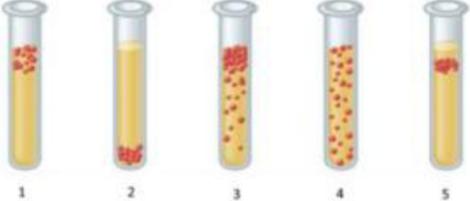


Q10	Define Nitrogen fixation.	1.5	CO1
Q11	State True or False: Microbial growth is the result of both cell division and change in cell size.	1.5	CO1
Q12	Calculate the generation time, if 20 bacterial cells growing logarithmically for 2 hours produced 2×10^4 cells.	1.5	CO4
Q13	State the difference between a facultative aerobe and a facultative anaerobe.	1.5	CO1
Q14	State the purpose of carboxysomes in oxygenic prokaryotes.	1.5	CO3
Q15	Mention archaeal variations of the ED pathway.	1.5	CO3
Q16	Identify which metabolic group can obtain energy from the transfer of electrons originating from chemical compounds and their carbon from an inorganic source? (a) chemoautotroph (b) chemoheterotroph (c) photoheterotroph (d) photoautotroph	1.5	CO2
Q17	In prokaryotes, which of the following is true? (a) As electrons are transferred through an ETS, H^+ is pumped out of cell. (b) As electrons are transferred through an ETS, H^+ is pumped into cell. (c) As protons are transferred through an ETS, electrons are pumped out of cell. (d) As protons are transferred through an ETS, electrons are pumped into the cell.	1.5	CO1
Q18	Match the following: (a) <i>Bacillus</i> (I) Obligate Anaerobes (b) <i>Clostridium</i> (II) Aerobes and Aerotolerant (c) <i>E. coli</i> (III) Facultative Anaerobes	1.5	CO2
Q19	State a reason why O_2 is not produced during anoxygenic photosynthesis.	1.5	CO2
Q20	Comment on requirement of reverse-electron flow in purple bacteria.	1.5	CO3
Section B (4Qx5M=20 Marks)			
Q1	Primary stock of a given vitamin C (M_w 176.12) solution is 1 mM. Calculate and explain preparation of 100 ml media containing 1 nM Vitamin A.	5	CO4
Q2	Classify microorganisms based on their C and energy sources with examples.	5	CO2
Q3	Discuss the advantages of pentose-phosphate pathway compared to glycolysis.	5	CO2
Q4	Design an experiment to test the effects of pH on microbial growth.	5	CO4
Section C (2Qx15M=30 Marks)			
Q 1	(a) Define Cardinal temperatures. (1 Mark) (b) State how cardinal temperatures affect microbial growth. (4 marks) (c) Mention the cardinal temperatures of <i>E. coli</i> . (1 Mark) (d) Describe the various temperature classes of microorganisms with examples and discuss molecular adaptations of psychrophiles. (09 marks).	15	CO5

Q2	Explain the various direct and indirect methods used for measurements of microbial growth and discuss their advantages and disadvantages.	15	CO3
Section D (2Qx10M=20 Marks)			
Q1	 <p>(a) Explain the principle of a culture-based assay to test oxygen requirements of various microorganisms. (2.5 marks)</p> <p>(b) Discuss oxygen requirements of microorganisms growing in above culture tubes (1-5). (7.5 marks)</p>	10	CO3
Q2	<p>(a) Define Specific growth rate and generation time. (02 Marks)</p> <p>(b) Derive a mathematical relationship for calculation of specific growth rate and generation time of <i>E coli</i> cells growing in batch cultures. (08 Marks).</p>	10	CO1