DECEMBER 2019

EXAMINATION TIME TABLE
B.E.(INFORMATION TECHNOLOGY)(Sem VIII) (CBSGS)

Days and Dates	Time	Paper Code	Paper
Wednesday, December 04, 2019	10:30 a.m. to 01:30 p.m.	53101	Elective II 1) Enterprise Resource Planning
Wednesday, December 04, 2019	10:30 a.m. to 01:30 p.m.	53102	2) Wireless Sensor Networks
Wednesday, December 04, 2019	10:30 a.m. to 01:30 p.m.	53103	3) Geographical Information System
Wednesday, December 04, 2019	10:30 a.m. to 01:30 p.m.	53104	4) Robotics
Wednesday, December 04, 2019	10:30 a.m. to 01:30 p.m.	53105	5) Soft Computing
Wednesday, December 04, 2019	10:30 a.m. to 01:30 p.m.	53106	6) Software Testing & Quality Assurance
Monday, December 09, 2019	10:30 a.m. to 01:30 p.m.	53107	Storage Network Management & Revival
Wednesday, December 11, 2019	10:30 a.m. to 01:30 p.m.	53108	Big Data Analytics
Friday, December 13, 2019	10:30 a.m. to 01:30 p.m.	53109	Computer Simulation & Modelling

(Time: 3 Hrs) **Marks: 80**

N.B. : 1. Question no. 1 is **compulsory**.
2. Solve any **Three** questions out of remaining **Five** questions.

Qu-1 Attempt any **FOUR** of the following.

a) **Demonstrate/outline** the working of Roulette-wheel selection. **5**

b) A single-layer neural network has the weights w = [0.2 0.5 0.66 0.45] with bias b=0.3. It is given an input of I = [0.5 0.8 0.1 0.36]. **Find/estimate** the output if the sigmoidal activation function is used (slope = 0.3) **5**

c) **Demonstrate/Outline** the excluded middle axioms, extended for fuzzy sets. **5**

d) How do genetic Algorithms differ from conventional optimization algorithms? **5**

e) Let us consider the discrete fuzzy set $A = \left\{ \frac{1}{a} + \frac{0.9}{b} + \frac{0.6}{c} + \frac{0.3}{d} + \frac{0.01}{e} + \frac{0}{f} \right\}$ using Zadeh's notation, defined on universe X = {a, b, c, d, e, f }. Compute/Infer λ cut for**:** a) $\lambda = 0.9$ b) $\lambda = 0.3$ **5**

Qu-2 a) Using Mamdani fuzzy model design a fuzzy logic controller to determine the wash time of a domestic washing machine. Assume that the inputs are dirt and grease on cloths. Use three descriptors for each input variables and five descriptors for the output variable. Derive a set of rules for control action and defuzzification. The design should be supported by figures wherever possible. Show/Defend that if the clothes are soiled to a larger degree the wash time will be more and vice-versa. **10**

b) Explain McCulloch Pitts neuron model with example. **10**

Qu-3 a) Determine the weights after one iteration for Hebbian learning of a single neuron network starting with initial weights w = [1 -1]. The inputs are X_1 = [1 -2], X2 = [2 3], X_3 = [1, -1] and learning rate c=1.
a) Use Bipolar Binary activation function.
b) Use Bipolar continuous activation function. **10**

b) What are Neuro-Fuzzy Systems? Explain the steps in Neuro-Fuzzy Hybrid System. **10**

Qu-4 a) What is Linear Separability? Explain with example why single layer perceptron is not capable of solving Linearly Inseparable problems. **10**

b) Using the binary input/output row matrix shown in table-1 train a hetero-associative network to store the input row vectors s = {s1, s2, s3, s4} to the output row vector t = {t1, t2}. Obtain/predict the final weight matrix **10**

Table-1: Input row vectors {s1, s2, s3, s4} and output row vector {t1, t2}.

	s1	s2	s3	s4	t1	t2
1st	1	0	0	0	1	0
2nd	1	1	0	0	1	0
3rd	0	0	0	1	0	1
4th	0	0	1	1	0	1

Qu-5 Consider a 2-2-2 three-layer network as shown in figure-1. Perform calculations (upto 4 decimal places) assuming back-propagation learning for one iteration on the input, and desired output patterns given in Table-2. **20**

a) Learning rate η = 0.8, Momentum α = 0.8 and Sigmoidal activation function.

Table-2: Input-Output pattern.

Pattern Index	Input		Output/desired	
	X1	X2	O1	O2
1	0.5	-0.5	0.9	0.1

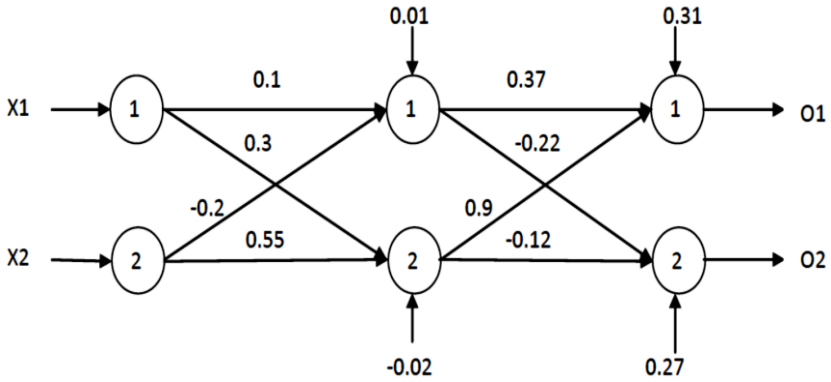

Figure-1: The MLP with initial weights

Qu-6 a) Describe Genetic Algorithms considering: Encoding, Selection, Crossover, Mutation, and Stopping Condition for Genetic Algorithms. **10**

b) Let R and S be two fuzzy relations defined as: **10**

$$R = \begin{array}{c} \\ x1 \\ x2 \end{array} \begin{array}{c} \begin{array}{ccc} y1 & y2 & y3 \end{array} \\ \begin{pmatrix} 0.0 & 0.2 & 0.8 \\ 0.3 & 0.6 & 1.0 \end{pmatrix} \end{array} \qquad S = \begin{array}{c} \\ y1 \\ y2 \\ y3 \end{array} \begin{array}{c} \begin{array}{ccc} z1 & z2 & z3 \end{array} \\ \begin{pmatrix} 0.3 & 0.7 & 1.0 \\ 0.5 & 1.0 & 0.6 \\ 1.0 & 0.2 & 0.0 \end{pmatrix} \end{array}$$

a) Compute/Infer the result of R°S using max-min composition.

b) Compute/Infer the result of R⋆S using max-product composition.

(3 hours) [80 marks]

Note: 1. Question number 1 is compulsory. Solve any three out of remaining.
2. Draw figure wherever necessary.
3. Assume suitable data wherever necessary.

1 (a) Consider an application that requires 1TB of storage capacity and performs 4900 IOPS. Application I/O size is 4 KB. As it is business critical application, response time must be within an acceptable range. Specification of available disk drive: **10M**
Drive capacity = 73 GB;
For rotational latency RPMs: 15,000 rpm;
Average seek time= 5ms;
Transfer rate: 40 MB/s;
- Calculate the number of disks required?

Considering seek time (Rs=5ms) as given above and I/O request arrives at a rate 100 I/Os per second, Calculate Utilization of I/O controller (U), Total Response time (R), Average Queue size and Total time spent by request in a queue.

(b) An application that generates 2400 IOPs with 40% reads and 60% writes. Calculate the IOPS generated for RAID level 1, 4 and 6. Also calculate storage efficiency and usable capacity for RAID levels 3, 5 and 6 with number of disks available are 5 and each disk has storage capacity of 120 GB. **10M**

2 (a) Compare and contrast RAID levels **10M**

(b) Explain Information Lifecycle Management for online order processing with the help of diagram. **10M**

3 (a) Explain Intelligent Storage System and its types. **10M**

(b) Explain FC addressing with respect to WWNN and WWNS. **10M**

4 (a) Explain SCSI communication and command model. **10M**

(b) Explain BC planning lifecycle in detail. Give comparison between RPO and RTO. **10M**

5 (a) What is virtualization? Explain its types with the help of neat labelled diagram. **10M**

(b) Differentiate Boolean based and probabilistic based matching process. **10M**

6 Write short notes on: **(any four)** **20M**
a. Journaling and Snapshot.
b. Document Surrogates.
c. Information System.
d. Local file system and network file system.
e. Types of indexing.
f. Zoned Bit Recording.

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(3 Hours) **[Total Marks : 80]**

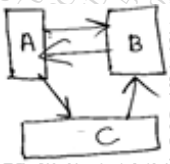
Please check whether you have got the right question paper.

N.B.: **1) Question No.1 is compulsory**
2) Attempt any three questions from remaining.
3) Assume suitable data if necessary.

1. Answer the following
a) Define Edit distance. Explain with example. **(05)**
b) What is the role and effect of page rank? **(05)**
c) List the different issues in stream processing. **(05)**
d) Distinguish between Name node and Data node. **(05)**

2. a) Compare and contrast **(10)**
i) Multistage and Multihash
ii) SQL and NoSQL
b) Explain FM algorithm with example? **(10)**

3. a) Compute simplified page rank using damping factor d = 0.9 for web. **(10)**



b) Explain selection and projection relational algebraic operation using MapReduce. **(10)**

4. a) Explain the different Hadoop components? **(10)**
b) Explain SIMRANK Algorithm with suitable example? **(10)**

5. a) Define Hub and Authority. Compute Hub and Authority scores for web. **(10)**

b) Explain different types of recommendation system with real time examples? **(10)**

6. Answer the following **(20)**
a) NoSQL data stores
b) SON algorithm with Map Reduce
c) MapReduce for Matrix-Multiplication
d) Clustering using Representatives Algorithm

(3 Hours) **[Total Marks: 80]**

N.B.: (1) Question **No.1** is **Compulsory**.
(2) Attempt **any three** questions from **remaining** questions.
(3) Assume **suitable** data wherever required but **justify** the same.
(4) **Figures** to the **right** indicate **full marks**.
(5) Answer to each new question to be started on a **fresh page**.

1. (a) Define Simulation. Explain when simulation is an appropriate tool and when it is not. **(10)**
(b) Explain in detail Verification of Simulation Model. **(10)**

2. (a) Consider a drive in restaurant where carhops take order and bring food to the car. Cars arrive according to the inter-arrival distribution of cars. There are two carhops, Able and Baker. Able is better able to do the job and works a bit faster than Baker. The distribution of their service time is also given. **(10)**

Time Between Arrivals (min)	2	3	4	5	6
Probability	0.18	0.25	0.27	0.17	0.13

Able's Service Time	2	3	4	5	**Baker's Service Time**	3	4	5	6
Probability	0.17	0.24	0.29	0.30	**Probability**	0.18	0.22	0.30	0.30

Develop the simulation table and analyze the system by simulating the arrival and service of 10 customers. Random digits for inter-arrival time and service time are as follows:

Customer	1	2	3	4	5	6	7	8	9	10
R.D. for Interarrival Time	--	32	66	41	21	37	79	18	60	98
R.D. for Service Time	49	53	34	17	30	52	22	62	56	73

(b) Describe the Event scheduling / Time advance algorithm. Give the system snapshots. **(10)**

3. (a) An industrial chemical that will retard the spread of fire in paint has been developed. The local sales representative has determined from past experience that 48% of the sales calls will result in an order. **(10)**
i) What is the probability that the first order will come on the fourth sales call of the day?
ii) If eight sales calls are made in a day, what is the probability of receiving exactly six orders?
iii) If four sales calls are made before lunch, what is the probability that one or less results in an order?

[TURN OVER

(b) By using Inverse Transform Technique which of the distributions random variates can be generated? Develop a random variate generator for random variable X with pdf **(10)**

$$f(x) = \begin{cases} e^{2x}, & -\infty < x \leq 0 \\ e^{-2x}, & 0 < x < \infty \end{cases}$$

4. (a) Test the following random numbers for independence by runs up and runs down test. **(10)**
Take $\alpha = 0.05$ and the 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}

(b) In stock brokerage, the following 20 time gaps were recorded between customers buy and sell orders (in seconds): **(10)**

1.95	1.75	1.58	1.42	1.28	1.15	1.04	0.93	0.84	0.75
0.68	0.61	11.98	10.79	9.71	14.02	12.62	11.36	10.22	9.20

Assuming exponential distribution is a good model for the individual gaps, calculate lag-1 autocorrelation.

5. (a) Suppose that the inter-arrival times and service times at a single chair unisex hair-styling shop have been shown to be exponentially distributed with values 2 per hour and 3 per hour respectively. Compute **(10)**

a) The utilization of server
b) The time-average number of customers in the system
c) The time-average number of customers in the queue
d) The average time customer spends in the system
e) The average time customer spends in the queue
f) The probability of zero, one, two, three, and four or more customers in the shop.

(b) Explain Inventory system. Discuss the cost involved in inventory systems. **(10)**

6. Write short notes on (**any two**): **(20)**

(a) Issues in simulation of manufacturing systems.
(b) Steps in simulation study.
(c) Output analysis for steady state simulation.
(d) Poisson Process and its properties.
