PG – 314

III Semester M.C.A. Examination, March/April 2021
(CBCS Scheme)
COMPUTER SCIENCE
MCA 304 : Statistical Analysis

Time : 3 Hours Max. Marks : 70

Instruction : *Answer* ***any five*** *from Part –* ***A*** *and* ***any four*** *from Part –* ***B.***

PART – A

Answer **any five** of the following. **Each** Question carries **six** marks. **(5×6=30)**

1. Define the following :
   a) Trail and Event
   b) Independent Events
   c) Mathematical Probability

2. Define Random Variable. Explain the types of Random Variables. And also explain probability Mass function and Probability Density function.

3. The Probability density function of a variable X is

X	1	2	3	4	5	6	7	8
P (X)	a	2a	3a	4a	5a	6a	7a	8a

Find a) Value of a b) $p(x <= 3)$ c) $p(5 <= x <= 7)$

4. Calculate Rank Correlation coefficient for the following data.

X	53	98	95	81	70	81	65	81
Y	25	47	82	76	53	61	75	70

5. Define Poisson Distribution. If the probability that an individual suffers with a bad reaction due to a certain injection is 0.001. Determining the probability that out of 2000 individuals a) exactly 3 b) more than 2 individuals suffers with a bad reaction. **6**

6. X is Normally distributed with mean 12 and variance 16, find the probability of
   a) $p(X >= 20)$ b) $p(X < 20)$ c) $p(0 <= X <= 12)$

P.T.O.

7. Fit a straight line to the following data

X	1	2	3	4	6	8
Y	2.4	3	3.6	4	5	6

8. Using the three yearly moving averages, determine the trend and plot the original and trend values on a graph.

Year of Production	1975	1976	1977	1978	1979	1980	1981	1982
Production in '000 units	21	22	23	24	25	26	27	28

PART – B

Answer **any four** of the following. **Each** question carries **10** marks. **(4×10=40)**

9. A continuous random variable has the following distribution function

$f(x) = KX^2$ if $0 <= x <= 3$

$= 0$; otherwise

a) Find K value.

b) Computer $p(1 <= x <= 2)$.

c) Find mean of the distribution.

10. Calculate Pearson Coefficient of correlation to the following data and also calculate regression equations to the given data

Price (Rs.)	10	12	13	12	16	15
Demand (units)	40	38	43	12	37	43

11. a) Derive Mean and variance of Binomial Distribution. 5

b) A large group of students took a test in Physics and the final grades have a mean of 70 and standard deviation of 10. If we can approximate the distribution of these grades by a normal distribution. What percent students 5

i) scored higher than 80 ?

ii) should pass the test (grades > = 60) ?

iii) should fail the test (grade < 60) ?

12. a) 20 people were attacked by a decease and only 18 were survived. Will you reject the hypothesis that the survival rate of attacked by this decease is 85% in favour of the hypothesis than its more at 5% Level of Significance. **5**

b) A Random Samples of 400 men and 600 women were asked whether they would like to have a flyover near there residence. 200 Men and 325 women are in favour of the proposal. Test the hypothesis that proportions of men and women in favour of the proposal at 5% LOS. **5**

13. a) Fit an equation of the type $Y = ab^x$ to the following data. **5**

X	1	2	3	4	5
Y	1.6	4.5	13.8	40.2	125

b) Two sample polls of votes for two candidates A and B for a public office are taken. One from among the residents of rural areas. The results are given in the table. Examine whether the nature of the area is related to voting preference in this election. **5**

Votes of Area	**A**	**B**	**Total**
Rural	620	380	1000
Urban	550	450	1000
Total	1170	830	2000

14. As a part of Investigation of the collapse of the roof of a building, a testing laboratory is given all the available bolts that are connected the steel structure at three different positions of the roof. The forces required to share each of these bolts are as follows. **10**

Position 1	90	32	79	98	83	91	
Position 2	105	89	93	104	89	95	86
Position 3	83	89	80	94			

Perform ANOVA at 0.05 LOS whether the difference among the sample means at 3 positions are significant.

PG – 909

III Semester M.C.A. Examination, August 2021
(Y2K5)
COMPUTER SCIENCE
3E5A : Computer Based Optimization Techniques

Time : 3 Hours Max. Marks : 80

Instruction : *Answer **any five full** questions, by choosing atleast **two** from **each** Part.*

PART – A

1. a) Define a Linear Programming Problem (LPP).

   b) A company produces two products A and B. The sales volume for A is atleast 80% of the total sale of both A and B. However, the company cannot sell more than 100 units of A per day. Both products use one raw material, of which the maximum daily availability is 240 kgs. The usage rates of the raw material are 2 kgs per unit of A and 4 kgs per unit of B. The profit per unit of A and B are Rs. 20 and Rs. 50 respectively. Formulate the above as an LPP maximizing the total profit.

   c) For the LPP formulated in 1 b) obtain two basic feasible solutions (b.f.s's).

   (3+8+5)

2. a) Use the graphical method to solve the following problem

   Minimize $Z = 15x_1 + 20x_2$

   Subject to $x_1 + 2x_2 \geq 10$

   $2x_1 - 3x_2 \leq 6$

   $x_1 + x_2 \geq 6$

   and $x_1 \geq 0, x_2 \geq 0$

   Indicate the b.f.s's in the graph.

   b) Solve the following LPP by using simplex method

   Max : $Z = 45x_1 + 80x_2$

   $5x_1 + 20x_2 \leq 400$

   Subject to : $10x_1 + 15x_2 \leq 450$

   $x_1, x_2 \geq 0$

   (8+8)

P.T.O.

3. Find an initial basic feasible solution for the following transportation problem using

   a) The north-west corner method

   b) The Vogel approximation method

	D_1	D_2	D_3	D_4	
S_1	11	13	17	14	250
S_2	16	18	14	10	300
S_3	21	24	13	10	400
	200	225	275	250	

   c) Also obtain an optimum basic feasible solution. **(4+5+7)**

4. a) Explain the Hungarian algorithm to solve an assignment problem.

   b) A department head has four subordinates and four tasks have to be performed. Subordinates differ in efficiency and tasks differ in their intrinsic difficulty. Time taken by each man to perform each task is given in the following matrix. How the tasks should be allocated to each person so as to minimize the total man-hours ?

Subordinates →	1	2	3	4
A	8	26	17	11
B	13	28	4	26
C	38	19	18	15
D	19	26	24	10

(8+8)

PART – B

5. a) Explain the steps involved in dual simplex method.

   b) Solve the following LPP using the Dual Simplex method :

   Min : $Z = 2x_1 + x_2$

   $3x_1 + x_2 \geq 3$

   $4x_1 + 3x_2 \geq 6$

   Subject to : $x_1 + 2x_2 \geq 3$

   $x_1, x_2 \geq 0$ **(8+8)**

6. a) Describe the M | M | 1 queueing system.

   b) A self-service store employees one cashier at its counter where 9 customers arrives on an average of every 5-minutes. Assuming that the system is an M | M | 1 system. Find (cashier can serve 10 in 5 minutes), average number of customers in the system, average time spent by a customer in the system.

   c) Derive the steady state probability distribution of system size in a M| M | 1 queueing system. **(5+3+8)**

7. a) A small project consists of the following activities (with times) :

Activity	Immediate Predecessor	Time
A	None	6
B	None	8
C	A	6
D	B	5
E	C, D	6
F	A	7
G	B	9

Draw the network diagram and identify the critical path. Compute total float for each activity.

THIRD Semester M.C.A. (One Time Measure) Examination August -2021

(Y2K5 Scheme)

COMPUTER SCIENCE

3MCA-2 : Design and Analysis of Algorithms

Time : 3 Hours | Max. Marks : 80

Instruction : *Answer* ***any five*** *questions choosing at least* ***two*** *from* ***each*** *Part.*

PART – A

1. a) Discuss important problem types. 8

   b) Give an account of general framework for analysis of algorithms. 8

2. a) Explain different asymptotic notations. What are the basic efficiency classes ? Enumerate. 8

   b) Explain the mathematical analysis of non-recursive algorithms with an example 8

3. a) Explain the brute-force based algorithm for finding the closest pair of points in two dimensional space. 8

   b) Write quick sort algorithm. What is the upper bound on its efficiency ? Comment on the specificity of the input for the algorithm. 8

4. a) Compare and contrast brute-force based algorithm and Strassen's algorithm for matrix multiplication. 8

   b) What is the basic principle behind the decrease and conquer technique ? What are its variations ? Write a decrease by a constant variation based algorithm to compute a^n. Comment on its time complexity. 8

PART – B

5. a) Explain the Horner's rule for evaluating a polynomial. Evaluate the following polynomial $P(x) = 7x^5 + 4x^3 + 7x^2 + 6x + 9$ at $x = 3$. 8

   b) Produce Floyd's algorithm for all the pairs shortest paths problem. Investigate its time complexity. 8

P.T.O.

6. a) Explain sorting by distribution counting algorithm. Comment on the specificity of the inputs for the algorithm and its efficiency. 8

b) Explain Horspool's algorithm for string matching. How does it score over brute-force method ? 8

7. a) Discuss Prim's algorithm for constructing a minimum spanning tree for a graph find its complexity. 8

b) Explain Branch and bound technique to solve the assignment problem for the following instance of the problem 8

	Job 1	Job 2	Job 3	Job 4
Person 1	10	5	4	7
Person 2	6	4	3	7
Person 3	5	8	3	8
Person 4	9	6	8	4

8. Write short notes on the following : (4×4 = 16)

a) Topological sorting

b) TSP problem

c) 4-queens problem

d) Selection sort.

PG – 311

III Semester M.C.A. Examination, March/April 2021
(CBCS Scheme)
COMPUTER SCIENCE
MCA 301 : File Structures

Time : 3 Hours Max. Marks : 70

***Instruction** : Answer **any five** questions from Part – **A** and answer **any four** questions from Part – **B**.*

PART – A

I. Answer **any five** questions. **Each** carries **6** marks. **(5×6=30)**

1) What are the different file processing operations ? Explain with general format and example.

2) What are the various file organization methods ? Discuss.

3) Explain the file operation and directory operation UNIX commands with examples.

4) What is multilevel indexing ? Discuss the advantages and disadvantages of multilevel indexing.

5) In the following table, given a text file with following characters and corresponding frequencies, discuss the mechanism to compress the text file.

Character	A	H	I	U	O	M
Frequency	0.10	0.15	0.20	0.30	0.10	0.15

6) Given a B+ Tree of order 3, insert the following number.

{4, 3, 6, 8, 5, 1, 0, 9, 2, 11, 18}

7) Discuss internal sorting and binary searching.

8) Explain Key-sorting with an algorithm and an example.

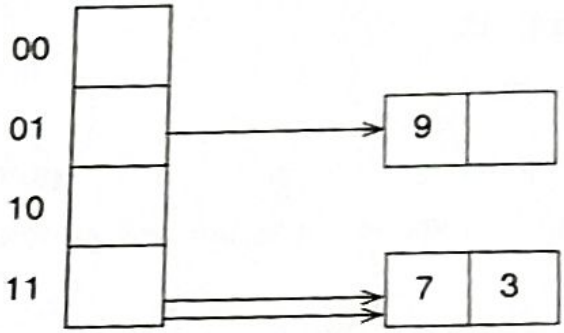
PART – B

II. Answer **any four** questions. **Each** carries **10** marks. **(4×10=40)**

9) What is extendible hashing ? Demonstrate the same on following set of Keys :

9, 7, 3, 5, 0, 8, 4, 1, 6, 2

Bucket size is 2. First three elements are hashed as below.



10) Given a 2 – 3 tree (B-Tree of order 3) Build B-Tree for the following inputs. (Show the tree at each insertion).

12, 5, 7, 13, 20, 9, 5, 60, 16 15 Delete 20, 60, 16, 15 and redraw the tree.

11) Write an algorithm for K-way merge sort algorithm. Trace the K-way merge sort algorithm for the given set of numbers : (K = 2).
5, 8, 3, 7, 9, 10, 6, 2, 17.

12) Define B-Tree, B+Tree and B* Tree. How are they different ? What are the advantages and disadvantages of them ?

13) a) Discuss methods of manipulating Buffers using Class. **5**

b) Discuss model for implementing consequential processes. **5**

14) Explain how to encapsulate a record related operations into a single class.

PG – 258

III Semester M.Sc. Examination, March/April 2021
(CBCS Scheme)
COMPUTER SCIENCE
MSC 304 : Cyber Space (Open Elective)

Time : 3 Hours Max. Marks : 70

Instructions : *Section – **A** : Answer **all** questions.*
*Section – **B** : Answer **any four** questions.*
*Section – **C** : Answer **any three** questions.*

SECTION – A

Answer **all** the following. **Each** question carries **two** marks : **(10×2=20)**

1. What is a protocol with respect to computers ? Give two examples of protocols.
2. Define the term e-governance.
3. What is DNS ?
4. Define the term "computer systems" with respect to IT Act, 2000/2008.
5. What is a computer virus ?
6. What does <a> mean in HTML ?
7. What is an ERP ?
8. List four advantages of e-commerce.
9. What is a digital signature ?
10. What is cyber appellate tribunal ?

P.T.O.

SECTION – B

Answer **any four** of the following. **Each** question carries **five** marks : **(4×5=20)**

11. Write an HTML code to create a table with three rows and three columns.

12. Why e-governance is important ? Explain.

13. Explain how e-mail works.

14. List the impacts of e-commerce on business.

15. Explain the architecture of a web browser.

16. List some salient features of IT Act,2000.

SECTION – C

Answer **any three** of the following. **Each** question carries **ten** marks : **(3×10=30)**

17. Define following terms with respect to the cyberspace :
    a) IP Address
    b) Malware
    c) Search Engine
    d) WWW.

18. a) Explain any two applications of e-commerce. **6**

    b) List and explain any four issues in the implementation of Indian e-governance. **4**

19. Write a note on stages of e-governance.

20. a) How does the IT Act, 2000 handle cyber related offenses ? Explain. **6**

    b) List the advantages of Social Media. **4**

21. Write a note on the following :
    a) Cryptography **5**
    b) Cyber Security. **5**

PG – 315

III Semester M.C.A. Examination, March/April 2021
(CBCS Scheme)
COMPUTER SCIENCE
MCA 307 : Softcore - Quantitative Teaching and Research Aptitude

Time : 3 Hours Max. Marks : 70

Instructions : *1) Answer **any five** from Part – **A**.*
*2) Answer **any four** from Part – **B**.*

PART – A

Answer **any five** of the following. **Each** question carries **six** marks : **(5×6=30)**

1. In a mixture of 60 litres, the ratio of milk and water is 2 : 1. If this ratio is to be 1 : 2, then what quantity of water to be added ?

2. Raju, Kushal and Virat start at same time, same point and in same direction to run around a circular ground. Raju completes a round in 250 seconds, Kushal in 300 seconds and Virat in 150 seconds. Find after what time will they meet again at the starting point ?

3. Naveen purchased 120 reams of paper at Rs.80 per ream. He spent Rs. 280 on transaction, paid octroi at the rate of 40 paisa per ream and paid Rs. 72 to the servant. If he wants to have a gain of 8%, what must be the selling price per ream ?

4. The captain of a cricket team of 11 members is 26 years old and the wicket keeper is 3 years old. If ages of these two are excluded, the average age of remaining players is one year less than the average age of the whole team. What is the average age of the team ?

5. Rohan took a loan of Rs. 1,500 with simple interest for as many years as the rate of interest. If he paid Rs. 540 as interest at the end of loan period, what was the rate of interest ?

6. Briefly explain the elements involved in the teaching process.

7. List and explain the characteristics of good listener as well as good teacher.

8. Distinguish between Seminar, Conference and Symposium.

P.T.O.

PART – B

Answer **any four** of the following. **Each** question carries **10** marks : **(4×10=40)**

9. a) Give a brief introduction about regulatory framework of higher education in India. **5**

   b) Write a note on Online Education System. Will it be a boon or bane ? Justify your answer. **5**

10. a) After two successive discounts, a tie with a list price of Rs. 120 is available at Rs. 90. If second discount is 9 %, what is the first discount ? **5**

    b) A man can row 40 km upstream and 55 km downstream in 13 hours. Also, he can row 30 km upstream and 44 km downstream in 10 hours. Find the speed of the man in still water and the speed of the current. **5**

11. a) The distance between two cities Chennai and Bengaluru is 330 km. A train starts from Chennai at 8 a.m. and travels towards Bengaluru at 60 kmph. Another train starts from Bengaluru at 9 a.m. and travels towards Chennai at 75 kmph. Find at what time do they meet ? **5**

    b) 10 women can complete a work in 7 days and 10 children take 14 days to complete the same work. How many days will 5 women and 14 children take to complete the work ? **5**

12. a) One year ago, the ratio of Manoj and Sachin's age was 6 : 7 respectively. Four years hence, this ratio would become 7 : 8. How old is Sachin ? **5**

    b) The price of a car is Rs. 3,25,000. It was insured to 85% of its price. The car was damaged completely in an accident and insurance company paid 90% of the insurance. What was the difference between the price of car and amount received ? **5**

13. a) A train passes a station platform in 36 seconds and a man standing on the platform in 20 seconds. If the speed of the train is 54 km/h, find the length of the platform ? **5**

    b) The top of a 15m high tower makes an angle of elevation of 60 degrees with the bottom of an electric pole and angle of elevation of 30 degrees with the top of the pole. What is the height of the electric pole ? **5**

14. a) A bag contains 6 Red and 4 Blue balls. Two balls are drawn at randomly. Find the probability that they are of the same color. **5**

    b) What was the day of the week on 12th January 1863 ? **5**