

Hall Ticket Number :

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**R-15**

**Code: 5G131**

*II B.Tech. I Semester Supplementary Examinations May 2017*

**Advanced Data Structures Through C++**

(Common to CSE & IT)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Explain the basic principles of object oriented programming 8M
- b) Write about different types of I/O streams in C++ 6M

**OR**

2. a) Discuss in detail about parameter passing methods with an example. 10M
- b) Write about
  - (i) Friend Function
  - (ii) Inline functions 4M

**UNIT-II**

3. a) Explain in detail about operator and function overloading with an example. 10M
- b) Differentiate constructors and destructors 4M

**OR**

4. a) Discuss in detail about Selection sort with an algorithm and an example 8M
- b) Define the notations below.
  - i) Big Oh
  - ii) Omega
  - iii) Theta 6M

**UNIT-III**

5. Compare and contrast between Stacks and Queues with an example 14M

**OR**

6. Discuss about
  - (i) Dictionaries
  - (ii) Hashing
  - (iii) Chaining 14M

**UNIT-IV**

7. a) What is a Binary Search Tree? Construct a Binary Search tree the following. 10M  
90 15 65 75 30 45 25 75 30 45
- b) Discuss about Priority Queue ADT 4M

**OR**

8. a) Explain in detail about Binary Search Trees and its operations. 6M
- b) What is an AVL tree? Construct an AVL Tree for the following. 8M  
10 15 25 75 35 45 20 75 35 55

**UNIT-V**

9. a) Explain in detail about Red-Black 4M
- b) Explain in detail about Splay Trees with an example 10M

**OR**

10. a) Discuss about Brute Force and Boyer-Moore Algorithms 10M
- b) Write short note on
  - (i) Standard Tries
  - (ii) Compressed tries 4M

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Hall Ticket Number :									
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<b>R-15</b>
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**Code: 5G432**

*II B.Tech. I Semester Supplementary Examinations May 2017*

**Digital Logic Design & Computer Organization**

(Information Technology)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70Marks )

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<b>UNIT-I</b>
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1. a) Which parts of the computers influences the performance of a computer system. Explain how while detailing the term “memory bus bottleneck”. 8M
- b) Differentiate between Von Neumann and Harvard architectures. Also, do illustrate various computer types. 6M

**OR**

2. a) Explain about little endian, middle endian, big endian machines along with names of the processors. Also, do discuss about their implications in Computer Science point of view. 4M  
3M
- b) (i) Find out binary representation of 17.52 2M  
(ii) What is the decimal equivalent of 1101.1101 2M  
(iii) What are the possible range of integers which we can store in a 16 bit register in both sign magnitude and 2s complement representations. 3M

<b>UNIT-II</b>
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3. a) What is the basis behind Karnaugh map simplification? What are the limitations of Karnaugh map based digital logic circuit simplification? How do you mitigate the same? 7M
- b) Draw circuit for parallel register transfer where source register is using D flip flops while destination register is using JK flip flops. Assume both source and destination registers are 4-bit long. 7M

**OR**

4. a) Simplify the following Boolean equations while mentioning which Boolean theorem is used during the simplification.  
 $( a + a'b' + b'c' + c' )' + a'b \cdot c \cdot ( e \cdot f + g \cdot h + m \cdot n + p \cdot q )$   
 $A \cdot (B + B' \cdot C) + (A' \cdot B + B') \cdot C'$   
 $xyz + x'y'z + xz + xyz'$  7M
- b) Represent the following function  $F(A, B, C, D) = A'BC + AD + AC$  both in SOP, POS form. 7M

UNIT-III
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5. a) What is instruction set architecture? What are controlling factors of ISA? 4M  
 b) What are various types of addressing modes commonly employed in computers? Give live explanations with each mode. 10M

## OR

6. a) Write about how real numbers are added and subtracted in computers. Preferably illustrate the same algorithmically. 7M  
 b) What is the range of a floating point number representation with an 8-bit significand (assuming the leading 1 is explicitly stored in the significand register) and 4-bit exponent? 7M

UNIT-IV
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7. a) Explain about the execution of an instruction giving details about various cycles involved. 7M  
 b) Explain about working of a micro-programmed control unit. 7M

## OR

8. a) Write about memory hierarchy of computer memories along with access times, cost, and reliability. See that you will consider L1, L2 etc cache memories also into account. 7M  
 b) Assume that a computers address bus is n-bits wide. How much RAM, ROM, RAM+ROM it can support really? What do you really understand by virtual memory? Why virtual memory systems have developed? Is your Windows 10 is virtual memory system? What about Linux? 7M

UNIT-V
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9. a) What are interrupts? Why do we need them? How interrupts are commonly handled? Assuming that currently an instruction is in it's decode cycle and an interrupt has arrived. Are we going to stop the current instruction there itself? If not, why? 7M  
 b) Explain the terms  
     (i) vectored interrupts 2M  
     (ii) interrupt masking 2M  
     (iii) DMA 3M

## OR

10. a) Explain multiple I/O devices are handled along with their pros and cons. 10M  
 b) Why do we use DMA based I/O? Explain. 4M

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Hall Ticket Number :

R-15

Code: 5G431

II B.Tech. I Semester Supplementary Examinations May 2017

### Discrete Mathematics

(Common to CSE & IT)

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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#### UNIT-I

1. a) Show that  $p \rightarrow q = (\sim p) \vee q$
- b) Show that  $(p \wedge q) \rightarrow (\sim p \vee q)$  is a tautology.
- c) Show that  $(p \wedge q) \rightarrow (\sim p \vee q)$  is a contradiction.

OR

2. a) Define the following
  - (i) Tautology
  - (ii) Contradiction
  - (iii) Contingency.
- b) Check till validity of following argument

#### UNIT-II

3. a) Give an indirect proof of the theorem "If  $3n+2$  is odd, then  $n$  is odd".
- b) Show that  $\sqrt{2}$  is irrational

OR

4. a) Show that if  $n$  is an integer greater than 1, then  $n$  is either a prime or a product of primes.
- b) Sort the list  $x = [64, 25, 12, 11]$  using selection sort algorithm.

#### UNIT-III

5. a) Show the sum of the degrees of all the vertices in a graph is equal to twice the number of edges in the graph.
- b) Prove that a simple graph with  $n$  vertices and  $k$  components can have at most  $(n - k)(n - k + 1)/2$  edges.

OR

6. a) Prove that the chromatic number of a graph will not exceed by more than one, the maximum degree of the vertices in a graph.
- b) Prove that a graph is a tree if and only if it is minimally connected.
- c) Find the complexity of a complete graph  $K_n$ .

## UNIT-IV

7. a) Let 100 of the 120 students of mathematics at a college take at least one of the languages Hindi, English and German. Also, let 65 study Hindi, 45 study English and 45 German. If 20 study Hindi and English, 25 study English and German and 15 study Hindi and German. Find the number of students who study all the three languages.
- b) Let  $A = \{a, b, c, d, e\}$  and  $B = \{c, e, f, h, k, m\}$  then prove if A and B are finite sets then  $|A \cap B| = |A| + |B| - |A \cup B|$ .

OR

8. a) Determine whether each of the following functions is a bijection from  $\mathbb{R}$
- (i)  $f(x) = -3x + 4$
- (ii)  $f(x) = -3x^2 + 7$
- b) If  $(n+1)$  integers are selected from the set  $\{1, 2, \dots, 2n\}$  then show that one of them divides another integer that has been selected.

## UNIT-V

9. a) Define the following with example
- (i) Reflexive relation
- (ii) Symmetric relation
- (iii) Transitive relation
- (iv) Anti-symmetric relation
- b) Show that  $(\mathbb{Z}^+, \text{divisibility})$  is a poset

OR

10. a) Show that in the set of integers  $I = \{\dots, -2, -1, 0, 1, 2, \dots\}$  then relation  $aRb \Rightarrow a = b \pmod{n}$   $n \in \mathbb{N}$  is an equivalence relation.
- b) Show that an equivalence relation defined in a set A decomposes the set into disjoint classes.

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**Code: 5G236**

*II B.Tech. I Semester Supplementary Examinations May 2017*  
**Electrical Engineering and Electronics Engineering**  
( Common to CSE & IT )

Max. Marks: 70

Time: 3 Hours

Answer all five units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Derive the relation between phase and line values of 3 phase balanced star connected system. 7M
- b) A current of 10 A flows in a circuit with a 30 degree angle of lag when the applied voltage is 100 V. Find the impedance, reactance and resistance of the circuit. 7M

**OR**

2. a) State and explain Kirchoff's laws with the help of neat diagram 7M
- b) Two resistances of 1.5  $\Omega$  and 3.5  $\Omega$  are connected in parallel and their combination is connected in series with a resistance of 1.95  $\Omega$ . Find the equivalent resistance of the circuit. What current will it draw if connected to a 30V supply? 7M

**UNIT-II**

3. The resistance of the field circuit of a shunt wound dc generator is 200 ohms. When the output of the generator is 100 kW, the terminal voltage is 500 V and the generated emf is 525 V. Calculate: (a) the armature resistance, and (b) the value of the generated emf when the output is 60 kW, with a terminal voltage of 520 V. 14M

**OR**

4. a) A 240V,dc shunt motor takes 32 A of line current of the armature and field resistances are 1.2  $\Omega$  and 240  $\Omega$  respectively of the load torque remains constant, find the resistance inserted in series with the armature to have the speed. 7M
- b) Explain Swinburne's test for the determination of efficiency of a dc machine 7M

**UNIT-III**

5. a) Explain the principle of operation of 3 phase induction motor 7M
- b) Discuss the synchronous impedance method of calculating voltage regulation of an alternator 7M

**OR**

6. a) List out different types of losses present in transformer 6M
- b) A 1- transformer has 500 primary and 100 secondary turns. The net cross-sectional area of the core is 50 cm<sup>2</sup>. if the primary winding is connected to a 50 Hz supply at 400V. Calculate (i) Peak value of the flux density in the core (ii) The voltage induced in the secondary winding. 8M

**UNIT-IV**

7. Explain the working of P-N-P transistor and mention its input-output characteristics 14M

**OR**

8. a) Explain in detail about frequency response of CE amplifier. 7M
- b) With a neat circuit explain the operation of half wave rectifier circuit 7M

**UNIT-V**

9. a) Derive the expression for the electrostatic deflection of CRO 7M
- b) Explain the principle of dielectric heating 7M

**OR**

10. Explain the concept of induction heating and also discuss about various industrial applications of induction heating 14M

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Hall Ticket Number :

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**R-15**

**Code: 5GC34**

*II B.Tech. I Semester Supplementary Examinations May 2017*

**Environmental Science**

( Common to ECE & IT )

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) Mention few institutions involved and role played by them in protecting the environment. 7M
- b) What are the reasons for the decline of ecosystem globally? 7M

**OR**

2. a) Outline the role of an individual in the prevention of pollution 7M
- b) Write on the need for public awareness of environment and its importance. 7M

**UNIT-II**

3. a) What is over grazing? Write a note on the impact of over grazing. 7M
- b) How soil erosion occurs. Mention few remedial measures to prevent soil erosion. 7M

**OR**

4. a) Enumerate few conflicts over water that you have known. 7M
- b) Write a note on alternate energy resources and their usage. 7M

**UNIT-III**

5. a) What are the characteristic features of aquatic ecosystem? 7M
- b) Summarize the threats to biodiversity. 7M

**OR**

6. a) Write on cycling of nutrients and energy in Nitrogen system. 7M
- b) Describe the values of biodiversity. 7M

**UNIT-IV**

7. a) Explain the effects caused by water pollution and how it will be controlled. 7M
- b) Write short notes on (i) Thermal pollution and (ii) Marine pollution 7M

**OR**

8. a) What are nuclear hazards? Mention few nuclear hazards occurred in recent years. 7M
- b) Describe the best practices of solid waste management. 7M

**UNIT-V**

9. a) How acid rains occurs. Explain. 7M
- b) Enumerate the human rights with respect to environment protection. 7M

**OR**

10. a) What is Air pollution Act? Mention the postulates of Air pollution Act? 7M
- b) Write notes on the impact of environment on human health. 7M

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**Code: 5G433***II B.Tech. I Semester Supplementary Examinations May 2017***Operating Systems & Linux Administration**

(Information Technology)

Max. Marks: 70

Time: 3 Hours

Answer *all five* units by choosing one question from each unit ( 5 x 14 = 70 Marks )

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**UNIT-I**

1. a) What are the differences between the operating system for mainframe computers and personal computers? Also describe the common functions of Operating systems. 10M
- b) Under what circumstances would a user be better off using a time sharing systems rather than a PC or a single user workstations. 4M

**OR**

2. a) Define system calls. List and explain the types system calls. 8M
- b) How could a system be designed to allow a choice of operating systems from which to boot? What would the bootstrap program need to do? 6M

**UNIT-II**

3. a) List and explain the multithreading models. 7M
- b) Describe the actions taken by a kernel to context switch between processes. 7M

**OR**

4. a) Consider a system where counting semaphore initialized to +17, on this semaphore variable the various operations like 23P, 18V, 16P, 14V and 1P are performed. Then what is the final value of semaphore? 4M
- b) Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs at most two resources. Show that the system is deadlock free. 10M

**UNIT-III**

5. a) What is the cause of thrashing? How does the system detect thrashing? 7M
- b) Why are segmentation and paging sometimes combined into one scheme? 7M

**OR**

6. a) Explain about FIFO, LRU page replacement algorithms with example. 10M
- b) Assume that a system contains 500GB secondary memory, 16GB Internal memory and size of the page is 8MB. Find the size of the page table. 4M

**UNIT-IV**

7. a) In what situations, would using memory as a RAM disk is more useful than using it as a disk cache? 7M
- b) Describe the interface to file system. 7M

**OR**

8. a) Explain different disk allocation methods in detail. 10M
- b) Discuss the various kinds of performance overhead associated with servicing an interrupt? 4M

**UNIT-V**

9. a) Briefly explain the domain name system. 8M
- b) Give a brief note on Linux multifunction server. 6M

**OR**

10. a) Describe the Linux system administration in detail. 7M
- b) How to set up local network services in Linux? Explain. 7M

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