This question paper contains **3** printed pages]

Roll No. | | | | | | | | | | | |

S. No. of Question Paper : **5595**

Unique Paper Code : **2532012402**

Name of the Paper : **Microbial Physiology and Metabolism-II**

Name of the Course : **Microbiology**

Semester : **IV, Part-II**

Duration : **3 Hours** Maximum Marks : **90**

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt any *five* questions.

All questions carry equal marks.

Attempt *all* parts of a question together.

1. (*a*) List various physiological groups of aerobic chemolithotrophic bacteria citing suitable examples. Write the reactions catalysed during the energy generation process by the respective groups. (4+4=8)

(*b*) Explain the mechanism of carbon dioxide fixation in green bacteria with the help of a diagram. (7)

(*c*) Give an example of the following (any *two*) : (2×1.5=3)

(*i*) Methylotrophic methanogen

(*ii*) Free living nitrogen fixed

(*iii*) Denitrifier

P.T.O.

2. (*a*) Differentiate between the following (any *two*) : (2×6=12)

   (*i*) Cyclic and non-cyclic photophosphorylation

   (*ii*) Assigmilatory and dissimilatory nitrate reduction

   (*iii*) Homo- and hetero-lactate fermentative pathways.

   (*b*) How does *E. coli* assimilate ammonia at high and low concentrations in the environment ? (6)

3. (*a*) Write the reactions catalyzed by the following enzymes (any *six*) : (6×2.5=15)

   (*i*) Transketolase

   (*ii*) Phosphoribulokinase

   (*iii*) Pyruvate decarboxylase

   (*iv*) Phosphopentose empimerase

   (*v*) RUBISCO

   (*vi*) Fructose 1,6 bis-phosphatase

   (*vii*) Acetaldehyde dehydrogehase.

   (*b*) Differentiate between anaerobic respiration and fermentation. (3)

4. (*a*) Write short notes on any *two* of the following : (2×6=12)

   (*i*) Barker's scheme of methanogenesis

   (*ii*) Pigment organization in phototrophs

   (*iii*) Nitrogenase protection from oxygen toxicity.

   (*b*) Describe Pasteur effect. Explain its molecular basis. (3+3=6)

5. (*a*) Explain the mechanism and significance of hydrogenases found in hydrogen oxidizers. (6)

(*b*) Describe the mechanism of action and properties of the enzyme nitrogenase. (6)

(*c*) Describe the photosynthetic electron transport in cynanobacteria with the help of a suitable diagram. (6)

Or

Write the contributions of the following scientists : (2×3=6)

(*i*) R. Hill

(*ii*) Carnahan and co-workers

(*iii*) S. Winogradsky.

6. (*a*) A branched fermentation pathway provides an organism with greater thermodynamic efficiency. Justify the statement. (6)

(*b*) Describe the significance of absorption and action spectra in understanding the mechanism of photosynthesis. (6)

(*c*) Explain the process of reverse electron transport. (3)

(*d*) Give an account of alternate nitrogenases *or* physiological regulation of nitrogenase. (3)