BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

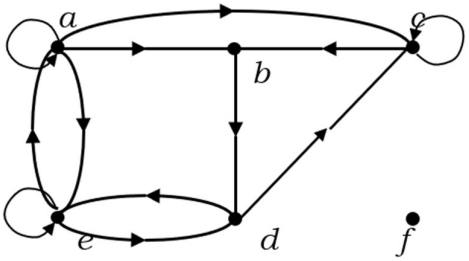
CLASS: MSC **SEMESTER: I**
BRANCH: BIOENGINEERING & BIOTECHNOLOGY **SESSION: MO/2023**

SUBJECT: BI103 MATHEMATICS AND STATISTICS FOR BIOLOGIST

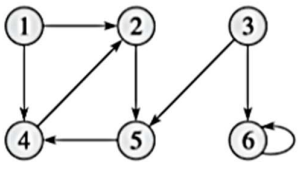
TIME: 3 HOURS **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and a total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have the correct question paper.**
5. Tables/Data handbook/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Write short notes on Matrices and its applications with examples in Computational Biology	[5]	1	3
Q.1(b)	Test whether the following set of vectors are linearly dependent or linearly independent {(1, 2, 1), (2, 1, 0), (1, -1, 2)}.	[5]	2	4
Q.2(a)	Test whether the following equations have unique solutions or not -x+y+2z=2,3x-y+z=6, -x+3y+4z=4. If so, find the solution.	[5]	2	3
Q.2(b)	Find the characteristic roots and eigenvectors of the matrix A=$\begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$	[5]	2	4
Q.3(a)	Define the Maxima and Minima of one variable and find the Maxima and Minima of $y = 2x^3 - 3x^2 + 6$.	[5]	3	3
Q.3(b)	Differentiate (i) x^5 (ii) e^{5x} (iii) sin x (iv) cos 6x each with respect to x	[5]	5	3
Q.4(a)	Find the in-degrees and out-degrees of this digraph.	[5]	2	3



Q.4(b)	Differentiate between wheel and cycle graph. Find the Adjacency and Incidence matrix of the graph.					[5]	2	3



Q.5(a) Find the Arithmetic Mean and standard deviation for the following. [5] 4 3

x	6	7	8	9	10	11	12
y	3	6	9	13	8	5	4

Q.5(b) Write a short note on the Random variable and Binomial distribution and its applications in Bioinformatics [5] 2 4

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