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Code: 5G131

II B.Tech. I Semester Supplementary Examinations May 2018

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)

UNIT-I

1. a) With the help of complete C++ programs explain the mechanism of Return-by-value and Return-by-reference of functions. 7M
- b) What is an Error and Exception? Explain the exception handling mechanism in C++? 7M

OR

2. a) Define "class" and "object". With an example, explain the concept of data encapsulation and accessing of member elements giving suitable examples. 6M
- b) When writing catch operator we can write directly type of exception as a type of its argument, pointer to a type of exception or reference to a type of exception. Compare these approaches. 8M

UNIT-II

3. a) What do you mean by run time polymorphism and how to implement run time polymorphism using virtual functions in C++? 7M
- b) What is template? Explain about function templates and class templates with suitable examples. 7M

OR

4. Explain in detail about Exception handling mechanism. 14M

UNIT-III

5. a) What is stack? Write the ADT implementation of stacks using templates in C++. 6M
- b) Develop a class for hash table using linear probing and neverUsed concept to handle an erase operation. Write complete C++ code for all the methods. Include a method to reorganize the table when (say) 60% of the empty buckets have never used equal to false. The reorganization should move pairs around as necessary and leave a properly configured hash table in which neverUsed is true for every empty bucket. 8M

OR

6. a) What is a dictionary? Define the abstract data type for it? Write the abstract class for the dictionary? 7M
- b) Give the applications of dictionary or dictionary with duplicates in which sequential access is desired. 7M

UNIT-IV

7. a) Write a method to delete the pair with the largest key from a Binary Search Tree. 6M
- b) Define a class called binarySearchTree to represent a Binary search tree. Extend this class by adding a public function outputInRange (Low,High) that outputs, in ascending order of key, all elements in a binary search tree whose key lies between Low and High. Use recursion and avoid entering sub trees that cannot possibly contain any elements with keys in desired range. 8M

OR

8. a) Draw the sequence of rotations required to perform a single right rotation and a double LR rotation in an AVL tree? 7M
- b) Explain how Priority Queue is Implemented Using Heaps. 7M

UNIT-V

9. a) Explain about the LLr, LRr, LLb, LRb imbalances in a Red-Black tree with example? 7M
- b) Does deleting a leaf node from a red-black tree then reinserting the same key always 7M

result in the original tree? Prove it does or given a counter example where it does not.

OR

10. a) What do you understand by the term "Trie"? Differentiate standard Tries and compressed Tries 8M
- b) Explain in detail about suffix tries with suitable examples. 6M

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R-15

Code: 5G132

II B.Tech. I Semester Supplementary Examinations May 2018

Digital Logic Design

(Computer Science & Engineering)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I

1. a) Perform the following operations in 2's complement form:

(i) $+6 - 3$ (ii) $-2 - 6$ (iii) $+4 - 7$

6M

b) List the truth table of the function

(i) $F = xy + xy' + y'z$

(ii) $F = y'z + wxy' + wxz' + w'x'z$

8M

OR

2. a) Given the two binary numbers $X = 1010100$ and $Y = 100011$, perform the subtraction (i) $X - Y$ (ii) $Y - X$ using 2's complement and 1's complement

7M

b) Find the Complement of the following expressions:

(i) $(x + y' + z) (x' + z')$ (ii) $(AB' + C) D' + E$

7M

UNIT-II

3. a) Show that the dual of the exclusive-Or is also its complement

7M

b) Derive the circuits for a three-bit parity generator and four-bit parity checker using odd parity bit.

7M

OR

4. Simplify the following boolean functions by first finding the essential prime implicants

(i) $F(w, x, y, z) = \sum(0,2,4,5,6,7,8,10,13,15)$

(ii) $F(A, B, C, D) = \sum(1,3,4,5,10,11,12,13,14,15)$

14M

UNIT-III

5. a) Design a combinational circuit that generates the 9's complement of a BCD digit

7M

b) Design a half-subtractor with inputs x and y and outputs D and B. The circuit subtractor x-y and places the difference in D and the borrow in B.

7M

OR

6. a) Implement a full adder with two 4 X 1 multiplexers

8M

b) Construct a 4-to-16 line decoder with five 2-to-4 line decoders with enable

6M

UNIT-IV

7. a) Write short notes on
- (i) JK flip-flop
 - (ii) D flip-flop
 - (iii) T flip-flop
- 6M
- b) Construct a JK flip-flop using a D flipflop ,a 2-to-1 line multiplexer and an inverter
- 8M

OR

8. a) Design a serial 2's complement with a shift register and a flip-flop. The binary number is shifted out from one side and it's 2's complement shifted into other side of the shift register.
- 6M
- b) Explain universal shift register with neat diagram
- 8M

UNIT-V

9. a) Given a 32 X 8 ROM chip with an enable input, show the external connections necessary to construct a 128 X 8 ROM with four chips and a decoder.
- 7M
- b) Write short notes on Programmable Array Logic with example
- 7M

OR

10. a) Write short notes on
- (i) SR latch with NAND gates
 - (ii) Debounce circuits
- 8M
- b) Distinguish between hazards in combinational and sequential circuits
- 6M

Code: 5G431

II B.Tech. I Semester Supplementary Examinations May 2018

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)

UNIT-I

1. a) Show that RVS follow logically from premises $C \vee D, (C \vee D) \rightarrow \sim H, \sim H \rightarrow (A \wedge \sim B), (A \wedge \sim B) \rightarrow R \vee S$ 7M
- b) With reference to $D) \rightarrow \sim H, \sim H \rightarrow (A \wedge \sim B), (A \wedge \sim B) \rightarrow R \vee S$, show that SVR is tautologically implied by $(P \vee Q) \wedge (P \rightarrow R) \wedge (Q \rightarrow S)$ 7M

OR

2. a) Without truth table prove that $\sim(Q \rightarrow S) \Rightarrow (Q \rightarrow (Q \rightarrow R)) \Rightarrow Q \rightarrow (P \vee R)$ 6M
- b) Prove that $(\forall x)[P(x) \rightarrow Q(x)], (\forall x)[R(x) \Rightarrow Q(x)] \Rightarrow (\forall x)[R(x) \rightarrow \sim P(x)]$ 8M

UNIT-II

3. a) Let $A = \{1, 2, 3, 4\}$ and $B = \{a, b, c\}$. Let $R = \{(1, a), (1, b), (2, b), (2, c), (3, b), (4, a)\}$ and $S = \{(1, b), (2, c), (3, b), (4, b)\}$. Compute (i) complement of R (ii) $R \cup S$ (iii) $R \cap S$ (iv) R^{-1} 7M
- b) Let $X = \{1, 2, 3, 4, 5, 6, 7\}$ and $R = \{(x, y) / x - y \text{ is divisible by } 3\}$. Show that R is an Equivalence relation. Draw the graph of R. 7M

OR

4. a) Write the properties of group 6M
- b) Draw the Hasse diagram of $(X, |)$, where X is the set of positive divisions of 45 and the relation R is such that $R = \{(x, y); x \in A, y \in A \text{ and } (x \text{ divides } y)\}$ 8M

UNIT-III

5. a) In how many ways can a committee of 8 is to be formed from 10 women and 12 men, if the committee should contain
- (i) equal number of men and women.
- (ii) at least 3 women. 7M
- b) n couples are attending the party with the following assumptions
- i. A wife can attend the party without her husband
- ii. A husband cannot attend the party without his wife.
- How many different gatherings are possible in the party? 7M

OR

6. a) A bag contains 10 red marbles, 10 white marbles, and 10 blue marbles. What is the minimum no. of marbles you have to choose randomly from the bag to ensure that we get 4 marbles of same color? 7M
- b) A box contains 6 red, 8 green, 10 blue, 12 yellow and 15 white balls. What is the minimum no. of balls we have to choose randomly from the box to ensure that we get 9 balls of same color? 7M

UNIT-IV

7. a) What is generating function, sequence, recurrence relation, formal power series with an examples? 6M
 b) Find a coefficient of x^{21} in the following expression: $(x^2 + x^3 + x^4 + x^5 + x^6)^8$ 8M

OR

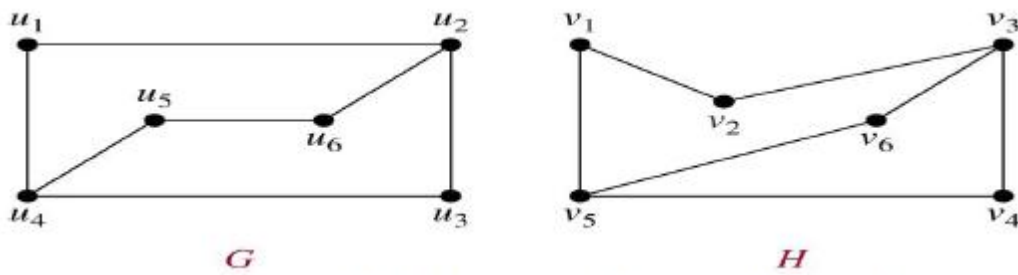
8. a) Solve $a_n = 6a_{n-1} - 9a_{n-2}$ with $a_0 = 1$ and $a_1 = 6$ using recurrence relation. 6M
 b) Solve the recurrence relation: $S(k) - S(k-1) - 2 = 0$, $S(0) = 0$, $S(1) = 1$ 8M

UNIT-V

9. a) Define Euler graph, Eulerian path, Hamiltonian graph and Hamiltonian path. Give an example of a graph which is
 i. Eulerian but not Hamiltonian
 ii. Hamiltonian but not Eulerian
 iii. Both Eulerian and Hamiltonian
 iv. Non Eulerian and non Hamiltonian. 8M
 b) Define planar graph. Is the complete graph K_4 planar? Prove that if G is a connected planar simple graph, then G has a vertex of degree not exceeding five. 6M

OR

10. a) Show that K_4 is non planar? 6M
 b) Determine whether the graphs G and H are isomorphic? 8M



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R-15

Code: 5G236

II B.Tech. I Semester Supplementary Examinations May 2018

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)

UNIT-I

1. a) State and explain the Kichhoff's laws 6M
- b) Three resistances 2 , 5 and 10 are connected in series across a supply voltage of 25 Volts. Calculate 8M
 - (i) Total current supplied
 - (ii) Voltage across each resistor

OR

2. a) Derive expression for equivalent capacitance when three capacitors of capacitances of C_1, C_2 and C_3 are connected in series 7M
- b) Three inductances 10 , 20 and 30 are connected in a delta connection. Find the equivalent star connection 7M

UNIT-II

3. a) Derive the EMF equation of DC generator 6M
- b) A 4 pole generator having 51 slots with each slot containing 20 conductors. The machine is driven at 1500 rpm and assuming the flux per pole to be 7.0mWb. What will be the voltage generated in machine when the armature winding is (i) Lap connected (ii) Wave connected. 8M

OR

4. a) What is meant by starter and explain the principle of operation of three point starter 7M
- b) What are the different types of speed control methods and explain any one of the speed control methods in detail 7M

UNIT-III

5. a) Explain the principle of operation of single phase transformer with a neat diagram 6M
- b) A 250KVA single phase transformer has iron losses of 1.8KW and full load copper losses is 200 watts. Calculate 8M
 - (i) Efficiency at full load at 0.8 p.f lagging
 - (ii) Efficiency at half load at 0.8 p.f leading
 - (iii) Maximum efficiency at 0.8 p.f lagging

OR

6. a) Explain the principle of operation of alternator with a neat sketch 7M
- b) Draw and explain the slip-torque characteristics of three phase induction motor 7M

UNIT-IV

7. a) With a neat circuit diagram explain the principle of operation of full wave diode bridge rectifier along with its input and output waveforms 8M
- b) What is meant by rectifier and list it's applications 6M

OR

8. a) Explain the following
- (i) PNP transistor (ii) NPN transistor 7M
- b) Draw the frequency response of CE amplifier and explain 7M

UNIT-V

9. Explain about different types of electric heating and mention its industrial applications 14M

OR

10. a) Draw and explain the principle of CRT 7M
- b) Explain the following
- (i) Voltage measurement of CRO
- (ii) Frequency measurement of CRO 7M

Code: 5GC33

II B.Tech. I Semester Supplementary Examinations May 2018

Probability & Statistics

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I

1. a) Companies B_1, B_2, B_3 produce 30%, 45% and 25% of the cars respectively. It is known that 2%, 3% and 2% of the cars produced from B_1, B_2 and B_3 are defective. (i) What is the probability that a car purchased is defective. (ii) If a car purchased is found to be defective, what is the probability that this car is produced by the company B_3 ? 7M
- b) A continuous random variable has the probability density function
 $f(x) = \begin{cases} kxe^{-\lambda x}, & x \geq 0, \lambda > 0 \\ 0, & \text{Otherwise} \end{cases}$ Determine (i) k (ii) mean (iii) Variance 7M

OR

2. a) In a bolt factory machines A, B, C manufactures 20%, 30%, 50% of the total of their output and 6%, 3% and 2% are defective. A bolt is drawn at random and found to be defective then find the probability that it is manufactured by (i) machine A (ii) machine B . 7M
- b) A sample of 4 items is selected at random from a box containing 12 items out of which 5 are defective. Find the expected number E of the defective items. 7M

UNIT-II

3. a) When the mean of the marks is 50% & σ is 5%. Then 60% of the students failed in an examination. Determine the grace marks to be awarded/pass mark should be reduced in order to show that 70% of the students passed. Assume that the marks are normally distributed. 7M
- b) On an average six bad cheques per day are received by a bank. Find the probability that the bank will receive four bad cheques on any given day. 7M
4. a) 10% of the bolts produced by a certain machine turn out to be defective. Find the probability that in a sample of 10 tools selected at random exactly two will be defective using (i) binomial distribution (ii) Poisson distribution and comment upon the result? 7M
- b) X is normally distributed with mean 12 and S.D = 4 then find (i) $P(0 < X < 12)$ (ii) $P(X > 20)$ (iii) $P(X < 20)$ (iv) if $P(X > C) = 0.24$ then find C . 7M

UNIT-III

5. a) Determine the mean and standard deviation of the sampling distribution of means of 300 random samples each of size $n=36$ are drawn from a population of $N=1500$ which is normally distributed with mean $\mu=22.4$ and standard deviation σ of 0.048, if sampling is done (i) with replacement (ii) without replacement. 7M
- b) Using the mean of a random sample of size 150 to estimate the mean mechanical aptitude of mechanics of a large workshop and assuming $\sigma=6.2$, what can we assert with 0.99 probability about the maximum size of the error. 7M

OR

6. a) Assuming that the population standard deviation is 0.3, calculate the (i) 95% and (ii) 99% confidence intervals for the mean lead concentration in a river if the mean lead concentration recovered from a sample of measurements in 36 different locations is 2.6gms/ml. 7M

- b) A producer of TV's believes from past experience that the mean length of life of TV's μ is a normal variable with mean $\mu_0=800$ hours and standard deviation $\sigma_0=10$ hours. It is known that TV's have mean length of life that is approximately normally distributed with a standard deviation of 100 hours. Construct a 95% Bayesian interval for μ if a random sample of 25 TV's has an average life of 780 hours.

7M

Code: 5GC33

UNIT-IV

7. a) Mice with an average lifespan of 32 months will live upto 40 months when fed by a certain nutritious food. If 64 mice fed on this diet have an average lifespan of 38 months and standard deviation of 5.8 months, is there any reason to believe that average lifespan is less than 40 months.
- b) If 6 out of 20 cigarette smokers randomly chosen preferred 'Charminar' cigarettes test the claim at 0.05 L.O.S., that 20% of the smokers prefer 'Charminar'.

7M

7M

OR

8. a) A machine runs on an average of 125 hours/year. A random sample of 49 machines has an annual average use of 126.9 hours with standard deviation 8.4 hours. Does this suggest to believe that machines are used on the average more than 125 hours annually at 0.05 level of significance?
- b) In a random sample of 10 bolts produced by a machine the mean length of bolt is 0.53 mm and standard deviation 0.03 mm. Can we claim from this that the machine is in power working order if in the past it produced bolts of length 0.5 mm? Use 0.05 L.O.S.

7M

7M

UNIT-V

9. a) Test whether there is significant difference at 0.05 level in the quality of teaching among four engineering colleges A, B, C, D of technological universities if the number of failures are 26, 23, 15, 32 respectively. Assume that each college has strength of 200 students.
- b) Test the hypothesis at 0.05 L.O.S that the presence or absence of hypertension (HT) is independent of smoking habits from the following experiments data on 180 persons.

7M

	Non smokers	Moderate smokers	Heavy Smokers
HT	21	36	30
No HT	48	26	19

7M

OR

10. a) Test for goodness of fit of a person distributed at 0.05 L.O.S. to the following frequency distribution.

Number of patients arriving/ hour: (x)	0	1	2	3	4	5	6	7	8
Frequency	52	151	130	102	45	12	5	1	2

7M

- b) Can we conclude that the population variances are equal for the following data of post graduates passed out from a 'state' and 'private' university?

State	8350	8260	8130	8340	8070	
Private	7890	8140	7900	7950	7840	7920

7M

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R-15

Code: 5G133

II B.Tech. I Semester Supplementary Examinations May 2018

Principles of Programming Languages

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

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

UNIT-I

1. a) List the potential benefits of studying programming language concept? 7M
- b) Discuss about the various programming domains and their associative languages? 7M

OR

2. a) Explain different aspects of the costs of a programming language? 7M
- b) Explain syntax of a "for" statement in PASCAL using BNF Notation and syntax graphs? 7M

UNIT-II

3. a) Define a variable and what the attributes of a variable are? Elaborate on address of a variable? 8M
- b) List and explain the design issues of pointers? 6M

OR

4. a) Write a note on Boolean and relational expressions? 7M
- b) Discuss the advantages and disadvantages of mixed mode arithmetic expressions? 7M

UNIT-III

5. a) List what advantages does java's break statement have over C's and C++'s break statement? 7M
- b) Explain about Unconditional Statements and guarded commands with suitable examples? 7M

OR

6. a) Explain the design issues of subprograms? 8M
- b) Describe about Co routines? 6M

UNIT-IV

7. a) List the design issues for abstract data types? 7M
- b) Explain the object-oriented programming support in java? 7M

OR

8. a) Describe briefly about Monitors? 7M
- b) Describe how exception is handled in ADA with an example? 7M

UNIT-V

9. a) Analyze the importance of logic programming languages over functional programming languages? 7M
- b) Explain about the applications of logic programming? 7M

OR

10. a) Write about data types and structures of LISP and LISP interpreter? 7M
- b) List the ways in which ML is significantly different from scheme? 7M
