K. J. Somaiya Institute of Engineering and Information Technology
Sion, Mumbai - 400022
NAAC Accredited Institute with 'A' Grade
NBA Accredited 3 Programs
(Computer Engineering, Electronics & Telecommunication Engineering and Electronics Engineering)
Permanently Affiliated to University of Mumbai

EXAMINATION TIME TABLE (JANUARY 2021)

PROGRAMME - B.E. (Computer) (REV-2012)(CBSGS)

SEMESTER - VII

Days and Dates	Time	Course Code	Paper
Friday, January 08, 2021	03:30 p.m. to 05:30 p.m.	CPC701	Digital Signal Processing
Monday, January 11, 2021	03:30 p.m. to 05:30 p.m.	CPC702	Cryptography and System Security
Wedneday, January 13, 2021	03:30 p.m. to 05:30 p.m.	CPC703	Artificial Intelligence
Friday, January 15, 2021	03:30 p.m. to 05:30 p.m.	CPE7021	Elective- II 1) Advance Algorithms
Friday, January 15, 2021	03:30 p.m. to 05:30 p.m.	CPE7022	2) Computer Simulation and Modeling
Friday, January 15, 2021	03:30 p.m. to 05:30 p.m.	CPE7023	3) Image Processing
Friday, January 15, 2021	03:30 p.m. to 05:30 p.m.	CPE7024	4) Software Architecture
Friday, January 15, 2021	03:30 p.m. to 05:30 p.m.	CPE7025	5) Soft Computing
Friday, January 15, 2021	03:30 p.m. to 05:30 p.m.	CPE7026	6) ERP and Supply Chain Management

Important Note: ● Change if any, in the time table shall be communicated on the college web site.

Mumbai
20th December, 2020.

Principal

University of Mumbai

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Computer Engineering

Curriculum Scheme: Rev 2012

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**
1.	The value of a signal, at any instant, corresponds to its _____ .
Option A:	Time
Option B:	Amplitude
Option C:	Phase
Option D:	Frequency
2.	Energy signals have signal power equal to ____ .
Option A:	Zero
Option B:	Infinite
Option C:	Finite
Option D:	One
3.	If a signal is identical to its folded version, with x(n) = x(−n), it is called _____ symmetric.
Option A:	False
Option B:	Odd
Option C:	Even
Option D:	Right
4.	If * represents value at origin and x(n) = {1,2,1*, 1} then x(n+1) will be
Option A:	{1,2*,1,1}
Option B:	{1,2,1,1*}
Option C:	{1*,2,1,1}
Option D:	{1,2,1,1,0*}
5.	_____ is the convolution of one Signal with a folded version of the other.
Option A:	Recursion
Option B:	Transformation
Option C:	Correlation
Option D:	Interpolation
6.	If the response of the system to an input depends on the future values of that input, then the system is _____.
Option A:	Causal
Option B:	Stable

Option C:	Linear
Option D:	Non-causal
7.	What is output when a signal x(t)=cos(pi*80*t) is sampled with a sampling frequency of 20Hz?
Option A:	cos(2*pi*n)
Option B:	cos(4*pi*n)
Option C:	cos(8*pi*n)
Option D:	cos(6*pi*n)
8.	FIR filters are _____ in nature.
Option A:	Non-recursive
Option B:	Unstable
Option C:	Recursive
Option D:	Non-Linear
9.	The 2 point DFT of u(n)- u(n-2) is
Option A:	{2, 1}
Option B:	{2, 0 }
Option C:	{2, 2 }
Option D:	{0 , 2}
10.	What is X(0) of the four point sequence x(n)={0,1,2,3}?
Option A:	1
Option B:	2
Option C:	5
Option D:	6
11.	DFT of unit impulse signal is
Option A:	1
Option B:	0
Option C:	n
Option D:	n/2
12.	DIT-FFT splits input sequence into
Option A:	N/2 data points
Option B:	Odd and Even parts
Option C:	N/3 data points
Option D:	N/4 data points
13.	For N=16 how many complex multiplications are required using FFT algorithm.
Option A:	40
Option B:	96
Option C:	32
Option D:	64
14.	Using Parseval's theorem what is the energy of x(n)={1,2,3,4}
Option A:	30 units
Option B:	14 units
Option C:	29 units

Option D:	31 units
15.	What is used to measure the amount of linear dependence between two variables
Option A:	Convolution
Option B:	Auto correlation
Option C:	Cross correlation
Option D:	Carl's Correlation coefficient
16.	Overlap add and Overlap save methods are used to perform _____ of long sequences.
Option A:	Correlation
Option B:	Convolution
Option C:	Transformation
Option D:	Decimation
17.	In Carl's Correlation coefficient, if r = 0, then it indicates that
Option A:	there is positive linear correlation
Option B:	there is negative linear correlation
Option C:	there is no linear correlation
Option D:	there is linear correlation
18.	What type of architecture does TMS320C54XX have?
Option A:	VLIW
Option B:	Von Neumann
Option C:	Harvard
Option D:	MIPS
19.	Identify the manipulation used in the DT signal y(n)=ax(n)
Option A:	scaling
Option B:	shifting
Option C:	downsampling
Option D:	upsampling
20.	Which of the following is common independent variable for biomedical signals and speech signal?
Option A:	Pitch
Option B:	Time
Option C:	Volume
Option D:	Amplitude

Q2	
A	**Solve any Two** **5 marks each**
i.	Explain Energy and Power signal with example.
ii.	Compute 4-point DFT of the sequence given by $x(n)= (-1)^n$
iii.	State whether the system y(n)=x(n/2) is linear/nonlinear and time variant /time invariant
B	**Solve any One** **10 marks each**
i.	State any five properties of DFT.
ii.	Let x(n)= {1,2,3,4,5,6,7} and h(n)={1,0,2} perform linear convolution using overlap save method.

Q3.	
A	**Solve any Two** **5 marks each**
i.	Compute linear convolution of the following sequences x(n)= {2,3,1,2} and h(n)= {1,2,1}
ii.	Explain the following systems: Linear and Nonlinear Causal and Non-causal
iii.	Explain role of DSP in speech processing or biomedical signal processing.
B	**Solve any One** **10 marks each**
i.	Perform 4-point DFT using radix-2 DIT-FFT for x(n)= {2,1,4,3}. Draw butterfly diagram.
ii.	If * represents value at the origin, Sketch the following signals for the sequence x(n)= (1,2,3,1*,2,3} x(n+2) x(-n) x(n-1) 2.x(n) x(n).u(n)

University of Mumbai

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev 2012

Examination: BE Semester VII

Course Code: CPC701 and Course Name: Digital Signal processing

Time: 2 hour Max. Marks: 80

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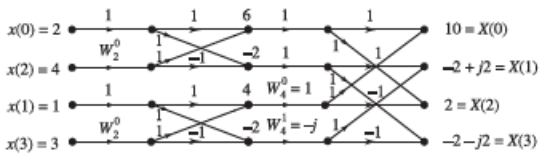
Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	B
Q2.	A
Q3.	C
Q4	B
Q5	C
Q6	D
Q7	A
Q8.	A
Q9.	B
Q10.	D
Q11.	A
Q12.	B
Q13.	C
Q14.	A
Q15.	D
Q16.	B
Q17.	C
Q18.	C
Q19.	A
Q20.	B

Q2	
A	**Solve any Two** **5 marks each**
i.	Explain Energy and Power signal with example. Answer: Definition and formula with example – 2.5 marks each
ii.	Compute 4-point DFT of the sequence given by $x(n)= (-1)^n$ Answer: X(k)={0,0,4,0} show all steps 5 marks
iii.	State whether the system y(n)=x(n/2) is linear/nonlinear and time variant /time invariant Answer: System is linear – 2.5 marks, show all steps System is time-variant – 2.5 marks, show all steps
B	**Solve any One** **10 mark each**
i.	State any five properties of DFT. Answer: Each property -2 marks
ii.	Let x(n)= {1,2,3,4,5,6,7} and h(n)= {1,0,2} perform convolution using overlap save method. Answer: {1,2,5,8,11,14,17,12,14} 10 marks

Q3.	
A	**Solve any Two** **5 marks each**
i.	Compute linear convolution of the following sequences x(n)= {2,3,1,2} and h(n)= {1,2,1} Answer: Step by step solution is required y(n) = {2,7,9,7,5,2}
ii.	Explain the following systems: 1. Linear and Nonlinear 2. Causal and non-causal Answer: Definition – 2.5 marks each
iii.	Explain role of DSP in speech processing or biomedical signal processing. Answer: Five unique points – 1 mark each
B	**Solve any One** **10 mark each**
i.	Perform 4-point DFT using radix-2 DIT-FFT for x(n)= {2,1,4,3}. Draw butterfly diagram. Answer:  If i/p shuffled – 1 mark

	Stage 1 O/P : 2 mark Stage 2 O/P : 2 mark Flow graph: 5 marks X(k)= {10,-2+2j,2,-2-2j}
ii.	If * represents value at the origin, Sketch the following signals for the sequence x(n)= (1,2,3,1*,2,3} 1. x(n+2) = {1,2,3,1,2,3*} 2. x(-n) = {3,2,1*,3,2,1} 3. x(n-1) = {1,2,3*,1,2,3} 4. 2.x(n) = {2,4,6,2*,4,6} 5. x(n). u(n) = {0,0,0,1*,2,3} Answer: Output sequence and signal plot- 2 marks each

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

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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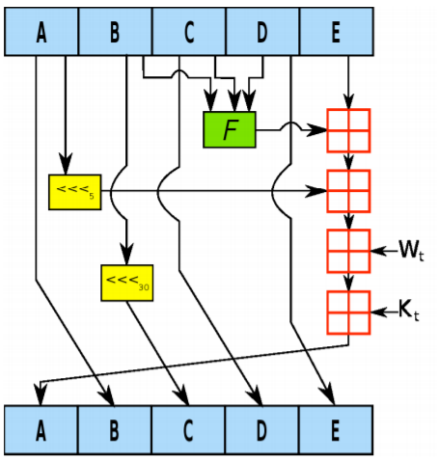
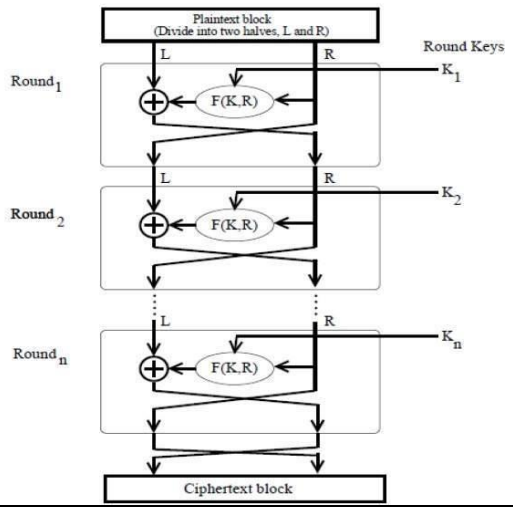
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	_____ is the process of making the provided data unreadable or unrecognizable to the unauthorized entities by applying a cryptographic algorithm
Option A:	Encipherment
Option B:	Traffic Padding
Option C:	Digital Signature
Option D:	Hashing
2.	_____refers to a situation where a statement's author cannot successfully dispute its authorship or the validity of an associated contract.
Option A:	Repudiation
Option B:	Non-Repudiation
Option C:	Cryptography
Option D:	Denial of Service
3.	Use Caesar's Cipher to decipher the following: HQFUBSWHG WHAW
Option A:	ABANDONED LOCK
Option B:	ENCRYPTED TEXT
Option C:	ABANDONED TEXT
Option D:	ENCRYPTED LOCK
4.	RC4, RC5 are examples of which kind of algorithms?
Option A:	Block Ciphers
Option B:	Stream Ciphers
Option C:	Hashing Algorithms
Option D:	Digital Certificate Algorithms
5.	After the 48 bit XOR operation, the total number of unique substitution boxes (S-Boxes) in DES are
Option A:	8
Option B:	4
Option C:	6
Option D:	12
6.	_____ is the process of writing the plaintext in rows and then creating the ciphertext by reading it off in columns one by one.

Option A:	Columnar Transposition Cipher
Option B:	Caesar Cipher
Option C:	Data Encryption Standard
Option D:	Diffie Hellman Algorithm
7.	The rail fence cipher is a form of _____
Option A:	Stream Cipher
Option B:	Substitution Cipher
Option C:	Block Cipher
Option D:	Transposition Cipher
8.	_____ points to the completeness and accuracy of the available data.
Option A:	Confidentiality
Option B:	Integrity
Option C:	Availability
Option D:	Non-Repudiation
9.	_____is the process selecting a trusted third party to audit, monitor and control the communication between two entities
Option A:	Notarization
Option B:	Encipherment
Option C:	Authentication
Option D:	Authorization
10.	What does the following figure represent? 
Option A:	Compression function
Option B:	Message digest generation using MD-5
Option C:	Elementary SHA operation for single round
Option D:	Processing of a single 1024-bit block
11.	_____ tries to alter the system resources, influence their activities or modifications to the data stream.
Option A:	Passive Attack
Option B:	Active Attack
Option C:	Sniffing Attacks

Option D:	Snooping Attacks
12.	The use of Information Technology, Internet or any other digital mediums to disturb the activities of a state or society, especially the intentional attacking of information systems, databased and servers for tactical or military determinations.
Option A:	Cyber Warfare
Option B:	Cyber Frauds
Option C:	Cyber Bullying
Option D:	Cyber Defamation
13.	_____ is an authentication protocol that works on the principle of generating tickets to allow nodes communicating over a non-secure network to prove their identity to one another in a secure manner.
Option A:	Digital Certificate Scheme
Option B:	Kerberos
Option C:	Digital Signature Scheme
Option D:	AES algorithm
14.	Identify this cipher 
Option A:	Feistel Cipher
Option B:	RC4
Option C:	RSA
Option D:	Caesar Cipher
15.	In computing, a _____ is any malware which misleads users of its true intent.
Option A:	Covert Channel
Option B:	Trojan Horse
Option C:	Virus
Option D:	Worm
16.	When small attacks add up to one major attack that can go undetected due to the nature of this type of cybercrime.
Option A:	Trojan Horse
Option B:	Virus
Option C:	Phishing Attacks

Option D:	Salami Attack
17.	An _____ is a device or software application that monitors a network or systems for malicious activity or policy violations. Any intrusion activity or violation is typically reported either to an administrator or collected centrally using a security information and event management system.
Option A:	Honeypots
Option B:	Intrusion Detection Systems
Option C:	Intrusion Prevention Systems
Option D:	Backdoors
18.	In the context of security_____ is the principle of making sure that the underlying association between both, the encrypted text (ciphertext) and the symmetric keys are as complex and indistinguishable as possible.
Option A:	Diffusion
Option B:	Confusion
Option C:	Euler's Theorem
Option D:	Feistel Cipher
19.	In a _____, any character of plain text from the given fixed set of characters is substituted by some other character from the same set depending on a key
Option A:	Substitution Cipher
Option B:	Transposition Cipher
Option C:	Digital Signature
Option D:	Digital Certificate
20.	_____ is a web security vulnerability that allows an attacker to interfere with the queries that an application makes to its database. It generally allows an attacker to view data that they are not normally able to retrieve. This might include data belonging to other users, or any other data that the application itself is able to access.
Option A:	Cross Site Request Forgery
Option B:	Cross Site Scripting
Option C:	SQL Injection
Option D:	Buffer Overflow

Q2 **20 Marks Total**	**Solve any Two Questions out of Three** **10 marks each**
A	Explain the mechanism behind Triple DES with 2 Keys. What were the drawbacks of Double DES which have been addressed in Triple DES?
B	Explain one round of the SHA algorithm in detail.
C	Explain the architecture of Kerberos Protocol in detail.

Q3. **20 Marks Total**	**Solve any Two Questions out of Three** **10 marks each**
A	What are the various Firewall types? Differentiate.

B	Suppose that two parties A and B wish to set up a common secret key (D-H key) between themselves using the Diffie Hellman key exchange technique. They agree on 7 as the modulus and 3 as the primitive root. Party A chooses 2 and party B chooses 5 as their respective secrets. What is the Diffie Hellman Shared Key ?
C	What is SSL? Explain the working of SSL Protocol in detail

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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.	B
Q3.	B
Q4	B
Q5	A
Q6	A
Q7	D
Q8.	B
Q9.	A
Q10.	C
Q11.	B
Q12.	A
Q13.	B
Q14.	A
Q15.	B
Q16.	D
Q17.	B
Q18.	B
Q19.	A
Q20.	C

Model Answer Key:

Q.2A

Ans:

1. Diagram depicting 3DES with two keys Key1 and Key2 expected. – 4 Marks
2. Explanation of the overall 3DES architecture expected. – 4 Marks
3. Drawbacks of 2 DES (Man in the middle expected) and how it is resolved in 3DES is expected. – 2 Marks

Q.2B

Ans:

Overall Steps of SHA algorithm is expected with either a single diagram with complete explanation or multiple diagrams for each step is also accepted.

Diagram – 4 Marks
Explanation- 6 Marks

Q.2C
Ans: The Kerberos protocol with proper explanation of KDC, Authentication Server, TGS is expected along with a diagram.
Diagram – 4 Marks
Explanation of each communication – 6 Marks

Q.3A
Ans:
Proper explanations/differentiation of broad 3 types: Packet filters, Proxy Server Firewalls, Stateful Inspection Firewalls needed. Diagram optional.
Types listing – 1 Mark
3 main firewall explanation 3 Marks each.

Q.3B
Ans:
Given-

- n = 7
- a = 3
- Private key of A = 2
- Private key of B = 5

Step-01: 6 Marks

Both the parties calculate the value of their public key and exchange with each other.

Public key of A

$= 3^{\text{private key of A}} \bmod 7$

$= 3^2 \bmod 7$

$= 2$

Public key of B

$= 3^{\text{private key of B}} \bmod 7$

$= 3^5 \bmod 7$

$= 5$

Step-02: 4 marks

Both the parties calculate the value of secret key at their respective side.

Secret key obtained by A

$= 5^{\text{private key of A}} \bmod 7$

$= 5^2 \bmod 7$

$= 4$

Secret key obtained by B

$= 2^{\text{private key of B}} \bmod 7$

$= 2^5 \bmod 7$

$= 4$

Finally, both the parties obtain the same value of secret key.

The value of common secret key = 4.

Q.3C

Brief explanation of SSL – 2 Marks

SSL architecture diagram – 4 Marks

Detailed explanation of SSL architecture – 4 Marks

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2012

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.	Artificial Intelligence finds its roots in
Option A:	Economy
Option B:	Philosophy
Option C:	Linguistics
Option D:	All of the above
2.	In intelligent agent the mapping from percept to action is done by
Option A:	Sensors
Option B:	Actuators
Option C:	Agent function
Option D:	Percept sequence
3.	Most of the real world environments are
Option A:	Fully Observable
Option B:	Partially Observable
Option C:	Static
Option D:	Classical
4.	Depth limited search (L- depth limit & D - depth of goal node) is incomplete when ?
Option A:	L > D
Option B:	L < D
Option C:	L = D
Option D:	Cannot predict
5.	In A* search the nodes are evaluated using which of the value ?

Option A:	Heuristic function
Option B:	Path cost from start node to current node
Option C:	Sum of the path cost from start node to current node and heuristic function
Option D:	Average of the path cost from start node to current node and heuristic function
6.	Which uninformed search algorithm uses the stack data structure for implementation ?
Option A:	Breadth first search.
Option B:	Depth first search
Option C:	Uniform cost search
Option D:	Bidirectional search
7.	A vacuum Cleaner world with two location, two sensors - location and dirt , three actions - left, right and suck will have a state space with how many possible states ?
Option A:	6
Option B:	8
Option C:	10
Option D:	12
8.	Hill climbing is which type of algorithm?
Option A:	Local search
Option B:	Uninformed
Option C:	Informed
Option D:	Adversial search
9.	Which of these is the first step in problem solving ?
Option A:	Figuring out initial state
Option B:	Problem formulation
Option C:	Goal formulation
Option D:	Enumerating successor functions

10.	In entailment : alpha = beta if and only if, in every model in which alpha is ____ beta is also ____
Option A:	True, True
Option B:	True, False
Option C:	False, True
Option D:	False, False
11.	Forward chaining is a _____ approach
Option A:	Up-Down
Option B:	Down-Up
Option C:	Procedural
Option D:	Declarative
12.	A Clause containing at most one positive literal is called _____
Option A:	Definite Clause
Option B:	Horn Clause
Option C:	Unification
Option D:	Resolution
13.	Can this two expressions unified: 1)P{a,g(x,a),f(y)} 2) P{a, g(f(b),a), x}
Option A:	Yes
Option B:	No
Option C:	Cannot say
Option D:	Not Possible
14.	Bayesian Belief Network is also known as
Option A:	belief network
Option B:	decision network
Option C:	Bayesian model
Option D:	All of the above

15.	The process by which the brain incrementally orders actions needed to complete a specific task is referred as _____
Option A:	Planning
Option B:	Partial order planning
Option C:	Total order planning
Option D:	Conditional Planning
16.	Expert systems are better than human in
Option A:	Memory
Option B:	Speed
Option C:	Availability
Option D:	problem solving
17.	Knowledge base of Expert system contains
Option A:	Factual Knowledge
Option B:	Factual and heuristic knowledge
Option C:	only Heuristic knowledge
Option D:	algorithms
18.	Which of the factors affect the performance of learner system does not include?
Option A:	Representation scheme used
Option B:	Training scenario
Option C:	Type of feedback
Option D:	Good data structures
19.	MYCIN was
Option A:	Expert system with backward chaining
Option B:	Expert system with forward chaining
Option C:	problem solving agent
Option D:	First computer game

20.	Which is not a component of learning agent?
Option A:	Critic
Option B:	Performance Element
Option C:	Program generator
Option D:	Learning element

Q2.	**Solve any Four out of Six. 5 marks each**
A	Define Artificial Intelligence. Describe some of the recent applications of AI.
B	List out and explain the characteristics features of expert system.
C	Explain the state space representation of Water – Jug problem.
D	State or interpret in your own words PEAS description for a Vacuum cleaner?
E	Differentiate between Forward chaining & Backward chaining
F	Describe Utility based agent.

Q3.	**Solve any Two Questions out of Three 10 marks each**
A	Consider the following knowledge base: Gita likes all kinds of food. Mango and chapati are food. Gita eats almond and is still alive. Anything eaten by anyone and is still alive is food. Convert to FOPL. Prove that Gita likes almond using resolution.
B	Compare the different Uninformed search strategies.
C	Briefly explain minimax algorithm with alpha beta pruning.

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Computer Engineering

Curriculum Scheme: Rev2012

Examination: BE Semester:VII

Course Code: CPC703 and Course Name: Artificial Intelligence

Time: 2 hours 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.	C
Q3.	B
Q4	B
Q5	C
Q6	B
Q7	B
Q8.	A
Q9.	C
Q10.	A

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

Q2.

A. Define Artificial Intelligence. Describe some of the recent applications of AI.

Ans: Definition : 2mks

Applications: 3 mks

B. List out and explain the characteristics features of expert system.

Ans: Atleast 5 features 1 mk each

C. Explain the state space representation of Water – Jug problem.

Ans: States: 3 mks

Graph: 2 mks

D. State or interpret in your own words PEAS description for a Vacuum cleaner?

Ans: PEAS : 1 mk each

1 mk for description of the problem

E. Differentiate between Forward chaining & Backward chaining

Ans: 8-10 differences with example.

F. Describe Utility based agent.

Ans: 4mks description 1 mk diagram

Q3.

A. Consider the following knowledge base:

1. Gita likes all kinds of food.
2. Mango and chapati are food.
3. Gita eats almond and is still alive.
4. Anything eaten by anyone and is still alive is food.

Convert to FOPL. Prove that Gita likes almond using resolution.

Ans: Conversion to FOPL: 3 mks

Conversion to CNF form: 3 mks

Resolution tree: 4 mks.

B. Compare the different Uninformed search strategies.

Ans: Comparison of BFS,DFS,IDS, DLS with respect to time, space, completeness, optimality

C. Briefly explain minimax algorithm with alpha beta pruning.

Ans: minimax algorithm: 4 mks

alpha beta pruning: 6 mks

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: Computer Engineering

Curriculum Scheme: Rev 2012

Examination: BE SemesterVII

Course Code: CPE7021 and Course Name: Advanced Algorithms

Time: 2 hour Max. Marks: 80

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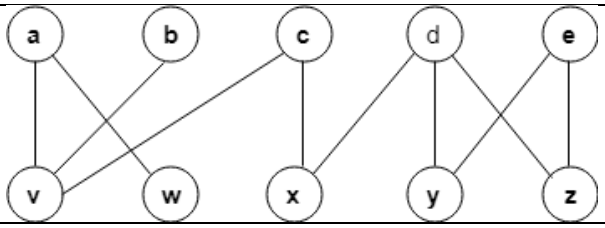
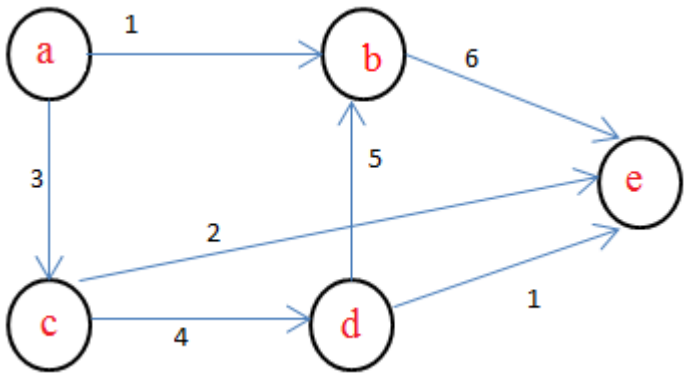
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	How many cases are there under Master's theorem?
Option A:	2
Option B:	3
Option C:	4
Option D:	5
2.	Indicate constant time complexity in terms of Big-O notation.
Option A:	O(n)
Option B:	O(1)
Option C:	O(logn)
Option D:	O(n2)
3.	Five node splitting operations occurred when an entry is inserted into a B-tree. Then how many nodes are written?
Option A:	**14**
Option B:	7
Option C:	11
Option D:	5
4.	Why do we impose restrictions likeroot property is black, every leaf is black, children of red node are black, all leaves have same black
Option A:	to get logarithm time complexity
Option B:	to get linear time complexity
Option C:	to get exponential time complexity
Option D:	to get constant time complexity
5.	What is order of resultant heap after merging two tree of order k?
Option A:	2*k
Option B:	k+1
Option C:	k*k
Option D:	k+logk
6.	Given a heap of n nodes. The maximum number of tree for building the heap is.
Option A:	n
Option B:	n-1
Option C:	n/2
Option D:	logn

7.	If a problem can be solved by combining optimal solutions to non-overlapping problems, the strategy is called _____
Option A:	Dynamic programming
Option B:	Greedy
Option C:	Divide and conquer
Option D:	Recursion
8.	Which of the following problems is NOT solved using dynamic programming?
Option A:	0/1 knapsack problem
Option B:	Matrix chain multiplication problem
Option C:	Edit distance problem
Option D:	Fractional knapsack problem
9.	In linear programming, the most popular non graphical procedure is classified as
Option A:	Linear procedure
Option B:	Non graphical procedure
Option C:	Graphical procedure
Option D:	Simplex method
10.	In simplex method,the non basic variable which is used to replace the basic variable is the variable which has
Option A:	Most positive columnn
Option B:	Most negative column
Option C:	Most negative row
Option D:	Most positive row
11.	Consider the brute force implementation in which we find all the possible ways of multiplying the given set of n matrices. What is the time complexity of this implementation?
Option A:	$O(n!)$
Option B:	$O(n^3)$
Option C:	$O(n^2)$
Option D:	Exponential
12.	In a bipartite graph G=(V,U,E), the matching of a free vertex in V to a free vertex in U is called?
Option A:	Bipartite matching
Option B:	Cardinality matching
Option C:	Augmenting
Option D:	Weight matching
13.	Which is not the main operation in push relabel algorithm
Option A:	Initialize pre-Flow ()
Option B:	Relabel ()
Option C:	Push ()
Option D:	Insert ()
14.	From the given graph, how many vertices can be matched using maximum matching in bipartite graph algorithm?

	
Option A:	6
Option B:	4
Option C:	3
Option D:	5
15.	How many times the for loop in the Bellmann Ford Algorithm gets executed?
Option A:	V times
Option B:	V-1
Option C:	E
Option D:	E-1
16.	What is the time complexity of Dijikstra's algorithm?
Option A:	O(N)
Option B:	$O(N^3)$
Option C:	$O(N^2)$
Option D:	O(logN)
17.	 In the given graph: Identify the shortest path having minimum cost to reach vertex E if A is the source vertex
Option A:	a-b-e
Option B:	a-c-e
Option C:	a-c-d-e
Option D:	a-c-d-b-e
18.	_____ is a method of constructing a smallest polygon out of n given points.
Option A:	Closest pair problem
Option B:	Quick hull problem
Option C:	Path compression
Option D:	Union by rank
19.	Which approach is based on computing the distance between each pair of distinct points and finding a pair with the smallest distance?

Option A:	Brute force
Option B:	Exhaustive search
Option C:	Divide and conquer
Option D:	Branch and bound
20.	_____ is a matching with the largest number of edges.
Option A:	Maximum bipartite matching
Option B:	Non-bipartite matching
Option C:	Stable marriage
Option D:	Simplex

Q2 (20 Marks)	
A	**Solve any Two** **5 marks each**
i.	Determine whether two-line segments intersect or not.(take any diagram of line intersection as an example)
ii.	With a suitable example, explain the significance of the order of growth in analysing the algorithm efficiency.
iii.	Explain the concept of flow network, maximum flow and residual network with example.
B	**Solve any One** **10 marks each**
i.	Explain Graham Scan algorithm steps in detailed. Find out convex hull with graham scan.(with suitable example.)
ii.	Create a red-black after successive insertion of the elements82, 9, 95, 16, 34, 12, 57, 64, 83, 41 and then successive deletion of the keys 16 and 82.

Q3.(20 Marks)	
A	**Solve any Two 5 marks each**
i.	Create a binomial heap for the following elements: 43, 39, 19, 62, 58, 9, 68, 27
ii.	Explain push Relabel algorithm with suitable example.
iii.	State and explain Dijkstra's algorithm.
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 the cutting rod problem with a suitable example.

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Program: Computer Engineering

Curriculum Scheme: Rev 2012

Examination: BE SemesterVII

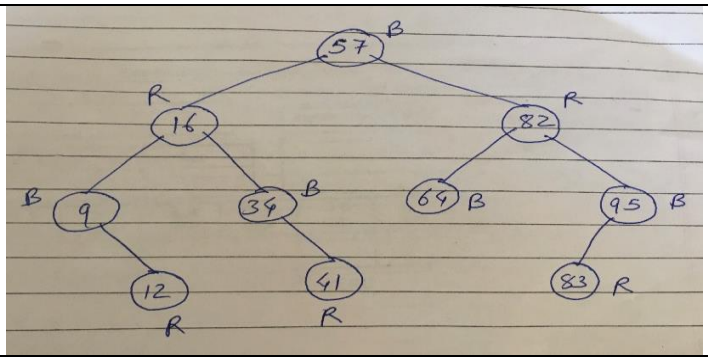
Course Code: CPE7021 and Course Name: Advance Algorithms

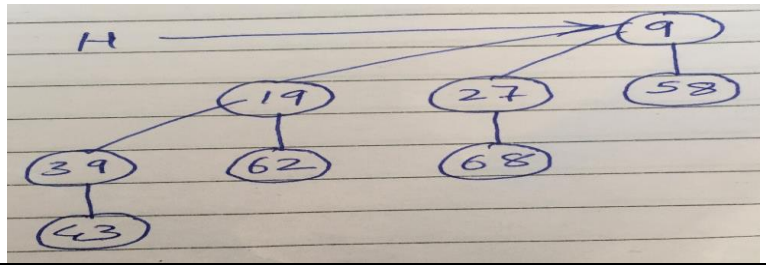
Time: 2 hour Max. Marks: 80

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

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

Q2 (20 Marks)	
A	**Solve any Two 5 marks each**
i.	Determine whether two-line segments intersect or not.(take any diagram of line intersection as an example) Suggested answer: 1) write down the properties of orientation 2 marks 2) one example as line intersect and another as lines don't intersect 3 marks
ii.	With a suitable example, explain the significance of the order of growth in analyzing the algorithm efficiency.
iii.	Explain the concept of flow network, maximum flow and residual network with example. Suggested Answer 1) Explanation of each concept 2 marks 2)explanation with properties and example 3 marks
B	Solve any One 10 marks each
i.	Explain Graham Scan algorithm steps in detail. Find out convex hull with graham scan. (With suitable example.) Suggested answer: 1) Graham Scan algorithm steps in detailed.-5 marks 2) finding convex hull with example -5 Marks
ii.	Create a red-black after successive insertion of the elements82, 9, 95, 16, 34, 12, 57, 64, 83, 41 and then successive deletion of the keys 16 and 82. Answer:

Q3.(20 Marks)	
A	**Solve any Two** **5 marks each**
i.	Create a binomial heap for the following elements: 43, 39, 19, 62, 58, 9, 68, 27 
ii.	Explain push Relabel algorithm with suitable example. Suggested answer: 1) Algorithm steps – 2 marks 2) Example with explanation -3 marks
iii.	State and explain Dijkstra's algorithm.
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 with maximum flow- 6 marks.
ii.	Explain the cutting rod problem with a suitable example. Suggested answer: 1)cutting rod problem explanation -3marks 2)detailed example explanation - 7 marks

University of Mumbai

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 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

==========

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1	Which of the following are advantages of simulation? a. Simulation allows "what-if?" type of questions. b. Simulation can usually be performed by hand or using a small calculator. c. Simulation does not interfere with the real-world system
Option A:	a and b
Option B:	a, b and c
Option C:	b and c
Option D:	a and c
2	The first step in simulation is to
Option A:	set up possible courses of action for testing.
Option B:	construct a numerical model.
Option C:	validate the model.
Option D:	define the problem.
3	Which of the following are disadvantages of simulation?
Option A:	inability to analyze large and complex real-world situations
Option B:	"time compression" capability
Option C:	could be disruptive by interfering with the real-world system
Option D:	is not usually easily transferable to other problems
4	If we are going to simulate an inventory problem, we must
Option A:	run the simulation for many days.
Option B:	run the simulation for many days many times, i.e., using multiple sets of random numbers.
Option C:	run the simulation many times, i.e., using multiple sets of random numbers.
Option D:	run the simulation once, for a relative short period of time.
5	Simulation should be thought of as a technique for
Option A:	increasing one's understanding of a problem.
Option B:	obtaining a relatively inexpensive solution to a problem.
Option C:	obtaining an optimal solution to a problem.
Option D:	providing quick and dirty answers to complex problems.
6	Standard deviation in statistical model can be defined as:

Option A:	$\sigma=\sqrt{V(X)}$
Option B:	$\sigma=\sqrt{E(X)}$
Option C:	$V=\sqrt{\sigma(X)}$
Option D:	$E=\sqrt{\sigma(X)}$
7	What is coefficient of variation in statistical model?
Option A:	Ratio of mean to standard deviation
Option B:	Ratio of variance to mean
Option C:	Ratio of standard deviation to mean
Option D:	Ratio of standard deviation to variance
8	In possion distribution probability of two ot more beep in 1-hour period is defined as:
Option A:	P(2 or more) = 1-(p(0)+p(1))
Option B:	P(2 or more) = p(0)-(1+p(1))
Option C:	P(2 or more) = 1+(p(0)+p(1))
Option D:	P(2 or more) = p(1)-(p(0)+1)
9	Which of the follwing statement is not true with reference to queueing system?
Option A:	In single-channel queue, the calling population is finite.
Option B:	Arrivals for service occur one at a time in a random fashion.
Option C:	The system capacity has no limit
Option D:	units are served in the order of their arrival
10	The M/M/s queue configuration allows for
Option A:	Single server
Option B:	Multiple server
Option C:	Constant service time
Option D:	General service time
11	What are the important properties of random numbers
Option A:	Uniform and independant
Option B:	Nonuniform and independent
Option C:	Uniform and depedent
Option D:	Nonuniform and dependent
12	All of the following are various ways of generating random numbers except
Option A:	Inverse-transform technique
Option B:	Acceptance-rejection technique
Option C:	Special properties
Option D:	Fibonacci series
13	Random numbers are used:
Option A:	To give random outcomes
Option B:	To describe the uncertainty of input values
Option C:	To assign values to the parameters
Option D:	To change the problem solution

14	Inverse cdf does not works for
Option A:	Weibull distribution
Option B:	Uniform distribution
Option C:	Chi-square
Option D:	Triangular distribution
15	Kolmogorov-Smirnov
Option A:	Compares the discrete cdf, F(x), of the uniform distribution with the empirical cdf, SN(x), of the N sample observations.
Option B:	Compares the continuous cdf, F(x), of the uniform distribution with the empirical cdf, SN(x), of the N sample observations.
Option C:	Approximately the distribution with n-1 degrees of freedom
Option D:	uses the sample statistic
16	Identify the correct sequence for steps of input model development Identify a probability distribution to represent the input process Collect data from the real system Evaluate the chosen distribution and parameters for goodness of fit. Choose parameters for the distribution
Option A:	1,2,3,4
Option B:	2,1,4,3
Option C:	2,1,3,4
Option D:	1,3,2,4
17	What factors are used to choose the family of distribution for input modelling
Option A:	The content of input data and its mean
Option B:	Input Data variation and standard deviation
Option C:	The context of input variable and Shape of Histogram
Option D:	Input variable and its vairance
18	_____ distribution represents the count of independent events occurring at fixed time and space
Option A:	Poisson
Option B:	Normal
Option C:	Binomial
Option D:	Weibull
19	Validation is generally achieved through the _____of the model.
Option A:	Implementation
Option B:	Deployment
Option C:	Calibration
Option D:	Redesigning
20	Following are the Performance evaluation Methods handled by use of Simulation in Manufacturing Systems. Throughput Analysis b)Bottleneck analysis c) System Usage Analysis
Option A:	Only a
Option B:	Both a and b

Option C:	Only b
Option D:	Both a and c

Q2	**Solve any Two Questions out of Three** **10 marks each**
A	What are the advantages and disadvantages of simulation?
B	Explain Poisson process and its properties.
C	Test the following random numbers for independence by runs up and down test. Take α=0.05 and critical value Z 0.025 =1.96 (0.12, 0.01, 0.23, 0.28, 0.89, 0.31, 0.64, 0.28, 0.33, 0.93).

Q3.	**Solve any Two Questions out of Three** **10 marks each**
A	What do you understand by calibration and validation of models? How can one increse the face validity of a model?
B	Discuss various issues in maufacturing and material handling in system's simulation.
C	Explain Inventory system. Discuss the cost involved in inventory systems.

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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

==========

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.	D
Q3.	D
Q4	B
Q5	A
Q6	A
Q7	C
Q8.	A
Q9.	A
Q10.	B
Q11.	A
Q12.	D
Q13.	B
Q14.	C
Q15.	B
Q16.	B
Q17.	C
Q18.	A
Q19.	C
Q20.	B

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

A. **1 mark each for below points**

Advantages of Simulation

- New polices, operating procedures, decision rules, information flows, organizational procedures, and so on can be explored without disrupting ongoing operations of the real system.
- New hardware designs, physical layouts, transportation systems, and so on, can be tested without committing resources for their acquisition.
- Hypotheses about how or why certain phenomena occur can be tested for feasibility.
- Insight can be obtained about the interaction of variables.
- Insight can be obtained about the importance of variables to the performance of the system.
- Bottleneck analysis can be performed indicating where work-in-process, information, materials, and so on are being excessively delayed.
- A simulation study can help in understanding how the system operates rather than how individuals think the system operates.
- "What-if" questions can be answered. This is particularly useful in the design of new system.

Disadvantages of Simulation

- Model building requires special training. It is an art that is learned over time and through experience. Furthermore, if two models are constructed by two competent individuals, they may have similarities, but it is highly unlikely that they will be the same.
- Simulation results may be difficult to interpret. Since most simulation outputs are essentially random variables (they are usually based on random inputs), it may be hard to determine whether an observation is a result of system interrelationships or randomness.
- Simulation modeling and analysis can be time consuming and expensive. Skimping on resources for modeling and analysis may result in a simulation model or analysis that is not sufficient for the task.

- Simulation is used in some cases when an analytical solution is possible, or even preferable, as discussed above.

B. **Properties of a Poisson Process**

Several properties of the Poisson process, discussed by Ross and others, are useful in discrete-system simulation. Random Splitting

- The first of these properties concerns random splitting. Consider a Poisson process {N(t), t≥0}having rate λ .

  - It, as represented by the left side of Figure.
  - Suppose that, each time an event occurs, it is classified as either a type I or a type II event.
  - Suppose further that each event is classified as a type I event with probability p and type II event with probability 1-p, independently of all other events.

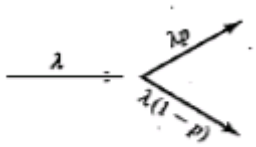


Figure 5.25 Random splitting.

Let N1(t) and N2 (t) be random variables that denote, respectively, the number of type I and type II events occurring in [0, t].

Note that N(t) = N1(t) + N2 (t).

It can be shown that N1(t) and N2(t) are both Poisson processes having rates λpand λ(1-p), as shown in Figure 5.25.

Furthermore, it can be shown that the two processes are independent.

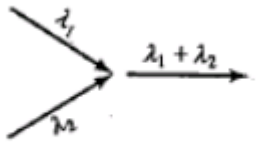


Figure 5.26 Pooled process.

C. Soultion: **Step1 :**

H0

: Ri~ Independently

H1

: Ri~is not independently

Step 2 :

Given random numbers=0.12, 0.01, 0.23, 0.28, 0.89, 0.31, 0.64, 0.28, 0.33, 0.93

N= Total numbers of random numbers=10

Step 3:

The sequence of runs up and runs down -, +, +, +, -, +, -, +, +

Total number of runs=R=6

Step 4 :

E(R) = (2N-1)/3

E(R) = (2*10-1)/3

E(R) = 19/3= 6.33

V(R) = (16N-29)/90

V(R) = (16*10-29)/90= 1.456

Z0

= [R - E(R)] / [V(R)]0. 5

Z0

= [10-6.33] / [1. 456]0. 5

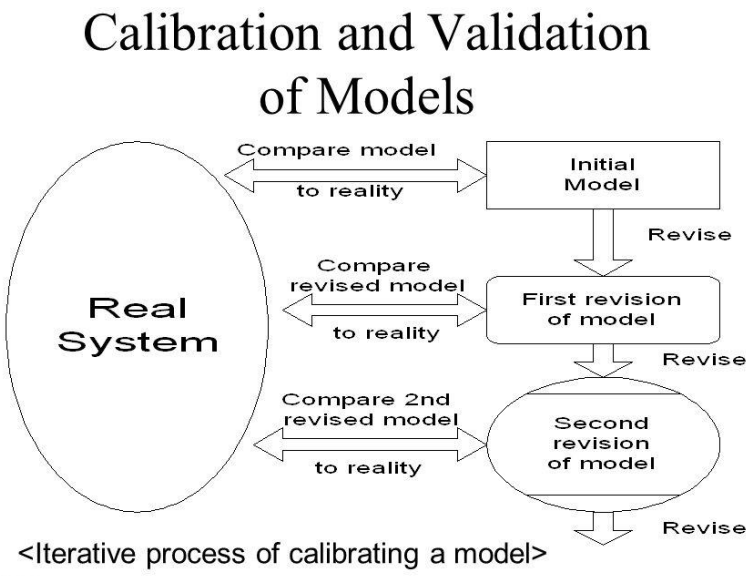
= 3.038

As Z0

lies in the shaded area, H0 is rejected.

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

A.



As an aid in the validation process, Naylor and Finger formulated a three-step approach which has been widely followed:

1. Build a model that has high face validity.
2. Validate model assumptions.
3. Compare the model input-output transformations to corresponding input output transformations for the real system.

Face Validity

- Construct a model that is reasonable on its face(ensure high degree of realism) to model users and experts without deep inspection or analysis.
- The potential users of model should be involved in:
- All phases from model's conceptualization to its implementation.
- Evaluation of model output for reasonableness.
- Identification of model deficiencies.

- User involvement also increases the model's perceived validity or credibility.
- Sensitivity analysis is another way available to check model's face validity.
- Here user checks if behavior of model changes in expected way with modification of input variables.
- In case of large-scale simulation models there are many input variables and possibly many sensitivity tests.
- If it is too expensive or time consuming to perform all of these tests, select the most critical ones.
- Objective scientific sensitivity test can be conducted if real system data are available for at least two setting of the input parameters.

B. address the following issues:

- Evaluating different machine and forklift-truck resource levels
- Sizing of work-in-process buffers
- Determining the impact of random machine downtimes
- Determining the effect of different logic for the forklift trucks

C. **Explanation of inventory system**

1. The Inventory System provides a complete set of methods to support inventory handling. All users of the Inventory System need the same functionality to complete their varied tasks.
2. The Inventory System allows you to:
    a. Remove items from inventory.
    b. Notify the store of a customer's intent to purchase an item that is not currently in stock. (back order)
    c. Notify the store of a customer's intent to purchase an item that has never been in stock. (pre order).

- The administrator of the store uses the inventory system to:

1. Place a specific number of items on a shelf for customers to purchase, backorder, or pre order.
2. Decrease the number of items available for purchase, back order, or pre order, perhaps because of an error in stocking the item.
3. Determine the number of items available for purchase, back order, or pre order.
4. Determine when a specific item will be back in stock.

   There are three types of costs that must be considered in setting inventory levels:

   Ordering Cost or Setup cost

5. Ordering costs are those fees associated with placing an order, including expenses related to personnel in purchasing department, communications, and the handling of related paper work.

6. Lowering these costs would be accomplished by placing small number of orders, each for a large quantity. Unlike carrying costs, ordering expenses are generally expressed as a monetary value per order.

   Holding or Carrying cost:

7. They are expenses such as storage, handling, insurance, taxes, obsolescence, theft, and interest on funds financing the goods.
8. These charges increase as inventory levels rise. To minimize carrying costs, management makes frequent orders of small quantities.
9. Holding costs are commonly assessed as a percentage of unit value, rather than attempting to derive monetary value for each of these costs individually.
10. This practice reflects the difficulty inherent in deriving a specific per unit cost, for example, obsolescence or theft.

Stock-out costs or shortage cost:

- They include sales that are lost, both short and long term, when a desired item is not available; the costs associated with back ordering the missing item; or expenses related to stopping the production line because a component part has not arrived.
- These charges are probably the most difficult to compute, but arguably the most important because they represent the costs incurred by customers when an inventory policy falters.
- Failing to understand these expenses can lead management to maintain higher inventory levels than customer requirements.

University of Mumbai

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 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.	In digital image of M rows and N columns and L discrete gray levels, calculate the bits required to store a digitized image for M=N=32 and L=8.
Option A:	16384
Option B:	4096
Option C:	8192
Option D:	3072
2.	Process of using known to estimate unknown is called
Option A:	interchange
Option B:	interpolation
Option C:	extrapolation
Option D:	estimation
3.	What is the set of pixels of 8-neighbors of pixel p at coordinates (x, y)?
Option A:	(x+1, y), (x-1, y), (x, y+1), (x, y-1), (x+2, y), (x-2, y), (x, y+2), (x, y-2)
Option B:	(x+1, y), (x-1, y), (x, y+1), (x, y-1), (x+1, y+1), (x+1, y-1), (x-1, y+1), (x-1, y-1)
Option C:	(x+1, y+1), (x+1, y-1), (x-1, y+1), (x-1, y-1), (x+2, y+2), (x+2, y-2), (x-2, y+2), (x-2, y-2)
Option D:	(x+2, y), (x-2, y), (x, y+2), (x, y-2), (x+2, y+2), (x+2, y-2), (x-2, y+2), (x-2, y-2)
4.	Name the filter that is best to remove salt and pepper noise?
Option A:	Low pass
Option B:	Sobel
Option C:	Median
Option D:	Laplacian
5.	Which of the following mask is used to sharpen images by subtracting a blurred version of original image from the original image itself?
Option A:	High pass
Option B:	low pass
Option C:	High boost
Option D:	median
6.	Image Thresholding is the example of
Option A:	similarity
Option B:	recognition

Option C:	discontinuity
Option D:	continuity
7.	Pixels are allocated to categories according to the range of values in which a pixel lies is called
Option A:	edge segmentation
Option B:	threshold segmentation
Option C:	null segmentation
Option D:	override segmentation
8.	A gradient operator for edge detection is
Option A:	Roberts
Option B:	Second order derivative
Option C:	Zero crossing operator
Option D:	Third order derivative
9.	Prewitt operator is not good to detect
Option A:	horizontal edges
Option B:	vertical edges
Option C:	cross edges
Option D:	diagonal edges
10.	Chess Board Distance is also called as
Option A:	D4
Option B:	Dm
Option C:	D8
Option D:	De
11.	Wavelet series equation is the sum of _____
Option A:	scaling and detail
Option B:	row and column inverse
Option C:	spatial and frequency mean
Option D:	row and summation detail along column
12.	Cosine transform is used in_____compression.
Option A:	EPS
Option B:	PNG
Option C:	JPEG
Option D:	TIFF
13.	Fourier transform of unit impulse at origin is
Option A:	0
Option B:	1
Option C:	undefined
Option D:	infinite
14.	Scaling vectors in discrete wavelet transform is taken as
Option A:	Heights
Option B:	Sharpness
Option C:	Intensity

Option D:	Weights
15.	Choose lossless statistical method example
Option A:	Run length encoding
Option B:	Huffman Encoding
Option C:	JPEG
Option D:	Improved Gray Scale Quantization
16.	When the human eye does not respond with equal intensity to all visual information is called
Option A:	Spatial redundancy
Option B:	Psycho visual redundancy
Option C:	Coding redundancy
Option D:	Temporal redundancy
17.	Which point processing technique can be used in Image Compression
Option A:	Dynamic Range Compression
Option B:	Contrast stretching
Option C:	Bit Plane slicing
Option D:	power law transform
18.	Which of the following transform is non sinusoidal in nature
Option A:	DCT
Option B:	Fourier
Option C:	Hadamard
Option D:	Wavelet
19.	Hit and Miss morphological transform is used for _____
Option A:	shape area detection
Option B:	shape edge detection
Option C:	shape enhancement
Option D:	shape detection
20.	Which binary operation is used to remove foreground pixels in an image
Option A:	thinning
Option B:	thickening
Option C:	opening
Option D:	closing

Q2 **(20 Marks)**	**Solve any Two Questions out of Three (10 marks each)**
A	Define digital image and explain chroma sub-sampling process in detail with example.
B	Equalize the given histogram. What happens if we equalize it twice, Justify. Gray Levels: 0, 1, 2, 3 No. of Pixels: 70, 20, 7, 3

C	Explain image segmentation and how to apply thresholding process to uneven illuminated images.

Q3. **(20 Marks)**	**Solve any Two Questions out of Three (10 marks each)**
A	Explain Hadamrd and Fast Hadamard Transform.
B	A source emits four symbols{a,b,c,d} with the probabilities 0.4,0.2, 0.1, and 0.3 respectively. Construct arithmetic coding to encode the word "dad"
C	Describe Opening and Closing morphological operators with example.

University of Mumbai

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 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.	**C**
Q2.	**B**
Q3.	**B**
Q4	**C**
Q5	**C**
Q6	**A**
Q7	**B**
Q8.	**B**
Q9.	**D**
Q10.	**C**

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

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

A]- Define digital image and explain chroma sub-sampling process in detail with example.

Answer

Definition of Image and representation – 2 Marks

Explanation of chroma sub-sampling process – 8 Marks

B]- Equalize the given histogram. What happens if we equalize it twice, Justify.

Gray Levels	0	1	2	3
No. of Pixels	70	20	7	3

Answer

Original Histogram and Equalized Histogram graphs – 2 Marks

6 Marks

Gray Level	No. of Pixels	PDF	Sk=CDF	Sk* 3	Rounding Off
0	70	0.7	0.7	2.1	2
1	20	0.2	0.9	2.7	3
2	7	0.07	0.97	2.91	3
3	3	0.03	1	3	3

n=100

Equalized Histogram

New Gray Level	No. of Pixels
0	0
1	0
2	70
3	30

Justification – 2 Marks

C]- Explain image segmentation and how to apply thresholding process to uneven illuminated images.

Answer

Image segmentation definition – 2 Marks

Thresholding process to uneven illuminated images explanation – 8 Marks

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

A]- Explain Hadamrd and Fast Hadamard Transform.

Answer

Hadamard Transform explanation – 5 Marks

Fast Hadamard Trasform Explanation – 5 Marks

B]- A source emits four symbols{a,b,c,d} with the probabilities 0.4,0.2, 0.1, and 0.3 respectively. Construct arithmetic coding to encode the word "dad"

Answer

Encoding of word "dad" using arithmetic coding – 10 marks

C]- Describe Opening and Closing morphological operators with example.

Answer

Explanation of Opening operation with example – 5Marks

Explanation of Closing operation with example – 5 Marks

University of Mumbai

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

Program: **SEMVII 2012 Scheme CBSGS**

Curriculum Scheme: Rev2012

Examination**: VII**

Course Code: **CPE7024** and Course Name: **Software Architecture**

Time: 2 hours Max. Marks: 80

1501_R12_Comp_VII_CPE7024_QP2

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Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	**A software system's architecture is (Simple)**
Option A:	The set of principal design decisions made about the system.
Option B:	The set of main decisions during software design
Option C:	The set of activities in software design
Option D:	The set of conclusions made about system in software design
2.	**Which of the following statements is true about software connector(Difficult)**
Option A:	A software connector is an design element tasked with effecting and regulating interactions among components.
Option B:	A software element which interact which each other
Option C:	A software components which communicate with each other.
Option D:	A software connector is an architectural element tasked with effecting and regulating interactions among components.
3.	**Which of the following is an architectural style rather than a pattern ?(Simple)**
Option A:	State-Logic-Controller
Option B:	Layered System
Option C:	State-compute-control
Option D:	Model-View-Controller
4.	**Architectural drift is the process of allowing**
Option A:	The design to deviate from the system's requirement
Option B:	The implementation to deviate from the system's requirements
Option C:	The implementation to deviate from the system's design
Option D:	The implementation of a program diverges from the initial design and requirement.
5.	**The disadvantage of Object Oriented Design (OOD) is(M)**
Option A:	It limits the creativity of the software architect
Option B:	It is not good performer when high performance is required.
Option C:	It does not take into account the vast body of non OO code.
Option D:	Object oriented uses more specific notations

6.	**What are disadvantages of Model view controller(M)**
Option A:	MVC segregates your project into a different segment, and it becomes easy for developers to work on
Option B:	The model pattern is little complex and Multiple technologies knowledge is required
Option C:	It is easy to edit or change some part of your project that makes project less development and maintenance cost
Option D:	MVC makes your project more systematic
7.	**Which of the following is an architectural pattern rather than a style ?(S)**
Option A:	Pipes and filters
Option B:	Model-view-controller
Option C:	Blackboard
Option D:	Virtual Machines
8.	**Which of the following is NOT an example of a software connector ?(S)**
Option A:	Procedure call
Option B:	Network socket
Option C:	Event Connectors
Option D:	Data Access Connectors
9.	**Mapping Problem is related to _____(S)**
Option A:	Software Design
Option B:	Software Modelling
Option C:	Software Analysis
Option D:	Software Implementation
10.	**Which is Not Analysis Goal?(S)**
Option A:	Completeness
Option B:	Consistency
Option C:	Complexity
Option D:	Compatibility
11.	**Full form of ATAM is(S)**
Option A:	Architectural Trade-Off Analysis Method
Option B:	Architectural Trent Analysis Method
Option C:	Architectural trade-of modelling Method
Option D:	Analysis trade-off architectural Method
12.	**REST is following type of Decentralized Architecture Style(M)**
Option A:	Distributed and Networked Architectures.
Option B:	Architectures for Network-Based Applications.
Option C:	Decentralized Architectures.
Option D:	Service-Oriented Architectures and Web Services.

13.	**Which is Non-Functional property of software Architecture(S)**
Option A:	Maintainability
Option B:	Portability
Option C:	Robustness
Option D:	Dependability
14.	**Which Statement is most suitable Pipe and filters Architectural Style (M)**
Option A:	They simplify systems maintenance and enhance its reuse
Option B:	They interact with the environment in limited ways
Option C:	Interactive applications are encouraged by the style
Option D:	They emphasize on incremental transformation of data by successive components
15.	**Which of the following statements best captures the relationship between Domain Specific Software Architectures (DSSAs) and architectural styles ?(D)**
Option A:	DSSAs have narrower scope, but encapsulate deeper knowledge
Option B:	DSSAs have narrower scope, but encapsulate shallower knowledge
Option C:	DSSAs have broader scope, but encapsulate shallower knowledge
Option D:	DSSAs have broader scope, but encapsulate deeper knowledge
16.	**Dimensions of Dependability are (D)**
Option A:	Usability, Reliability, Security, Flexibility
Option B:	Availability, Reliability, Maintainability, Security
Option C:	Availability, Rel1iability, Security, Safety
Option D:	Security, Safety, Testability, Usability
17.	1.A model is **accurate** — a. if it is open to more than one interpretation. 2. A model is **precise** — b. if it is correct, conforms to fact, or deviates from correctness within acceptable limits. 3. A model is **ambiguous** — c. if it is specific, detailed, and exact **Select the correct match(M)**
Option A:	1-a, 2-b,3-c
Option B:	1-c, 2-b,3-a
Option C:	1-b,2-c,3-a
Option D:	1-b,2-a,3-b
18.	**DSSE combines understanding from three principal areas(S)**
Option A:	Domain, Business goals, Technology
Option B:	Domain, software, Technology
Option C:	Domain, programming, Customer
Option D:	Domain, software, Engineering
19.	**A domain-specific software architecture (DSSA) comprises(M)**
Option A:	Reference architecture, component library, application configuration
Option B:	Domain Model, Topology, Architecture Diagram,
Option C:	Reference architecture, Software design, Application configuration
Option D:	Reference architecture, Software design, Domain Model

20.	**Design decisions encompasses(M)**
Option A:	Design decisions related to system structure, behavior, interaction, nonfunctional properties, implementation
Option B:	Design decisions related to system structure, model, communication, nonfunctional properties, topology.
Option C:	Design decisions related to system structure, behavior, interaction, nonfunctional properties, implementation
Option D:	Design decisions related to system structure, visualization, interaction, functional properties, implementation

Option 3

Q2. **(20 Marks Each)**	
A	**Solve any Two** **5 marks each**
i.	Differentiate between software Architectural and Software Design
ii.	What is the relationship between DSSA and Product line.
iii.	Explain design issues for NFPs: Complexity, Heterogeneity
B	**Solve any One** **10 marks each**
i.	**Define and explain with example** • Prescriptive Architecture • Descriptive Architecture • Architectural Degradation • Architectural Recovery
ii.	Using appropriate example, any two-architecture style.
Q3. **(20 Marks Each)**	
A	**Solve any Two** **5 marks each**
i.	What do you mean by Architectural degradation? Explain architectural drift and architectural degradation?
ii.	What is the difference between Architectural styles & Architectural patterns.
iii.	Explain Lightweight C2 framework.
B	**Solve any One** **10 marks each**
i.	What is a mapping problem in implementation? Differentiate between one way and round trip mapping.
ii.	Explain Domain Specific Software Architecture with suitable example

University of Mumbai

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

Program: **SEMVII 2012 Scheme CBSGS**

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: **CPE7024** and Course Name: **Software Architecture**

Time: 2 hour Max. Marks: 80

1501_R12_Comp_VII_CPE7024_AK2

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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	D
Q5	B
Q6	B
Q7	B
Q8.	B
Q9.	D
Q10.	C
Q11.	A
Q12.	B
Q13.	D
Q14.	D
Q15.	D
Q16.	C
Q17.	C
Q18.	A
Q19.	A
Q20.	C

Q2. (total-20 Marks)

Model Answer: A

i) Brief ---------- 1 marks

Atleast 4 point ---------- 4 marks

ii) full name of DSSA ---------- 1marks

atleast 2 relations ---------- 2marks

iii) Issues on each ----------2.5 marks each

Model Answer: B

i) Definition with example of each ---------- 2.5 marks

ii) Diagram of each ---------- 2 marks each

Explanations in details ---------- 3 marks each

Q3. Total-20 Marks

Model Answer: A

i) Meaning ---------- 1 mark

brief architecture drift ---------- 2 mark

brief architecture degradation ---------- 2 mark

ii) At least 02 difference ---------- 4 marks

Brief meaning ---------- 1 marks

iii) Brief of framework ---------- 1 mark

C2 lightweight details ---------- 4 mark

Model Answer: B

i) Difference at least 03 ---------- 2 marks each

Brief detail ---------- 4 marks

ii)Brief details ---------- 6 marks

example ---------- 4 marks

University of Mumbai

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2012

Examination: BE Semester VII

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

Time: 2 hour Max. Marks: 80

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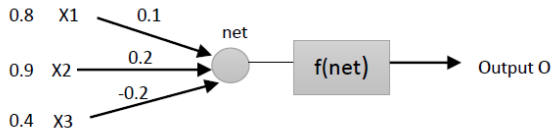
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1	Following is not a soft computing technique
Option A:	Fuzzy Computing
Option B:	Artificial Intelligence
Option C:	Quick sort and Merge sort algorithm
Option D:	Genetic Algorithm
2	Learning means
Option A:	Temporary change in structure
Option B:	Temporary change in behavior
Option C:	Permanent change in structure
Option D:	Permanent change in behavior
3.	Perceptron is used for
Option A:	Continuous input
Option B:	Binary input
Option C:	Continuous and binary both
Option D:	Analog input
4.	Following is an unsupervised algorithm in neural network
Option A:	Hebbian learning
Option B:	Perceptron learning rule
Option C:	Delta learning rule
Option D:	Back Propagation algorithm.
5.	Following is NOT present in Single Layer feedforward network,
Option A:	Weights
Option B:	Input layer
Option C:	Output layer
Option D:	Hidden layer
6.	Which basic logical operation not linearly separable
Option A:	XOR
Option B:	AND
Option C:	OR
Option D:	NOT

7.	Widrow Hoff learning is
Option A:	Continuous input
Option B:	Binary input
Option C:	Continuous and binary both
Option D:	Independent of activation functions
8.	Core of a fuzzy membership function is
Option A:	Where incomplete membership values present
Option B:	Where complete membership values present
Option C:	Where values 0.5 is present
Option D:	Where values 0 is present
9.	Following is NOT fuzzification method
Option A:	Intuition
Option B:	Inference
Option C:	Rank Ordering
Option D:	Weighted Average
10.	Alpha cut is defined as
Option A:	Crisp value whose membership value greater than or equal to alpha
Option B:	Crisp value whose membership value greater than alpha
Option C:	Crisp value whose membership value less than or equal to alpha
Option D:	Crisp value whose membership value less than alpha
11.	Following is NOT a Defuzzification method
Option A:	Center of sums
Option B:	Max membership principle
Option C:	Rank Ordering
Option D:	Weighted Average
12.	In Membership function Y-axis is
Option A:	degrees of membership in the [-1, 1] interval
Option B:	degrees of membership in the [0, 1] interval
Option C:	degrees of membership in the [-1, 0, 1] interval
Option D:	degrees of membership in the [0, infinity] interval
13.	Fuzzy logic is a tool used for
Option A:	Handling hard computing values
Option B:	Handling imprecision in data
Option C:	Handling precise data
Option D:	Handling binary data
14.	_____ of bit involves changing bits from 0 to 1 and 1 to 0
Option A:	Mutation
Option B:	Crossover
Option C:	Selection
Option D:	Segregation

15.	_____ is a way of representing individual genes
Option A:	Conversion
Option B:	Encoding
Option C:	Coding
Option D:	Decoding
16.	The mutation operator that takes genome and inverts it's bits is
Option A:	Flip
Option B:	Boundary
Option C:	Uniform
Option D:	Gaussian
17.	_____is a derivative-free heuristic method for multidimensional function optimization.
Option A:	Simulated Annealing.
Option B:	Genetic Algorithm
Option C:	Random search
Option D:	Downhill simplex search
18.	Following can not be derived
Option A:	Derivative Free Optimization
Option B:	Derivative Based Optimization
Option C:	Derivative
Option D:	Optimization
19.	Total layers present in ANFIS architecture is
Option A:	7
Option B:	6
Option C:	5
Option D:	4
20.	CANFIS stands for
Option A:	Collective Neuro Fuzzy Inference System
Option B:	Cooperative Neuro Fuzzy Inference System
Option C:	Coactive Neuro Fuzzy Inference System
Option D:	Creative Neuro Fuzzy Inference System

Q2.	**Solve <u>any Four</u> out of Six** **(5 marks each)**
A	Differentiate between hard computing and soft computing.
B	How derivative free optimization techniques are different than derivative based optimization techniques? Explain classical Newton's method of optimization.
C	Explain Architecture of ANFIS with a neat diagram.

D	Explain following terms with respect to Genetic algorithm using suitable example 1) Crossover 2) Mutation 3) Inversion 4) Deletion
E	Given X = (X1,X2) , Y =(Y1,Y2,Y3) and Z =(Z1 , Z2). Let R1 be relation from X to Y and R2 be the relation from Y to Z. Find (1) Max-Min composition of R1 and R2 (2) Max-Product composition of R1 and R2. R1: X1 (0.5, 0.4, 0), X2 (0.3, 0.8, 0.1) R2: Y1 (0.2, 0.7), Y2 (0.3, 0.8), Y3 (1, 0)
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. 

Q3.	**Solve <u>any Two</u> Questions out of Three (10 marks each)**
A	Design a fuzzy controller to control the feed amount of purifier for the water purification plant. Raw water is purified by injecting chemicals. Assume input as water temperature and grade of water, output as amount of purifier. Use three descriptors for each of the input and output variables. Design rules to control action and defuzzification. Design should be supported by figures whenever necessary. Clearly indicate that when temperature is low, grade is low then chemical used is in large amount.
B	Explain perceptron learning algorithm and implement OR function using perceptron network for bipolar inputs and targets.
C	Explain all the steps involved in Genetic algorithm with the help of flowchart.

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University of Mumbai

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 2021

Program: **Computer Engineering**

Curriculum Scheme: Rev2012

Examination: BE Semester VII

Course Code: CPE7025 and Course Name: Soft Computing

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.	C
Q2.	D
Q3.	B
Q4.	A
Q5.	D
Q6.	A
Q7.	D
Q8.	B
Q9.	D
Q10.	A

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

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

Q2.	**Solve any Four out of Six** **(5 marks each)**
A	**Differentiate between hard computing and soft computing.** *Marking Scheme:* At least Five differences expected, 1M for each difference.
B	**How derivative free optimization techniques are different than derivative based optimization techniques? Explain classical Newton's method of optimization.** *Marking Scheme:*

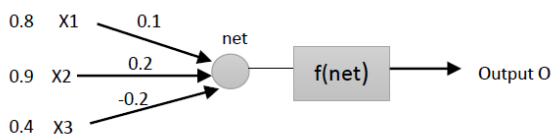
<table>
<tr><td></td><td>Difference between derivative based and derivative free optimization techniques (at least two points) [2M]
Explanation of Classical Newton's method [3M]</td></tr>
<tr><td>C</td><td>Explain Architecture of ANFIS with a neat diagram.

<u>Marking Scheme:</u>
Correct Architecture diagram of ANFIS [3M]
Proper Explanation of each layer [2M]</td></tr>
<tr><td>D</td><td>Explain following terms with respect to Genetic algorithm using suitable example
1) Crossover
2) Mutation
3) Inversion
4) Deletion

<u>Marking Scheme:</u>
Crossover[2M]
Mutation[1M]
Inversion[1M]
Deletion[1M]</td></tr>
<tr><td>E</td><td>Given X = (X1,X2) , Y =(Y1,Y2,Y3) and Z =(Z1 , Z2). Let R1 be relation from X to Y and R2 be the relation from Y to Z. Find (1) Max-Min composition of R1 and R2 (2) Max-Product composition of R1 and R2.

<table>
<tr><td>R1</td><td>Y1</td><td>Y2</td><td>Y3</td></tr>
<tr><td>X1</td><td>0.5</td><td>0.4</td><td>0</td></tr>
<tr><td>X2</td><td>0.3</td><td>0.8</td><td>0.1</td></tr>
</table>
<table>
<tr><td>R2</td><td>Z1</td><td>Z2</td></tr>
<tr><td>Y1</td><td>0.2</td><td>0.7</td></tr>
<tr><td>Y2</td><td>0.3</td><td>0.8</td></tr>
<tr><td>Y3</td><td>1</td><td>0</td></tr>
</table>

<u>Marking Scheme:</u>
1) Max-Min solution (2.5M)
2) Max-Product Solution (2.5M)
Solution:
1) Max-min composition
<table>
<tr><td>0.3</td><td>0.5</td></tr>
<tr><td>0.3</td><td>0.8</td></tr>
</table>
2) Max-Product composition
<table>
<tr><td>0.12</td><td>0.35</td></tr>
<tr><td>0.24</td><td>0.64</td></tr>
</table></td></tr>
<tr><td>F</td><td>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.</td></tr>
</table>

	 *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	**Design a fuzzy controller to control the feed amount of purifier for the water purification plant. Raw water is purified by injecting chemicals. Assume input as water temperature and grade of water, output as amount of purifier. Use three descriptors for each of the input and output variables. Design rules to control action and defuzzification. Design should be supported by figures whenever necessary. Clearly indicate that when temperature is low, grade is low then chemical used is in large amount.** *Marking Scheme:* Step 1: Identify input/output variables and defining descriptors. [2M] Step2: Fuzzification [2M] Step3: Form Rule base [2M] Step 4: Rule Evaluation [2M] Step 5: Defuzzification [2M]
B	**Explain perceptron learning algorithm and implement OR function using perceptron network for bipolar inputs and targets.** *Marking Scheme:* Explanation of perceptron learning algorithm [3M] Implementation of OR function [7M]
C	**Explain all the steps involved in Genetic algorithm with the help of flowchart.** *Marking Scheme:* Give two marks for Explanation of Each step (Initial population - 2M , Evaluation of individual fitness - 2M, Selection - 2M, crossover - 2M, Mutation - 2M)

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University of Mumbai

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 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

Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Complete the sentence: MRP-II systems provide_____.
Option A:	Information that can be used for other company functions
Option B:	Accurate inventory information.
Option C:	Information that is useful to all functional areas and encourage cross-functional interaction.
Option D:	Information with cost data.
2.	The _____ and _____ manage the supplier relations, monitor the vendor activities and manage the supplier quality in an organization.
Option A:	Supplier management, customization processes
Option B:	Supplier maintenance, control processes
Option C:	Supplier management, control processes
Option D:	Supplier maintenance, customization processes
3.	Which of the following statements about radio frequency identification (RFID) is not true?
Option A:	RFID systems transmit radio signals over long distances.
Option B:	Companies may be required to upgrade hardware and software to accommodate the massive amounts data that are being produced by RFID systems.
Option C:	RFID systems provide a powerful technology for tracking the movement of goods throughout the supply chain.
Option D:	RFID systems use tiny tags with embedded microchips containing data about an item and its location.
4.	Financial Management is mainly concerned with_____
Option A:	Efficient Management of every business
Option B:	All aspects of acquiring and utilizing financial resources for firms' activities.
Option C:	Profit maximization
Option D:	Arrangement of funds
5.	A data warehouse is a collection of _____ that is critical to the successful execution of enterprise initiatives.
Option A:	Raw Data
Option B:	Tables
Option C:	Computer Based Information

Option D:	Reports
6.	Who are the primary 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:	Only Customers
7.	An agile supply chain takes care of:
Option A:	Either demand or supply uncertainty.
Option B:	A high level of both demand and supply uncertainty
Option C:	A high level of supply disruptions/uncertainty.
Option D:	A high level of demand uncertainty.
8.	Enterprise Application Integration (EAI) is the use of _____ over an enterprise to start the alliance of hardware systems and software applications.
Option A:	Technology
Option B:	Application
Option C:	Services and technologies
Option D:	Process
9.	Which of the following is not a supply chain requirement?
Option A:	Marketing
Option B:	Planning
Option C:	Sales force automation
Option D:	Returns
10.	Identify the right answer. The two major objectives of Human Resources are: 1. To provides instant updates of information. 2. To make the workflow cost effective. 3. To help senior management taking strategic decision. 4. To provide self-service benefits to the employees.
Option A:	2,3
Option B:	4,1
Option C:	2,4
Option D:	1,3
11.	The reengineering team must consider _____ in the redesign of a process.
Option A:	All resources.
Option B:	Existing System
Option C:	Legacy System
Option D:	All process stakeholders
12.	Data mining is a powerful new technology to _____ from large databases.
Option A:	Retrieving data.
Option B:	Generating reports
Option C:	Show result
Option D:	Extraction of hidden predictive information

13.	The primary concept of _____ is that storing huge amount of data.
Option A:	Data mining
Option B:	Supply chain management.
Option C:	Data warehousing
Option D:	OLAP
14.	Which system provides the foundation for creating concurrent business processes across the supply chain and achieving Return on Assets (ROA) improvement?
Option A:	Inventory
Option B:	Manufacturing
Option C:	Sales
Option D:	Finance
15.	The _____ approach emphasizes the human element of necessary change within organizations.
Option A:	Business Process Reengineering
Option B:	Data mining.
Option C:	Data warehousing
Option D:	OLAP
16.	The purpose of supply chain management is to_____.
Option A:	increase the production level
Option B:	manage and integrate supply and demand management
Option C:	enhance the quality of a product and services
Option D:	provide satisfaction to the customer
17.	_____ provides planning, scheduling and control of facilities and equipment.
Option A:	HR module
Option B:	Sales and distribution
Option C:	Finance
Option D:	Plant maintenance control
18.	An enterprise is a group of people with _____.
Option A:	Separate goal for each department.
Option B:	Multiple Goal
Option C:	Common Goal
Option D:	Two or more goals.
19.	What is the strategy of package evaluation?
Option A:	Accept with error
Option B:	Do it right the first time.
Option C:	Take it as a trial
Option D:	Trial and error
20.	Which of the following is not true with respect to ‘CRM module’?
Option A:	Implementing a CRM strategy is advantageous to both small-scale and large-scale business ventures.
Option B:	CRM exchange transactions with other modules.

Option C:	CRM stores information about customers which includes determining the requirements of high-value customers.
Option D:	CRM stores information about customers which includes determining the requirements of low-value customers.

Q2 (20 Marks)	**Solve any Four out of Six** **5 marks each**
A	Write a short note on: EAI
B	Discuss the various business modules of an ERP system
C	Exemplify any two technologies used in SCM
D	How SCM benefits in Newspaper distribution
E	Illustrate Business Process Re-Engineering (BPR) in detail.
F	Explain need and structure of ERP.

Q3. (20 Marks)	**Solve any Two Questions out of Three** **10 marks each**
A	Illustrate the importance of post implementation phase of ERP systems
B	Discuss the mathematical model of SCM.
C	Explain vehicle routing with suitable current online example such as OLA cab etc. by focusing on its scenario.

University of Mumbai

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

Examinations Commencing from 23rd December 2020 to 6th January 2021 and from 7th January 2021 to 20th January 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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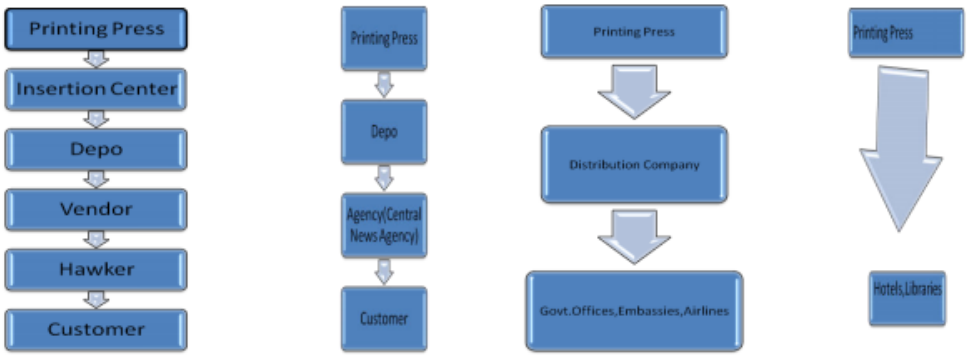
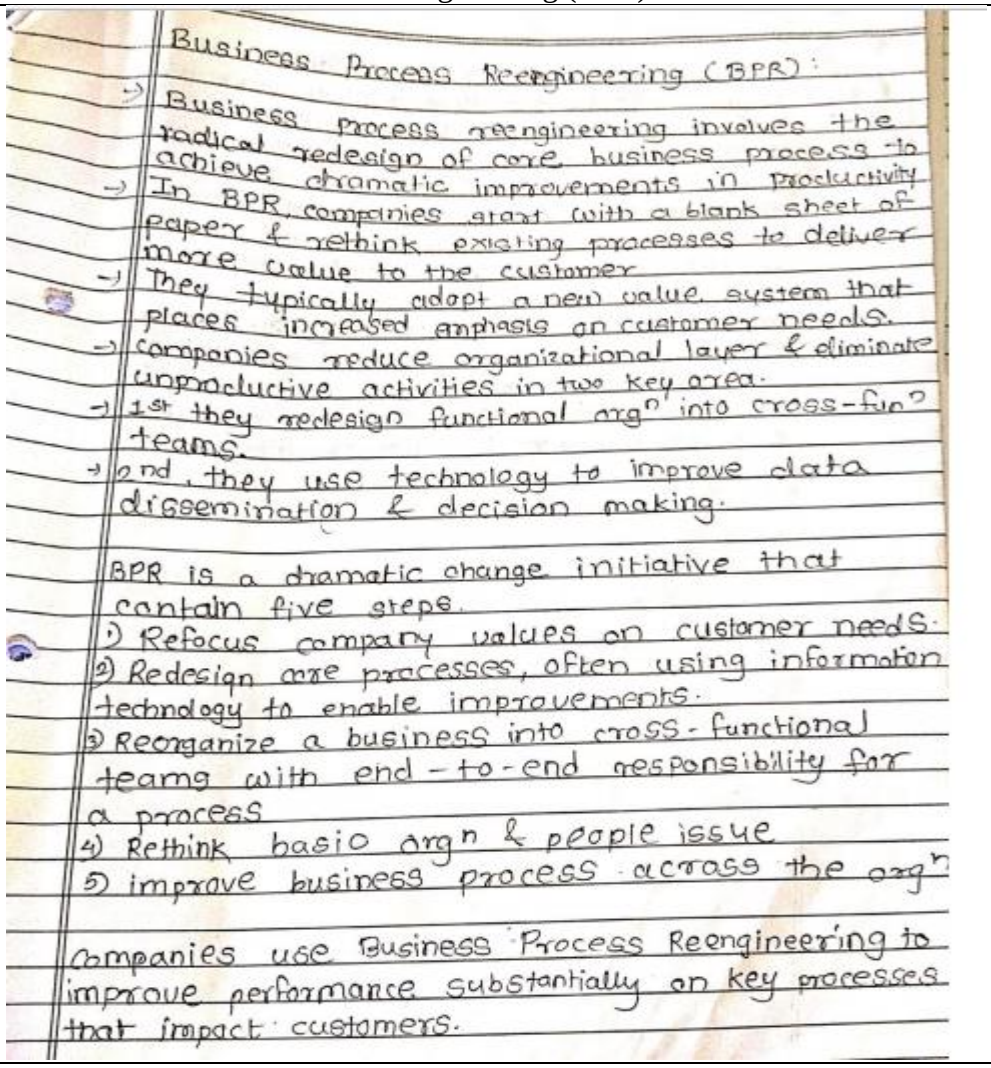
Q1. Choose the correct option for following questions. All the Questions are compulsory and carry equal marks

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

Q2 (20 Marks)	**Solve any Four out of Six** **5 marks each** **Explaination-3marks, Application-2marks**
A	Write a short note on: EAI
Ans	Enterprise application integration (EAI) is the task of uniting the databases and workflows associated with business applications to ensure that the business uses the information consistently and that changes to core business data made by one application are correctly reflected in others. Enterprise application integration (EAI) is the use of software and computer systems' architectural principles to integrate a set of enterprise computer applications Enterprise application integration is an integration framework composed of a collection

	of technologies and services which form a middleware to enable integration of systems and applications across an enterprise. Many types of business software such as supply chain management applications, ERP systems, CRM applications for managing customers, business intelligence applications, payroll and human resources systems typically cannot communicate with one another in order to share data or business rules. For this reason, such applications are sometimes referred to as islands of automation or information silos. This lack of communication leads to inefficiencies, wherein identical data are stored in multiple locations, or straightforward processes are unable to be automated. Enterprise application integration is the process of linking such applications within a single organization together in order to simplify and automate business processes to the greatest extent possible, while at the same time avoiding having to make sweeping changes to the existing applications or data structures. Applications can be linked either at the back-end (database) or the front-end. EAI can be used for different purposes: • Data integration: Ensures that information in multiple systems is kept consistent. This is also known as enterprise information integration (EII). • Vendor independence: Extracts business policies or rules from applications and implements them in the EAI system, so that even if one of the business applications is replaced with a different vendor's application, the business rules do not have to be re-implemented. • Common facade: An EAI system can front-end a cluster of applications, providing a single consistent access interface to these applications and shielding users from having to learn to use different software packages. • EAI (enterprise application integration) refers to the plans, methods, and tools aimed at modernizing, consolidating, and coordinating the computer applications in an enterprise. Typically, an enterprise has existing legacy applications and databases and wants to continue to use them while adding or migrating to a new set of applications that exploit the Internet, e-commerce, extranet, and other new technologies. EAI may involve developing a new total view of an enterprise's business and its applications, seeing how existing applications fit into the new model, and then devising ways to efficiently reuse what already exists while adding new applications and data.
B	Discuss the various business modules of an ERP system
Ans	1.Human Resource 2.Finance/Accounts 3.Manufacturing 4.Sales and Distribution 5.Marketing 6.Production
C	Exemplify any two technologies used in SCM
Ans	Explanation with example about any two of the below topics: 1. EDI 2. Intranet/ Extranet 3. Data mining/ Data Warehousing/ Data Mart

	4. E-Commerce 5. E- Procurement 6. Bar coding/ QR Coding 7. RFID
D	How SCM benefits in Newspaper distribution
Ans	(STUDENTS MAY WRITE IN THEIR OWN WORDS)Model Answer may include the explanation about the following supply chain channels: 
E	Illustrate Business Process Re-Engineering (BPR) in detail.
Ans	

Business Process Reengineering Can:

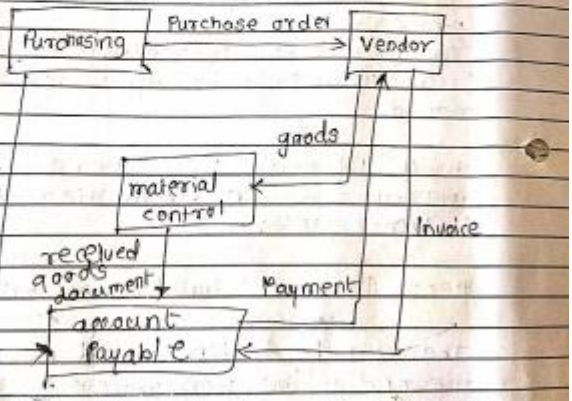
1. Reduce costs & cycle time: BPR to improve reduce costs & cycle times by eliminating unproductive activities & the employee who perform them. Reorg^{n} by teams decreases the need for management layers, accelerates information flows, & eliminates the errors & mlw caused by multiple handoffs.

2. Improve quality: BPR improve quality by reducing the fragmentation of work & establishing clear ownership of processes. workers gain responsibility for their o/p & can measure their performance based on prompt feedback.

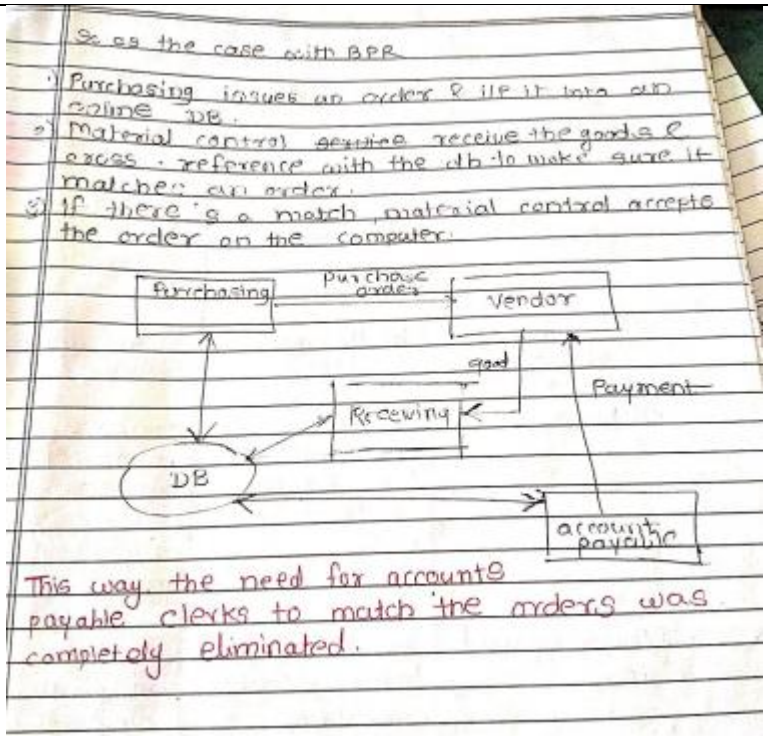
eg. BPR example.

They analyze the current system, & found out that it worked as follows:

1) When the purchasing department would write a purchase order, they sent a copy to accounts payable.
2) Then, the material control would receive the goods & send a copy of the related document to account payable.
3) At the same time, the vendor would send a receipt for the goods to accounts payable.



Then, the clerk at the account payable department would have to match the 3 orders & if they match, he or she would issue the payment. This took a lot of manpower in the department.

	
F	Explain need and structure of ERP.
Ans	* Structure of ERP :- → ERP system are fully integrated, enterprise wide business appl^{n} with not only a complete set of traditional modules such as accounting, human resources management, sales & distribution & manufacturing, but they also provide extensions such as scm, data warehouse & CRM. → The structure of ERP is composed of 4 levels which is shown in fig: N/w level : it is the infrastructure of the system which makes the information flow both internal & external enterprise flows Page No.

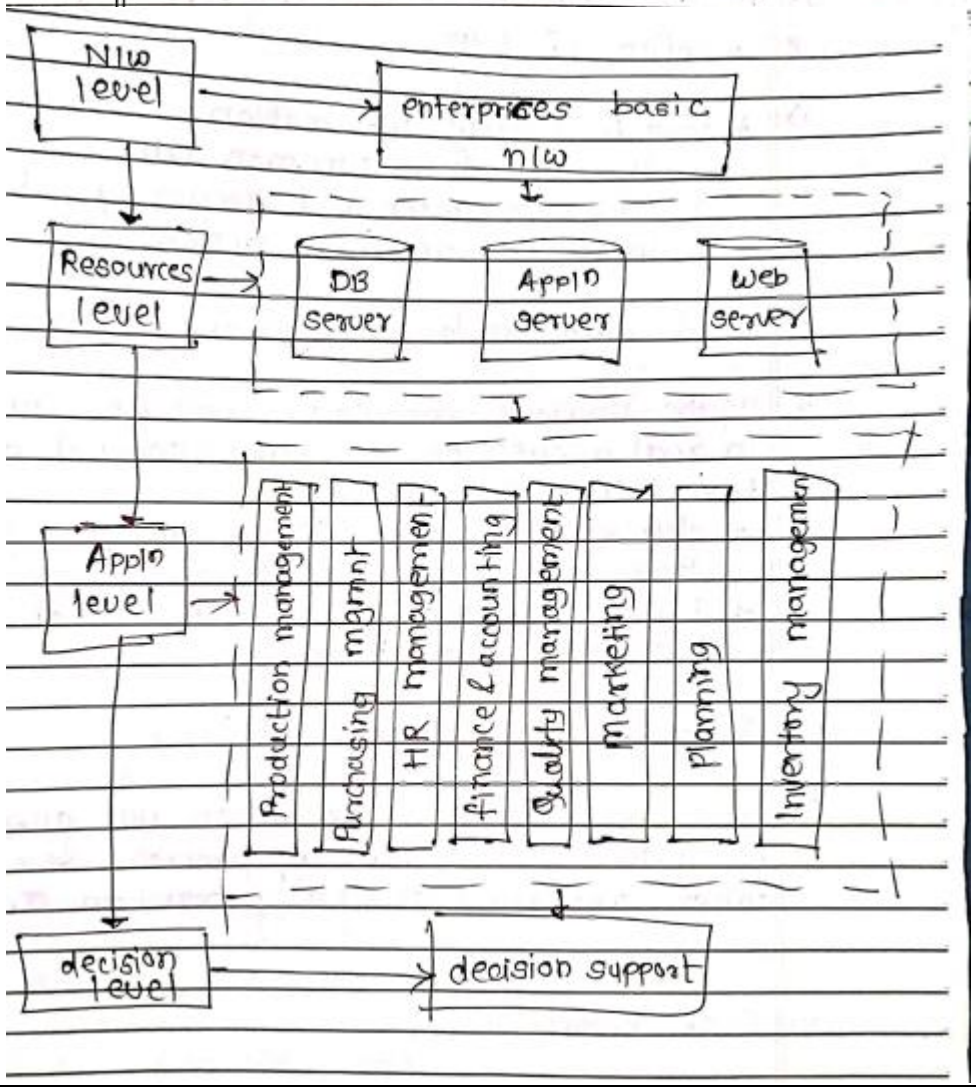
smoothly through the n|w

2) Resource level : it include h|w, s|w & data needed by ERP system.

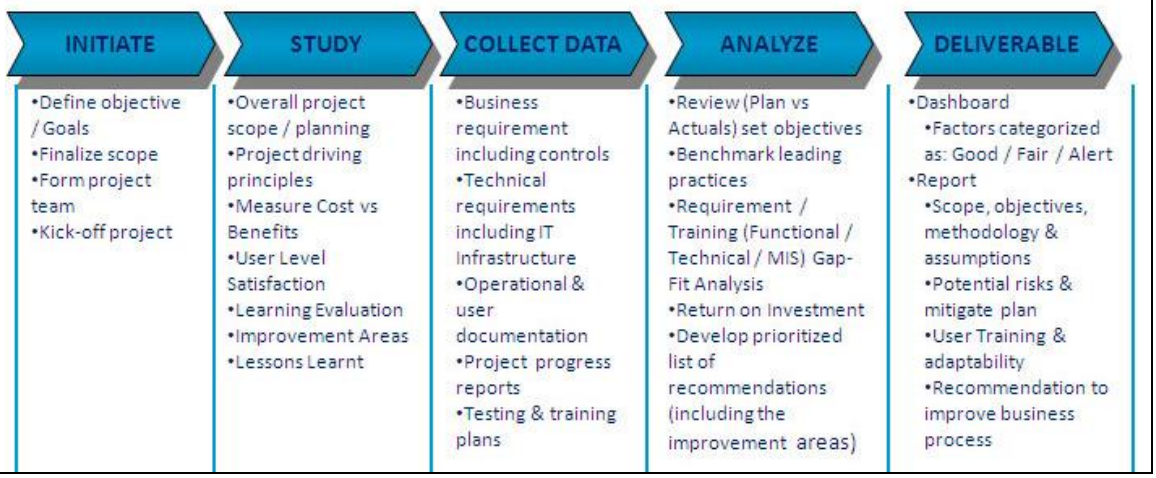
3) Appln level : it contains different subsystem used by the personnel in diff sections in an enterprise.
Through these subsystem, management provides ERP with the data resources or obtains the required information.

4) decision support level :

→ employing models & methods, mgmt process data or information for decision making
→ The choice of information system, for which many options exist, must be driven by & closely aligned with, the broader framework of competitive positioning decisions.



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

(20 Marks)	
A	Illustrate the importance of post implementation phase of ERP systems
Ans	ERP Post-Implementation Audit (PIA) is done after completion of the ERP Implementation Project. This would help organization to realize the complete benefits from its ERP Investment. PIA purpose is to evaluate whether project objectives were met, to determine how effectively the project was run, to learn lessons for the future, and to ensure that the organization gets maximum possible benefit from the project. A forward-looking audit can discover many tips and strategies for improvement. PIA should be conducted after the ERP system has reached a relative stage of maturity, and once business process change caused by the ERP truly takes effect on the organization. PIA would assist organization to effect needed changes in organizational plans & processes and realize potential operational & strategic benefits. In case of an initial ERP project failure, an important role of PIA is to redefine and/or limit the scope of the ERP project, and promote learning & system acceptance through user training and stakeholder commitment to the ERP project. Weaknesses identified during the audit, due to lack of controls, poor implementation processes, non-mitigation of associated risks to acceptable levels, should be brought to the attention of the concerned responsible for corrective action. Follow up activity after PIA can be categorized into following stages: • Steps to overcome productivity downside by redefining jobs / roles, establishing new practices, fine-tuning ERP system, and owning of the new information series created by ERP. • ERP functionality enhancements involve skills development, structural changes, process integration and add-ons • Involve business transformation, where the synergies of people, processes, and technology can reach their peak. • Audit outcomes would then be used to resolve problems in these stages and push the organization upwards to realize additional system benefits. ERP Post Implementation Audit – Project Methodology 

	ERP POST IMPLEMENTATION AUDIT COMPONENTS
B	Discuss the mathematical model of SCM.
Ans	Listing of Models 2 Marks Explanation with example 8 Marks 1.Model for Vendor Analysis 2.Vehicle Routing Algorithm 3.Make Vs Buy Model
C	Explain vehicle routing with suitable current online example such as OLA cab etc. by focusing on its scenario.
Ans	Explanation of vehicle routing algo 4 marks Application w.r.t OLA 6 marks The VRP concerns the service of a delivery company. How things are delivered from one or more depots which has a given set of home vehicles and operated by a set of drivers who can move on a given road network to a set of customers. It asks for a determination of a set of routes, S, (one route for each vehicle that must start and finish at its own depot) such that all customers' requirements and operational constraints are satisfied and the global transportation cost is minimized. This cost may be monetary, distance or otherwise. The road network can be described using a graph where the arcs are roads and vertices are junctions between them. The arcs may be directed or undirected due to the possible presence of one way streets or different costs in each direction. Each arc has an associated cost which is generally its length or travel time which may be dependent on vehicle type. Ola app works: 1.Once a user gets registered, upon login, there is an option where the App instantly detects the location of the user via GPS. 2.The customer has to enter the drop location. The App shows different categories of cabs along with their price. Now, the customer can choose a taxi as per their requirements & preferences. 3.After this, the customer's request is sent to the driver. 4.As soon as a driver accepts the request, a confirmation message with details of the driver is being sent to the customer via message or mail. 5.He driver picks up the customer from the pickup location and completes the ride by dropping off the customer at the requested location. There are multiple payment options like-Cash, Ola Money, Debit/ Credit Card, UPI Payments, and much more. In share ride :- Every cab has GPS tracking device which always send its location to ola/uber service provider. Ola/Uber keeps the map of all its associated/registered cabs based on divided

	areas/zones. when 1st customer book its share ride then algorithm(Ola/Uber system picks the nearest cab to pick up location and allocate the recently booked ride into the Ola/Uber app running on cab driver mobile) works same as it works for private ride like mini, micro etc. Now, Suppose there are multiple cabs in same area and cab1 is running with one customer and cab2 is running with zero customer Now allocation of appropriate ride for next customer will be decide on the basis of destination set by next customer. For cab1 :- if next customer is also travelling into same area/zones defined by the Ola/Uber service provider the Ola/Uber system will allocate the ride to this cab else repeat the step 1 If no cab available in the area/zone, then it picks the cab which is going in same area/zone and allocate the same ride in cab driver mobile app. In non-share ride:- Allocate the nearest mini, micro cab to newly pickup location.