BCS

BEC-32

Roll No. 2 0 1 7 0 2 1 0 4 1

B. Tech.
EVEN SEMESTER
MINOR TEST 2018 - 2019

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 microprocessor? What is the difference between microprocessor and a CPU? Draw the architecture of 8085 and discuss in brief. 4

(b). Explain the function of following pins of 8085: 2
(i)IO/$\overline{M}$ (ii) HOLD (iii) $\overline{RESET\ IN}$ (iv)ALE (v) $\overline{INTA}$ (vi) TRAP (vii) SID (viii) RST 5.5

(c). Explain what operation will take place when the following instructions are execute.: 2
(i)LXI rp (ii) RAL (iii) SHLD addr (iv) CMP M
Also give the information such as no of bytes, machine cycle, T-state, addressing mode and status of flags.

(d) Explain the operational difference between CALL address and JMP address 2
instructions. What are the similarities between CALL and RST instructions?

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

(a). What is the need of demultiplexing the bus AD7-AD0? Explain with the help of 4
suitable schematic.

(b). What is machine cycle? Draw and discus the timing diagram of instruction IN 08H.If 2
processor is operating at 3 MHz, calculate its execution time.

(c). What is the significance of flag register? Draw and discuss the format of flag 2
register of 8085.

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

(a). What do you mean by addressing modes? Explain the various types of addressing 4
modes of 8085 with the help of suitable examples.

(b). Write a program to arrange a series of numbers in ascending order. These numbers 2
are stored in memory locations 2500H to 2509H.
54H,2AH,EBH,A2H,B7H,F2H,5AH,9CH,C9H,FCH

(c). Write a program to count from 0 to 9 with one second delay between each count. At 2
the count of 9, the counter should' reset itself to 0 and repeat the sequence
continuously. Assume the clock frequency of processor is 1 MHz.

BCS-15

Roll No.

B. Tech (Electrical Engg.)-5ᵗʰ Semester
ODD SEMESTER
MINOR TEST 2017-2018
Subject Name: Database Management System

Time: 2 Hrs.

Max. Marks: 20

Note: Answer all questions

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

a) What do you mean by database management system? Explain component of DBMS. (4)

b) Explain the term referential Integrity with example. (2)

c) What do you mean by DDL and DML? Explain with example. (2)

d) Draw a table of student with name, dob, mobile no, roll no, percentage also find the name of those student having more than 70% marks. (2)

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

a) What do you mean by E-R Diagram? Why do we use E-R diagram in database. Draw an E-R diagram for hospital. (4)

b) Explain primary key, candidate key, and foreign key with the example. (2)

c) Describe the three-tier architecture of DBMS with the help of example. (2)

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

a) Create a table of a employee having schema EMPNO, NAME, JOB, HIREDATE, DEPTNO, salary (4)
   1. Display employee Name which starts with 'A'.
   2. Name of employee whose salary is between 6000-8000.

b) What are equi-join and outer join? Explain with suitable example. (2)

c) Explain SQL and its advantages. Also explain SQL data types. (2)

B. TECH/M.TECH/MCA/MBA/M.SC,
(SEM IV) EVEN SEMESTER
MINOR TEST (EXAMINATION) 2018 -2019

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

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

$$f(x_1, x_2, x_3) = 2 x_1 - 3 x_2 + 4 x_3 + 4 x_1^2 + 4 x_2^2 - 6x_3^2 + 2x_1 x_3 + 2 x_2 x_3 - 100$$

subject to $x_1 - x_2 + x_3 = 10.$

(c) Discuss the nature of all extreme points of the problem:

$$f(x_1, x_2) = x_1^3 - 3x_1 x_2 + x_2^2 - 10 x_2.$$

(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) Min $z = 3 x_1 + x_2$ subject to   4
$$x_1 + x_2 \geq 1,$$
$$2x_1 + 3x_2 \geq 2,$$
$$3x_1 + 4x_2 \geq 6$$

$x_1, x_2 \geq 0$, by dual simplex method.

   3

(b) *Minimize* $z = -10x - 15y - 8z$
subject to constraints
$$x + 2y + 2z \leq 200,$$
$$2x + y + z \leq 220,$$
$$3x + y + 2z \leq 180,$$

$x \geq 0, y \geq 0, z \geq 0.$

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

$$x_1 - 3x_2 + 4x_3 = 5,$$
$$x_1 - 2x_2 + 5x_3 \le 3,$$
$$x_1 - 2x_2 - x_3 \ge 4,$$

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

3

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

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

$x_i \ge 0, \ i = 1, 2, 3$. 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
$$\text{Max } z = x_1 + x_2 + 8000 x_3 + 7000 x_4 \qquad \text{subject to,}$$
$$8x_1 + 3x_2 + 500 x_3 + 100 x_4 \le 40,$$
$$8x_1 + 10x_2 - 200 x_4 \le 60,$$
$$x_1 + 2x_2 \le 2000,$$
$$x_1 + x_2 \le 1500,$$
$$x_2 \le 600$$
$$3x_3 + x_4 \le 66, \quad x_3 + x_4 \le 45, \quad x_3 \le 20, \quad x_4 \le 40,$$
$$x_1 \ge 0, \ x_2 \ge 0, \ x_3 \ge 0, \ x_4 \ge 0.$$

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

120

						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
$$f(x_1, x_2, x_3) = 20 x_1 - 50 x_2 + 40 x_3 + 4 x_1^2 + 5 x_2^2 - 6x_3^2 + 2x_1 x_3$$
$$+ 2 x_2 x_3 - 6 x_1 x_2 - 100.$$

(d) Find the minimum of the function $f(x) = x^3 + x^2 - 30x - 2$ in the interval -1 to 5 by   3
Fibonacci method with $n = 6$.

Roll No. [2][6][1][7][0][7][1][9][3][5]

B. Tech.
(SEM IV) EVEN SEMESTER
MAJOR EXAMINATION 2018 - 2019

Theory of Computation

Time: 3 Hrs.

Max. Marks: 50

Note: Answer all questions.

Q.1 Attempt any five parts of the following. $(5 \times 2 = 10)$

(a) Give state diagram of DFA recognizing the following language. The alphabet is $\{0,1\}$. $L_1 = \{w \mid w$ does not contain the substring 110$\}$

(b) Give NFA with three states for the following language. $L_2 = \{w \mid w$ ends with 00$\}$

(c) Explain Myhill-Nerode theorem by taking a suitable example.

(d) Show that Moore and Mealy machines are equivalent.

(e) Using pumping lemma , show that the language $L_3 = \{ 0^n 1^m 0^n \mid m , n \geq 0 \}$ is not regular.

(f) Find a regular expression corresponding to each of the following subsets of $\{0,1\}^*$
  (i) The language of all strings not containing the substring 000.
  (ii) The language of all strings that do not contain the substring 110.

(g) For the regular expression (1 + 10)* , draw the corresponding DFA

Q.2 Attempt any two parts of the following. $(2 \times 5 = 10)$

(a) Give context-free grammars that generate the following languages. In all parts, the alphabet Σ is $\{0,1\}$.
  i. $\{w \mid w$ contains at least three 1s$\}$
  ii. $\{w \mid w$ starts and ends with the same symbol$\}$
  iii. $\{w \mid$ the length of w is odd$\}$
  iv. $\{w \mid$ the length of w is odd and its middle symbol is a 0$\}$
  v. $\{w \mid w = w^R,$ that is, w is a palindrome$\}$

(b) Begin with the grammar :
  $S \rightarrow ASB \mid \mathcal{E} , A \rightarrow aAS \mid a$ and $B \rightarrow SbS \mid A \mid bb$

  i.   Are there any useless symbols ? Eliminate them if so.
  ii. Eliminate $\mathcal{E}$ productions.
  iii. Eliminate unit productions.
  iv. Put the grammar into Chomsky normal form.

(c) Show that the class of context-free languages is closed under the regular operations, union, concatenation, and star.

Q.3 Attempt any two parts of the following. (2 × 5 = 10)

(a) Obtain a PDA to accept the language $L = \{w: w \varepsilon (a+b)^*$ and $n_a(w) > n_b(w)\}$

(b) Construct a PDA equivalent to the following grammar.
$S \rightarrow aAA, A \rightarrow aS | bS | a$

(c) Show that acceptance by final state is equivalent to acceptance by empty stack for Push down automata.
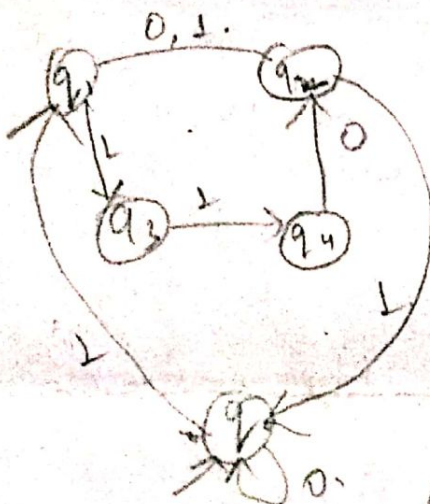
Q.4 Attempt any two parts of the following. (2 × 5 = 10)

(a) Obtain a Turing machine to accept a string w of a's and b's such that number of a's in w is equal to number of b's in w.

(b) Prove that if a language L is accepted by a multi tape Turing machine then it is accepted by a single tape Turing machine.

(c) Prove that the halting problem of Turing machines is undecidable.

Q.5 Attempt any two parts of the following. (2 × 5 = 10)

(a) Obtain a Turing machine to accept the language $L(M) = \{0^n1^n2^n: n \geq 0\}$

(b) Discuss in brief about primitive recursive functions.

(c) Prove that, if a Language L and its complement both are recursively enumerable then L is recursive as well.

GALAT HAI

YE WALA

$L_3 = \{0^n 1^m 0^n\}$.

$n = 2, m = 3$.

$\underline{0\,0}\,\underline{1\,1\,1}\,\underline{0\,0}$
$\ \ n\ \ \ \ y\ \ \ \ z$

$n y^i z$ such that $i = 2$.

$= n y^2 z$

$= 0\,0\,1\,1\,0\,1\,1\,0\,0$

Not found in L_3

now,
$\underline{0\,0}\,\underline{1\,1\,1}\,\underline{0\,0}$
$\ \ n\ \ \ y\ \ \ \ \ 2$

$n y^i z \quad i = 2$

$n y^2 z$

$0\,0\,1\,1\,0\,1\,1\,1\,0\,0$

$\rightarrow^n$ —

Not regular.

Roll No.

B.Tech.
EVEN SEMESTER
Major Examination 2018-2019
Database Management Systems

Time: 3 Hrs.   Max. Marks: 50

Note: Answer all questions. Each question carries equal marks.

Q.1 Attempt any five parts of the following: (5×2=10)
- (a) Explain the role of DDL, DML, Database Manager and File Manager in a DBMS.
- (b) Define Foreign key a suitable example.
- (c) Draw an E-R diagram to capture relevant data related to a hospital management system. Indicate a Primary Key for each Entity Set and identify relationships between entity sets.
- (d) Explain levels of abstractions in a database with suitable examples.
- (e) Define the terms Relation, Tuple, Tuple component, Arity of a Relation in relational data model and give example for each of them.
- (f) Define to differentiate between relational algebraic operations "Natural-Join" and "Theta Join" and explain with suitable examples.
- (g) Discuss safety of Tuple Relational Calculus Expressions.

Q.2 Attempt any two parts of the following.   (2×5=10)
- (a) Define the term Functional Dependency and explain all of its variants with suitable examples.
- (b) Let F be a set of functional dependencies on a set of attributes U, and X be a subset of U, then define F^+ and X^+. Write algorithm for computing X^+ and explain the algorithm with a suitable example.
- (c) Define the terms Multivalued Dependency and Inclusion Dependency and discuss their relevance in database design.

Q.3 Attempt any two parts of the following.   (2×5=10)
- (a) What are normalization and its motive? Differentiate between 2NF & 3NF. Explain them with suitable examples.
- (b) Define Lossless Join Decomposition and write algorithm for testing Lossless Joins. Consider a relation $R(A, B, C, D, E)$ with functional dependencies $A \rightarrow C, B \rightarrow C, C \rightarrow D, DE \rightarrow C, CE \rightarrow A$. Consider the decomposition of relation R into two relations $R1(A, D), R2(A, B), R3(B, E), R4(C, D, E)$ and $R5(A, E)$ and trace the algorithm. Lossless
- (c) Write notes on Normalization using MVD & JDS.

Q.4 Attempt any two parts of the following.   (2×5=10)
- (a) What is database transactions? Discuss its ACID properties.
- (b) Write algorithm for testing View serializable schedules of database transactions. Trace the algorithms for the schedule given below.

T1	T2	T3
Read(Q)		
	Write(Q)	
Write(Q)		
		Write(Q)

- (c) Define Conflict serializable schedules of database Transactions and Explain them with suitable examples.

Q.5 Attempt any two parts of the following.   (2×5=10)
- (a) What is lock based protocols for transaction concurrency control. Write Strict Two-Phase Locking and Rigorous Two Phase Locking protocol for the concurrency control and explain them with suitable example.
- (b) Write Timestamp-Ordering Protocol for the concurrency control and explain it with a suitable example.
- (c) Discuss the methods for recovery from transaction failures.

B. Tech.
EVEN SEMESTER
MAJOR EXAMINATION 2018 - 2019
COMPUTER ORGANIZATION & DESIGN

Time: 3 Hrs.

Note: Attempt all questions. Each question carries equal marks.

Max. Marks: 50

1. Attempt any five parts of the following:

   (5×2 = 10)

   (a) Consider an instruction pipeline with five stages without any branch prediction: Fetch Instruction (FI), Decode Instruction (DI), Fetch Operand (FO), Execute Instruction (EI) and Write Operand (WO). The stage delays for FI, DI, FO, EI and WO are 5 ns, 7 ns, 10 ns, 8 ns and 6 ns, respectively. There are intermediate storage buffers after each stage and the delay of each buffer is 1 ns. A program consisting of 12 instructions I1, I2, I3, ..., I12 is executed in this pipelined processor. Instruction I4 is the only branch instruction and its branch target is I9. If the branch is taken during the execution of this program, find out the time (in ns) needed to complete the program.

   (b) What is pipelining? Consider A nonpipelined system that takes 50 ns to process a task. The same task can be processed in a 6-segment pipeline with a clock cycle of 10s. Determine the speed up ratio of the pipeline for 100 tasks. What is maximum speedup ratio that can be achieved?

   (c) The value of a float type variable is represented using the single-precision 32-bit floating point format IEEE-754 standard that uses 1 bit for sign, 8 bits for biased exponent and 23 bits for mantissa. A float type variable X is assigned the decimal value of −48.625. Find out the representation of X in hexadecimal notation.

   (d) The content of the top of memory stack is 5320. The content of the stack pointer(SP) is 3560. A two-word call subroutine instruction is located in memory at address 1120 followed by the address field of 6720 at location 1121. What are the contents of PC, SP and the top of the stack-

   I. Before the call instruction is fetched from the memory
   II. After the call instruction is executed.
   III. After the return from subroutine

   (e) An instruction is stored at location 300 with its address field at location 301. The address field has value 400. A processor register R1 contains the number 200. Evaluate the effective address for following addressing modes-

   I. Direct
   II. Immediate
   III. Relative
   IV. Register Indirect
   V. Indexed with R1 as Indexed Register

   (f) Design and explain briefly a common bus system for a computer having 4-registers each of 8 bits.

   (g) Given the 16bit value 1001101011001101. What operations are required in order to

   I. Complement the middle eight bits
   II. Complement even indexed bits
   III. Set to 1 the last eight bits
   IV. Set all bits to zero

2. Attempt any two parts of the following:

   (2×5 = 10)

   (a) Explain Booth multiplication algorithm with flowchart and suitable example.

   (b) Perform the arithmetic operations below with signed-2's complement representation. Use seven bits to accommodate each number together with its sign. Also, determine whether there is an overflow or not.

   I. (+35) + (+40)

II.   (-35) + (-40)
III.   (-80) - (+16)
IV.   (+15) - (-30)

(c) Draw the flowchart for multiplication of two decimal numbers and explain the process with a suitable example.

3.   **Attempt any two parts of the following:**   (2× 5 = 10)

(a) Show the contents of registers E, A, Q, and SC during the process of decimal division of 10100011 by 1011 and 00001111 by 0011. Use a dividend of eight bits.

(b) Explain the process of division of two floating point numbers with the help of flowchart and suitable example.

(c) Design and explain an array multiplier that multiplies two 4-bit numbers. Use AND gates and binary adders.

4.   **Attempt any two parts of the following:**   (2× 5 = 10)

(a) Answer the following questions-

I.   Consider a system with 2 level caches. Access times of Level 1 cache, Level 2 cache and main memory are 1 ns, 10ns, and 500 ns, respectively. The hit rates of Level 1 and Level 2 caches are 0.8 and 0.9, respectively. What is the average access time of the system ignoring the search time within the cache?

II.   Consider a direct mapped cache of size 32 KB with block size 32 bytes. The CPU generates 32-bit addresses. Find out the number of bits needed for cache indexing and tag bits.

(b) Describe DMA with suitable block diagram. Why does DMA have priority over the CPU when both request a memory transfer? Explain.

(c) Explain the memory hierarchy in brief. Consider A computer uses RAM chips of 128 * 8 capacity and answer the below questions-

I.   How many 128 x 8 RAM chips are needed to provide a memory capacity of 2048 bytes?
II.   How many lines of the address bus must be used to access 2048 bytes of memory? How many of these lines will be common to all chips?
III.   How many lines must be decoded for chip select? Specify the size of the decoders.

5.   **Attempt any two parts of the following:**   (2× 5 = 10)

(a) A virtual memory system has an address space of 8K words, a memory space of 4K words, and page and block sizes of 1K words. The following page reference changes occur during a given time interval.

4 2 0 1 2 6 1 4 0 1 0 2 3 5 7.

Determine the four pages that are resident in main memory after each page reference change if the replacement algorithm used is

I.   FIFO
II.   LRU
III.   Optimal Page Replacement

(b) Explain the following modes of data transfer in brief-

I.   Programmed I/O
II.   Interrupt-initiated I/O

(c) Explain the various methods used for asynchronous data transfer with a suitable diagram.