

Unit 2: Bacteria and Viruses

Multiple Choice Questions - Questions 1-64

Exercise (Questions 1-10)

1. Which of the following components is not found in all kinds of bacteria?

- (a) Ribosomes
- (b) Cell membrane
- (c) Nucleoid

✓ **(d) Capsule**

Why: Only some bacteria make a capsule - it is not a universal structure like the others.

2. The bacterial chromosome is typically:

- (a) Linear, double-stranded DNA
- (b) Circular, single-stranded RNA

✓ **(c) Circular, double-stranded DNA**

- (d) Linear, single-stranded DNA

Why: Most bacteria carry a single circular, double-stranded DNA chromosome.

3. In bacterial cells, respiration occurs at:

- (a) Mitochondria

✓ **(b) Cell membrane**

- (c) Ribosomes
- (d) Endoplasmic reticulum

Why: Bacteria lack mitochondria, so respiratory enzymes are located in the cell membrane instead.

4. Which group of bacteria is known as a good source of antibiotics?

- (a) Omnibacteria
- (b) Spirochaetes
- (c) Pseudomonas

✓ **(d) Actinomycetes**

Why: Actinomycetes naturally produce many well-known antibiotics such as tetracycline and streptomycin.

5. What is the primary function of flagella in bacterial cells?

- (a) DNA replication
- (b) Cell division

✓ **(c) Motility**

- (d) Protein synthesis

Why: Flagella are whip-like structures whose main job is to move the bacterial cell.

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6. Which type of motility in bacteria is mediated by pili?

- (a) Brownian movement
- (b) Gliding motility
- ✓ (c) **Twitching motility**
- (d) Swarming motility

Why: Twitching motility is powered by pili that extend, grip a surface, and retract.

7. Which of the following bacterial structures is responsible for detecting and responding to chemicals?

- (a) Capsule
- (b) Pili
- ✓ (c) **Flagella**
- (d) Ribosomes

Why: Flagella let bacteria sense chemical gradients and move toward or away from them.

8. Which one of the following is not Nitrifying bacteria?

- (a) Nitrosomonas
- (b) Nitrobacter
- (c) Azotobacter
- ✓ (d) **Pseudomonas**

Why: Pseudomonas takes part in denitrification, not nitrification.

9. The enzyme responsible for converting HIV RNA into DNA is:

- (a) RNA polymerase
- ✓ (b) **Reverse transcriptase**
- (c) DNA helicase
- (d) Integrase

Why: Reverse transcriptase copies the viral RNA genome into a DNA strand inside the host cell.

10. The HIV capsid contains:

- (a) Single-stranded DNA and reverse transcriptase
- ✓ (b) **Single-stranded RNA and reverse transcriptase**
- (c) Double-stranded DNA and integrase
- (d) Double-stranded RNA and RNA polymerase

Why: HIV is a retrovirus, carrying single-stranded RNA together with the reverse transcriptase enzyme.

SLO Based MCQs — Structure of Bacteria (Questions 11-23)

11. The major component of bacterial cell wall is:

- ✓ (a) **Peptidoglycan**
- (b) Lecithin
- (c) Disaccharides
- (d) All of above

Why: Peptidoglycan (murein) is the defining structural molecule of the bacterial cell wall.

12. The cell wall of Gram-positive and Gram-negative bacteria differs in:

- (a) Gram positive contain thin layer of peptidoglycan
- (b) Gram negative contain less-lipid content
- (c) Gram negative contain lesser periplasmic space
- ✓ (d) Gram positive contain thick layer of peptidoglycan and less lipid content

Why: Gram-positive walls have a thick peptidoglycan layer and comparatively little lipid.

13. Gram-positive bacteria stain purple because they retain:

- (a) Secondary dye
- ✓ (b) Violet dye
- (c) Safranin
- (d) Alcohol

Why: Their thick peptidoglycan traps the crystal violet (primary) dye during Gram staining.

14. Which bacteria possess pore made up of porin protein, for specific molecules?

- (a) Gram positive
- ✓ (b) Gram negative
- (c) Both (a) and (b)
- (d) None of them

Why: Porins sit in the outer membrane, a layer found only in Gram-negative bacteria.

15. At some points, bacterial cell membrane invaginates to form vesicles, tubules or lamellae in cytoplasm, these structures are known as:

- (a) Ribosomes
- (b) Endosomes
- ✓ (c) Mesosomes
- (d) Peroxisomes

Why: These membrane infoldings are specifically named mesosomes.

16. Which of the following is not the function of mesosomes?

- ✓ (a) Adhesion
- (b) DNA replication
- (c) Cell division
- (d) Respiration

Why: Mesosomes assist DNA replication, cell division, and respiration - not adhesion.

17. Chromosome of bacteria differs from eukaryotic chromosomes in:

- (a) Have nucleosome
- (b) Have histones
- ✓ (c) Lack histones
- (d) Bounded by membrane

Why: Bacterial DNA is not packaged with histone proteins, unlike eukaryotic chromosomes.

18. Circular, double-stranded, extra-chromosomal DNA in bacteria is called:

- (a) Genomic DNA
- (b) Chromosomal DNA
- (c) Episome
- ✓ (d) Plasmid

Why: This small circular extra piece of DNA is defined as a plasmid.

19. Plasmids are used to carry gene of interest for the synthesis of specific:

- (a) Polysaccharides
- ✓ (b) Proteins
- (c) Nucleic acids
- (d) Lipids

Why: Plasmids act as vectors that make bacteria produce specific target proteins.

20. The structure in bacteria that enable them to resist against antibiotics:

- ✓ (a) Plasmids
- (b) Ribosomes
- (c) Cell wall
- (d) Cell membrane

Why: Plasmids often carry genes that give bacteria resistance to antibiotics.

21. Smaller subunit of bacterial ribosome sediments at:

- (a) 70S
- (b) 50S
- (c) 80S
- ✓ (d) 30S

Why: The bacterial 70S ribosome is built from a 30S small subunit and a 50S large subunit.

22. Many bacteria can survive extended periods of harsh conditions by forming specialized cells called:

- (a) Exospores
- ✓ (b) Endospores
- (c) Microspores
- (d) Megaspores

Why: These thick-walled, dormant survival cells are specifically called endospores.

23. The process by which bacteria make endospores is called:

- ✓ (a) Sporulation
- (b) Fragmentation
- (c) Sporogony
- (d) Lysis

Why: Endospore formation in bacteria is specifically termed sporulation.

24. When a bacterial population moves together by means of flagella, it is called:

- (a) Twitching
- (b) Crawling
- (c) Brownian movement
- ✓ (d) **Swarming**

Why: Coordinated group movement powered by flagella is called swarming.

25. Counter-clockwise rotation of flagellum pushes the cell:

- ✓ (a) **Forward**
- (b) Backward
- (c) Medially
- (d) Laterally

Why: Counter-clockwise rotation bundles the flagella together, driving the cell forward.

26. Which of the following is similar to twitching movements?

- (a) Gliding
- ✓ (b) **Crawling**
- (c) Brownian movement
- (d) Swarming

Why: Twitching motility is essentially a pili-powered crawling movement.

27. The movement used to move over surfaces mediated by pili is called:

- (a) Crawling
- (b) Twitching
- ✓ (c) **Both (a) and (b)**
- (d) Flagella movement

Why: This pili-driven surface movement is described as both crawling and twitching.

28. The type of movement in bacteria which is due to expansion created by pushing force of dividing cells is:

- (a) Gliding
- (b) Twitching
- ✓ (c) **Sliding**
- (d) Swarming

Why: Sliding motility results from the physical push of cells multiplying and expanding outward.

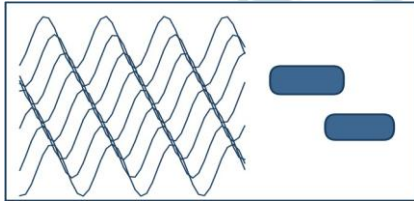
29. Spirochetes move by:

- (a) Flexing
- (b) Axial filament
- (c) Modified flagellum
- ✓ (d) **All of above**

Why: Spirochete flexing movement is driven by the axial filament, which is itself a modified flagellum.

30. Identify movement:

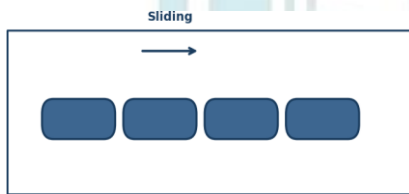
- (a) Flagella movement
- ✓ (b) **Swarming**
- (c) Sliding
- (d) Twitching



Why: The dense mat of overlapping flagella around clustered cells is characteristic of swarming.

31. Identify movement:

- (a) Swimming
- (b) Swarming
- ✓ (c) **Sliding**
- (d) Gliding



Why: The cells shown pushed along in a line, without flagella, is typical of sliding motility.

32. Identify bacteria:

- (a) Atrichous
- (b) Monotrichous
- (c) Peritrichous
- ✓ (d) **Lophotrichous**



Why: A cluster (tuft) of flagella at a single pole defines the lophotrichous arrangement.

33. The bacteria with tuft of flagella at both poles is:

- (a) Atrichous
- (b) Peritrichous
- ✓ (c) **Amphitrichous**
- (d) Lophotrichous

Why: Amphitrichous bacteria carry a tuft of flagella at both ends of the cell.

34. Basal body consisting of (one pair) of rotating rings is found in:

- (a) Gram negative
- ✓ (b) **Gram positive**
- (c) Both (a) and (b)
- (d) None of them

Why: Gram-positive bacteria have a simpler basal body with just one pair of rings, unlike Gram-negative's two pairs.

35. The structure which connects basal body with filament, in bacteria is:

- (a) Pilus
- (b) Rotating ring
- (c) Plasmid
- ✓ (d) **Hook**

Why: The hook is the flexible joint linking the basal body to the flagellar filament.

Bacteria; Ecology and Diversity (Questions 36-47)

36. The fossil record of prokaryotes shows that archea and bacteria were abundant.....years ago:

- (a) 2.5 billion
- ✓ (b) **3.5 billion**
- (c) 3.5 million
- (d) 1.5 billion

Why: Fossil evidence places abundant prokaryotic life at about 3.5 billion years ago.

37. Margulis and Schwartz classified bacteria intophyla:

- (a) 27
- (b) 8
- ✓ (c) **16**
- (d) 5

Why: Margulis and Schwartz's classification system divided bacteria into 16 phyla.

38. Escherichia coli belongs to:

- ✓ (a) **Omnibacteria**
- (b) Cyanobacteria
- (c) Spirochetes
- (d) Spiroplasmas

Why: E. coli is a rod-shaped, Gram-negative bacterium classified under Omnibacteria.

39. The group of bacteria which played most important role in history of the Earth for increasing free oxygen in atmosphere:

- (a) Mycoplasmas
- (b) Spiroplasmas
- (c) Pseudomonas
- ✓ (d) **Cyanobacteria**

Why: Ancient photosynthetic cyanobacteria released the oxygen that built up Earth's atmosphere.

40. The mats on the sediments in the sea are dominated by:

- (a) Pseudomonas
- ✓ (b) **Cyanobacteria**
- (c) Actinomycetes
- (d) Chemosynthetic bacteria

Why: Cyanobacterial mats are the dominant microbial layers found on sea-floor sediments.

41. Group of bacteria which lack cell wall resistant to penicillin are:

- (a) Mycoplasmas
- (b) Spiroplasmas
- (c) Spirochetes
- ✓ (d) **Both (a) and (b)**

Why: Both Mycoplasmas and Spiroplasmas lack a cell wall, so penicillin (which blocks wall-building) has no target.

42. Many cyanobacteria fix atmospheric nitrogen in their special cells called:

- (a) Akinetes
- (b) Hormogonia
- ✓ (c) **Heterocysts**
- (d) Resting spore

Why: Heterocysts are the specialized cyanobacterial cells where nitrogen fixation takes place.

43. Which bacterial group possess 2 to more than 100 flagella?

- ✓ (a) **Spirochetes**
- (b) E.coli
- (c) Cyanobacteria
- (d) Pseudomonas

Why: Spirochetes can bear anywhere from 2 to over 100 flagella-like fibrils.

44. Azotobacter belongs to:

- (a) Chemosynthetic bacteria
- (b) Actinomycetes
- ✓ (c) **N₂-fixing bacteria**
- (d) Omnibacter

Why: Azotobacter is a well-known free-living nitrogen-fixing bacterium.

45. Aboutnew antibiotics from actinomycetes are being discovered each year.

- (a) 15
- (b) 100
- ✓ (c) 150
- (d) 180

Why: Roughly 150 new antibiotics are reported from actinomycetes each year.

46. Bacillus thuringiensis is Gram soil dwelling bacterium, commonly used as

- (a) Negative, recycler
- ✓ (b) Positive, biopesticide
- (c) Negative, biopesticide
- (d) Positive, recycler

Why: B. thuringiensis is Gram-positive and is widely used as a natural biopesticide.

47. Which of the following is nitrifying bacteria?

- ✓ (a) Azotobacter
- (b) Pseudomonas
- (c) E.coli
- (d) Treponema

Why: Among these options, Azotobacter is the one linked to processing nitrogen compounds, unlike the others.

Normal Flora (Questions 48-50)

48. Which of the following is not included in normal flora of humans?

- (a) Bacteria
- (b) Fungi
- (c) Protists
- ✓ (d) Plants

Why: Normal flora is made up of microbes like bacteria, fungi, and protists - not plants.

49. The most likely organ to get colonized by microbial species is:

- ✓ (a) Skin
- (b) Heart
- (c) Brain
- (d) Blood

Why: Skin is constantly exposed to the environment, making it a prime site for microbial colonization.

50. Enteric bacteria secrete:

- ✓ (a) Vitamin K & B12
- (b) Vitamin B6 & C
- (c) only Vitamin K
- (d) All of above

Why: Gut (enteric) bacteria are specifically known for producing vitamin K and vitamin B12.

Virus (Questions 51-64)

51. Size range of viruses is from 20 nm to:

- (a) 250 \u03bcm
- (b) 350 \u03bcm
- ✓ (c) 250 nm
- (d) 600 \u03bcm

Why: Viruses typically range from about 20 nm up to 250 nm in size.

52. The largest size viruses are:

- (a) Parvoviruses
- ✓ (b) Pox viruses
- (c) Adenoviruses
- (d) Herpes viruses

Why: Poxviruses are among the largest known viruses, nearly visible under a light microscope.

53. Viruses can pass through filter paper because they are..... times smaller to bacteria:

- (a) 100 to 10,000
- (b) 10 to 100
- ✓ (c) 10 to 1000
- (d) 1 to 10,000

Why: Viruses are roughly 10 to 1000 times smaller than bacteria, letting them slip through filters that trap bacteria.

54. Bacterial viruses (bacteriophages) may be icosahedral which means having:

- (a) 10 faces
- (b) 15 faces
- ✓ (c) 20 faces
- (d) 100 faces

Why: Icosahedral describes a shape with 20 flat faces.

55. Number of capsomeres in virus causing common cold are:

- (a) 152
- ✓ (b) 252
- (c) 162
- (d) 262

Why: The adenovirus, which causes the common cold, has a capsid built from 252 capsomeres.

56. The best known phages of E.coli are:

- (a) P-phages
- (b) R-phages
- (c) S-phages
- ✓ (d) T-phages

Why: The T-series phages (like T4) are the best-studied bacteriophages that infect E. coli.

57. How many tail fibres are attached with end plate of a bacteriophage:

- (a) 2
- (b) 4
- ✓ (c) 6
- (d) 8

Why: A T4 phage's end plate anchors six tail fibers.

58. The spikes of HIV are made up of:

- (a) Glycolipids
- ✓ (b) Glycoproteins
- (c) Nucleoproteins
- (d) Lipoproteins

Why: HIV's surface spikes are glycoprotein molecules that let it latch onto host cells.

59. The average diameter of HIV is about:

- (a) 250 nm
- (b) 180 nm
- ✓ (c) 100 nm
- (d) 10 nm

Why: HIV particles measure roughly 100 nm across on average.

60. The most distinguishing character of retroviruses is the presence of enzyme:

- (a) DNA polymerase
- (b) Restriction endonuclease
- (c) DNAase
- ✓ (d) Reverse transcriptase

Why: Reverse transcriptase, which converts RNA into DNA, is the defining enzyme of retroviruses.

61. The AIDS causing virus was given name of Human Immunodeficiency virus (HIV) in:

- (a) 1984
- (b) 1896
- ✓ (c) 1986
- (d) 2001

Why: The virus was officially given the name HIV in 1986.

62. Experts have concluded that HIV originated in the jungles of Africa among wild:

- ✓ (a) Chimps
- (b) Cats
- (c) Beasts
- (d) Elephants

Why: Genetic evidence traces HIV's origin to a virus found in wild chimpanzees.

63. Bacteria whose genome has DNA of some other organism is called:

- (a) Pathogenic bacteria
- (b) Mutagenic bacteria
- (c) Methanogenic bacteria

✓ (d) **Transgenic bacteria**

Why: Bacteria carrying inserted foreign DNA are specifically termed transgenic.

64. Which is not true about shape of the head of bacteriophages?

- (a) Two triangles having a common base
- (b) Prism shaped
- ✓ (c) **Octagonal**
- (d) Elongated

Why: Phage heads can be triangular-prism-like or elongated, but an octagonal shape is not a real form - so this is the false statement.