CC2 Model Questions

Unit 1 Unit 1 Cell organization

Short questions (2 marks)

SL. No.

Why is physical damage to the cytoplasmic membrane potentially lethal for the cell?

How is a spheroplast formed?

What does the enzyme lysozyme do?

What is the composition of an S-layer?

What does the enzyme lysozyme do?

What is dipicolinic acid and where is it found?

Define the word chemotaxis.

Why does alcohol readily decolorize gram-negative but not gram-positive bacteria?

Broad questions (more than 2 marks)

Lysozyme can affect Eubacterial cell wall but cannot affect Archaebacterial cell wall. Why?

What are the major characteristic features of archaebacterial cell membrane?

Compare the flagella of Bacteria and Archaea in terms of their structure and function.

Write short note on Bacterial Porins

Draw a labelled diagram to depict the stages of bacterial sporulation

What chemical components are found in the outer membrane of gram-negative bacteria?

Draw the basic structure of a lipid bilayer and label the hydrophilic and hydrophobic regions.

Why do bacterial cells need cell walls? Do all bacteria have cell walls?

Unit 2 Bacteriological techniques

Very short answer/One word answer questions (1 mark)

SL. No.

1. Define the terms “pure culture” of bacteria.
2. In which plate method spreader is required?
3. Who developed the streak plate method for isolating pure culture?

Short questions (2 marks)

SL. No.

1. What is serial dilution?
2. Write the name of three pure culture isolation methods for aerobic bacteria.
3. Write the differences between spread plate and pour plate method?

Broad questions (3 marks each)

SL. No.

1. How will you maintain and preserve the pure culture of bacteria?
2. How will you culture the anaerobic bacteria?
3. Write a short note on the pour plate method with a simple diagram.

1. Name one epiphytic alga. 1
2. What is heterotrichous alga. 1
3. What is floridian starch? 1
4. What is the composition of flagellar root of algae? 1
5. Name one algal group where sexual reproduction is absent. 1
6. What is physiological anisogamy? Cite one example where it is found. 1
7. What is akinet? Cite an algal example. 1
8. What is diatomaceous earth? 1
9. What is kelp? 1
10. What is auxospore? 1
11. What is eye spot? Where do you find it? 2
12. Name two species of algae used in agriculture. 2
13. What is biodiesel? Where do you find it? 2
14. Name the pigment constitution of Rhodophyceae. 2
15. Name one parasitic and one saprophytic fungus. 2

16. What is the composition of fungal cell wall? 2

17. What is algal bloom? 2

18. What is dolipore septum? Where do you find it? 2

19. What is Buller phenomenon? 2

20. What is parasexuality? Give an example 8where it occurs. 2

21. Distinguish between gametangial coupulation and gametangial contact with examples. 4

22. What is heterothallism? Explain tetrapolar heterothallism. 1+3

23. Differentiate between diplontic and diplobiontic life cycles with examples. 4

24. Explain degeneration of sexuality in fungi. What is fungi imperfecti? 3+1

25. What is single cell protein? Name two potential species of algae used as single cell protein. 1+2

26. Write a note on the biosynthesis of fungal cell wall. 3

27. Write a note on hyphal modification of fungi. 4

28. Explain mitotic crossing over and haplodization with examples. 4

29. Distinguish between haplobiontic and halodiplobiontic life cycles of algae with examples. 5

30. Write with examples the types of asexual reproduction in fungi. 4

Unit 3 Microscopy

Short questions (2 marks)

SL. No.

What do you mean by the numerical aperture of a microscope?

Oil immersion objective gives a better resolved image than dry objectives in light microscopy. Explain why.

Why do electron micrographs have greater resolution than light micrographs?

What major advantage does phase-contrast microscopy have over staining?

Define the terms magnification and resolution.

Broad questions (more than 2 marks)

Diagrammatically represents the mechanism of image formation in bright field microscopy.

Describe the working principle of Phase contrast microscope

Write the differences between TEM and SEM

Unit 4 Growth & Nutrition

Short questions (2 marks)

SL. No.

1. Define culture media. Give one example
2. Define pure culture. Between broth & solid media which one is used to isolate pure culture.
3. Mention two differences between synthetic & complex media.
4. Mention two reasons why bacto-agar is used as a solidifying agent.
5. Define macro-elements & microelements with examples.
6. Explain enrichment media with a suitable example.
7. What is pasteurization? Between bulk and flash pasteurization, which one is more effective & why?
8. Name two media which are widely used for detecting *E.coli* & other related bacteria in water supplies. Which material is present there which favors the growth of gram negative bacteria over gram positive.
9. Compare defined media with complex media.
10.. Explain why MacConkey agar is a selective and differential medium.
11. Classify the microbes according to the source of requisite energy.
12. Compare membrane filter with depth filter.
13. Mention the effect of UV radiation on microbial growth.
14. Why is moist heat more effective than dry heat during sterilization?
15. Define decimal reduction time (D value). How do antimicrobial agents affect D value?
16. Define a single colony. Why do we isolate a single colony from a mixed culture?
17. Which macromolecule is the most abundant in a cell? What is the effect of short supply of nutrients on microbial growth?
18. Give an example of one photolithoautotroph & one chemolithoheterotroph.

Broad questions (more than 2 marks)

1. Name the methods for single colony isolation. Why is serial dilution needed before doing the methods?
2. Explain why autoclaving is the best method for sterilization.
3. Mention the factors that influence the effectiveness of growth controlling agents.
4. Mention the mode of action of i) Ethylene oxide i) iodine iii) phenol iv) quaternary ammonium compound
5. Explain how the following media are used as selective and differential i) Manitol salt agar ii) McConkey agar

Unit 5 Reproduction in Bacteria

Very short answer/One word answer questions (1 mark)

SL. No.	
1.	Define generation time.
2.	What are secondary metabolites?
3.	What do you mean by coenocytic microorganism?
4.	Define mean growth rate constant.
5.	Name a halophile.
6.	What is a batch culture?
7.	Define growth.
8.	What is shift down experiment?
9.	What do you mean by limiting nutrients?
10.	When can a culture have a long lag phase after inoculation?
11.	Define piezophile?
12.	Give an example of a hyperthermophile.
13.	What are persister cells?

Short questions (2 marks)

SL. No.	
1.	Why are generation times in nature usually much longer than in culture?
2.	What is the function of bactoprenol?
3.	Why are plate count results often expressed as colony forming units?
4.	Define balanced growth and unbalanced growth.
5.	Distinguish between barotolarent and barophilic microorganisms with suitable examples.
6.	Define oligotrophic and copiotrophs.
7.	Why do microorganisms enter the stationary phase?
8.	Starvation can be a positive response for bacteria. Explain?
9.	How to tell whether a bacterial culture is viable or not?
10.	Would you expect generation time to be a constant characteristic of a bacterial species? explain.
11.	During the lag phase the number of bacterial cells remains constant. Does this mean that the cells are dormant?
12.	By how many ways bacteria reproduce?
13.	Which factors decide the length of the lag phase?
14.	What are VBNC bacteria?
15.	Which phase is used for physiological studies and why?

Broad questions (more than 2 marks)

SL. No.	
1.	What are the factors that regulate growth?
2.	Explain phases of the growth curve with the help of a diagram.
3.	Write a note on binary fission with a proper diagram.
4.	What is the potential importance of a growth curve?
5.	If the generation time is 90 min and the initial population contains 10^3, how many bacteria will be there after 8 hrs of exponential growth?
6.	Calculate the mean growth rate and generation time of a culture that increases in the exponential phase from 5x10^2 to 1x10^8 cells in 12 hrs.
7.	Describe diagrammatically stages of binary fission.

8. Give the Mathematical expression of growth explaining the concept of growth in bacteria.

9. What is the function of the following proteins in cell division
a)Min E
b) Fts Z
d)Mre
c)FtsI

Unit 6: Bacterial Systematics

SL. No.

1. Define protobiont.

2. How can RNA be considered as elixir molecule of primitive life?

3. Compartmentalisation is the basis of formation of early life- justify.

4. State two approaches each of metapopulation & ecotype model in explaining the evolutionary path.

5. Explain Punctuated equilibrium & Concept of Neutral mutation hypotheses of evolution.

6. Cite two justifications of endosymbiont hypothesis of formation of eukaryotic cells.

7. What is the basis of hydrogen hypothesis?

8. State two similarities & two dissimilarities of bacteria and archaea.

9. Define the terms: a) Strain, b) Type strain, c) Biovar, d) Morphovar

10. What is FAME analysis? Explain the probable information obtained from this analysis.

11. Mention & explain two Molecular approaches in identification of characters of bacteria.

12. State the difference between orthologous & paralogous sequences.

13. What are the optimality criteria and algorithms used for phylogenetic tree construction?

14. Cite three differences between global & local sequence alignment.

Unit 7:Important archaeal and eubacterial groups

Very short answer/One word answer questions (1 mark)

SL. No.

1. Low G+C Gram positive bacteria placed in which phylum?
2. High G+C Gram Positive bacteria placed in which phylum?
3. Name the two classes of Low G+C endospore forming bacteria.
4. Write the causative agents of Botulism and Tetanus
5. In which *Bacillus sp* parasporal body is found?
6. Which bacteria is used as a probiotic agent for health benefits?
7. What is Cyanobacteria?

Short questions (2 marks)

SL. No.

1. Based on phylogenetic relationship Gram positive bacteria will be divided into how many groups and what are the names of the groups?
2. Define the terms “MRSA” and “VRSA”.
3. Write the two genera of the family Streptococcaceae.
4. Write a few lines about Cyanobacterial toxins.
5. Write the use of Spirulina

Broad questions (more than 2 marks)

SL. No.

1. Write the characteristic differences of streptococci,Enterococci and lactococci? 3

2. What is the difference between alpha haemolysis and beta haemolysis? 3

3. List the major properties that define the genus Lactobacillus. In what ways are species important in food and dairy industries? 2+2=4

4. Mention the names of major phyla in the domain archaea.

5. Compare the properties of *Sulfolobus* & *Thermoproteus* briefly.

6. What are extreme halophiles? Discuss the role of compatible solute concept in maintaining the structure of halophiles.

7. Describe the actual function of bacteriorhodopsin.

8. Where do we find methanogens in nature?

9. Classify methanogens on the basis of biochemical requirement of substrates.

10. What are the various orders of methanogens? Give one example of each order.

11. Enlist the coenzymes required for methanogenesis with proper functions.

12. How pesudomurein is different from murein? Explain with chemical structure.

13. Write short note on: a) S-Layer, b) Nanoarcheota, c) Rickettsia, d) Zooglea, e) Properties of Salmonellae, f) Bdellovibrio, g) *Streptomyces sp*., h) Propionic acid bacteria,

14. What is lipoglycan? How does the tetraether molecules stabilize the archaeal structure at high temperatures?

15. Mention the unique feature of *Picrophilus*.

16. Describe the strategies for high temperature adaptation of archaea briefly.

17. State a few properties of actinobacteria.

18. Compare & contrast between *Beijerinckia* sp. & *Rhizobium radiobacter*.

19. Cite two properties of Purple Sulphur bacteria.

20. Explain the utility of oxidase & catalase tests in detection of members of enterobactericeae.

21. What do you mean by lactic acid & mixed acid fermentation?

22. Why does *Serratia sp.* look red?

23. Mention some important features of the genus *Pseudomonas*.

24. What is the difference between pseudomonad & pseudomonas?

25. Define myxospore.

26. Cite the properties of the member of ξ proteobacteria.

27. How is the acid fast property attributed to Mycobacteria? What is cord factor?

28. What are the major virulence factors of streptococci?

29. Mention the important features of the genus Staphylococcus.

30. What are the antibiotics produced by Bacillales & Clostridiales?

31. Define ‘Cellulosomes’.

32. Give some examples of pathogenic members of the genus Clostridium with diseases they cause.

33. Describe the various specialized structures formed by cyanobacteria.

34. What is Ladderane lipid? State it's utility.

35. Mention the environmental benefits of annamox reaction.