CRM08	Rev 1.16	AI	07/04/25

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
	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 Anil is an engineering student who studies logic. Therefore Anil is not in II Sem ii. For all x, $[p(x) \rightarrow \{q(x)^\wedge r(x)\}]$ for all x, $[p(x) ^\wedge s(x)]$ 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) $[\sim p ^\wedge (\sim q ^\wedge r)] \vee [(q ^\wedge r) \vee (p ^\wedge r)] <=> r$	8	L3	CO1

(ii) $(\sim p \vee \sim q) \rightarrow (p \wedge q \wedge r) \iff p \wedge r$			
c	For any two odd integers m and n, show that: (i) m + n is even (ii) mn is odd	9	L3	C

PART B

3	a	Find the coefficients of
		
		   i. $x^9 y^3$ in the expansion of $(2x - 3y)^{12}$
		   ii. $a^2 b^3 c^2 d^5$ in the expansion of $(a+2b-3c+2d+5)^{16}$
			10	L3	CO2

	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.
		   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
			6	L3	CO2

OR

4	a	Find the coefficients of
		   i. $w^3 x y z^2$ in the expansion of $(2w-x+3y-2z)^8$
		   ii. $x^{11} y^4$ in expansion of $(2x^3-3xy^2+z^2)^6$
			10	L3	CO2

	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.
		   i. There is no restriction on the choice.
		   ii. Two particular persons will not attend separately.
		   iii. Two particular persons will not attend together.
			6	L3	CO2

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