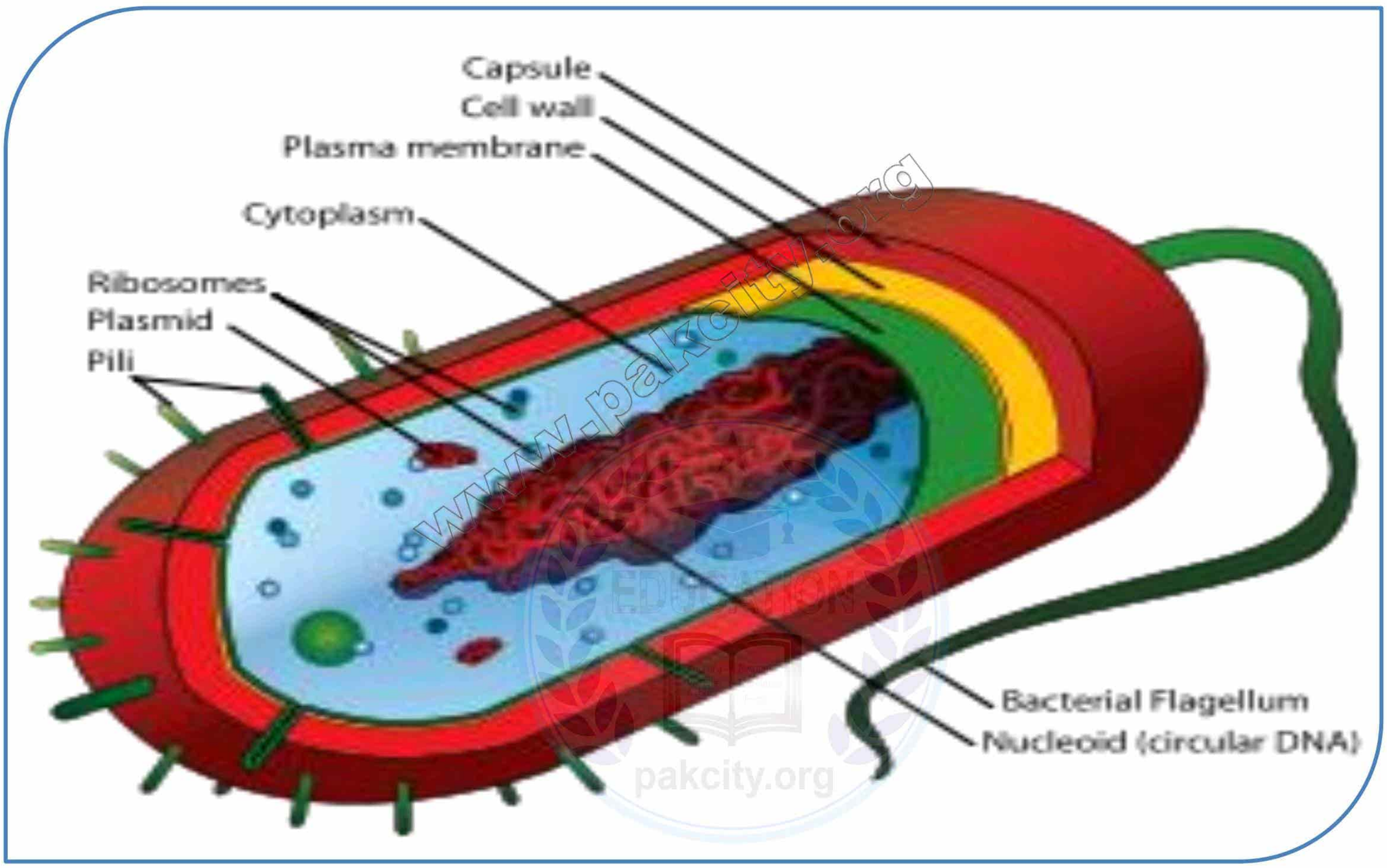
CHAPTER 6

Kingdom Prokaryotae (Monera)



- **Exercise Short Answers**
- **Important Short Answers**
- **Exercise MCQ's**
- **Important Additional MCQ's**
- **Past MDCAT MCQ's**

Exercise MCQ's

❖ **Encircle the correct answer from the multiple choices.**

1) Which of the following is not found in bacterial cells?
a) Cell membrane b) Ribosomes c) A nucleoid d) Capsule

2) The major locomotory structures in bacteria are:
a) Flagella b) Fimbriae c) Pili d) Cilia

3) Which of the following is primary bacterial cell wall function?
a) Transport b) Support c) Motility d) Adhesion

4) Which of the following is present in both gram positive and gram negative bacteria:
a) An outer membrane b) Peptidoglycan c) Techoic acid d) Lipopolysaccharides

5) Mesosomes are internal extensions of the:
a) Cell wall b) Cell membrane c) Chromatin body d) Capsule

6) Bacterial endospores function in:
a) Reproduction b) Protein synthesis c) Survival d) Storage

Answer key:

1	d	**2**	a	**3**	b	**4**	b	**5**	b
6	c								

Most Important MCQ's

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❖ **Encircle the correct answer from the multiple choices.**

Prokaryotes and discovery of bacteria

1) The most ancient bacteria are:
a) Eubacteria b) Escherichia coli c) Archaebacteria d) Streptococus

2) Who proved that micro-organism could cause disease?
a) Louis Pasteur b) R. Koch c) A.V.Leeuwenhook d) Robert Hooks

3) Germ Theory of disease was formulated by:
a) Louis Pasteur b) R. Koch c) A.V.Leeuwenhook d) Edward Jenner

4) E.coli is a ……. Bacteria:
a) Gram –ve b) Gram +ve c) Both d) None

5) The smallest bacteria is:
a) Mycoplasma b) E.coli c) Camphylobacter d) Clostridium

6) Which of the following do not possess cell wall?
a) E.coli b) Mycoplasma c) Spirochete d) Yeast

7) These bacteria re smallest and without cell wall:
a) Mycoplasma b) Pseudomonas c) Spirochete d) E.coli

8) The smallest bacterium for examples some members of genus Mycoplasma are about …… in diameter.
a) 50-100nm b) 100-150nm c) 50-150nm d) 10-200nm

9) The word Archaeobacteria (a division of bacteria) derived from Greek means:
a) True bacteria b) False bacteria c) Recent bacteria d) Ancient bacteria

10) Who coined the term Animalcules for microorganisms like Bacteria and protozoa?
a) Robert Koch b) Louis Pasteur c) Alexander Fleming d) Leeuwenhoek

11) Who discovered the bacteria causing tuberculosis and also developed various techniques of media preparation and maintenance of pure culture?
a) Robert Koch b) Louis Pasteur c) Alexander Fleming d) Leeuwenhoek

12) Which of the following statement is incorrect regarding germ theory of diseases postulated by Robert Koch?
a) A specific organism can always be found in association with a given disease
b) The organism can be isolated and grown in pure culture in the laboratories
c) The pure culture cannot produce the disease when inoculated into susceptible animal however the causative organism isolated from pure culture can do so
d) It is possible to recover the organism in pure culture from the experimentally infected animals.

13) Which of the following structure is not present in all the bacteria?
a) Cell membrane b) Chromatin bodies c) Ribosomes d) Capsule

14) In bacterial categories the bacteria smaller in number are:
a) Gram-ive bacteria b) Eubacteria c) Ancient bacteria d) Gram +ive bacteria

15) Germ theory of disease has _____ postulates:
a) 3 b) 5 c) 4 d) 6

Shapes of Bacteria

16) A tetrad is a square of:
a) 2 cocci b) 4 cocci c) 6 cocci d) 8 cocci

17) A square of 4 cocci is termed as:
a) Tetrad b) Tetrose c) Pentoses d) Hexoses

18) A cube of 8 cocci is called:
a) Sarcina b) Octamer c) Tetrad d) Streptococus

19) Oval shaped bacteria are called:
a) Cocci b) Bacilli c) Spirilla d) Vibrio

20) Rod shaped bacteria are called:
a) Cocci b) Bacilli c) Spirilla d) vibrio

21) Bacteria arrangement having division in random planes are:
a) Staphylococcus b) Streptococcus c) Sarcina d) Tetrad

22) Curved of comma shaped bacteria are called:
a) Staphylococcus b) Streptococcus c) Spirochete d) Bacilli

23) Which of the following are spiral-shaped bacteria?
a) Cocci b) Pseudomonas c) Bacilli d) Vibrio

24) The size of Spirochete is:
a) 0.1 -600 um b) 100-200 nm c) 500 um d) 0.75-1.25 um

25) E. coli and example of entrobacteriace is important for causing diarrheal diseases its size is:
a) 0.1-600 um
b) 100-200 nm
c) 1.1-1.5 um (width) 2.0-6.0 um (length)
d) 0.75-1.25 um

26) Some bacteria ranging occasionally a size of 500 m in length are:
a) Escherichia coli b) Spirochetes c) Mycoplasma d) Epulopiscuim

27) Coccobacillus has a shape similar to:
a) Diplobacillus b) Sarcina c) Egg d) None of these

28) The first bacterium isolated was:
a) Coccus b) Bacillus c) Vibrio d) Spirochete

29) Which of the following bacteria are thick rigid and spiral?
a) Vibrio b) Spirillum c) Spirochete d) Coccus

30) A group of 8 cocci is called:
a) Diplococci b) Octococci c) Tetrad d) Sarcina

31) Which of the following has a chain arrangement?
a) Streptobacillus b) Treptococci c) Staphylococci d) Both A and B

32) Which of the following bacteria do not have flagella commonly?
a) Cocci b) Bacilli c) Streptobacilli d) Vibrio

Structure of Bacteria

33) Bacteria without any flagella are called:
a) Peritrichous b) Monotrichous c) Lophotrichous d) Atrichous

34) A bacteria with single polar flagellum is:
a) Monotrichous b) Lopotrichous c) Amphitricous d) Atrichous

35) The bacterium with a truft of flagella at one pole is called:
a) Atrichous b) Monotrichous c) Amphitrichous d) Lopotrichous

36) When truft of flagella is present at each of two poles in bacteria is called:
a) Amphitrichous b) Lopotrichous c) Peritrichous d) Atrichous

37) Many bacteria contain flagella for their locomotion. When flagella surround the whole bacterial cell, this condition is called as:
a) Atrichous b) Lopotrichous c) Amphitrichous d) Peritrichous

38) Pilli are made of special protein called:
a) Pillin b) Flagellin c) Tubulin d) Myosin

39) Conjugation in bacteria is promoted by:
a) Flagella b) Pilli c) Cillia d) Gametes

40) Which of the following structures is present on Gram-negative bacteria only and is involved in mating process between cells called conjugant?
a) Endospores b) Capsule c) Pillin d) Pilli

41) Cell wall of Archaebacteria do not contain:
a) Peptidoglycan b) Cellulose c) Chitin d) Cutin

42) Which of the following is not found in all bacteria?
a) Cell membrane b) Capsule c) Slime d) Cell envelop all

43) Bacterial pathogenicity is due to:
a) Gram positive b) Gram negative c) Cocci d) Bacilli

44) Which is present in both gram-positive and gram-negative cell wall?
a) Techoic acid b) Peptidoglycan c) An outer membrane d) Lipopolysacchride

45) Peptidoglycan is absent in:
a) Eubacteria b) Cyanobacteria c) Archeobacteria d) Gram negative bacteria

46) The cell walls of most bacteria have a unique macromolecule composed of long glycan chains cross-linked with peptide fragments called as:
a) Cellulose b) Peptidoglycan c) Chitin d) Lipoproteins

47) Mesosomes are internal extensions of the:
a) Cell wall b) Cell membrane c) Chromatin body d) Capsule

48) Name the structure involved in DNA replication:
a) Cysts b) Ribosomes c) Mesosomes d) Spores

49) Mesosomes are infoldings of the cell membrane and are involved in:
a) DNA replication b) Protein synthesis c) RNA synthesis d) Metabolism

50) Extra chromosomal rings of DNA in bacteria are:
a) Nucleoid b) Plasmid c) Mesosomes d) Ribosomes

51) Important vectors in modern genetic engineering techniques are:
a) Plasmid b) Nucleoid c) Mesosomes d) Ribosomes

52) Bacteria membranes differ from eukaryotic in lacking:
a) Cholesterol b) Techoic acid c) Lipids d) Proteins

53) Plasma membrane and everything present within is called:
a) Chloroplast b) Cytoplasm c) Protoplast d) Protoplasm

54) The thick walled, desiccation resistant forms in bacteria are:
a) Spore b) Cyst c) Plasmid d) Nucleoid

55) Which of the following structure provides greater pathogenicity to the bacteria?
a) Capsule b) Slime c) Cell Wall d) Cell membrane

56) Gram positive bacteria appear:
a) Purple b) Red c) Pink d) Blue

57) Extremely long molecule of DNA that is tightly folded to fit inside the cell component is called:

a) Nucleus b) Chromosome c) Chromatid d) Chromatin body

Nutrition of bacteria

58) In root nodules bacteria convert nitrogen into:

a) Ammonia b) Nitrate c) Urea d) Nitrate

59) Photosynthetic prokaryotes lack:

a) Ribosomes b) Cytoplasm c) Chloroplast d) Cell membrane

60) Some bacteria break down proteins of dead plants & animals & release:

a) Potassium b) Phosphorus c) Nitrates d) Oxygen

61) The common waste material in bacteria is:

a) Glycogen b) Lactic acid c) Ammonia d) Urea

62) Purple non-sulphur bacteria is an example of:

a) Heterotrophic bacteria b) Chemosynthetic bacteria c) Photosynthetic bacteria d) Saprotrophic bacteria

63) Those bacteria which are fully dependent upon their host for nutrition are called:

a) Heterotrophic bacteria b) Chemosynthetic bacteria c) Saprophytic bacteria d) Parasitic bacteria

64) Nitrifying bacteria are the examples of:

a) Hetrotrophic bacteria b) Chemosynthetic bacteria c) Saprophytic bacteria d) Parasitic bacteria

Respiration in Bacteria

65) Which of the following is anaerobic bacterium:

a) Camphylobacter b) Pseudomonas c) Spirochete d) E.coli

66) Aerobic bacteria is:

a) Camphylobacter b) E.coli c) Pseudomonas d) None

67) Which of the following is a microaerophilic bacterium:

a) Camphylobacter b) Pseudomonas c) Spirochete d) E.coli

68) Which is microaerophilic bacterium?

a) Pseudomonas b) Spirochete c) Camphylobacter d) E.coli

69) Which one of the following requires low concentration of oxygen?

a) Camphylobacter b) Spirochete c) Pseudomonas d) E.coli

70) The bacteria which can grow either in the presence of oxygen are called:

a) Facultative b) Aerobic c) Microaerophilic d) Anaerobic

71) E.coli is an example of:

a) Aerobic bacteria
b) Anaerobic bacteria
c) Facultative anaerobic bacterium
d) Microaerophilic bacterium

Growth and Reproduction of Bacteria

72) The phase of rapid growth in bacteria is called:

a) Lag b) Log c) Stationary d) Death

73) Rapid phase of growth of bacteria is:

a) Lag phase b) Log phase c) Stationary phase d) Decline phase

74) Bacteria divide at exponential rate during:

a) Stationary phase b) Decline phase c) Log phase d) Lag phase

75) Bacteria increase in number by asexual means of reproduction called:

a) Binary fission b) Regeneration c) Budding d) All of these

76) Some bacteria transfer genetic material from a donor to recipient bacteria during a process:

a) Binary fission b) Budding c) Regeneration d) Conjugation

77) Sex pili is formed in which of the following processes:

a) Binary fission b) Mitosis c) Sexual reproduction d) Conjugation

Importance of Bacteria

78) The bacteria that cause diseases in human beings, are called:

a) Photosynthetic bacteria b) Facultative bacteria c) Chemosynthetic bacteria d) Pathogenic bacteria

Control of Bacteria

79) Chemical substances used on living tissues that inhibit the growth of micro-organism are called:

a) Antiseptics b) Disinfectants c) Antibiotics d) Vaccines

80) Who developed the vaccine against anthrax?

a) Louis Pasteur b) Edward Jennar c) Leuvenhoek d) Alexander Fleming

81) Antibiotics are chemotherapeutic chemical substances which are synthesized are secreted by:

a) Certain Bacteria b) Certain Algae c) Certain virus d) Both A & B

82) Louis Pasteur was one of the pioneer microbiologists. His main achievements are the development of vaccine for disease:

a) Anthrax-Cholera-Malaria
b) Small pox-Chicken pox-Anthrax
c) Anthrax-Fowl cholera-Rabies
d) Small pox-Fowl cholera-Rabies

83) The agent responsible for rabies is:

a) Rabid dogs b) Foxes c) Cats d) All of these

Use and Misuse of Antibiotics

84) Most widespread problem of antibiotics misuse is:

a) Rapid outbreak
b) Disturbance of metabolism
c) Increased resistance in pathogens
d) Immunity

85) Misuse of penicillin may cause:

a) Fever b) Deafness c) Allergy d) Teeth discoloration

86) Misuse of penicillin may cause:

a) Allergic reactions b) Deafness c) Headache d) Discoloration

87) Misuse of which antibiotics can affect Auditory Nerve, thus causing deafness?

a) Penicillin b) Streptomycin c) Tetracycline d) Lovastatin

Cyanobacteria

88) Name the cyanobacteria which are helpful in fixing atmospheric nitrogen:

a) Heterocyts b) Akinetes c) Nostoc d) Hormogonium

89) Reserved food-material in cyanobacteria is:

a) Glycogen b) Fat c) Protein d) Sterols

90) All of the following is related to Nostoc except:

a) Trichome b) Slimy covering c) Heterocysts d) Branched filaments

91) The thick walled reproductive cell of cyanobacteria are called:

a) Heterocyts b) Trichome c) Hormogonia d) Akinete

92) Cyanobacteria have _____ cell wall:

a) Gram +ve b) Gram – ve c) Acid fast d) Cellulose rich

93) Which of the following help cyanobacteria to locomote?

a) Flagella b) Gas vesicles c) Both of these d) None of these

94) Cyanobacteria reproduce by:

a) Binary fission b) Mitosis c) Meiosis d) Conjugation

95) Approximately _____ species of bacteria are known to cause diseases in humans:

a) 100 b) 200 c) 300 d) 400

Answer key:

1	c	**2**	a	**3**	b	**4**	a	**5**	a	**6**	b	**7**	a	**8**	d	**9**	d	**10**	d
11	a	**12**	c	**13**	d	**14**	c	**15**	c	**16**	b	**17**	a	**18**	a	**19**	a	**20**	b
21	a	**22**	a	**23**	d	**24**	c	**25**	c	**26**	b	**27**	c	**28**	b	**29**	b	**30**	d
31	d	**32**	a	**33**	d	**34**	a	**35**	d	**36**	d	**37**	a	**38**	d	**39**	a	**40**	b
41	d	**42**	a	**43**	d	**44**	c	**45**	a	**46**	b	**47**	c	**48**	d	**49**	a	**50**	b
51	a	**52**	a	**53**	c	**54**	b	**55**	b	**56**	a	**57**	d	**58**	b	**59**	c	**60**	c
61	b	**62**	c	**63**	d	**64**	b	**65**	c	**66**	c	**67**	a	**68**	c	**69**	a	**70**	a
71	c	**72**	b	**73**	b	**74**	c	**75**	a	**76**	d	**77**	d	**78**	d	**79**	a	**80**	a
81	a	**82**	c	**83**	d	**84**	c	**85**	c	**86**	b	**87**	b	**88**	c	**89**	a	**90**	d
91	d	**92**	b	**93**	b	**94**	a	**95**	b										

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Past MDCAT MCQ's

2008

1) Which of the following are spiral-shaped bacteria?

a) Cocci b) Pseudomonas c) Bacilli d) Vibrio

2009

2) Which of the following is aerobic bacterium?

a) Spirochete b) E. coli c) Cyanobacteria d) Pseudosomanas

2010

3) The entire cell wall of bacteria is often regarded as a single huge molecule or molecular complex called:

a) Capsule b) Slime capsule c) Secondary wall d) Sacculus

4) Bacterial 'death rate' is equal to 'birth rate; in:

a) Lag phase b) Death phase c) Log phase d) Stationary phase

2011

5) The structure which contains the gene for drug resistance bacteria are:

a) Nucleoids b) Chromatin Bodies c) Mesosomes d) Plasmids

6) Antibiotics that kill microbes immediately are called:

a) Microbistatic b) Biostatic c) Microbicidal d) Chemotherapeutic

2012

7) Most widespread problem of the antibiotics misuse is the:

a) Rapid cure
b) Disturbance of metabolism
c) Increased resistance in pathogen
d) Immunity

2013

8) Which statement about bacteria is true:

a) Gram positive bacteria have more lipids in their cell wall
b) Gram negative bacteria have more lipids in their cell wall
c) Lipids are absent in cell wall of both gram positive and negative bacteria
d) Both have equal amount of lipids

2014

9) Treatment by using attenuated culture of bacteria is called:

a) Chemotherapy b) Antisepsis c) Sterilization d) Vaccination

10) Peptidoglycan or murein is a special or distinctive feature of cell wall in:

a) Algae b) Bacteria c) Fungi d) Plants

11) Which one of the following antibiotic causes permanent discoloration of teeth in young children if it is misused?

a) Penicillin b) Sulfonamide c) Streptomycin d) Tetracycline

2015

12) Cyanobacteria are:

a) Photoautotrophic bacteria b) Saprotrophic bacteria c) Chemosynthetic bacteria d) Parasitic bacteria

13) During favourable conditions, certain bacteria produces:

a) Ribosomes b) Mitochondria c) Plasmids d) Spores

2016

14) Many bacteria are motile due to presence of:

a) Flagella b) Cilia c) Pilli d) Microtubules

Answer key:

1	d	**2**	d	**3**	d	**4**	d	**5**	d
6	c	**77**	c	**8**	c	**9**	d	**10**	b
11	d	**12**	a	**13**	d	**14**	a		

Exercise Short Answers

Q:1(a) Name general characteristics that could be used to define the prokaryotes.

Ans: General Characteristics of Prokaryotes:

- Organisms having prokaryotic cells are called prokaryotes (e.g., bacteria and cyanobacteria).
- They have no many of the membrane bound structures (e.g., mitochondria, endoplasmic reticulum, Golgi bodies and chloroplasts etc.).
- Nuclear membrane is absent, therefore, prokaryotic cell has no distinct nucleus.
- Prokaryotes have small sized ribosomes (70S).
- Mitosis is missing and cell divides by fission.
- The cell wall of the prokaryotic cell is composed of polysaccharide chains bounded covalently to the shorter chains of amino acids forming peptidoglycan or murine. The entire cell wall may be called as sacculus.

Q:1 (b) Do any other microbial group besides bacteria have prokaryotic cells?

Ans: Yes, Cyanobacteria have prokaryotic cell.

Q:1 (c) In which habitats are bacteria found? Give some general means by which bacteria derive nutrients.

Ans: Habitats of bacteria: Bacteria are found everywhere in the air, land, lakes, oceans, oil deposits, ponds, ditches, streams, rivers, in food, humus, plant roots, body surface, body cavities and in the intestine of man and animals.

Means of obtaining nutrition in bacteria:

- Parasitic
- Saprophytic
- Photosynthetic
- Chemosynthetic

Q:2 (a) List functions that the cell membrane performs in bacteria.

Ans: Functions of cell membrane in bacteria:

- Regulates the transport of materials.
- Contains enzymes for respiration.
- Responsible for the relationship of cell to outside.

Q:2 (b) What are mesosomes and some of their possible function?

Ans: Mesosomes: The cell membrane invaginates into the cytoplasm forming structure called as mesosomes.

- Mesosomes are in the form of vesicles, tubules or lamellae.

Functions of Mesosomes:

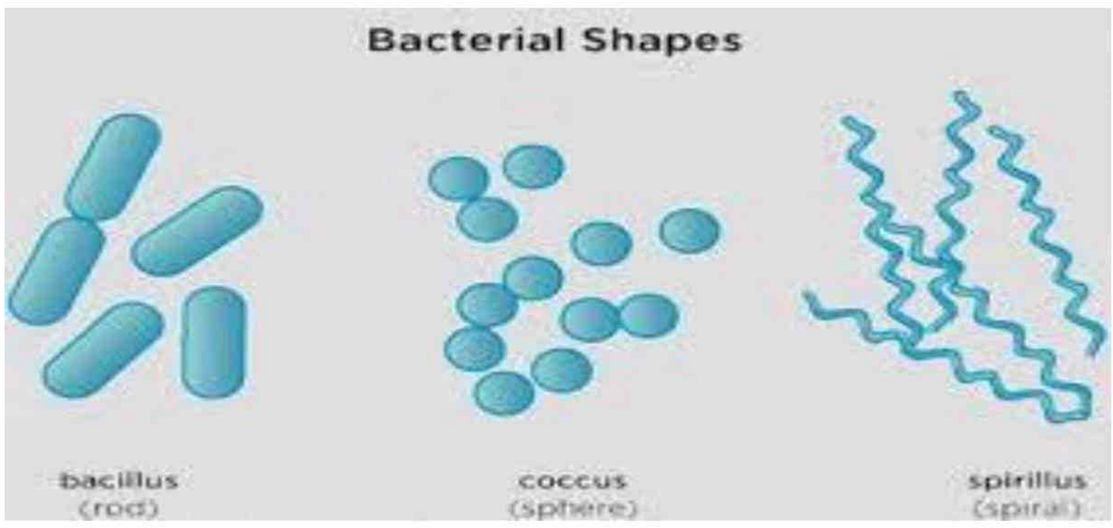
- Measosomes are involved in DNA replication.
- They are involved in the cell division.
- Some messomes are also involved in export of exo-cellular enzyme.
- Respiratory enzymes are also present on the mesosomes.

Q:3 What is unique about the structure of bacterial ribosomes?

Ans: They are smaller than eukaryotic ribosomes. They are about 70S.

Q:4 Draw the three bacterial shapes?

Ans: Shapes of bacteria:



Q:5 Name a bacterium that has no cell wall.

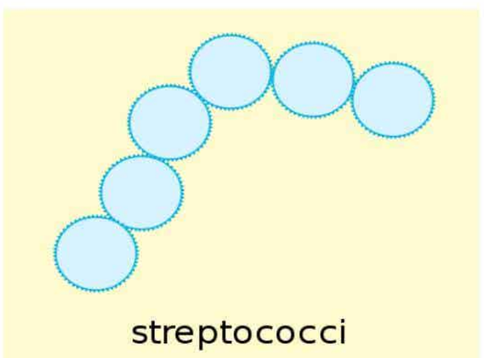
Ans: Mycoplasmas.

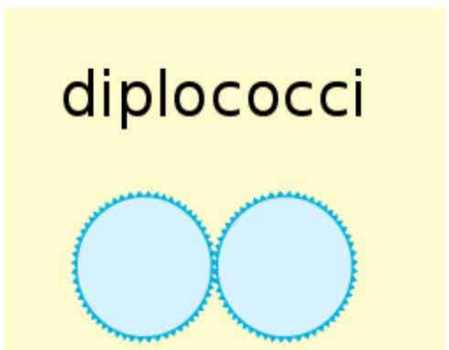
Q:6 A gram stain discharge from an abscess shows cocci in irregular grape like clusters. What is the most likely genus of the bacterium?

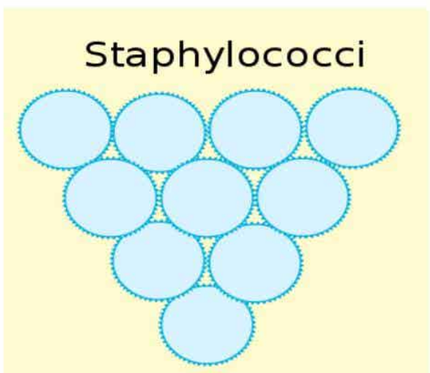
Ans: Staphylococcus.

Q:7 Draw an outline and label (i) Streptococcus, (ii) Diplococcus, (iii) Staphylococci.

Ans:







Q:8 You observe a culture of predominantly round (presumably spherical) bacteria that though apparently fully divided, nevertheless have failed to separate, thus resulting in long chains of cells. What, generally might you call such an arrangement?

Ans: Streptococci (Trichous).

Q:9 Match the following description with the best answer.

1	Division in one plane; cocci arranged in pairs	(a) Bacillus
2	Division in one plane; cocci arranged in chains	(b) Streptobacillus
3	Division in one plane; cocci arranged in square of four	(c) Spirochete
4	Division in one plane; rods completely separate after division	(d) Spirillum
5	Division in one plane; rods arranged in chains	(e) Vibrio
6	A comma shaped bacterium	(f) Streptococcus
7	A thin, flexible spiral	(g) Staphylococcus
8	A thick, rigid spiral	(h) Diplococcus (i) Tetrad (j) Sarcina

Answers:

1	h	**2**	f	**3**	i	**4**	a	**5**	b	**6**	e	**7**	c	**8**	d

Important Short Answers

Q:1 Differentiate between Eubacteria and Archaeobacteria.

Eubacteria	Archaeobacteria
• Eubacteria derived from Greek word that means "true bacteria.	• Archaeobacteria derived from Greek word that means "ancient bacteria.
• They are found in everywhere.	• They are mostly found in extreme environment.
• They contain peptidoglycan.	• They do not contain peptidoglycan.
• Their cell walls composed of sugar molecules,, teichoic acid lipoproteins and lipopolysaccharides,, which are linked to peptidoglycan.	• Their cell walls are composed of proteins, glycoproteins and polysaccharides.

Q:2 Enlist taxonomic groups of bacteria on the basis of presence of flagella and pattern of attachment of flagella.

Ans: On the basis of presence, attachment and number of flagella, bacteria are classified as:

1) **Atrichous:** The bacteria without any flagella are called atrichous.
2) **Monotrichous:** These have a single polar flagellum.
3) **Lophotrichous:** These have a tuft of flagella at one pole only.
4) **Amphitrichous:** These have tuft of flagella at both poles.
5) **Peritrichous:** In this condition flagella surrounds the whole cell.

Q:3 Write Koch postulates of Germ Theory of disease.

Ans: Germ Theory of Disease:

Koch formulated the germ theory of disease which has four postulates. These are used to find out whether the organism found in disease site is disease site is disease causing or not.

Postulates of Germ Theory:

i. A specific organism (germ) is associated with a given disease.
ii. The organisms can be isolated and grown in pure culture in the laboratory.
iii. The pure culture will produce the disease when inoculated into susceptible animal.
iv. It is possible to recover the (same) organism in pure culture from experimentally infected animal.

Q:4 Is there any similarity between Bacteria and Plant cell wall?

Ans: Yes, following similarities are found between bacterial and plant cell wall:

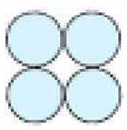
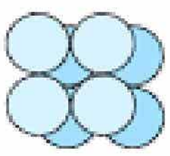
a) Both do not act as barriers to materials passing through it.
b) Both, cellulose found in plant cell wall and polysaccharide as a constituent of peptidoglycan present in the bacterial cell wall, are carbohydrate.
c) Both are non-living.

Q:5 Enlist the achievements of Louis Pasture in the field of microbiology?

Ans: The achievements of Pasture in the field of microbiology:

- Pasture's main achievements are the development of vaccines for disease anthrax fowl cholera and rabies.
- He made significant contributions in development of pasteurization.
- He also made significant contributions in the development of fermentation industries.
- He proved that microorganisms could cause disease.

Q:6 Differentiate between Tetrad and Sarcina.

Tetrad	Sarcina
• When the division of cell is in two planes it will produce a tetrad arrangement.	• When the division is in three planes, it will produce a sarcina arrangement.
• A tetrad is a sequence of four cocci.	• Sarcina is a cube of eight cocci.
• Shape is given below.  tetrad	• Shape is given below.  sarcina

Q:7 Differentiate between Spores and Cyst.

Spores	Cyst
• Spores are metabolically dormant bodies	• Cyst are thick walled, dormant dessication resistant forms and
• produced at a large stage of cell growth	• develop during differentiation of vegetative cells which can germinate
• They are resistant to change in light, pH,high temperature, dessication.	• They are not heat resistant.

Q:8 Differentiate between Gram-positive and Gram-negative bacteria.

Characteristics	Gram-Positive bacteria	Gram-Negative bacteria
Staining	• It is stained purple	• It is stained pink
No. of major layers	• 1	• 2
Chemical make up	• Peptidoglycan Techoic acid, Lipotechoic acid, Lipids (1 - 4%)	• Lipopolysaccharides, Lipoproteins peptidoglycan, Lipids (11 - 12%)
Overall thickness	• 20 - 80 nm	• 8 - 11 nm
Outer membrane	• No	• Yes
Periplasmic space	• Present in some	• Present in all
Permeability	• More permeable	• Less permeable

Q:9 What is the difference between photosynthesis in plants and photosynthesis in bacteria?

Ans: During photosynthesis the autotrophic bacteria utilize hydrogen sulphide instead of water as in plants as hydrogen source and liberate sulphur instead of oxygen.

In Bacteria:

$$CO_2 + 2H_2S \xrightarrow[\text{Chlorophyll}]{\text{Light}} (CH_2O)n + H_2O + 2S$$

In Plants:

$$6CO_2 + 12H_2O \xrightarrow[\text{Chlorophyll}]{\text{Light}} C_6H_{12}O_6 + 6O_2 + \text{Energy}$$

Q:10 What is flagella? What are the important functions performed by flagella?

Ans: Flagella: These are extremely thin, hair like appendages. They come out through cell wall and originate from basal body, structure just beneath the cell membrane in the cytoplasm.

- They are made up of protein flagellin.

Functions:

- Primary function of flagella is to help in motility.
- With the help of flagella, flagellate bacteria can also detect and move in response to chemical signals which is a type of behavior called as chemotaxis.

Q:11 What is pilli? Describe its functions.

Ans: Pilli: These are hollow, non-helical, filamentous appendages.

- Pilli are smaller than flagella and are not involved in motility.
- True pili are only present in gram-negative bacteria.
- They are made up of special protein called pilin.

Function:

- They are primarily involved in a mating process between cells called conjugation process.
- Some pili function as a means of attachment of bacteria to various surfaces.

Q:12 Give the economic importance of cyanobacteria.

Ans: Advantages of Cyanobacteria:

- **Reclamation of Alkaline Soils:** They help in the reclamation of alkaline soils.
- **Fixation of Nitrogen:** They have heterocysts which are helpful in the fixation of atmospheric nitrogen.
- **Photosynthetic Activity:** They release oxygen gas in environment due to their photosynthetic activity.
- **Pollution Indicator:** Oscillation and few other cyanobacteria can be used as pollution indicator.
- **Symbiotic Associations:** They have symbiotic relationships with protozoa, fungi and nitrogen fixing species from associations with angiosperms. They are photosynthetic partner in most of lichen association.

Disadvantage of Cyanobacteria:

- **Water Blooms:** Many species form water blooms where they often impart unpleasant smell and due to large amount of suspended organic matter water becomes unfit for consumption.

Q:13 What is super blue green algae?

Ans: Super blue green algae: Super blue green algae are basically expensive pond scum, in which cyanobacterium is a single called organism that produces its own food through photosynthesis. It serves as a "complete whole food" which contains 60% protein with all essential amino acids in perfect balance

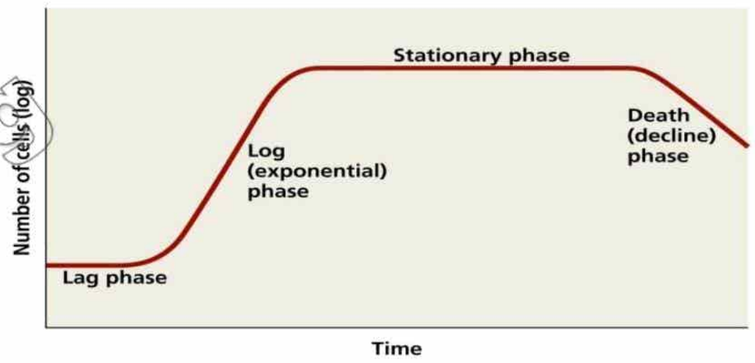
Q:14 How the photosynthetic system of cyanobacteria resembles that of eukaryote?

Ans: Their photosynthetic system closely resembles that of eukaryotes because they have chlorophyll and photo-system II. They carry out oxygenic photosynthesis i.e. they use water as an electron donor and generate oxygen during photosynthesis.

Q:15 Describe the four distinct phases recognized in bacterial growth curve.

Ans: Four distinct phases are recognized in bacterial growth curve:

1. **Lag Phase:** It is the phase of no growth. Bacteria prepare themselves for division.
2. **Log Phase:** It is the phase of rapid growth. Bacteria divide at exponential rate.
3. **Stationary Phase:** Bacterial death rate is equal to bacterial rate of reproduction and multiplication.
4. **Death/Decline Phase:** Bacteria start dying. Here the death rate is more than reproduction rate.



Q:16 Differentiate between Capsule and Slime.

Capsule	Slime
• Some bacteria produce capsule. It is tightly bound to the cell.	• It is present in some bacteria. It is a loose, soluble cover of macromolecules called as slime capsule
• It has a thicker, gummy nature that gives sticky characters to colonies of encapsulated bacteria.	• Slime provides greater pathogenicity to bacteria and protects them against phagocytosis.
• It is made up of repeating polysaccharides units, and of protein, or both.	• It is made up of lipids and protein usually.

Q:17 What are cyanobacteria? Also describe size, and locomotion.

Ans: Cyanobacteria: The cyanobacteria are the largest and most diverse group pf photosynthetic bacteria which was previously known as "blue green algae".

- Cyanobacteria are true prokaryotes.
- They may be unicellular, exist as colonies of many shapes, or form filaments consisting of trichomes surrounded by mucilaginous sheath.

Size of cyanobacteria:

- They range in diameter from about 1 - 10 micro meter.

Locomotion in cyanobacteria:

- They lack flagella and often use gas vesicles to move in the water, and many filamentous species have gliding motility.

Q:18 What are antibiotics? How misuse of antibiotics effect human health?

Ans: Antibiotics: Antibiotics is a Greek word ANTI, against and BIOS, life. Antibiotics are the chemotherapeutic chemical substances which are used in treatment of infectious diseases. Antibiotics are synthesized and secreted by certain bacteria, antinomycetes and fungi.

Misuse of antibiotics effect human health:

- Misuse of antibiotics such as penicillin can cause allergic reactions.
- Streptomycin can affect auditory nerve thus causing deafness.
- Tetracycline and its related compounds cause permanent discoloration of teeth in young children.

Q:19 What is the ecological importance of bacteria?

Ans: Ecological importance of bacteria:

- Bacteria are ecologically very important.
- They are highly adaptable as a group and are found nearly everywhere.
- They are able to decompose organic matter and play a significant role in the completion of cycles of nitrogen, phosphorous, sulphur and carbon.

Q:20 What is the sterilization process? How dry and moist heat are effective in killing bacteria?

Ans: Sterilization: The process in which we use physical agents to control bacteria/microorganisms is known as sterilization process. Sterilization is deduction of all life forms.

Dry and moist heat are effective in killing bacteria: Both dry and moist heat are effective.

- Moist heat cause coagulation of proteins and kills the microbes.
- Dry heat cause of oxidation of chemical constituents of microbes and kills them.

Q:21 Differentiate between Parasitic/Pathogenic bacteria and Saprophytic/Non-pathogenic bacteria.

Parasitic/Pathogenic bacteria	Saprophytic/Non-pathogenic bacteria.
• Bacteria that attack and harm their hosts while getting benefits like food, shelter reproductive space.	• Saprophytic bacteria get their food from dead organic matter.
• Bacteria that causes disease in living organisms.	• Bacteria usually do not cause disease in living organisms.
• **Examples:** *Mycobacterium tuberculosis, Shigella sp.*	• **Example:** *Colon bacilli, certain Lactobacillus sp.*

Q:22 Differentiate between Flagella and Pilli.

Flagella	Pilli
• Flagella are larger than pilli.	• Pilli are smaller flagella.
• These are extremely thin, hair like appendages. They come out through cell wall and originate from basal body, structure just beneath the cell membrane in the cytoplasm	• These are hollow, non-helical, filamentous appendages.
• They are made up of protein flagellin.	• They are made up of special protein called pilin.
• Most of bacilli and spiral shaped bacteria have flagella; cocci very rarely have flagella.	• True Pilli are only present in gram-negative bacteria
• Primary function of flagella is to help in motility. • With the help of flagella, flagellate bacteria can also detect and move in response to chemical signals which is a type of behavior called as chemotaxis.	• They are not involved in motility • They are primarily involved in a mating process between cells called conjugation process. • Some pilli function as a means of attachment of bacteria to various surfaces.

Q:23 What are plasmids? What is the role played by the plasmids?

Ans: Plasmid: Many bacteria contain plasmid in addition to chromosomes. These are the circular, double stranded DNA molecules.

- They are self-replicating and are not essential for bacterial growth and metabolism.
- They often contain drug resistant, heavy metals, disease and insect resistant genes on them.
- Plasmids are important vectors, in modern engineering techniques.

Q:24 Name the substances that bacteria store. Also name the common waste materials of bacteria.

Ans: Substances that bacteria store: Bacteria store glycogen, sulphur, fat and phosphate.

Common waste materials of bacteria: Common waste materials are alcohol lactic acid and acetic acid.

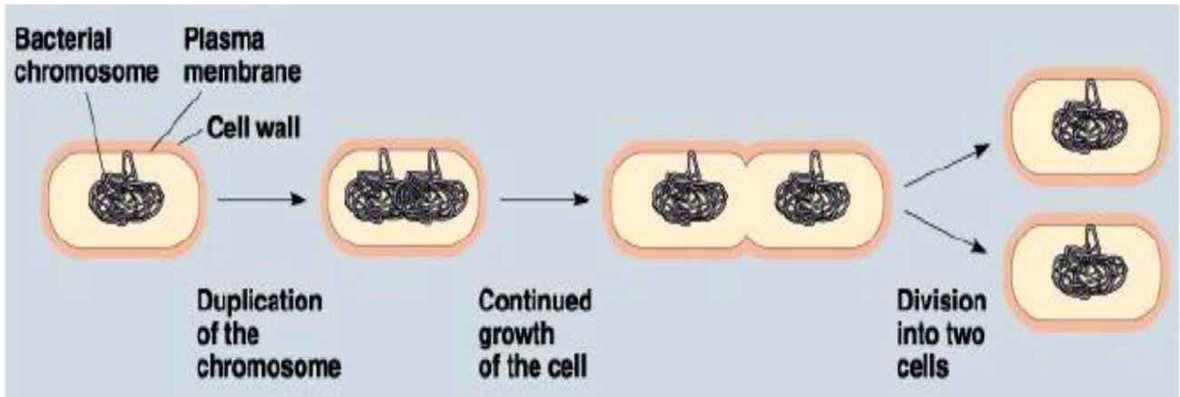
Q:25 Differentiate between Nucleus and Nucleotide.

Nucleus	Nucleotide
• Nucleus is structure where eukaryote stores their genetic information.	• Nucleoid is region where prokaryote stores their genetic information.
• It is large and well organized.	• It is small and poorly organized.
• Nucleus is surrounded by double membrane.	• Nucleoid is without such structure.
• Nucleus contains many chromosomes.	• Nucleoid generally has one circular DNA molecules.

Q:26 What is the type of asexual reproduction in bacteria?

Ans: Asexual reproduction in bacteria:

Bacteria increase in number by an asexual means of reproduction, called binary fission. In binary fission parent cell enlarges, its chromosomes duplicates, and plasma membrane pinches inward at the center of the cell. When nuclear material has been evenly distributed, the cell wall grows inward to separate cell into two.



Q:27 How electromagnetic radiations are effective in killing bacteria? And how heat sensitive compounds are sterilized?

Ans: Electromagnetic radiations are effective in killing bacteria:

Certain electromagnetic radiations below 300 nm are effective in killing of microorganisms. Gamma rays are in general used for sterilization process.

Heat sensitive compounds are sterilized:

Heat sensitive compounds like antibiotics, sears, hormones etc., can be sterilized by means of membrane filters.

Q:28 Differentiate between Micobicidal and Microbistatic effect.

Microbicidal effect	Microbistatic effect
• Microbicidal effect is one that kills the microbes immediately.	• Microbistatic effect inhibits the reproductive capacities of the cells
• It reduces the microbial population instantly.	• It maintains the microbial population at constant.
• High temperature, acids, alkalis, radiations, antibiotics, sterilization, moist and dry heat are methods used as microbicidal effects.	• Low temperatures, membrane filters, many disinfectants and antiseptics are methods used as microbistatic effects.

Q:29 What is the Hormogonia? Also differentiate between Heterocyst and Akinetes.

Ans: Hormogonia:

Hormogonia are motile filaments of cells formed by some cyanobacteria in the order Nostocales and Stigonematales.

Hetrocyst	Akinates
• All cells in trichome are mostly similar in structure but at slightly large, round, light yellowish thick walled cells called as heterocyst	• Akinetes are thick walled, enlarged vegetative cells which accumulate food and become resting cells. • On arrival of favorable conditions they form normal vegetative cells.

Q:30 Differentiate between Disinfectants and Chemotherapeutic Agents.

Disinfectants	Chemotherapeutic Agents
• The important chemical agents used for disinfection are oxidizing and reducing agents. • For example halogen and phenols, hydrogen peroxide, Potassium permanganate, alcohol and formaldehyde etc. inhibit the growth of vegetative cells and are used on non-living materials.	• Chemotherapeutic agents and antibodies work with natural defense and stop the growth of bacteria and other microbes. They destroy or inhibit the growth of microorganisms in living tissues. • These are sulfonamides, tetracycline, penicillin, etc.

Q:31 Classify the bacteria on the basis of respiration?

Ans: Respiration in bacteria:

1) **Aerobic Bacteria:** Bacteria, which are able to grow in the presence of oxygen, are called aerobic bacteria. Eg. Pseudomonas is an aerobic bacterium.
2) **Anaerobic Bacteria:** Bacteria, which can grow in the absence of oxygen are known as anaerobic bacteria. Eg. Spirochete is an anaerobic bacterium.
3) **Facultative Bacteria:** Facultative bacteria grow either in the presence or absence of oxygen. Eg. E.Coli is a facultative anaerobic bacterium.
4) **Microaerophilic Bacteria:** Some bacteria require a low concentration of oxygen for growth and are known as microaerophilic. Eg. Campylobacter is a microaerophilic bacteria.