Reg. No.:

Name :

VIT

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

Continuous Assessment Test II – October 2022

Programme	:	**B.Tech**	Semester	:	**FS 2022-23**
Course	:	**Theory of Computation**	Code	:	**BCSE304L**
			Slot	:	**C1+TC1**
Faculty	:	**Dr. Anita X, Dr. Jani Anbarasi L, Dr. Jothi R, Dr. Karmel A, Dr. Renjith P N, Dr. Sathyarajasekaran K,**	Class Nbr	:	**CH2022231001273 CH2022231001269 CH2022231001260 CH2022231001262 CH2022231001267 CH2022231001264**
Time	:	**90 Minutes**	Max. Marks	:	**50**

Answer ALL the questions

Q.No.	Questions	Marks
1.	Check and prove whether the following languages are regular or not. a) $L= \{a^{n+m}b^n c^m / n \text{ is odd, m is even}\}$ (5M) b) $L= \{0^i1^j2^k / k>i+j\}$ (5M)	10
2.	A fruit shop owner instructs his employees to buy apples and bananas from a wholesale market and also instructs them to arrange fruits in the bag such that the apples are at the bottom followed by bananas to protect bananas from smashing. The number of bananas bought should be thrice as that of apples. He wants to check whether the arrangement and count made by the employees are same using a machine. Design a pushdown automaton (PDA) with which the checking process can be done. Validate your model.	10
3.	a) A girl collects three different shells from the sea shore and arranges them in an order where blue colour comes first followed by red colour and finishes in green colour, the count of red colour shell and green colour shell may not be equal but the count of blue shells should be the total count of red and green shells. Construct a context free grammar that may represent the above collection sequence. (5M) b) Identify two sample strings and validate it with the generated CFG. (5M)	10

4.	Given the following CFG, G $X \rightarrow P0P \mid RP \mid Q0Q$ $P \rightarrow 00Q0 \mid RSP \mid 00 \mid SR$ $Q \rightarrow 1Q \mid 1PQ \mid 11 \mid 0X$ $R \rightarrow R0 \mid 1R \mid S$ $S \rightarrow 1S \mid T$ $T \rightarrow \varepsilon$ a) For the above grammar, design a simplified CFG, G_1. (6M) b) Write any two words generated by L (G_1). For the 1st generated word, perform LMD and RMD. (4M) **NOTE**: word length should be greater than 7.	10
5.	Represent the following grammar G into Chomsky Normal Form. G=({S,A,B,C,D},{a,b}, {S→bA | aB | ~~D~~ A→bAA | aS | a B→aBB | bS | b ~~C→ba | ab~~ ~~D→AD~~}, S)	10

b→P
a→Q
aB→R
bA→S

S→PA|QB
A→SA|QS|a
B→RB|PS|b

⇔⇔⇔