BACHELOR OF TECHNOLOGY (C.B.C.S.) (2014 COURSE)
B.Tech.Sem - V IT : : SUMMER - 2022
SUBJECT : THEORY OF AUTOMATA & FORMAL LANGUAGES

Day : Monday   Time : 10:00 AM-01:00 PM
Date : 30-05-2022   **S-13409-2022**   Max. Marks : 60

N.B.
1) All questions are **COMPULSORY.**
2) Figures to the right indicate **FULL** marks.
3) Assume suitable data wherever necessary.

Q.1 Construct Mealy and Moore machine for the input over $\Sigma = \{0,1,2\}$ print **(10)** the residue modulo 5 of the input treated as a ternary base 3 with digits 0,1 and 2 numbers.

OR

Construct a Mealy machine accepting the strings from $(0+1)*$ and **(10)** producing the output as indicate below:

String ends with	Output
101	x
110	y
otherwise	z

Q.2 Construct NFA with $\in$ transitions for the following regular expression also **(10)** convert this to minimized DFA
$(ab+ba)*aa(ab+ba)*$

OR

Construct NFA with $\in$ transitions for the following regular expression also **(10)** convert this to minimized DFA
$10+(0+11)0*1$

Q.3 Define the context free grammars in a 4-tuple from (V,T,P,S) for the given **(10)** language on $\Sigma = (a,b)$
i) All strings having atleast two a's.
ii) All possible strings not containing triple b's.

OR

a) Convert the following grammar into CNF: **(05)**
$S \rightarrow abAB \mid bAda$

$A \rightarrow baB \mid a$

$B \rightarrow CAb \mid Bb$

b) Convert the following grammar into equivalent GNF: **(05)**
$S \rightarrow AB, A \rightarrow BS \mid b, B \rightarrow SA \mid a$

Q.4 Construct a pushdown automata over $\Sigma = a,b,c$ for $a^n b^n c^n$ where n >= 0. **(10)**

OR

Show that the context free languages are closed under union, concatenation **(10)** and kleen star.

Q.5 Design a TM fo find GCD of two given numbers. **(10)**

OR

Design a turning machine which computes 2's complement of a given **(10)** BINARY number.

Q.6 Explain phases of compiler construction and application of regular **(10)** expression in various phases.

OR

Explain application of CFG in Markup Languages. **(10)**

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