



2. (a) Differentiate between the following pairs (**Any three**) :
- (i) Passive and Facilitated Diffusion
  - (ii) Batch and Continuous Culture
  - (iii) Cyclic and Non-Cyclic Photophosphorylation
  - (iv) Thermophiles and Psychrophiles (4×3=12)
- (b) Giving a suitable example and explain how is methane generated during metabolism in methanogens. (3)
3. (a) Write short notes on the following (**Any three**) :
- (i) ABC Transporter
  - (ii) Synchronous Growth
  - (iii) Hydrogen Oxidizers
  - (iv) Methods for determination of Microbial Cell Mass (4×3=12)
- (b) Explain any one contribution of the following scientists (**Any two**) :
- (i) W. Stoeckenius
  - (ii) S. Winogradsky
  - (iii) R. Emerson (1.5×2=3)
4. (a) Write balanced chemical equations catalyzed by following enzymes (**Any six**) :
- (i) Transketolase
  - (ii) PGAL – Dehydrogenase

(iii) Phosphoribulokinase

(iv) PEP-Synthetase

(v) ATP-Citrate lyase

(vi) Hydrogenase

(vii) Fumarate Reductase (1.5×6=9)

(b) How does pH influence the growth of microorganisms? Classify organisms into various groups on the basis of their preferences for pH. Describe the mechanism/s such microbes possess to maintain a neutral cellular pH. (2+2+2=6)

5. (a) Explain the mechanism of nutrient uptake by PEP-PTS in microorganisms. (4)

(b) Define chemolithotrophy. Classify aerobic chemolithotrophs into physiological groups with examples. (5)

(c) Write about the factors that affect the length of the lag phase during the growth of microorganisms. (3)

(d) Give an example of each of the following :

(i) Hyperthermophile

(ii) Barophile

(iii) Compatible Solute (1×3=3)

6. (a) How do aerobes and other oxygen tolerant microbes protect themselves from oxygen toxicity? Explain briefly. (4)

- (b) Write an account of siderophores and their role in microbial metabolism ? (4)
- (c) What is the function of LHCs and RCs in photosynthesis ? (3)
- (d) Describe the mechanism of photosynthesis in *Halobacterium helobium*. (4)