DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103
Semester Winter Examination – Dec. -2019

Branch: Information Technology   **Sem.:- V**
Subject: - Design and Analysis of Algorithms (BTITC502)   **Marks: 60**
Date: - 11/12/2019   **Time: 3 Hr.**

Instructions to the Students
     1. Each question carries 12 marks.
     2. Attempt **any five** questions of the following.
     3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
     4. If some part or parameter is noticed to be missing, you may appropriately
        assume it and should mention it clearly.

Q.1. Solve the following Questions: (06*02=12)
A) What is Performance Analysis? How Performance of an algorithm is measured?
B) Define and explain with example asymptotic notations: O, Ω and Θ.
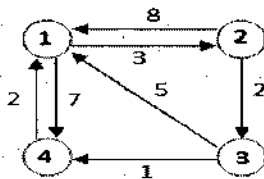
Q.2. Solve the following Questions: (06*02=12)
A) Write recurrence relation and formulas for Strassen's Matrix Multiplication. Multiply following two

matrices using Strassen's Matrix Multiplication: $A = \begin{bmatrix} 15 & 7 \\ 8 & 5 \end{bmatrix}$ $B = \begin{bmatrix} 20 & 23 \\ 17 & 2 \end{bmatrix}$
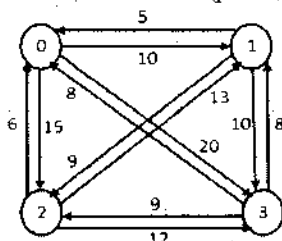
B) Solve the following instance of Knapsack Problem using Greedy approach:
n = 6, m = 20, (p1, ..., p6) = (12, 5, 15, 7, 6, 18) and (w1,....., w6) = (2, 3, 5, 7, 1, 5)

Q.3. Solve the following Questions: (06*02=12)
A) Find All Pairs shortest path for given graph **(Starting Vertex is 1)**:

B) Find optimal tour for TSP problem in given graph **(Starting Vertex is 0)**:

Q.4. Solve the following Questions: (06*02=12)

A) Write algorithm for Graph Coloring Problem using Backtracking. Give only three colors (Red, Green and Blue) to the vertices in given graph using Backtracking and draw its State Space Tree (**Starting Vertex is 0**):
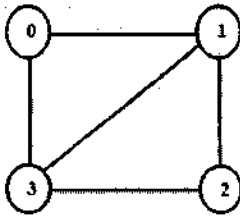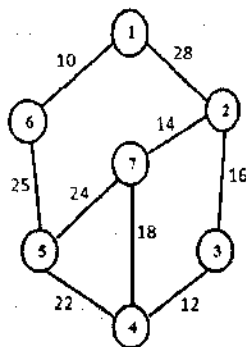

B) Define the terms Live node, E-node, Dead node and Bounding Function. Explain Least Cost Search using Branch-and-Bound.

Q.5. Solve the following Questions: (06*02=12)

A) Define Spanning Tree. Write Prim's Algorithm for Minimum Cost Spanning Tree. Find minimum cost and draw spanning tree for following graph using Prim's Algorithm (**Starting Vertex is 1**):

B) What is String Matching? Write the Naïve String Matching Algorithm. Give the Complexity and number of valid string matching shifts using Naïve String Matching Algorithm for following problem instance: T = 1011101110 and P = 111 where n = 10 and m = 3.

Q.6. Solve the following Questions: (06*02=12)

A) Draw and explain commonly believed relationship between P, NP, NP-hard and NP-complete Problems.

B) What are Hamiltonian Path and Hamiltonian Circuit? Explain with example Hamiltonian Circuit Problem is NP-complete Problem.

*** Paper End ***

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,

LONERE – RAIGAD - 402 103

Winter Semester Examination – December - 2019

Branch: Information Technology   **Sem.:- V**

Subject with Subject Code:- Software Engineering(BTITC503)   **Marks: 60**

Date:- 13/12/2019   **Time:- 3 Hr.**

Instructions to the Students
1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

	(Marks)
Q.1 a)Explain Waterfall and Prototyping process models with its merits and demerits.	06
b)What is extreme programming? What are the key activities of extreme programming?	06
Q.2 a)What are the tasks of requirements engineering?	06
b)What is use case diagram? What are the elements of use case diagram? Draw use case diagram for library management system.	06
Q.3 a)What is a pattern? What types of design patterns are available for the Software Engineer?	06
b)Explain the different types of architectural style in detail.	06
Q.4 a)What is debugging? Why is debugging so difficult?	06
b)Explain Formal Technical Reviews in detail.	06
Q.5 a)What types of analysis activity occur during modeling of a WebApp?	06
b)What roles do people play on a WebE team?	06
Q.6 a)Explain size oriented and function oriented metrics with one example each.	06
b)What types of risks are we likely to encounter as software is built?	06

****** PAPER END******

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY,
LONERE – RAIGAD -402 103
Winter Semester Examination – December - 2019

Branch: Information Technology **Sem.:- V**

Subject: - Probability and Queuing Theory (BTIT504) **Marks: 60**

Date:- 16/12/2019 **Time:- 3 Hr.**

Instructions to the Students
1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

Q.No		Questions	marks
Q1	a)	Define the terms random variables, variance and standard deviation, moment	04
	b)	State and prove multiplication theorem of probability	04
	c)	Find the probability that in 5 tossing a perfect coin turns up head at least 3 times in succession	04
Q2	a)	What are the conditions under which binomial distribution is used? Mention the equations for distribution function, mean, variance	05
	b)	The hourly wages of 1000 workmen are normally distributed around a mean of Rs 70 and with a standard deviation of Rs 5. Estimate the number of workers whose hourly wages will be i) between Rs 69 and Rs 72. ii) more than 75 iii) less than 63 **Or** A life insurance salesman sells on the average of 3 life insurance policies per week. Use Poisson's law to calculate the probability that in a given week he will sell 1. Some policies 2. Two or more policies but less than 5 Assuming that there are 5 working days per week, what is the probability that in a given day he will sell one policy	07
Q3	a)	What is Hypothesis? The manufacturer of a patient medicine claimed that it is effective in relieving 90% of the people suffering from the disease. From a sample of 200 people using the medicine 160 were relieved of suffering. Determine if the claim is legitimate	06
	b)	The following data gave the number of air-craft accidents that occurred during the various days of a week. Tests whether the accidents are uniformly distributed over the week	06

Days:	Mon	Tue	Wed	Thu	Fri	Sat	Total
No. of accidents:	15	19	13	12	16	15	90

Q4	a)	What are the characteristics of queuing system? Write symbolic representation of queuing model. What do you mean by transient state and steady state queuing systems?	07
	b)	In a health clinic, the average rate of arrival of patients is 12 patients per hour. On an average, a doctor can serve patients at the rate of one patient every four minutes. Assume arrival of patients follow Poisson distribution and service to patients follows exponential distribution. i) Find average number of patients in waiting line and in clinic. ii) Find average waiting time in waiting line or in a queue and also average waiting time in clinic.	05
Q5	a)	Define Markov process and Stochastic process. Explain transition probability matrix and its Diagrammatic representation	05
	b)	Two manufacturers A and B are competing with each other in a restricted market. Over the years, A's customers have exhibited a high degree of loyalty as measured by the fact that customers using A's product 80% of time. Also former customers purchasing the product from B have switched back to A's 60% of time. i) Construct and interpret the state transition matrix in terms of (a) retention and loss (b) retention and Gain ii) Calculate the probability of a customer purchasing A's product at the end of the second period	07

Q6	a)	Suppose there are two markets product of brand A and B respectively. Let each of these two brands have exactly 50% of total market in same period and let the market be of a fixed size . The transition matrix given below if the initial market share breakdown is 50% for each brand then determine their market share in the steady state.
		
		                                 TO
		                               A B
		                     A 0.9 0.1
		           FRO B 0.5 0.5
		           M
			06

	b)	Explain Markov chain and classification of states of Markov chain in details.	06

*****End Paper*****

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103
Winter Semester Examination — Dec. 2019

Branch: Information Technology   **Sem.:- V**
Subject:- Human Computer Interaction(BTITOE505B)   **Marks: 60**
Date:- 18/12/2019   **Time:- 3 Hr.**

Instructions to the Students
1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
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Q.1.
a) Illustrate human eye with suitable diagram.   **06**
b) Elucidate Human memory in detail   **06**
Q.2.
a) Describe any 5 Nielsen's heuristics principle in details.   **06**
b) Enlist three principles that support usability of system.Explain any one in detail.**06**

Q.3.
a) What is Socio-technical models ? Explain any three key stages in CUSTOM methodology .   **06**
b) Illustrate GOMS in detail.   **06**

Q.4.
a) Describe Interaction styles ,Explain Direct Manipulation method   **06**
b) Explain in detail Interaction Devices and its applications.   **06**

Q.5.
a) How Information will be treated as wealth of human, Describe Information search in detail.   **06**
b) Describe User Documentation with suitable examples   **06**

Q.6.
a) What is Hypertext used for, how does Hypertext work   **06**
b) Illustrate Ubiquitous computing also explain its application   **06**
Paper End

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103
Winter Semester Examination – December - 2019

Branch: Information Technology   **Sem.:- IV**
Subject with Subject Code: - Graph Theory (BTITOE505A)   **Marks: 60**
Date:- 18/12/2019   **Time:- 3 Hr.**

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Instructions to the Students
1. Each question carries 12 marks.
2. Attempt any five questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

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                                                      (Marks)

Q.1. (a) State Handshaking theorem for undirected graph and then prove that an undirected graph has even number vertices of odd degree.   **[6]**

(b) If G is a bipartite graph and the bipartition of G is X and Y, then show that: **[6]**
$$\sum_{v \in X} \deg(v) = \sum_{v \in Y} \deg(v)$$

Q.2. (a) Prove that: If G is a graph with at least one cut-vertex, then at least two of the blocks of G contain exactly one cut vertex.   **[6]**

(b) What is an automorphism of graphs? Give the automorphism for a Kn graph.   **[6]**

Q.3. (a) Prove that a graph G is tree if and only if G is acyclic and $|E(G)| = |V(G)|-1$ **[6]**

(b) State and explain Menger's theorem with the help of example.   **[6]**

Q.4. (a) Prove that a connected graph G is Eulerian if and only if every vertex of G has even degree.   **[6]**

(b) Prove that if graph G is Hamiltonian, then for every nonempty subset: $S \leq V(G)$, $C(G-S) \leq |S|$.   **[6]**

Q.5. (a) Explain planar graph and show that if G is connected planar graph with n vertices, m edges and r regions, then $n-m+r=2$ **[6]**

(b) State Kuratowski's theorem for non-planar graphs. find chromatic number of Cn and Km,n graphs.   **[6]**

Q.6. (a) Explain Perfect Matching in graph with example.   **[6]**
Explain Ramsay's theorem for monochromatic cliques.   **[6]**

End of Paper

DR. BABASAHEB AMBEDKAR TECHNOLOGICAL UNIVERSITY, LONERE – RAIGAD -402 103
Winter Semester Examination – Dec. - 2019

Branch: Electronics and Telecommunication Engineering   Sem.: - V
Subject: - Introduction to MEMS (BTEXPE506D)   Marks: 60
Date: - 20/12/2019   Time: - 3 Hr.

Instructions to the Students
1. Each question carries 12 marks.
2. Attempt **any five** questions.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly.

	(Marks)
Q.1. a) Compare microelectronics and MEMS	(06)
b) State the different types of pressure sensor. Explain anyone in details.	(06)
Q.2. a) What is piezo resistivity? Explain single crystal silicon as piezo resistive material.	(06)
b) What is substrate? Explain active substrate material and its property.	(06)
Q.3. a) State various PVD techniques. Explain any one technique with diagram.	(06)
b) What is photo lithography? Explain procedure in Lithography.	(06)
Q.4. a) Distinguish between wet and dry etching process.	(06)
b) What is bulk micromachining? Explain process in bulk micromachining.	(06)
Q.5. a) What is stress? State and explain different types of stresses.	(06)
b) Explains the bending of beam with types of support.	(06)
Q.6. a) Describe the procedure involved in the Finite Element Methods.	(06)
b) Explain different types finite elements in FEM.	(06)

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Winter Semester Examination – December - 2019

Branch: Information Technology   **Sem.:- V**

Subject with Subject Code: Data Visualization (BTITE506E)   **Marks: 60**

Date:- 20/12/2019   **Time:- 3 Hr.**

Instructions to the Students
1. Each question carries 12 marks.
2. Attempt **any five** questions of the following.
3. Illustrate your answers with neat sketches, diagram etc., wherever necessary.
4. If some part or parameter is noticed to be missing, you may appropriately assume it and should mention it clearly

			(Marks)
Q.1.	(a)	Explain why data display requires planning. Write about the principles that should be followed when thinking about data and its representation.	(06)
	(b)	Explain basics of the processing environment and philosophy behind the processing environment.	(06)
Q.2.	(a)	With the help of an example explain how to interpolate between values in a data set with the use of the Integrator class.	(06)
	(b)	Explain techniques of reading, displaying, and interacting with a data set using suitable example.	(06)
Q.3.	(a)	With the help of a suitable example explain the process of extracting the data from HTML-formatted tables; also explain the use of regular expression for parsing the JavaScript data for the same example.	(06)
	(b)	What is sophisticated sorting? Use compare () method to explain sophisticated sorting.	(06)
Q.4.	(a)	Suppose you have provided a dataset of zip code numbering system of different area from Indian geographical area. Use scatterplot maps to relate these zip code to geography.	(06)
	(b)	With the help of an example describe the various preprocessing tasks that may be required for a dataset that contains multiple numbers of rows and columns.	(06)

Q.5. (a) What is a treemap? For preparing a visual model, explain how you will use the treemap library to plot a relative usage of each word from the given text. (06)

(b) With the help of an example explain what are the disadvantages of using the graphs as a visual model? Elaborate techniques for coping with graph data. (06)

Q.6. (a) Explain various tools and methods that can be used to acquire data from the internet. Describe different file location used to acquire data in processing. (06)

(b) Describe various Compressed Data and Binary Data formats. (06)

Paper End