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<b>R-17</b>
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**Code: 7G142**

II B.Tech. II Semester Supplementary Examinations February 2022

**Design and Analysis of Algorithms**  
( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. a) Explain the properties of an Algorithm with an example.	7M		
b) Give algorithm for matrix multiplication and find the time complexity of algorithm using step-count method	7M		
<b>OR</b>			
2. a) Explain about the amortized analysis in detail	7M		
b) What are the disjoint set operations? Explain in detail.	7M		
<b>UNIT-II</b>			
3. a) What are the advantages of divide and conquer	7M		
b) Explain strassens matrix multiplication	7M		
<b>OR</b>			
4. Consider the following instance of knapsack problem $n=3, M=20, (p_1, p_2, p_3)=(25, 24, 15), (w_1, w_2, w_3)=(18, 15, 10)$ Find the optimal solution for i. Maximum profit   ii. Minimum weight   iii. Maximum profit per unit weight	14M		
<b>UNIT-III</b>			
5. a) What does dynamic programming have in common with divide and conquer	7M		
b) What are the applications of dynamic programming?	7M		
<b>OR</b>			
6. Using algorithm OBST compute $w(i,j), r(i,j)$ and $c(i,j), 0 \leq i < j \leq 4$ for the identifier set $(a_1, a_2, a_3, a_4) = (\text{end, goto, print, stop})$ with $p(1)=3, p(2)=3, p(3)=1, p(4)=1, q(0)=2, q(1)=3, q(2)=1, q(3)=1, q(4)=1, q(5)=1$ using $r(i, j)$ construct the optimal binary search tree.	14M		
<b>UNIT-IV</b>			
7. a) Give the implicit and explicit constraints in 8 queen's problem. Explain	7M		
b) Write the control abstraction for backtracking method.	7M		
<b>OR</b>			
8. a) Generate FIFO branch and bound solution for the given knapsack problem $m=15, n=3, (p_1, p_2, p_3)=(10, 6, 8)$ and $(w_1, w_2, w_3)=(10, 12, 3)$	7M		
b) Analyze the time complexity of 8-queens problem.	7M		
<b>UNIT-V</b>			
9. a) What is satisfiability problem? Explain in detail.	7M		
b) Explain the classes of P and NP.	7M		
<b>OR</b>			
10. a) What is the methodology of non-deterministic algorithms?	7M		
b) Let X be a problem that belongs to the class NP. Then X may be NP complete. Justify.	7M		

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**Code: 7G133**

II B.Tech. I Semester Supplementary Examinations February 2022

**Digital Logic Design**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. a) Convert the following numbers into decimals (i) $(B65F)_{16}$ (ii) $(127.4)_8$ (iii) $(4021.2)_5$ (iv) $(1010110)_2$	8M		
b) Expand $A + BC' + ABD' + ABCD$ to MIN TERMS and MAX TERMS.	6M		
<b>OR</b>			
2. a) Convert the following decimal numbers to base indicated. i. 7163 to octal      ii. 1762 to hex decimal	7M		
b) Find the dual of the following expressions (i) $(X+Y'+Z)(X'+Z')(X+Y)$ (ii) $(AB'+C)D'+E$	7M		
<b>UNIT-II</b>			
3. a) Show that the dual of the exclusive-OR is equal to its complement	7M		
b) Simplify the Boolean function using three variable map $F(X, Y, Z) = \Sigma(0,1,5,7)$	7M		
<b>OR</b>			
4. a) Make a K-map for the function $F(X,Y,Z,W) = XY + XZ' + Z + XW + XY'Z + XYZ$ and realize the minimized expression using NAND gates only	7M		
b) Simplify the Boolean expression using K-MAP $F(A,B,C,D) = m(1,2,3,8,9,10,11,14) + d(7,15)$	7M		
<b>UNIT-III</b>			
5. a) Design and draw a Full Subtractor which will use two Half Subtractors?	7M		
b) Explain the functionality of a Multiplexer along with applications?	7M		
<b>OR</b>			
6. a) Realize the function $f(A,B,C,D) = m(1,2,3,4,6,7,8,10,12,14,15)$ using 4:1 MUX?	7M		
b) Design and implement 4-bit Priority Encoder?	7M		
<b>UNIT-IV</b>			
7. a) Elaborate about Shift Registers?	7M		
b) Define a register. Construct a shift register from S-R Flip-Flops. Explain its working.	7M		
<b>OR</b>			
8. a) Construct a JK flip-flop using a D Flip-Flop ,a 2-to-1 line multiplexer and an Inverter?	7M		
b) With a neat diagram, explain master slave JK Flip-Flop?	7M		
<b>UNIT-V</b>			
9. a) Describe about Error detection and correction methods used in logic circuits?	7M		
b) Explain about programmable logic devices?	7M		
<b>OR</b>			
10. a) Explain Ripple counter operation and its applications using a diagram?	6M		
b) Elaborate Random access memory and its types with examples?	8M		

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**Code: 7G143**

II B.Tech. II Semester Supplementary Examinations February 2022

**Formal Languages and Automata Theory**  
( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit ( 5x14 = 70 Marks )

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Marks    CO    Blooms  
Level

**UNIT-I**

1. Consider the following  $\epsilon$ -NFA

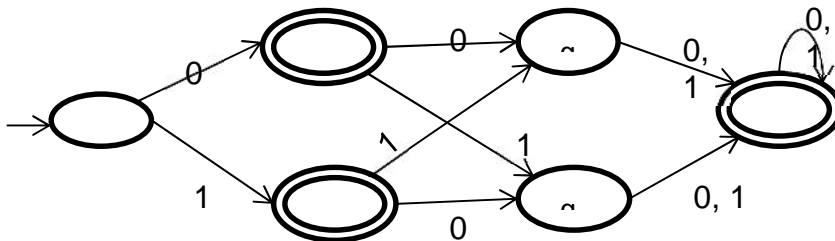
	$\epsilon$	a	b	c
p	$\emptyset$	{p}	{q}	{r}
q	{p}	{q}	{r}	$\emptyset$
$\odot$ r	{q}	{r}	$\emptyset$	{p}

- i. Compute the  $\epsilon$ -closure of each state
- ii. Convert the automation to a DFA.

14M    CO1    L1,L2

**OR**

2. Construct the Minimized DFA for the given below DFA.



**Fig : DFA**

14M    CO1    L1,L2

**UNIT-II**

3. Construct DFA for the Regular expression  $(0+1)^* (00+11)(0+1)^*$

14M    CO2    L2,L3

**OR**

4. a) Show that  $L = \{a^n b^n c^n / n > 0\}$  is not regular using pumping lemma

8M    CO2    L2,L3

b) Illustrate the closure properties of Regular Sets

6M    CO2    L2,L3

<b>UNIT-III</b>
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5. Construct regular grammar for given DFA.

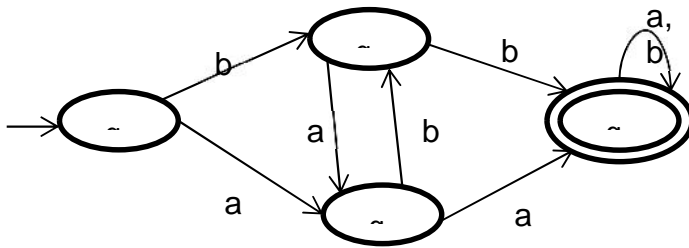


Fig : DFA

14M CO3 L4

OR

6. Convert the following CFG into CNF.

S  $aA \mid a \mid Bb \mid cC$

A  $aB \mid \epsilon$

B  $a \mid Aa$

C  $cCD$

D  $ddd$

14M CO3 L4

<b>UNIT-IV</b>
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7. Obtain a PDA to accept the language  $L(M) = \{w \mid w \in (a+b)^* \text{ and } n_a(w) = n_b(w)\}$ .

14M CO4 L3

OR

8. Construct CFG for the PDA  $M = (\{q_0, q_1\}, \{0, 1\}, \{R, Z_0\}, \quad, q_0, Z_0, \quad)$  and  $\quad$  is given below:

$(q_0, 1, Z_0) = (q_0, RZ_0)$

$(q_0, 1, R) = (q_0, RR)$

$(q_0, 0, R) = (q_1, R)$

$(q_1, 0, Z_0) = (q_0, Z_0)$

$(q_0, \epsilon, Z_0) = (q_0, \epsilon)$

$(q_1, 1, R) = (q_1, \epsilon)$

14M CO4 L3

<b>UNIT-V</b>
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9. Design a TM for  $L = \{0^n 1^n \mid n \geq 1\}$

14M CO5 L3

OR

10. a) Explain church's hypotheses briefly.

6M CO5 L3

- b) Describe in detail about Turing reducibility and Halting Problem.

8M CO5 L3

\*\*\*END\*\*\*

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**Code: 7G144**

II B.Tech. II Semester Supplementary Examinations February 2022

**Object Oriented Programming using JAVA**

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks

**UNIT-I**

- 1. a) What is recursion? Write a recursive program in Java to find the Fibonacci Series. 7M
- b) Explain parameterized constructor. Write a program using parameterized constructor that reads two numbers and compute their sum. 7M

**OR**

- 2. a) Explain data abstraction with a real time example. 7M
- b) What is Byte code? Explain the various stages of programming in Java 7M

**UNIT-II**

- 3. a) Explain the keywords this, static, super and final with one example each. 7M
- b) How do you achieve multiple inheritance in java? Give Example. 7M

**OR**

- 4. a) What is method overloading? Can you define two methods that have same name but different parameter types? 7M
- b) Explain with an example program the importance of interfaces in java programming. 7M

**UNIT-III**

- 5. a) What is the difference between checked and unchecked exception? Write the code segments for each type. 7M
- b) Differentiate between multithreading and multitasking. Explain thread life cycle in detail 7M

**OR**

- 6. a) Differentiate between throw and throws. Differentiate between error and exception. Give example 7M
- b) Write an example program for try and catch block. 7M

**UNIT-IV**

- 7. a) With the help of an example program explain how we can return the values from a lambda expression. 7M
- b) Write about the generic interfaces. 7M

**OR**

- 8. a) What is a Generic Method? Illustrate Generic Method with an example program. 7M
- b) How to add a bridge method in Generic class? Explain with an example. 7M

**UNIT-V**

- 9. a) Give brief description about LinkedList class? 7M
- b) List the various constructors present in Scanner class. 7M

**OR**

- 10. a) Explain ArrayList class and explain following methods: 8M  
i. add() ii. size() iii. equals() iv. remove()
- b) Explain how collections can be accessed using an iterator. 6M

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**Code: 7G145**

II B.Tech. II Semester Supplementary Examinations February 2022

**Operating Systems**

(Computer Science and Engineering)

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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Marks

**UNIT-I**

- 1. a) Describe the different type of Operating System Services. 7M
- b) Define a System Call. List the different type of System Calls. 7M

**OR**

- 2. a) Demonstrate the Storage Device Hierarchy with diagram. 7M
- b) Compare the difference between Symmetric and Asymmetric multi processor systems 7M

**UNIT-II**

- 3. a) Define Critical Section. List the requirements that drive the solution to the critical section problem. 7M
- b) Discuss about the Semaphore usage in detail. 7M

**OR**

- 4. a) Explain about Processor Affinity in detail. 7M
- b) Solve the Critical Section problem using Lock mechanism 7M

**UNIT-III**

- 5. a) Explain Dead lock characterization in detail 10M
- b) List the methods for handling Dead locks 4M

**OR**

- 6. a) Discuss the importance of Bankers algorithm in defining a systems safe state. 7M
- b) Explain Resource Allocation Graph in detail. 7M

**UNIT-IV**

- 7. a) What is Mounting? Describe its importance in file system 7M
- b) Describe the Layered file system. 7M

**OR**

- 8. a) Discuss about any two file access methods. 8M
- b) List the operations that are performed on a directory. 6M

**UNIT-V**

- 9. a) What is an Interrupt? Discuss in-detail about interrupt driven I/O cycle. 9M
- b) Write short note on buffering 5M

**OR**

- 10. a) List the steps in DMA transfer. 7M
- b) What is a Virus? Discuss about different categories of a Virus 7M

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Code: 7GC42

II B.Tech. II Semester Supplementary Examinations February 2022

**Probability and Statistics**

( Common to CE, ME &amp; CSE )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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**UNIT-I**

1. a) If  $P(A) = \frac{1}{4}$ ,  $P(B) = \frac{1}{3}$  and  $P(A \cup B) = \frac{1}{2}$  then evaluate  $P(A/B)$ ,  $P(B/A)$ ,  $P(A \cap B')$  and  $P(A/B')$  8M

- b) State and prove Addition theorem on probability for three events. 6M

**OR**

2. a) State and prove Baye's theorem. 8M

- b) A card is drawn from a well shuffled deck of 52 playing cards. What is the probability of drawing a red king (ii) 3, 4, 5 or 6 (iii) black card. 6M

**UNIT-II**

3. a) Find the continuous probability function  $f(x) = k x^2 e^{-x}$  when  $x > 0$  find (i) k (ii) mean (iii) variance 7M

- 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 7M  
(ii) There are exactly 3 emergency calls in a 10 minute interval

**OR**

4. a) 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)  $P(1 < x < 4)$  7M

- b) In a normal distribution, 7% are under 35 and 89% are under 63. Find the mean and the standard deviation of the distribution. 7M

**UNIT-III**

5. A random sample of size 81 taken whose variance is 20.25 and mean is 32, construct 98% confidence interval 14M

**OR**

6. A population consists of the five numbers 2, 3, 6, 8, 11. Consider all possible samples of size 2 which can be drawn with replacement from this population. Find the population mean and standard deviation, and mean and standard deviation of the sampling distribution of means. 14M

**UNIT-IV**

7. An ambulance services claims that it takes on the average less than 10min to reach its destination in emergency calls. A sample of 36 calls has a mean of 11 min and the variance of 16 min. test the significance 0.05 level. 14M

**OR**

8. A die is thrown 9000 times and of these 3220 yielded a die is thrown 9000 times and of these 3220 yielded a or 4. i.e., this is consistence with the hypothesis is that die was unbiased. 14M

**UNIT-V**

9. 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 14M

**OR**

10. 200 digits were choose at random from a set of tables. The frequencies of the digits are shown below

Digit	0	1	2	3	4	5	6	7	8	9
Frequency	18	19	23	21	16	25	22	20	21	15

Use the chi-square test to assess the correctness of the hypothesis that the digits were distributed in equal number in the tables from which these were chosen. 14M

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**Code: 7G141**

II B.Tech. II Semester Supplementary Examinations February 2022

**Computer Organization**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five full questions by choosing one question from each unit (5x14 = 70 Marks )

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	Marks	CO	Blooms Level
<b>UNIT-I</b>			
1. a) Elaborate on the basic components and operations of a Central Processing Unit?	7M		
b) Explain about signed magnitude approach for representing the fixed-point numbers?	7M		
<b>OR</b>			
2. a) Define bus? Draw the figure to show how functional units are interconnected using a bus and explain it?	7M		
b) Perform the 2's complement subtraction of a smaller number (101011) from a larger number (111001).	7M		
<b>UNIT-II</b>			
3. a) Define is register transfer language? Explain the basic symbols used in register Transfer?	7M		
b) Elaborate about shift micro-operations with examples?	7M		
<b>OR</b>			
4. a) Elaborate the significance of Reduced Instruction set Computer along with its applications?	7M		
b) Explain the application of stack organization with example?	7M		
<b>UNIT-III</b>			
5. a) Describe microinstruction sequencing in detail?	7M		
b) Define is a micro-operation? Explain the four different types of micro-operations?	7M		
<b>OR</b>			
6. Explain Address sequencing in control memory using a selection of address for control memory?	14M		
<b>UNIT-IV</b>			
7. a) Differentiate between Static RAM and Dynamic RAM?	7M		
b) Explain how multiplication is performed using an Array Multiplier for fixed-point numbers?	7M		
<b>OR</b>			
8. a) Derive and explain an algorithm for adding and subtracting 2 floating-point binary numbers?	7M		
b) Write and explain the algorithm for non-restoring division with a suitable example?	7M		
<b>UNIT-V</b>			
9. a) What is an Arithmetic Pipeline? Explain the steps in arithmetic pipelining.	7M		
b) Describe the steps involved in CPU-IOP communication.	7M		
<b>OR</b>			
10. a) Define is an Input-Output processor? Explain the need for an Input-Output processor?	7M		
b) Elaborate are the steps required for a pipelined processor to process the instruction?	7M		

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