QP Code: R262E010 | Reg. No | | | | | | | | | | | AY 25

Gandhi Institute of Engineering and Technology University, Odisha, Gunupur
(GIET University)

B.C.A. (Second Semester - Regular) Examinations, May – 2026

BCA252004 - Linear Algebra

Time: 2 hrs | 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.	Construct the Truth table for $(p \vee q) \wedge (\neg p \vee q)$.	CO1	K1
b.	Find the Generating function of the infinite series 1,1,1,1	CO2	K1
c.	Find the value of the Boolean function represented by $F(x, y, z) = xy + \bar{z}$.	CO3	K2
d.	Find a vector in the direction of vector $\vec{a} = \hat{\imath} - 2\hat{\jmath}$ that has magnitude 7 units.	CO4	K2
e.	The mean and median of a distribution are 28 and 24 respectively. Find the mode and also find (Mean − Mode)**.**	CO5	K1

PART – B **(10 x5=50 Marks)**

Answer ***ALL*** questions

		Marks	CO #	Blooms Level
2. a.	Show that p∨$(q \wedge r) and$ (p∨q)∧(p∨r) are logically equivalent.	5	CO1	K2
b.	Check the tautology $(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r)$.	5	CO1	K3
	(OR)			
c.	For sets A = {x | x is an integer, $1 \leq x \leq 6$} and B = {x | x is an even integer, $2 \leq x \leq 8$}, find the set A – B, B – A, A ∪ B, A ∩B, A Δ B,	7	CO1	K3
d.	There are 11 teachers who teach Maths or Physics in a school of these 7 teach only Maths and 3 teach both Maths and physics. How many teachers teach physics?	3	CO1	K2
3.a.	Solve the recurrence relation $a_n = 6a_{n-1} - 9a_{n-2} \quad n \geq 2$, Given $a_0 = -5 \; and \; a_1 = 3$	5	CO2	K2
b.	Solve the recurrence relation $a_n - 7a_{n-1} + 12a_{n-2} = 5^n$	5	CO2	K3
	(OR)			
c.	Show that the relation $R = \{(a, b) \; ! \quad a \equiv b \; mod n\}$ is equivalence relation on the set of integers.	5	CO2	K3
d.	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
4.a.	Show that the set of integers forms a group under addition.	6	CO3	K3
b.	Show that the Poset $(\{1,2,4,5,10,20\},/)$ is a lattice.	4	CO3	K2

(OR)

c.	How many positive integers not exceeding 1000 are divisibility 7 or 11.	4	CO3	K2
d.	Show that the set of Real number R excluding zero forms a group under the binary operation of multiplication.	6	CO3	K3
5.a.	i. Find the angle between the vectors $\vec{a}$ and $\vec{b}+\vec{c}$. $Where\ \ \vec{a}=\hat{\imath}+\hat{\jmath}$, $\vec{b}=3\hat{\imath}+2\hat{\jmath}+3\hat{k}$ and $\vec{c}=\hat{\imath}+2\hat{\jmath}$. ii. Show that divergence of curl is zero.	6	CO4	K2
b.	Find the volume of the tetrahedron whose adjacent edges are given by $(1,1,1),(2,-1,3),(2,1,-1)$.	4	CO4	K3

(OR)

c.	Find the directional derivative of F=$x^2y^2z^2$ at a point $(1,1,1)$ in the direction of $\vec{a}$ $(1,2,3)$.	5	CO4	K2
d.	Find the angle between two normal surfaces $x^2+y^2+z^2=10$ and $x^2+2y^2+3z^2=15$ at point $P(2,3,4)$.	5	CO4	K3
6.a.	There are 3 Companies A_1, A_2 and A_3 which products $35\%, 35\%\ and\ 30\%$ of the product and $1\%, 2\%, 3\%$ products are defective produced by A_1, A_2 and A_3 respectively. If a product is chosen randomly which is defective then what is the probability of that it is produced by Company A_2 .	6	CO5	K2
b.	If P(A)=0.8 P(B)=0.5, P$\left(\frac{B}{A}\right)=0.4$ then Find i. P(A∩B) ii. P(A∪B) iii. $P(A\|B)$	4	CO5	K3

(OR)

c.	Find the correlation coefficient between x and y for the following data	5	CO5	K2

x	70	90	80	74	65	83
y	74	84	63	87	78	90

d.	A survey conducted on 20 households in a locality by a group of students resulted in the following frequency table for the number of family members in a household. Find the Mode.	5	CO5	K3

Family size	1−3	3−5	5−7	7−9	9−11
Number of families	7	8	2	2	1

--- End of Paper ---