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<b>R-15</b>
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**Code: 5G131**

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 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) Define a class and a class member. Explain static class members with the help of an example. 8M
- b) Discuss friend functions in C++giving suitable example. 6M

**OR**

- 2. a) What is dynamic memory management? Write a C++ program demonstrating the usage of new and delete operators for a single variable as well as for an array. 6M
- b) Define a class Rectangle which has a length and a breadth. Define the constructors and the destructor and member functions to get the length and the breadth. Write a global function which creates an instance of the class Rectangle and computes the area using the member functions. 8M

**UNIT-II**

- 3. a) What's the difference between public, private, and protected? How can we protect derived classes from breaking when we change the internal parts of the base class? 7M
- b) What is Hybrid inheritance? Write a program to illustrate the concept of Hybrid Inheritance. 7M

**OR**

- 4. a) Write a C ++ program using stack ADT that reads an infix expression, converts the expression to postfix form and evaluates the postfix expression. 8M
- b) Explain the need for "Virtual Destructor". Can we have "Virtual Constructors"? 6M

**UNIT-III**

- 5. a) Define hashing, hash function and collision giving suitable examples. 7M
- b) Explain the different methods that are used to calculate hash functions. 7M

**OR**

- 6. a) Explain the linear probing method in Hashing? Also explain its performance analysis? 7M
- b) What is hashing with Chains? Explain? Compare this with Linear Probing? 7M

**UNIT-IV**

- 7. a) Write a method to find the height of a Binary Search Tree? 8M
- b) Explain the list representation of a tree by means of an example. 6M

**OR**

- 8. a) Explain different rotations in AVL Trees for insertion. 7M
- b) Explain insertion and deletion in a priority queue. 7M

**UNIT-V**

- 9. a) Define red-black tree. Find out the worst case time complexity if a new node is inserted in a red-black tree with n nodes (height of a red-black tree). 7M
- b) Define B-tree. Explain about insertion operation in a B-tree . 7M

**OR**

- 10. a) Discuss various types of pattern matching algorithms. 8M
- b) Explain how insertion and deletion operations is done on a Splay Tree. 6M

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Hall Ticket Number :

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**R-15**

**Code: 5G432**

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 2017

**Digital Logic Design and Computer Organization**

( 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) Convert the following decimal numbers into binary, octal, hexadecimal  
854, 67.75, 923 9M
- b) How to measure the performance of a computer system? 5M

**OR**

2. a) Discuss the basic functional units of a computer system. 8M
- b) Differentiate between fixed point notation and floating point notation for numbers 6M

**UNIT-II**

3. a) Minimize the following expressions using K-maps and realize using NOR gates only.  
(i)  $f_1 = \sum [2,7,8,9,10,12]$   
(ii)  $F(A,B,C,D) = \sum 4,5,6,12,13$   $D(2,9,15)$  10M
- b) Realize all other gates using NAND gate only. 4M

**OR**

4. Implement a full adder circuit using NOR gates; implement a full adder using 8x1 multiplexers. Explain both the circuits and compare their efficiency. 14M

**UNIT-III**

5. a) With the help of a flowchart describe multiplication operation on floating point numbers. 7M
- b) Construct the circuit to perform basic arithmetic operations on binary input 7M

**OR**

6. a) Illustrate the significance of condition code flags in program execution. 7M
- b) Describe the general format of instructions with relevant examples. 7M

**UNIT-IV**

7. How does a processor execute a register transfer instruction? Consider a single bus organization of the data path inside a processor. 14M

**OR**

8. a) Compare the organization of a 8M x 32 memory module using 512K x 8 memory chips. 8M
- b) Discuss the significance of transaction look aside buffer in virtual memory. 6M

**UNIT-V**

9. a) Differentiate between a subroutine and an interrupt service routine. 5M
- b) Explain the use of DMA controllers in a computer system and illustrate distributed arbitration with necessary diagram. 9M

**OR**

10. a) What functions need to be performed by an I/O interface? Construct a 8-bit input interface circuit. 8M
- b) Illustrate the operation of the small computer system interface bus. 6M

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**Code: 5G431**

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 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) Explain the difference between the principal of disjunctive and conjunctive normal forms. 7M
- b) Obtain the principal conjunctive normal form of the formula given by  $(\sim P \rightarrow R) \wedge (Q \rightarrow P)$  7M

**OR**

- 2. a) Write short notes on Universal Quantifiers 6M
- b) Prove or disprove the validity of the following arguments  
 Every living thing is a plant or animal  
 David's dog is alive and it is not a plant  
 All animals have hearts  
 Hence, David's dog has a heart 8M

**UNIT-II**

- 3. a) Explain the properties of relations with example? 8M
- b) Draw the Hasse diagram of the following set under the partial ordering relation "DIVIDES" {3,9,27,54} 6M

**OR**

- 4. a) Let  $Z$  be the group of integers with the binary operation  $*$  defined by  $a * b = a + b - 2$ , for all  $a, b \in Z$ . Find the identity element of the group  $(Z, *)$ ? 6M
- b) Explain Homomorphism, Isomorphism with an example 8M

**UNIT-III**

- 5. a) Explain pigeonhole principles with example. 6M
- b) How many numbers can be formed using the digits 1, 3, 4, 5, 6, 8, and 9 if no repetitions are allowed? 8M

**OR**

- 6. a) Find the number of ways of distributing 5 different books among 3 persons such that each one gets at least one book. 7M
- b) How many integral solutions are there to  $x_1 + x_2 + x_3 + x_4 + x_5 = 20$  where each  $x_i \geq 2$ ? 7M

**UNIT-IV**

- 7. a) Find the coefficient of  $x^{20}$  in  $(x^3 + x^4 + x^5 + \dots)^5$ . 6M
- b) Find the coefficient of  $X^{15}$  in  $A(X) = (x^2 + x^3 + x^4 + x^5)(x + x^2 + \dots + x^{15})$  8M

**OR**

- 8. a) Solve the recurrence relation  $a_n - 9a_{n-1} + 26a_{n-2} - 24a_{n-3} = 0$  for  $n \geq 3$ . 6M
- b) Solve the recurrence relation  $a_n - a_{n-1} = 3n + 2, a_0 = 1, n \geq 1$  by substitution method. 8M

**UNIT-V**

- 9. a) State and explain the Four - Colour problem for planar graphs. 7M
- b) Prove that the regions of a plane graph can be 4 - colored if G has a Hamiltonian cycle. 7M

**OR**

- 10. a) Explain various types of graphs with examples 8M
- b) Prove that  $K_5$  is non-planar? 6M

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<b>R-15</b>
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**Code: 5G236**

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 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) Explain about different types of electrical elements? 7M
- b) Deduce the equivalent resistance when  $R_1, R_2$  and  $R_3$  are connected in parallel. 7M

**OR**

2. Derive the necessary equations for converting star to delta and Delta to star 14M

**UNIT-II**

3. a) With a neat sketch explain the constructional details and principle of operation of DC generator 10M
- b) Write the applications of DC generators 4M

**OR**

4. a) Explain the working principle of DC motor with a neat diagram 7M
- b) Derive the expression for torque of DC motor 7M

**UNIT-III**

5. a) How the efficiency of single phase transformer can be find out from the OC and SC tests. 14M

**OR**

6. a) Sketch the slip torque characteristics of three phase induction motor and explain 7M
- b) Describe the procedure required to find out the efficiency of three phase induction motor by using a brake test. 7M

**UNIT-IV**

7. a) What is a PN junction diode and explain the V-I characteristics of PN junction diode 7M
- b) What is rectifier and explain the operation of single phase half wave diode rectifier with a neat output waveforms 7M

**OR**

8. a) Draw and explain the input and output characteristics of CE amplifier 7M
- b) How transistor can be acts as an amplifier 7M

**UNIT-V**

9. a) Explain about induction and dielectric heating and mention its industrial applications 14M
- OR**
10. a) Draw the block diagram of CRO and explain 7M
  - b) Explain any two applications of CRO 7M

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Hall Ticket Number :

**R-15**

**Code: 5GC34**

II B.Tech. I Semester Regular & Supplementary Examinations Nov/Dec 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) Explain the root cause of the current environmental crisis through the four spikes 7M
- b) Why do we say that any study of the environment becomes an interdisciplinary one? 7M

**OR**

2. a) Why is there a general lack of public awareness about environmental issues? 7M
- b) Explain the concept of ecological footprint through an example 7M

**UNIT-II**

3. a) With a help of case study explain dam construction effects on forest and tribal people 7M
- b) Outline the conflicts of floods and droughts over water resource. 7M

**OR**

4. a) Summarize the effects of extracting the mineral resources 7M
- b) Differentiate between traditional agriculture and modern agriculture 7M

**UNIT-III**

5. a) Explain food chain and food web. 7M
- b) Explain the energy flow as we move up the tropic levels. 7M

**OR**

6. a) Distinguish between in situ and ex situ conservation. Explain the advantages and disadvantages of each approach. 7M
- b) Explain the hot spots of biodiversity. Predict the treats on biodiversity. 7M

**UNIT-IV**

7. a) Explain the sources and effects of outdoor air pollution 7M
- b) Explain the sources and effects of noise pollution 7M

**OR**

8. a) Explain causes, effects and control measures of urban solid wastes. 7M
- b) Explain causes, effects & control measures soil pollution 7M

**UNIT-V**

9. a) Write a note on i)wet land reclamation ii)global warming 7M
- b) Explain the practice of rain water harvesting. 7M

**OR**

10. a) Write a note on value based education in relation to environment. 7M
- b) Summarize the salient features of the Environmental protection act? 7M

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**Code: 5G433**

II B.Tech. I Semester Regular &amp; Supplementary Examinations Nov/Dec 2017

**Operating Systems and 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) Explain the layered structure of an operating system by giving typical operations and the objects that are operated in each layer. 10M
- b) What are Operating-System Services? 4M

**OR**

2. a) What is a System call? Explain the various types of system calls provided by an operating system. 8M
- b) Discuss about the functionality of system boot with respect to operating system. 6M

**UNIT-II**

3. a) What is a process? Explain about various fields of Process Control Block. 8M
- b) What is Dining Philosophers problem? Discuss the solution to Dining philosopher's problem using monitors. 6M

**OR**

4. a) Define a Thread? Give the benefits of multithreading. What resources are used when a thread is created? How do they differ from those used when a process is created? 10M
- b) Define Monitor. Explain how it overcomes the drawback of semaphores. 4M

**UNIT-III**

5. a) Illustrate the page-replacement algorithms i) FIFO ii) Optimal Page Replacement use the reference string 7, 0,1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2,1, 2, 0, 1, 7, 0,1 for a memory with three frames. 8M
- b) What is demand paging? Discuss the hardware support required to support demand paging. 6M

**OR**

6. a) Explain implementation of virtual memory through Demand Paging. 8M
- b) What is Paging? Discuss the Paging model of logical and physical memory. 6M

**UNIT-IV**

7. a) Briefly explain about single-level, two-level and Tree-Structured directories. 6M
- b) Write in detail about file attributes, operations and types and structures. 8M

**OR**

8. a) Explain and compare the SCAN and C-SCAN disk scheduling algorithms. 10M
- b) Explain the bit vector representation of free space management. 4M

**UNIT-V**

9. a) Explain in detail about the system administration of LINUX system and the requirements for LINUX system administrator. 7M
- b) Explain in detail about setting up a LINUX multifunction server. 7M

**OR**

10. a) Explain in detail the file system in LINUX system. 7M
- b) Give the procedure for setting VMware on LINUX host and adding guest OS 7M

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