|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27** | | | | | | |
| **B.Sc. MICROBIOLOGY – II SEMESTER** | | | | | | |
| **SEMESTER EXAMINATION: APRIL 2018** | | | | | | |
| **MB 216: Biophysics, Biochemistry and Microbial Diversity** | | | | | | |
|  |  |  |  |  |  |  |
| **Time- 2 1/2 hrs** | |  | **Max Marks-70** | | |  |
|  |  |  |  |  |  |  |
| **This paper contains 2 printed pages and 4 parts**  (For supplementary candidates)  Do not write the register number on the question paper  Please attach the question paper along with the answer script.  **I. Answer any FIVE of the following 5x3=15**  1. What is the hierarchy of protein structural organization?  2. Write the principle of electrophoresis? Which electrophoretic technique is used for separation of  a) DNA and b) Proteins?  3. Are there other possible conformations of the double helix (B-DNA)? If yes, what are reasons for  their occurrence?  4. What are the benefits of phycobiont and mycobiont in lichen mutualism?  5. Define: a) co-factors b) apoenzyme c) holoenzyme  6. What is the pH of a mixture of 0.042M NaH2PO4 and 0.058M Na2HPO4 (pKa = 6.86)?  7. Calculate the decay constant of 32P. The half-life of 32P is 14.2 days.  **II. Answer any FIVE of the following 5x5=25**  8. List the negative microbial interaction and briefly explain two of them.  9. a. Draw a typical cloverleaf structure for transfer RNA?  b. Explain the Lambert-Beers law.  10. Prokaryotes were classified phenetically in the first edition of Bergey’s Manual of Systematic  Bacteriology whereas microbial classification in the second edition was largely phylogenetic*.*  What do you think are the advantages and disadvantages of the phylogenetic classification used  in the second edition?  11. How are lipids classified based on their chemical composition? MB-216-A-17  12. a. What is the appropriate molecular weight of a protein with 550 amino acid residues in  a single polypeptide chain?  b. Trehalose, a disaccharide produced in fungi, has the followingstructure:    Is trehalose a reducing sugar? Explain.  13. Explain indirect methods of autoradiography and the reasons for its use.  14. Explain how do we calculate Km and Vmax from a graph?  **III. Answer any TWO of the following 2x10=20**  15. a. Draw the general structure of an amino acid? Classify amino acids on the basis of their R  groups.  b. What is numerical taxonomy and why are computers so important in this approach?  16 a. Differentiate between fibrous and globular protein.  b. List the type of chromatographic techniques you have studied and briefly discuss their  principles.  17 a. Explain in detail the adaptation strategies of psychrophiles and thermophiles.  b. Illustrate diagrammatically the titration curve of a monoprotic acid.  **III. Answer the following 1x10=10**  18.a. A series of DNA hybridization experiments were performed in which the DNA of two given  organisms were separated into single stands. Then the two organisms single stranded DNA  was incubated together, and the percentage that hybridized (combined with that of the other  species) were determined. From the data given, which two species are probably most closely  related? Reason your answer.   |  |  | | --- | --- | | **Species** | **Percentage hybridization** | | A and B | 50 | | A and C | 53 | | B and C | 75 |   b. If you raise the temperature of an enzyme catalyzed reaction, what would you expect to  happen? | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |
|  | | | | | | |

7. t1/2 = 0.693 / K

Therefore, K = 0.693 / 14.2 = 0.0488 days-1

**(1 mark for the equation and 2 mark for solution)**

14. *K*M

and*V*max can be estimated by plotting the velocity versus [S].

However, a more accurate way is to make a Lineweaver–Burk

plot of 1/*V* versus 1/[S]. With such a graph, the *y* intercept

yields 1/*V*max, which can then be converted to *V*max. The *x*

intercept is –1/*K*M, which can also be converted to *K*M.