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

CLASS: IMSC **SEMESTER:VI**
BRANCH: MATHEMATICS **SESSION:SP/2024**

SUBJECT: MA308 DIFFERENCE EQUATION

TIME: 3 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*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Derive $\Delta^n[3^k \cdot (2-3k+k^2)]$.	[5]	1	3
Q.1(b)	Obtain the factorial polynomial of $P_3(k) = k^3 + 5k^2 + 4k + 3$. Hence find $\Delta^{-1}[P_3(k)]$.	[5]	1	4
Q.2(a)	Solve: $y_{k+1} - 3y_k = 2k \cdot 3^k$.	[5]	2	3
Q.2(b)	Solve: $(k+2)y_{k+1} - (k+1)y_k = 5 + 2^k - k^2$.	[5]	2	3
Q.3(a)	Use method of variation of constants to find the general solution of $y_{k+2} - 6y_{k+1} + 8y_k = 2 - 5 \cdot 3^k$	[5]	3	3
Q.3(b)	Determine the general solution of $$y_{k+2} - \left(\frac{2k+1}{k}\right) y_{k+1} + \left(\frac{k}{k-1}\right) y_k = k(k+1)$$ given that $y_k^{(1)} = k - 1$ is a solution of the corresponding homogeneous equation.	[5]	3	4
Q.4(a)	Find the general solution of the difference equation $y_{k+2} - 6y_{k+1} + 9y_k = 1 - k^2 + 3^k$.	[5]	4	3
Q.4(b)	Use z-transform method to find the general solution of $y_{k+1} - 5y_k + 6y_{k-1} = 1$.	[5]	4	4
Q.5(a)	Determine the solution of the partial difference equation $z(k+1, l) - 2z(k, l+1) - 3z(k, l) = 0$.	[5]	5	3
Q.5(b)	Solve the following partial difference equation: $z(k+1, l+1) + 2z(k, l) = l - k$.	[5]	5	4

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