

CONTINUOUS INTERNAL EVALUATION - 1

Dept: AI/CD/CS	Sem / Div: IV	Sub: DISCRETE MATHEMATICAL STRUCTURES	S Code: BCS405A
Date: 16/04/25	Time: 3-4:30PM	Max Marks: 50	Elective: Y

Note: Answer any 2 full questions, choosing one full question from each part.

QN	Questions	Marks	RBT	CO's
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PART A

1	a Define a tautology. Prove that for any propositions p, q, r the compound propositions $\{p \rightarrow (q \rightarrow r)\} \rightarrow \{(p \rightarrow q) \rightarrow (p \rightarrow r)\}$ is tautology.	8	L3	CO1
	b Find following argument is valid or not. i. No engineering student of I or II sem studies logic <u>Anil is an engineering student who studies logic.</u> Therefore Anil is not in II Sem ii. For all x, $[p(x) \rightarrow \{q(x) \wedge r(x)\}]$ <u>for all x, $[p(x) \wedge s(x)]$</u> therefore for all x, $[r(x) \wedge s(x)]$	8	L3	CO1
	c For the following statements: "If n is an odd integer, then n+9 is an even integer" give: (i) a direct proof (ii) an indirect proof (iii) proof by contradiction.	9	L3	CO1

OR

2	a Prove using laws of logic $p \rightarrow (q \rightarrow r)$ is logically equivalent to $(p \wedge q) \rightarrow r$	8	L3	CO1
	b Simplify, (i) $[\neg p \wedge (\neg q \wedge r)] \vee [(q \wedge r) \vee (p \wedge r)] \Leftrightarrow r$	8	L3	CO1

$$(ii) (\sim p \vee \sim q) \rightarrow (p \wedge q \wedge r) \Leftrightarrow p \wedge r$$

c For any two odd integers m and n, show that:

- (i) $m + n$ is even (ii) mn is odd

9 L3 CO1

PART B

3 a Find the coefficients of

10 L3 CO2

i. x^9y^3 in the expansion of $(2x - 3y)^{12}$

ii. $a^2b^3c^2d^5$ in the expansion of $(a+2b-3c+2d+5)^{16}$

b By mathematical induction prove that, for any positive integer n , $11^{n+2} + 122^{n+1}$ is divisible by 133

9 L3 CO2

c Find the number of permutations of the letters of the word MISSISSIPPI.

6 L3 CO2

i. How many of these begin with I?

ii. How many of these begin with S and end with S

iii. How many of these begin with P and end with M

OR

4 a Find the coefficients of

10 L3 CO2

i. w^3xyz^2 in the expansion of $(2w-x+3y-2z)^8$

ii. $x^{11}y^4$ in expansion of $(2x^3-3xy^2+z^2)^6$

b By mathematical induction prove that, 3 divides n^3-n for every integer $n \geq 2$

9 L3 CO2

c A women has 11 close relatives and she wishes to invite 5 of them to dinner. In how many ways she can invite them in the following situations.

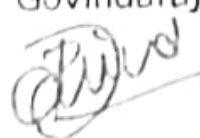
6 L3 CO2

i. There is no restriction on the choice.

ii. Two particular persons will not attend separately.

iii. Two particular persons will not attend together.

Prepared by: Govindaraj P




HOD
