BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION MO/SP20)**

CLASS: MSC   SEMESTER : I
BRANCH: BT   SESSION : MO/2022

SUBJECT: BT404 MATHEMATICS AND STATISTICS FOR BIOLOGISTS
TIME: 03 HOURS   FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. **Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

Q.1(a)   What is Venn diagram?   [2]
Q.1(b)   Find the matrix multiplication   [3]

$$\begin{bmatrix} a & b & c \\ d & e & f \end{bmatrix} \times \begin{bmatrix} 1 & 4 \\ 2 & 5 \\ 3 & 6 \end{bmatrix}$$

Q.1(c)   Calculate arithmetic mean and mode of the following distribution: [5]

Class limits	15-25	25-35	35-45	45-55	55-65	65-75
Frequency	4	11	19	14	0	2

Q.2(a)   What is Null hypothesis?   [2]
Q.2(b)   What is Type I and Type II error, One tail and two tail test?   [3]
Q.2(c)   Of 160 offspring of a certain cross between guinea pigs, 102 are red, 24 are black, and 34 are white.   **[5]**
         According to a genetic model the probabilities of red, black and white are respectively 9/16, 3/16
         and ¼. Test at 2% significance level that if the data is consistent with the model. (X2>5.99)=0.05

Q.3(a)   Proof with an example that integration is "differentiation in reverse".   [2]
Q.3(b)   Find the limit of following   [3]
         (i) $\lim_{x-2} (3x^2+5x-9)$ (ii) $\lim_{x-5} (x^2-25)/(x^2+x-30)$
Q.3(c)   Integrate the function (i) $f(x)=2x \sin(x^2+1)$ (ii) $f(x)=4x^3-3/x^4$ [5]

Q.4(a)   What is HIV?   [2]
Q.4(b)   State about Ludeking-piret model with graph representation.   [3]
Q.4(c)   With proper diagram describe any two model of protein folding.   [5]

Q.5(a)   What is turning point?   [2]
Q.5(b)   What is MATLAB and how it is important to biological issues.   [3]
Q.5(c)   A business firm receives on an average 2.5 call/day during the time period10.30-10.35 am. Find the   [5]
         probability that on a certain day, firm receives (a) no call (b) exactly 3 calls. (e-2.5=0.0821).

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