STELLA MARIS COLLEGE (AUTONOMOUS) CHENNAI –600 086
(For candidates admitted during the academic year 2011-12)

SUBJECT CODE: 11BY/PE/BB24

M. Sc. DEGREE EXAMINATION, APRIL 2012
BIOTECHNOLOGY
SECOND SEMESTER

COURSE : ELECTIVE
PAPER : BIOPHYSICS & BIOSTATISTICS
TIME : 3 HOURS **MAX. MARKS: 100**

SECTION – A

ANSWER ALL THE QUESTIONS **(20 x 1 = 20)**

1. What are anomers?
2. Define signal transduction.
3. What are supramolecules?
4. Write a note on H DNA
5. Define Anfinsen's principle.
6. Give the structure of the ATP molecule.
7. Explain the m/z ratio.
8. Give one limitation of using CD/ORD to identify protein structure.
9. Glucose + Pi → Glucose-6-phosphate + H2O (Go'=13.8 kJ./mol)
   ATP + H2O → ADP + Pi (Go'= -30.5 kJ/mol)

   What is Go' for
   Glucose + ATP → Glucose-6-phosphate+ ADP
10. What are chylomicrons?
11. Given (RT/F = 58 at T = 20 C) use the Nernst equation to calculate the equilibrium membrane potential for potassium (K+) ions if the concentration outside the cell is 20mM and the concentration inside the cell is 300mM.
12. Differentiate between Type I and Type II error
13. What is a histogram?
14. What is the difference between random sampling and systemic sampling methods?

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15. What is the mode of the following distribution.
    2,1,3,4,7,9,1,1,3,1,5,1,6,8,9,1,5,14,1,7,5,1.
16. The value of R^2 is only between -1 and +1 . True or False.
17. Define Null hypothesis.
18. The arithmetic mean is computed by
    a. finding the value that occurs most often.
    b. finding the middle observation and dividing by 2.
    c. summing the values and dividing by the number of values.
    d. electing the value in the middle of the data set.
19. What is degree of freedom?
20. What is the test used to compare the variance of two different samples from the same population?

SECTION – B

ANSWER ANY FOUR QUESTIONS IN ABOUT 600 WORDS (4x 10 = 40)

21. A genetics engineer was attempting to cross a tiger and a cheetah. She predicted a phenotypic outcome of the traits she was observing to be in the following ratio 4 stripes only: 3 spots only: 9 both stripes and spots. When the cross was performed and she counted the individuals she found 50 with stripes only, 41 with spots only and 85 with both. According to the Chi-square test, did she get the predicted outcome?

22. Researchers want to examine the effect of perceived control on health complaints of geriatric patients in a long-term care facility. Thirty patients are randomly selected to participate in the study. Half are given a plant to care for and half are given a plant but the care is conducted by the staff. Number of health complaints is recorded for each patient over the following seven days. Compute the appropriate t-test for the data provided below.

Control over Plant	**No Control over Plant**
23	35
12	21
6	26
15	24
18	17
5	23
21	37
18	22
34	16
10	38
23	23
14	41
19	27
23	24
8	32

23. a) The following table shows the grouped data, in classes, for the heights of 50 people.

height (in cm) - classes	**frequency**
120 <- 130	2
130 <- 140	5
140 <- 150	25
150 <- 160	10
160 <- 170	8

Calculate the mean height and standard deviation.

b) Explain any four different types of sampling methods.

24. Discuss the role of ATP in biological activities.
25. Explain the different levels of protein structure.
26. Explain the process of protein folding

SECTION – C

ANSWER ANY TWO QUESTIONS IN ABOUT 1500 WORDS (2x20=40)

27.

a) Is there a significant relationship between the number of petals on a flower and how much the plant weighs?

Petals	Weight
18	1
15	7
8	11
6	6
4	18
2	22

b)

1) What are the characteristics of a good table?
2) Give any five applications of statistics in biology.

28. Explain the instrumentation, working and applications of XRD.
29. Explain active and passive transport. Add a note on Donnan equilibrium.
30. In an education experiment it was predicted that students will learn biology most effectively with a constant background sound, as opposed to an unpredictable sound or no sound at all. She randomly divides twenty-four students into three groups of eight. After studying, all students take a 10 point multiple choice test over the material. Their scores follow, perform an one way ANOVA for the same.

group	test scores							
1) constant sound	7	4	6	8	6	6	2	9
2) random sound	5	5	3	4	4	7	2	2
3) no sound	2	4	7	1	2	1	5	5

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