Continuous Assessment Test (CAT) – II   OCTOBER 2024

Programme	:	BTech Computer Science and Engineering	Semester	:	FALL 24-25
Course Code & Course Title	:	BCSE304L THEORY OF COMPUTATION	Class Number	:	CH2024250101445 CH2024250100914 CH2024250100900
Faculty	:	Dr. S. KIRUTHIKA, Dr. NATHEZHTHA T, Dr. TAHIR MUJTABA,	Slot	:	A1+TA1
Duration	:	90 MINUTES	Max. Mark		50

General Instructions:

- Write only your registration number on the question paper in the box provided and do not write other information.
- Use statistical tables supplied from the exam cell as necessary
- Use graph sheets supplied from the exam cell as necessary
- Only non-programmable calculator without storage is permitted

Answer all questions

Q. No	Sub Sec.	Description	Marks
1.		In a communication system, messages are sent using a sequence of two symbols, 'a' and 'b'. To ensure data integrity, the system requires that every message contains an equal number of 'a's and 'b's. (a) You have been tasked with designing a Context-Free Grammar (CFG) to validate these messages before they are transmitted. (5 Marks) (b) Identify a string of minimum length 6 and validate the string using LMD, RMD and parse tree. (5 Marks)	10
2.		Determine whether the following string w=aabbbbbb is in the language generated by the given grammar G using CYK algorithm $S \rightarrow AB$, $A \rightarrow BB \mid a$, $B \rightarrow AB \mid b$	10
3.		For the following regular expression $(a\mid b)^* ((ab)^+\mid(ba)^*)$ Construct a grammar G in simplified form (5 marks) Convert the grammar G into Chomsky Normal Form (CNF) G_1 (5 marks)	10
4.		a) Construct a Context Free Grammar (CFG), G for the following language L= {x ε {0,1}* | symbol at position i is same as symbol at position i+2 and |x| $\geq$ 2} (5 Marks) b) Show that L = { $a^p b^q \mid p > q$ } is not regular (5 Marks)	10
5.		$L = \{(ab)^n (ba)^{n+m+k} (ab)^{m+2} (ba)^K\}$, where n, m, k>0, construct automata for	10

the language L.

NOTE:

1. ab or ba should not pass together in one single transition

2. no new variable should represent ab or ba

********** All the best *************