Name of the Program: B.Tech   Semester: IV
Stream: CSE
PAPER TITLE: Computer Architecture   PAPER CODE: ECS42102
Maximum Marks: 40   Time duration: 3 Hours
Total No of questions: 09   Total No of Pages: 01

Instruction to the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups
Group A
Answer all the questions of the following $5 \times 1 = 5$

1.   I) A floating point number is actually stored as _____

       II)Overflow condition in 2' complement arithmetic is detected by

       III) What is the time complexity of booths multiplication algorithm.

       IV)What do you understand by one word.

      V) What is an Instruction?

Group B

(Answer any three questions)

                             $3 \times 5 = 15$

2. The main memory of a system has a word length of 32-bits & is both word and byte addressable. The system has a 16 bit address bus. The lowest numbered byte in a word occupies bits 0 through 7. The byte number of lowest numbered byte in a word is the byte address for that word. Both bytes and words are numbered starting from 0. Now, find the following: **(1+1+1+2)**

     a) Byte address of the 9th memory word
     b) Word address of the 9th byte
     c) Word address of the word containing byte with byte address = 34
     d) Number of words in this byte addressable memory

3. Explain clearly, the register-indirect, the indexed and the base register with indexed addressing modes. Next, point out the exact difference between the three.   (1+1+1+2)

4. Draw the schematic diagram of hardware needed to implement "shift-subtract" restoring division technique (positive integers); next, give a step by step illustration of the above division technique with dividend D = $(1000)_2$ and divisor M = (0011).   (2+3)

5. Explain the Direct Mapping technique for cache memory; next consider a system with main memory divided into 4096 blocks of 16 words each and cache memory having 128 blocks. What are the values of s, r & w ? Into which cache block will memory block 258 be loaded ?
(2+2+1)

Group C
(Answer any two questions)

$$2 \times 10 = 20$$

6. State the algorithm designed to overcome the disadvantage of Booths multiplication algorithm along with the flowchart. Represent each and every step of the proposed algorithm for multiplying 7 and (-2).

[2+3+2+3=10]

7. Discuss the properties of memory hierarchy with diagram? Write a short note on Indexed & Indirect memory addressing scheme.

8. Explain with diagram the basic functional blocks of a computer.

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END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B.TECH   Semester: IV
Stream: CSE
PAPER TITLE: Algorithms -II   PAPER CODE: ECS42104
Maximum Marks: 40   Time duration: 3 hours
Total No of questions: 13   Total No of Pages: 02

Instruction for the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups
Group A
Answer all the questions of the following   **5 × 1 = 5**

1. The following function is an example of
   int fib_r (int n)
   {
    if (n<=1) return 1;
   else
   return(fib_r (n-1)+fib_r(n-2));
    }
   (A) Linear recursion (B) Binary recursion (C) Nested Recursion (D) Tail recursion

2. Which of the following sorting algorithms has average –case and worst-case running time of O (n logn)? (A) Bubble sort (B) Selection sort (C) Merge sort (D) Quick sort

3. The time factor that determines efficiency of algorithm is measured by: (A) Counting microseconds (B) Counting the number of loop invariants (C) Counting the number of statements (D) Counting the kilobytes of

4. Let X be a problem that belongs to the class NP. Then which one of the following is TRUE? (A) There is no polynomial time algorithm for X (B) If X can be solved deterministically in polynomial time, then P = NP (C) If X is NP-hard, then it is NP-complete (D) X may be undecidable.

5. What is the largest number of key comparisons made by binary search in searching for a key in the following array? 3,14, 27, 31, 39, 42, 55, 70, 74, 81, 85, 93, 98

(Short Answer Type Questions)
Answer *any three* of the following   **3 × 5 = 15**

6. Write general outlines for analyzing time efficiency of recursive algorithms.
7. Write the algorithm for Bubble sort and derive its time complexity.
8. Explain how Binary Search method fails to find 43 in the given sorted array:
   8, 12, 25, 26, 35, 48, 57, 78, 86, 93, 97, 108, 135, 168, 201
9. Differentiate between Spanning tree and minimum spanning tree (MST). Apply Prim's algorithm to find MST for the following graph.   **(2+3)**
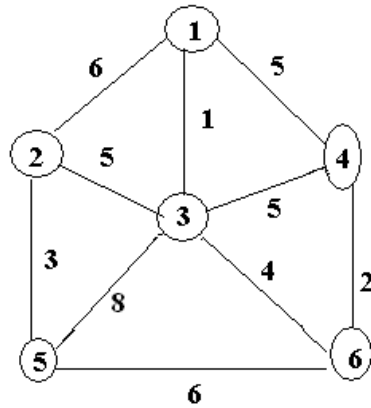

Fig.3

10. Write notes on P and NP problems

GROUP –C
(Long Answer Type Questions)
Answer *any two* of the following   **2 × 10 = 20**

11. Write the psuedocode for the Selection sort algorithm. What loop variant does it maintain? Why does it need to run for only the first n-1 elements rather than for all n elements? Give the best and Worst case time complexity of Selection sort.

12. a. What is minimum spinning tree? Generate the Minimum spinning tree for the following graph using Prim's algorithm.   **(5+5)**
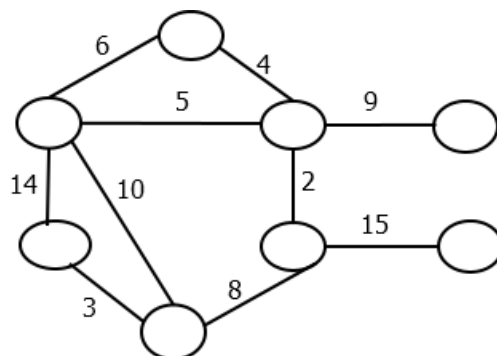
b. What is decision problem? Differentiate between Optimization and Decision Problems.

13. a. Write Pseudocode for the Merge sort method. Derive worst case complexity.   **(5+5)**

b. What is the computational complexity of the Fibonacci sequence and how is it calculated.

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ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech   Stream: CSE   Semester: IV
PAPER TITLE: Object Oriented Programming   PAPER CODE: ECS42106
Maximum Marks: 40   Time Duration: 3 Hours
Total No of Questions: 08   Total No of Pages: 02

Instruction to the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups
Group A
Answer all the questions of the following   **5 x 1 = 5**

1.   a) What is the difference between suspending and stopping a thread?

        b) What is a finally block?

        c) Describe the arguments used in the method drawRoundRect ( ).

        d) What are the differences between an abstract class and an interface?

        e) Mention the various sections of a web page.

GROUP –B
(**Short Answer Type Questions**)
Answer *any three* of the following   **3 x 5 = 15**

2.   i) Define constructor with a suitable example.
        ii) Write a java program to implement the concept of nesting of methods.   **[2 + 3]**

3.   i) What is method overriding?
        ii) Write a java program to make method overriding compulsory.   **[1 + 4]**

4.   i) What is multiple inheritance?
        ii) Write a java program to implement the concept of multiple inheritance.   **[1 + 4]**

5.   i) What is an exception?
        ii) Write a java program to throw your own exception.   **[1 + 4]**

(Long Answer Type Questions)
Answer *any two* of the following   **2 X 10 = 20**

6.   i) Create a try block that is likely to generate three types of exception and then incorporate necessary catch blocks to catch and handle them appropriately.

ii) Write a java program to create a thread by implementing runnable interface.

iii) Describe the different stages in the life cycle of an applet with a suitable block diagram.
[3 + 3 + 4]

7.   i) Describe the three ways of drawing polygons.

ii) Write an applet to draw a circle inside a square.

iii) Describe the three different ways by which a running thread may relinquish its control to another thread.   **[3 + 4 + 3]**

8.   i) Write a java program to set and retrieve the priority of a thread.

ii) Develop an applet that receives three numeric values as input from the user and then displays the largest of the three on the screen. Write a HTML page and test the applet.   **[4 + 6]**

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ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech   Semester: IV
Stream: CSE/ECE/EE
PAPER TITLE: Digital Electronics   PAPER CODE: EEC42102
Maximum Marks: 40   Time duration: 3 hours
Total No of questions: 08   Total No of Pages: 02

Instruction for the Candidate:
 1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
 2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
 3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups
Group A
Answer all the questions of the following   **5×1 = 5**

1. a) Convert $A0F9.0EB_{16}$ to decimal.

   b) Reduce the following Boolean expression: $AB + \overline{\overline{AC}} + A\overline{B}C(AB + C)$

   c) Differentiate Combinational and Sequential Circuit.

   d) Show how the J-K flip flop can be operated as a toggle flip flop.

   e) What is the difference between Ring and Johnson Counter?

GROUP –B
(**Short Answer Type Questions**)
Answer *any three* of the following   **3×5 = 15**

2. a) Simplify the following Boolean function using K-Map and realize the simplified expression using logic gates. [3]

   $$f(A,B,C,D) = \textstyle\prod_M (1,4,5,11,12,14) \cdot d(6,7,15)$$

   b) Implement the Boolean function using 8:1 multiplexer [2]

   $$f(A,B,C,D) = \textstyle\sum_m (1,3,4,11,12,13,14,15)$$

3. a) Construct a Master slave JK flip flop with truth table and explain the operations. [3]

   b) Design a 3:8 line Decoder. [2]

4. Obtain the set of prime implicants for the boolean expression [5]

   $$f = \textstyle\sum_m (1,2,3,5,6,7,8,9,12,1315)$$

5. Implement the following set of Boolean functions with a PLA: [5]

   $$F_1(A,B,C) = \textstyle\sum_m (0,1,2,4)$$
   $$F_2(A,B,C) = \textstyle\sum_m (0,5,6,7)$$

(Long Answer Type Questions)

Answer *any two* of the following   **2×10 = 20**

6. a) Design MOD-6 Asynchronous/Ripple Up Counter using JK Flip Flop   [4]

b) Write the different conditions to check for determining the type of Decoder, number of AND gates and OR gates for realization of Boolean expression using PLDs. Realize the following set of logical expressions using ROM, PLA and PAL.   [6]

$$Y_1 = AC + \overline{A}B$$
$$Y_2 = ABC + AB\overline{C} + \overline{A}BC$$
$$Y_3 = A\overline{B}C + AB\overline{C} + A\overline{B}\overline{C}$$

7. a) Define a Register. What is the difference between a Register and a Shift Register? Explain the data movement technique through a Parallel-In Serial Out Shift Register.   [1+2+2]

b) How does a JK flip flop differ from an SR flip flop in its operation? What is its advantage over an SR flip flop?   [3+2]

8. a) Design 2-bit Magnitude Comparator Circuit.   [4]

b) Explain the operation of master slave J-K flip flop and show how the race around condition is eliminated in it.   [6]

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END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: BCA/ BTECH   Semester: IV
Stream: CSE/ECE/EE/ME/CE
PAPER TITLE: HSS IV (Economics for Engineers)
PAPER CODE: HEC42180
Maximum Marks: 40   Time duration: 3 Hours
Total No of questions: 12   Total No of Pages: 02

Instruction to the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Section A

(Answer any **FIVE** *of the following questions)*   **Marks: 5*2=10**

1. State the Law of Demand.

2. What do you mean by Perfectly Elastic demand?

3. What do you mean by Opportunity Cost?

4. What do you mean by Income effect?

5. Explain two features of Perfectly Competitive market.

6. Why does an investor want to hold a portfolio?

Section B

(Answer any **TWO** *of the following questions)*   **Marks: 2*5=10**

7. State and explain the features of Monopolistic Competition.

8. Distinguish between Cardinal and Ordinal utility theory. Mention any two exceptions to the law of

   demand.   (2+3)

9. Suppose due to adequate rainfall, there has been a good harvest for mangoes. How will the equilibrium price and quantity demanded change under the new situation? Explain diagrammatically.

Section C

*(Answer any **TWO** of the following questions)* **Marks: 2*10=20**

10. Discuss the common characteristics of infrastructure assets.

11. What do you mean by Own Price, Cross Price and Income Elasticity of demand? Explain with examples.

12. Distinguish between Increase in demand and Extension of demand. What do you mean by Giffen goods? (8+2)

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END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: **B. Tech. in CSE/ECE/EE**   Semester: **IV**
PAPER TITLE: **Probability and Statistics**   PAPER CODE: **SMA42102**
Maximum Marks: **40**   Time duration: **3 hours**
Total No of questions: **08**   Total No of Pages: **02**

Instruction for the Candidate:
1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, and Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
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Answer all the Groups
Group A
Answer all the questions of the following   **5 × 1 = 5**

1. **a)** What is the physical significance of variance in probability distribution?
    b) What do we mean by Unbiased Estimator in Statistics?
    c) What is the sampling distribution of the sample mean, when the sample is drawn from a normal population with known population variance?
    d) State Bayes' Theorem.
    e) State statistical definition of probability and its limitation.

GROUP –B
(**Short Answer Type Questions**)
Answer *any three* of the following   **3 × 5 = 15**

2. Obtain the rank correlation coefficient for the following data:

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

3. Two urns contain respectively 5 white, 7 black balls and 4 white, 2 black balls. One of the urn is selected by toss of a fair con and then 2 balls are drawn without replacement. If both balls drawn are white, what is the probability that the first urn is selected?

4. Let T_1 and T_2 be two statistics with expectations $E(T_1) = \theta_1 + \theta_2$ and $E(T_2) = \theta_1 - \theta_2$. Find unbiased estimators of θ_1 and θ_2.

5. If X is normally distributed with mean 12 and s.d. 4, find $P(0 \leq X \leq 12)$. [Given that the area under standard normal curve less than $z = 3$ is 0.9986]

6.   **a)** The reading of voltage (V) and current (A) through a resistance (R) in an experiment are given by the following table:

Voltage	40	40	60	60	80	80	110	110
Current	5.1	4.8	6.2	5.9	0	10.3	13.0	12.7

Using linear regression, predict the value of current when voltage is 100. Also, predict the voltage value when current is 11.

b) Define regression coefficients and its two important properties.   **7+3**

7.   In a 300 ml soft-drink bottle of a particular brand the contents may vary little bit from bottle to bottle, because the filling machinery is not perfectly precise. Assuming normal distribution of the contents of the bottles about mean μ (true average of the contents of the bottle) and standard deviation of the distribution is 1.1 ml.

a) Obtain 99% confidence interval for μ on the basis of 3 observations (contents in ml.): 297.3, 298.7, and 299.2. What is the marginal error?

b) Let the margin of error is 1, then what should be the required sample size at 99% level of significance?   **5+5**

8.   **a)** The diameter of a component produced on a semi-automatic machine is known to be distributed normally with a mean of 15 mm and a standard deviation of 0.2 mm. If we pick up a random sample of size 10, what is the probability that the same mean will be between 14.95 and 15.05 mm? [Given that $\Phi(2.5) = 0.9938$].

b) Derive the maximum likelihood estimator for the parameter of the exponential distribution.

                    5+5

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