



Academic Year (2021-22)

Year: 3 Semester: VI

Program: B. Tech. (Computer Engineering)

Subject: Advance Algorithm

Date: 28/06/2022

Max. Marks: 75

Time: 10:30 am to 1:30 pm

Duration: 3 Hours

**REGULAR EXAMINATION**

**Instructions:** Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.

- (1) This question paper contains 02 pages.
- (2) All Questions Are Compulsory.
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- (4) Answer to each new question is to be started on a fresh page.
- (5) Figures in the brackets on the right indicate full marks.
- (6) Assume suitable data wherever required, but justify it.
- (7) Draw the neat-labelled diagrams, wherever necessary.

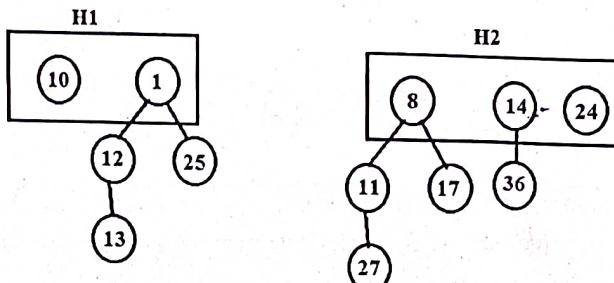
Question No.		Max. Marks
Q1 (a)	<p>What is the difference between Randomized BST and Treap?  Construct the Treap for following elements:  (10 , 6), (20 , 5), (30 , 4), (40 , 3), (50 , 2), (60 , 1)  Is above constructed Treap is “Skewed Data Structure”?  Comment on the Probability of “Skewed Treap”.</p>	[05]
Q1 (b)	<p>Apply Push-Relabel algorithm on following Flow Network. Draw the resultant network and give Maximum Flow.</p> <pre> graph LR     s((s)) -- "0/15" --&gt; a((a))     s -- "4/4" --&gt; c((c))     a -- "4/12" --&gt; b((b))     a -- "0/15" --&gt; c     b -- "4/7" --&gt; t((t))     b -- "0/3" --&gt; d((d))     c -- "4/10" --&gt; d     c -- "0/10" --&gt; t     d -- "4/5" --&gt; t   </pre>	[10]
Q2 (a)	<p>Construct the Balanced KD Tree for following elements where K=2  (6 , 2), (7 , 1), (2 , 9), (3 , 6), (4 , 8), (8 , 4), (5 , 3), (1 , 5), (9 , 5)  OR  Construct the RB Tree for successive insertion of following elements:  (9), (5), (98), (-5), (6), (4), (15), (3), (23)  Define and mention the Black Depth of constructed RB Tree.  (Note: Write 'R' for Red node and 'B' for Black node while constructing the RB Tree)</p>	[10] [10] P.T.O



~~Q2 (b)~~

List all the properties of Binomial Heap.  
 Find the mistake in following Binomial Heaps, Correct the mistake and perform MELD operation on H1 and H2.

[05]



~~Q3 (a)~~

Give complexity analysis of Randomized Quick Sort in detail.

[05]

OR

Demonstrate Maximum bipartite matching using Ford-Fulkerson method for following input adjacency matrix.

[05]

$$\begin{matrix} 0 & 1 & 1 & 0 & 0 & 0 \\ 1 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 \end{matrix}$$

~~Q3 (b)~~

Discuss All the Line Segment properties in detail with suitable example.

[10]

OR

Define Convex Hull and explain Graham Scan algorithm with suitable example.  
 Example should have Minimum 8 points, forming a Convex Hull of 4 points.  
 (Note: Draw Convex Hull and show the clear stack state after each step of Graham Scan Algorithm. Draw the Final Convex Hull)

[10]

~~Q4 (a)~~

Prove that Vertex Cover Problem is NP-Complete and design an approximation algorithm for same.

[08]

OR

Prove that TSP Problem is NP-Complete and design an approximation algorithm for same.

[08]

~~Q4 (b)~~

What is Indicator Random Variable (IRV)? Why it is used?

[07]

Perform IRV analysis of Hiring Problem using N<sup>th</sup> Harmonic Series.

~~Q5~~

Write a short note on any Three.

- i. Amortized Analysis using Potential Method on Stack
- ii. P, NP, NPC and NPH classes of Algorithm
- iii. Satisfiability (3 SAT)
- iv. Big-O, Small-o, Omega , small Omega and Tilde

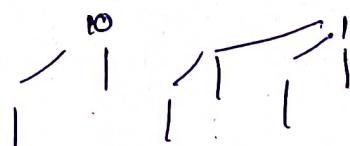
[05]

[05]

[05]

[05]

All the Best!





Academic Year (2021-22)

Year: 3 Semester: VI

Program: B. Tech. (Computer Engg.)

Subject: Human Machine Interaction

Date: 07/07/2022

Max. Marks: 75

Time: 10:30 am to 1:30 pm

Duration: 3 hrs

**REGULAR EXAMINATION**

**Instructions:** Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.

- (1) This question paper contains 2 pages.
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Question No.		Max. Marks
Q1 (a) <input checked="" type="checkbox"/>	Explain Norman's fundamental principles of interaction <b>OR</b> Explain "Human errors" in HMI.	[05] [05]
Q1 (b) <input checked="" type="checkbox"/>	Explain seven stages of action. What are the <u>three levels of processing</u> ?	[10]
Q2 (a) <input checked="" type="checkbox"/>	Differentiate between GUI and Web Design interface <b>OR</b> Explain Iterative design and prototyping in detail. What is Design Rationale?	[10] [10]
Q2 (b) <input checked="" type="checkbox"/>	Discuss the advantages of good Graphical User Interfaces (GUI)	[05]
Q3 (a) <input checked="" type="checkbox"/>	Discuss how colors can be used to design the user interfaces	[05]
Q3 (b) <input checked="" type="checkbox"/>	Design a UI for Picnic Planner <b>OR</b> Design a UI for 'Cleanliness Drive Awareness Campaign'	[10] [10]
Q4 (a) <input checked="" type="checkbox"/>	Illustrate Mobile 2.0 <b>OR</b> List and explain briefly the qualities of a Visually Pleasing Composition	[08] [08]
Q4 (b) <input checked="" type="checkbox"/>	Explain typical human computer Interaction Speed with example.	[07]



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<b>Q5 (a)</b>	Describe all factors of Interface Design. Provide innovative Web Application by integrating the technologies that are used in Interface Design. <b>OR</b> Explain in detail Mobile Information Architecture	[10]
<b>Q5 (b)</b>	Discuss different types of statistical graphs	[10]
		[05]

All the Best!



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Academic Year (2021-22)  
Year: 3 Semester: VI

Program: B. Tech. (Computer Engg.)  
Subject: Business Analytics  
Date: 05/07/2022

Max. Marks: 75  
Time: 10:30 am to 1:30 pm  
Duration: 3 Hours

**REGULAR EXAMINATION**

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Question No.		Max. Marks
Q1	With a use case clearly explain the following: (Any 3) 1) Business Analytics 2) Descriptive Analytics <i>past, olap, dashboards</i> 3) Predictive Analytics 4) Prescriptive Analytics <i>past &amp; present, ML,</i>	[15]
Q2	Explain the following functions in SAS (Any 5) a. COMPBL b. COMPRESS c. STRIP d. INTCK e. INTNX f. CATX g. FIND	[15]
Q3 (a)	Which object can use a data item that has a classification type of geography? List the essential steps for creating a <u>geo-map</u> , <u>table</u> ,	[08]
OR		
Explain different types of filters used in SAS.		
Q3 (b)	Explain the following PROC in detail with relevant code snippets.(Any 2) Proc means Proc Freq Proc import	[07]



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Q4	<p>Analyse loan data and discuss the visual analytics tools assisting in decision-making for loan approval. Assume appropriate relevant input data.</p> <p style="text-align: center;">OR</p> <p>Perform descriptive analytics with data visualization techniques like tables, graphs over student's performance. Assume appropriate relevant input data.</p>	[15]
Q5 (a)	<p>Explain the purpose of following panes available in SAS Visual Analytics Report Builder. (Any 2)</p> <ul style="list-style-type: none"><li>a) Roles Pane</li><li>b) Action Pane</li><li>c) Rules Pane</li></ul>	[08]
Q5 (b)	<p>Explain the following with relevant examples (Any 2)</p> <ul style="list-style-type: none"><li>a) Calculated item</li><li>b) Aggregated measure</li><li>c) Custom Category</li></ul>	[07]

All the Best!



Academic Year (2021-22)

Year: 3 Semester: VI

**Program: B. Tech. (Computer Engineering)**

**Subject: Information Security**

**Date: 02-07-2022**

**Max. Marks: 75**

**Time: 10:30 am to 1:30 pm**

**Duration: 3 Hours**

**REGULAR EXAMINATION**

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Question No.		Max. Marks
Q1 (a)	What are Basic Security Goals. Explain various threats to Basic Security Goals? <b>OR</b> What are the ITU-T(X.800) Recommended Security Mechanism. Explain any three of them.	[05] [05]
Q1 (b)	Prove using Playfair Encryption and Decryption Techniques works for Plaintext "instruments" using Key as "MONARCHY".	[10]
Q2 (a)	i. Find Multiplicative Inverse of 8 mod 11 using extended Euclidean Algorithm. ii. Apply key generation process in S-DES to find various keys. Use initial Key as 1011001101 Given P10 (3,5,2,7,4,10,1,9,8,6) P8 (6,3,7,4,8,5,10,9) <b>OR</b> Explain AES Encryption and Decryption Algorithm along with Block diagram. Discuss Round 1 in details.	[05] [05] [10]
Q2 (b)	Explain Double and Triple DES.	[05]
Q3 (a)	Generate public key, private key and cipher test using RSA for given values p=7, q=11, e=7 and M=9 <b>OR</b> Explain Pretty Good Privacy in details.	[05] [05]
Q3 (b)	Explain MD5 algorithm in details. How it differs from SHA? <b>OR</b> Explain how to secure IP Protocol using transport and tunnel modes. Also give packet format for same.	[10] [10]
Q4 (a)	Explain RSA Digital Signature Scheme?	[10]



OR

Why there is a Need of Mutual Authentication. Explain Kerberos Protocol in details with schematic.

[10]

~~Q4(b)~~ What is SQL Injection attack? How it occurs. How to Mitigate SQL Injection attack.

[05]

~~Q5(a)~~ What is Man in Middle Attack. How it is possible in Diffie-Hellman protocol. Alice and Bob uses Diffie-Hellman Key Exchange technique with a common prime 71 and primitive root 7. Show that 7 is primitive root of 71. If Alice's private key is 5 and Bob's private key is 12. Find Alice's and Bob's public keys. Also find shared secret key?

51      n

[10]

~~Q5 (b)~~ Explain incomplete mediation in software security.

[05]

OR

Explain TCP SYN flooding attack?

[05]

All the Best!



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Academic Year (2021-22)  
Year: 3 Semester: VI

Program: B. Tech. (Computer Engg.)

Max. Marks: 75

Subject: Software Engineering

Time: 10:30 am to 1:30 pm

Date: 30/06/2022

Duration: 3 Hours

**REGULAR EXAMINATION**

**Instructions:** Candidates should read carefully the instructions printed on the question paper and on the cover page of the Answer Book, which is provided for their use.

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Question No.		Max. Marks
Q1 (a)	What do you mean by Task Network or Activity Network? Draw a WBS for Online Education System that uses Spiral process model for developing.	[05]
Q1 (b)	<p>i. Explain Function Point estimation technique in detail. ii. Find function points for an E-commerce application with the following data,</p> <p>No. of User inputs 50 No. of User outputs 30 No. of User inquiries 35 No. of User files 06 No. of external interfaces 04</p> <p>Assume average complexity for adjustment factors and weighting factors.</p> <p style="text-align: center;">OR</p> <p>Explain the COCOMO II models of empirical estimation.</p>	[06] [04]
Q2 (a)	Differentiate between the following: <p>i. Verification and Validation ii. White box testing and black box testing</p>	[05]
Q2 (b)	<p>Explain Basis Path Testing in detail</p> <p style="text-align: center;">OR</p> <p>Explain the different testing strategies used.</p>	[10] [10]

$$\begin{aligned} 6 - 5 &= 1 \\ &= 2 \\ &= 2 \\ &= 1 \end{aligned}$$

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Q3 (a)	When should one use a Spiral model? Discuss the advantages and disadvantages of the prototype model.  OR Explain Kanban model in brief. Distinguish between Scrum and Kanban model	[05]
Q3 (b)	Explain the various software engineering paradigms.	[10]
Q4 (a)	Explain the contents of repository with diagram.  <sup>SCM</sup>	[05]
Q4 (b)	What are the different categories of Risks? Explain the steps in developing RMMM plan.  OR Explain in detail the change control mechanism and version control mechanism for software change management.	[10]
Q5 (a)	Explain DevOps Architecture with neat and labelled diagram	[05]
Q5 (b)	i. Explain the abstraction, information hiding, functional independence and refinement by clearly mentioning the differences and similarity between them.  ii. Explain "Reduce the user memory load" golden rule for user interface design.  OR What do you understand by Transform mapping? Explain the design steps involved in map a DFD into software architecture with help of suitable diagrams	[05] [10]

All the Best!

Reduce  
transfer  
avoid