BTECH
(SEM III) THEORY EXAMINATION 2018-19
COMPUTER ORGANIZATION AND ARCHITECTURE

Time: 3 Hours　　　　　　　　　　　　　　　　　　*Total Marks: 70*

Note: 1.　　Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.　　**Attempt *all* questions in brief.**　　　　　　　　　　**2 x7 = 14**

   a.　What do you understand by Locality of Reference?
   b.　Which of the following architecture is/are not suitable for realizing SIMD?
   c.　What is the difference between RAM and DRAM?
   d.　What are the difference between Horizontal and vertical micro codes? .
   e.　Describe cycle stealing in DMA.
   f.　List three types of control signals.
   g.　Define the role of MIMD in computer architecture.

SECTION B

2.　　**Attempt any *three* of the following:**　　　　　　　**7 x 3 = 21**

   a.　Evaluate the arithmetic statement $X = (A+B)*(C+D)$ using a general register computer with three address, two address and one address instruction format a program to evaluate the expression .
   b.　Perform the division process of 00001111 by 0011(use a dividend of 8 bits).
   c.　A two way set associative cache memory uses blocks of 4 words. The cache can accommodate a total of 2048 words from memory. The main memory size is 128K X 32.
   　　　i.　Formulate all pertinent information required to construct the cache memory.
   　　　ii.　What is the size of cache memory?
   d.　What is associative memory? Explain with the help of a block diagram. Also mention the situation in which associative memory can be effective utilized.
   e.　A Computer uses a memory unit with 256K words of 32 bits each. A binary instruction code is stored in one word of memory. The instruction has four parts: an indirect bit, an operation code, a register code part to specify one of 64 registers and an address part.
   　　(i) How many bits are there in the operation code, the register code part and the address part?
   　　(ii) Draw the instruction word format and indicate the number of bits in each part.
   　　(iii) How many bits are there in the data and address inputs of the memory?

3. **Attempt any _one_ part of the following:** $\quad$ **7 x 1 = 10**

   (a) Write short notes on :
(i) Instruction pipeline.
(ii) DMA based data transfer.

   (b) Explain the difference between vectored and non-vectored interrupt. Explain stating examples of each.

4. **Attempt any _one_ part of the following:** $\quad$ **7x 1 = 10**

   (a) Draw the flow chart of Booth's Algorithm for multiplication and show the multiplication process using Booth's Algorithm for (-7) X (+3).

   (b) Write short notes on:
     (i) $\quad$ Amdahl's Law
     (ii) $\quad$ Pipelining

5. **Attempt any _one_ part of the following:** $\quad$ **7 x 1 = 10**

   (a) What is a microprogram sequencer? With block diagram, explain the working of microprogram sequencer.

   (b) Draw a flowchart for adding and subtracting two fixed point binary numbers where negative numbers are signed 1's complement presentation.

6. **Attempt any _one_ part of the following:** $\quad$ **7 x 1 = 10**

   (a) Give the block diagram of DMA controller. Why are the read and write control lines in a DMA controller bidirectional?

   (b) Explain all the phases of instruction cycle.

7. **Attempt any _one_ part of the following:** $\quad$ **7 x 1 = 10**

   (a) Explain the basic concept of Hardwired and Software control unit with neat diagrams.

   (b)

	1	2	3	4	5	6
S1	X					X
S2		X			X	
S3			X			
S4				X		
S5		X				X

For the following Reservation table:

   i. $\quad$ Calculate the set of the forbidden latencies and collision vector.

   ii. $\quad$ Draw a state diagram, showing all possible initial sequences (cycles) without a collision in the pipeline.

   iii. $\quad$ Simple cycles (SC)

   iv. $\quad$ Greedy cycles among simple the cycles

   v. $\quad$ MAL (minimum average latency)

   vi. $\quad$ What is the minimum allowed constant cycles

   vii. $\quad$ Maxi. Throughput

   viii. $\quad$ Throughput if the minimum constant cycle is used.

B. Tech.
(SEM III) THEORY EXAMINATION 2018-19
DATA STRUCTURES USING C

Time: 3 Hours   *Total Marks: 100*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. **Attempt *all* questions in brief.**   **2 x 10 = 20**

   a.   Differentiate between overflow and underflow condition in a linked list.

   b.   Define connected graph and complete graph with example.

   c.   With the help of algorithm explain the binary search.

   d.   Write a program in C to compute the factorial of given number recursively.

   e.   Define Binary search tree. How it is different from binary tree?

   f.   How the graph can be represented in memory? Explain with suitable example.

   g.   Explain stable and in place sorting?

   h.   Write the syntax to check whether a given circular queue is full or empty?

   i.   Convert the following infix expression into postfix expression:
         B-C/D+A*(F-G/H)

   j.   What are the advantages and disadvantages of array over linked list?

SECTION B

2. **Attempt any *three* of the following:**   **10 x 3 = 30**

   a.   Assume the declaration of multi-dimensional arrays A and B to be,
         A (-2:2, 2:22) and B (1:8, -5:5, -10:5)
         (i)   Find the length of each dimension and number of elements in A and B.
         (ii) Find the address of element B (2, 2, 3), assuming Base address of B = 400
               and there are W=4 words per memory location.

   b.   Write a Program in C to implement all operations of a Stack using array.

   c.   Suppose the following list of letters is inserted in order into empty binary
         search tree: J, R, D, G, T, E, M, H, P, A, F, Q
         (i)   Construct the binary Search Tree
         (ii) Find the in-order, Pre-order and Post-order Traversal of the BST created.

   d.   Explain Depth First Search Traversal in Graph with the help of an example.

   e.   Classify the Hashing Functions based on the various methods by which the key
         value is found. What are the types of Collision Resolution Techniques and the
         methods used in each of the type?

SECTION C

3. **Attempt any *one* part of the following:**   **10 x 1 = 10**

   (a)   Illustrate the operation of Quick sort on the array, A= (19, 4, 7, 24, 52, 56, 87)

   (b)   Discuss the advantages of using B-Tree. Insert the following Information 86,
         23, 91, 4, 67, 18, 32, 54, 46, 96, 45 into an empty B-Tree with order 4.

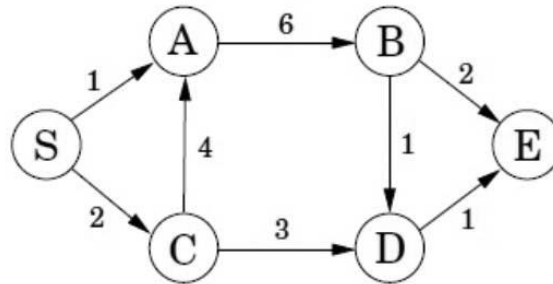**4.** **Attempt any *one* part of the following:** 10 x 1 = 10

    (a)   Write a program in C for implementation of queue. Your program should at least contain ADD, CREATE, DELETE, FULL, EMPTY functions.

    (b)   Explain Tower of Hanoi problem and write a recursive algorithm to solve it.

5. **Attempt any *one* part of the following:** 10 x 1 = 10

    (a)   Define Floyd Warshall Algorithm for all pair shortest path and apply the same on following graph:
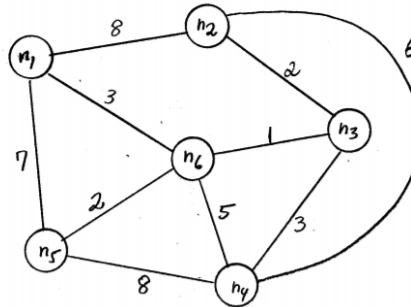
    (b)   Considering 'S' as source vertex, Apply the Dijkstra's shortest path algorithm on the following graph:

6. **Attempt any *one* part of the following:** 10 x 1 = 10

    (a)   Construct the binary tree using following in-order and post-order traversal.

        In-order   : DBMINEAFCJGK

        Post-order : ABDEIMNCFGJK

    (b)   Differentiate between fixed length and variable length encoding. Draw the Huffman tree for the following symbols whose frequency of occurrence in message is stated along with symbol below
           A:15, B:6, C:7, D:12, E:25, F:4, G:6, H:1, I:15

        Decode the message: 1110100010111011

7. **Attempt any *one* part of the following:** 10 x 1 = 10

    (a)   Write a program to insert a new element in the given unsorted array at k^{th} position.

    (b)   Write a program to implement linear linked list, showing all the operations that can be performed on a linked list.

B. TECH.
(SEM III) THEORY EXAMINATION 2018-19
DISCRETE STRUCTURES AND THEORY OF LOGIC

Time: 3 Hours   *Total Marks: 70*

Note: **1.** Attempt all Sections. If require any missing data; then choose suitably.
      2. Any special paper specific instruction.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 7 = 14**

    a.   Find the power set of each of these sets, where a and b are distinct elements.
        i) $\{a\}$ ii) $\{a, b\}$ iii) $\{\emptyset, \{\emptyset\}\}$ iv) $\{a, \{a\}\}$

    b.   Define Ring and Field.

    c.   Draw the Hasse diagram for D_{30}.

    d.   What are the contrapositive, converse, and the inverse of the conditional statement "The home team wins whenever it is raining?"

    e.   How many bit strings of length eight either start with a '1' bit or end with the two bits '00'?

    f.   Define Injective, surjective and bijective function.

    g.   Show that $\neg (p \vee q)$ and $\neg p \wedge \neg q$ are logically equivalent.

SECTION B

2.   **Attempt any *three* of the following:**   **7 x 3 = 21**

    a.   A total of 1232 student have taken a course in Spanish, 879 have taken a course in French, and 114 have taken a course in Russian. Further, 103 have taken courses in both Spanish and French, 23 have taken courses in both Spanish and Russian, and 14 have taken courses in both French and Russian. If 2092 students have taken at least one of Spanish, French, and Russian, how many students have taken a course in all three languages?

    b.   (i)   Let H be a subgroup of a finite group G. Prove that order of H is a divisor of order of G.
        (ii)   Prove that every group of prime order is cyclic.

    c.   Define a lattice. For any a, b, c, d in a lattice $(A, \leq)$ if $a \leq b$ and $c \leq d$ then show that $a \vee c \leq b \vee d$ and $a \wedge c \leq b \wedge d$.

    d.   Show that $((p \vee q) \wedge \sim (\sim p \wedge (\sim q \vee \sim r))) \vee (\sim p \wedge \sim q) \vee (\sim p \vee r)$ is a tautology without using truth table.

    e.   Define a Binary Tree. A binary tree has 11 nodes. It's in order and preorder traversals node sequences are:
        Preorder: A B D H I E J K C F G
        In-order: H D I B J E K A F C G
        Draw the tree.

SECTION C

3. **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a) Prove that if n is a positive integer, then 133 divides $11^{n+1} + 12^{2n-1}$.

(b) Let n be a positive integer and S a set of strings. Suppose that R_n is the relation on S such that s R_n t if and only if s = t, or both s and t have at least n characters and the first n characters of s and t are the same. That is, a string of fewer than n characters is related only to itself; a string s with at least n characters is related to a string t if and only if t has at least n characters and t begins with the n characters at the start of s.
What is the equivalence class of the string 0111 with respect to the equivalence relation R.

4. **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a) Let G = {1, -1, i, -i} with the binary operation multiplication be an algebraic structure, where i = $\sqrt{-1}$. Determine whether G is an Abelian or not.

(b) What is meant by a ring? Give examples of both commutative and non-commutative rings.

5. **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a) Show that the inclusion relation $\subseteq$ is a partial ordering on the power set of a set S. Draw the Hasse diagram for inclusion on the set P (S), where S = {a, b, c, d}. Also Determine whether (P (S), $\subseteq$) is a lattice.

(b) Find the sum-of-products and Product of sum expansion of the Boolean function F (x, y, z) = (x + y) z'.

6. **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a) What is a tautology, contradiction and contingency? Show that (p ∨ q) ∧ (¬ p ∨ r) → (q ∨ r) is a tautology, contradiction or contingency.

(b) Show that the premises "It is not sunny this afternoon and it is colder than yesterday," "We will go swimming only if it is sunny," "If we do not go swimming, then we will take a canoe trip," and "If we take a canoe trip, then we will be home by sunset" lead to the conclusion "We will be home by sunset."

7. **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a) What are different ways to represent a graph. Define Euler circuit and Euler graph. Give necessary and sufficient conditions for Euler circuits and paths.

(b) Suppose that a valid codeword is an n-digit number in decimal notation containing an even number of 0's. Let a_n denote the number of valid codewords of length n satisfying the recurrence relation $a_n = 8a_{n-1} + 10^{n-1}$ and the initial condition $a_1 = 9$. Use generating functions to find an explicit formula for a_n.

Mathematics IV KAS302

Assignment 1

1. In an asymmetrical distribution mean is 16 and median is 20. Calculate the mode of the distribution.
2. The lines of regression of y on x and x on y are respectively y = x+5 and 16x - 9y = 94, Find the correlation coefficient.
3. Find the moment generating function of the discrete Binomial distribution. Also find the first and second moments about mean.
4. The first four moments of a distribution about x = 4 are 1, 4, 10 and 45. Find the moments about mean and origin. State whether the distribution is leptokurtic or platykurtic.
5. A random variable X has the following probability function: Value of X, Find k and Evaluate P(X<6), P(X ≥ 6).

x	0	1	2	3	4	5	6	7
p(x)	0	k	2k	2k	3k	k^2	$2k^2$	$7k^2 + k$

6. An urn I contains 3 white and 4 red balls and an urn II contains 5 white and 6 red balls. One ball is drawn at random from one of the urns and is found to be white. Find the probability that it was drawn from urn I.
7. Fit a Poisson distribution to following data and find theoretical frequencies

X	0	1	2	3	4
f(x)	192	100	24	3	1

8. Define the coefficient of skewness. Find the coefficient of skewness from the following data:

Years under	10	20	30	40	50	60
No of Persons	15	32	51	78	97	109

9. Obtain the rank correlation coefficient for the following data:

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

10. The curve of best fit of the type $y = ae^{bx}$ to following data by the method of least squares:

x:	1	2	3	4
f(x):	6	11	18	27

11. Find the moment generating function of the the probability distribution function given by

$$f(x) = \begin{cases} x, for\ 0 < x < 1 \\ 2 - x, for\ 1 \le x < 2 \\ 0, elsewhere \end{cases}$$

12. In a partially destroyed laboratory record of an analysis of a correlation data, the following results only are legible:
    Variance of x = 9, Regression equations: 8x-10y+66=0, 40x-18y=214.
    What were (a) the mean values of x and y (b) the standard deviation of y and the coefficient of correlation between x and y.

B.Tech.
(SEM III) THEORY EXAMINATION 2017-18
COMPUTER ORGANIZATION & ARCHITECTURE

Time: 3 Hours   *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   Attempt *all* questions in brief.   2 x 7 = 14

   a.   Draw the circuit diagram of D Flip Flop.
   b.   Write the difference between RAM & ROM.
   c.   Write short note on pipelining process.
   d.   Write the difference between serial & parallel communication.
   e.   Perform the following operation on signed numbers using 2's compliment method: $(56)_{10} + (-27)_{10}$
   f.   Write speed up performance laws.
   g.   Differentiate between Horizontal & Vertical microprogramming.

SECTION B

2.   Attempt any *three* of the following: 7 x 3 = 21

   a.   What is programmable logic device? List various techniques to program PLD. Explain any one technique with example.
   b.   (i)   Draw the block diagram for a small Accumulator based CPU
         (ii)   How floating point numbers are represented in computer, also give IEEE 754 standard 32-bit floating point number format.
   c.   Draw the data path of sequential n bit binary divider. Give the non restoring division algorithm for unsigned integers. Also illustrate algorithm for unsigned integer with a suitable example.
   d.   What is micro programmed control unit? Give the basic structure of micro programmed control unit. Also discuss the microinstruction format and the control unit organization for a typical micro programmed controllers using suitable diagram.
   e.   What do you mean by locality of reference? Explain with suitable example.

SECTION C

3.   Attempt any *one* part of the following: 7 x 1 = 7

   (a)   Differentiate between RISC & CISC based microprocessor.
   (b)   Explain Booths multiplication algorithm in detail.

4.   Attempt any *one* part of the following: 7 x 1 = 7

   (a)   Draw the Data path of 2's compliment multiplier. Give the Robertson multiplication algorithm for 2's compliment fractions. Also illustrate the algorithm for 2's compliment fraction by a suitable example.
   (b)   Describe Sequential Arithmetic & Logic unit (ALU) using proper diagram

5.   Attempt any *one* part of the following: 7 x 1 = 7

   (a)   Give the structure of commercial 8MX 8 bit DRAM chip.
   (b)   Explain the working of DMA controller with help of suitable diagrams.

6. **Attempt any *one* part of the following:**   **7 x 1 = 7**

    (a)   What is hardwired control? List various design methods for hardwired control. Discuss in detail using diagram any one of the method for designing GCD processor.

    (b)   How pipeline performance can be measured? Discuss. Give a space time diagram for visualizing the pipeline behavior for a four stage pipeline.

7. **Attempt any *one* part of the following:**   **7 x 1 = 7**

    (a)   Discuss the various types of address mapping used in cache memory.

    (b)   A moving arm disc storage device has the following specifications:

        Number of Tracks per recording surface   200
        Disc rotation speed   2400 revolution/minute
        Track-storage capacity   62500 bits
        Estimate the average latency and data transfer rate of this device.

Printed Pages: 02   **Sub Code: NCS301**

Paper ID: | 1 | 0 | 3 | 3 | **Roll No.** | | | | | | | | | | |

B TECH
(SEM III) THEORY EXAMINATION 2017-18
DATA STRUCTURES USING C

Time: 3Hours   *Max. Marks: 100*
Note: Attempt all Sections. Assume missing data, if any.
SECTION A

1.   Attempt *all* questions in brief.   10x2=20

a. List out the areas in which data structures are applied extensively?
b. What data structure is used to perform recursion?
c. What are the methods available in storing sequential files?
d. What are the advantages of B $^{+}$ tree over B- tree?
e. Define graph. How a graph is different from a tree?
f. Define space complexity and time complexity.
g. How a pointer to a function is declared in C?
h. Define priority queue.
i. What is binary tree? Explain.
j. Define garbage collection.

SECTION B

2.   Attempt any *three* of the following: 10 x 3 = 30

a. Write a program in C for implementation of a queue. Your program should at least contain ADD, CREATE. DELETE, FULL and EMPTY functions.
b. If an array is defined as int a[10] [20] in C, devise a formula to calculate the address of an any variable say a[i] [j], for any valid value of i and j.
c. Write a program to implement STACK using linked list.
d. Write an algorithm to multiply two matrices and determine complexity of the algorithm.
e. What is binary search tree? Write the important applications of binary search tree. Write algorithm to delete a node from a binary search tree.

SECTION C

3.   Attempt any *one* part of the following: 10 x 1 = 10

(a) What do you mean by hashing and collision? Discuss the advantages and disadvantages of hashing over other searching techniques.
(b) Write short notes on following
    i.) B-Tree
    ii.) Minimum cost spanning tree

4.   Attempt any *one* part of the following: 10 x 1 = 10

(a) Write a program to implement tree traversals using linked list.

(b) Describe a procedure to convert a recursive algorithm to a non recursive Algorithm.

5.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

   (a) What is a doubly linked list? How is it different from the single linked list?

   (b) What is a sparse matrix? How sparse matrix can be represented efficiently in memory?

6.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

   (a) Discuss Huffman algorithm and its significance.

   (b) Write Dijkastra algorithm for finding the shortest path from a source vertex.

7.   **Attempt any *one* part of the following:**   **10 x 1 = 10**

   (a) What are the various asymptotic notations? Explain with example.

   (b) If the Tower of Hanoi is operated on n=10 disks, calculate the total number of moves.

B.Tech.

(SEM III) THEORY EXAMINATION 2017-18
Discrete Structures & Theory of Logic

Time: 3 Hours   *Total Marks: 70*

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.
  2. Any special paper specific instruction.

SECTION A

1.   Attempt *all* questions in brief.   2 x 7 = 14

a. Define Eulerian path, circuit and graph

b. Let A=(2,4,5,7,8)=B ,aRb if and only if a+b<=12.Find relation matrix

c. Explain edge coloring and k egde coloring.

d. Define Chromatic number and Isomorphic graph.

e. Define union and intertersection of multiset and find for
    A=[1,1,4,2,2,3],B=[1,2,2,6,3,3].

f. Find the contrapositive of –"If he has courage, then he will win".

g .Define rings and write its properties.

SECTION B

2.   Attempt any *three* of the following: 7 x 3 = 21

a. Prove by mathematical induction
          $3+33+333+\ldots\ldots\ldots\ldots33..3 = (10^{n+1}-9n-10)/27$

b. Define the following with one example:
    i) Bipartite graph.

    ii) Complete graph.

    iii) How many edges in K_7 and $K_{3,6}$

    iv) Planar Graph.

c. For any positive integer D36, then find whether (D36,'|') is lattice or not?

d. Let X={1,2,3.....7} and R={(x,y) | (x-y) is divisible by 3).Is R equivalence   relation
    Draw the diagraph of R

e. Simplify the following Boolean function using K-map:
    $F(x,y,z)=\sum(0,2,3,7)$

SECTION C

3. **Attempt any _one_ part of the following:** **7 x 1 = 7**

(a) Solve $a_r - 6a_{r-1} + 8a_{r-2} = r.4^r$, given $a_0 = 8$, and $a_1 = 1$.

(b) Show that: $r \rightarrow \sim q$, $r \vee s$, $s \rightarrow \sim q$, $p \rightarrow q \leftrightarrow \sim p$ are inconsistent

4. **Attempt any _one_ part of the following:** **7 x 1 = 7**

(a) Write the properties of Group. Show that the set(1,2,3,4,5)is not group under addition and multiplication modulo 6.

(b) Prove by mathematical induction
$n^4 - 4n^2$ is divisible by 3 for all $n >= 2$.

5. **Attempt any _one_ part of the following:** **7 x 1 = 7**

(a)Explain Modular lattice, distribute lattice and bounded lattice with eg and diagram

(b) Draw the Hasse diagram of $(A, \leq)$, where

A= {3,4,12,24,48,72} and relation $\leq$ be such that $a \leq b$ if a divides b

6. **Attempt any _one_ part of the following:** **7 x 1 = 7**

(a) Given the inorder and postorder traversal of a tree T
Inorder : HFEABIGDC   Postorder : BEHFACDGI .

Determine the tree T and its Preorder.

(b) Translate the following sentences in quantified expressions of predicate logic.

i) All students need financial aid.
ii) Some cows are not white..
iii) Suresh will get if division if and only if he gets first div.
iv) if water is hot,then shyam will swim in pool.
v) All integer are either even or odd integer.

7. **Attempt any _one_ part of the following:** **7 x 1 = 7**

(a) Define and Explain any two the following:
1. BFS and DFS in Trees.
2. Euler Graph
3. Adjacency matrix of a graph.

(b) Solve the recurrence relation: $a_r + 4a_{r-1} + 4a_{r-2} = r^2$.

Mathematics IV KAS302

Assignment 2

1. If the regression coefficient are 0.8 and 0.2, what would be the value of coefficient of correlation?

2. A random variable X takes values 1,2,3…. With probability mass function $\frac{\lambda^r}{r!}, r = 1,2,3 \dots \infty$ find the value of λ.

3. A couple has two children. Find the probability that both children are boys, if it is known that at least one of the children is a boy.

4. Four persons are chosen at random from a group containing 3 men, 2 women and 4 children. Prove that the chance that exactly two of them will be children is 10/21.

5. Explain t-test for "small samples".

6. Write the test statistic for z test of significance for difference of means of two large samples.

7. In a certain factory turning out razor blade, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in a packet of 10. Use Poisson distribution to calculate the approximate number of packets containing blades with no defective, one defective and two defectives blades in a consignment of 10,000 packets.

8. In a sample of 1000 cases, the mean of a certain test is 14 and S.D. is 2.5. Assuming the distribution to be Normal, find
   (i)   How many students score between 12 and 15?
   (ii)   How many score above 18?
   (iii)   how many score below 8?
    Given f(0.8)=0.2881 , f(0.4)=0.1554 , f(1.6)=0.4452 , f(2.4)=0.4918

9. Out of 800 families with 4 children each find the expected number of families with (i) 2 boys and 2 girls   (ii)at least one boys   (iii)no girl   (iv) at most 2 girls? Assume equal prob for boys and girls.

10. Show that Poisson Distribution is a particular limiting form of the Binomial Distribution when p or q is very small, and n is large enough.

11. Fit an exponential curve obeying the gas equation $PV^{\gamma} = K$ for the data:

V	50	100	150	200
P	135	48	26	17

12. The average income of persons was Rs 210 with a S.D. of Rs 10 in a sample of 100 people of a city. For another sample of 150 persons, the average income was Rs 220 with S.D. of Rs 12. The S.D. of incomes of the people of the city was Rs 11. Test whether there is any significant difference between the average incomes of the localities. Given Z tabulated value at 5% level 1.96.

13. Calculate first four moments from the following frequency distribution table and hence find coefficient of skewness and kurtosis.

x	5-15	15-25	25-35	35-45	45-55	55-65
f	10	20	25	20	15	10

14. The first four moments of the distribution about the value 4 of the variables are -1.5, 17, - 30 and 108. Find the moments about the mean, origin; and measure the skewness and Kurtosis also.
15. In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation. Given f(0.5) =0.19 and f(1.4) =0.42.

B.TECH.
THEORY EXAMINATION (SEM–IV) 2016-17
COMPUTER ORGANIZATION

Time : 3 Hours   *Max. Marks : 100*

Note : *Be precise in your answer. In case of numerical problem assume data wherever not provided.*

SECTION-A

1   Explain the following : (10×2=20)

a) What is multiplexer? Give some applications of multiplexer.

b) Show the bit configuration of 24 bit register when its contents represent the decimal equivalent of 195 in BCD.

c) Discuss self complementing BCD code.

d) What is micro code? Explain.

e) What do you understand by wide branch addressing? Explain.

f) Write short note on RISC.

g) Write short note on indirect addressing.

h) Discuss write back method.

i) What is flash memory?

j) What is asynchronous data transfer? Explain.

SECTION-B

2   Attempt any five of the following : (10×5=50)

a) Register A holds the 8-bit binary 11011001. Determine the B operand and the logic micro operation to be performed in order to change the value in A to

    i.   01101101

    ii.   11111101

b) Give the hardware implementation of following operations;-

    i.   Selective set

    ii.   Selective complement

c) Write a program to evaluate the arithmetic statement

$$X=(A-B+C*(D*E-F))/(G+H*K)$$

    i.   Using a general register computer with three address instructions.

    ii.   Using an accumulator type computer with one address instruction.

d) Give the brief description of various I/O bus architecture.

e) What do you understand by hardwired control? Also discuss DMA.

f) Write short nots on

    i.   Serial communication

    ii.   Input Output Processor

g) A virtual memory has page size of 1 K words. There are 8 pages and 4 blocks. The associative memory page table contains the following entries

Page	Block
0	3

1	1
4	2
6	0

Make a list of all virtual addresses (in decimal) that will cause a page fault if used by the CPU.

h) Explain decoder. Draw the block diagram of 2 to 4 line decoder with NAND gate. Also show its truth table.

SECTION-C

Attempt any two of the following : (15×2=30)

3. Attempt the following

   a) Give the block diagram of DMA controller. Why are the read and write control lines in a DMA controller bidirectional?
   b) Discuss the working principle of I/O processor

4. Attempt the following

   a. What do you mean by asynchronous data transfer? Explain strob controller and hand shaking mechanism for asynchronous data transfer.
   b. Convert the followings
      i. $(100100)_2$ = $(?)_{10}$
      ii. $(235.41)_7$ = $(?)_{13}$

5. Attempt the following

   a. An encoded microinstruction format is to be used. Show how a 9 bit micro operation field can be divided in to sub field to specify 46 different actions.
   b. How a processor executed instructions? Define the internal functional units of a processor and how they are interconnected?

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(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2012267   Roll No.

B.TECH

Regular Theory Examination (Odd Sem - III), 2016-17

DATA STRUCTURES USING 'C'

Time : 3 Hours   *Max. Marks : 100*

Section - A

1.   **Attempt all parts. All parts carry equal marks. Write answer of each part in short.   (10×2=20)**

a)   Define time complexity and space complexity of an algorithm.

b)   What are the merits and demerits of array data structures?

c)   How do you push elements in a linked stack?

d)   Differential linear and non linear data structures.

e)   What is the significance of priority queue?

f)   Define complete binary tree. Give example.

g)   When does a graph become tree?

h)   Prove that the number of odd degree vertices in a connected graph should be the even.

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i) What is sorting? How is sorting essential for database applications?

j) Give the worst case and best case time complexity of binary search.

Section - B

Note : Attempt any 5 questions from this section.

(5×10=50)

2. What is recursion? Write a recursive program to find sum of digits of the given number. Also calculate the time complexity. [Ex: 259 = 16 = 7(Answer)].

3. Solve the following :
   a) ((A – (B + C) * D) / (E + F))   [Infix to postfix]
   b) (A + B) + *C – (D – E) ^ F   [Infix to prefix]
   c) 7 5 2 + * 4 1 5 – / –   [Evaluate the given postfix expression]

4. Write a C program to implement the array representation of circular queue.

5. Write a C program to implement binary tree insertion, deletion with example.

6. Write the C program for various traversing techniques of binary tree with neat example.

7. What is quick sort? Sort the given values using quick sort; present all steps/iterations :
38, 81, 22, 48, 13, 69, 93, 14, 45, 58, 79, 72

8. Illustrate the importance of various traversing techniques in graph along with its application.

9. Compare and contrast the difference between B+ tree index files and B tree index files with an example.
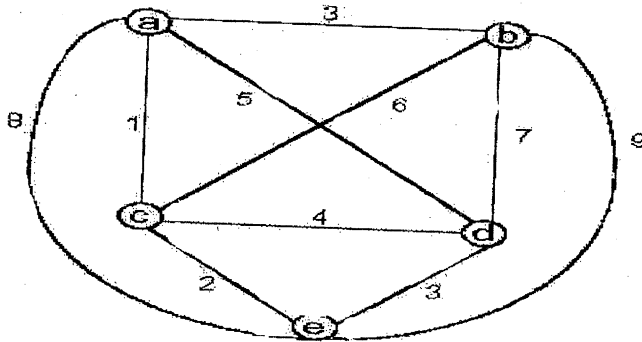
Section - C

Note : Attempt any 2 questions from this section.

(2×15=30)

10. What is meant by circular linked list? Write the functions to perform the following operations in a doubly linked list.
    a) Creation of list of nodes.
    b) Insertion after a specified node.
    c) Delete the node at a given position.
    d) Sort the list according to descending order
    e) Display from the beginning to end.

11. Define AVL Trees. Explain its rotation operations with example. Construct an AVL tree with the values 10 to 1 numbers into an initially empty tree.

12. Discuss Prim's and Kruskal's algorithm. Construct minimum spanning tree for the below given graph using Prim's algorithm (Source node = a).

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(Following Paper ID and Roll No. to be filled in your
Answer Books)

Paper ID : 2012265	Roll No.							

B.TECH.

Regular Theory Examination (Odd Sem-III), 2016-17

DISCRETE STRUCTURES AND GRAPH THEORY

Time : 3 Hours   *Max. Marks : 100*

SECTION-A

1.   Attempt all parts. All parts carry equal marks. Write
     answer of each part in short.   (10×2=20)

a)   Let R be a relation on the set of natural numbers N,
     as R = {(x, y): x, y ∈ N, 3x + y = 19}. Find the
     domain and range of R. Verify whether R is
     reflexive.

b)   Show that the relation R on the set Z of integers
     given by R = {(a,b): 3 divides a − b}, is an
     equivalence relation.

c)   Show the implications without constructing the
     truth table $(P{-}{>}Q){-}{>}Q{=}{>}P \vee Q$.

d)   Show that the "greater than or equal" relation (>=)
     is a partial ordering on the set of integers.

302/12/2016/15480   (1)   [P.T.O.

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e) Distinguish between bounded lattice and complemented lattice.

f) Find the recurrence relation from $y_n = A2^n + B(-3)^n$.

g) Define ring and give an example of a ring with zero-divisors.

h) State the applications of binary search tree.

i) Define Multigraph. Explain with example in brief.

j) Let G be a graph with ten vertices. If four vertices has degree four and six vertices has degree five, then find the number of edges of G.

SECTION - B

Attempt any 5 questions from this section

(5×10=50)

2. Write the symbolic form and negate the following statements:
   - Everyone who is healthy can do all kinds of work.
   - Some people are not admired by everyone.
   - Everyone should help his neighbors, or his neighbors will not help him.

3. In a Lattice if $a \leq b \leq c$, then show that
   a) $a \vee b = b \wedge c$
   b) $(a \vee b) \vee (b \wedge c) = (a \vee b) \wedge (a \vee c) = b$

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4. State and prove Lagrange's theorem for group. Is the converse true?

5. Prove that a simple graph with n vertices and k components can have at most $\dfrac{(n-k)(n-k+1)}{2}$ edges.

6. Prove by induction: $\dfrac{1}{1.2} + \dfrac{1}{2.3} + ... + \dfrac{1}{n(n+1)} = \dfrac{n}{(n+1)}$.

7. Solve the recurrence relation $y_{n+2} - 5y_{n+1} + 6y_n = 5^n$ subject to the condition $y_0 = 0, y_1 = 2$.

8. a) Prove that every finite subset of a lattice has an LUB and a GLB.
   b) Give an example of a lattice which is modular but not a distributive.

9. Explain in detail about the binary tree traversal with an example.

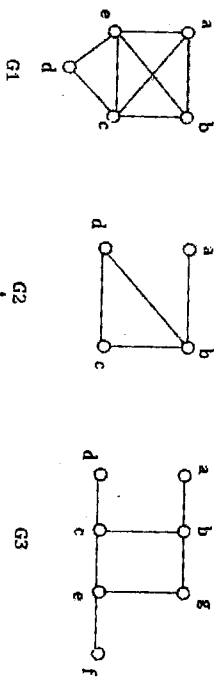## SECTION - C

Attempt any 2 questions from this section.

(2×15=30)

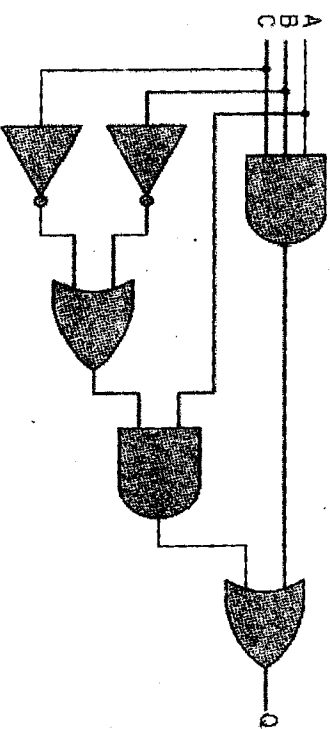10. a) Prove that a connected graph G is Euler graph if and only if every vertex of G is of even degree.

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b) Which of the following simple graph have a Hamiltonian circuit or, if not a Hamiltonian path?

11. a) Find the Boolean algebra expression for the following system.

b) Suppose that a cookie shop has four different kinds of cookies. How many different ways can six cookies be chosen?

12. a) Prove that every cyclic group is an abelian group.

b) Obtain all distinct left cosets of $\{(0), (3)\}$ in the group $(Z_6, +_6)$ and find their union.

c) Find the left cosets of $\{[0], [3]\}$ in the group $(Z_6, +_6)$.

Mathematics IV KAS302

Assignment 3

1. Classify the following equation $t\dfrac{\partial^2 u}{\partial t^2} + 3\dfrac{\partial^2 u}{\partial x \partial t} + x\dfrac{\partial^2 u}{\partial x^2} + 17\dfrac{\partial u}{\partial x} = 0$.

2. Solve using the method of Separation of Variables
$\dfrac{\partial u}{\partial t} = \dfrac{\partial u}{\partial x} - 2u, u(x,0) = 10e^{-x} - 6e^{-4x}$

3. Solve by method of sepration of variables $\dfrac{\partial^2 u}{\partial x^2} = 2u + \dfrac{\partial u}{\partial y}$, subject to the condition

   that u=0 and $\dfrac{\partial u}{\partial x} = e^{-3y}$ when x=0 for all values of y.

4. Find the deflection of the vibrating string which is fixed at the ends x=0 and x=2 and

   the motion is started by displacing the string into the form $\sin^3(\dfrac{\pi x}{2})$ and releasing it

   with zero initial velocity at t=0.

5. Solve the following Laplace equation $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$ in a rectangle with

   $u(0, y) = 0, u(a, y) = 0, u(x,b) = 0$ and $u(0, y) = f(x)$ along x – axis.

6. A bar 10cm long, with insulated sides, has its ends A and B maintained at
   temperature 50°C and 100°C respectively., until the steady state conditions prevail.
   The temperature at A is suddenly raised to 90°C and at the same time that of B is
   lowered to 60°C . Find the temperature distribution in the bar at time t.

7. In a blade manufacturing factory, 1000 blades are Examined daily. Draw the **np chart**
   for the following table and examine whether the process is under–control?

Date	1	2	3	4	5	6	7	8	9	10	11	12	13	14
No. of Defective Blades	9	10	12	8	7	15	10	12	10	8	7	13	14	15

8. two independent samples of size 7 and 9 have the following values:

Sample A:	10	12	10	13	14	11	10		
Sample B:	10	13	15	12	10	14	11	12	11

   Test whether the difference between the mean is significant.

9. Describe briefly the chi-square test Twenty-two animal suffering from same disease
   with the same severity. A serum was administered to 10 of the animals and the
   remaining were uninoculated to serve a control.
   The results were as follows:

	Recovered	Died	Total
Inoculated	7	3	10
Uninoculated	3	9	12
Total	10	12	22

   Apply chi-square test to test the association between Inoculations and control the
   disease. Interpret the result.

10. Two samples are drawn from two normal population. From the following data test
    whether the two samples have the same variance at 5%

| Sample 1: | 60 | 65 | 71 | 74 | 76 | 82 | 85 | 87 | | |
| Sample 2: | 61 | 66 | 67 | 85 | 78 | 63 | 85 | 86 | 88 | 91 |

11. Solve $(D^2 - DD' - 2D'^2)z = e^x(y - 1)$

12. Solve $[D^2 + 2DD' + D'^2 - 2D - 2D']z = \sin(x + 2y)$

13. Solve the partial differential equation $x^2(y-z)p + y^2(z-x)q = z^2(x-y)$ using Lagrange's method.

14. Solve $(p^2 + q^2)y = qz$ by Charpit's method

15. Solve: $((D - 3D' - 2)^2 z = 2e^{2x} \tan(y + 3x)$

16. Solve $x^2 r + 2xys + y^2 t = x^m y^n$