the following is an example of good aseptic technique?

- A. Touching sterile surfaces with bare hands
- B. Using disinfectants on surfaces before working
- C. Blowing on samples to dry them
- D. Leaving containers open when not in use
- Answer: B. Using disinfectants on surfaces before working

87. What is the main purpose of a micropipette in a biology lab?

- A. To measure large volumes of liquids
- B. To measure small, precise volumes of liquids
- C. To mix chemicals
- D. To heat solutions
- Answer: B. To measure small, precise volumes of liquids

88. Which of the following is NOT a common piece of equipment found in a biology laboratory?

- A. Microscope
- B. Bunsen burner
- C. Centrifuge
- D. Welding machine
- Answer: D. Welding machine

89. What should you do if you spill a biological sample in the lab?

- A. Leave it for the next shift
- B. Clean it up immediately using appropriate disinfectant and report it
- C. Ignore it
- D. Cover it with paper towels
- Answer: B. Clean it up immediately using appropriate disinfectant and report it

90. In a biology lab, what is the purpose of using a fume hood?

- A. To store hazardous chemicals
- B. To protect against exposure to harmful vapors and fumes
- C. To incubate cultures

- D. To weigh samples accurately
 - Answer: B. To protect against exposure to harmful vapors and fumes
92. What is the first step in using a microscope?
- A. Turning on the light source
 - B. Adjusting the eyepiece
 - C. Placing the slide on the stage
 - D. Cleaning the lenses
 - Answer: D. Cleaning the lenses
92. Why is it important to dispose of biological waste properly?
- A. To maintain laboratory aesthetics
 - B. To prevent environmental contamination and ensure safety
 - C. To increase laboratory funding
 - D. To reduce the need for cleaning
 - Answer: B. To prevent environmental contamination and ensure safety
93. Which of the following practices helps in maintaining accurate experimental records?
- A. Recording data at the end of the day
 - B. Using a personal shorthand
 - C. Documenting observations immediately and clearly
 - D. Only recording significant results
 - Answer: C. Documenting observations immediately and clearly
94. What is the purpose of using an incubator in a biology lab?
- A. To keep samples at room temperature
 - B. To heat chemicals rapidly
 - C. To maintain a controlled environment for growing cultures
 - D. To provide a sterile work area
 - Answer: C. To maintain a controlled environment for growing cultures
95. What should you do if you accidentally break glassware in the lab?
- A. Sweep it up with a broom
 - B. Pick it up with your hands
 - C. Use a dustpan and brush and dispose of it in a designated sharps container
 - D. Leave it for someone else to clean
 - Answer: C. Use a dustpan and brush and dispose of it in a designated sharps container
96. Which type of biological material requires the highest level of biosafety precautions?
- A. Plant tissues
 - B. Non-pathogenic bacteria
 - C. Viruses causing severe diseases
 - D. Fungi
 - Answer: C. Viruses causing severe diseases
97. What is the primary function of a centrifuge in a biology lab?
- A. To heat samples

- B. To separate components of a mixture based on density
- C. To measure pH
- D. To sterilize equipment
- Answer: B. To separate components of a mixture based on density

98. Which of the following is essential for maintaining the accuracy of pipetting?

- A. Using the same pipette for all experiments
- B. Regularly calibrating the pipette
- C. Only using disposable pipette tips
- D. Pipetting very quickly
- Answer: B. Regularly calibrating the pipette

99. What is the correct way to handle chemical spills on your skin in the lab?

- A. Wipe it off with a tissue
- B. Rinse immediately with plenty of water and seek medical attention
- C. Ignore it if it's not painful
- D. Cover it with a bandage
- Answer: B. Rinse immediately with plenty of water and seek medical attention

100. Why is it important to flame the loop before and after using it in microbiology?

- A. To keep it warm
- B. To sterilize it and prevent contamination
- C. To make it easier to handle
- D. To change its color
- Answer: B. To sterilize it and prevent contamination

101. What is the purpose of a control sample in an experiment?

- A. To provide a basis for comparison with the experimental group
- B. To test new hypotheses
- C. To increase the complexity of the experiment
- D. To use extra reagents
- Answer: A. To provide a basis for comparison with the experimental group

Cell Biology

1. What is the basic unit of life?

- A) Atom
- B) Molecule
- C) Cell
- D) Tissue
- Answer: C) Cell

2. What is the main function of the nucleus in a cell?

- A) Energy production
- B) Protein synthesis
- C) Genetic information storage
- D) Waste removal
- Answer: C) Genetic information storage

3. Which organelle is known as the powerhouse of the cell?

- A) Ribosome
- B) Mitochondria
- C) Golgi apparatus
- D) Endoplasmic reticulum
- Answer: B) Mitochondria

4. What is the semi-permeable membrane surrounding the cell called?

- A) Cell wall
- B) Cytoplasm
- C) Nucleus
- D) Plasma membrane
- Answer: D) Plasma membrane

5. Which type of cell contains a cell wall?

- A) Animal cell
- B) Plant cell
- C) Bacterial cell
- D) Both B and C
- Answer: D) Both B and C

6. Which of the following is NOT found in a prokaryotic cell?

- A) DNA
- B) Ribosomes
- C) Nucleus
- D) Plasma membrane
- Answer: C) Nucleus

7. What is the function of ribosomes?

- A) Lipid synthesis
- B) Protein synthesis
- C) DNA replication

- D) Cell division
 - Answer: B) Protein synthesis
8. Which organelle is responsible for packaging and distributing proteins?
- A) Mitochondria
 - B) Nucleus
 - C) Golgi apparatus
 - D) Lysosomes
 - Answer: C) Golgi apparatus
9. What is the fluid that fills the cell and surrounds the organelles called?
- A) Cytoplasm
 - B) Nucleoplasm
 - C) Cytoskeleton
 - D) Endoplasm
 - Answer: A) Cytoplasm
10. Which structure is responsible for photosynthesis in plant cells?
- A) Mitochondria
 - B) Chloroplast
 - C) Vacuole
 - D) Lysosome
 - Answer: B) Chloroplast
11. What is the role of the endoplasmic reticulum?
- A) Protein and lipid synthesis
 - B) Cellular respiration
 - C) Digesting cellular waste
 - D) Controlling cell division
 - Answer: A) Protein and lipid synthesis
12. Which of the following is a function of the plasma membrane?
- A) DNA replication
 - B) Protein synthesis
 - C) Regulating the movement of substances in and out of the cell
 - D) Energy production
 - Answer: C) Regulating the movement of substances in and out of the cell
13. What is the gel-like substance inside the nucleus called?
- A) Cytoplasm
 - B) Nucleoplasm
 - C) Endoplasm
 - D) Protoplasm
 - Answer: B) Nucleoplasm
14. Which of the following is true about eukaryotic cells?
- A) They do not have a nucleus

- B) They lack membrane-bound organelles
- C) They have a nucleus
- D) They are always unicellular
- Answer: C) They have a nucleus

15. Which cell structure is involved in the modification, sorting, and packaging of proteins for secretion?

- A) Ribosome
- B) Endoplasmic reticulum
- C) Golgi apparatus
- D) Lysosome
- Answer: C) Golgi apparatus

16. Which of the following is a characteristic of prokaryotic cells?

- A) Presence of a nucleus
- B) Lack of a plasma membrane
- C) Lack of membrane-bound organelles
- D) Presence of mitochondria
- Answer: C) Lack of membrane-bound organelles

17. Which organelle is involved in cellular respiration?

- A) Chloroplast
- B) Mitochondria
- C) Ribosome
- D) Nucleus
- Answer: B) Mitochondria

18. What structure do plant cells have that animal cells do not?

- A) Plasma membrane
- B) Nucleus
- C) Cell wall
- D) Mitochondria
- Answer: C) Cell wall

19. What is the primary function of lysosomes?

- A) Energy production
- B) Protein synthesis
- C) Digesting cellular waste
- D) Photosynthesis
- Answer: C) Digesting cellular waste

20. Which of the following structures is involved in protein synthesis?

- A) Mitochondria
- B) Ribosome
- C) Golgi apparatus
- D) Lysosome
- Answer: B) Ribosome

21. What is the name of the process by which cells divide to form two daughter cells?

- A) Meiosis
- B) Mitosis
- C) Binary fission
- D) Cytokinesis
- Answer: B) Mitosis

22. Which of the following organelles is associated with the breakdown of fatty acids and the detoxification of harmful substances?

- A) Golgi apparatus
- B) Peroxisome
- C) Endoplasmic reticulum
- D) Lysosome
- Answer: B) Peroxisome

23. Which part of the cell is responsible for controlling the activities of the cell and contains the genetic material?

- A) Plasma membrane
- B) Cytoplasm
- C) Nucleus
- D) Mitochondria
- Answer: C) Nucleus

24. What is the main component of the cell wall in plant cells?

- A) Chitin
- B) Cellulose
- C) Peptidoglycan
- D) Glycogen
- Answer: B) Cellulose

25. Which of the following is a difference between plant and animal cells?

- A) Plant cells lack a nucleus
- B) Animal cells have chloroplasts
- C) Plant cells have a large central vacuole
- D) Animal cells have a cell wall
- Answer: C) Plant cells have a large central vacuole

26. What is the function of the cytoskeleton?

- A) To provide energy for the cell
- B) To store genetic information
- C) To provide structural support and shape to the cell
- D) To produce proteins
- Answer: C) To provide structural support and shape to the cell

27. Which cellular structure is responsible for producing ribosomes?

- A) Nucleus

- B) Nucleolus
- C) Golgi apparatus
- D) Endoplasmic reticulum
- Answer: B) Nucleolus

28. What is the primary function of the plasma membrane?

- A) Protein synthesis
- B) Energy production
- C) Regulating what enters and leaves the cell
- D) Storage of genetic information
- Answer: C) Regulating what enters and leaves the cell

29. Which of the following best describes the function of mitochondria?

- A) Photosynthesis
- B) Protein synthesis
- C) Cellular respiration
- D) DNA replication
- Answer: C) Cellular respiration

30. What is the role of the rough endoplasmic reticulum?

- A) Lipid synthesis
- B) Protein synthesis
- C) Energy production
- D) Detoxification
- Answer: B) Protein synthesis

31. Which organelle contains digestive enzymes to break down waste materials and cellular debris?

- A) Golgi apparatus
- B) Lysosome
- C) Endoplasmic reticulum
- D) Mitochondria
- Answer: B) Lysosome

32. Which of the following structures is not found in animal cells?

- A) Nucleus
- B) Chloroplast
- C) Mitochondria
- D) Ribosome
- Answer: B) Chloroplast

33. What is the role of messenger RNA (mRNA)?

- A) Carrying amino acids to the ribosome

- B) Transferring genetic information from DNA to the ribosome
- C) Forming the core of ribosomes
- D) Synthesizing DNA
- Answer: B) Transferring genetic information from DNA to the ribosome

34. What are introns?

- A) Coding regions of DNA
- B) Non-coding regions of DNA
- C) Segments of mRNA that code for proteins
- D) Regulatory sequences in DNA
- Answer: B) Non-coding regions of DNA

35. Which of the following describes the semi-conservative nature of DNA replication?

- A) Each new DNA molecule contains one old and one new strand
- B) Each new DNA molecule contains two new strands
- C) DNA replication occurs only in the presence of RNA
- D) DNA is replicated without using a template
- Answer: A) Each new DNA molecule contains one old and one new strand

36. What is the function of topoisomerase in DNA replication?

- A) Synthesizing new DNA strands
- B) Unwinding the DNA double helix
- C) Relieving supercoiling tension
- D) Adding RNA primers
- Answer: C) Relieving supercoiling tension

37. What is the purpose of gel electrophoresis in molecular biology?

- A) Amplifying DNA
- B) Sequencing DNA
- C) Separating DNA fragments by size
- D) Synthesizing proteins
- Answer: C) Separating DNA fragments by size

38. Which molecule is essential for the process of translation?

- A) DNA
- B) mRNA
- C) RNA Polymerase
- D) DNA Polymerase
- Answer: B) mRNA

39. What is a mutation?

- A) A change in the amino acid sequence of a protein
- B) A change in the DNA sequence
- C) A change in the structure of an organelle
- D) A type of RNA
- Answer: B) A change in the DNA sequence

40. Which of the following processes involves the copying of a gene's DNA sequence into RNA?

- A) Translation
- B) Transcription
- C) Replication
- D) Transformation
- Answer: B) Transcription

41. Which type of bond is formed between amino acids during protein synthesis?

- A) Hydrogen Bond
- B) Ionic Bond
- C) Peptide Bond
- D) Covalent Bond
- Answer: C) Peptide Bond

42. What is the function of ribosomal RNA (rRNA)?

- A) Carrying amino acids to the ribosome
- B) Forming the structural and functional components of the ribosome
- C) Transferring genetic information from DNA to ribosome
- D) Synthesizing DNA
- Answer: B) Forming the structural and functional components of the ribosome

43. What is a promoter?

- A) A sequence that signals the start of translation
- B) A region of DNA where transcription begins
- C) A protein that binds to DNA
- D) A type of RNA
- Answer: B) A region of DNA where transcription begins

44. Which process is used to amplify specific DNA sequences in vitro?

- A) Gel Electrophoresis
- B) PCR (Polymerase Chain Reaction)
- C) DNA Sequencing
- D) Southern Blotting
- Answer: B) PCR (Polymerase Chain Reaction)

45. What is the function of RNA polymerase?

- A) Synthesizing DNA
- B) Synthesizing RNA from a DNA template
- C) Binding to ribosomes during translation
- D) Unwinding the DNA double helix
- Answer: B) Synthesizing RNA from a DNA template

46. Which molecule serves as the template for transcription?

- A) DNA
- B) mRNA
- C) tRNA

- D) Protein
- Answer: A) DNA

47. What is the genetic code?

- A) The set of rules by which information in DNA is translated into proteins
- B) The sequence of nucleotides in DNA
- C) The sequence of amino acids in proteins
- D) The process of replicating DNA
- Answer: A) The set of rules by which information in DNA is translated into proteins

48. What is the purpose of a poly-A tail in mRNA?

- A) Initiating translation
- B) Protecting mRNA from degradation
- C) Binding to ribosomes
- D) Facilitating splicing
- Answer: B) Protecting mRNA from degradation

49. What is a silent mutation?

- A) A mutation that changes an amino acid in a protein
- B) A mutation that does not change the amino acid sequence of a protein
- C) A mutation that results in a premature stop codon
- D) A mutation that deletes a segment of DNA
- Answer: B) A mutation that does not change the amino acid sequence of a protein

50. Which of the following is a characteristic of a plasmid?

- A) It is a linear DNA molecule
- B) It is found only in eukaryotic cells
- C) It can replicate independently of chromosomal DNA
- D) It is composed of RNA
- Answer: C) It can replicate independently of chromosomal DNA

51. What is the role of the spliceosome?

- A) Synthesizing RNA
- B) Editing RNA by removing introns and joining exons
- C) Synthesizing DNA
- D) Binding to ribosomes during translation
- Answer: B) Editing RNA by removing introns and joining exons

52. Which of the following enzymes is involved in transcription?

- A) DNA Polymerase
- B) RNA Polymerase
- C) Helicase
- D) Ligase
- Answer: B) RNA Polymerase

53. What is the function of a ribosome?

- A) Replicating DNA

- B) Synthesizing RNA
- C) Synthesizing proteins
- D) Degrading mRNA
- Answer: C) Synthesizing proteins

54. What is a polypeptide?

- A) A polymer of nucleotides
- B) A polymer of amino acids
- C) A type of RNA molecule
- D) A segment of DNA
- Answer: B) A polymer of amino acids

55. Which molecule is required for translation to occur?

- A) DNA
- B) RNA Polymerase
- C) tRNA
- D) Ligase
- Answer: C) tRNA

56. What is the function of a promoter in transcription?

- A) Terminating transcription
- B) Initiating translation
- C) Binding RNA polymerase to start transcription
- D) Splicing mRNA
- Answer: C) Binding RNA polymerase to start transcription

57. What is the role of telomerase?

- A) Synthesizing RNA
- B) Protecting chromosome ends
- C) Replicating DNA
- D) Unwinding the DNA helix
- Answer: B) Protecting chromosome ends

58. Which type of RNA carries amino acids to the ribosome?

- A) mRNA
- B) rRNA
- C) tRNA
- D) snRNA
- Answer: C) tRNA

59. What is the function of DNA ligase?

- A) Synthesizing DNA
- B) Unwinding DNA
- C) Sealing breaks in the DNA backbone
- D) Adding RNA primers
- Answer: C) Sealing breaks in the DNA backbone

60. Which of the following best describes a gene?

- A) A segment of RNA that codes for a protein
- B) A segment of DNA that codes for a protein
- C) A protein that regulates transcription
- D) A type of ribosome
- Answer: B) A segment of DNA that codes for a protein

61. What is a frameshift mutation?

- A) A change in one nucleotide base
- B) An insertion or deletion of nucleotides that alters the reading frame
- C) A mutation that causes a stop codon to appear early
- D) A mutation that duplicates a segment of DNA
- Answer: B) An insertion or deletion of nucleotides that alters the reading frame

62. What is a transposon?

- A) A segment of DNA that can move from one location to another within the genome
- B) A type of RNA molecule
- C) A segment of RNA that codes for a protein
- D) A protein that binds to DNA
- Answer: A) A segment of DNA that can move from one location to another within the genome

63. What is an operon?

- A) A cluster of genes under the control of a single promoter
- B) A segment of DNA that codes for a protein
- C) A type of RNA molecule
- D) A protein that binds to DNA
- Answer: A) A cluster of genes under the control of a single promoter

64. What is a gene family?

- A) A group of unrelated genes
- B) A group of related genes that share a common ancestor
- C) A segment of DNA that codes for a protein
- D) A protein that binds to RNA
- Answer: B) A group of related genes that share a common ancestor

65. What is the role of a regulatory gene?

- A) To synthesize proteins
- B) To control the expression of other genes
- C) To replicate DNA
- D) To transcribe RNA
- Answer: B) To control the expression of other genes

66. Which of the following describes epigenetics?

- A) The study of changes in gene expression that do not involve changes in DNA sequence
- B) The study of DNA sequences

- C) The study of protein synthesis
- D) The study of RNA transcription
- Answer: A) The study of changes in gene expression that do not involve changes in DNA sequence

67. What is the function of a start codon?

- A) To terminate transcription
- B) To initiate translation
- C) To splice RNA
- D) To replicate DNA
- Answer: B) To initiate translation

68. What is a SNP (single nucleotide polymorphism)?

- A) A change in one nucleotide in the DNA sequence
- B) A type of RNA molecule
- C) A segment of DNA that codes for a protein
- D) A protein that binds to RNA
- Answer: A) A change in one nucleotide in the DNA sequence

69. What is the function of the ribosome?

- A) To synthesize DNA
- B) To synthesize RNA
- C) To synthesize proteins
- D) To replicate chromosomes
- Answer: C) To synthesize proteins

70. What is a frameshift mutation?

- A) A change in one nucleotide base
- B) An insertion or deletion of nucleotides that shifts the reading frame
- C) A mutation that causes a stop codon to appear early
- D) A mutation that duplicates a segment of DNA
- Answer: B) An insertion or deletion of nucleotides that shifts the reading frame

71. What is a dominant allele?

- A) An allele that is always expressed when present
- B) An allele that is never expressed
- C) An allele that is expressed only in the absence of a recessive allele
- D) An allele that codes for RNA
- Answer: A) An allele that is always expressed when present

72. What is a recessive allele?

- A) An allele that is always expressed
- B) An allele that is expressed only in the presence of another recessive allele
- C) An allele that codes for proteins
- D) An allele that is found only in prokaryotes
- Answer: B) An allele that is expressed only in the presence of another recessive allele

73. What is genetic linkage?

- A) The tendency of genes located close to each other on a chromosome to be inherited together

- B) The exchange of genetic material between homologous chromosomes

- C) The replication of DNA

- D) The synthesis of proteins

- Answer: A) The tendency of genes located close to each other on a chromosome to be inherited together

74. What is the purpose of a genetic cross?

- A) To determine the sequence of nucleotides in DNA

- B) To study the inheritance of traits

- C) To replicate DNA

- D) To synthesize RNA

- Answer: B) To study the inheritance of traits

75. What is a genotype?

- A) The physical appearance of an organism

- B) The genetic makeup of an organism

- C) The number of chromosomes in a cell

- D) The sequence of amino acids in a protein

- Answer: B) The genetic makeup of an organism

76. What is a phenotype?

- A) The physical appearance of an organism

- B) The genetic makeup of an organism

- C) The number of chromosomes in a cell

- D) The sequence of nucleotides in DNA

- Answer: A) The physical appearance of an organism

77. What is genetic recombination?

- A) The process by which DNA is replicated

- B) The exchange of genetic material between homologous chromosomes

- C) The synthesis of RNA from a DNA template

- D) The formation of proteins from amino acids

- Answer: B) The exchange of genetic material between homologous chromosomes

78. What is a polyploid organism?

- A) An organism with only one set of chromosomes

- B) An organism with multiple sets of chromosomes

- C) An organism with half the normal number of chromosomes

- D) An organism with double the number of autosomes

- Answer: B) An organism with multiple sets of chromosomes

79. What is the function of a stop codon?

- A) To initiate translation

- B) To terminate translation

- C) To splice RNA
- D) To replicate DNA
- Answer: B) To terminate translation

80. What is a silent mutation?

- A) A mutation that changes an amino acid in a protein
- B) A mutation that does not change the amino acid sequence of a protein
- C) A mutation that results in a premature stop codon
- D) A mutation that duplicates a segment of DNA
- Answer: B) A mutation that does not change the amino acid sequence of a protein

81. What is an oncogene?

- A) A gene that has no function
- B) A gene that promotes cell division and can lead to cancer
- C) A gene that suppresses tumors
- D) A gene that codes for RNA
- Answer: B) A gene that promotes cell division and can lead to cancer

82. What is a tumor suppressor gene?

- A) A gene that promotes cell division
- B) A gene that suppresses cell division and prevents cancer
- C) A gene that codes for proteins
- D) A gene that is found only in prokaryotes
- Answer: B) A gene that suppresses cell division and prevents cancer

83. What is a genome?

- A) The complete set of genes in an organism
- B) A single gene
- C) A segment of RNA
- D) A protein that binds to DNA
- Answer: A) The complete set of genes in an organism

84. What is the role of a transcription factor?

- A) To synthesize DNA
- B) To bind to DNA and regulate gene expression
- C) To replicate chromosomes
- D) To synthesize proteins
- Answer: B) To bind to DNA and regulate gene expression

85. What is a transgenic organism?

- A) An organism with a mutation in its genome
- B) An organism that contains a gene from another species
- C) An organism that has lost a gene
- D) An organism that cannot replicate DNA
- Answer: B) An organism that contains a gene from another species

86. What is a polygenic trait?

- A) A trait controlled by one gene
- B) A trait controlled by multiple genes
- C) A trait that does not vary among individuals
- D) A trait controlled by a single nucleotide
- Answer: B) A trait controlled by multiple genes

87. What is a chromatin?

- A) A protein that binds to RNA
- B) A complex of DNA and proteins that forms chromosomes
- C) A type of RNA molecule
- D) A gene that codes for a protein
- Answer: B) A complex of DNA and proteins that forms chromosomes

88. Who is known as the "Father of Indian Plant Physiology"?

- A) C.V. Raman
- B) Jagadish Chandra Bose
- C) M.S. Swaminathan
- D) Har Gobind Khorana
- Answer: B) Jagadish Chandra Bose

89. Which Indian scientist is renowned for his work on the Green Revolution?

- A) Satyendra Nath Bose
- B) Venkatraman Ramakrishnan
- C) M.S. Swaminathan
- D) Prafulla Chandra Ray
- Answer: C) M.S. Swaminathan

90. Who won the Nobel Prize in Physiology or Medicine in 1968 for his work on the interpretation of the genetic code?

- A) C.N.R. Rao
- B) Venkatraman Ramakrishnan
- C) Har Gobind Khorana
- D) Satyendra Nath Bose
- Answer: C) Har Gobind Khorana

91. Which scientist is credited with the discovery of the malaria parasite in India?

- A) Ronald Ross
- B) Salim Ali
- C) Har Gobind Khorana
- D) Jagadish Chandra Bose
- Answer: A) Ronald Ross

92. Who is known as the "Birdman of India" for his contributions to ornithology?

- A) M.S. Swaminathan
- B) Salim Ali
- C) Jagadish Chandra Bose

- D) C.V. Raman
- Answer: B) Salim Ali

93. Which Indian biologist is known for his pioneering research in the field of agriculture and his leadership in the Green Revolution?

- A) Prafulla Chandra Ray
- B) Jagadish Chandra Bose
- C) M.S. Swaminathan
- D) Salim Ali
- Answer: C) M.S. Swaminathan

94. Who was awarded the Nobel Prize in Chemistry in 2009 for studies of the structure and function of the ribosome?

- A) Har Gobind Khorana
- B) Venkatraman Ramakrishnan
- C) C.V. Raman
- D) Prafulla Chandra Ray
- Answer: B) Venkatraman Ramakrishnan

95. Which scientist is known for his work on plant diseases and the establishment of the Central Food Technological Research Institute in Mysore?

- A) C.V. Raman
- B) M.S. Swaminathan
- C) Venkatraman Ramakrishnan
- D) P. K. Iyengar
- Answer: B) M.S. Swaminathan

96. Who is considered the founder of modern biochemistry in India?

- A) Prafulla Chandra Ray
- B) Har Gobind Khorana
- C) Salim Ali
- D) C.N.R. Rao
- Answer: A) Prafulla Chandra Ray

97. Which Indian biologist was instrumental in the discovery of gene splicing and molecular cloning techniques?

- A) Jagadish Chandra Bose
- B) Har Gobind Khorana
- C) Venkatraman Ramakrishnan
- D) M.S. Swaminathan
- Answer: B) Har Gobind Khorana

98. Who is renowned for his extensive work in endocrinology, particularly in the field of diabetes?

- A) Salim Ali
- B) Venkatraman Ramakrishnan
- C) Prafulla Chandra Ray

- D) M. Visvesvaraya
- Answer: C) Prafulla Chandra Ray

99. Which scientist is known for the Bose-Einstein Statistics and has made significant contributions to quantum mechanics?

- A) Satyendra Nath Bose
- B) Jagadish Chandra Bose
- C) Har Gobind Khorana
- D) C.V. Raman
- Answer: A) Satyendra Nath Bose

100. Who was the first Indian woman to receive a Ph.D. in science and made significant contributions to cytogenetics and plant breeding?

- A) Asima Chatterjee
- B) Janaki Ammal
- C) Kamala Sohonie
- D) Rajeshwari Chatterjee
- Answer: B) Janaki Ammal

Microbiology

1. Which of the following is not a prokaryote?

- a) Bacteria
- b) Archaea
- c) Fungi
- d) Cyanobacteria
- Answer: c) Fungi

2. What is the primary component of bacterial cell walls?

- a) Cellulose
- b) Chitin
- c) Peptidoglycan
- d) Lignin
- Answer: c) Peptidoglycan

3. Which scientist is known as the father of microbiology?

- a) Louis Pasteur
- b) Robert Koch
- c) Antonie van Leeuwenhoek
- d) Alexander Fleming
- Answer: c) Antonie van Leeuwenhoek

4. What is the function of ribosomes in bacterial cells?

- a) Energy production
- b) Protein synthesis
- c) DNA replication
- d) Cell motility
- Answer: b) Protein synthesis

5. Which of the following is a gram-positive bacterium?

- a) Escherichia coli
- b) Staphylococcus aureus
- c) Salmonella typhimurium
- d) Neisseria gonorrhoeae
- Answer: b) Staphylococcus aureus

6. Which staining technique is used to differentiate bacterial species into two large groups?

- a) Acid-fast stain
- b) Gram stain
- c) Endospore stain
- d) Negative stain
- Answer: b) Gram stain

7. What structure is responsible for bacterial motility?

- a) Pili
 - b) Flagella
 - c) Capsule
 - d) Fimbriae
 - Answer: b) Flagella
8. Which of the following is not a characteristic of viruses?
- a) Acellular structure
 - b) Ability to reproduce independently
 - c) Obligate intracellular parasite
 - d) Contains either DNA or RNA
 - Answer: b) Ability to reproduce independently
9. Which of the following is an example of a viral disease?
- a) Tuberculosis
 - b) Malaria
 - c) Influenza
 - d) Cholera
 - Answer: c) Influenza
10. Which of the following is a type of horizontal gene transfer in bacteria?
- a) Transformation
 - b) Transcription
 - c) Replication
 - d) Translation
 - Answer: a) Transformation
11. What is the primary function of the bacterial capsule?
- a) Protein synthesis
 - b) DNA replication
 - c) Protection from phagocytosis
 - d) Energy production
 - Answer: c) Protection from phagocytosis
12. Which of the following is not a form of bacterial metabolism?
- a) Photosynthesis
 - b) Chemosynthesis
 - c) Fermentation
 - d) Mitosis
 - Answer: d) Mitosis
13. What is the optimal pH range for most bacteria to grow?
- a) 1-3
 - b) 4-6
 - c) 6.5-7.5
 - d) 8-10
 - Answer: c) 6.5-7.5

14. Which molecule is the primary energy carrier in bacterial cells?

- a) ATP
- b) NADH
- c) FADH₂
- d) GTP
- Answer: a) ATP

15. Which of the following bacteria are known for nitrogen fixation?

- a) E. coli
- b) Rhizobium
- c) Streptococcus
- d) Pseudomonas
- Answer: b) Rhizobium

16. What is the role of plasmids in bacterial cells?

- a) Protein synthesis
- b) Energy production
- c) Antibiotic resistance
- d) Cell motility
- Answer: c) Antibiotic resistance

17. What is the term for bacteria that require oxygen for growth?

- a) Obligate anaerobes
- b) Facultative anaerobes
- c) Aerotolerant anaerobes
- d) Obligate aerobes
- Answer: d) Obligate aerobes

18. What is the term for a bacterial growth phase where the number of new cells equals the number of dying cells?

- a) Lag phase
- b) Log phase
- c) Stationary phase
- d) Death phase
- Answer: c) Stationary phase

19. What are endospores?

- a) Active reproductive cells
- b) Metabolically inactive structures
- c) Viral particles
- d) Fungal spores
- Answer: b) Metabolically inactive structures

20. What is the primary purpose of the electron transport chain in bacteria?

- a) DNA replication
- b) Protein synthesis

- c) ATP production
- d) Cell division
- Answer: c) ATP production

21. What is the structure of bacterial chromosomes?

- a) Linear
- b) Circular
- c) Segmented
- d) Branched
- Answer: b) Circular

22. What enzyme is responsible for synthesizing new DNA strands?

- a) DNA ligase
- b) DNA helicase
- c) DNA polymerase
- d) DNA primase
- Answer: c) DNA polymerase

23. Which process involves the uptake of naked DNA by a bacterial cell from its environment?

- a) Conjugation
- b) Transduction
- c) Transformation
- d) Replication
- Answer: c) Transformation

24. What is the role of mRNA in bacterial cells?

- a) DNA replication
- b) Protein synthesis
- c) Energy production
- d) Cell division
- Answer: b) Protein synthesis

25. Which of the following is not a type of RNA found in bacterial cells?

- a) mRNA
- b) tRNA
- c) rRNA
- d) snRNA
- Answer: d) snRNA

26. What is a plasmid?

- a) A viral particle
- b) A small, circular piece of DNA
- c) A protein
- d) A type of RNA
- Answer: b) A small, circular piece of DNA

27. What type of genetic material do bacteriophages contain?

- a) DNA only
- b) RNA only
- c) Both DNA and RNA
- d) Either DNA or RNA
- Answer: d) Either DNA or RNA

28. Which of the following is a method of horizontal gene transfer in bacteria?

- a) Binary fission
- b) Transformation
- c) Mitosis
- d) Meiosis
- Answer: b) Transformation

29. What is an operon?

- a) A group of genes under the control of a single promoter
- b) A protein complex
- c) A type of RNA molecule
- d) A phase of bacterial growth
- Answer: a) A group of genes under the control of a single promoter

30. What is the function of the lac operon in *E. coli*?

- a) DNA replication
- b) Lactose metabolism
- c) Protein synthesis
- d) RNA transcription
- Answer: b) Lactose metabolism

31. Which of the following is a common virulence factor in pathogenic bacteria?

- a) Capsule
- b) Ribosome
- c) Flagella
- d) Pilus
- Answer: a) Capsule

32. Which of the following diseases is caused by a protozoan?

- a) Tuberculosis
- b) Malaria
- c) Influenza
- d) Cholera
- Answer: b) Malaria

33. What is the causative agent of tuberculosis?

- a) *Streptococcus pneumoniae*
- b) *Mycobacterium tuberculosis*

- c) Staphylococcus aureus
- d) Bacillus anthracis
- Answer: b) Mycobacterium tuberculosis

34. Which of the following is a common fungal infection?

- a) Athlete's foot
- b) Malaria
- c) Influenza
- d) Lyme disease
- Answer: a) Athlete's foot

35. Which type of microorganism is responsible for causing cholera?

- a) Virus
- b) Bacterium
- c) Fungus
- d) Protozoan
- Answer: b) Bacterium

36. What is the primary mode of transmission for the Ebola virus?

- a) Airborne droplets
- b) Contaminated food
- c) Direct contact with bodily fluids
- d) Vector-borne transmission
- Answer: c) Direct contact with bodily fluids

37. Which of the following is a zoonotic disease?

- a) Chickenpox
- b) Rabies
- c) Measles
- d) Hepatitis B
- Answer: b) Rabies

38. What is the primary function of antibodies?

- a) Energy production
- b) DNA replication
- c) Neutralizing pathogens
- d) Protein synthesis
- Answer: c) Neutralizing pathogens

39. Which of the following is a symptom of a bacterial infection?

- a) Fever
- b) Rash
- c) Cough
- d) All of the above
- Answer: d) All of the above

40. What is the causative agent of Lyme disease?

- a) *Borrelia burgdorferi*
- b) *Yersinia pestis*
- c) *Rickettsia rickettsii*
- d) *Treponema pallidum*
- Answer: a) *Borrelia burgdorferi*

Microbial Ecology

41. Which of the following is an example of a symbiotic relationship between microorganisms and plants?

- a) Pathogenic infection
- b) Nitrogen fixation
- c) Antibiotic production
- d) Decomposition
- Answer: b) Nitrogen fixation

42. What is the primary role of decomposers in an ecosystem?

- a) Producing energy
- b) Breaking down organic matter
- c) Fixing nitrogen
- d) Pollination
- Answer: b) Breaking down organic matter

43. Which of the following microorganisms are involved in the carbon cycle?

- a) Algae
- b) Fungi
- c) Bacteria
- d) All of the above
- Answer: d) All of the above

44. What is a biofilm?

- a) A type of virus
- b) A community of microorganisms attached to a surface
- c) A single bacterial cell
- d) A type of fungal spore
- Answer: b) A community of microorganisms attached to a surface

45. Which of the following processes is not part of the nitrogen cycle?

- a) Nitrogen fixation
- b) Nitrification
- c) Denitrification
- d) Photosynthesis
- Answer: d) Photosynthesis

46. What is the primary role of cyanobacteria in the environment?

- a) Nitrogen fixation

- b) Carbon fixation
- c) Decomposition
- d) Pathogenesis
- Answer: b) Carbon fixation

47. Which of the following is an example of a mutualistic relationship?

- a) Parasitism
- b) Commensalism
- c) Symbiosis
- d) Amensalism
- Answer: c) Symbiosis

48. Which microorganisms are primarily responsible for fermentation?

- a) Bacteria and fungi
- b) Viruses and bacteria
- c) Protozoa and algae
- d) Fungi and viruses
- Answer: a) Bacteria and fungi

49. Which of the following is a primary producer in aquatic ecosystems?

- a) Fungi
- b) Algae
- c) Bacteria
- d) Protozoa
- Answer: b) Algae

50. What is the main function of mycorrhizal fungi?

- a) Decomposing organic matter
- b) Fixing nitrogen
- c) Assisting plants in nutrient absorption
- d) Causing plant diseases
- Answer: c) Assisting plants in nutrient absorption

Microbial Control

51. Which of the following methods is used for sterilization?

- a) Pasteurization
- b) Filtration
- c) Boiling
- d) Autoclaving
- Answer: d) Autoclaving

52. What is the principle behind the use of antibiotics?

- a) Inhibiting viral replication
- b) Killing or inhibiting bacterial growth
- c) Neutralizing toxins
- d) Enhancing the immune response

- Answer: b) Killing or inhibiting bacterial growth

53. Which of the following is an example of a physical method of microbial control?

- a) Antibiotics
- b) Disinfectants
- c) Ultraviolet radiation
- d) Vaccines

- Answer: c) Ultraviolet radiation

54. What is the purpose of using antiseptics?

- a) Sterilizing surgical instruments
- b) Disinfecting surfaces
- c) Reducing microbial load on living tissues
- d) Treating bacterial infections

- Answer: c) Reducing microbial load on living tissues

55. Which of the following is a common method for measuring bacterial growth?

- a) Gram staining
- b) Polymerase chain reaction (PCR)
- c) Optical density measurement
- d) Gel electrophoresis

- Answer: c) Optical density measurement

56. What is the function of a disinfectant?

- a) Killing microorganisms on living tissues
- b) Inhibiting the growth of microorganisms
- c) Killing microorganisms on inanimate objects
- d) Enhancing the growth of beneficial bacteria

- Answer: c) Killing microorganisms on inanimate objects

57. Which of the following is a method used to preserve microbial cultures?

- a) Autoclaving
- b) Lyophilization
- c) Incineration
- d) Filtration

- Answer: b) Lyophilization

58. What is the purpose of using bacteriostatic agents?

- a) Killing bacteria
- b) Inhibiting bacterial growth
- c) Enhancing bacterial growth
- d) Lysing bacterial cells

- Answer: b) Inhibiting bacterial growth

59. Which of the following is an example of a chemical method of microbial control?

- a) Incineration
- b) Refrigeration

- c) Alcohol
- d) Filtration
- Answer: c) Alcohol

60. What is the role of vaccines in microbial control?

- a) Directly killing pathogens
- b) Neutralizing toxins
- c) Stimulating the immune response to prevent infections
- d) Inhibiting viral replication
- Answer: c) Stimulating the immune response to prevent infections

61. What is the primary purpose of the streak plate method?

- a) Measuring bacterial growth
- b) Isolating pure bacterial colonies
- c) Identifying bacterial species
- d) Quantifying bacterial load
- Answer: b) Isolating pure bacterial colonies

62. Which of the following is a selective medium used for isolating Gram-positive bacteria?

- a) MacConkey agar
- b) Mannitol salt agar
- c) Eosin methylene blue agar
- d) Blood agar
- Answer: b) Mannitol salt agar

63. What is the purpose of the polymerase chain reaction (PCR) in microbiology?

- a) Measuring bacterial growth
- b) Identifying bacterial species
- c) Amplifying specific DNA sequences
- d) Isolating pure bacterial colonies
- Answer: c) Amplifying specific DNA sequences

64. Which technique is used to determine the antibiotic susceptibility of bacteria?

- a) Gram staining
- b) Kirby-Bauer disk diffusion test
- c) Polymerase chain reaction (PCR)
- d) Streak plate method
- Answer: b) Kirby-Bauer disk diffusion test

65. What is the primary purpose of using a microscope in microbiology?

- a) Measuring bacterial growth
- b) Observing microscopic organisms
- c) Quantifying bacterial load
- d) Identifying bacterial species
- Answer: b) Observing microscopic organisms

66. Which staining technique is used to identify acid-fast bacteria?

- a) Gram stain
- b) Acid-fast stain
- c) Endospore stain
- d) Negative stain
- Answer: b) Acid-fast stain

67. What is the function of a spectrophotometer in microbiology?

- a) Measuring optical density
- b) Isolating bacterial colonies
- c) Identifying bacterial species
- d) Staining bacterial cells
- Answer: a) Measuring optical density

68. Which of the following is a commonly used method for bacterial identification?

- a) Gram staining
- b) Polymerase chain reaction (PCR)
- c) DNA sequencing
- d) All of the above
- Answer: d) All of the above

69. What is the purpose of the serial dilution technique?

- a) Measuring bacterial growth
- b) Isolating pure bacterial colonies
- c) Reducing bacterial concentration for quantification
- d) Identifying bacterial species
- Answer: c) Reducing bacterial concentration for quantification

70. Which method is used to visualize bacterial motility?

- a) Gram staining
- b) Wet mount preparation
- c) Polymerase chain reaction (PCR)
- d) Kirby-Bauer disk diffusion test
- Answer: b) Wet mount preparation

71. Which of the following is a mechanism of antibiotic resistance in bacteria?

- a) Enzyme degradation of antibiotics
- b) Efflux pumps
- c) Alteration of target sites
- d) All of the above
- Answer: d) All of the above

72. What is the primary function of the CRISPR-Cas system in bacteria?

- a) DNA replication
- b) RNA transcription
- c) Adaptive immunity against viruses
- d) Protein synthesis

- Answer: c) Adaptive immunity against viruses

73. Which of the following is an example of a biotechnological application of microorganisms?

- a) Antibiotic production
- b) Bioremediation
- c) Fermentation
- d) All of the above

- Answer: d) All of the above

74. What is quorum sensing in bacteria?

- a) Communication between bacteria to coordinate group behavior
- b) Mechanism of DNA replication
- c) Process of bacterial cell division
- d) Method of horizontal gene transfer

- Answer: a) Communication between bacteria to coordinate group behavior

75. Which of the following is a method used for the genetic modification of bacteria?

- a) Conjugation
- b) Transduction
- c) Transformation
- d) All of the above

- Answer: d) All of the above

76. What is the function of restriction enzymes in molecular biology?

- a) Synthesizing DNA
- b) Cutting DNA at specific sequences
- c) Amplifying DNA
- d) Transcribing RNA

- Answer: b) Cutting DNA at specific sequences

77. Which of the following is an example of a nosocomial infection?

- a) Tuberculosis
- b) Hospital-acquired pneumonia
- c) Influenza
- d) Lyme disease

- Answer: b) Hospital-acquired pneumonia

78. What is the role of bioinformatics in microbiology?

- a) Studying microbial behavior
- b) Analyzing biological data
- c) Identifying bacterial species
- d) Measuring bacterial growth

- Answer: b) Analyzing biological data

79. Which of the following is a technique used to study gene expression in bacteria?

- a) Gram staining

- b) Northern blotting
- c) Polymerase chain reaction (PCR)
- d) Kirby-Bauer disk diffusion test
- Answer: b) Northern blotting

80. What is the primary function of a chemostat in microbial culture?

- a) Maintaining a continuous culture with constant nutrient supply
- b) Isolating pure bacterial colonies
- c) Measuring bacterial growth
- d) Sterilizing culture media
- Answer: a) Maintaining a continuous culture with constant nutrient supply

81. Which of the following is a common symptom of a viral infection?

- a) Fever
- b) Fatigue
- c) Muscle aches
- d) All of the above
- Answer: d) All of the above

82. What is the causative agent of whooping cough?

- a) Streptococcus pyogenes
- b) Bordetella pertussis
- c) Haemophilus influenzae
- d) Corynebacterium diphtheriae
- Answer: b) Bordetella pertussis

83. Which of the following is a sexually transmitted infection (STI)?

- a) Tuberculosis
- b) Influenza
- c) Gonorrhea
- d) Hepatitis A
- Answer: c) Gonorrhea

84. What is the primary mode of transmission for Hepatitis B?

- a) Airborne droplets
- b) Contaminated water
- c) Blood and bodily fluids
- d) Vector-borne transmission
- Answer: c) Blood and bodily fluids

85. Which of the following is a common fungal infection of the skin?

- a) Ringworm
- b) Tuberculosis
- c) Influenza
- d) Rabies
- Answer: a) Ringworm

86. What is the causative agent of syphilis?

- a) Treponema pallidum
- b) Neisseria gonorrhoeae
- c) Chlamydia trachomatis
- d) Human papillomavirus
- Answer: a) Treponema pallidum

87. Which of the following diseases is caused by a prion?

- a) Mad cow disease
- b) Lyme disease
- c) Measles
- d) Hepatitis C
- Answer: a) Mad cow disease

88. What is the main symptom of cholera?

- a) Severe diarrhea
- b) Skin rash
- c) Muscle aches
- d) Coughing
- Answer: a) Severe diarrhea

89. Which of the following is a vector-borne disease?

- a) Influenza
- b) Malaria
- c) Cholera
- d) Tuberculosis
- Answer: b) Malaria

90. Which type of microorganism causes athlete's foot?

- a) Bacterium
- b) Virus
- c) Fungus
- d) Protozoan
- Answer: c) Fungus

91. What is the primary purpose of bioremediation?

- a) Producing antibiotics
- b) Cleaning up environmental pollutants
- c) Enhancing food production
- d) Treating infectious diseases
- Answer: b) Cleaning up environmental pollutants

92. Which microorganism is commonly used in the production of bread?

- a) Escherichia coli
- b) Saccharomyces cerevisiae
- c) Streptococcus pyogenes
- d) Bacillus subtilis

- Answer: b) *Saccharomyces cerevisiae*

93. What is the main application of lactic acid bacteria in the food industry?

- a) Producing antibiotics
- b) Fermenting dairy products
- c) Cleaning up oil spills
- d) Synthesizing vitamins
- Answer: b) Fermenting dairy products

94. Which of the following is a benefit of probiotics?

- a) Enhancing immune function
- b) Reducing inflammation
- c) Improving digestive health
- d) All of the above
- Answer: d) All of the above

95. Which microorganism is used in the production of soy sauce?

- a) *Lactobacillus*
- b) *Aspergillus*
- c) *Rhizobium*
- d) *Saccharomyces*
- Answer: b) *Aspergillus*

96. What is the primary use of *Streptomyces* in biotechnology?

- a) Producing antibiotics
- b) Fermenting dairy products
- c) Cleaning up oil spills
- d) Synthesizing vitamins
- Answer: a) Producing antibiotics

97. Which of the following microorganisms is used in the production of biofuels?

- a) *E. coli*
- b) Algae
- c) *Streptococcus*
- d) *Bacillus*
- Answer: b) Algae

98. What is the main role of yeast in alcoholic fermentation?

- a) Producing lactic acid
- b) Producing ethanol
- c) Producing antibiotics
- d) Producing vitamins
- Answer: b) Producing ethanol

99. Which microorganism is commonly used for the production of insulin?

- a) *E. coli*
- b) *Saccharomyces cerevisiae*

- c) *Aspergillus niger*
- d) *Bacillus subtilis*
- Answer: a) *E. coli*

100. What is the primary function of nitrifying bacteria in the nitrogen cycle?

- a) Fixing nitrogen
- b) Converting ammonia to nitrate
- c) Decomposing organic matter
- d) Denitrifying nitrate to nitrogen gas
- Answer: b) Converting ammonia to nitrate

**Human physiology
and
Biochemistry**

1. Which organ is responsible for pumping blood throughout the body?

- a) Lungs
- b) Liver
- c) Heart
- d) Kidney
- Answer: c) Heart

2. What is the primary function of red blood cells?

- a) To fight infection
- b) To transport oxygen
- c) To clot blood
- d) To carry nutrients
- Answer: b) To transport oxygen

3. Which system controls body movement and coordination?

- a) Circulatory system
- b) Digestive system
- c) Nervous system
- d) Endocrine system
- Answer: c) Nervous system

4. Where does gas exchange occur in the respiratory system?

- a) Trachea
- b) Bronchi
- c) Alveoli
- d) Larynx
- Answer: c) Alveoli

5. What type of joint is the shoulder?

- a) Hinge joint
- b) Ball and socket joint
- c) Pivot joint
- d) Saddle joint
- Answer: b) Ball and socket joint

6. Which part of the brain regulates balance and coordination?

- a) Cerebrum
- b) Cerebellum
- c) Medulla oblongata
- d) Hypothalamus
- Answer: b) Cerebellum

7. What is the main function of the large intestine?

- a) Absorption of nutrients
- b) Absorption of water
- c) Digestion of proteins
- d) Storage of bile
- Answer: b) Absorption of water

8. What is the primary role of insulin in the body?

- a) To increase blood sugar levels
- b) To decrease blood sugar levels
- c) To break down proteins
- d) To store fat
- Answer: b) To decrease blood sugar levels

9. Which hormone is produced by the adrenal glands?

- a) Insulin
- b) Glucagon
- c) Adrenaline
- d) Thyroxine
- Answer: c) Adrenaline

10. Which structure in the kidney filters blood to form urine?

- a) Nephron
- b) Ureter
- c) Bladder
- d) Urethra
- Answer: a) Nephron

11. What is the basic unit of the nervous system?

- a) Neuron
- b) Axon
- c) Dendrite
- d) Synapse
- Answer: a) Neuron

12. Where is the pituitary gland located?

- a) In the neck
- b) In the chest
- c) In the brain
- d) In the abdomen
- Answer: c) In the brain

13. Which blood vessel carries oxygenated blood from the lungs to the heart?

- a) Pulmonary artery
- b) Pulmonary vein
- c) Aorta
- d) Vena cava
- Answer: b) Pulmonary vein

14. What is the main function of white blood cells?

- a) To transport oxygen
- b) To fight infections
- c) To carry nutrients
- d) To form blood clots
- Answer: b) To fight infections

15. Which muscle is primarily responsible for breathing?

- a) Diaphragm
- b) Pectoralis major
- c) Deltoid
- d) Rectus abdominis
- Answer: a) Diaphragm

16. What is the primary function of the small intestine?

- a) Absorption of nutrients
- b) Absorption of water
- c) Storage of bile
- d) Secretion of digestive enzymes
- Answer: a) Absorption of nutrients

17. What is the structural and functional unit of the kidney?

- a) Glomerulus
- b) Nephron
- c) Loop of Henle
- d) Renal corpuscle
- Answer: b) Nephron

18. What is the name of the protein that carries oxygen in red blood cells?

- a) Hemoglobin
- b) Myoglobin
- c) Albumin
- d) Fibrinogen
- Answer: a) Hemoglobin

19. What is the function of platelets in the blood?

- a) To transport oxygen
- b) To fight infections
- c) To clot blood
- d) To carry nutrients
- Answer: c) To clot blood

20. Which organ produces bile?

- a) Liver
- b) Stomach
- c) Pancreas

- d) Gallbladder
- Answer: a) Liver

21. Which part of the brain controls voluntary movements?

- a) Cerebrum
- b) Cerebellum
- c) Medulla oblongata
- d) Thalamus
- Answer: a) Cerebrum

22. What is the main function of the respiratory system?

- a) To transport nutrients
- b) To produce hormones
- c) To exchange gases
- d) To regulate temperature
- Answer: c) To exchange gases

23. Which type of muscle is found in the walls of hollow organs?

- a) Skeletal muscle
- b) Cardiac muscle
- c) Smooth muscle
- d) Voluntary muscle
- Answer: c) Smooth muscle

24. What is the role of the hypothalamus?

- a) To control balance
- b) To regulate homeostasis
- c) To produce hormones
- d) To process sensory information
- Answer: b) To regulate homeostasis

25. What is the primary function of the skeletal system?

- a) To produce red blood cells
- b) To provide structural support
- c) To regulate metabolism
- d) To control body temperature
- Answer: b) To provide structural support

26. Which part of the eye is responsible for focusing light?

- a) Cornea
- b) Retina
- c) Iris
- d) Lens
- Answer: d) Lens

27. What is the function of the pancreas in digestion?

- a) To produce bile

- b) To secrete digestive enzymes
- c) To absorb nutrients
- d) To store glycogen
- Answer: b) To secrete digestive enzymes

28. What is the role of the thymus gland?

- a) To produce insulin
- b) To regulate metabolism
- c) To mature T-cells
- d) To filter blood
- Answer: c) To mature T-cells

29. Which part of the brain controls heart rate and breathing?

- a) Cerebellum
- b) Medulla oblongata
- c) Thalamus
- d) Hypothalamus
- Answer: b) Medulla oblongata

30. What type of joint is found in the elbow?

- a) Ball and socket joint
- b) Hinge joint
- c) Pivot joint
- d) Saddle joint
- Answer: b) Hinge joint

31. What is the main function of the lymphatic system?

- a) To transport oxygen
- b) To regulate body temperature
- c) To fight infections
- d) To store nutrients
- Answer: c) To fight infections

32. What is the name of the structure that connects muscles to bones?

- a) Ligament
- b) Tendon
- c) Cartilage
- d) Fascia
- Answer: b) Tendon

33. Which hormone regulates the sleep-wake cycle?

- a) Melatonin
- b) Cortisol
- c) Insulin
- d) Adrenaline
- Answer: a) Melatonin

34. What is the primary function of the spleen?

- a) To produce insulin
- b) To store bile
- c) To filter blood
- d) To produce red blood cells
- Answer: c) To filter blood

35. Which structure in the ear is responsible for hearing?

- a) Cochlea
- b) Tympanic membrane
- c) Eustachian tube
- d) Semicircular canals
- Answer: a) Cochlea

36. What is the role of the liver in metabolism?

- a) To store glycogen
- b) To produce bile
- c) To detoxify chemicals
- d) All of the above
- Answer: d) All of the above

37. Which type of blood vessel carries blood away from the heart?

- a) Vein
- b) Artery
- c) Capillary
- d) Venule
- Answer: b) Artery

38. What is the main function of the endocrine system?

- a) To transport oxygen
- b) To produce hormones
- c) To fight infections
- d) To digest food
- Answer: b) To produce hormones

39. Which organ system is responsible for producing movement?

- a) Skeletal system
- b) Muscular system
- c) Nervous system
- d) Endocrine system
- Answer: b) Muscular system

40. What is the main function of hemoglobin?

- a) To transport oxygen
- b) To fight infections
- c) To clot blood
- d) To absorb nutrients

- Answer: a) To transport oxygen

41. What is the building block of proteins?

- a) Monosaccharides
 - b) Nucleotides
 - c) Amino acids
 - d) Fatty acids
- Answer: c) Amino acids

42. Which molecule is the main energy currency of the cell?

- a) DNA
 - b) ATP
 - c) RNA
 - d) Glucose
- Answer: b) ATP

43. What type of bond holds amino acids together in a protein?

- a) Hydrogen bond
 - b) Ionic bond
 - c) Peptide bond
 - d) Covalent bond
- Answer: c) Peptide bond

44. Which process converts glucose into pyruvate?

- a) Glycolysis
 - b) Krebs cycle
 - c) Electron transport chain
 - d) Gluconeogenesis
- Answer: a) Glycolysis

45. Which molecule is a major component of cell membranes?

- a) Protein
 - b) Carbohydrate
 - c) Phospholipid
 - d) Nucleic acid
- Answer: c) Phospholipid

46. What is the main function of enzymes in biochemical reactions?

- a) To act as reactants
 - b) To provide energy
 - c) To speed up reactions
 - d) To maintain equilibrium
- Answer: c) To speed up reactions

47. Which molecule carries genetic information?

- a) DNA
- b) ATP

- c) Protein
- d) Glucose
- Answer: a) DNA

48. What is the end product of glycolysis?

- a) Glucose
- b) Pyruvate
- c) Acetyl-CoA
- d) Lactate
- Answer: b) Pyruvate

49. Which vitamin is essential for blood clotting?

- a) Vitamin A
- b) Vitamin B12
- c) Vitamin C
- d) Vitamin K
- Answer: d) Vitamin K

50. What is the primary function of carbohydrates in the body?

- a) To provide energy
- b) To store genetic information
- c) To build muscle
- d) To form cell membranes
- Answer: a) To provide energy

51. Which enzyme breaks down lactose into glucose and galactose?

- a) Amylase
- b) Lipase
- c) Lactase
- d) Protease
- Answer: c) Lactase

52. What is the role of NADH in cellular respiration?

- a) To provide energy
- b) To carry electrons
- c) To store oxygen
- d) To break down glucose
- Answer: b) To carry electrons

53. Which molecule is the final electron acceptor in the electron transport chain?

- a) Oxygen
- b) Carbon dioxide
- c) Water
- d) ATP
- Answer: a) Oxygen

54. What is the monomer of nucleic acids?

- a) Amino acid
- b) Monosaccharide
- c) Nucleotide
- d) Fatty acid
- Answer: c) Nucleotide

55. Which polysaccharide is used for energy storage in animals?

- a) Cellulose
- b) Starch
- c) Glycogen
- d) Chitin
- Answer: c) Glycogen

56. Which process synthesizes glucose from non-carbohydrate sources?

- a) Glycolysis
- b) Gluconeogenesis
- c) Glycogenesis
- d) Lipolysis
- Answer: b) Gluconeogenesis

57. What type of bond connects nucleotides in a DNA strand?

- a) Hydrogen bond
- b) Ionic bond
- c) Phosphodiester bond
- d) Peptide bond
- Answer: c) Phosphodiester bond

58. Which molecule is a common energy source for cellular processes?

- a) NADPH
- b) ATP
- c) FADH₂
- d) NADH
- Answer: b) ATP

59. Which vitamin is necessary for calcium absorption?

- a) Vitamin A
- b) Vitamin B₆
- c) Vitamin D
- d) Vitamin E
- Answer: c) Vitamin D

60. What is the primary function of lipids in the body?

- a) To provide energy
- b) To store genetic information
- c) To build muscle
- d) To form cell membranes
- Answer: d) To form cell membranes

61. What is the main function of ribosomes in the cell?

- a) To produce ATP
- b) To synthesize proteins
- c) To digest macromolecules
- d) To replicate DNA
- Answer: b) To synthesize proteins

62. Which molecule acts as the energy currency in cells?

- a) NAD⁺
- b) FAD
- c) ATP
- d) CoA
- Answer: c) ATP

63. Which metabolic pathway occurs in the mitochondria?

- a) Glycolysis
- b) Calvin cycle
- c) Krebs cycle
- d) Fermentation
- Answer: c) Krebs cycle

64. What is the primary function of vitamins in the body?

- a) To provide energy
- b) To act as coenzymes
- c) To build muscle
- d) To store genetic information
- Answer: b) To act as coenzymes

65. Which molecule stores genetic information?

- a) ATP
- b) RNA
- c) DNA
- d) Protein
- Answer: c) DNA

66. Which enzyme catalyzes the conversion of pyruvate to acetyl-CoA?

- a) Pyruvate kinase
- b) Lactate dehydrogenase
- c) Pyruvate dehydrogenase
- d) Citrate synthase
- Answer: c) Pyruvate dehydrogenase

67. What is the primary function of hemoglobin?

- a) To carry oxygen
- b) To transport glucose
- c) To store fat

- d) To synthesize proteins
- Answer: a) To carry oxygen

68. Which process involves the breakdown of fatty acids for energy?

- a) Glycolysis
- b) Beta-oxidation
- c) Gluconeogenesis
- d) Krebs cycle
- Answer: b) Beta-oxidation

69. Which molecule is the starting point for glycolysis?

- a) Pyruvate
- b) Glucose
- c) Acetyl-CoA
- d) Lactate
- Answer: b) Glucose

70. What is the main function of chlorophyll in plants?

- a) To absorb light
- b) To store energy
- c) To transport water
- d) To synthesize proteins
- Answer: a) To absorb light

71. Which process produces the most ATP?

- a) Glycolysis
- b) Krebs cycle
- c) Electron transport chain
- d) Fermentation
- Answer: c) Electron transport chain

72. Which enzyme is involved in DNA replication?

- a) RNA polymerase
- b) DNA polymerase
- c) Ligase
- d) Helicase
- Answer: b) DNA polymerase

73. What is the end product of the Krebs cycle?

- a) Glucose
- b) Pyruvate
- c) NADH and FADH₂
- d) Lactate
- Answer: c) NADH and FADH₂

74. Which molecule is involved in the detoxification of hydrogen peroxide?

- a) Catalase

- b) Amylase
- c) Lipase
- d) Protease
- Answer: a) Catalase

75. What is the main role of mitochondria in the cell?

- a) To synthesize proteins
- b) To produce ATP
- c) To store genetic information
- d) To digest macromolecules
- Answer: b) To produce ATP

76. Which vitamin is necessary for the synthesis of collagen?

- a) Vitamin A
- b) Vitamin B6
- c) Vitamin C
- d) Vitamin D
- Answer: c) Vitamin C

77. Which type of macromolecule is an enzyme?

- a) Carbohydrate
- b) Lipid
- c) Protein
- d) Nucleic acid
- Answer: c) Protein

78. Which process synthesizes ATP from ADP and inorganic phosphate?

- a) Glycolysis
- b) Oxidative phosphorylation
- c) Krebs cycle
- d) Fermentation
- Answer: b) Oxidative phosphorylation

79. Which molecule is produced during photosynthesis?

- a) Glucose
- b) Pyruvate
- c) Acetyl-CoA
- d) Lactate
- Answer: a) Glucose

80. What is the primary function of the Golgi apparatus?

- a) To synthesize proteins
- b) To modify and package proteins
- c) To produce ATP
- d) To store genetic information
- Answer: b) To modify and package proteins

81. Which amino acid is the precursor for serotonin?

- a) Tyrosine
- b) Tryptophan
- c) Glutamine
- d) Methionine
- Answer: b) Tryptophan

82. Which molecule is the final product of the Calvin cycle?

- a) ATP
- b) NADPH
- c) Glucose
- d) Oxygen
- Answer: c) Glucose

83. Which enzyme catalyzes the first step of glycolysis?

- a) Hexokinase
- b) Phosphofruktokinase
- c) Pyruvate kinase
- d) Aldolase
- Answer: a) Hexokinase

84. Which metabolic pathway generates the most NADH?

- a) Glycolysis
- b) Krebs cycle
- c) Electron transport chain
- d) Fermentation
- Answer: b) Krebs cycle

85. Which vitamin is required for the synthesis of coenzyme A?

- a) Vitamin B1
- b) Vitamin B5
- c) Vitamin B6
- d) Vitamin B12
- Answer: b) Vitamin B5

86. Which molecule is the primary electron donor in photosynthesis?

- a) Water
- b) NADPH
- c) Glucose
- d) ATP
- Answer: a) Water

87. Which enzyme is responsible for breaking down triglycerides?

- a) Amylase
- b) Lipase
- c) Lactase
- d) Protease

- Answer: b) Lipase

88. Which molecule is the final product of fermentation in yeast?

- a) Lactate
- b) Ethanol
- c) Acetyl-CoA
- d) Pyruvate
- Answer: b) Ethanol

89. Which vitamin is important for vision?

- a) Vitamin A
- b) Vitamin B12
- c) Vitamin C
- d) Vitamin K
- Answer: a) Vitamin A

90. Which molecule carries genetic instructions from DNA to the ribosome?

- a) rRNA
- b) tRNA
- c) mRNA
- d) DNA polymerase
- Answer: c) mRNA

91. Which process breaks down glucose to produce energy in the absence of oxygen?

- a) Aerobic respiration
- b) Glycolysis
- c) Fermentation
- d) Krebs cycle
- Answer: c) Fermentation

92. Which molecule is a byproduct of protein metabolism?

- a) Ammonia
- b) Glucose
- c) Fatty acids
- d) Lactate
- Answer: a) Ammonia

93. What is the primary function of the rough endoplasmic reticulum?

- a) To synthesize lipids
- b) To detoxify drugs
- c) To synthesize proteins
- d) To produce ATP
- Answer: c) To synthesize proteins

94. Which vitamin is an antioxidant?

- a) Vitamin A
- b) Vitamin B6

- c) Vitamin C
- d) Vitamin D
- Answer: c) Vitamin C

95. Which enzyme is inhibited by cyanide?

- a) Hexokinase
- b) Cytochrome c oxidase
- c) Lactate dehydrogenase
- d) Pyruvate dehydrogenase
- Answer: b) Cytochrome c oxidase

96. Which molecule is the main storage form of energy in animals?

- a) Glycogen
- b) Starch
- c) Cellulose
- d) Chitin
- Answer: a) Glycogen

97. Which amino acid contains sulfur?

- a) Serine
- b) Tyrosine
- c) Cysteine
- d) Glutamine
- Answer: c) Cysteine

98. Which vitamin is required for the synthesis of neurotransmitters?

- a) Vitamin A
- b) Vitamin B6
- c) Vitamin C
- d) Vitamin D
- Answer: b) Vitamin B6

99. Which molecule is the final product of the pentose phosphate pathway?

- a) Glucose
- b) Ribose-5-phosphate
- c) Pyruvate
- d) Acetyl-CoA
- Answer: b) Ribose-5-phosphate

100. Which enzyme catalyzes the conversion of ATP to cAMP?

- a) Adenylate cyclase
- b) Protein kinase
- c) Phosphodiesterase
- d) Glycogen phosphorylase
- Answer: a) Adenylate cyclase