## GURUDAS COLLEGE INTERNAL EXAMINATION,2020 SUBJECT - CMSA (1+1+1 new regulations) Part-II (Honours) PAPER – III

FM=50

## Answer Question No. 1 and any 2 from the rest

Answer any **four** Questions (4x5)

1. a. When a grammar said to be ambiguous? What are the limitations of finite state automata?

b. Design a DFA that accepts strings defined over  $\sum = \{0,1\}$  whose decimal representation is divided by 2.

- c. What are the advantages of RK methods over Taylor series method?
- d. What is relative error and percentage error?
- e. What do you mean by Generating Function?

f. Find the number of relations from  $A = \{a,b,c\}$  to  $B = \{1,2\}$ Show that any finite simple graph has has at least 2 vertices with same degree?

- g. Define the Konnisberge bridge problem in Graph theory.
- h. When are two graphs G and G\* said to be isomorphic?
- 2. a. Define Moore and Mealy machine.
  - b. Construct a Mealy machine which is equivalent to Moore machine given in the table below:

| Present State | Next State |     | output |
|---------------|------------|-----|--------|
|               | A=0        | A=1 |        |
| <b>→</b> q0   | q1         | q2  | 1      |
| q1            | q3         | q2  | 0      |
| q2            | q2         | q1  | 1      |
| q3            | q0         | q3  | 1      |

c. Consider a grammar G whose productions are

 $S \rightarrow aAS |a, A \rightarrow SbA|SS|ba$ 

Show that S contains aabbaa and construct a derivation tree whose yield is aabbaa.

[4+5+6]

- 3. a. Write down the composite expression for Simpsons  $1/3^{rd}$  rule. Evaluate  $\int_{1}^{2} dx/\sqrt{1 + x^{2}}$  by taking 8 intervals using this rule. Compute the error in this case.
  - b. Derive and State the algorithm of Newton Raphson method to find root of a equation .

[2+6+1+6]

- 4. a. State and Prove Generalized Pigeon hole principal.
- b. What do you mean by a proposition and tautology? Give examples.
- c. Define a minimum spanning tree for a given weighted undirected graph G. Describe the Krushkal's algorithm . Clearly state your assumption.

[4+5+6]

- 5. a. Write an algorithm for BFS traversal of a Graph.Prove that a simple graph with n vertices and k components can have almost (n-k) (n-k+1)/2 edges.
  - b. Solve the recurrence Relation together with the given initial condition an=5an-1-6an-2 for n>=2, a0=1,a1=0. What is the generating function for the sequence 1,1,1,1,1,1?
  - c. State the principal of Inclusion and Exclusion for 4 sets P,Q,R,S. Find the number of positive integers not exceeding 100 that are not divisible by 5 or by 7. [5+5+5]

## Send the Scanned answer scripts to the following mail id: csexam.cmsa3@gmail.com