BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2025)

CLASS: IMSc **SEMESTER : VI/ADD**
BRANCH: MATHEMATICS **SESSION : SP/2025**

SUBJECT: MA308 DIFFERENCE EQUATION

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 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**

			CO	BL
Q.1(a)	Find $\Delta^2 \cos(k)$.	[2]	1	3
Q.1(b)	Use Leibnitz's theorem to calculate $\Delta^n(2^k k^2)$.	[3]	1	3
Q.2(a)	Evaluate $\sum_{k=1}^{n}(k3^k)$.	[2]	1	3
Q.2(b)	If the factorial function representation of $P_k = 4k^3 + 3k^2 + 2k - 1$ is $\sum_{i=0}^{3} S_i k^{(i)}$, then find S_i for $i = 0,1,2,3$.	[3]	1	4
Q.3(a)	Solve $y_{k+1} - y_k = \frac{1}{k(k+1)}$.	[2]	2	3
Q.3(b)	Solve $y_{k+1} - 3y_k = 2^k$	[3]	2	4
Q.4(a)	Solve $(2k+1)y_{k+1} + (k+2)y_k = 0$	[2]	2	3
Q.4(b)	Use Bernoulli polynomial to solve $y_{k+1} - y_k = 1 + k^2 - 3k^3$	[3]	2	3
Q.5(a)	Check whether the set of functions $\{a^k, ka^k, k^2a^k\}$ is linearly dependent or independent.	[2]	3	3
Q.5(b)	Find the general solution of the equation $y_{k+2} - 7y_{k+1} + 6y_k = 2^k$, given that $y_k^{(1)} = 6^k$ and $y_k^{(2)} = 1$ are two solutions of the corresponding homogeneous equation.	[3]	3	4

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