Total No. of Questions : 8]

SEAT No. :

PC-2368

[Total No. of Pages : 4

[6354]-485
B.E. (Computer Engineering)
DESIGN AND ANALYSIS OF ALGORITHMS
(2019 Pattern) (Semester - VII) (410241)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data if necessary.***
4) ***Figures to the right indicate full marks.***

Q1) a) You are given a set of tasks, each with a deadline and a penalty for missing the deadline. The objective is to schedule these tasks in a way that minimizes the total penalty incurred. However, you can only work on one task at a time, and once a task is started, it must be completed before moving on to the next task. Additionally, you can't start a task after its deadline has passed. Design a greedy algorithm to efficiently schedule these tasks to minimize the total penalty and prove its correctness. **[8]**

b) Suppose we have a knapsack with a maximum weight capacity of 15 units, and we have the following items with their respective weights (Wi) and values (Vi) :

Objects	Weight	Value
O1	8	10
O2	6	8
O3	4	3
O4	2	4

Use greedy approach to maximize the total value of items we can put into the knapsack without exceeding its weight capacity. **[8]**

c) With respect to dynamic programming, what do you understand by optimal substructure? **[2]**

OR

P.T.O.

Q2) a) We are given the sequence {4, 10,3, 12,20, and 7}. We are given with five matrices of the size 4 × 10, 10 × 3,3 × 12, 12 × 20,20 × 7 respectively. Use dynamic programming to solve chain matrix multiplication. **[10]**

b) Under what situation do you think the dynamic programming approach for solving a knapsack problem might struggle to find the optimal solution? Briefly explain. **[4]**

c) Enlist the uses of writing control abstraction for any algorithmic strategies. **[4]**

Q3) a) Consider a graph represented by the adjacency matrix given below :

	A	B	C	D	E	F	G
A	0	1	1	0	0	0	0
B	1	0	0	1	1	0	0
C	1	0	0	0	0	1	1
D	0	1	0	0	0	0	0
E	0	1	0	0	0	0	0
F	0	0	1	0	0	0	0
G	0	0	1	0	0	0	0

Use a recursive backtracking algorithm to colour this graph with three colours R,G,B **[8]**

b) Consider three items along with respective weights and value as

	Weight	Value
O_1	10	12
O_2	8	10
O_3	6	8

Assume the Knapsack capacity m = 14. Solve this 0/1 Knapsack problem using LC branch and bound method. **[9]**

OR

Q4) a) We have a salesman who needs to visit four cities (A, B, C, D) and return to the starting city. The distances between these cities are as follows :

Distance from A to B: 10 units

Distance from A to C: 15 units

Distance from A to D: 20 units

Distance from B to C: 35 units

Distance from B to D: 25 units

Distance from C to D: 30 units

Find the shortest possible route that visits each city exactly once and returns to the starting city. Use branch and bound method to find the optimum route for traveling salesman, assume A as a starting point of the tour. **[8]**

b) Write a short note on LC branch and bound method. **[5]**

c) What are the drawbacks of branch and bound method? **[4]**

Q5) a) What are the advantages and disadvantages of : **[8]**

i) Aggregate Analysis

ii) Accounting Method

b) What are approximation algorithms? Based on the approximation ratio, classify the approximation algorithms. **[9]**

OR

Q6) a) Why potential function method cannot be used for analysing binary counter? Explain **[8]**

b) Comment on the following statements : **[9]**

i) "The knapsack problem is NP-hard"

ii) "Boolean Satisfiability Problem (SAT) is NP-complete"

iii) "Minimum spanning tree is tractable problem"

Q7) a) Write a Rabin-Karp string matching algorithm. Let input to the algorithm be Original text "t" of length n and pattern text being matched is "p" of length m. What is the expected runtime and worst–case runtime of this algorithm? **[10]**

b) Briefly explain performance measures – speedup, efficiency, throughput, contention, and latency of multithreaded algorithms. **[8]**

OR

Q8) a) Consider the graph represented by an adjacency matrix : **[10]**

	A	B	C	D	E	F	G
A	0	1	0	0	0	0	0
B	1	0	0	1	1	0	0
C	1	0	0	0	0	1	1
D	0	1	0	0	0	0	0
E	0	1	0	0	0	0	0
F	0	0	1	0	0	0	0
G	0	0	1	0	0	0	0

Show stepwise process how the distributed breadth first search algorithm works on the above graph.

b) If we have two matrices of the order m x n and n x p then what will be the time complexity of multiplying these matrices in conventional approach and in multithreaded approach. Discuss. **[8]**

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Total No. of Questions : 8]

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PC-2369

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B.E. (Computer Engineering)

MACHINE LEARNING

(2019 Pattern) (Semester - VII) (410242)

Time : 2 ½Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 OR Q.2, Q.3 OR Q.4, Q.5 OR Q.6, Q.7 OR Q.8.*
2) *Figures to the right side indicate full marks.*
3) *Draw neat diagram wherever necessary.*
4) *Assume suitable data, if necessary.*

Q1) a) Explain Lasso Regression. Explain how Lasso Regression is used for feature selection. **[6]**

b) Define different regression models. **[6]**

c) Describe the bias-variance trade-off and its relationship to under fitting and overfitting. **[6]**

OR

Q2) a) Explain the advantages of RMSE over MSE as an evaluation metric. **[6]**

b) What do you mean by least square method? Explain least square method in the context of linear regression. **[6]**

c) Write a short note on Stochastic gradient descendent algorithms. **[6]**

Q3) a) Explain kernel methods which are suitable for SVM. **[6]**

b) What are advantages and disadvantages of K-NN? **[6]**

c) What are different distance metrics are used in K-NN? **[5]**

P.T.O.

OR

Q4) a) What is Multi Class Classification? Explain the variants of Multi Class Classification. **[5]**

b) What are different techniques used for outlier handing? **[6]**

c) With suitable diagram, Explain Random forest Algorithm with example. **[6]**

Q5) a) Why K-medoid is used? Explain K-medoid algorithm. **[5]**

b) Why density based clustering is used? Explain any one. **[6]**

c) Cluster the following eight points (with (x, y) representing locations) into three clusters. **[6]**

P1(1, 3), P2(2, 2), P3(5, 8), P4(8, 5), P5(3, 9), P6(10, 7), P7(3, 3), P8(9, 4), P9(3, 7)

Use K-Means Algorithm to find the three cluster.

OR

Q6) a) What is isolation factor model? **[5]**

b) Explain Hierarchical Clustering with an example. **[6]**

c) Micro-Average Precision and Recall, Micro-Average F-score, **[6]**

Q7) a) Explain Recurrent Neural Networks with an example. **[6]**

b) What are different activation function used in NN? **[6]**

c) What is multilayer perceptron? Describe with diagram. **[6]**

OR

Q8) a) Explain building blocks of RBF networks. **[6]**

b) What is personalized recommendation? What is content based recommendation? **[6]**

c) Explain the Convolution Neural Network (CNN) with suitable example. **[6]**

Total No. of Questions : 8]

SEAT No. :

PC-2370

[Total No. of Pages : 2

[6354]-487

B.E. (Computer Engineering)

BLOCKCHAIN TECHNOLOGY

(2019 Pattern) (Semester - VII) (410243)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates :

1) *Solve questions Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a) Discuss in brief Bitcoin and Ethereum cryptocurrencies. **[8]**

b) Explain following : **[9]**

i) Proof of work

ii) Proof of stake and

iii) Proof of activity

OR

Q2) a) List and explain types of Blockchain. **[8]**

b) Explain Byzantine general problem scenario. Explain the problem and its probable consequences. **[9]**

Q3) a) Differentiate between Coinbase and Binance. **[9]**

b) What is Metamask? Discuss any one application of Metamask. **[8]**

OR

Q4) a) List and explain types of crypto wallet. **[8]**

b) Write a note on Bitcoin. **[9]**

P.T.O.

Q5) a) What is Swarm, and how does it address the need for decentralized storage in the Ethereum network? **[9]**

b) What is Ethereum? Define smart contracts and give an example of a real-world scenario where a smart contract could be beneficial. **[9]**

OR

Q6) a) State and explain the various components of Ethereum. Explain the various types of Ethereum Networks. **[9]**

b) Explain Decentralized Messaging Platform - Whisper and its purpose in the Ethereum ecosystem. **[9]**

Q7) a) With the help of neat diagram explain how blockchain can be used for any supply chain application. **[9]**

b) Explain the use of blockchain technology in the government sector. 'Which are the different blockchain based applications proposed for it? **[9]**

OR

Q8) a) Explain how blockchain and IOT can work together. **[9]**

b) List out the applications of blockchain technology in different areas. Explain any 2 in detail. **[9]**

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Total No. of Questions : 8]

SEAT No. :

PC2374

[Total No. of Pages :2

[6354]-491

B.E. (Computer Engineering)

OBJECT ORIENTED MODELING & DESIGN

(2019 Pattern) (Semester- VII) (Elective - III) (410244D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Neat diagrams must be drawn whenever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data if necessary.*

Q1) a) What is an Actor, a Use Case, Use case diagram, Explain various relationships in use case diagram with example. **[5]**

b) Draw State Diagram for cash Despenser and explain concurrency. **[5]**

c) Draw an ACTIVITY diagram for describing how selling two wheeler to a customer take place at a dealers Place. Customer can enquire about the two wheeler model available, a sale person is assign to show the customer the vehicles, the sale person show the available two wheelers, customer choose the model for purchase, he can optionally take, accessories like rear-guard etc,ask for a quotation and choose to purchase a vehicle if interested Explain notation used in a sentence each. **[8]**

OR

Q2) a) Write the Use case description for Buying a beverage **[5]**

b) Model a SEQUENCE diagram for 'Rent a Car'. Use Case in an online web based car rental application. Here are some of the assumptions. The customer needs to first choose the type of the car he wants to rent. The car database is maintained in the system organized into type like family car, sports car etc. Based on the car available, the rates of rental are shown, the booking is then made, confirmed, the booking details stored in the system and user is issued an electronic confirmation of the booking. **[5]**

c) Draw Sate diagram for telephone line connection. Give the meaning of Event, State and transition in the diagram. **[8]**

P.T.O.

Q3) a) Illustrate different reuse things that can be considered during modelling a system. **[5]**

b) What are the different Software Control Strategy used in system design. **[5]**

c) Illustrate what is Subsystem along with ways in which Subsystems can communicate. **[7]**

OR

Q4) a) While designing a system explain how data storage management is designed. **[5]**

b) How Global Resources are Handled while System design **[5]**

c) What are the different architecture styles followed in Software design. Draw Architecture of ATM system. **[7]**

Q5) a) How adjustment of inheritance is done in class design. Explain. **[5]**

b) Explain the tasks involved in design optimization. **[5]**

c) What is the importance of adjustment of inheritance? Discuss the steps doing it. **[7]**

OR

Q6) a) What are the steps involved in class design. Explain How to bridge the gap from high level requirement to low level services. **[5]**

b) Discuss how you identify use cases and actors with respect to use case diagrams? **[5]**

c) Explain the following terms in relation to class design **[7]**

i) Refactoring

ii) Reification.

Q7) a) Explain three important parts of design pattern. **[5]**

b) What is communication pattern? Explain any one communication pattern in detail. **[5]**

c) What is Design Pattern? Explain different types of design Patterns. **[8]**

OR

Q8) a) Explain counted pointer example in detailed. **[5]**

b) What is view handler pattern? Explain in detail. **[5]**

c) Write short note on **[8]**

i) Client Dispatcher server

ii) Publisher subscriber

Total No. of Questions : 8]

SEAT No. :

PC2379

[Total No. of Pages : 2

[6354]-496
B.E. (Computer Engineering)
SOFTWARE TESTING & QUALITY ASSURANCE
(2019 Pattern) (Semester - VII) (Elective - IV) (410245 D)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) *Solve Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*
2) *Figures to the right side indicate full marks.*
3) *Assume suitable data if necessary.*
4) *Neat diagrams must be drawn wherever necessary.*

Q1) a) Identify the importance of Regression testing & explain it. [6]

b) Explain any two non functional testing. [6]

c) Can you explain statement coverage & Branch coverage testing? [6]

OR

Q2) a) Explain any two functional testing. [6]

b) Explain in detail performance testing with example. [6]

c) What do you think about dynamic techniques? [6]

Q3) a) Differentiate between quality assurance & qualits conterl. [6]

b) Can you clarify different levels of cmm. [6]

c) Illustrate selenium's IDE and explain indetail. [5]

OR

Q4) a) Why software has defects? explain in detail. [6]

b) Explain in detail reliability of quality Process. [6]

c) Explain Important Aspects of quality management. [5]

P.T.O.

Q5) a) Illustrate selenium tool suite in detail. **[6]**

b) Construct different automated testing process. **[6]**

c) Explain Robotic process Automation in details. **[6]**

OR

Q6) a) What is performance testing. What is use of it. **[6]**

b) How would you explain selenium web driver? Explain it **[6]**

c) Construct different automated testing process. **[6]**

Q7) a) Can you explain how to maintain SQA. **[6]**

b) Compare Run charts and control chart in detail. **[6]**

c) Explain six sigma characteristics in details. **[5]**

OR

Q8) a) Compare flow charts and control chart in detail. **[6]**

b) Explain in detail total quality management. **[6]**

c) Compare the Ishikawa's flow chart and histogram tool. **[5]**

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