

B.Tech 3rd Semester Exam., 2021
(New Course)

BIOLOGY FOR ENGINEERS

Time : 3 hours

Full Marks : 70

Instructions :

- (i) The marks are indicated in the right-hand margin.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all.
- (iv) Question No. 1 is compulsory.

1. Choose the correct answer of the following
(any seven) : $2 \times 7 = 14$

(a) A genetically engineered micro-organism used successfully in bioremediation of oil spills is a species of

- (i) *Trichoderma*
- (ii) *Bacillus*
- (iii) *Pseudomonas*
- (iv) *Xanthomonas*

- (b) Which one is a hereditary disease?
 - (i) Cataract
 - (ii) Leprosy
 - (iii) Colour blindness
 - (iv) Phenylketonuria

- (c) Which of the following is responsible for phosphate solubilization?
 - (i) *Streptococcus*
 - (ii) *Streptomyces*
 - (iii) *Bacillus*
 - (iv) *Clostridium*

- (d) What is the concentration of H^+ in a solution of 0.1 M NaOH?
 - (i) 10^{-14} M
 - (ii) 10^{-10} M
 - (iii) 10^{-13} M
 - (iv) 10^{13} M

(e) Mendel's dihybrid phenotypic ratio is

(i) 1:1:1:1

(ii) 3:1

(iii) 9:3:3:1

(iv) 9:1:1:5

(f) The bread wheat, *Triticum aestivum*, that is commonly used all over the world, is

(i) hexaploid

(ii) tetraploid

(iii) triploid

(iv) diploid

(g) Inheritance of ABO blood group illustrates

(i) endoploidy

(ii) multiple allelism

(iii) polyploidy

(iv) incomplete dominants

(h) Yield coefficient represents

(i) total biomass or product produced

(ii) conversion efficiency of a substrate into product

(iii) conversion rate of a substrate into biomass or product

(iv) production time of biomass or product

(i) Which ratio is constant of DNA?

(i) $A+G/T+C$

(ii) $A+T/G+C$

(iii) $A+C/U+G$

(iv) $A+U/C+G$

(j) All alleles originate from

(i) mutations

(ii) cross over

(iii) gene flow

(iv) non-disjunction

(5)

2. Write the answer in very brief of the following : $3\frac{1}{2}\times 4=14$

- (a) What is basic principle of flying of bird and aircraft?
- (b) Define epistasis.
- (c) Classify about types of proteins.
- (d) How can you say that RNA is a genetic material?

3. Write the answer in very brief of the following : $3\frac{1}{2}\times 4=14$

- (a) Define term of complementation.
- (b) Define term of secondary structure of protein. <https://www.akubihar.com>
- (c) Define endothermic reaction in biological systems.
- (d) Define growth kinetics.

4. Write the answer in short of the following : $7\times 2=14$

- (a) Differentiate between autotroph and heterotroph organisms.
- (b) What are dominant traits in living organism?

(6)

5. Write the answer in short : $7\times 2=14$

- (a) What is the need of study of biology for an engineer?
- (b) Write the principle of light microscope used for observation of cell.

6. Write the answer in short of the following : $7\times 2=14$

- (a) Discuss about how biological discovery in 20th century led to major investigation in environmental science.
- (b) Deliberate about the gene interaction and epistasis.

7. Write the answer in short of the following : $7\times 2=14$

- (a) How can you say that proteins act as structural elements of a living cell?
- (b) Differentiate between photosynthesis and respiration in plant.

(7)

8. Explain that all forms of life have the same building blocks but create diversification. 14
9. How can you say that genetics is to biology and Newton's laws are to physical sciences? 14
