

B.TECH.
(SEM IV) EVEN SEMESTER
MINOR TEST (EXAMINATION) 2019 -2020

SUBJECT NAME: OPTIMIZATION TECHNIQUES

Time: 2 hrs.

Note: Answer all questions.

Max. Marks: 30

Q.1 Attempt any three parts of the following. Q. 1(a) is compulsory.

- (a) Maximize $f(x_1, x_2) = 32x_1 + 50x_2 - 10x_1^2 + 20x_2^2$ subject to 4
 $3x_1 + x_2 \leq 11,$
 $2x_1 + 5x_2 \leq 16.$
 by method of Kuhn – Tucker conditions. Explain all cases.

- (b) Optimize the following problem by Langragian Method: 3

$$f = 9 - 8x_1 - 6x_2 - 4x_3 + 2x_1^2 + 2x_2^2 + x_3^2 + 2x_1x_2 + 2x_1x_3$$

$$\text{subject to } x_1 + x_2 + 2x_3 = 3$$

- (c) Find the all extreme points of the function 3
 $f(x_1, x_2, x_3) = 3x_1^3 - x_2^3 + x_3^3 - 4x_1 + 12x_2 - 24x_3$. Let the point $(\frac{2}{3}, -2, 2\sqrt{2})$ is
 the extreme point of the function, show the nature of this extreme point $(\frac{2}{3}, -2, 2\sqrt{2})$.
 (d) Find the minimum of the function 3

$$f(x) = x^4 - 5x^3 - 20x + 150$$

by the Golden section method in the interval (1, 6), given that $n = 6$.

Q.2 Attempt any three parts of the following. Q. 2(a) is compulsory.

- (a) Use dual simplex method to solve $\text{Max } z = -2x_1 - x_2$ subject to 4
 $3x_1 + x_2 \geq 3$
 $4x_1 + 3x_2 \geq 6$
 $x_1 + 2x_2 \geq 3$ and $x_1, x_2 \leq 0$.

- (b) Solve the problem, Maximize $f = 3x + 2y + 5z$ subject to conditions 3
 $x + 2y + z \leq 430$
 $3x + 2z \leq 460$
 $x + 4y \leq 420$
 $x \geq 0, y \geq 0, z \geq 0$
 by using simplex method.

- (c) Obtain the dual of the given LPP: $\text{Min } z = x_1 - 3x_2 + 7x_3$ 3

- (c) Obtain the dual of the given LPP: $\text{Min } z = x_1 - 3x_2 + 7x_3$ subject to the constraints 3

$$\begin{aligned} x_1 - 3x_2 + 4x_3 &= 5, \\ x_1 - 2x_2 + 5x_3 &\leq 3, \\ x_1 - 2x_2 - x_3 &\geq 4, \end{aligned}$$

$x_2, x_3 \geq 0$ and x_1 is unrestricted.

- (d) Solve by Karmarkar's method to the following L. P. problem: 3

$$\begin{aligned} \text{Minimize } f &= 4x_1 + 15x_2 - 13x_3 \text{ Subject to} \\ 3x_1 - 4x_3 &= 0, \\ x_1 + x_2 + x_3 &= 1, \end{aligned}$$

$x_i \geq 0, i = 1, 2, 3$. Use the value of $\varepsilon = 0.05$ for testing the convergence of the procedure and $\alpha = 1/4$.

Q.3 Attempt any three parts of the following. Q. 3(a) is compulsory.

- (a) Solve the following Linear Programming Problem by decomposition principle: 4

$$\begin{aligned} \text{Max } z &= x_1 + x_2 + 8000x_3 + 7000x_4 \text{ subject to,} \\ 8x_1 + 3x_2 + 500x_3 + 100x_4 &\leq 40, \\ 8x_1 + 10x_2 - 200x_4 &\leq 60, \\ x_1 + 2x_2 &\leq 2000, \\ x_1 + x_2 &\leq 1500, \\ x_2 &\leq 600 \\ 3x_3 + x_4 &\leq 66, \quad x_3 + x_4 \leq 45, \quad x_3 \leq 20, \quad x_4 \leq 40, \\ x_1 \geq 0, \quad x_2 \geq 0, \quad x_3 \geq 0, \quad x_4 \geq 0. \end{aligned}$$

- (b) Solve the following transportation problem by using Vogel's approximation method. 3

						Available	
	9	12	9	6	9	10	5
	7	3	7	7	5	5	6
	6	5	9	11	3	11	2
	6	8	11	2	2	10	9
Require	4	4	6	2	4	2	

- (c) Obtain the extreme point of the objective function. Also discuss its nature. 3

$$\begin{aligned} f(x_1, x_2, x_3) &= 20x_1 - 50x_2 + 40x_3 + 4x_1^2 + 5x_2^2 - 6x_3^2 + 2x_1x_3 \\ &\quad + 2x_2x_3 - 6x_1x_2 - 100. \end{aligned}$$

- (d) Find the minimum of the function $f(x) = 10x^5 - 40x^4 + 30x^3 + 5$ by Fibonacci method in the given interval (1, 3.5) up to 6 iterations. Also test the accuracy. 3

B. Tech.
EVEN SEMESTER
MINOR TEST 2019 - 2020

Subject Name: Computer Organization & Design

Time: 2 Hrs.

Max. Marks: 20

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

- (a). Design an Arithmetic unit to perform following operations on register with size of 4-bits- 4
- | | |
|---------------------------------------------|--------------------------------------------|
| I. Addition | II. Subtraction |
| III. Increment the content of register by 2 | IV. Decrement the content of register by 2 |
| V. Decrement the content of register by 1 | VI. Increment the content of register by 1 |
| VII. Addition with Carry | VIII. Subtraction with Borrow |
- (b). Answer the following questions considering 32-bit, single precision floating point IEEE representation 2
- What is the decimal value of the floating-point number C1D10000?
 - IEEE floating point notation of value -85.125 in Hexadecimal number system
- (c). Consider the two 8-bit numbers A=11000001 and B=10000100 stored in 2's complement format- 2
- Give the decimal equivalent of each number.
 - Add the two binary numbers and interpret the sum.
 - Determine the values of C, Z, S and V status bits after the addition.
- (d). A four-stage pipeline has the stage delays as 150, 120, 160 and 140 ns respectively. Registers are used between the stages and have a delay of 5 ns each. Compute- 2
- Pipeline cycle time
 - Non-pipeline execution time
 - Speed up ratio
 - Pipeline time for 1000 tasks
 - Sequential time for 1000 tasks
 - Throughput

Q.2 Attempt any Two parts of the following. Q. 2(a) is compulsory.

- (a). Design and explain a common bus system for a computer having 3-registers each of 4 bits using three state gates. 4
- (b). Design a four-bit arithmetic left and right shift circuit. 2

- (c). The 8-bit registers AR, BR, CR and DR initially have the following values: AR = 11110010 2
BR = 11111111 CR = 10111001 DR = 11101010. Determine the 8-bit values in each register after the execution of the following sequence of microoperations.

AR \leftarrow AR + BR

CR \leftarrow CR AND DR, BR \leftarrow BR + 1

AR \leftarrow AR - CR

Q.3 Attempt any Two parts of the following. Q. 3(a) is compulsory.

- (a). What is instruction format. Write a program that can evaluate the following expression 4
in-

$$X = (A-B) * ((C - D * E) / (F-A) * D)$$

I. Single Accumulator Organization

II. Stack Organization

III. General Register Organization

- (b). Consider the following table for ALU operation encoding 2

OPR Code	Operation	OPR Code	Operation
00000	Transfer	01010	OR
00001	Increment	01100	XOR
00010	Add	01110	Complement
00101	Subtract	10000	Shift Right
00110	Decrement	11000	Shift Left
01000	AND		

Assume that there are seven register in CPU with general register organization. Determine the microoperation that will be executed in processor for following control words-

- I. 00101001100101
- II. 00000000000000
- III. 01001001001100
- IV. 00000100000010
- V. 11110001110000

Give the control words for following instruction considering the above scenario-

I. R1 \leftarrow R2 + R3

I. R4 \leftarrow R4'

II. R5 \leftarrow R5 - 1

III. R6 \leftarrow shl R1

IV. output \leftarrow R7

V. Output \leftarrow R7 - R1

- (c). Explain the various types of Addressing mode with example. 2

BCS-16

Roll No. 2018021081

B.Tech
(SEM IV) Even Semester
Minor Test : 2019-2020

Subject Name : Theory Of Computation

Time : 2 hr

Note : Attempt all questions .

Max Marks:30

Q1. Attempt any three parts of the following . Q. 1(a) is compulsory.

- (a) Obtain a DFA that accepts set of all strings that , when interpreted as a binary integer is divisible by 5. Examples of such strings in the language are 0, 10011 , 1001100 and 0101.
- (b) Draw a NFA to accept the language: $L = \{w : w \text{ has arbitrary number of 2's followed by arbitrary number of 1's followed by arbitrary number of 0's} \}$.
- (c) Explain in brief about the algebraic laws for regular expression.
- (d) Draw a DFA to accept the language L over the alphabet $\Sigma = \{a,b\}$ such that L contains only strings having odd number of a's and odd number of b's.

Q2 . Attempt any three parts of the following . Q. 2(a) is compulsory.

- (a) Draw a DFA to accept the language : $L = \{ w : w \text{ has odd number of 0's followed by even number of 1's} \}$. Also write the regular expression for this language.
- (b) Explain the Myhill-Nerode theorem by taking a suitable example.
- (c) Using pumping lemma, show that $L = \{ ww^r : w \in (a+b)^* \}$ is not regular.
- (d) Differentiate between Moore and Mealy machines by taking a suitable example.

Q3 . Attempt any three parts of the following . Q. 3(a) is compulsory.

- (a) Using Brzozovski's method , convert the regular expression $(a+b)^*aba$ into the corresponding DFA.
- (b) Write regular expressions for the foilowing languages over the alphabet, $\Sigma = \{a, b\}$
 - (i) All strings that do not end with ab.
 - (ii) All strings that contain an even number a's.
 - (iii) All strings which do not contain the substring ba
- (c) Prove that regular languages are closed under intersection operation.
- (d) Explain Arden's theorem by taking a suitable example.

Time: 2 Hrs.

Max. Marks:20

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Question No. Q1(a) is compulsory.

- (a) Explain the functioning of major components of DBMS in a database system. 4
- (b) What are the advantages of having data files created by a DBMS over data files created by a procedural language? 2
- (c) Define the terms "Relation", "Arity of a relation", "Tuple", "Degree of a relation" in relational data model? Give Examples for each of them. 2
- (d) What are integrity constraints? Define and explain with suitable example the referential Integrity? 2

Q.2 Attempt any Two parts of the following. Question No. Q2(a) is compulsory.

- (a) Define to differentiate between (i) Schema and Instance, (ii) Key and Super key, (iii) Primary key and Foreign key, (iv) Strong Entity Set and Weak Entity Set. Support your answers giving suitable examples. 4
- (b) What are the levels of abstraction in a database system? Is there isolation among these levels? Justify your answer. 2
- (c) Draw an ER-Diagram to capture data in your university relevant for controller of examinations. Identify the entity sets and their attributes, primary keys and relationships among entity sets. 2

Q.3 Attempt any Two parts of the following. Question No. Q3(a) is compulsory.

- (a) Consider the relations under relation schemes given below 4
 - Supplier(Scode, Sname, Scity, Turnover)
 - Product(Pcode, Pname, Qty, Weight, Colour, Cost)
 - SuppliedProducts(Scode, Pcode, Qty)
 Write SQL statements and equivalent relational algebra statements to express the following queries:
 - i. Get all details of supplier who operate from Gorakhpur with turnover 90 crores,
 - ii. Get names of supplier whose names begins with character A and ends with character Z,
 - iii. For each product supplied, get the Product code, and city names where it is available.
 - iv. Get the names of suppliers who supply the product coded as 2020.
- (b) Consider the relations $r(R)$ and $s(S)$ under the schema $R(A, B, C)$ and $S(D, E, F)$ respectively. 2
 - i. $\pi_A(r)$
 - ii. $\sigma_{B=17}(r)$
 - iii. $r \times s$
 - iv. $\pi_{A,F}(\sigma_{C=D}(r \times s))$

Express the queries written above in Tuple Relational Calculus expressions.

- (c) Write notes on PL/SQL. 2

Paper code: MBA 113

Roll no:

2	0	1	8	0	2	1	0	8	4
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Course: MBA

Year 1st / Semester: 2nd

Minor Examination: Session 2019-2020

MANAGEMENT INFORMATION SYSTEM

Time: 2 hrs.

Maximum Marks: 30

NOTE: ATTEMPT ALL QUESTIONS. Each question carries equal marks.

Q1. Attempt any three of the following. Q.1 (a) is compulsory.

- Define MIS. Explain the recent trends developed in Information System. (4)
- MIS supports a manager in his functional responsibilities. Explain. (3)
- Why is long range plan of MIS necessary? How is it linked with the business plan of the organization? (3)
- Describe the contents of MIS plan. Explain the purpose of each one of them. (3)

Q2. Attempt any three of the following. Q.2 (a) is compulsory.

- Describe in detail the phases of Software Development Life cycle. How does Iterative Waterfall model works? (4)
- Explain the need and the steps followed during training of End users in MIS. (3)
- How does organization works as a system? Explain the Leavitt's diamond model of contemporary change in the organization. (3)
- Define Prototype. State its features. Explain the advantages and disadvantages of Prototype model. (3)

Q3. Attempt any three of the following. Q.3 (a) is compulsory.

- Explain the long term and short term planning process of MIS. List their advantages and disadvantages. (4)
- Describe the different types of Information System Planning. List their advantages and disadvantages. (3)
- What is Organizational Planning? Explain the importance of organizational Planning for the MIS planning. (3)
- What are the various issues involved in MIS Design and Development Process. Explain. (3)

BEC-32

Roll No.

2018021084

B. Tech. 2nd year(CSE)/3rd year(ECE)
MINOR TEST 2019 - 2020(Even Semester)

Microprocessors and Applications

Time: 2 Hrs.

Max. Marks: 20

Note: Answer all questions.

Q.1 Attempt any Three parts of the following. Q. 1(a) is compulsory.

- (a). What is the use of program counter and stack pointer? Take an appropriate example to explain how information is saved on to the stack of 8085? 4
- (b). What is the need of flag register? Discuss each flag bit of 8085. 2
- (c). Write a program to perform multiplication of two 8-bit numbers. 2
- (d). Six bytes of data are stored in memory locations starting from 2500H. Write a program to add all the data bytes and store the result at two consecutive memory locations, 2508H and 2509H. 2

Q.2 Attempt any Two parts of the following. Q. 2(a) is compulsory.

- (a). Explain the function of following pins of 8085: 4
(i)HOLD (ii)READY (iii) \overline{INTA} (iv) $\overline{IO/\overline{M}}$ (v) \overline{RD} (vi) RESET OUT (vii)TRAP (viii)SID
- (b). Explain the need to demultiplex the bus AD₇-AD₀. 2
- (c). Discuss why the number of output ports in the peripheral-mapped I/O is restricted to 256 ports. 2
In the peripheral-mapped I/O, can an input and an output port has same port address?

Q.3 Attempt any Two parts of the following. Q. 3(a) is compulsory.

- (a). Explain what operation will take place when the following instructions are executed: 4
(i)DAD (ii) IN 8 bit address (iii) LDA 16 bit address (iv)CMP M
Also give the information such as no of bytes, machine cycle, T-state, addressing mode and status of flags.
- (b). Draw the timing diagram of instruction STAX B. If processor is operating at 6 MHz, calculate its execution time. 2
- (c). Write a program to count from 0 to 9 with 1 ms delay between each count. At the count of 9, the counter should reset itself to 0 and repeat the sequence continuously. Assume the clock frequency of processor is 3MHz. 2