University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai College of Engineering)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev 2012

Examination: BE SemesterVII

Course Code: CPE7021 and Course Name: Advance Algorithms

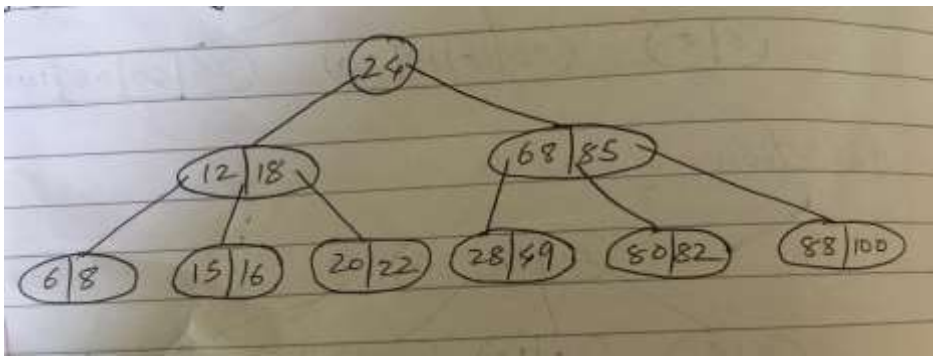
Time: 2 hour Max. Marks: 80

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	A
Q3.	A
Q4	C
Q5	C
Q6	A
Q7	B
Q8.	C
Q9.	B
Q10.	C
Q11.	D
Q12.	D
Q13.	A
Q14.	B

Q15.	D
Q16.	D
Q17.	D
Q18.	A
Q19.	C
Q20.	D

Q2 **(20 Marks**	
A	**Solve any Two 5 marks each**
i.	Solve the following recurrence equations using master method: a)$T(n) = 8T(n/2) + n^2$ b)$T(n) = 4T(n/2) + nlogn$ Suggested answer: a) Here $a = 8, b = 2, F(n) = n^2$ Solution is $T(n) = O(n^3)$ b) Here, $a= 4, b = 2, F(n) = nlogn$ Solution is $T(n) = O(n^2log^2n)$
ii.	Determine whether consecutive segments turn left or right with example and explain concept of orientation. Suggested answer: 1) explanation 2 marks 2) explain the concept with example/diagram 3 Marks
iii.	State the properties of Red-Black Tree. Suggested answer: 1)properties 4 marks 2)suitable diagram 1 mark
B	**Solve any One** **10 marks each**
i.	Find Maximum flow for a complete directed graph using Ford-Fulkerson Algorithm and explain terminologies used algorithm. Suggested answer: 1) algorithm – 2 Marks 2) terminologies- 2 marks

	3) Complete directed graph example explanation with maximum flow- 6 marks.
ii.	Explain Johnson's all pair shortest path algorithm with example. Suggested answer: 1)algorithm -3 marks 2)step by step explanation with neat diagram- 7 marks

Q3.(20 Marks)	
A	**Solve any Two 5 marks each**
i.	What is bipartite graph and bipartite matching? Explain with example. Suggested answer: 1) Definitions and explanation. 2 marks 2) Explanation with example 3 marks
ii.	Compare Dynamic programming and Divide and conquer .Suggest the solution using both approaches for generating Fibonacci series. Suggested answer: 1)Comparison -2marks 2)Solution using both approaches 3 marks
iii.	Explain the simplex method of solving linear programming using suitable example. Suggested answer: 1)simplex method explanation 3 marks 2)detail example 7 marks
B	**Solve any One** **10 marks each**
i.	Find an optimal parenthesization of a matrix-chain product whose sequence of dimensions is ⟨5, 10, 3, 12, 5, 50, 6⟩. Answer:The minimal cost is **2010** and the optimal parenthization is : **((A1*A2) *(A3*A4) *(A5*A6))**
ii.	Create a B-Tree of order 5 for the following elements: 12, 8, 16, 24, 6, 18, 28, 100, 15, 49, 68, 20, 22, 80, 82, 85, 88 

University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai College of Engineering)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: CPE7021 and Course Name: Advance Algorithms

Time: 2 hour Max. Marks: 80

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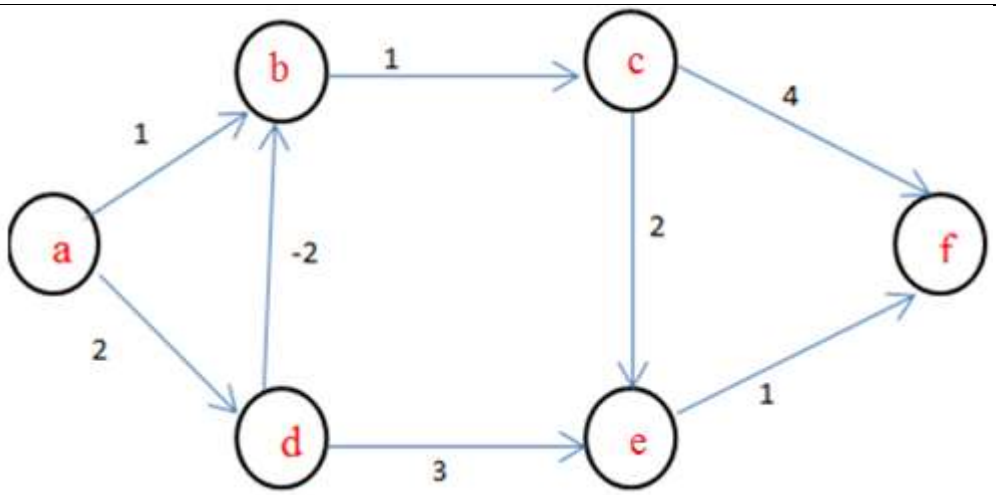
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Master's theorem is used for?
Option A:	solving recurrences
Option B:	solving iterative relations
Option C:	analyzing loops
Option D:	calculating the time complexity of any code
2.	The solution of the recurrence T(n) = 4T(n/2) + n is
Option A:	O(n^2)
Option B:	O(n log^2 n)
Option C:	O(n logn)
Option D:	O(n^3)
3.	Which of the following is true?
Option A:	larger the order of B-tree, less frequently the split occurs
Option B:	larger the order of B-tree, more frequently the split occurs
Option C:	smaller the order of B-tree, more frequently the split occurs
Option D:	smaller the order of B-tree, less frequently the split occurs
4.	In tree structure, the node which is free of child node is called
Option A:	Descendant node
Option B:	Root node
Option C:	Leaf node
Option D:	Search node
5.	Which of the following is an application of Red-black trees?
Option A:	used to store strings efficiently
Option B:	used to store integers efficiently
Option C:	can be used in process schedulers, maps, sets
Option D:	for efficient sorting
6.	The main distinguishable characteristic of a binomial heap from a binary heap is that
Option A:	it allows union operations very efficiently
Option B:	it does not allow union operations that could easily be implemented in binary heap
Option C:	the heap structure is not similar to complete binary tree
Option D:	the location of child node is not fixed i.e child nodes could be at level (h-2) or (h-3) where h is height of heap and h>4
7.	If an optimal solution can be created for a problem by constructing optimal solutions for its subproblems, the problem possesses _____ property.
Option A:	Overlapping subproblems
Option B:	Optimal substructure

Option C:	Memoization
Option D:	Greedy
8.	In dynamic programming, the technique of storing the previously calculated values is called _____
Option A:	Saving value property
Option B:	Storing value property
Option C:	Memoization
Option D:	Mapping
9.	The following paradigm can be used to find the solution of the problem in minimum time: Given a set of non-negative integer, and a value K, determine if there is a subset of the given set with sum equal to K:
Option A:	Divide and Conquer
Option B:	Dynamic Programming
Option C:	Greedy Algorithm
Option D:	Branch and Bound
10.	In linear programming the term which states the value of objective function improvement is classified as
Option A:	Stated function
Option B:	Improvement function
Option C:	Better programmed
Option D:	Best
11.	Which of the following is the recurrence relation for the matrix chain multiplication problem where mat[i-1] * mat[i] gives the dimension of the ith matrix?
Option A:	dp[i,j] =1 if i=j dp[i,j] = min{dp[i,k] + dp[k+1,j]}
Option B:	dp[i,j] =0 if i=j dp[i,j] = min{dp[i,k] + dp[k+1,j]}
Option C:	dp[i,j] =1 if i=j dp[i,j] = min{dp[i,k] + dp[k+1,j]} + mat[i-1]*mat[k]*mat[j]
Option D:	dp[i,j] =0 if i=j dp[i,j] = min{dp[i,k] + dp[k+1,j]} + mat[i-1]*mat[k]*mat[j]
12.	Which algorithm is used to solve a maximum flow problem?
Option A:	Prim's algorithm
Option B:	Kruskal's algorithm
Option C:	Dijkstra's algorithm
Option D:	Ford-Fulkerson algorithm
13.	What is the total number of iterations used in a maximum matching algorithm?
Option A:	[n/2]+1
Option B:	[n/3]
Option C:	[n/2]+n
Option D:	[n/2]
14.	Which is the correct technique for finding a maximum matching in a graph?
Option A:	DFS traversal
Option B:	BFS traversal
Option C:	Shortest path traversal
Option D:	Heap order traversal
15.	What is the running time of Bellmann Ford Algorithm?

Option A:	O(V)b)
Option B:	$O(V^2)$
Option C:	O(ElogV)
Option D:	O(VE)
16.	Which of the following is the most commonly used data structure for implementing Dijkstra's Algorithm?
Option A:	Max priority queue
Option B:	Stack
Option C:	Circular queue
Option D:	Min priority queue
17.	 In the given graph: Identify the path that has minimum cost to travel from node a to node f
Option A:	a-b-c-f
Option B:	a-d-e-f
Option C:	a-d-b-c-f
Option D:	a-d-b-c-e-f
18.	What is the basic operation of closest pair algorithm using brute force technique?
Option A:	Euclidean distance
Option B:	Radius
Option C:	Area
Option D:	Manhattan distance
19.	What is the worst case complexity of quick hull?
Option A:	O(N)
Option B:	O(N log N)
Option C:	$O(N^2)$
Option D:	O(log N)
20.	What is testing of a complete bipartite subgraph in a bipartite graph problem called?
Option A:	P Problem
Option B:	P-Complete Problem
Option C:	NP Problem
Option D:	NP-Complete Problem

Q2 **(20 Marks)**	

A	**Solve any Two** **5 marks each**
i.	Solve the following recurrence equations using master method: a)$T(n) = 8T(n/2) + n^2$ b)$T(n) = 4T(n/2) + n\log n$
ii.	Determine whether consecutive segments turn left or right with example and explain concept of orientation.
iii.	State the properties of Red-Black Tree.
B	**Solve any One** **10 marks each**
i.	Find Maximum flow for a complete directed graph using Ford-Fulkerson Algorithm and explain terminologies used algorithm.
ii.	Explain Johnson's all pair shortest path algorithm with example.

Q3. **(20 Marks)**	
A	**Solve any Two** **5 marks each**
i.	What is bipartite graph and bipartite matching? Explain with example.
ii.	Compare Dynamic programming and Divide and conquer .Suggest the solution using both approaches for generating Fibonacci series.
iii.	Explain the simplex method of solving linear programming using suitable example.
B	**Solve any One** **10 marks each**
i.	Find an optimal parenthesization of a matrix-chain product whose sequence of dimensions is ⟨5, 10, 3, 12, 5, 50, 6⟩.
ii.	Create a B-Tree of order 5 for the following elements: 12, 8, 16, 24, 6, 18, 28, 100, 15, 49, 68, 20, 22, 80, 82, 85, 88

University of Mumbai

Examination 2020 under cluster 04 (Lead College: PCE)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: CPC703 and Course Name: Artificial Intelligence

Time: 2 hour Max. Marks: 80

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1. Choose the correct option for following questions. All the Questions are compulsory and carry equal marks

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	C
Q3.	D
Q4	A
Q5	C
Q6	C
Q7	D
Q8.	A
Q9.	C
Q10.	B

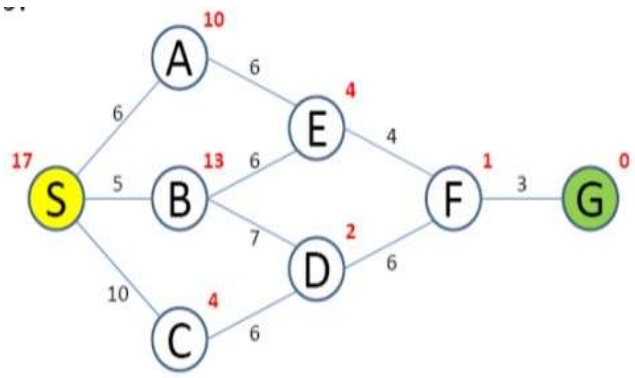
Q11.	A
Q12.	C
Q13.	B
Q14.	C
Q15.	D
Q16.	D
Q17.	C
Q18.	B
Q19.	A
Q20.	A

Q2. Attempt any two_answer key

1	Compare breath first search (BFS), Depth first search (DFS) Depth limited search (DLS) & Iterative Deeping search algorithms based on performance measure with justification: Complete, Optimal, Space & Time complexity. **Ans :** **Evaluation Parameter of BFS,DFS ,DLS & IDFS --------(2 & 1/2 Marks each)** **Complete** **Space complexity** **Time complexity** **optimality**	10

2	Consider the following facts about the dolphin 1.Whoever can read is literate. Dolphins are not literate. Some dolphins are intelligent 1.Represent above sentence in the first order predicate logic (FOLP) 2.Convert them to clause form 3.Prove that "Some who are intelligent cannot read" using resolution technique **Ans :** **FOL – 3 M** **CNF- 2 M** **Resolution tree -5 M**	10
3	Explain partial order planning with an example. **Ans : Definition : 1Mark** **Explanation – 3Marks** **Example – 5Marks** **Limitation/Disadvantage -1 M**	10

Q3. Attempt any 2

1	Draw general architecture of an Expert system. Explain each component in details with an example. **Ans :** 1. **What is an Expert system – 1M** 2. **Architecture - 3 Marks** 3. **Explain each component – 6 Marks**	10
2	Apply A* algorithm on the following figure. Start node is S and goal node is G. Heuristic values are given beside node.  	10

	Ans : Calculate f(n)=g(n) +h(n) **Show each step** **Ans : cost = 5+6+4+3=18**	
3	Give a formal definition of Bayesian Belief network (BBN). Illustrate a process of constructing a BBN with a suitable scenario. What type of inference can be drawn from BBN network. **Ans :** **Definition : 1 M** **Draw Bayesian network: 3M** **Inference drawn using probability chart example : 6 Marks**	10

University of Mumbai

Examination 2020 under cluster 04 (Lead College: PCE, Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: CPC703 and Course Name: Artificial Intelligence

Time: 2 hour Max. Marks: 80

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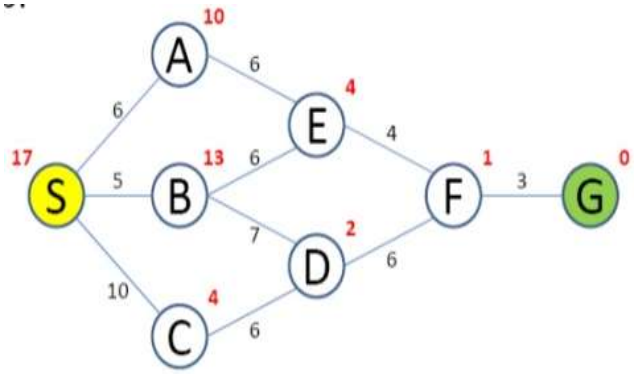
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	What is Artificial intelligence?
Option A:	Making a Machine intelligent
Option B:	Programming with your own intelligence
Option C:	Playing a Game
Option D:	Putting your intelligence into Computer
2.	Which of the following is not a goal of AI?
Option A:	Thinking humanly
Option B:	Adapting to the environment and situations
Option C:	To rule over humans
Option D:	Real Life Problem Solving
3.	Which of the following is not a goal of an AI agent?
Option A:	Perceiving data from the environment
Option B:	Adapting to the environment and situations
Option C:	Acting upon the Environment
Option D:	Reversing the previously performed actions
4.	Satellite Image Analysis System is
Option A:	partially Observable
Option B:	Fully Observable
Option C:	Episodic
Option D:	Single agent
5.	An agent is composed of
Option A:	Architecture
Option B:	Perception Sequence
Option C:	Architecture and Program
Option D:	Perception Sequence
6.	What is the heuristic function of A* search?
Option A:	f(n) != h(n)
Option B:	f(n) < h(n)
Option C:	f(n) = g(n)+h(n)
Option D:	f(n) > h(n)

7.	Which were built in such a way that humans had to supply the inputs and interpret the outputs?
Option A:	Agents
Option B:	Actuators
Option C:	Sensor
Option D:	AI system
8.	Which form is called as a conjunction of disjunction of literals?
Option A:	Conjunctive normal form
Option B:	Disjunctive normal form
Option C:	Normal form
Option D:	First normal form
9.	Which is used to construct the complex sentences?
Option A:	Symbols
Option B:	Connectives
Option C:	Logical connectives
Option D:	Preposition
10.	Which algorithm will work backward from the goal to solve a problem?
Option A:	Forward chaining
Option B:	Backward chaining
Option C:	Hill-climb algorithm
Option D:	Stimulus annealing
11.	Which function is used to calculate the feasibility of whole game tree?
Option A:	Evaluation function
Option B:	Transposition
Option C:	Alpha-beta pruning
Option D:	Gradient descent
12.	Forward chaining systems are _____ whereas backward chaining systems are _____
Option A:	Goal-driven, goal-driven
Option B:	Goal-driven, data-driven
Option C:	Data-driven, goal-driven
Option D:	Data-driven, data-driven
13.	The process by which the brain incrementally orders actions needed to complete a specific task is referred as
Option A:	Planning problem
Option B:	Partial order planning
Option C:	Total order planning
Option D:	Both Planning problem & Partial order planning
14.	Uncertainty arises in the Wumpus world because the agent's sensors give only
Option A:	Full & Global information
Option B:	Partial & Global Information
Option C:	Partial & local Information
Option D:	Full & local information

15.	Which is true for Decision theory?
Option A:	Decision Theory = Probability theory + utility theory
Option B:	Decision Theory = Inference theory + utility theory
Option C:	Decision Theory = Probability theory + preference
Option D:	Decision Theory = Uncertainty + utility theory
16.	Where does the Bayes rule can be used?
Option A:	Solving queries
Option B:	Increasing complexity
Option C:	Decreasing complexity
Option D:	Answering probabilistic query
17.	What is the consequence between a node and its predecessors while creating Bayesian network?
Option A:	Functionally dependent
Option B:	Dependent
Option C:	Conditionally independent
Option D:	Both Conditionally dependent & Dependent
18.	In which of the following learning the teacher returns reward and punishment to learner?
Option A:	Active learning
Option B:	Reinforcement learning
Option C:	Supervised learning
Option D:	Unsupervised learning
19.	Which of the following is not a components of an Expert Systems?
Option A:	Generator
Option B:	Inference Engine
Option C:	User Interface
Option D:	Knowledge Base
20.	What is the main challenges of NLP?
Option A:	Handling Ambiguity of Sentences
Option B:	Handling Tokenization
Option C:	Handling POS-Tagging
Option D:	Morphological Segmentation

Q2	**Solve any Two Questions out of Three** **10 marks each**
A	Compare goal-based agent with model-based agent. Gives the PEAS for self-driven car agent. Characterized its environment
B	**Consider the following facts about the dolphin** 1.Whoever can read is literate. Dolphins are not literate. Some dolphins are intelligent

	1.Represent above sentence in the first order predicate logic (FOPL) 2.Convert them to clause form 3.Prove that "Some who are intelligent cannot read" using resolution technique
C	Explain partial order planning with an example.

Q3.	**Solve any Two Questions out of Three** **10 marks each**
1	Draw general architecture of an Expert system. Explain each component in details with an example.
3	Apply A* algorithm on the following figure. Start node is S and goal node is G. Heuristic values are given beside node. 
3	Give a formal definition of Bayesian Belief network (BBN). Illustrate a process of constructing a BBN with a suitable scenario. What type of inference can be drawn from BBN network.

University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai College of Engineering)

Examinations Commencing from 15th June 2021 to 26th June2021

Program: Computer Engineering

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: CPC702 and Course Name: Cryptography and System Security

Time: 2 hour Max. Marks: 80

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Q1. Choose the correct option for following questions. All the Questions are compulsory and carry equal marks

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	A
Q3.	A
Q4	C
Q5	D
Q6	A
Q7	B
Q8.	D
Q9.	A
Q10.	C
Q11.	B
Q12.	A
Q13.	C
Q14.	C
Q15.	A
Q16.	B
Q17.	D
Q18.	D
Q19.	D
Q20.	B

Q2. Whichever option(1/2/3) you Select for subjective/descriptive questions (total-20 Marks)

Model Answer:

a) 3 main principles- confidentiality, integrity and availability – basic introduction and significance.
b) Explanation of keyed and keyless transposition – 2 Marks
Example of each- 1.5 Marks each
c) Comparisons- at least on 5 points – 1 Mark each
d) Buffer Overflow- 2.5 Marks
Incomplete mediation- 2.5 Marks
e) IDS- definition and basic working- 2 Marks
Categorization and explanation- 3 Marks
f) Comparisons- at least on 5 points – 1 Mark each

Q3. Whichever option (1/2/3) you Select for subjective/descriptive questions (total-20 Marks)

Model Answer:

a) Feistel cipher diagram -3 Marks
   Working – 4 Marks
   Usage in DES – 3 Marks
b) Kerberos – user and Servers communication diagram – 4 Marks
   Communication messages and explanation – 6 Marks
c) Key calculation at A – 3 Marks
   Key calculation at B – 3 Marks
   Shared key calculation- 4 Marks

University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai College of Engineering)

Examinations Commencing from 15th June 2021 to 26th June2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: CPC 702 and Course Name: Cryptography and System Security

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	----------makes relationship between ciphertext and key as complex as possible
Option A:	Confusion
Option B:	Diffusion
Option C:	Hashing
Option D:	Authentication
2.	----------Used to protect blocks of data, such as messages, from alteration.
Option A:	Data integrity algorithms
Option B:	Asymmetric encryption
Option C:	Asymmetric encryption
Option D:	Authentication protocols
3.	----------involves the passive capture of a data unit and its subsequent retransmission to produce an unauthorized effect
Option A:	Replay
Option B:	Masquerade
Option C:	Modification of Message
Option D:	Denial of Service
4.	----------is not a specific security mechanism.
Option A:	Encipherment
Option B:	Digital Signature
Option C:	Event Detection
Option D:	Access Control
5.	The encrypted message “meet me after the toga party” with a rail fence of depth 2 is
Option A:	METHEPARTYMEETAFTERTOGA
Option B:	MEETAFTERTOGAMETHEPARTY
Option C:	MEETMEAFTERTHETOGAPARTY
Option D:	MEMATRHTGPRYETEFETEOAAT
6.	Apply Caesar cipher technique to encrypt the message “meet me after the toga party”
Option A:	cipher: PHHW PH DIWHU WKH WRJD SDUWB
Option B:	cipher: QIIX QI EJXIV XLI XSKE TEVXC

Option C:	cipher: OGGV OG CHVGT VJG VQIC RCTVA
Option D:	cipher: PHHW OG DIWHU WKH TEVXC
7.	The number of substitution boxes in DES after the 48 bit XOR operations are
Option A:	7
Option B:	8
Option C:	6
Option D:	9
8.	A desirable property of any encryption algorithm is that a small change in either the plaintext or the key should produce a significant change in the ciphertext.
Option A:	Reversible mapping
Option B:	Feistel Structure
Option C:	Round Function
Option D:	Avalanche Effect
9.	IDEA word in IDEA algorithm is abbreviation of
Option A:	International Data Encryption Algorithm
Option B:	International Decryption Encryption Algorithm
Option C:	Integrated Data Encrypting Algorithm
Option D:	Integrated Decrypting Encrypting Algorithm
10.	Which of the following is not an application of hash function?
Option A:	Password verification
Option B:	Integrity checking of data
Option C:	Encoding and decoding of data
Option D:	Digital signature
11.	Alice digitally signs a message and send it to Bob. Verification of the signature by bob requires
Option A:	Alice's private key
Option B:	Alice's public key
Option C:	Bob's private key
Option D:	Bob's public key
12.	Which of the following property is not true with respect to Message Authentication code (MAC)?
Option A:	It is one to many function
Option B:	It condenses variable length message
Option C:	It uses secret key
Option D:	It is fixed size authenticator
13.	Which of the following algorithm is used in DSS signature?
Option A:	MD4
Option B:	MD5
Option C:	SHA1
Option D:	SHA2

14.	Suppose that Alice has obtained a certificate from certification authority CA1 and Bob has obtained certificate authority from CA2. Alice can use a chain of certificates to obtain Bob's public key. which of the following is the correct order of chain used in X.509?
Option A:	CA2 CA1 CA1 Bob
Option B:	CA1 CA1 CA2 Alice
Option C:	CA1 CA2 CA2 Bob
Option D:	CA1 CA2 CA2 Alice
15.	Intrusion detection is the process of detecting actions that attempts to compromise confidentiality, integrity and _____.
Option A:	Availability
Option B:	Authenticity
Option C:	Non-repudiation
Option D:	Anonymity
16.	Which of the following firewall works at layer 3, 4, 5, and 7?
Option A:	Packet filter
Option B:	Application proxy
Option C:	Personal firewall
Option D:	Stateful inspection
17.	What is privilege escalation?
Option A:	Creating a user account with higher privileges
Option B:	Creating a user account with Administrator privileges
Option C:	Creating two user account one with high privileges and one with lower privileges
Option D:	Increasing privileges on a user account
18.	Which of the following turn out to be best mechanism for memory and address protection?
Option A:	Fencing
Option B:	Relocation
Option C:	Segmentation
Option D:	Paging
19.	Following is not a characteristic of Virus?
Option A:	Viruses destroy and modify user data
Option B:	Virus is a standalone malicious program
Option C:	Virus is a code embedded in a legitimate program
Option D:	Virus is always activated by some event
20.	In SSL protocol, the maximum length of each fragment after encryption is
Option A:	214+1028
Option B:	214+2048
Option C:	216+1028
Option D:	216+2048

Q2	**Solve any Four out of Six** **5 marks each**
A	What are the key Principles of Security?
B	Explain with examples, keyed and keyless transposition ciphers.
C	Compare packet sniffing and packet spoofing.
D	What is Buffer overflow and incomplete mediation in software security?
E	Write short notes on Intrusion Detection Systems.
F	Differentiate between MD5 and SHA.

Q3	**Solve any Two Questions out of Three** **10 marks each**
A	Explain working of DES detailing the Feistel structure.
B	Explain Kerberos systems that support authentication in distributed systems.
C	A and B decide to use Diffie Hellman algorithm to share a key. They chose p=23 and g=5 as the public parameters. Their secret keys are 6 and 15 respectively. Compute the shared key that they share**.**

University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai College of Engineering)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: CPE7022 and Course Name: Computer Simulation and Modeling

Time: 2 hour Max. Marks: 80

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Q1. Choose the correct option for following questions. All the Questions are compulsory and carry equal marks

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	B
Q3.	A
Q4	C
Q5	D
Q6	A
Q7	B
Q8.	A
Q9.	B
Q10.	C
Q11.	D
Q12.	B
Q13.	D
Q14.	A
Q15.	B
Q16.	D
Q17.	A
Q18.	B
Q19.	C
Q20.	C

Q2. (total-20 Marks)

A. 1 mark each for below points

a. Simulation enables the study of, and experimentation with, the internal interactions of a complex system, or of a subsystem within a complex system.

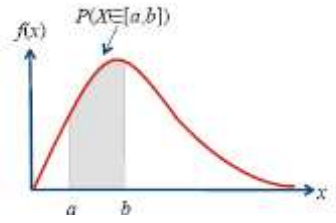
b. Informational, organizational, and environmental changes can be simulated, and the effect of these alterations on the model's behavior can be observed.

c. The knowledge gained in designing a simulation model may be of great value toward suggesting improvement in the system under investigation.

d. By changing simulation inputs and observing the resulting outputs, valuable insight may be obtained into which variables are most important and how variables interact.

e. Simulation can be used as a pedagogical device to reinforce analytic solution methodologies.

B. Continuous Random variable probability formula $P(a \le X \le b) = \int_a^b f(x)dx$ 1 mark



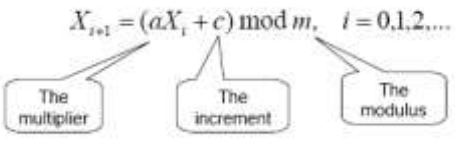
Three condition for PDF (Diagram and conditions explanation 2 marks)

1. $f(x) \geq 0$, for all x in Rx
2. $\int_{Rx} f(x)dx=1$
3. f(x)=0,if x is not in Rx

Properties: 2 marks with explanation

1. $P(X = x_0) = 0$, because $\int_{x_0}^{x_0} f(x)dx = 0$
2. $P(a \le X \le b) = P(a < X \le b) = P(a \le X < b) = P(a < X < b)$

C. 2 marks for Integer generation formula and its explanation of a c and m



$$R_i = \frac{X_i}{m}, \quad i = 1,2,...$$

1 mark for the formula

Example -

- Use $X_0 = 27$, $a = 17$, $c = 43$, and $m = 100$.
- The *Xi and Ri values are:*

$X_1 = (17*27+43) \bmod 100 = 502 \bmod 100 = 2$, $R_1 = 0.02$;

$X_2 = (17*2+32) \bmod 100 = 77$, $R_2 = 0.77$;

$X_3 = (17*77+32) \bmod 100 = 52$, $R_3 = 0.52$;

D. **Solution of problem is**

Example: Suppose 5 generated numbers are 0.44, 0.81, 0.14, 0.05, 0.93.

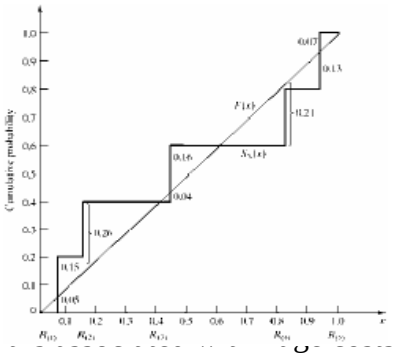
Step 1:	$R_{(i)}$	0.05	0.14	0.44	0.81	0.93	Arrange $R_{(i)}$ from smallest to largest
	i/N	0.20	0.40	0.60	0.80	1.00	
Step 2:	$i/N - R_{(i)}$	0.15	0.26	0.16	-	0.07	$D^+ = \max\{i/N - R_{(i)}\}$
	$R_{(i)} - (i-1)/N$	0.05	-	0.04	0.21	0.13	$D^- = \max\{R_{(i)} - (i-1)/N\}$

Step 3: $D = \max(D^+, D^-) = 0.26$

Step 4: For $\alpha = 0.05$,

$D_\alpha = 0.565 > D$

Hence, H_0 is not rejected.



E.

Inventory procurement, storage and manageme ssociated with each these functions.

Inventory costs are basically categorized into three headings:

1. Ordering Cost
2. Carrying Cost
3. Shortage or stock out Cost & Cost of Replenishment

    a. Cost of Loss, pilferage, shrinkage and obsolescence etc.

    b. Cost of Logistics

    c. Sales Discounts, Volume discounts and other related costs.

1. **Ordering Cost**
   Cost of procurement and inbound logistics costs form a part of Ordering Cost. Ordering Cost is dependant and varies based on two factors - The cost of ordering excess and the Cost of ordering too less. Both these factors move in opposite directions to each other. Ordering excess quantity will result in carrying cost of inventory. Where as ordering less will result in increase of replenishment cost and ordering costs.

These two above costs together are called Total Stocking Cost. If you plot the order quantity vs the TSC, you will see the graph declining gradually until a certain point after which with every increase in quantity the TSC will proportionately show an increase.

2. **Carrying Cost**
   Inventory storage and maintenance involves various types of costs namely:
   - Inventory Storage Cost
   - Cost of Capital

   Inventory Storage Cost
   Inventory storage costs typically include Cost of Building Rental and facility maintenance and related costs. Cost of Material Handling Equipments, IT Hardware and applications, including cost of purchase, depreciation or rental or lease as the case may be.
   Cost of Capital
   Includes the costs of investments, interest on working capital, taxes on inventory paid, insurance costs and other costs associate with legal liabilities.

Q3. Whichever option (1/2/3) you Select for subjective/descriptive questions (total-20 Marks)

A.

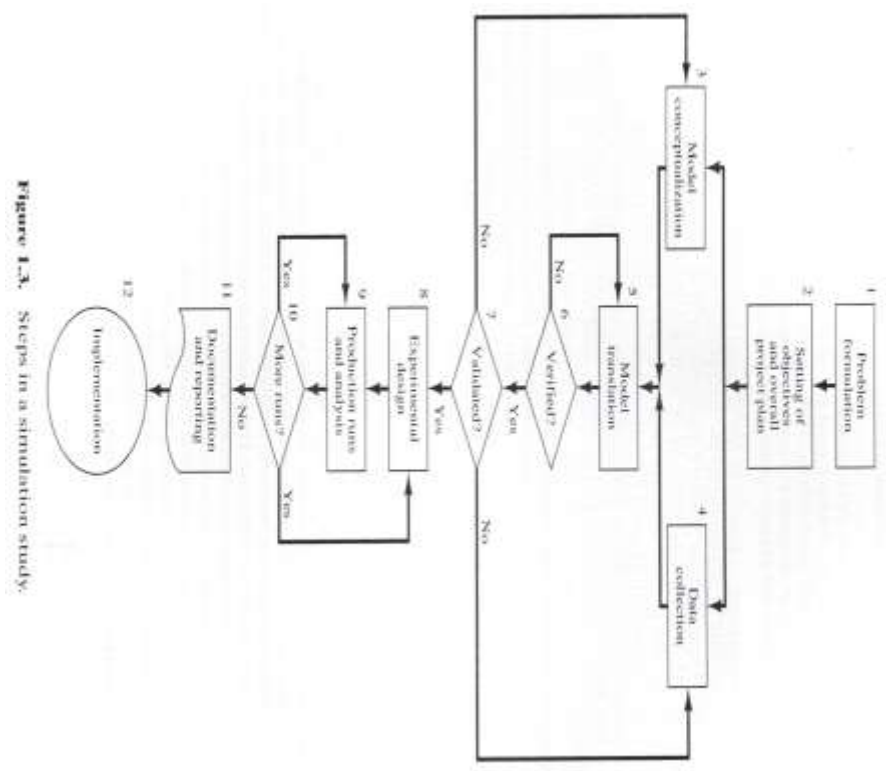


Figure 1.3. Steps in a simulation study.

B. 5 marks for Acceptance and Rejection

- Useful particularly when inverse cdf does not exist in closed form, a.k.a. thinning
- Illustration: To generate random variates, $X \sim U(1/4, 1)$
- *R does not have the desired distribution, but R conditioned (R') on the event {R ≥ ¼} does.*

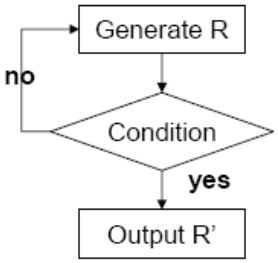
- Efficiency: Depends heavily on the ability to

Procedures:

Step 1. Generate R ~ U[0,1]

Step 2a. If R >= ¼, accept X=R.

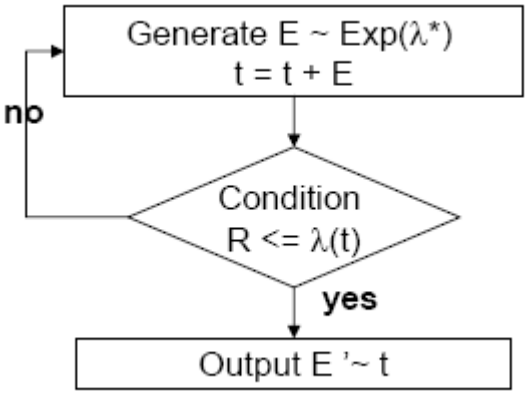
Step 2b. If R < ¼, reject R, return to Step 1



- minimize the number of rejections.

NSPP (5 marks)

- Non-stationary Poisson Process (NSPP): a Possion arrival process with an arrival rate that varies with time
- Idea behind thinning:
  - Generate a stationary Poisson arrival process at the fastest rate, $\lambda^* = max\ \lambda(t)$
  - But "accept" only a portion of arrivals, thinning out just enough to get the desired time-varying rate



- **Example of NSPP**

Data: Arrival Rates

t (min)	*Mean Time Between Arrivals (min)*	*Arrival Rate λ(t) (#/min)*
0	15	1/15
60	12	1/12
120	7	1/7
180	5	1/5
240	8	1/8
300	10	1/10
360	15	1/15
420	20	1/20
480	20	1/20

Procedures:

Step 1. $\lambda^* = max\ \lambda(t) = 1/5$, $t = 0$ and $i = 1$.

Step 2. For random number $R = 0.2130$,

$E = -5ln(0.213) = 13.13$

$t = 13.13$

Step 3. Generate $R = 0.8830$

$\lambda(13.13)/\lambda^* = (1/15)/(1/5) = 1/3$

Since $R > 1/3$, do not generate the arrival

Step 2. For random number $R = 0.5530$,

$E = -5ln(0.553) = 2.96$

$t = 13.13 + 2.96 = 16.09$

Step 3. Generate $R = 0.0240$

$\lambda(16.09)/\lambda^* = (1/15)/(1/5) = 1/3$

Since $R < 1/3$, $T_1 = t = 16.09$,

and $i = i + 1 = 2$

C. Steps with Example 10 marks

Step 1. Choose a level of significance a and a sample size n. For the bank model, choose

a = 0.05, n = 6

Step 2. Compute the sample mean Y_2 and the sample standard deviation S over the *n* replications.

$$\overline{Y_2} = \{1/n\} \sum_{i=1}^{n} Y_{2i} = 2.51 \text{ minutes}$$

- $S = \{ \sum_{i=1}^{n} (Y_{2i} - \overline{Y_2})^2 / (n - 1)\}^{1/2} = 0.82$ minute
- where Y_{2i}, $i = 1, .., 6$, are shown in Table 2.
- ***Step 3***. Get the critical value of *t* from Table A.4. For a two-sided test such as that in Equation 1, use $t_{\alpha/2, n-1}$; for a one-sided test, use $t_{\alpha, n-1}$ or $-t_{\alpha, n-1}$ as appropriate (n -1 is the degrees of freedom). From Table A.4, $t_{0.025,5} = 2.571$ for a two-sided test.

Step 4. Compute the test statistic

$t_0 = (Y_2 - \mu_0) / \{S / \sqrt{n}\}$ ----- (Eq 2) where μ_0 is the specified value in the null hypothesis, H_0. Here $\mu_0 = 4.3$ minutes, so that

$t_0 = (2.51 - 4.3) / \{0.82 / \sqrt{6}\} = - 5.34$

Step 5. For the two-sided test, if $|t_0| > t_{\alpha/2, n-1}$, reject H_0. Otherwise, do not reject H_0. [For the one-sided test with H_1: $E(Y_2) > \mu_0$, reject H_0 if $t > t_{\alpha, n-1}$; with H_1 : $E(Y_2) < \mu_0$, reject H_0 if $t < -t_{\alpha, n-1}$]

Since $| t | = 5.34 > t_{0.025,5} = 2.571$, reject H_0 and conclude that the model is inadequate in its prediction of average customer delay.

Recall that when testing hypotheses, rejection of the null hypothesis H_0 is a strong conclusion, because

$P(H_0 \text{ rejected} \mid H_0 \text{ is true}) = \alpha$

Step 1. Choose a = 0.05 and n = 6 (sample size).

Step 2. Compute $Y_2 = 4.78$ minutes, S = 1.66 minutes

Step 3. From Table A.4, the critical value is $t_{0.025,5} = 2.571$.

Step 4. Compute the test statistic $t_0 = (Y_2 - m_0) / \{S / Ön\} = 0.710$.

Step 5. Since $| t | < t_{0.025,5} = 2.571$, do not reject H_0 , and thus tentatively accept the model as valid.

University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai College of Engineering)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: CPE7022 and Course Name: Computer Simulation and Modeling

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Simulation modeling can be used a) as an analysis tool for predicting effect of changes on existing system b) as a design tool to predict performance of new system
Option A:	only a
Option B:	both a and b
Option C:	only b
Option D:	both statements are wrong
2.	_____contain no random variables and have a known set of inputs which will result in a unique set of outputs.
Option A:	Static
Option B:	Deterministic
Option C:	Stochastic
Option D:	Dynamic
3.	System is defined as a group of objects that are joined together in some regular _____ or interdependence toward the accomplishment of some purpose.
Option A:	Interaction
Option B:	Connection
Option C:	Fashion
Option D:	Non interaction
4.	Bank is an example of _____system
Option A:	Continuous
Option B:	Static
Option C:	Discrete
Option D:	Non Static
5.	Step 8 in simulation study is
Option A:	Verification
Option B:	Validation
Option C:	Model transition
Option D:	Experimental design
6.	Average wait time in single channel queue is calculated as
Option A:	total time customer wait in queue/ total no of customers
Option B:	total time customer spending in queue/ total no of customers in queue

Option C:	total time customer leaves in queue/ total no of customers
Option D:	total time customer working in queue/ total no of customers
7.	Variance is calculated by the formula
Option A:	V(X)=E(X)-E(X)^2
Option B:	V(X) = E((X – E[X])^2)
Option C:	V(X)=E(X)-E(X')
Option D:	V(X)=E(X-X')^2
8.	Calculate variance and standard deviation based on the given values: E(X)=2 , $E(X^2)=8$
Option A:	V(X)=4 , Std=2
Option B:	V(X)=2 , Std=4
Option C:	V(X)=4 , Std=4
Option D:	V(X)=2 , Std=2
9.	Which one is a Discrete distribution: a) Bernoulli Distribution b)Binomial c) Exponential
Option A:	both a and c
Option B:	both a and b
Option C:	a , b and c
Option D:	b and c
10.	Categories of test for random numbers
Option A:	Test for Independence
Option B:	Test for Uniformity
Option C:	Test for Independence and Uniformity
Option D:	Test for Non uniformity
11.	K-S Test and Chi-Square test belong to which category of test for random numbers
Option A:	Test for Uniformity
Option B:	Test for Non-Uniformity
Option C:	Test for Non-Independence
Option D:	Test for Independence
12.	Gap and Poker Test are _____
Option A:	Test for Non-Uniformity
Option B:	Test for Independence
Option C:	Test for Non-Independence
Option D:	Test for Uniformity
13.	Random Vairate Generation Techniques are a) Inverse Transform b) Non Correlation c)Acceptance-rejection
Option A:	both b and c
Option B:	both a and b
Option C:	a, b and c
Option D:	both a and c
14.	Verification refers to building the
Option A:	Model right

Option B:	Right model
Option C:	Correct model
Option D:	Random model
15.	Validation refers to building
Option A:	Model right
Option B:	Right model
Option C:	Correct model
Option D:	Random model
16.	Number of approaches involved in Naylor and Finger validation is
Option A:	2
Option B:	1
Option C:	4
Option D:	3
17.	Histograms are useful for determining _____ of distribution
Option A:	Shape
Option B:	Structure
Option C:	Format
Option D:	Flow
18.	Chi-square goodness of fit test is valid for
Option A:	Small sample size
Option B:	Large sample size
Option C:	Medium sample size
Option D:	Entire population
19.	Which of the following computer simulation area does not involve human or equipment?
Option A:	Medical
Option B:	Education
Option C:	Constructive
Option D:	Manufacturing
20.	Which is not an issue in Manufacturing and Material handling simulation?
Option A:	Modelling Downtime
Option B:	Modelling Failure
Option C:	Detailing of materials
Option D:	Modelling downtime and Failures

Q2	**Solve any Four out of Six** **5 marks each**
A	Explain when simulation is an Appropriate tool?
B	State and Explain Continuous Random Variables with its properties.
C	Explain Linear Congruential Method with an Example.
D	Apply K-S test on following data and State whether hypothesis is rejected/accepted? Random Numbers are 0.44,0.81,0.14,0.05,0.93(Consider D_{alpha}=0.565)
E	Explain Naylor and Finger approach for validation of model.
F	Describe in detail the different costs involved in Inventory System.

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Describe the Steps of Simulation Study in Detail with is Flowchart.
B	State the Steps of Acceptance Rejection Technique and Explain NSPP.
C	Describe the Steps for conduction of t test with an Example.

University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai College of Engineering)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: CPC701 and Course Name: Digital Signal Processing

Time: 2 hour Max. Marks: 80

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Q1. Choose the correct option for following questions. All the Questions are compulsory and carry equal marks

Question Number	Correct Option
Q1.	B
Q2.	A
Q3.	B
Q4	C
Q5	D
Q6	B
Q7	A
Q8.	A
Q9.	D
Q10.	A

Q11.	B
Q12.	C
Q13.	B
Q14.	C
Q15.	B
Q16.	A
Q17.	A
Q18.	D
Q19.	B
Q20.	B

Q2. Solve any Four out of Six : **5 marks each**

(Total-20 Marks)

Model Answer:

2 A. Determine the response of the system for the input x(n) ={0,1,2,3}

and impulse response h(n) ={2,1,1,2}

Note: Student should solve linear convolution in time domain.

Answer : y(n)= { 0,2,5,9,7,7,6} is the response of the system.

5 marks for showing all steps

B. If x (n) = { 1, -2, 2, 3} and h (n) = { 2,1, 1}

Determine linear convolution using circular convolution

Answer : Let Length of x(n) be M and h(n) be N.

Here M = 4 and N = 3 thus M+N -1 = 6

Step 1: Thus padding both the sequences to make number of elements = 6

x(n) = { 1, -2, 2, 3, 0, 0}

h(n) = {2, 1, 1, 0, 0, 0}

1 mark

Step 2: Compute circular matrix

2 marks

Step 3: y(n)= { 2,-3,3,6,5,3}

2 marks

C. Classify whether y(n)=n x(n) is

1. Causal/Non causal
2. Linear / Non linear
3. Time variant/Time invariant

Answer : The system is Causal (1 mark), Linear (2 mark) and Time variant (2 mark).

D. Verify Parseval's theorem for X(k)={10, -2+2j, -2, -2-2j}using DFT properties

Answer : 30 units.

2 marks for formula, 3 marks for calculation

E. Determine cross correlation of x(n)={8,9,2,3} and y(n)= { 4,3,6}

Answer : $\mathbf{r_{xy}(l)}$= { 48,78,71*,60,17,12}

*--- specifies origin

5 marks for showing all steps

F. Compare microprocessor with Digital signal processor

Answer : Any five points**.**

Q3. Solve any Two Questions out of Three: **10 marks each**

(Total-20 Marks)

Model Answer:

3. A. Discuss any 5 properties of DFT

Answer: Property name with clear Definition**.**

2 marks for each property

B. Compute DFT of x(n) = {0,1,2,1} using Radix - 2 DIT FFT. Draw the flow graph.

Answer : If i/p shuffled – 2 mark

Stage 1 O/P : { 2,-2,2,0} --- 2 mark

Stage 2 O/P : X(k) = { 4,-2,0-2} ---- 2 mark

Flow graph: 4 marks

C. Perform linear convolution of x(n)= {4,4,3,3,2,2,1,1} and h(n)= {-1,1} using overlap add method .

Answer: y(n) = { -4,0,1,0,1,0,1,0,1,0}

10 marks for all steps

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University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai College of Engineering)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: CPC701 and Course Name: Digital Signal Processing

Time: 2 hour Max. Marks: 80

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks (2 marks each)**
1.	One dimensional signal is a function of
Option A:	Multiple independent variables
Option B:	Single independent variable
Option C:	Multiple dependent variables
Option D:	Single dependent variable
2.	For x(n)= { 1,2,3,5}, what will be the value at origin after performing x(n+1)
Option A:	2
Option B:	1
Option C:	3
Option D:	5
3.	Find the fundamental period of the signal x(n) = sin(0.02*pi*n)
Option A:	10
Option B:	100
Option C:	50
Option D:	25
4.	A signal is a power signal if
Option A:	P= finite, E=0
Option B:	P= finite, E=finite
Option C:	P=finite, E=Infinity
Option D:	P=Infinity, E=Infinity
5.	Determine the energy of signal x(n)=u(n)-u(n-6)
Option A:	4
Option B:	8
Option C:	10
Option D:	6
6.	Identify a non-causal system from the following
Option A:	y(n)=n x(n)
Option B:	y(n)= x(n) +x(n+2)
Option C:	y(n)= x(n-2) +x(n-1)
Option D:	y(n)=x(n)+x(n-2)
7.	An LTI system is one which satisfies the properties of

Option A:	Linearity, Time invariance
Option B:	Non linearity , Time invariance
Option C:	Linearity , Time variance
Option D:	Non linearity , Time variance
8.	For a discrete time to be stable its impulse response
Option A:	Should be absolutely summable
Option B:	Need not be absolutely summable
Option C:	Can be infinite
Option D:	Can be zero
9.	DFT of circular convolution of x1(n) and x2(n) is
Option A:	1
Option B:	0
Option C:	infinity
Option D:	X(k)X(k)
10.	DFT of x(n)={1,0,1,0} is
Option A:	X(k)= { 2,0,2,0}
Option B:	X(k)= {2,2,2,2}
Option C:	X(k)={2,0,0,0}
Option D:	X(K)={2,1,1,1}
11.	IDFT of X(k)= {4,0,0,0}
Option A:	x (n) = {1,0,0,0}
Option B:	x (n) = {1,1,1,1}
Option C:	x (n) = {1,0,1,0}
Option D:	x (n) = {0,1,0,1}
12.	For a radix -2 FFT, N must be a power of
Option A:	N
Option B:	4
Option C:	2
Option D:	N/2
13.	The number of complex multiplications involved in the direct computation of 8-point DFT is
Option A:	8
Option B:	64
Option C:	16
Option D:	56
14.	The computation of 32-point DFT by radix-2 DIT-FFT involves _____ stages of computation
Option A:	3
Option B:	4
Option C:	5
Option D:	6

15.	Method of convolution of two sequences when one sequence is much larger than the other is
Option A:	Circular convolution method
Option B:	Overlap add method
Option C:	Cross correlation method
Option D:	Auto correlation method
16.	Let length of input sequence be L and impulse response be M, then the length of input sequence block in overlap save method is
Option A:	L+M-1
Option B:	L+M
Option C:	L+M+1
Option D:	L-M+1
17.	The Nyquist rate and Nyquist interval of $\sin(2\pi t)$ is
Option A:	2Hz, 0.5 sec
Option B:	0.5Hz, 2 sec
Option C:	1 Hz, 0.5sec
Option D:	1.5 Hz, 1 sec
18.	FFT computation is faster than DFT because it utilizes the following properties
Option A:	Convolution
Option B:	Linearity
Option C:	Time reversal
Option D:	Periodicity and Symmetry
19.	TMS320C5X is a ------- bit, fixed point processor
Option A:	8
Option B:	16
Option C:	32
Option D:	64
20.	Analog speech signal can be converted to digital speech signal using
Option A:	Sampling
Option B:	Sampling, Quantization and Coding
Option C:	Coding
Option D:	Quantization

Q2.	**Solve any Four out of Six** **5 marks each**
A	Determine the response of the system for the input x(n) ={0,1,2,3} and impulse response h(n) ={2,1,1,2} .
B	If x (n) = { 1, -2, 2, 3} and h (n) = { 2,1, 1} Determine linear convolution using circular convolution
C	Classify whether y(n)=n x(n) is 1. Causal/Non causal 2. Linear / Non linear 3. Time variant/Time invariant
D	Verify Parseval's theorem for X(k)={10, -2+2j, -2, -2-2j} using DFT properties
E	Determine cross correlation of x(n)={8,9,2,3} and y(n)= { 4,3,6}
F	Compare microprocessor with Digital signal processor

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	Discuss about any 5 properties of DFT.
B	Compute DFT of x(n) = { 0,1,2,1} using Radix - 2 DIT FFT. Draw the flow graph.
C	Perform linear convolution of x(n)= {4,4,3,3,2,2,1,1} and h(n)= {-1,1} using overlap add method .

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: **CPE7026** and Course Name: **Enterprise Resource Planning and Supply Chain Management (ERP & SCM)**

Time: 2 hour Max. Marks: 80

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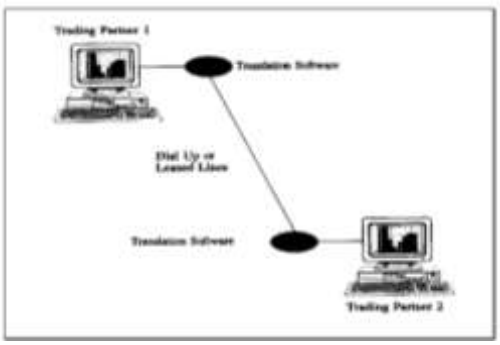
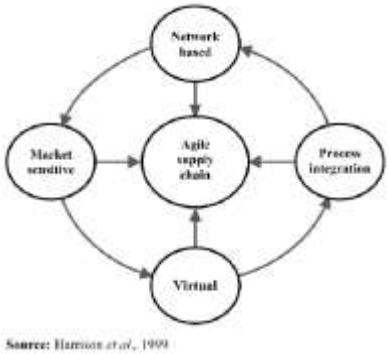
Q1. Choose the correct option for following questions. All the Questions are compulsory and carry equal marks

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	D
Q2.	B
Q3.	C
Q4	C
Q5	B
Q6	A
Q7	D
Q8.	C
Q9.	B
Q10.	A
Q11.	A
Q12.	B
Q13.	C
Q14.	D
Q15.	A
Q16.	B
Q17.	D
Q18.	A
Q19.	B
Q20.	B

Q2 (20 Marks)	**Solve any Four out of Six 5 marks each** **Explaination-3marks, Application-2marks**
A	Explain the major drivers of Supply Chain Management
Ans	1. Production – This driver can be made very responsive by building factories that have a lot of excess capacity and use flexible manufacturing techniques to produce a wide range of items. To be even more responsive, a company could do their production in many smaller plants that are close to major groups of customers so delivery times would be shorter. If efficiency is desirable, then a company can build factories with very little excess capacity and have those factories optimized for producing a limited range of items. Further efficiency can also be gained by centralizing production in large central plants.

	2. Inventory – Responsiveness can be enhanced by stocking high levels of inventory for a wide range of products. Additional responsiveness can be gained by stocking products at many locations so as to have the inventory close to customers and available to them immediately. Economies of scale and cost savings can be gotten by stocking inventory in only a few central locations such as regional distribution centers (DCs). 3. Location/Warehousing – A location decision that emphasizes responsiveness would be one where a company establishes many locations that are close to its customer base. Efficiency can be achieved by aggregating its inventory to a central location. 4. Transportation – Responsiveness can be achieved by a transportation mode that is fast and flexible such as trucks and airplanes. Efficiency can be emphasized by transporting products in larger batches and doing it less often. The use of transportation modes such as ship, railroad, and pipelines can be very efficient. 5. Information – The power of this driver grows stronger each year as the technology for collecting and sharing information becomes more wide spread, easier to use, and less expensive. Information, much like money, is a very useful commodity because it can be applied directly to enhance the performance of the other four supply chain drivers. High levels of responsiveness can be achieved when companies collect and share accurate and timely data generated by the operations of the other four drivers.
B	Explain Electronic Data Interchange (EDI) and its benefits.
Ans	Electronic Data Interchange (EDI) is defined as: “Computer-to-computer transfer of commercial and administrative transaction using an agreed standard to structure the data pertaining to that transaction”. The term “Electronic Data Interchange” is normally only used to signify communication of business transactions between computers in different companies in a standard format. EDI messages were originally sent directly between the computers: the sending computer modem dials the receiving computer, a telephone link is established and the message is sent. EDI messages are now often sent by the internet: the cost is lower (there is no need to pay for transatlantic telephone calls). Further, since virtually all companies now have some form of Internet access already, the system is easier to implement.  The implementation of EDI brings benefits both domestically and

	internationally. Use of EDI makes immediate and long-time benefits including: • Is the fastest, most efficient way to exchange purchasing orders, invoices, fund transfer, shipping notices and other frequently used business documents. • EDI is a tool to save money and time. • Eliminate data entry errors • Lower office overhead. • Reduce paper consumption. • Increase revenue by expanding the geographic market. • Reduce cost by reducing or eliminating paper-based documents and associated preparation, storage and retrieval cost. • Advance shipping notice can be sent to the receiver to say what is arriving. This is ideal for manufacturers who use a Just in Time system. • A more efficient use of staff resources. • The ability to track vessels and cargo. • Enforce discipline within the business operation.
C	What are the characteristics of Agile Supply Chain?
Ans	An Agile Supply Chain agility refers to speed and efficiency. An agile supply chain is focused on speed, cost efficiency, responsiveness, flexibility, and productivity in the production and delivery of goods. Combined, they define what an agile supply chain is: a system of product distribution that is concerned with doing things quickly, saving costs, being responsive to the market and consumer demands, maintaining flexibility, and keeping productivity at all-time highs. Agile supply chains rely on real-time data to help make decisions in day-to-day operations, as well as projected data in supply forecasts. Combined, it creates a more robust process that saves businesses and consumers money, eliminates waste of excess inventory, foresees potential shortages, and does it all quickly and productively. With agile supply chain, flexibility is key.  Source: Harrison et al., 1999 Agile supply chain will also need a set of its own unique key performance indicators (KPI). The commonly used KPI in predominantly lean supply chain operating environment will not fit and often misguide the management. On top of the most frequently used KPI for agile supply chains are:

	Design to market time Customer satisfaction and delight Production throughput Delivery lead-time Product availability in the market Capacity synchronisation and optimisation Cost-to-serve Frequency of product up-grading Service innovation and flexibility
D	Explain E-Procurement Model.
Ans	E-procurement (electronic procurement, sometimes also known as supplier exchange) is the business-to-business or business-to-consumer or business-to-government purchase and sale of supplies, work, and services through the Internet as well as other information and networking systems, such as electronic data interchange and enterprise resource planning. The e-procurement value chain consists of indent management, e-Informing, e-Tendering, e-Auctioning, vendor management, catalogue management, Purchase Order Integration, Order Status, Ship Notice, e-invoicing, e-payment, and contract management. Indent management is the workflow involved in the preparation of tenders. This part of the value chain is optional, with individual procuring departments defining their indenting process. In works procurement, administrative approval and technical sanction are obtained in electronic format. In goods procurement, indent generation activity is done online. Elements of e-procurement include request for information, request for proposal, request for quotation, RFx (the previous three together), and eRFx (software for managing RFx projects). Alongside with increased use of e-procurement, needs for standardization arise. Currently, there is one globally developed open extensible markup language based standard framework built on a rich heritage of electronic business experience. It consists of five layers - messaging, registry and repository, collaboration protocol, core components and business processes. These are the main types: E-sourcing Finding potential new suppliers using the internet during the information gathering step of the procurement process. E-tendering The process of screening suppliers and sending suppliers requests for information (RFI) and requests for price (RFP) E-informing Qualification of suppliers for suitability. It doesn't involve transaction but

	instead handles information about the supplier's quality financial status or delivery capabilities. E-reverse auctions Enable the purchasing company to buy goods and services that have the lowest price or combination of lowest price and other conditions via internet technology. E-MRO and web-based ERP These involve the purchase and supply of products which are the core of the most E- procurement applications. The software used manages the process of creating and approving purchasing requisitions, placing orders and receiving goods or service ordered.
E	Elaborate on the various phases of CRM.
Ans	Customer relationship management plays an integral part in a typical company's marketing system. CRM is a process of gathering and analyzing customer data, building precise marketing campaigns and managing relationships for optimized retention. These activities are performed over the three phases of customer acquisition, retention and extension or expansion. **Customer Acquisition** Acquiring customers has always been the first important step in establishing business relationships. With CRM, advanced software databases are used to capture key customer data at the point of first contact. Profile data includes a prospect's name, address, phone number, email address and sometimes social media accounts. Entering this data into a computer enables future and ongoing communication access. **Customer Retention** The real purpose of gathering data on acquired customers is to improve retention rates. Effective data analysis, regular and systematic follow-up communication with contacts, and well-serviced accounts help you reduce your company's churn rate. Data analysis allows you to identify the traits of prospects and customers that offer the best lifetime earning potential as well, which enables greater focus on retaining core customers. **Customer Extension** The customer extension phase of CRM includes activities intended to draw out the length of typical customer relationships, enabling greater revenue.
F	Explain SCOR Model
Ans	The supply chain operations reference model (SCOR) is a management tool used to address, improve, and communicate supply chain management decisions within a company and with suppliers and customers of a company. The model describes the business processes required to satisfy a customer's demands. It also helps to explain the processes along the entire supply chain and provides a basis for how to improve those processes Plan Demand and supply planning and management are included in this first

	step. Elements include balancing resources with requirements and determining communication along the entire chain. The plan also includes determining business rules to improve and measure supply chain efficiency. These business rules span inventory, transportation, assets, and regulatory compliance, among others. The plan also aligns the supply chain plan with the financial plan of the company Source This step describes sourcing infrastructure and material acquisition. It describes how to manage inventory, the supplier network, supplier agreements, and supplier performance. It discusses how to handle supplier payments and when to receive, verify, and transfer product Make Manufacturing and production are the emphasis of this step. Is the manufacturing process make-to-order, make-to-stock, or engineer-to-order? The make step includes, production activities, packaging, staging product, and releasing. It also includes managing the production network, equipment and facilities, and transportation Deliver Delivery includes order management, warehousing, and transportation. It also includes receiving orders from customers and invoicing them once product has been received. This step involves management of finished inventories, assets, transportation, product life cycles, and importing and exporting requirements. Return Companies must be prepared to handle the return of containers, packaging, or defective product. The return involves the management of business rules, return inventory, assets, transportation, and regulatory requirements.

Q3. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each**
A	Explain the strategy used by Mumbai Dabbawallas. What a larger organization with more resources learn from their simplistic system?
Ans	How Mumbai dabbawalla works -5 marks, Learning strategies 5 marks Mumbai Dabbawalla work: A collecting dabbawalla, usually on bicycle, collects dabbas either from a worker's home or from the dabba makers. As many of the carriers are of limited literacy (the average literacy of Dabbawallas is that of 8th grade), the dabbas (boxes) have some sort of distinguishing mark on them, such as

	a colour or group of symbols. The dabbawalla then takes them to a sorting place, where he and other collecting dabbawallas sort the lunch boxes into groups. The grouped boxes are put in the coaches of trains, with markings to identify the destination of the box (usually there is a designated car for the boxes). The markings include the railway station to unload the boxes and the destination building delivery address. Some modern infrastructure improvements such as the Mumbai Metro are not used in the supply chain, as cabins do not have the capacity for hundreds of tiffin. At each station, boxes are handed over to a local dabbawalla, who delivers them. The empty boxes are collected after lunch or the next day and sent back to the respective houses. The dabbawallas also allow for delivery requests through SMS Learning Strategies: No over-reliance on technology Create an integrated performance chain Acute visibility. Keep it simple
B	Your college is planning to automate its processes by developing an online system. Design the steps that you would undertake to develop the same and justify the modules of ERP that you would include. (STUDENTS MAY WRITE THIS IN THEIR OWN WORDS)
Ans	Implementation Diagram with different modules involved: 5 marks Showing integration between different modules. Explanation of the modules: 5 marks Modules: 1.Human Resource 2.Exam Module 3.Accounts 4.Library 5.Procurement
C	Explain the various technologies utilized for developing an ERP module.
Ans	List of Technologies with explanation: 7 marks Usage of Technologies: 3 marks 1.Data Warehousing 2.Data Mining 3.Business Intelligence 4.OLAP 5.OLTP 6.Business Reengineering

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: **CPE7026** and Course Name: **Enterprise Resource Planning and Supply Chain Management (ERP & SCM)**

Time: 2-hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	The disadvantage of business intelligence is?
Option A:	Improved sales forecasting
Option B:	improved decision making
Option C:	improved business processes
Option D:	replacing managerial staff
2.	OLAP is used to transform data warehouse data into _____.
Option A:	Reports
Option B:	strategic information
Option C:	existing data
Option D:	Tables
3.	Set of parallel printed lines with different thickness of black and white character is called
Option A:	Magnetic code
Option B:	RFID
Option C:	Barcode
Option D:	QR code
4.	Who are the prime users of SCM systems
Option A:	Sales, marketing, customer service
Option B:	Accounting, finance, logistics, and production
Option C:	Customers, resellers, partners, suppliers, and distributors
Option D:	Sales, marketing
5.	_____ became the prime concept of production management and control.
Option A:	BOM
Option B:	MRP
Option C:	ERP
Option D:	MRP-II
6.	_____ is the use of technologies and services across an enterprise to enable the integration of software applications and hardware systems.
Option A:	EAI

Option B:	ERP
Option C:	SCM
Option D:	CRM
7.	The primary concept of _____ is that storing huge or large amount of data
Option A:	Data mining
Option B:	OLAP
Option C:	Supply chain management
Option D:	Data warehousing
8.	Electronic Data Interchange is necessary in
Option A:	B2C e-Commerce
Option B:	C2C e-Commerce
Option C:	B2B e-Commerce
Option D:	Commerce using internet
9.	Big Bang implementation strategy is
Option A:	Functional all modules install at once only
Option B:	ERP all modules install at once
Option C:	Technical all modules install at once only
Option D:	Application all modules install at once only
10.	BaaN software is famous for _____
Option A:	Manufacturing
Option B:	HR
Option C:	plant and maintenance
Option D:	Finance
11.	Which of the following is not a mathematical model of SCM
Option A:	CRM
Option B:	Model for vendor analysis
Option C:	Make Vs Buy model
Option D:	Vehicle Routing algorithm
12.	EAI implementation pitfalls are _____ and _____.
Option A:	lack of training, continuous update
Option B:	constant change, lack of EAI experts
Option C:	cost of software, lack of technical support
Option D:	changing market, development cost
13.	What are the major benefits of an ERP system in business
Option A:	Sales forecasts, sales strategies, and marketing campaigns
Option B:	Market demand, resource and capacity constraints, and real-time scheduling
Option C:	Forecasting, planning, purchasing, material management, warehousing, inventory, and distribution.
Option D:	Sales Forecast, Market demand
14.	Which one is not an ERP Technologies
Option A:	Data Warehousing
Option B:	Business Process Reengineering

Option C:	Data Mining
Option D:	Manufacturing Resource Planning
15.	Hire to Retire is a business process of which module
Option A:	Human Resource Module
Option B:	Sales and Distribution Module
Option C:	Material Management Module
Option D:	Accounts Module
16.	_____ is a system of enterprise resource planning software and tools that are hosted and managed offsite in the cloud by the vendor.
Option A:	Generalist ERP.
Option B:	Cloud-based ERP
Option C:	Small Business ERP
Option D:	Open-Source ERP
17.	Logistics is an integral part of supply chain management. Which explanation best represents outbound logistics
Option A:	The management of material resources entering an organization from its suppliers and other partners
Option B:	An emphasis on using the supply chain to deliver value to customers who are actively involved in product and service specification
Option C:	A supply chain that emphasizes distribution of a product to passive customers
Option D:	The management of resources supplied from an organization to its customers and intermediaries
18.	What should be the filter applied by an organization to limit the number of packages to be considered.
Option A:	pre-evaluation screening
Option B:	post implementation.
Option C:	project planning.
Option D:	gap analysis
19.	Material Requirement Planning (MRP) module utilizes application software for scheduling _____.
Option A:	Sales management
Option B:	Production processes
Option C:	Marketing techniques
Option D:	Human resource management
20.	Which is not an open-source ERP
Option A:	ERPNext
Option B:	Oracle ERP
Option C:	Odoo
Option D:	Dolibarr

Q2 **(20 Marks)**	**Solve any Four out of Six** **5 marks each**
A	Explain the major drivers of Supply Chain Management
B	Explain Electronic Data Interchange (EDI) and its benefits.
C	What are the characteristics of Agile Supply Chain?
D	Explain E-Procurement Model.
E	Elaborate on the various phases of CRM.
F	Explain SCOR Model

Q3. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each**
A	Explain the strategy used by Mumbai Dabbawallas. What a larger organization with more resources learn from their simplistic system?
B	Your college is planning to automate its processes by developing an online system. Design the steps that you would undertake to develop the same and justify the modules of ERP that you would include.
C	Explain the various technologies utilized for developing an ERP module.

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: CPE7023 and Course Name: Image Processing

Time: 2 hour Max. Marks: 80

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Q1.Choose the correct option for following questions. All the Questions are compulsory and carry equal marks

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	**D**
Q2.	**B**
Q3.	**A**
Q4	**B**
Q5	**B**
Q6	**B**
Q7	**C**
Q8.	**B**
Q9.	**A**
Q10.	**A**

Q11.	**C**
Q12.	**A**
Q13.	**B**
Q14.	**D**
Q15.	**B**
Q16.	**C**
Q17.	**C**
Q18.	**D**
Q19.	**B**
Q20.	**B**

Q2. Solve any Two Questions out of Three 10 marks each

A]– Perform histogram equalization on the given image transform.

Gray Level	0	1	2	3	4	5	6	7
No. of Pixels	800	1000	850	650	300	250	100	150

Answer

Original Histogram graph – 1 Marks

Equalized Histogram graph – 1 Marks

Solution -8 Marks

Gray Level(r)	No. of Pixels(nk)	PDF= nk/n	Sk=CDF	Sk* 7	Rounding Off
0	800	0.19	0.19	1.33	1
1	1000	0.23	0.42	2.94	3

2	850	0.21	0.63	4.41	4
3	650	0.16	0.79	5.53	6
4	300	0.07	0.86	6.02	6
5	250	0.06	0.92	6.44	6
6	100	0.02	0.94	6.58	7
7	150	0.04	0.98	6.86	7

n = 4100

Equalized Histogram

New Gray Level	No. of Pixels
0	0
1	800
2	0
3	1000
4	850
5	0
6	1200
7	250

B]- What is image segmentation? Explain the following methods of image segmentation. i) Region growing ii) Region splitting iii) Thresholding.

Answer

Definition of image segmentation – 2 Marks

Methods of image segmentation - 2 Marks

Region growing – 2 Marks

Region splitting – 2 Marks

Thresholding – 2 Marks

C] - Explain Homomorphic filter in detail.

Answer C

Homomorphic filter diagram – 2 Marks

Description – 8 Marks

Q3. Solve any Two Questions out of Three 10 marks each

A] - Explain chain code with example and show that how first difference makes chain code rotation invariant.

Answer

Chain code with example – 5 Marks

First difference makes chain code rotation invariant description - 5 Marks

B]- What are the different types of redundancies in digital image? Explain in detail.

Answer

Different types of redundancies in digital image – 2 Marks

Coding redundancy, Inter-pixel redundancy, Psycho-visual redundancy with explanation – 8 marks

C]- Find Huffman code for following stream of data

{a,a,a,a,b,b,b,b,b,b,b,b,b,,c,c,c,c,,d,d,d,d,d,d,e,e,e,e,,f,f,f,f,f,f,f,f,f}

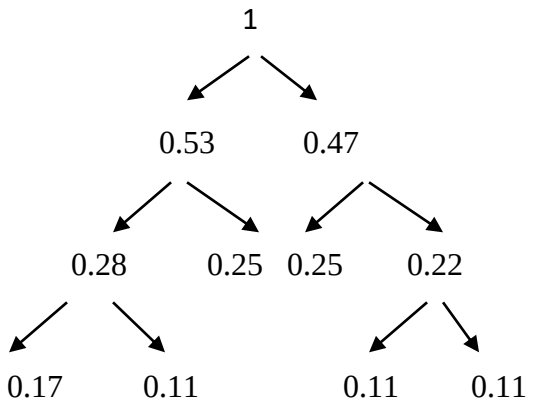
Answer

10 Marks

Symbol	Frequencies	Probability
a	4	0.11
b	9	0.25
c	4	0.11
d	6	0.17
e	4	0.11
f	9	0.25

Total - 36

0.25	0.25	0.28	0.47	0.53	1
0.25	0.25	0.25	0.28	0.47	
0.17	0.22	0.25	0.25		
0.11	0.17	0.22			
0.11	0.11				
0.11					



b	10
c	001
d	111
e	000
f	01

Symbol	Code
a	100

University of Mumbai

Examination 2020 under cluster 4 (Lead College: PCE, New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: CPE7023 and Course Name: Image Processing

Time: 2 hour Max. Marks: 80

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	A bitmap image file format for pictures and animations that use 256 (or fewer) distinct colors.
Option A:	PDF
Option B:	PSD
Option C:	TIFF
Option D:	GIF
2.	Two pixels p and q are said to be --------- if i) q is in N4(p) or ii) q is in ND(p) and the set N4(p) ∩ N4(q) has no pixels
Option A:	8-connected
Option B:	M-connected
Option C:	diagonally connected
Option D:	4-connected
3.	Which of the following expression is used to denote spatial domain process?
Option A:	g(x ,y)=T[f(x, y)]
Option B:	f(x+ y)=T[g(x +y)]
Option C:	g(x*y)=T[f(x*y)]
Option D:	g(x-y)=T[f(x-y)]
4.	Which of the following shows three basic types of functions used frequently for image enhancement?
Option A:	Linear, logarithmic and inverse law
Option B:	Power law, logarithmic and inverse law
Option C:	Linear, logarithmic and power law
Option D:	Linear, exponential and inverse law
5.	In contrast stretching, if r1=s1 and r2=s2 then which of the following is true?
Option A:	The transformation is not a linear function that produces no changes in gray levels
Option B:	The transformation is a linear function that produces no changes in gray levels
Option C:	The transformation is a linear function that produces changes in gray levels
Option D:	The transformation is not a linear function that produces changes in gray levels
6.	Which of the following is the primary objective of sharpening of an image?
Option A:	Blurring the image
Option B:	Highlight fine details in the image
Option C:	Increase the brightness of the image
Option D:	Decrease the brightness of the image

7.	What is the unit of compactness of a region?
Option A:	Meter
Option B:	Meter2
Option C:	No units
Option D:	Meter-1
8.	If the inner region of the object is textured then approach we use is
Option A:	discontinuity
Option B:	similarity
Option C:	extraction
Option D:	recognition
9.	To avoid the negative values taking absolute values in Laplacian image doubles
Option A:	thickness of lines
Option B:	thinness of lines
Option C:	thickness of edges
Option D:	thinness of edges
10.	Based on the 4-directional code, the first difference of smallest magnitude is called as:
Option A:	Shape number
Option B:	Chain number
Option C:	Difference
Option D:	Difference number
11.	The Walsh and Hadamard transforms are _____in nature.
Option A:	sinusoidal
Option B:	cosine
Option C:	non-sinusoidal
Option D:	cosine and sine
12.	Discrete cosine transforms (DCTs) express a function or a signal in terms of
Option A:	Sum of cosine functions oscillating at different frequencies
Option B:	Sum of cosine functions oscillating at same frequencies
Option C:	Sum of cosine functions at different sampling intervals
Option D:	Sum of cosine functions oscillating at same sampling intervals
13.	DCT is used in----------
Option A:	MPEG
Option B:	JPEG Standards
Option C:	Arithmetic Coding
Option D:	Huffman Coding
14.	Scaling vectors in discrete wavelet transform is taken as
Option A:	Heights
Option B:	Sharpness
Option C:	Intensity
Option D:	Weights

15.	Compressed image can be recovered back by
Option A:	image enhancement
Option B:	image decompression
Option C:	image contrast
Option D:	image equalization
16.	Every run length pair introduce new
Option A:	pixels
Option B:	matrix
Option C:	intensity
Option D:	frames
17.	Information per source is called
Option A:	sampling
Option B:	quantization
Option C:	entropy
Option D:	normalization
18.	Which technique is lossless image compression?
Option A:	Improved Gray Scale Quantization
Option B:	Vector Quantization
Option C:	JPEG
Option D:	Huffman Coding
19.	What is the meaning of pixel value ‘1’ in binary imaging?
Option A:	black
Option B:	white
Option C:	gray
Option D:	yellow
20.	Hit-or- Miss transformation is used for shape
Option A:	removal
Option B:	detection
Option C:	compression
Option D:	decompression

<table>
<tr><td>Q2
(20 Marks)</td><td>Solve any Two Questions out of Three 10 marks each</td></tr>
<tr><td>A</td><td>Perform histogram equalization on the given image transform.
<table>
<tr><td>Gray Level</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>No. of Pixels</td><td>800</td><td>1000</td><td>850</td><td>650</td><td>300</td><td>250</td><td>100</td><td>150</td></tr>
</table></td></tr>
<tr><td>B</td><td>What is image segmentation? Explain the following methods of image segmentation. i) Region growing ii) Region splitting iii) Thresholding.</td></tr>
<tr><td>C</td><td>Explain Homomorphic filter in detail.</td></tr>
</table>

Q3. **(20 Marks)**	**Solve any Two Questions out of Three 10 marks each**
A	Explain chain code with example and show that how first difference makes chain code rotation invariant.
B	What are the different types of redundancies in digital image? Explain in detail.
C	Find Huffman code for following stream of data {a,a,a,a,b,b,b,b,b,b,b,b,b,,c,c,c,c,,d,d,d,d,d,d,e,e,e,e,,f,f,f,f,f,f,f,f,f}

University of Mumbai

Examination 2020 under cluster 04 (Lead College: PCE New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: CPE7024 and Course Name: Software Architecture

Time: 2 hour Max. Marks: 80

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1501_R12_Comp_VII_CPE7024_AK1

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Q1. Choose the correct option for following questions. All the Questions are compulsory and carry equal marks

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	B
Q3.	A
Q4	C
Q5	D
Q6	D
Q7	A
Q8.	D
Q9.	B
Q10.	A

Q11.	B
Q12.	C
Q13.	A
Q14.	D
Q15.	A
Q16.	B
Q17.	A
Q18.	A
Q19.	D
Q20.	A

Q2. Whichever option(1/2/3) you Select for subjective/descriptive questions (total-20 Marks)

Model Answer: (with marks distribution)

A. architecture implementation framework----------2 Marks
How does an architecture implementation framework differ from middleware? ---3 Marks

B. C2 architectural style Diagram----------2 Marks
explanation----------2 Marks
example----------1 mark

C. difference between view & viewpoint – Any three point----------3mark
example----------2 marks

D. Domain-Specific software architecture- Definition with explanation----------2 marks
DSSA process----------3 marks

E. Design issues for non-functional properties-scalability & heterogeneity.
Definition----------2 marks
issues----------3 marks

F. stakeholder driven modeling Explanation----------3 marks
basic activities of stakeholder driven modeling ----------2 marks

Q3. Whichever option (1/2/3) you Select for subjective/descriptive questions (total-20 Marks)

Model Answer: (with marks distribution)

A. i).Data access connector-- figure of Data access connector type & its variation----------2marks
Explanation----------3 marks
ii.) Stream connector-- figure of stream connector type & its variation----------2marks
Explanation----------3 marks
iii)Procedure call connector-- figure of Procedure call connector type & its variation----2marks
Explanation----------3 marks

B. REST
Definition----------1 mark
Diagram----------4 marks
Explanation----------5 marks

C. service oriented architecture & web services
What are SOA & web services----------2 marks
Diagram----------3 marks
Explanation----------3 marks
Example----------2 marks

University of Mumbai

Examination 2020 under cluster 04 (Lead College: PCE New Panvel)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: Computer Engineering

Curriculum Scheme: R-2012

Examination: BE Semester VII

Course Code: CPE7024 and Course Name: Software Architecture

Time: 2 hour Max. Marks: 80

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1501_R12_Comp_VII_CPE7024_QP1

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	**What does Software architecture means?**
Option A:	It is set of principal design decisions made about the system.
Option B:	It comprises of software system only
Option C:	It is design of software components
Option D:	It is collection of software system.
2.	Which technique is used for evaluating overall complexity of proposed architecture to look at the components
Option A:	Cohesion
Option B:	Flow & sharing dependencies
Option C:	Size
Option D:	Structure
3.	MVC pattern evolves to _____ model.
Option A:	PAC model
Option B:	Arch model
Option C:	Slinky model
Option D:	SCC model
4.	Which of the following type has the main goal to achieve performance?
Option A:	Object Oriented or abstract data type system
Option B:	Main program and subroutine Architecture
Option C:	Remote Procedure Call system
Option D:	Pipe & filter
5.	Which of the following is not a software connector
Option A:	Procedure call
Option B:	Event
Option C:	Data access
Option D:	Pipe &filter
6.	Linkage connector provide
Option A:	Communication service
Option B:	Coordination service
Option C:	Conversion service

Option D:	Facilitation service
7.	Which of the following is not an example of viewpoints
Option A:	Structural
Option B:	Logical
Option C:	Concurrency
Option D:	Physical
8.	What is reference architecture?
Option A:	It is a reference model mapped onto software components
Option B:	It provided data flow with comments
Option C:	It provides data flow with pieces
Option D:	It is a reference model mapped onto software components & data flow with comments
9.	What is an XML namespace?.
Option A:	A set of names applied to specific spaces within an XML document, such as the head and body
Option B:	A set of names representing a specific XML vocabulary
Option C:	A set of names for XML documents pertaining to a particular vocabulary
Option D:	A set of names applied to specific spaces within an XLS document, such as the head and body
10.	Which factor considered for evaluating framework
Option A:	Platform support & fidelity
Option B:	Components &links
Option C:	Links
Option D:	Model
11.	The main technique for achieving portable software
Option A:	is to have independent platform
Option B:	is to isolate System dependency
Option C:	is to increase overall performance
Option D:	is to have independent software
12.	The concepts of push/pull type of pipelines are used in …
Option A:	Broker Architectural Style
Option B:	Layered Architectural Style
Option C:	Pipe & filter Architectural Style
Option D:	RPC Architectural Style
13.	A product line affects which of the following
Option A:	Relationship with its customers, Organization in its structure
Option B:	Components
Option C:	Links
Option D:	Connector
14.	Which of the following is not non-functional properties
Option A:	Efficiency
Option B:	Scalability

Option C:	Complexity
Option D:	Correctness
15.	Domain Specific software architecture comprises____
Option A:	A reference architecture, a component library & an application configuration method
Option B:	A reference architecture only
Option C:	a component library only
Option D:	an application configuration method only
16.	Which of the following is commonly used to describe the service interface, how to bind information, and the nature of the component's service or endpoint?
Option A:	Xml
Option B:	WSDL
Option C:	SCDL
Option D:	UML
17.	Which of the following describes a message-passing taxonomy for a component-based architecture that provides services to clients upon demand?
Option A:	SOA
Option B:	EBS
Option C:	GEC
Option D:	XML
18.	Scalability is___
Option A:	The capability of software system to be adapted to meet new requirements of size scope
Option B:	to improve connectivity
Option C:	To improve components function
Option D:	To improve system performance
19.	Which of the following are goals of analysis
Option A:	Completeness only
Option B:	Correctness only
Option C:	Consistency only
Option D:	Completeness, consistency, compatibility & correctness
20.	Wright developed by _____
Option A:	Allen & Garlan
Option B:	Luckham
Option C:	Gorlick
Option D:	Razouk

Q2 **(20 Marks)**	**Solve any Four out of Six** **5 marks each**
A	What is architecture implementation framework? How does an architecture implementation framework differ from middleware?
B	Explain in detail C2 architectural style.
C	What is a difference between view & viewpoint
D	What is Domain-Specific software architecture? Explain DSSA process in detail.
E	Explain design issues for non-functional properties-scalability & heterogeneity.
F	What do you mean by stakeholder driven modeling?

Q3. **(20 Marks)**	**Solve any Two Questions out of Three** **10 marks each**
A	Explain any two connector in detail i.)Data access connector ii.)Stream connector iii. Procedure call connector
B	What is REST? Explain its architecture
C	Discuss service oriented architecture & web services

University of Mumbai

Examination 2020 under cluster 4 (Lead College: Pillai College of Engineering)

Examinations Commencing from 15th June 2021 to 26th June 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: CPE7025 and Course Name: **Soft Computing**

Time: 2hour Max. Marks: 80

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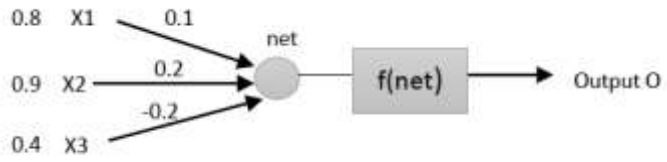
Q1. Choose the correct option for following questions. All the Questions are compulsory and carry equal marks

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	D
Q3.	B
Q4	A
Q5	D
Q6	A
Q7	B
Q8.	B
Q9.	C
Q10.	A

Q11.	A
Q12.	B
Q13.	A
Q14.	C
Q15.	A
Q16.	B
Q17.	C
Q18.	B
Q19.	A
Q20.	D

Q2. Model Answer: (with marks distribution) (Q2 carries 20M)

Q2.	Solve any Four out of Six (5 marks each)	
A	**What are the characteristics of Neural networks? Write any two applications of Neural network.** *Marking Scheme:* Characteristics of Neural Networks : Adaptability, Learnability, Fault Tolerance, Robustness, Parallel computation etc. [3M] Two Applications with proper explanation [2M]	
B	**What do you understand by derivative based optimization? Explain Steepest Descent method of Optimization.** *Marking Scheme:* Explanation of Derivative based optimization [2M] Explanation of Steepest Descent method with proper diagram [3M]	
C	**Explain Architecture of ANFIS with a neat diagram.**	

	Marking Scheme: Correct Architecture diagram of ANFIS [3M] Explanation of each layer [2M]	
D	**Explain how Genetic Algorithms are different from Traditional search algorithms? Explain Roulette Wheel Selection and Tournament selection method with a suitable example.** *Marking Scheme:* Any two differences [1M] Roulette wheel selection with example and diagram [2M] Tournament Selection with example and diagram [2M]	
E	**Find out all α-level sets and Strong α-level sets for the following fuzzy set.** **A = { (3,0.1), (4,0.2), (5,0.3), (6,0.3), (7,0.4), (8,0.5),(10,0.8),(12,1),(14,0.8),(15,0.5)}** *Marking Scheme:* Correct α-level sets [3M] Correct Strong α-level sets [2M]	
F	**A neuron with 3 inputs has the weight vector W = [0.1 0.2 – 0.2]. If input vector is [0.8 0.9 0.4] then find the output of a neuron. Use binary sigmoidal activation function. Assume λ=1.**  *Marking Scheme:* Correct computation of **net** value [2M] Correct final output[3M] *Solution :* net = (0.1*0.8 + 0.2 * 0.9 + (-0.2*0.4)) = 0.08+0.18-0.08 = 0.18 output o = f (net)= $\left[\frac{1}{1 + e^{(-\lambda \text{ net})}} \right]$ = 1 / 1+ $e^{-0.18}$= 0.5448	

Q3. Model Answer: (with marks distribution) (Q3 carries 20M)

Q3.	**Solve any Two Questions out of Three (10 marks each)**
A	**Determine the weights after three iterations for Hebbian learning of a single neuron network starting with initial weight** $W^t = [1 \ -1]$. Inputs $X_1 = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$, $X_2 = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$, $X_3 = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ and c = 1 **Use bipolar binary activation function.** *Marking Scheme:*

Give 3M for Computation of each iteration , so for 3 iterations 3*3 = 9M
Final correct answer [1M]

Solution:

Iteration 1

Step 1 : Set $X = X_1$

$net_1=3, \quad o_{1=}\text{ sign }(3) = 1, \ \Delta W_1=\begin{bmatrix} 1 \\ -2 \end{bmatrix} \quad W_2$

$= \begin{bmatrix} 2 \\ -3 \end{bmatrix}$

Step 2 : Set $X = X_2$

$net_2= -5, \quad o_2=\text{sign }(-5) = -1, \ W_2=\begin{bmatrix} -2 \\ -3 \end{bmatrix}$

$W_3 =\begin{bmatrix} 0 \\ -6 \end{bmatrix}$

Step 3 : Set $X = X_3$

$net_3 = 6, \ o_3=\text{sign }(6) = 1, \ \Delta W_3=\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

$W_4 = \begin{bmatrix} 1 \\ -7 \end{bmatrix}$

Iteration 2 :

Step 1 : Set $X = X_1$

$net_4 = = 15, \ o_4=1 \ , \Delta W_4=\begin{bmatrix} 1 \\ -2 \end{bmatrix}$

$\rightarrow W_5 = \begin{bmatrix} 2 \\ -9 \end{bmatrix}$

Step 2 : Set $X = X_2$

$net_5 = -23, o_5 = -1$

$\rightarrow \Delta W_5 = c\, o_5\, X_5$

$= (1)(-1)\begin{bmatrix} 2 \\ 3 \end{bmatrix}=\begin{bmatrix} -2 \\ -3 \end{bmatrix}$

$\rightarrow W_6 = W_5 + \Delta W_5$

$= \begin{bmatrix} 2 \\ -9 \end{bmatrix}+\begin{bmatrix} -2 \\ -3 \end{bmatrix}=\begin{bmatrix} 0 \\ -12 \end{bmatrix}$

Step 3 : Set $X = X_3$

$X = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$

$net_6 = = 12, o_6=1 \ , \Delta W_6=\begin{bmatrix} 1 \\ -1 \end{bmatrix}$

$W_7 = \begin{bmatrix} 1 \\ -13 \end{bmatrix}$

Iteration 3

Step 1 : Set $X = X_1$

$net_7 = = 27, o_7=1 \ , \Delta W_7=\begin{bmatrix} 1 \\ -2 \end{bmatrix}$

	$W_8 = \begin{bmatrix} 2 \\ -15 \end{bmatrix}$ **Step 2 :** Set $X = X_2$ $net_8 = -41, o_8 = -1, \Delta W_8 = \begin{bmatrix} -2 \\ -3 \end{bmatrix}$ $\rightarrow W_9 = \begin{bmatrix} 0 \\ -18 \end{bmatrix}$ **Step 3 :** Set $X = X_3$ $net_9 = 18, o_9 = 1, \Delta W_9 = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ $W_{10} = \begin{bmatrix} 1 \\ -19 \end{bmatrix}$ **…Ans.**
B	**Design a fuzzy controller for a train approaching or leaving a station. The inputs are distance from a station and speed of the train. The output is the amount of brake power used. Use,** **(i) Triangular membership functions** **(ii) Four descriptors for each of the input and out variables** **(iii) Five to six rules.** **(iv) Appropriate deffuzification method** **Clearly show that if a train is at a short distance with a great speed , the brake power required would be very high and vice versa.** *Marking Scheme:* Step 1: Identify input/output variables and defining descriptors. [2M] Step2: Fuzzification [2M] Step3: Correct Rule base [2M] Step 4: Rule Evaluation [2M] Step 5: Defuzzification [2M]
C	**With the help of suitable diagrams, explain different types of crossover and Mutation techniques in Genetic algorithm.** *Marking Scheme:* Types of crossover with suitable example and diagrams [5M] Types of Mutation with suitable example and diagrams [5M] *Solution:* Types of crossovers: Single-point, Two point, Multipoint, Uniform crossover, Matrix crossover Types of Mutation: Point mutation, replace, swapping, scramble etc.

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