Name. _____		Printed Pages:01
Student Admn. No.: _____		

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School of Basic Sciences
Summer TermExamination – July - August 2024
[Programme: B.Sc (Maths)] [Semester:3][Batch:]

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Course Title: Algebra & Mathematical Methods	**Max Marks: 100**
Course Code: B030301T	Time:3 Hrs.

Instructions:	1. *All questions are compulsory.*
	2. *Assume missing data suitably, if any.*

		K Level	COs	Marks
	SECTION-A (15 Marks) 5 Marks each			
1.	If R be a relation in the set of integers Z defined by: $\qquad$ R = {(x,y) : x, y ∈ Z and x-y is divisible by 3}. Find the distinct equivalence classes of R.	K1	CO1	5
2.	Define even and odd permutation. Determine whether the permutation f = (1243)(3521) is even or odd permutation.	K1	CO2	5
3.	Find L[cos2t]	K1	CO4	5
	SECTION-B(40 Marks) 10 Marks each			
4.	Show that Z_5 = {0, 1, 2, 3, 4} is a ring under addition modulo 4 and multiplication modulo 4.	K2	CO3	10
5.	Examine if the set of all 2x2 non-singular matrices over R of the form $[m\ 0\ 0\ 1]$ with m ≠ 0 is a group under matrix multiplication. $\quad$ i.	K4	CO2	10
6.	Apply Partial Fraction Method to find the inverse Laplace Transform of $\frac{2s^2 - 6s + 5}{s^3 - 6s^2 + 11s - 6}$.	K3	CO4	10
7.	Develop the Fourier series expansion for f(x), if f(x) = {− π, $if − π < x < 0$ x, $if\ 0 < x < π$	K3	CO5	10
	SECTION-C (45 Marks) 15 Marks each			
8.	Use Laplace transform method to examine the solution of the initial value problem: y'' − 2y' + y = e^x with y(0) = 2 and y'(0) = -1.	K4	CO6	15
9.	Prove that the characteristic of any Integral domain R is either zero or a prime number.	K5	CO3	15
10	Prove that the set S = {$[a\ b\ 0\ 0]$: a, $b ∈ Z$ } is a right ideal of M_2, the ring of 2x2 matrices over integers, which is not a left ideal of M_2	K5	CO3	15