1. a) Describe any simple test to differentiate lipids from other biomolecules.   [1]
    b) How are lipids classified?   [2]
    c) Write down the structures of :   [3×1]
        i)   Caproic acid
        ii) Palmitoleic acid
        iii) Any one prostaglandin

2. a) Define 'carrier' and 'tracer'.   [1+1]
    b) Deduce a relation between decay constant (λ) and half life of a radioactive substance.   [3]
    c) Define 'average life' of a radioactive molecule.   [1]

3. a) What is linking number of a DNA molecule? The linking number is an integer but the twist and writhing number may or may not be an integer. Explain this mathematically.   [1+3]
    b) In Messelson Stahl's experiment on semiconservative replication of DNA, the intermediate buoyant density of a DNA sample taken after first generation of growth a *E.coli* sample in ^{14}N medium also supports the dispersive mode of replication. How did they present evidence to nullify this mode of replication?   [2]

4. a) Mitochondria are termed as 'semi-autonomous' cell organelles. —Explain.   [2]
    b) Define the term mitochondrial biogenesis.   [1]
    c) Compare between mitochondrial DNA and chloroplast DNA.   [2]

5. Prove that correlation coefficient 'r' lies between −1 and +1.   [5]

6. a) What do you mean by growth factor? Give an example.   [2+1]
    b) Write down the differences between microaerophilic and aerotolerant organisms with suitable examples.   [3]

7. a) Define exponential phase of bacterial growth.   [1·5]
    b) Explain what will happen if a bacterial culture at stationary phase is inoculated into a high nutrient media.   [1]
    c) Derive the bacterial growth equation and define the generation time of growth.   [1·5+1]

8. a) Glucose and fructose give the same osazone— Justify the statement.   [2]
    b) What do you mean by inversion of sugar?   [2]
    c) How will you convert glucose to glucouonic acid?   [2]

9. a) State Lambert's and Beer's Laws.   [2]
    b) Define the term molar extinction coefficient.   [1]
    c) What are the factors that can affect the absorption patterns of a protein in solution?   [2]

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