Reg. No										

AY 24

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY
UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

B.C.A (Second Semester) Regular/Supplementary Examinations, May – 2025

BCA23204: Advanced Mathematical Computation

(BCA)

Time: 3hrs | Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. If A={1,2,3,4,5} B={4,5,6,7,8} C={7,8,9,10,11} Find A∪ $B \cup C$,A∩ $(B \cup C)$.	CO1	K1
b. Verify Eulers theorem $f = ax^2 + by^2 + 2hxy$.	CO1	K1
c. Expand the series $i.(1+x)^{-1}$ ii. $(1-x)^{-1}$	CO2	K2
d. Define Homomorphism.	CO1	K1
e. How many edges are there in a graph with 10vertices each of degree 6?	CO2	K2

PART – B **(10 x5=50 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. Check that (p→ $q) \rightarrow r$ *and* $(p \rightarrow q) \wedge (q \rightarrow r)$ logically equivalent or not.	5	CO3	K3
b. Check the tautology $(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r)$.	5	CO2	K2
(OR)			
c. If A={0,2,4,6,8} $B = \{0,1,2,3,4\}$ $C = \{0,3,6,9\}$ $Find\ \ A \cup B \cup C$, $A \cap B \cap C$, $(A \cap B) \cup C$, $(A - B) \cup (B - A)$.	5	CO3	K3
d. Show that (p→ $q) \vee (p \rightarrow r)$ *and* $p \rightarrow (q \vee r)$ logically equivalent.	5	CO2	K2
3.a. If $U = e^{xyz}$ then prove that $U_{yx} = U_{xy}$	5	CO2	K2
b. Find the maximum or minimum value of $1 - x^2 - y^2$.	5	CO3	K3
(OR)			
c. Find the directional derivatives of $f = x^2 + y^2 + z^2$ at a point (1,1,1) in the direction of (1,2,3).	5	CO3	K3
d. If $u = \tan^{-1}\left(\frac{x^3+y^3}{x+y}\right)$ then proof that $xu_x + yu_y = sin2u$	5	CO2	K2
4.a. Show that (R, +) is a group under addition.	5	CO2	K2
b. Define Permutation group. Find the permutation group of {1,2,3}.	5	CO3	K3
(OR)			
c. Prove that the Identity element is unique in a group.	5	CO2	K2
d. Show that (Z, +) satisfy inverse property but (Z, X) does not.	5	CO3	K3
5.a. Find the recurrence solution for the Fibonacci series.	5	CO2	K2

b.	Show that Poset $(\{1,2,4.5,10,20\},/)$ is a lattice. Draw its Hess Diagrams.	5	CO3	K3
	(OR)			
c.	A total of 1232 students have taken Physics,879 has taken Chemistry and 114 students have taken Mathematics.Furthermore103 have taken both Physics and Chemistry,23 have taken both Physics and Mathematics ,14 have taken both Chemistry and Mathematics. If 20192 students have taken at least one of Physics, Chemistry and Mathematics. How many students have taken all three subjects.	5	CO2	K2
d.	Find the solution of the recurrence relation $a_n = 6a_{n-1} - 9a_{n-2}$ with $a_0 = 1$ and $a_1 = 6$.	5	CO3	K3
6.a.	If there are 20 vertices & each of degree 3 then how many regions of a diagram?	5	CO3	K3
b.	Define Planar Graph and Euler's formula.	5	CO2	K2
	(OR)			
c.	Define Graph & types of graphs.	5	CO3	K3
d.	How many vertices does a regular graph of degree 4 with 10 edges?	5	CO2	K2

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