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**R-15**

**Code: 5G441**

II B.Tech. II Semester Supplementary Examinations October 2020

## **Database Management Systems**

( 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) List four significant differences between a file processing system and a DBMS.  
b) Explain various query processor components and its functions.

**OR**

2. a) Explain about types of database languages with syntax and example?  
b) Explain different types of database users and write the functions of DBA?

### **UNIT-II**

3. a) Explain the following terms:  
i) Relationship set ii) Composite attribute iii) Multivalued attribute iv) Derived attribute  
b) Name the main steps in database design. What is the goal of each step? In which step is the E-R model mainly used?

**OR**

4. Distinguish strong entity set with weak entity set? Draw an ER diagram to illustrate weak entity set?

### **UNIT-III**

5. What are views? Discuss the problems encountered in modifying database through views

**OR**

6. a) Explain about union and intersect operator  
b) Explain briefly about joins and its types with examples?

### **UNIT-IV**

7. Give an example of a relation schema R and a set of dependencies such that R is in BCNF but is not in 4NF.

**OR**

8. Suppose you are given a relation R = (A,B,C,D,E) with the following functional dependencies:

**{CE→D, D→B, C→A}**

- i. Find all candidate keys.
- ii. Identify the best normal form that R satisfies (1NF, 2NF, 3NF, or BCNF).
- iii. If the relation is not in BCNF, decompose it until it becomes BCNF. At each step, identify a new relation, decompose and re-compute the keys and the normal forms they satisfy.

### **UNIT-V**

9. How data organized in a tree-based index. When would you use a tree-based index?

**OR**

10. a) Briefly discuss the AICD prosperities of transaction.  
b) What are the main differences between ISAM and B+ tree indexes?

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Code: 5G143

II B.Tech. II Semester Supplementary Examinations October 2020

**Formal Languages and Automata Theory**

( 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 )

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**UNIT-I**

1. a) What is Finite Automaton? Explain Finite State Machine with Example. 7M  
 b) Draw a DFA which accepts string with a's and b's such that number of a's is multiple of 3 7M

**OR**

2. a) Write a procedure for convert NFA- $\epsilon$  moves it into NFA without  $\epsilon$  moves with example 7M  
 b) Design a Mealy machine for input from  $(0+1+2)^*$  print the residue modulo 5 of the input treated as a ternary (base 3, with digits 0, 1, 2) numbers. 7M

**UNIT-II**

3. a) Construct a Finite Automata for the regular expression  $(0+1)(1+10)^*$  7M  
 b) Prove that  $L=\{ a^n b^n / n > 0 \}$  is not regular using pumping lemma 7M

**OR**

4. a) Write regular expression for the following  
 i) The set of all Strings of 0's and 1's string begin with 0 or 1 and not having two consecutive 0's.  
 ii) The set of all strings over  $\{0,1\}$  having even number of 0's and odd number of 1's.  
 iii) The set of all strings with 1100 as substring over the  $\Sigma=\{0,1\}$  7M  
 b) Write procedure for converting Regular Grammar to Finite Automaton. 7M

**UNIT-III**

5. a) Construct the CFG for the set of all strings over  $\{a, b\}$  Consisting of Equal number of a's and b's. 4M  
 b) Converting the following CFG into GNF  
 $S \rightarrow XA/BB, B \rightarrow b/SB, X \rightarrow b, A \rightarrow a$  10M

**OR**

6. a) Write the procedure for the conversion of right linear grammar to left linear grammar. 7M  
 b) What is derivation tree? Explain Left most derivation and Right most derivation with examples. 7M

**UNIT-IV**

7. a) Define a PDA. Design a PDA for  $L=\{XCX^r / X \in (a,b)^*\}$  process the string abbacabba. Note:  $X^r$  stands for reverse of the string X. 7M  
 b) Write procedure for constructing CFG for given PDA 7M

**OR**

8. a) Design PDA generating  $L=\{a^j b^i c^k / i = j \text{ or } j = k\}$ . 7M  
 b) Convert the following Context Free Grammar to Push Down Automata  
 $S \rightarrow 0A, A \rightarrow 0ABC/1B/0, B \rightarrow 1$  7M

**UNIT-V**

9. a) Design a Turing machine for recognizing multiplication of two numbers 7M  
 b) What is PCP? Explain with example 7M

**OR**

10. a) Construct LR(0) items for the following grammar  
 $S' \rightarrow A, A \rightarrow aAa/B, B \rightarrow b$  7M  
 b) Explain Church's Hypothesis. 7M

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<b>R-15</b>
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**Code: 5G144**

II B.Tech. II Semester Supplementary Examinations October 2020

**Object Oriented Programming**

( 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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<b>UNIT-I</b>
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- 1. a) What is an array? Write a Java program to print upper triangle values of a given two dimensional array. 7M
- b) Illustrate method overloading in Java. 7M

**OR**

- 2. a) List and describe Java Buzzwords. 7M
- b) Explain Object Oriented Programming concepts. 7M

<b>UNIT-II</b>
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- 3. a) How to call super class constructor using derived class? Explain. 7M
- b) Define interface. Write a java program to implement interface. 7M

**OR**

- 4. a) Describe the Object Class. 7M
- b) How interface variables can be accessed? Explain. 7M

<b>UNIT-III</b>
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- 5. a) With suitable program explain multiple catch clauses. 7M
- b) Describe the Thread Life Cycle. 7M

**OR**

- 6. a) What is the need of finally? Explain.
- b) How to create multiple threads. Explain in brief.

<b>UNIT-IV</b>
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- 7. a) With suitable example explain StringTokenizer. 7M
- b) Describe the window fundamentals. 7M

**OR**

- 8. a) Explain linked list class. 7M
- b) Explain briefly passing parameters to Applets 7M

<b>UNIT-V</b>
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- 9. a) Describe the delegation event model. 7M
- b) Briefly explain Components and Containers. 7M

**OR**

- 10. What is a Datagram? Explain in brief. 14M

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Code: 5GC42

II B.Tech. II Semester Supplementary Examinations October 2020

**Probability & Statistics**

( Common to CE, ME, CSE &amp; 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) Find the probability of getting a sum of 10 if we throw two dice  
 b) A random variable X has the following probability function

x	0	1	3	4	5	6	7
P(x)	0	K	2K	2K	3K	K <sup>2</sup>	7K <sup>2</sup> +K

- (i) Find the value of K  
 (ii) Evaluate  $p(0 < X < 5)$   
 (iii) Evaluate  $p(X < 6)$

**OR**

2. a) If  $P(A) = \frac{1}{2}$ ,  $P(B) = \frac{1}{3}$  and  $P(A \cap B) = \frac{1}{5}$  then find (i)  $P(A \cup B)$  (ii)  $P(A^c \cap B)$  (iii)  $P(A \cap B^c)$   
 (iv)  $P(A^c \cap B^c)$   
 b) Find the continuous probability function  $f(x) = k x^2 e^{-x}$  when  $x \geq 0$  find (i) k  
 (ii) mean (iii) variance

**UNIT-II**

3. a) A die is thrown 6 times. If getting an even number is a success, find the probabilities of  
 (i) at least one success (ii) 3 successes (iii) 4 successes  
 b) If a random variable has a poisson distribution such that  $P(1) = P(2)$  find  
 (i) Mean of the distribution  
 (ii)  $P(4)$   
 (iii)  $P(x = 1)$   
 (iv)  $P(1 < x < 4)$

**OR**

4. a) The mean and variance of a binomial variable X with parameters n and p are 16 and 8. Find  $P(x = 1)$  and  $P(x > 2)$   
 b) A hospital switch board receives an average of 4 emergency calls in a 10 minute interval. What is the probability that  
 (i) There are at most 2 emergency calls in a 10 minute interval  
 (ii) There are exactly 3 emergency calls in a 10 minute interval

**UNIT-III**

5. a) A normal population has a mean of 0.1 and standard deviation of 2.1. Find the probability that mean of a sample of size 900 will be negative  
 b) A random sample of size 81 taken whose variance is 20.25 and mean is 32, construct 98% confidence interval

**OR**

6. a) The variance of population is 2. The size of the sample collected from the population is 169. What is the standard error of mean  
 b) A research worker wants to determine the average time it takes a mechanic to rotate the tires of a car and he wants to be able to assert with 95% Confidence that the mean of his sample is of by at most 0.5 minutes. If he can presume from past experience that  $\sigma = 1.6$  minutes how large a sample will have to take

<b>UNIT-IV</b>
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7. a) In a sample of 1,000 people in Karnataka 540 are rice eaters and the rest are wheat eaters. Can we assume that both rice and wheat are equally popular in the state at 1% level of significance
- b) If 80 patients are treated with an antibiotic 59 got cured. Find a 99% confidence limits to the true population of cure

**OR**

8. The mean yield of wheat from a district A was 210 pounds with S.D 2.5 inches per acer from a sample of 100 plots. In another district the mean yield was 220 pounds with S.D 12 pounds from a sample of 150 plots. Assuming that the S.D of yield in the entire state was 11 pounds. Test whether there is any significant difference between the mean yield of crops in the two districts

<b>UNIT-V</b>
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9. The measurements of the output of two units have given the following results. Assuming that both samples have been obtained from the normal populations at 10% significant level, Test whether the two populations have the same variance

Unit-A	14.1	10.1	14.7	13.7	14.0
Unit-B	14.0	14.5	13.7	12.7	14.1

**OR**

10. The number of automobile accidents per week in a certain community are as follows 12, 8, 20, 2, 14, 10, 15, 6, 9, and 4. Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period

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<b>R-15</b>
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**Code: 5G141**

II B.Tech. II Semester Supplementary Examinations October 2020

**Computer Organization**

( 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 )

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<b>UNIT-I</b>
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- 1. a) Simplify the following expressions using Boolean algebra:  
i)  $A'B+ABC'+ABC'$       ii)  $AB+A(CD+CD')$
- b) Represent the decimal 8620 in BCD code, excess-3 code, 2421 code and as an unsigned binary number.

**OR**

- 2. a) Represent the decimal numbers -7.1 and -2.01 in 32-bit floating point notation (IEEE standard 754).
- b) Convert the following boolean function to its canonical form:  
 $F(A, B, C, D) = (0,1,2,4,6,12)$ .

<b>UNIT-II</b>
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- 3. a) What is register? Explain about Register Transfer
- b) What is the difference between a direct and an indirect address instruction

**OR**

- 4. a) What is the application of stack organization explain with example
- b) What is Reduced Instruction set Computer? what are it's applications

<b>UNIT-III</b>
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- 5. Explain microinstruction format.

**OR**

- 6. a) Explain about decoding of microoperation fields.
- b) How the microprogrammed control organization works.

<b>UNIT-IV</b>
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- 7. Multiply the two signed binary integers using the Booth's multiplication algorithm:  
 $A=100101, B=011011$ .

**OR**

- 8. a) Explain memory hierarchy in a computer system.
- b) Write short notes on Cache memory.

<b>UNIT-V</b>
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- 9. a) Explain about CPU-IOP communication.
- b) Explain Four-Segment Instruction Pipeline.

**OR**

- 10. a) Explain about connection of I/O bus to input-output devices.
- b) Explain the possible way for executing multiple functional units with processor.

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**Code: 5G142**

II B.Tech. II Semester Supplementary Examinations October 2020

**Design and Analysis of Algorithms**

( 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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<b>UNIT-I</b>
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- 1. a) What is an Algorithm? What are the properties of an algorithm? Explain the Pseudo code conventions for the algorithms. 7M
- b) Write an algorithm for finding the factorial of a given number. And compute the space and time complexities. 7M

**OR**

- 2. Explain Asymptotic Notations with examples. 14M

<b>UNIT-II</b>
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- 3. a) Solve the following recurrence relations.
  - i)  $T(n)=2T(n/2)+n\log n, T(1)=1$
  - ii)  $T(n)=2T(n/3)+T(2n/3)+Cn, T(1)=1$  7M
- b) Explain Quick Sort algorithm with an example. 7M

**OR**

- 4. a) Write the control abstraction for greedy method. 4M
- b) Explain Krushkal's algorithm with an example. 10M

<b>UNIT-III</b>
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- 5. a) Solve the following Knapsack problem using dynamic programming technique for  $m=40, n=4, (P1:P4)=(11,21,31,33)$  and  $(w1:w4)=(2,11,22,15)$  7M
- b) State and explain Reliability Design. 7M

**OR**

- 6. a) Solve the 8 Queen problem using Backtracking. 10M
- b) Write Dynamic Programming general method. 4M

<b>UNIT-IV</b>
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- 7. a) State and Explain Sum of Subsets problem. 6M
- b) Let  $w = \{5,10,12,13,15,18\}$  &  $m=30$ . Find all possible subsets of  $w$  that sum to  $m$ . Draw the portion of the state space tree that is generated. 8M

**OR**

- 8. Find the Least Cost Branch and Bound solution for Travelling Sales Person for the given

$$\text{Cost Matrix} = \begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$$

14M

<b>UNIT-V</b>
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- 9. Explain the classes NP-Hard and NP-Complete with example. 14M

**OR**

- 10. Explain Cook's Theorem with an example. 14M

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