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Roll No..................

B.Sc.(Bio-Tech.)-I Yr.

NS-3461

B.Sc.(Bio-Tech.) Examination, May 2017

Bio-Mathematics and Bio-Statistics

(B-107)

(New)

Time : Three Hours]   *[Maximum Marks : 50*

Note : Attempt any **five** questions. Each question carries 10 marks.

1. (a) Define the following terms—   5
    - (i) Finite set
    - (ii) Proper subset
    - (iii) Super set
    - (iv) Universal set
    - (v) Singleton set

    (b) If $A = \{x \in N : x < 6\}$ 5

    $B = \{x : x^2 \le 10, x \in z\}$

    $C = \{2, 4, 6, 8, 10\}$

    Find (i) $A \cap (B - C)$

    (ii) $(A - B) \cup (C - B)$

P.T.O.

2. (a) Define linear function with example.   5

    (b) Evaluate

    $$\lim_{x \to 2} \frac{x^2 - 3x + 2}{x^2 - 4}$$ 5

3. (a) Find the value   5

    (i) $\frac{d}{dx}\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2$

    (ii) $\frac{d}{dx} x^3 \log x$

    (b) Evaluate :   5

    (i) $\int \frac{\cos x}{\sin^2 x} dx$

    (ii) $\int (x+1)(x+2)^2 dx$

4. (a) Find the term independent of x in the expansion of $\left(\frac{3}{2}x^2 + \frac{1}{3x}\right)^9$ by using Binomial theorem.   5

    (b) (i) Show that

    $$\log 25 + 2\log 3 - 3\log 2 = \log\frac{225}{8}$$

    (ii) Find the value   5

    $\log_{10} 5$ given that

    $\log_{10} 2 = 0.3010$

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5. (a) Write a note on the merits and demerits of the arithmetic mean. 5

(b) Write a note on graphical representation of data. 5

6. (a) Three light bulbs are chosen at random from 15 bulbs of which 5 are defective. Find the probability that :

(i) none of defective 5

(ii) exactly one is defective

(iii) at least one is defective

(b) Three machines A, B and C produce respectively 50%, 30% and 20% of the total produce of a factory. The percentages of defective output of these machines are 3%, 4% and 5%. If an item is selected at random, find the probability that it is defective. 5

7. What is the relation between Normal and Binomial distribution. 10

Let x be binomially distributed random variable with mean=1 and variance = 0.9 compute $P[3 \leq x \leq 5]$.

(a) What do you understand by t-test? Describe their practical importance. 5

(b) The following table gives the number of units of an article produced daily (for same days) by two labourers A and B.

A	48	30	38	41	38	35		
B	39	38	41	33	32	39	40	34

can these results be treated as sufficient evidence that labourer B is more stable? 5

[5% value of F at $v_1 = 5$, $v_2 = 7$ is 3.97]

Explain the Completely Randomised Design and Ramdomised Block Design. Give their advantages and disadvantages. 10

9. (a) Two lines of regression are given by $x+2y-5=0$ and $2x+3y-8=0$ and variance of $x=12$. Calculate the values of $\bar{x}, \bar{y}, \sigma_y^2$ and r. 5

(b) Define z-test and its practical importance. 5