Course Code : CST 307 EIQU/RW – 16/1621

Sixth Semester B. E. (Computer Science and Engineering) Examination

DESIGN AND ANALYSIS OF ALGORITHMS

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions carry equal marks.
(2) Solve any **two** sub – questions from each questions.
(2) Mention comments properly before writing the algorithms.

1. (a) Solve the following non homogeneous recurrence and provide the suitable asymptotic bound.

$$t_n = \begin{cases} 1 & \text{if } (n = 0) \\ 4t_{n-1} - 2^n & \text{otherwise} \end{cases}$$ 5

(b) Solve the following recurrence relation :

$$T(n) - 4T(n-1) + 3T(n-2) = 0, T(0) = 0, T(1) = 2$$ 5

(c) If an algorithm contains a loop in which value of the index variable is modified, using divided by 2 operations in two separate instructions. Similarly there are two individual instructions in the loop. What is the recurrence relation of the loop ? Solve the recurrence without any initial conditions. 5

2. (a) Why there is a necessity for amortized analysis ? Apply aggregate analysis method for providing amortized cost for stack operations PUSH, POP and MULTIPOP. 5

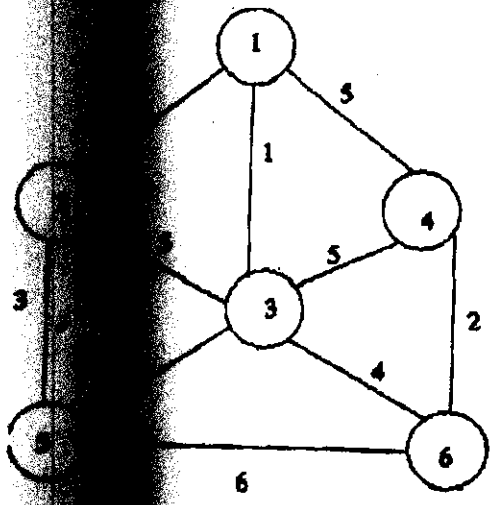
(b) Explain insertion sort for the following array and write functions used to implement the sort process.

21 , 29 , 17 , 55 , 33 , 79 , 30 , 94 5

(c) What is bitonic sorting network ? Explain with suitable example. 5

3. (a) Write greedy algo[rithm] for single source shortest path algorithm. Explain the data structures u[sed] time complexity of the algorithm. 5

(b) Write KRUSKA[L's algorithm]. Implement the algorithm on the following graph. Comment on the [time] complexity of the algorithm. Write any two applications of KRUSKAL's [algorithm].



5

(c) Explain how divi[de and conq]uer strategy takes place in merge sort ? Explain with suitable exa[mple]. 5

4. (a) Write forward algo[rithm] for generating shortest path in multistage graph. Explain the compelexity [of the algorithm]. 5

(b) Implement the ed[it distance] problem on the following two strings :

[S1] : POLYNOMIAL

[S2] : POTENTIAL 5

(c) Implement travelli[ng salesman] problem on the following matrix. Find the cost and sequence of [visiting the cities].

0	5
3	8
6	2
5	0

5

5. (a) Write an algorithm [to] design Euler's cycle on a given graph. Comment on the time comp[lexity of] the algorithm. 5

(b) Design fixed and variable solution for sum of subset problem with $m = 31$ and array content $\{ 25 , 6 , 11 , 20 , 5 \}$. 5

(c) Write an algorithm to perform Graph Coloring. Comment on the time complexity of algorithm for a connected graph. 5

6. (a) What is independent set problem ? Can you reduce independent set problem into clique problem in polynomial time ? If yes, how ? 5

(b) Explain the three functions for implementing non – deterministic algorithm, with suitable example. 5

(c) Explain the followings with the help of an example :—

(1) P Problems

(2) NP Problems

(3) NP – C

(4) NP – hard

(5) Undecidability. 5

Course Code : CST 308 **EIQU/RW – 16 /1622**

Sixth Semester B. E. (Computer Science and Engineering) Examination

DATABASE MANAGEMENT SYSTEM

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) Due credit will be given to neatness and adequate dimensions.

(2) Illustrate your answer wherever necessary with the help of neat sketches.

1. (a) Consider the following database schema and answer the following queries in SQL.

TABLE (CompID, MfgName, MgfModel, ProType)
EMP (Emp-Num, EmplastName, EmpFirstName, EmpPhone)
PACKAGE (PackID, PackName, PackVer, PackTypePackCost)
PC (TagNum, CompID, EmpNum, Location)
SOFTWARE (PackID, TagNum, InstallDate, SoftCost)

(i) For each PC assigned to employers 124, list the tag numbers and computer ID along with the name of the computer manufacturer.

(ii) Find the numbers and name of all employers who are not assigned a PC for home use.

(iii) Find the tag number and comptuer IDs for those PCs that have at least one Database package installed on it.

(iv) For each PC assigned to employee 124, list the tag number and computer ID along with name of computer manufacturer.

(v) List the package IDs and names of any PCs assigned to Ramon Alverez. 10

2. (a) Normalize the g... e to its highest normal form and also specify anomalies and functional ...ncies in every normal form.

Roll No		Subject	Marks	Rank	Year
101		OS DBMS CN	60 65 70	3	4
102		E – COM DMW CG	70 75 70	2	4
108		ITP EDC NT	80 70 72	2	2

6

(b) Compute the c... the given set of functional dependencies,

R = { K , ... P } ,

F = { MN ... M → N , K → LN }

OR

(b) Design an E–R ... for an airline. The database must keep track of customers and ...ervations, flights and their status, seat assignments on individual ... the schedule and routing of future flights. 4

3. (a) What are the re... having variable – length records ? What typ... of separator ch... e needed for each ? 5

(b) Explain the para... d for block storage and table storage in detail. 5

4. Solve any **two** :—

(a) Discuss the proce... uery processing with a block diagram. 5

(b) What is meant by t... heuristic optimization ? Discuss the main heuristics that are applied d... ery optimization. 5

(c) What is the difference between pipelining and materialization ? 5

(d) Discuss the rules for transformation of query trees and identify when each rule should be applied during optimization. 5

5. (a) What is meant by the concurrent execution of database transactions in a multiuser system ? Discuss why concurrency control is needed, and give informal examples. 5

(b) What is a serial schedule ? What is a serializable schedule ? Why a serial schedule is considered correct ? Why a serializable schedule is considered correct ? 5

OR

(c) Discuss the timestamp ordering protocol for concurrency control. How does strict timestamp ordering differ from basic timestamp ordering ? 5

6. Solve any **two** :—

(a) Discuss the different types of transaction failures. What is meant by catastrophic failure ? 5

(b) What are the before image (BFIM) and after image (AFIM) of a data item ? What is the difference between in – place updating and shadowing, with respect to their handling of BFIM and AFIM ? 5

(c) Describe the write – ahead logging protocol. 5

(d) How can recovery handle transaction operations that do not affect the database, such as the printing of reports by a transaction ? 5

Course Code : CST 309 EIQU/RW – 16 / 1623

Sixth Semester B. E. (Computer Science and Engineering) Examination

INTRODUCTION TO WIRELESS COMMUNICATION SYSTEM

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions carry marks as indicated against them.
(2) Due credit will be given to neatness and adequate dimensions.
(3) Assume suitable data and illustrate answers with neat sketches wherever necessary.

1. (a) (i) We have channel bandwidth of 1 MHz, The SNR for this channel is 511, then what are appropriate bit rate and signal level ?

(ii) The attenuation of a signal is -20 dB, what is the final signal power, it was originally 5 w ? 5

(b) Write short notes on, How a call initiated by mobile to the land line subscriber ? Draw neat and labeled timing diagram. 5

OR

(c) Calculate total latency, where message size 1 M bit, queuing time is 2 μs, processing time is 1 μs and 15 routers are in between placed. Distance between two station are 3000 km, Bandwidth allocated is 6 Mbps. (Assume propagation speed = 2.4×10^8 m/s). 5

2. (a) List the various IEEE Wireless standards for WLL, WLAN and WPAN. Explain in short the application of Wireless LAN, how it is advantageous over a Wired LAN ? 5

OR

(b) Enlist the advantages of WLL over a Wired telephone approach. List the possible ways which makes WLL practically implementable. 5

(c) Explain IEEE 802.16 fixed broadband wireless access standards. 5

3. (a) A cellular service pro decides to use a digital TDMA scheme which can tolerate a signal erference ration of 15 dB in the worst case. Find the optimal v N for :

(i) Omnidirectiona as

(ii) 120^0 sectoring

(iii) 60^0 sectoring.

Should sectoring be If so, which case (60^0 or 120^0) should be used ? (assume path l ent of n = 4 and considering trunking efficiency) 6

OR

(b) What is Handoff ? W significance of Handoff Threshold in Wireless Cellular Network ? I possible methods used for Handoff Decision. Explain any one in 6

(c) In a dense Urban en path loss component = 4.5 and the required signal to interference 13 dB.
Calculate :—

(i) The Reuse fac issible.

(ii) For the rural en with path loss = 3, discuss the permissible Reuse factor. 4

4. (a) Differentiate between ous TDM and Statistical TDM. Give the classification of belo and Solve.
Ten sources, six wit ate of 200 kbps and four with a bit rate of 400 kbps with no nizing bits. Answer the following questions about the final stage ultiplexing :

(a) What is the a a frame in bits ?

(b) What is the te ?

(c) What is durat frame ?

(d) What is the d ?

Each output slot ca bits from each source. 6

(b) Explain carrier sense multiple access (CSMA) protocol. 4

OR

(c) Explain spread spectrum multiple access method with example. 4

5. (a) Explain Signaling system No7 (SS7). 5

OR

(b) What is GSM ? Explain frame structure of GSM. 5

(c) (i) Write difference between wireless and fixed telephone network.

(ii) Explain X.25 protocol. 5

6. (a) Why Wireless Application Protocol (WAP) is called as Open Standard protocol? Explain the features and also mentioned the limitations of WAP Design. 6

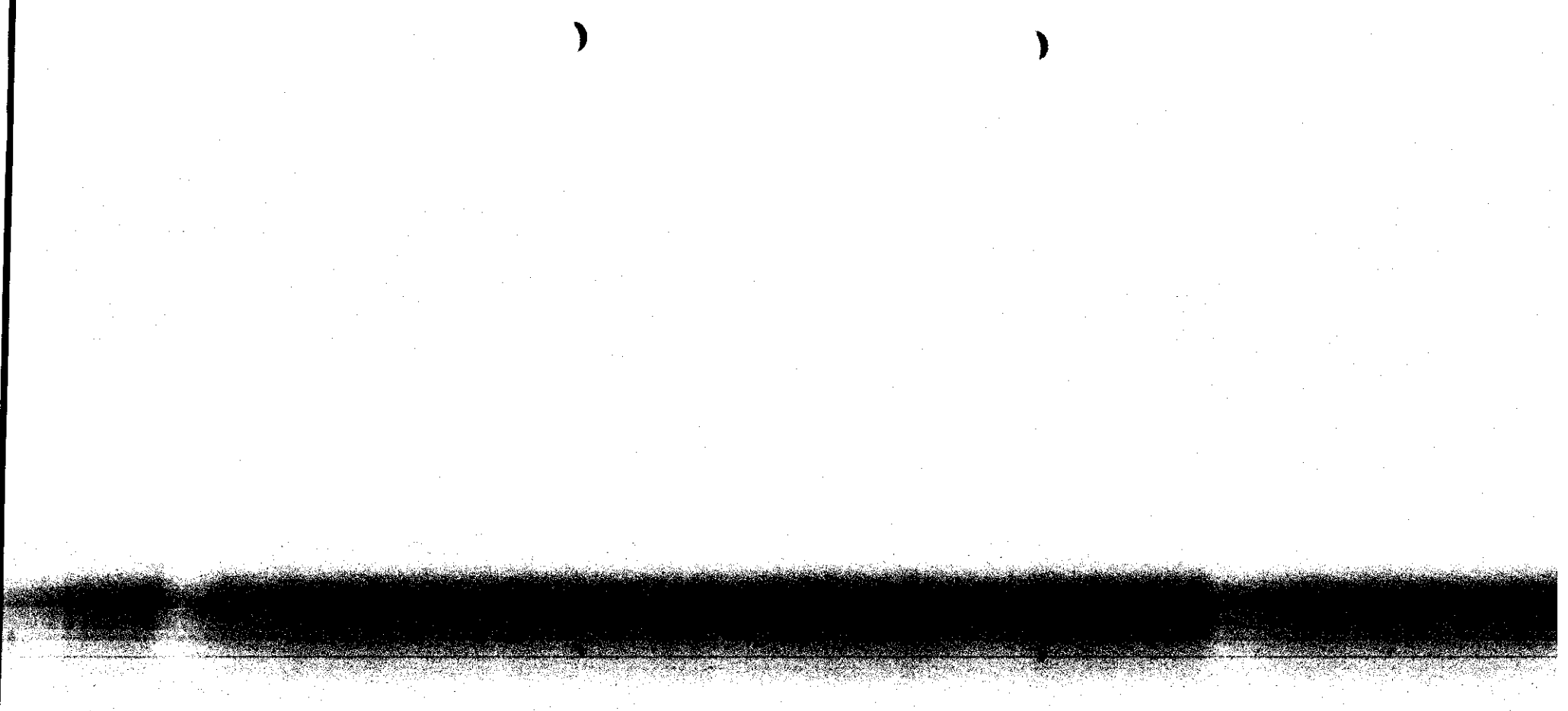
OR

(b) Describe with neat sketch WTLS (wireless transport layer security) hand shake protocol action. 6

(c) How frequency Hopping is implemented in Bluetooth for Multiple Access ? 4

OR

(d) Give the significance of Pico nets and scatter nets with respect to Bluetooth technology. 4



Course Code : CST 311 **EIQU/RW – 16/1624**

Sixth Semester B. E. (Computer Science and Engineering) Examination

ARTIFICIAL INTELLIGENCE

Time : 3 Hours] [Max. Marks : 60

Instructions to Candidates :—

(1) All questions carry marks as indicated against them.
(2) Assume suitable data wherever necessary.
(4) Illustrate your answers wherever necessary with the help of neat sketches.

1. Solve any **two** :—

(a) Consider the missionaries and cannibals problem which is stated as follows :
3 missionaries and 3 cannibals are on one side of the river along with a boat which can hold one or two people. Find a way to get everyone to the other side, without leaving a group of missionaries in one place outnumbered by the cannibals in that place.
How you will represent state of the above problem ?
What are different operators (rules) of the above problem ? 5

(b) Write seven characteristics of a problem with appropriate examples. 5

(c) Write operators (rules) for 8 – puzzle (sliding tiles) problem. 5

2. Solve any **two** :—

(a) Give the algorithm for breadth first search. Apply BFS to solve missionaries and cannibals problem. 5

(b) Write heuristic function for 8 – puzzle problem. Apply hill climbing on 8 – puzzle with suitable initial and goal states. 5

(c) What is means ends analysis algorithm ? Give its peculiar characteristics. 5

3. Solve any **two** :—

(a) Write implication [illegible] implication in terms of basic connectives (conjunction, disjunction **and** [illegible] Verify with the help of truth table. 5

(b) Write the **follow**[illegible]nces in to first order predicate logic.

(1) Deepak [illegible] a surgeon or a lawyer.

(2) All surge[illegible] doctors.

(3) Deepak [illegible]oss who is a lawyer.

(4) There ex[illegible]wyer, all of whose customers are doctors.

(5) Harish d[illegible] have a lawyer (i. e. not a customer of any lawyer). 5

(c) Write the follow[illegible]ce in to first order predicate logic and then convert into skolem nor[illegible]

(1) Every e[illegible] some color. 5

4. Solve any **two** :—

(a) Explain in brief [illegible]es' theorem can be used to deal with uncertainty in AI. 5

(b) Explain with th[illegible] an example Bayesian belief network. 5

(c) Write a short [illegible] fuzzy sets and its basic operations in terms of membership fun[illegible] 5

5. Solve any **two** :—

(a) Consider the [illegible]k represented by the training examples of Table 1 :

Day	Outlook	[illegible]rature	Humidity	Wind	Play Tennis
D1	Sunny	[illegible]t	High	Weak	No
D2	Sunny	[illegible]t	High	Strong	No
D3	Overcast	[illegible]t	High	Weak	Yes
D4	Rain	[illegible]ld	High	Weak	Yes

Contd.....

Day	Outlook	Temperature	Humidity	Wind	Play Tennis
D5	Rain	Cool	Normal	Weak	Yes
D6	Rain	Cool	Normal	Strong	No
D7	Overcast	Cool	Normal	Strong	Yes
D8	Sunny	Mild	High	Weak	No
D9	Sunny	Cool	Normal	Weak	Yes
D10	Rain	Mild	Normal	Weak	Yes
D11	Sunny	Mild	Normal	Strong	Yes
D12	Overcast	Mild	High	Strong	Yes
D13	Overcast	Hot	Normal	Weak	Yes
D14	Rain	Mild	High	Strong	No

Table 1

Apply ID3 algorithm and decide which attribute should be selected as decision attribute for the root node ? 5

(b) Design a three input perceptron that implements Boolean function $AA \sim B$. 5

(c) Explain working of a single neuron. Solve NOR classification problem by using single neuron. 5

6. Solve any **two** :—

(a) What do you mean by an expert system shell ? How is it designed ? 5

(b) What are the features of a typical expert system ? 5

(c) If an expert system needs to be built fuzzy logic, what minimum stages will be required to build a system ? Explain in brief. 5

Course Code: CST310-4

Sixth Semester BE (Computer Science and Engineering) Examination

BUSINESS INTELLIGENCE AND ITS APPLICATIONS

Time: 3 Hours] [Max. Marks: 60

Instructions to Candidates:

1. All questions carry marks as indicated against them.
2. Number your answers properly.
3. Assume suitable data and illustrate answers with neat sketches wherever necessary.

Question		Description of Question	Marks	CO
1.	(a)	What is semi-structured data? List three resources of semi-structured data.	(05)	CO1
		OR		
		Can XML data be converted into a structured format? Explain with an example.		
1.	(b)	Compare OLTP and OLAP systems	(05)	CO1
2.		Solve any two.		
	(a)	Write a short note on evolution of BI.	(05)	CO1
	(b)	Explain the BI framework with the help of a diagram.	(05)	CO2
	(c)	What is the role of data warehousing in BI?	(05)	CO2
3.	(a)	Explain schema integration and instance integration with the help of an example.	(06)	CO3
	(b)	What is data quality? How is it helpful in BI?	(04)	CO3
		OR		

What is data profiling? How is it used in BI?

4. (a) Mr. Smith manages a small product distribution company. Because the business is growing fast, Mr. Smith recognizes that it is time to manage the information pool to help guide the accelerating growth. Mr. Smith, who is familiar with spreadsheet software, currently employs a small sales force of four people. He asks you to develop a data warehouse application prototype that will enable him to study sales figure by year, region, salesperson, and product. (08) (CO4)

1) Identify the appropriate fact table components.

2) Identify the appropriate dimension tables.

3) Draw a star schema diagram for this data warehouse.

4) Identify the attributes for dimension tables.

(b) You are the owner of a retail chain. You wish to enhance the productivity of your employees. Give 6 metrics that you will define to achieve this objective. (02) (CO4)

5. Solve any two.

(a) Why is "measurement, analytics, and knowledge management" so important for an enterprise? Give your reasons to support your answer. (05) (C05)

(b) Create a balanced scorecard for a fictitious enterprise. Explain the rationale behind it. (05) (CO5)

(c) What is an enterprise dashboard? Who is the user? Explain your answer. (05) (CO5)

6. (a) Mention one open source tool for each of the following categories: (05) (CO5)

(i) ETL (ii) RDBMS
(ii) Reporting (iii) Analysis
(iii) Data Integration

(b) List steps for creating a report in Pentaho. (05) (CO5)