R-20

Code: 20DC11T

M.C.A. I Semester Regular & Supplementary Examinations June 2022
Probability and Statistics
Max. Marks: 60   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x12 = 60 Marks)
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		Marks	CO	BL

UNIT–I

1. a) A problem is given to four students A, B, C, D. Probability of solving them independently are $\frac{2}{3}, \frac{2}{5}, \frac{1}{4}, \frac{3}{4}$. If all of them try to solve the problem, what is the probability that problem is solved?   4M CO1 L2

   b) A random variable X has the following probability function

X=x	1	2	3	4	5	6
P(X=x)	k	3k	5k	7k	9k	11k

   Find (i) k   (ii) Mean (iiii) Variance (iv) P(1<X<5)   8M CO1 L3

OR

2. a) A bag A contains 2 white and 3 red balls and bag B contains 4 white and 5 red balls. One ball is drawn at random from one of the bags and it is found to be red. Find the probability that the red ball drawn is from bag B.   6M CO1 L2

   b) If the probability density function of a random variable is given by
   $f(x) = kx2e-x$ when $x \geq 0$. Find (i)k (ii)Mean (iii) Variance   6M CO1 L3

UNIT–II

3. a) The probability that the life of a bulb is 100 days is 0.05. Find the probability that out of 6 bulbs (i) at least one   (ii) none (iii) greater than 4 will be having a life of 100 days.   6M CO2 L3

   b) In a test on 2000 electric bulbs, it was found that the life of a particular make, was normally distributed with an average life of 2040 hrs and standard deviation 40 hrs. Estimate the no. of bulbs likely to burn for i) more than 2140 hrs ii) between 1920 and 2020 iii) less than 1960 hrs   6M CO2 L3

OR

4. Four coins are tossed 160 times. The number of times x heads occur is given below.

X	0	1	2	3	4
No.of times	8	34	69	43	6

   Fit a binomial distribution to this data on the hypothesis that coins are unbiased.   12M CO2 L4

UNIT–III

5. A population consists of six numbers 4,8,12,16,20,24. Consider all samples of size 2 which can be drawn without replacement from this population. Find
   (i)   The population mean
   (ii) The population standard deviation
   (iii) the mean of sampling distribution of means
   (iv) The standard deviation of sampling distribution of means.   12M CO3 L3

OR

6. a) To estimate the average time it takes to assemble a certain computer components, the industrial engineer at an electronics firm timed 40 technicians in the performance of the task, getting a mean of 12.73 minutes and a standard deviation of 2.06 minutes.
   (i) What can we say with 99% confidence about the maximum error if 12.73 is used as a point estimate of the actual average time required to do the job.
   (ii) Use the given data to construct a 99% confidence interval.   8M CO3 L4

   b) It is desired to estimate the mean time of continuous use until an answering machine will first require service. If it can be assumed that standard deviation is equal to 60 days, how large a sample is needed so that one will be able to assert with 90% confidence that the sample mean is off by at most 10 days.   4M CO3 L4

UNIT–IV

7. a) In a sample of 600 students of a certain college 400 are found to use ball pens. In another college from a sample of 900 students 450 were found to use ball pens. Test whether 2 colleges are significantly different with respect to the habit of using ball pens. take level of significance as 5%   6M CO4 L4

   b) The following table gives the number of aircraft accidents that occurred during the six days of the week. Find whether the accidents are uniformly distributed over the week.

Days	Mon	Tue	Wed	Thurs	Fri	Sat
No.of accidents	14	18	12	11	15	14

   6M CO4 L4

OR

8. Two independent samples 8 and 7 items respectively had the following values of the variables.

Sample I	9	11	13	11	16	10	12	14
Sample II	11	13	11	14	10	8	10	

Do the estimates of population variance differ significantly at 5% level of significance   12M CO4 L4

UNIT–V

9. Patients arrive at a hospital at random with a mean arrival rate of 3 per hour. The department is an average 15 minutes with each patient, actual consulting times being exponentially distributed. Find
   (i) The proportion of time that the doctor is idle
   (ii) The mean number of patients waiting to see the doctor
   (iii) The probability of there being more than 3 patients waiting
   (iv) The mean waiting time for patients   12M CO5 L3

OR

10. A super market has a single cashier. During peak hours, customers arrive at a rate of 20 customers per hour. The average number of customers that can be processed by the cashier is 24 per hour. Calculate
   (i) The probability that cashier is idle
   (ii) The average number of customers in the queuing system.
   (iii) The average time a customer spends in the system
   (iv) The average time the customers are in the queue
   (v) The average time a customer spends in the queue waiting for service.   12M CO5 L3

END

R-20

Code: 20DF13T

M.C.A. I Semester Regular & Supplementary Examinations June 2022

Relational Database Management Systems

Max. Marks: 60   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x12 = 60 Marks)

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		Marks	CO	BL

UNIT–I

		Marks	CO	BL
1. a)	State the advantages of DBMS over file system.	7M	1	2
b)	Mention the roles of a Database Administrator	5M	1	2

OR

2.	Explain the term aggregation in an ER model? Develop an ER diagram using aggregation that captures the following information: Employees work for projects. An employee working for a particular project uses various machinery. State any options you make. Also discuss about the ER diagram you have designed.	12M	2	3

UNIT–II

3.	Explain the Unary and Binary Operators of Relational Algebra with an example each.	12M	2	2

OR

4.	Construct the Tuple Relational Calculus expressions for the following schema: SUPPLIER (SID, SNAME, CITY) PARTS (PID, PNAME, COLOR) ORDERS (SID, PID, QUANTITY) (a) Find the parts supplied by the suppliers who stay in Paris. (b) Find the names of suppliers who supply green and blue parts. (c) Find the supplier IDs of those, who supply all parts. (d) Find the names of suppliers and the parts supplied by them.	12M	4	3

UNIT–III

5. a)	Explain the aggregate functions in SQL	6M	3	2
b)	What is Referential integrity? Explain the integrity constraints in SQL	6M	3	3

OR

6. a)	What is lossless decomposition? Why should you normalize a relation	7M	3	3
b)	Differentiate 3NF and BCNF	5M	2	2

UNIT–IV

7. a)	When do, two transactions conflict.	5M	5	2
b)	Explain conflict serializability	7M	5	2

OR

8.	Explain log based recovery	12M	5	2

UNIT–V

9.	Explain Static hashing techniques. Implement extendable hashing for the following problem, where each bucket can hold upto 3 search key values **Search Key Values**: 2, 3, 5, 7, 11, 17, 19, 23, 29, 31 **Hash Function:** $h(k) = k \bmod 8$	12M	5	3

OR

10.	Differentiate a B Tree and B$^+$ Tree file indexing.	6M	5	2
	Construct a B$^+$ Tree of degree 3 for the following values			
	20, 16, 3, 21, 9, 7, 23, 15, 11	6M	5	3

****END****

R-20

Code: 20DC12T

M.C.A. I Semester Regular & Supplementary Examinations June 2022

Technical Communication

Max. Marks: 60   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x12 = 60 Marks)
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			Marks	CO	BL

UNIT–I

1.	Define Communication. What are the elements in the process of communication?	12M	CO1	L3

OR

2.	Write a note on the objectives and principles of Communication.	12M	CO1	L3

UNIT–II

3.	a)	What are the gestures and postures of positive Body language?	6M	CO2	L2
	b)	Write the significance of Non-Verbal communication in the Technical arena.	6M	CO2	L2

OR

4.	Explain the following elements of a presentation.			
	a) Planning presentation (4)			
	b) Preparing presentation (4)			
	c) Organizing a presentation (4)	12M	CO2	L2

UNIT–III

5.	a)	You have received a product in a damaged condition. Write a letter of complaint emphasizing the need of greater care.	6M	CO4	L2
	b)	What are Etiquettes? Discuss the email etiquettes.	6M	CO4	L2

OR

6.	a)	You are a Programmer in TechMahendra Company compose an email regarding work from home option due to Covid-19.	6M	CO4	L3
	b)	Imagine you are a Lead of a Team of ABC company. Issue a memo analyzing reasons for cancellation of the meeting.	6M	CO4	L3

UNIT–IV

7.	Write a brief note for the following:			
	a) Significance of the Report writing in professional arena.			
	b) List out the objectives and structure of a Report.	12M	CO5	L3

OR

8.	The principal of your college has appointed a committee of two teachers and three students to suggest new directions in this pandemic Covid-19 in which students "co-curricular activities can be developed. Write a committee's report.	12M	CO5	L3

UNIT–V

9.	a)	Sketch the structure of Resume and write a Resume of your profile.	6M	CO3	L3
	b)	Describe the Pre-Interview Strategies.	6M	CO3	

OR

10.	In what way Group Discussion process becomes an important aspect in the selection process of recruitment? Enlist the features and techniques of GD.	12M	CO3	L3

****END****

Code: 20DF14T

M.C.A. I Semester Regular & Supplementary Examinations June 2022

Computer Organization

Max. Marks: 60   Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x12 = 60 Marks)

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		Marks	CO	BL

UNIT–I

1.	a)	What is a number system? Explain different types of number systems.	6M	1	2
	b)	Define Combinational circuits and explain its Characteristics.	6M	1	1

OR

2.	a)	Explain Boolean Algebra with suitable examples.	6M	2	2
	b)	What is an adder? Explain half adders and full adders.	6M	2	2

UNIT–II

3.	a)	Explain the concept of memory hierarchy with the help of the diagram.	6M	3	2
	b)	Illustrate the memory address map and functionality.	6M	3	3

OR

4.	a)	What are the differences among direct mapping and associative mapping?	6M	3	3
	b)	Describe the ROM chip? How does a ROM chip work?	6M	2	3

UNIT–III

5.	a)	Explain Basic CPU Organization? Describe assembler directives.	6M	2	1
	b)	Explain the concept of Intel 8086 CPU architecture in detailed.	6M	2	2

OR

6.		What is an addressing mode? Discuss in detail about different addressing modes with suitable examples.	12M	2	1

UNIT–IV

7.	a)	Explain Programming with assembly language instructions.	6M	2	1
	b)	Describe the Flag transfer. Explain arithmetic and logical instructions with examples?	6M	2	3

OR

8.	a)	Describe conditional and unconditional transfer with examples.	6M	3	3
	b)	Explain the shift and rotate instructions with examples.	6M	3	3

UNIT–V

9.	a)	Explain priority interrupts by using daisy chaining methods.	6M	3	2
	b)	Define address sequencing and give examples.	6M	2	1

OR

10.		What is DMA? How the DMA controller works with a neat diagram?	12M	5	3

****END****

Code: 20DF12T

M.C.A. I Semester Regular & Supplementary Examinations June 2022
Data Structures and Algorithms
Max. Marks: 60   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x12 = 60 Marks)
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			Marks	CO	BL

UNIT–I

1.	a)	Explain the importance of data structures used in various algorithmic designs with suitable examples.	6M	1	2
	b)	Illustrate Factorial using iterative and recursive algorithm.	6M	1	4

OR

2.	a)	Define the general rules for running time calculation.	4M	1	1
	b)	Illustrate asymptotic notion using examples.	8M	1	4

UNIT–II

3.	a)	Define stack? Demonstrate Stack ADTs with examples.	6M	2	3
	b)	Develop an algorithm to Evaluate an Expression using stacks and explain with an example.	6M	2	6

OR

4.	a)	Give ADT for Single Linked list.	6M	2	1
	b)	Illustrate insert, delete and display operations in a linked list.	6M	2	4

UNIT–III

5.	a)	Define hashing? Explain different hashing functions.	4M	3	2
	b)	Illustrate separate chaining collision resolution technique with example.	8M	3	4

OR

6.	a)	Define Threaded binary tree? Give the node structure for threaded binary tree?	4M	3	1
	b)	Illustrate threaded binary tree with examples.	8M	3	4

UNIT–IV

7.	a)	Explain AVL tree rotations.	6M	4	3
	b)	What is the meaning of height balanced tree? How rebalancing is done in height balanced tree.	6M	4	1

OR

8.	a)	Define Graph. Discuss about different graph representations.	6M	4	2
	b)	Explain Breadth First Search traversal of Graph using an example.	6M	4	5

UNIT–V

9.	a)	Demonstrate selection sort with suitable example.	6M	5	3
	b)	Illustrate Radix sort with the help of example.	6M	5	4

OR

10.	a)	Explain Merge Sort algorithm to sort an integer array in an ascending order.	6M	5	3
	b)	Evaluate Merge Sort for best, average and worst case.	6M	5	5

****END****

Code: 20DF11T

M.C.A. I Semester Regular & Supplementary Examinations June 2022
Mathematical Foundations of Computer Science

Max. Marks: 60   Time: 3 Hours
Answer *any five full questions* by choosing one question from each unit (5x12 = 60 Marks)
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			Marks	CO	BL

UNIT–I

1. a) Define Statement and Explain all the Connectivity's with the help of Truth Table — 6M CO1 L3

   b) Obtain the principal disjunctive normal form of the given Compound Statement $(P \wedge \sim Q \wedge \sim R) \vee (Q \wedge R)$ — 6M CO1 L4

OR

2. a) Define Quantifiers and write all the properties of Quantifiers with Examples. — 6M CO1 L3

   Show that (R V S) follows logically from the premises C V D ,(C V D)
   $\sim$H,$\sim$H (A $\sim$B)   and (A $\sim$B) (RVS) — 6M CO1 L2

UNIT–II

3. a) Define binary relation? Write the properties of binary relation with an example. — 6M CO2 L3

   b) Define partition set? prove that any equivalence relation R on A induces a partition of A — 6M CO2 L3

4. a) Let A={ 1,2,3,…19,20} , and R be the equivalence relation on A defined by aRb if and only if a – b is divisible by 5. Find the partition of A induced by R — 6M CO2 L1,L2

   b) Let A={1,2,3,4,6,8,12 }. On A , define the partial ordering relation R by aRb if and only if a|b. Draw hasse diagram — 6M CO2 L1,L2

UNIT–III

5. a) Define the terms Combinations & Permutations with examples. — 6M CO3 L3

   b) How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8, 9 if no repetitions are allowed? — 6M CO3 L4

6. a) How many committees of five with a given Chairperson can be selected from 12 Students — 6M CO3 L4

   b) In how many ways can the 26 letters of the English alphabet be permitted So that none of the patterns CAR, DOG, PUN or BYTE occurs? — 6M CO3 L4

UNIT–IV

7. Solve the recurrence relation $a_n + a_{n-1} - 6a_{n-2} = 0$ for n   2 given that $a_0 = -1$ and $a_1 = 8$ — 12M CO4 L1

OR

8. a) Find the sequences generated by the following functions: $(3 + x)^3$ — 6M CO4 L4

   b) Solve the recurrence relation $3a_{n+1} – 4a_n = 0$, n 0 , $a_1 = 5$. — 6M CO4 L4

UNIT–V

9. a) Define Graph and explain various types of representation of a Graph — 6M CO5 L3

   b) Define and explain Bipartite Graph with neat Diagram — 6M CO5 L3

OR

10. a) Define and Explain various properties of Tree. — 6M CO5 L3

   b) Define Spanning Tree and explain step by step procedure for the derivation of spanning tree by using Primes Algorithm — 6M CO5 L3

END