CBCS SCHEME

USN | | | | | | | | | | |

21CS51

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Automata Theory and Compiler Design

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define the following terms :
i) String ii) Language iii) Alphabet iv) Length of string **(04 Marks)**

b. Explain the various phases of compiler with neat diagram. **(08 Marks)**

c. Define DFA and design a DFA to accept the following language:
i) To accept strings having even number of a's and odd number of b's.
ii) To accept strings of a's and b's not having the substring aab. **(08 Marks)**

OR

2 a. Design the equivalent DFA to the following ∈-NFA.

(05 Marks)

b. Minimize the following DFA by identifying distinguishable and non-distinguishable states.

	δ	0	1
→	A	B	F
	B	G	C
*	C	A	C
	D	C	G
	E	H	F
	F	C	G
	G	G	H
	H	G	C

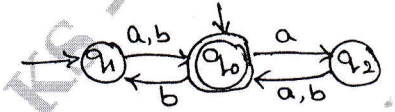
(10 Marks)

c. With neat diagram explain the components of language processing system in detail. **(05 Marks)**

Module-2

3 a. Define Regular Expressions. Write a regular expressions for the following :
i) $L = \{a^n b^m \mid n+m \text{ is even}\}$
ii) The set of all strings whose 3rd symbol from right end is 0
iii) $L = \{a^{2n} b^{2m} \mid n \geq 0 , m \geq 0\}$ **(10 Marks)**

b. Convert the following automata to a regular expression.



(04 Marks)

c. Explain the concept of input buffering in the Lexical Analysis along with sentinels. **(06 Marks)**

OR

4 a. State and prove Pumping Lemma for regular languages and also prove the language $L = \{a^n b^n \mid n \geq 0\}$ is not a regular. **(10 Marks)**

b. Construct ∈-NFA for the following regular expression
(0 + 11) 0*1 **(04 Marks)**

c. Define Token, Lexeme and Pattern with example. **(06 Marks)**

Module-3

5 a. Define CFG. Write a CFG to the following languages.
i) All strings over {a, b} that are even and odd Palindromes.
ii) $L = \{a^n \mid n \geq 0\}$ **(10 Marks)**

b. Define ambiguity. Consider the grammar $E \rightarrow E + E \mid E * E \mid (E) \mid id$
Construct the leftmost and rightmost derivation, parse tree for the string id + id * id.
Also show that the grammar is ambiguous. **(10 Marks)**

OR

6 a. Consider the CFG given below with the production set, compute the following for the same.
(i) First( ) and Follow( ) set (ii) Predictive Parsing table
Grammar is,

$E \rightarrow TE'$
$E' \rightarrow +TE' \mid E$
$T \rightarrow FT'$
$T' \rightarrow *FT' \mid E$
$F \rightarrow (E) \mid id$ **(14 Marks)**

b. Write an algorithm to eliminate lift recursion from a grammar. Also eliminate lift recursion from the grammar

$S \rightarrow Aa \mid b$
$A \rightarrow Ac \mid Sd \mid \in$ **(06 Marks)**

Module-4

7 a. Define PDA. Design PDA for the language $L = \{WCW^R \mid W \in (a, b)\}$ and also show the Instaneous Description (ID) for the input aabCbaa. **(10 Marks)**

b. Construct LR(0) automata for the grammar given below.

$S \rightarrow L = R \mid R$
$L \rightarrow *R \mid id$
$R \rightarrow L$ **(10 Marks)**

OR

8 a. Define shift reduce Parser and Handle. Also list and explain the different actions operations available in Bottom up parser. **(10 Marks)**

b. Construct the LR(1) automata for the given grammar.

$S \rightarrow AA$
$A \rightarrow aA \mid b$ **(10 Marks)**

Module-5

9 a. Design a Turing machine to accept the language $L = \{0^n 1^n 2^n \mid n \geq 1\}$ **(10 Marks)**

b. Write a short note on the following :
(i) Post correspondence problem (ii) Design issues in code generation **(10 Marks)**

OR

10 a. Translate the arithmetic expression $a = b * -c + b * -c$ into
(i) Three address code (ii) Quadruple (iii) Triple **(10 Marks)**

b. Write a short note on :
(i) Decidable language (ii) Halting problems in Turing machines. **(10 Marks)**

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

21CS52

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Computer Networks

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define Computer Networks. Explain local area network in detail with a neat diagram. **(06 Marks)**

b. Explain MAN with a neat labelled diagram. **(06 Marks)**

c. List and explain design issues for layer. **(08 Marks)**

OR

2 a. What are guided transmission media? Explain twisted pair cable in detail. **(06 Marks)**

b. Explain TCP/IP reference model with a neat labelled diagram. **(10 Marks)**

c. Briefly discuss virtual private networks. **(04 Marks)**

Module-2

3 a. List and explain any two data link layer design issues. **(10 Marks)**

b. A bit stream transmitted using standard CRC method. The generator polynomial is $X^3 + 1$.

i) What is actual bit string transmitted

ii) Suppose 3rd bit from the left is inverted during transmission, how will receiver detect this error? **(10 Marks)**

OR

4 a. Explain Go-Back-N protocol working. **(10 Marks)**

b. Briefly explain static channel and dynamic channel allocation problem. **(10 Marks)**

Module-3

5 a. Write an Dijkstra's algorithm to compute shortest path through graph. Explain with example. **(10 Marks)**

b. Illustrate working of OSPF and BGP. **(10 Marks)**

OR

6 a. What is congestion control? List and explain various approaches to congestion control. **(12 Marks)**

b. What is packet scheduling algorithm? Explain FIFO algorithm. **(08 Marks)**

Module-4

7 a. Write a program for congestion control using leaky bucket algorithm. **(10 Marks)**

b. Briefly explain about transport service primitives. **(10 Marks)**

OR

8 a. With a neat labelled diagram, explain TCP segment structure. **(10 Marks)**

b. Explain TCP connection management with TCP connection management FSM diagram. **(10 Marks)**

Module-5

9 a. Explain client/server and P-P architecture with a neat labelled diagram. **(10 Marks)**

b. Explain use and server interaction with a neat diagram. **(10 Marks)**

OR

10 a. Explain persistant and non persistant http in details. **(10 Marks)**

b. Write notes on:

(i) E-mail in the internet

(ii) Distributed DNS architecture **(10 Marks)**

* * * * *

VTU-05-04-2024 01:07:28pm
KS - KS - KS - KS - KS - KS - KS - KS - KS
05-04-2024 01:32:04pm
KS - KS - KS - KS - KS - KS - KS - KS - KS

CBCS SCHEME

USN | | | | | | | | | | |

21CS53

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Database Management Systems

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define DBMS. Explain all the basic operations that can be performed by DBMS on a database. **(05 Marks)**

b. Explain the different users of a database system. **(10 Marks)**

c. Describe the 3-Schema Architecture. **(05 Marks)**

OR

2 a. Define the following terms:
i) Data model ii) Schema iii) Insurance iv) Canned transaction **(04 Marks)**

b. Describe the structural constraints of a database system with suitable example. **(10 Marks)**

c. Explain all the E-R diagram notations. **(06 Marks)**

Module-2

3 a. Explain the four relational model constraints. **(06 Marks)**

b. Explain all the steps of Relational database design using E-R to relational schema with a suitable example. **(06 Marks)**

c. Discuss the DIVISION operation of relational algebra. Find the Quotient for the following :

A =

SNO	DNO
S_1	P_1
S_1	P_2
S_1	P_3
S_1	P_4
S_2	P_1
S_2	P_2
S_3	P_2
S_4	P_2
S_4	P_4

B_1 =

PNO
P_2

B_2 =

PNO
P_2
P_4

B_3 =

PNO
P_1
P_2
P_4

Find i) A/B_1 ii) A/B_2 iii) A/B_3 **(08 Marks)**

OR

4 a. Explain the characteristics of a relational model. **(06 Marks)**

b. Explain all types of outer join operations in relational algebra. Demonstrate the advantage of outer join operation over the inner join operation. **(06 Marks)**

c. Considering the following schema
Sailors (sid, sname, rating, age)
Boats (bid, bname, color)
Reserves (sid, bid, day)
Write a relational algebra queries for the following :
i) Find the names of sailors who have reserved boat#103.
ii) Find the names of sailors who have reserved a red boat.
iii) Find the names of sailors who have reserved a red or green boat.
iv) Find the names of sailors who have reserved all boats. **(08 Marks)**

Module-3

5 a. Explain the basic data types available for attributes in SQL. **(05 Marks)**

b. Demonstrate the following constraints in SQL with suitable example:
i) NOT NULL ii) Primary key iii) Foreign key iv) Default v) Check. **(10 Marks)**

c. What are triggers? Explain with syntax and suitable example. **(05 Marks)**

OR

6 a. Explain the basic definition of a cursor and its usage with the help of a suitable example. **(05 Marks)**

b. What are Assertions? Assuming suitable company schema write an Assertion for the condition.
"The salary of an Employee must not be greater than the salary of the manager of the department that the employee works for". **(05 Marks)**

c. Referring to the below mentioned company schema. Write the SQL queries for the following:

Employee

Fname	Lname	Minit	Ssn	Bdate	Address	Sex	Salary	SuperSsn	Dno

Department

Dname	Dnumber	Mgr_Ssn	Mgr_start_date

Department_location

Dnumber	Dlocation

Project

Pname	Pnumber	Plocation	Dnum

Work_on

Essn	DNo	HRS

Defendant

Essn	Dependentname	Sex	Bdate

i) For each department retrieve the department number, the number of employees in the department and their average salary.
ii) For each project on which more than 2 employees work, retrieve the project number, the project name and the number of employees who work on the project.
iii) For each project, retrieve the project number, the project name and the number of employees from department no. 5 who work on that project.
iv) For each department that has more than 5 employees, retrieve the department number and the number of its employees who are making more than $40,000 salary.
v) Retrieve the names of an employees who have two or more dependents. **(10 Marks)**

Module-4

7 a. Explain the types of update anomalies with examples. **(05 Marks)**

b. Explain Armstrong's rules of inference. **(05 Marks)**

c. What is the need for normalization? Explain 1NF, 2NF and 3NF with examples. **(10 Marks)**

OR

8 a. Explain the informal design guidelines of a database. **(06 Marks)**

b. What is equivalence of sets of functional dependencies? Check whether the following sets of F.D's are equivalent or not.

$FD_1 = \{A \rightarrow B, B \rightarrow C, AB \rightarrow D\}$

$FD_2 = \{A \rightarrow B, B \rightarrow C, A \rightarrow C, A \rightarrow D\}$ **(08 Marks)**

c. Write an algorithm to find the closure of functional dependency 'F'. **(06 Marks)**

Module-5

9 a. Explain the desirable properties of a transaction. **(06 Marks)**

b. Explain with a neat diagram, the state transition diagram of a transaction. **(06 Marks)**

c. Explain two phase locking mechanism with suitable example. **(08 Marks)**

OR

10 a. Discuss on the database inconsistency problem. **(10 Marks)**

b. Explain Binary locks and shared locks with algorithms. **(10 Marks)**

CBCS SCHEME

USN | | | | | | | | | | |

21AI54

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Principles of Artificial Intelligence

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. Define AI. Explain the foundation of AI in detail. (10 Marks)
b. Explain the history of AI in detail. (10 Marks)

OR

2 a. Briefly explain the properties of task environment. (10 Marks)
b. Explain the following with respect to structure of agents:
i) Simple reflex agents ii) Model-based reflex agents iii) Utility-based agents. (10 Marks)

Module-2

3 a. Explain Goal formulation and problem formulation with examples. (10 Marks)
b. Discuss problems that uses problem solving methods. (10 Marks)

OR

4 a. Explain BFS, DFS and Depth-limited search along with example. (10 Marks)
b. Discuss the different solutions and metrics for searching. (10 Marks)

Module-3

5 a. Explain A* search and Memory-bounded heuristic search with example. (10 Marks)
b. Discuss Heuristic functions in detail. (10 Marks)

OR

6 a. Explain the propositional logic syntax and semantics. (10 Marks)
b. Explain the following with examples :
i) Logical Equivalence ii) Inference rules iii) Horn clauses (10 Marks)

Module-4

7 a. Explain the syntax and semantics of first-order logic. (10 Marks)
b. Explain the following with respect to firs-order logic:
i) Assertions and queries ii) Numbers, Sets and Lists iii) Wumpus world (10 Marks)

OR

8 a. Explain Unification and Simple forward chaining along with the examples. (10 Marks)
b. Explain backward chaining algorithm with example. (10 Marks)

Module-5

9 a. Explain Basic Probability Notation in detail. (10 Marks)
b. Explain Inference using Full Joint distributions. (10 Marks)

OR

10 a. Explain Baye's rule and its use in detail. (10 Marks)
b. Explain Independence with respect to Quantifying uncertainty. (10 Marks)

* * * * *

CBCS SCHEME

USN | | | | | | | | | | |

21RMI56

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024
Research Methodology & Intellectual Property Rights

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

Module-1

1 a. What is Engineering Research? What are the primary objectives of conducting research in engineering? **(10 Marks)**

b. What are the various types of engineering research? Explain. **(10 Marks)**

OR

2 a. Explain Fabrication, Falsification and Plagiarism related to Engineering research. **(10 Marks)**

b. What ethical considerations and responsibilities should be taken into account when determining authorship in Engineering research? **(10 Marks)**

Module-2

3 a. How do researchers distinguish between new and existing knowledge during a literature review? **(10 Marks)**

b. How can researchers effectively use search engines to find relevant literature in their fields? **(10 Marks)**

OR

4 a. What challenges do researchers commonly face when reading mathematical content or algorithm? **(10 Marks)**

b. What is impact of Title and Keywords on Citations? Explain Citation based knowledge flow. **(10 Marks)**

Module-3

5 a. What is definition of Intellectual Property (IP)? In what way does Intellectual Property contribute to economic growth and cultural development in a society? **(10 Marks)**

b. Discuss the history of Intellectual property in India. **(10 Marks)**

OR

6 a. Explain the step by step process of obtaining a patent. From the initial idea to the grant of the patent. **(10 Marks)**

b. What are the commonly used terms in the field of patenting and how do they contribute to effective communication in this domain. **(10 Marks)**

Module-4

7 a. Explain the criteria that an original work must meet to quality for copyright protection. **(10 Marks)**

b. Explain the process of copyright registration? What are the benefits for the copy right holders? **(10 Marks)**

OR

8 a. Explain the process of Trademark registration. **(10 Marks)**

b. Explain the classification system for trademarks and its role in categorizing different types of marks. **(10 Marks)**

Module-5

9 a. Explain the process of Industrial design registration. **(10 Marks)**

b. Explain the famous case law between Apple Inc Vs Samsung Electronics Co. related with Industrial Design rights. **(10 Marks)**

OR

10 a. Which specific acts, laws and rules govern geographical indications in India? Give some examples of well known geographical indications registered in India. **(10 Marks)**

b. How would you describe the overall ecosystem and significance of geographical indications in India? **(10 Marks)**

* * * * *

VTU-18-04-2024 02:14:15pm
KS - KS - KS - KS - KS - KS - KS - KS
18-04-2024 01:31:43pm
KS - KS - KS - KS - KS - KS - KS - KS

CBCS SCHEME

21CIV57

USN | | | | | | | | | |

Question Paper Version : D

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2023/Jan. 2024
Environmental Studies

Time: 1 hr.] [Max. Marks: 50

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the **fifty** questions, each question carries one mark.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. **For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.**
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

VTU-24-01-2024 01:13:37pm - KS - KS - KS - KS
KS - KS - KS - 24-01-2024 01:32:41pm - KS - KS - KS

---

1 GIS uses the information from which of the following sources
a) Non-Spatial Information System
b) Spatial Information System
c) Global Information System
d) Position Information System

2 EIA can be expanded as
a) Environment and Industrial Act
b) Environmental and Impact Activities
c) Environmental Impact Assessment
d) Environmental Impact Activity

3 ISO 14000 standards deals with
a) Pollution management b) Risk management
c) Environmental management d) None of these

4 Which of the following represents India in ISO
a) PFRDA b) FSSAI c) BIS d) BCCI

5 Which of the following is having high population density
a) India b) China c) USA d) Western Europe

6 Environment education is targeted to
a) General public
b) Professional social groups
c) Technical and Scientists
d) All of the above

7 Discharge of municipal waste cause
a) Depletion of dissolved oxygen
b) Destroy aquatic life
c) Impair biological activity
d) All of the above

8 _____ is are referred to a Earth's lungs
a) Forests b) Carbon cycle c) Water sources d) Miner

9 Solid waste is best managed through
a) Incineration b) Open dumping c) Sanitary landfill d) Composting

10 Love canal tragedy is attributed to
a) Soil pollution b) Hazardous waste c) Air pollution d) None of these

11 Disaster management includes _____
a) Mitigation b) Reconstruction c) Rehabilitation d) All of these

12 What is the health effects of fluoride in drinking waster
a) Arthritis b) Diarrhea c) Anemia d) All of these

13 What is the permissible range of pH for drinking water as per Indian standards
a) 6 – 9 b) 6 – 8.5 c) 6.5 – 8.5 d) 6 5 – 7.5

14 The infiltration of water into the subsurface is the
a) Influent b) Effluent c) Discharge d) Recharge

15 Environmental (Protection Act) was enacted in the year
a) 1986 b) 1992 c) 1984 d) 1974

16 What is the full form of NGO
a) Non-Governmental Organization
b) Non-Governance Organizations
c) No- Governance Organizations
d) Null – Governmental organizations

17 The primary cause of acid rain around the world is
a) CFC b) SO_2 c) CO d) O_3

18 Bhopal Gas Tragedy caused due to leakage of
a) Methyl ISO Cyanate (MIC) b) Sulphur dioxide
c) Mustered gas d) Methane

19 Deforestation can
a) Increase the rainfall
b) Increase soil fertility
c) Introduce silt in the river
d) None of the above

20 The word Environment is derived from
a) Greek b) French c) Spanish d) English

21 According to Biomedical Waste (Management and Handling) Rules 1998, waste should not be stored beyond _____
a) 12 hours b) 48 hours c) 72 hours d) 96 hours

22 Pyrolysis is an _____ process
a) Exothermic b) Endothermic c) Both a and b d) Neither a and b

23 Chloroflurocarbons are
a) Nontoxic b) Flammable c) Corrosive d) Odorous

24 Which of the following is an air pollutant
a) Carbon dioxide b) Oxygen c) Nitrogen d) Particulate matter

25 Urbanization is
a) Local environmental issue
b) Nation environmental issue
c) Both a and b
d) Not at all an issue

26 Earth day is held every year on :
a) June 5th b) November 23rd c) April 22nd d) January 26th

27 The term hotspot was introduced by –
a) Norman Myere b) Jacob Von Verkul
c) A.G. Transley d) Ernst Haeckel

28 In an Ecosyste, the energy flow is always
a) Always unidirectional
b) Always bidirectional
c) In any direction
d) Always down directional

29 Which of the following is considered as an alternate fuel
a) CNG b) Kerosene c) Coal d) Petrol

30 Nuclear power plant in Karnataka is located at
a) Bhadravati b) Sandur c) Raichur d) Kaiga

31 The main cause of damage to Taj Mahal is _____
a) Water pollution b) Soil pollution c) Acid rain d) Fog

32 Reducing the amount of future climate change is called.
a) Mitigation b) Geo-engineering c) Adaptation d) None of these

33 Ozone layer is at a height of _____ above the Earth's surface
a) 19 to 48m b) 19 to 480m c) 19 to 48km d) 190 to 480km

34 Which ministry is mainly responsible for research and development in renewable energy sources such as wind, power small hydro, biogas and solar power
a) Human Resource Development
b) Agriculture and Famous welfare
c) Ministry of new and Renewable energy
d) Health and Family welfare

35 The OTEC is an energy technology that converts
a) Energy in large fides of ocean to generate electricity
b) Energy in ocean waves to generate electricity
c) Energy in ocean due to thermal gradient to generate electricity
d) Energy in the fast moving ocean currents to generate electricity

36 In a Lake, phytoplankton grow in abundance in
a) Littoral zone b) Limnetic zone c) Profundal zone d) Benthic region

37 The prescribed limits of noise in residential area during day is
a) 55dB b) 45dB c) 60dB d) 50dB

38 The maximum allowable concentration of fluorides in drinking water
a) 3mg/L b) 2mg/L c) 2.5mg/L d) 1.5mg/L

39 The color code of plastic bag for disposing microbial laboratory culture waste
a) Red b) Black c) Blue d) White

40 The hazardous pollutant released from batteries is
a) Arsenic b) Cobalt c) Barium d) Cadmium

41 Biodiversity is a measure of variation at the _____ level
a) Genetic b) Species c) Ecosystem d) All of these

42 World Environment Day is celebrated on _____
a) 5th May b) 5th June c) 18th June d) 16th August

43 Mining means
a) To conserve minerals b) To check pollution
c) To extract minerals and ores d) None of these

44 Direct conversion of solar energy is attained by
a) Solar Photo volcanic system
b) Solar diesel hybrid system
c) Solar thermal system
d) Solar air heater

45 What % of its geographical area of a country should be under forest cover
a) 23% b) 43% c) 13% d) 33%

46 Hazardous Waste Management Act was enacted in India in the year
a) 1988 b) 1989 c) 1990 d) 1991

47 Which of these following elements is the case of e-waste?
a) Cadmium b) Beryllium c) Lead d) All of these

48 Remote sensing techniques make use of the properties of _____emitted, reflected or diffracted by the sensed objects
a) Electric waves b) Sound waves
c) Electromagnetic waves d) Wind waves

49 The altitudinal distance of a geostationary satellite from the earth is about
a) 26,000km b) 30,000km c) 36,000km d) 44,000km

50 Montreal protocol is related to the
a) Food security b) Global warming
c) Sustainable development d) Ozone layer depletion

* * * * *