

Hall Ticket Number :

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**R-17**

**Code: 7G141**

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

## **Computer Organization**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following ( 5 x 14 = 70 Marks )

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	Marks	CO	Blooms Level
1. a) What is meant by 'bus'? Give a detailed classification of bus types in computer architecture.	6M	CO1	L1
b) Explain about sign magnitude and 2's complement approaches for representing the fixed point numbers. Explain why 2's complement approach is preferable	8M	CO1	L2
2. a) What is the use of three-state buffer? Explain its function with a neat sketch of logic symbol.	6M	CO2	L2
b) Summarize all the 16 logic micro operations with a comprehensive truth table.	8M	CO2	L2
3. a) Write a brief note on instruction set completeness.	6M	CO2	L1
b) How does a processor react to an external interrupt? Explain the interrupt cycle with a neat sketch of a flow chart.	8M	CO2	L2
4. With a neat sketch of block diagram explain the functional units of a micro programmed control unit.	14M	CO3	L1
5. a) Explain the different mapping techniques used in the usage of Cache memory.	6M	CO3	L2
b) Compare and contrast between the hardwired and micro programmed control units.	8M	CO3	L2
6. Illustrate the steps involved in Booth's multiplication algorithm for the multiplication signed binary numbers with flowchart and numerical examples.	14M	CO4	L2
7. a) What is an Input-Output processor? Explain the need for Input-Output processor	8M	CO5	L1
b) State the differences between full and half-duplex serial mode of communications. With a neat sketch of frame format, explain the concept of bit-oriented protocols.	6M	CO5	L2
8. a) Explain the working of DMA.	8M	CO5	L5
b) What is the impact of data dependencies in a program that offset the performance of pipelined architectures? Cite any two methods by which this conflict can be controlled.	6M	CO5	L2

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R-17

Code: 7G142

II B.Tech. II Semester Regular &amp; Supplementary Examinations November 2020

**Design and Analysis of Algorithms**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following ( 5 x 14 = 70 Marks )

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		Marks	CO	Blooms Level																					
1.	Define Time and Space Complexity of an algorithm. Explain how to express the complexity in asymptotic notations.	14M	1	1																					
2.	Discuss the steps in Mathematical analysis for recursive algorithms. Do the same for finding the factorial of number.	14M	1	6																					
3.	Explain the working of Merge Sort Algorithm with an example. Give the analysis of Merge sort algorithm.	14M	2	2																					
4.	a) Explain the methodology of Dynamic programming. List the applications of Dynamic programming.	4M	3	2																					
	b) Explain reliability design problem with an example.	10M	3	2																					
5.	Explain the Travelling salesman problem using Dynamic Programming.	14M	3	2																					
6.	a) Solve the following instance of knapsack problem using branch and bound algorithm with $W=15$ .																								
	<table border="1"> <thead> <tr> <th>Item</th> <th>Weight</th> <th>Profit</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>5</td> <td>\$40</td> </tr> <tr> <td>2</td> <td>7</td> <td>\$3</td> </tr> <tr> <td>3</td> <td>2</td> <td>\$18</td> </tr> <tr> <td>4</td> <td>4</td> <td>\$4</td> </tr> <tr> <td>5</td> <td>5</td> <td>\$10</td> </tr> <tr> <td>6</td> <td>1</td> <td>\$2</td> </tr> </tbody> </table>	Item	Weight	Profit	1	5	\$40	2	7	\$3	3	2	\$18	4	4	\$4	5	5	\$10	6	1	\$2			
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5	5	\$10																							
6	1	\$2																							
	b) Develop the pseudo code for knapsack problem using branch and bound algorithm.	7M	4	3																					
7.	a) Discuss in detail about NP Complete Problems.	8M	5	6																					
	b) List examples of problems in NP Complete Problems.	6M	5	1																					
8.	a) What is the relationship between P, NP, NPC classes? What do you understand by Polynomial time reducibility?	8M	5	1																					
	b) Explain COOK's Theorem.	6M	5	2																					

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**Code: 7G143**

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

**Formal Languages and Automata Theory**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following ( 5 x 14 = 70 Marks )

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	Marks	CO	Blooms Level
1. a) Construct a Melay machine to determine the residue mod 3 for each binary string treated as a binary integer.	7M	1	L2
b) Design FA which accepts even number of 0's and even number of 1's.	7M	1	L5
2. a) Design DFA for the set of all strings that either begins or ends or both with 'ab'. Also explain applications of automata theory.	7M	1	L5
b) Explain the minimization of FSM and equivalence between two FSMs.	7M	1	L3
3. a) Explain closure properties of regular languages.	7M	2	L1
b) Prove or disprove that the language L given by $L = \{ a^m b^n / m, n, m \text{ and } n \text{ are positive integer} \}$ is regular.	7M	2	L3
4. a) Differentiate between CNF and GNF with suitable examples.	7M		L2
b) Define CNF and convert the following grammar into CNF. $S \rightarrow aAD$ $A \rightarrow aB / bAB$ $B \rightarrow b$ $D \rightarrow d$	7M	3	L4
5. a) Show that $L = \{ a^i b^j / j = i^2 \}$ is not context free language.	7M	3	L3
b) Convert given CFG to GNF where $V = \{ S, A \}$ , $T = \{ 0, 1 \}$ and P is $S \rightarrow AA / 0$ $A \rightarrow SS / 1$	7M	3	L4
6. a) Let G be a CFG that generates the set of palindromes given by $S \rightarrow aSa / bSb / a / b$ Find the PDA that accepts $L(G)$ and simulate for input abbbbba.	7M	4	L2
b) Construct the PDA that recognizes the language $L = \{ x = x^R / x \text{ belongs to } \{ a, b \}^+ \}$ .	7M	4	L4
7. a) Discuss about Universal Turing Machine and operations on Turing Machine.	7M	5	L2
b) Design Turing Machine for palindrome over $\Sigma = \{ a, b \}$ .	7M	5	L5
8. a) Compare Finite Automata, Push down Automata and Turing Machine with suitable examples.	7M	5	L4
b) Design Turing Machine for 2's complement where $\Sigma = \{ 0, 1 \}$ .	7M	5	L5

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**R-17**

**Code: 7G144**

II B.Tech. II Semester Regular & Supplementary Examinations November 2020

**Object Oriented Programming Using Java**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following ( 5 x 14 = 70 Marks )

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	Marks	CO	Blooms Level
1. a) List and explain the characteristics of java language	8M	1	1,5
b) Write a java program to print the Pascal triangle	6M	1	3
2. How many types of access specifiers are supported by java? Explain each with suitable example program.	14M	1	1,2
3. a) Differentiate between overloading and overriding	5M	2	4
b) List the advantages of packages over classes.	5M	2	1
c) Explain the importance of dynamic method dispatch using java	4M	2	2
4. a) Explain with example program the importance of interfaces in java programming.	10M	2	5
b) Illustrate the use of super keyword with respect to java	4M	2	2
5. a) Distinguish between final and finally keywords	4M	3	4
b) What is an exception? How can we create our own exceptions? Illustrate with suitable example.	10M	3	1,2
6. a) With the help of an example program explain how we can return the values from a lambda expression.	7M	4	5
b) Write about the generic interfaces.	7M	4	2
7. Discuss in detail about the collection interfaces	14M	5	6
8. a) Give brief description about TreeSet class?	7M	5	1
b) List the various constructors present in Scanner class.	7M	5	1

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**Code: 7G145**

II B.Tech. II Semester Regular &amp; Supplementary Examinations November 2020

**Operating Systems**

( Computer Science and Engineering )

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following ( 5 x 14 = 70 Marks )

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	Marks	CO	Blooms Level
1. a) Define System Calls and System Commands in Operating System. What are the different System calls available to support creation, execution and storage of a program or process?	8M	CO1	L1
b) Discuss any one process scheduling algorithm.	6M	CO1	L5
2. a) Compare between the following i) Paging and Segmentation ii) Page table and segment table	6M	CO2	L4
b) What are semaphores? Explain two primitive semaphore operations. What are its advantages?	8M	CO2	L5
3. a) What are co-operating processes? Describe the mechanism of inter process communication using shared memory in a producer-consumer problem	7M	CO2	L1
b) What are two advantages do threads have over multiple processes? What major disadvantages do they have? Suggest one application that would benefit from the use of threads	7M	CO2	L1
4. a) What is virtual memory? How it could be implemented in our operating system. Explain with example.	8M	CO3	L4
b) Illustrate logical address space and physical address space.	6M	CO3	L2
5. a) Compare about internal fragmentation and external fragmentation.	7M	CO3	L4
b) Discuss classic problem of synchronization in detail?	7M	CO3	L5
6. What are the various disk scheduling policies? What are the criteria for selecting a Disk Scheduling Algorithm?	14M	CO4	L2
7. Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in order), how would each of the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)? Which algorithm makes the most efficient use of memory?	14M	CO4	L1
8. a) With regards to I/O design principles describe the layers of the I/O system and justify this structure.	8M	CO5	L5
b) Explain different methods used to solve the problem of security at the operating system level	6M	CO5	L4

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**Code: 7GC42**

II B.Tech. II Semester Regular &amp; Supplementary Examinations November 2020

**Probability and Statistics**

( Common to Civil Engineering, ME &amp; CSE )

Max. Marks: 70

Time: 3 Hours

Answer any five questions from the following ( 5 x 14 = 70 Marks )

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- Marks
1. a) Two marbles are drawn in succession from a box containing 10 red, 30 white, 20 blue and 15 orange marbles, with replacement being made after each drawing. Find the probability that (i) both are white (ii) first is red and second is white. 7M
- b) The diameter of an electric cable say  $X$  is assumed to be a continuous random variable with Probability density function  
 $f(x) = 6x(1-x) ; 0 \leq x \leq 1.$   
 Find mean and variance. 7M
2. a) State and prove Baye's theorem. 7M
- b) The cumulative distribution function of a continuous random variable  $X$  is given by
- $$F(x) = \begin{cases} 0, & x < 0 \\ x^2, & 0 \leq x < 1/2 \\ 1 - \frac{3}{25}(3-x)^2, & (1/2) \leq x < 3 \\ 1, & x \geq 3 \end{cases}$$
- 7M
- Find the pdf of  $x$  and evaluate  $P((1/3) \leq X < 4).$
3. a) In a large consignment of electric bulbs 10% are defective. A random sample of 20 is taken for inspection. Find the probability that  
 (i) All are good bulbs.  
 (ii) At most there are three defective bulbs.  
 (iii) Exactly there are three defective bulbs. 7M
- b) The weekly wages of 1000 workmen are normally distributed around a mean of Rs.70 with a standard deviation of Rs.5. Estimate the number of workers whose weekly wages will be  
 (i) Between Rs.69 and Rs.72 (ii) Less than Rs.69 (iii) More than Rs.72. 7M
4. a) Fit a Poisson distribution for the following data and calculate the expected frequencies
- |      |     |     |    |    |   |   |
|------|-----|-----|----|----|---|---|
| x    | 0   | 1   | 2  | 3  | 4 | 5 |
| f(x) | 142 | 156 | 69 | 27 | 5 | 1 |
- 7M
- b) Out of 800 families with 5 children each, how many would you expect to have (i) 3 boys (ii) 5 girls (iii) either 2 or 3 boys? Assume equal probabilities for boys and girls. 7M
5. a) A population consists of the four numbers 3, 7, 11, 15. 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. 7M
- b) The standard deviation of the life-times of television tubes manufactured by a company is estimated as 100 hours. Find how large a sample must be taken in order to be 99% confident that the error in the estimated mean life-time will not exceed 20 hours 7M

6. a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near their residence. 200 men and 325 women were in favor of the proposal. Test the hypothesis that proportions of men and women in favor of the proposal are same at 5% level.

7M

b) Two random samples gave the following data

	size	mean	Variance
Sample I	8	9.6	1.2
Sample II	11	16.5	2.5

Is the difference between means significant?

7M

7. The following data give the number of air-craft accidents that occurred during the various days of a week

Day	Mon	Tue	Wed	Thu	Fri	Sat
No. of accidents	15	29	13	12	16	15

Test whether the accidents are uniformly distributed over the week.

14M

8. Two random samples drawn from two normal populations have the variable values as below:

Sample1	19	17	16	28	22	23	19	24	26			
Sample2	28	32	40	37	30	35	40	28	41	45	30	36

Obtain the estimate of the variance of the population and test whether the two populations have the same variance.

14M

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