RAMAKRISHNA MISSION VIDYAMANDIRA
(Residential Autonomous College affiliated to University of Calcutta)
B.A./B.Sc. SIXTH SEMESTER EXAMINATION, JUNE 2022
THIRD YEAR [BATCH 2019-22]
Date : 13/06/2022
MICROBIOLOGY (HONOURS)
Time : 11 am – 1 pm
Paper : DSE3
Full Marks : 50

1. Answer **any ten** of the following questions: [10×2]

   a) What are renewable and non-renewable energy? Explain with example.

   b) Differentiate between 'biofuel' and 'fossil fuel'.

   c) Why is lignocellulosic biomass considered as a better alternative for the production of biofuels?

   d) Name some byproducts produced during ethanol production from biomass.

   e) What is 'biodiesel'?

   f) What do you mean by PAM 60?

   g) Why does Margaret Dayoff is famous?

   h) What is biological database?

   i) What are specialized databases?

   j) Write down the full form of EMBL and DDBJ.

   k) What do you mean by multiple sequence alignment?

   l) What is bit unit?

   m) Write down the relationship between PAM and BLOSUM matrix.

   n) What do you mean by database similarity searching?

   o) Differentiate between local alignment and global alignment process.

Answer **any three** of the following questions: [3×10]

2. a) Mention advantages and disadvantages of biodiesel.

   b) Discuss the importance of 'enzyme catalyzed transesterification' in biodiesel production.

   c) "Lignin has negative impacts on biofuel production"-Explain. (3+3+4)

3. a) Briefly describe the 'pretreatment' process during ethanol production from lignocellulosic biomass.

   b) What is 'biogas'. Discuss the various parts of a typical biogas plant.

   c) Describe various techniques used for cultivating algae to be used for biofuel production. (3+4+3)

4. a) What do you mean by BLOSUM 60 matrix?

   b) When will be alignment score zero, negative and positive in BLOCK database searching?

   c) Suppose you have been asked to retrieve the complete genomic/cDNA/mRNA sequence of the actin gene from pea aphid. Explain your step by step protocol. (2+3+5)

5. a) Differentiate sequence homology with sequence similarity with proper example.

   b) Explain substitution matrix in terms of DNA sequence alignment.

   c) In Dot matrix, what could be the different possibilities to interpret the alignment between two DNA sequences? (3+3+4)

6. a) Differentiate between PAM and BLOSUM matrix.

   b) What could be your assumption in BLAST result based on the following E values:

      i) $E < 1e - 50$ (or 1×10^{-50})

      ii) E is between 0.01 and $1e - 50$,

      iii) E is between 0.01 and 10

      iv) $E > 10$

   c) Give the statistical significance of the following FASTA Z score:

      i)   Z-score > 15,

      ii) Z is in the range of 5 to 15

      iii) $Z < 5$ (3+4+3)

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