

PUNE VIDHYARTHI GRIHA'S
COLLEGE OF SCIENCE & TECHNOLOGY
S.Y. B.SC (COMPUTER SCIENCE) – SEM-IV REGULAR AND ATKT FIRST HALF OF
APRIL -2024 EXAMINATION
SUB: THEORY OF COMPUTATION

Q.P CODE: USCS401

(TIME :2 ½ Hrs.)

TOTAL MARKS :75

N.B:-

1. All questions are compulsory.
2. Answers to the same question must be written together.
3. Numbers to the right indicate full marks.
4. Draw neat labeled diagrams wherever necessary.
5. Use of non-programmable calculators are allowed.

Q1) Attempt the following (ANY FOUR) (Each of 5 marks) [20M]

- ~~A.~~ Define transition system in brief.
- ~~B.~~ Define DFA with example.
- ~~C.~~ Write the difference between DFA and N DFA.
- ~~D.~~ Explain Moore machine with an example.
- E. How to generate grammar by language.
- F. Explain different types of grammar with examples.

Q2) Attempt the following (ANY FOUR) (Each of 5 marks) [20M]

- ~~A.~~ Describe the set represented by following regular expressions.
 1. $(a+b)^*(aa+bb+ab+ba)^*$
 2. $(aa)^* + (aaa)^*$
 3. $a+b(a+b)^*$
 4. $(aa)^*(\epsilon+0)$
 5. ab^*a
- ~~B.~~ Prove $(a+b)^* = a^*(ba)^*$ and also draw the transition system for $a^*(ba)^*$
- ~~C.~~ Explain Closure properties for regular language with suitable example.
- D. Solve following examples to check whether Regular language is closed under homomorphism
 - i. $\Sigma(0,1)$ and $\tau\{a,b\}$
 $h(0)=aa, h(1)=bb$
if $L=\{00, 101\}$
find $h(L)$?
 - ii. $\Sigma(0,1)$ and $\tau\{a,b\}$
 $h(0)=ab, h(1)=ba$
if $L=\{00, 101\}$
find $h(L)$?

- ~~E.~~ Explain identities of regular expression for infinite languages.
- ~~F.~~ Define regular grammar with suitable example

Q3) Attempt the following (ANY FOUR) (Each of 5 marks)

[20M]

- A. Explain CYK algorithm with suitable example.
- B. What is Turing Machine ? Explain its components and its operations.
- ~~C.~~ Write short note on steps for PDA.
- ~~D.~~ Difference between Recursive Enumerable language and Recursive language with example.
- E. Explain how to convert CFL to CFG with suitable examples.
- ~~F.~~ Design turing machine for 1's complement for string 1010.

Q4) Attempt The Following (Any Five) (Each Of 3 Marks)

[15M]

- ~~A.~~ Write the difference between mealy and moore machine.
- ~~B.~~ Write components of grammar and explain it with example.
- ~~C.~~ Design PDA for 0^n1^n , $n \geq 0$ in CFL language.
- ~~D.~~ Explain Derivation tree/ Parse tree used in computation with suitable example.
- E. Rewrite the following grammar after eliminating the useless symbols

$S \rightarrow AB|DS$

$A \rightarrow a$

$B \rightarrow c$

$C \rightarrow D$

$D \rightarrow Dd|\epsilon$

$E \rightarrow a$

- F. What is Linear bound automata. Explain in brief with its standard examples.