



GIET UNIVERSITY, GUNUPUR - 765022
B.C.A (Second Semester) Regular Examinations, May - 2024
BCA23204 - Advanced Mathematical Computation

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. Construct the Truth table $(P \vee Q) \rightarrow (P \wedge Q)$ | CO1 | K1 |
| b. Find the length and magnitude of $(4,8,0)$ and $(3,2,5)$. | CO1 | K1 |
| c. Find the polar form of $1 + i$. | CO2 | K2 |
| d. Find the general form and a_{20} of $1,7,13,19,25, \dots$ | CO2 | K1 |
| e. Define Graph and Subgraph. | CO1 | K2 |

PART – B**(10 x5=50 Marks)**Answer **ALL** questions

- | | Marks | CO # | Blooms
Level |
|---|-------|------|-----------------|
| 2. a. Show that $(p \rightarrow q) \vee (p \rightarrow r)$ and $p \rightarrow (q \vee r)$ logically equivalent. | 5 | CO3 | K3 |
| b. Check the tautology $(p \rightarrow q) \wedge (q \rightarrow r) \rightarrow (p \rightarrow r)$. | 5 | CO3 | K3 |

(OR)

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|---|---|-----|----|
| c. If $A = \{0,2,4,6,8\}$ $B = \{0,1,2,3,4\}$ $C = \{0,3,6,9\}$ Find $A \cup B \cup C$,
$A \cap B \cap C$, $(A \cup B) \cap C$, $(A \cap B) \cup C$, $(A - B) \cup (B - A)$,
$(A \cup B) - (A \cap B)$. | 6 | CO4 | 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? | 4 | CO3 | K2 |
| 3.a. Find the scalar triple product and volume of the tetrahedron $[4,9,-1][2,6,0]$ and $[5,-4,2]$. | 6 | CO3 | K2 |
| b. Find the angle between the vectors \vec{a} and $\vec{b} + \vec{c}$. Where $\vec{a} = \hat{i} + \hat{j}$,
$\vec{b} = 3\hat{i} + 2\hat{j} + 3\hat{k}$ and $\vec{c} = \hat{i} + 2\hat{j}$. | 4 | CO2 | K3 |

(OR)

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|--|---|-----|----|
| c. 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 | CO3 | K3 |
| d. Find the directional derivative of $F = x^2 + y^2 + z^2$ at a point $(1,1,1)$ in the direction of $\vec{a} (1,2,3)$. | 5 | CO4 | K2 |

- 4.a. Express in the form of $z = x + iy$. i. $z = \frac{7}{7+2i}$ ii. $z = \frac{2+i}{1+i}$ iii. $(5 - 3i)^3$ 6 CO3 K3
- b. Find the conjugate of $\frac{(3-2i)(2+3i)}{(1+2i)(2-i)}$. 4 CO3 K2
- (OR)
- c. If $Z_1 = 7 + 4i$ and $Z_2 = 8 - 3i$ then find $Z_1 + Z_2$, $Z_1 - Z_2$, $Z_1 \cdot Z_2$, $\frac{Z_1}{Z_2}$, $Z_1 \cdot \bar{Z}_2$ 5 CO2 K3
- d. If $z_1 = 2 + 8i$ and $z_2 = 1 - i$,then find $\left| \frac{z_1}{z_2} \right|$. 5 CO3 K3
- 5.a. Solve the Recurrence relation i. $a_n - 5a_{n-1} + 6a_{n-2} = 0$ 6 CO4 K3
ii. $a_n - 12a_{n-1} + 36a_{n-2} = 0$
- b. Solve. i. $2(x + 3) - 10 = 6(32 - 3x)$ ii. $\frac{x-2}{5} - \frac{x-4}{2} = 2$ 4 CO3 K3
- (OR)
- c. Solve the recurrence relation $a_n = 6a_{n-1} - 9a_{n-2}$ $n \geq 2$, Given $a_0 = -5$ and $a_1 = 3$ 5 CO3 K3
- d. Solve the recurrence relation $a_n - 5a_{n-1} + 7a_{n-2} = 0$ $n \geq 2$. 5 CO4 K3
- 6.a. Draw the Hess 's diagram of power set of $\{a, b, c\}$. Find its maximal, Minimal ,greatest and lowest element. 5 CO4 K2
- b. Show that $(Z_6, +_6)$ is a Group. 5 CO4 K3
- (OR)
- c. In a G.P series 3rd term is 24 and 6th term is 192 then find its 10th terms. 5 CO3 K4
- d. Insert five numbers between 8 and 26 such that resulting sequence is an A.P. 5 CO4 K3

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