No. of pages: 4 Registration No. .....

END SEMESTER ASSESSMENTS, AUTUMN 2023

Program: B.TECH COMPUTER SCIENCE & ENGINEERING/B.TECH COMPUTER SCIENCE & BUSINESS SYSTEMS/B.TECH COMPUTER SCIENCE & ENGINEERING (LATERAL)/B.TECH COMPUTER SCIENCE & BUSINESS SYSTEMS (LATERAL)/B.TECH COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)/B.TECH COMPUTER SCIENCE AND ENGINEERING (IOT, CYBERSECURITY AND BLOCKCHAIN TECHNOLOGY)	
Subject Name: ALGORITHM - I	
Subject Code: 1000012101/1000022101/1000032101/ 1000092101/1000102101/1000112101	**Semester:** III
Duration: *2 Hours*	**Maximum Marks:** *50*

Note: Answer the following questions as directed.

Group A
(Answer All questions)
(Each question carries 1 mark)

1. **Write the correct answer from the options given:** **(10 X 1)**

(i) Which of the following is not true?

(a) The worst-case minimum possible time complexity of a comparison-based sorting algorithm is O(n(log(n))

(b) Quick sort is not a stable sorting algorithm

(c) Counting Sort is a comparison -based sorting algorithm

(d) Heap Sort is a comparison - based sorting algorithm

(ii) Which of the following is not $O(n^2)$?

(a) $15*(n^2)$

(b) $n^{1.98}$

(c) $n^3/sqrt(n)$

(d) $20*(n^2)$

(iii) Consider the strings "PQRSTPQRS" and "PRATPBRQRPS". What is the length of the longest common subsequence?

(a) 9

(b) 8

(c) 7

(d) 6

(iv) The worst-case situation occurs in the linear search algorithm when the item to be searched is

(a) somewhere in the middle of the array
(b) not in the array at all
(c) the first element of the array
(d) the last element of the array or is not there at all

(v) There are 4 different algorithms A1, A2, A3, A4 to solve a given problem with the orders log(n), log (log(n)), n log(n), n / log(n), respectively. Which one of these is the best algorithm?

(a) A1
(b) A2
(c) A3
(d) A4

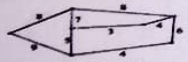
(vi) MERGE_SORT(arr, beg, end)

```
1: if beg = end
2: set mid = (beg + end)/2
3: MERGE_SORT(arr, beg, mid)
4: MERGE_SORT(arr, mid, end)
5: MERGE (arr, beg, mid, end)
6: end of if
END MERGE_SORT
```

Find the error line(s) in the above function call

(a) 1 & 5
(b) 3 & 4
(c) 1 & 4
(d) None of these

(vii) The minimum cost spanning tree in the following graph has the cost



(a) 28
(b) 29
(c) 30
(d) 31

(viii) Assuming that $n = 8^k$, k being an integer greater than 0, the solution to the recurrence relation $f(n) = 4\, f(n/8) + n^2$ with $f(1) = 0$ is

(a) $O(n^2)$
(b) $O(n^2 \log n)$
(c) $O(n^{2/3})$
(d) $O((2/3)n)$

(ix) Which of the following methods is most effective for picking the pivot element of the given array in quicksort algorithm for reducing the total number of comparisons?

(a) First element
(b) Last element
(c) Random element
(d) Median

(x) How many pairwise comparisons are involved in an insertion sort algorithm?

(a) n
(b) n^2
(c) n^2-n
(d) None of these

11- 5
10- 3
7- 3
5- 4

Group B

(Answer any Four questions out of Six)
(Each question carries 5 marks)

(4 X 5)

2. Find an optimal solution to the knapsack instance with four objects A1, A2, A3 and A4, having weights as (3, 4, 3, 5) and profits as (10, 5, 7, 11), respectively, assuming the maximum weight capacity of the knapsack is 15.

3. Distinguish between Dynamic Programming and Divide-and-Conquer paradigms of algorithm design.

4. What is the lower bound on the worst-case time complexity of sorting algorithms based on comparisons? Justify your answer using a binary decision tree. (1 + 4)

5. State the algorithm for obtaining a single solution to the 8 Queen's problem.

6. Describe the algorithm for depth-first-search in a graph.

7. Solve the following recurrence relation.

$$T(n) = \{1, n = 1\; T\left(\frac{n}{2}\right) + n, \quad n > 1$$

Group C

(Answer any Two questions out of Four)
(Each question carries 10 marks)

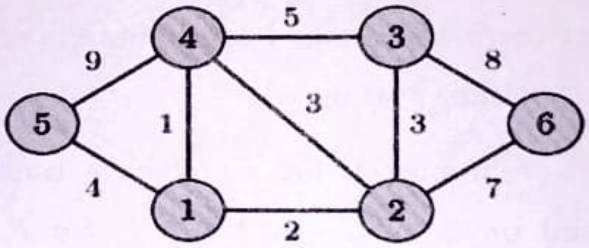
(2 X 10)

8. Suppose a chain of 5 matrices A, B, C, D and E of the orders 10 x 30, 30 x 40, 40 x 100, 100 x 5, and 5 x 10, respectively are to be multiplied to

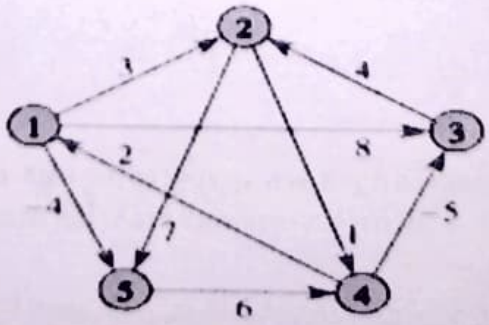
evaluate the product matrix P = A x B x C x D x E. Find the minimum number of scalar multiplications needed to compute P and also show the corresponding orders (parenthesizing scheme) in which the respective matrices are to be multiplied to evaluate P with this minimum number of scalar multiplications. (Detailed computational steps need to be shown to get the full credit).

9. (a) Explain the Divide and Conquer approach for designing algorithms.
(b) Derive the average time complexity of the quicksort algorithm assuming that all key values are equally likely to occur. (2 + 8)

10. (a) What do you mean by a minimum spanning tree of a given graph?
(b) Construct a minimum spanning tree of the graph given below using Prim's algorithm. Show each of the steps involved. (2 + 8)



11. (a) State the All–Pairs Shortest Path problem in a graph?
(b) Compute the all-pairs shortest paths for the given graph following the steps of the Floyd-Warshall algorithm. (You must show all the steps involved in the computation). (2 + 8)



No. of pages: 3 Registration No. 22001234950

END SEMESTER ASSESSMENTS, AUTUMN 2023

Program: B.TECH COMPUTER SCIENCE & ENGINEERING/B.TECH COMPUTER SCIENCE & BUSINESS SYSTEMS/B.TECH COMPUTER SCIENCE & ENGINEERING (LATERAL)/B.TECH COMPUTER SCIENCE & BUSINESS SYSTEMS (LATERAL)/B.TECH COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)/B.TECH COMPUTER SCIENCE AND ENGINEERING (IOT, CYBERSECURITY AND BLOCKCHAIN TECHNOLOGY)	
Subject Name: OBJECT ORIENTED PROGRAMMING THROUGH C++	
Subject Code: 1000012102/1000022102/1000032102/ 1000092102/1000102102/1000112102	**Semester:** III
Duration: *2 Hours*	**Maximum Marks:** *50*

Note: Answer the following questions as directed.

Group A
(Answer All questions)
(Each question carries 1 mark)

1. **Write the correct answer from the options given:** **(10 X 1)**

(i) What is used to write/display to the console in C++?
(a) printf (b) cout
(c) write (d) putline

(ii) A derived class is also called a _____.
(a) Small class (b) Subclass
(c) Noticeable class (d) Big class

(iii) Which header file is required in C++ to use OOP?
(a) stdlib.h (b) stdio.h
(c) iostream.h (d) conio.h

(iv) Which among the following doesn't come under OOP concept?
(a) Data hiding (b) Encapsulation
(c) Platform independent (d) Data binding

(v) How many types of access specifiers are provided in OOP (C++)?
(a) 3 (b) 2
(c) 1 (d) 4

(vi) Which of the following is not true about polymorphism?

(a) Helps in redefining the same functionality
(b) Increases overhead of function definition always
(c) It is feature of OOP
(d) Ease in readability of program

(vii) The copy constructors can be used to ________

(a) Copy an object for type casting
(b) Copy an object so that it can be passed to another primitive type variable
(c) Copy an object so that it can be passed to a function
(d) Copy an object so that it can be passed to a class

(viii) Which feature of OOP reduces the use of nested classes?

(a) Inheritance
(b) Polymorphism
(c) Binding
(d) Encapsulation

(ix) Which keyword is used to declare virtual functions?

(a) virtual
(b) Virt
(c) virtually
(d) vt

(x) Encapsulation and abstraction differ as ____________

(a) Hiding and hiding respectively
(b) Hiding and Binding respectively
(c) Binding and Hiding respectively
(d) Can be used any way

Group B

(Answer any Four questions out of Six)

(Each question carries 5 marks)

(4 X 5)

2. What is scope resolution operator? Which operators are not used for operator overloading?

3. Write down the difference between procedural languages and object-oriented language.

4. What is run time polymorphism? Write a c++ program to demonstrate the virtual function of runtime polymorphism. (1 + 4)

5. Write a c++ program to illustrate the function overloading.

6. Differences between Function overloading and Function overriding.

7. Write a c++ program to create a member function of another class.

Group C

(Answer any Two questions out of Four)

(Each question carries 10 marks)

(2 X 10)

8. What is encapsulation? What are the advantages of encapsulation? Explain three types of c++ class access modifiers. (1 + 3 + 6)

9. Write down the features of Constructors. How many types of constructors are used in c++? Write a c++ program to explain parameterized constructor. (3 + 1 + 6)

10. Advantages and disadvantages of inline functions in c++. Why we used the inline function? (6 + 4)

11. Difference between abstraction and encapsulation? Write a c++ program to explain encapsulation property. (5 + 5)

No. of pages: 4 Registration No. .....

END SEMESTER ASSESSMENTS, AUTUMN 2023

Program: B.TECH COMPUTER SCIENCE & ENGINEERING/B.TECH COMPUTER SCIENCE & BUSINESS SYSTEMS/B.TECH COMPUTER SCIENCE & ENGINEERING (LATERAL)/B.TECH COMPUTER SCIENCE & BUSINESS SYSTEMS (LATERAL)/B.TECH COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)/B.TECH COMPUTER SCIENCE AND ENGINEERING (IOT, CYBERSECURITY AND BLOCKCHAIN TECHNOLOGY)	
Subject Name: COMPUTER ARCHITECTURE	
Subject Code: 1000012103/1000022103/1000032103/ 1000092103/1000102103/1000112103	**Semester**: III
Duration: *2 Hours*	**Maximum Marks**: *50*

Note: Answer the following questions as directed.

Group A
(Answer All questions)
(Each question carries 1 mark)

1. **Write the correct answer from the options given:** **(10 X 1)**

(i) MIPS means
- (a) Multiple Instruction Per Second
- (b) Million Instructions Per Second
- (c) Multi-Instruction Performed System
- (d) None of these

(ii) A pipeline stage
- (a) is sequential circuit
- (b) is combinational circuit
- (c) consists of both sequential and combinational circuits
- (d) None of these

(iii) Utilization pattern of successive stages of a synchronous pipeline can be specified by
- (a) Truth Table
- (b) Excitation Table
- (c) Reservation Table
- (d) Periodic Table

(iv) Which of the following is not RISC architecture characteristic?
- (a) Simplified and unified format of code of instructions
- (b) No specialized register
- (c) No storage/storage instruction
- (d) Small register file

(v) Which of the following architectures corresponds to von-Neumann
(a) MISD (b) MIMD
(c) SISD (d) SIMD

(vi) Which of the following is not the cause of possible data hazard?
(a) RAR (b) WAR
(c) RAW (d) WAW

(vii) In associative mapping, in a 16 bit system the tag field has _____ bits.
(a) 12 (b) 8
(c) 9 (d) 10

(viii) VLIW stands for?
(a) Very Long Instruction Word (b) Very Long Instruction Width
(c) Very Large Instruction Word (d) Very Long Instruction Width

(ix) In which type of memory mapping there will be conflict miss?
(a) Direct mapping (b) Set associative mapping
(c) Associative mapping (d) Both (a) & (b).

(x) The number of cycles required to complete n tasks in a k stage pipeline is
(a) K+n-1 (b) Nk+1
(c) K (d) None of these

Group B
(Answer any Four questions out of Six)
(Each question carries 5 marks)
(4 X 5)

2. Explain difference between RISC and CISC with proper diagram.
3. Explain Different types of Data Hazards using examples.
4. Consider one 5-Stage pipelining Structure, where 12 numbers of Instructions are there; and pipeline cycle time is 2 Microseconds. Find out
(a) Speed up
(b) Efficiency

(c) Throughput

5. Write difference between superscalar, super-pipelined and VLIW processor architectures.
6. Assume 3-frames are available in a memory segment; Reference string:
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1
Calculate how many page faults will be there in case of Optimal and LRU algorithm?
7. Explain the difference between Central and distributed Shared memory Architecture.

Group C
(Answer any Two questions out of Four)
(Each question carries 10 marks)
(2 X 10)

8. (a) Explain Amdahl's Law.
(b) Suppose that we want to enhance the processor used for Web serving. The new processor is 10 times faster on computation in the Web serving application than the original processor. Assuming that the original processor is busy with computation 40% of the time and is waiting for I/O 60% of the time, what is the overall speedup gained by incorporating the enhancement? (3 + 7)
9. Assume there is 5-stage pipeline structure, and each stage is taking 1 clock cycle.
(a) Find out clock cycles are required to complete the instruction set. And also identify the different types of data hazards.

```
XOR  R1, R2, R3
ADD  R4, R1, R5
DIV  R6, R1, R7
OR   R8, R6, R9
MUL  R10, R1, R11
```

(b) If you are using operand forwarding techniques, find out clock cycles are required to complete the instruction set. And also identify the different types of data hazards. And compare the clock cycles for both cases. (5 + 5)

10. Consider five stage pipelined processor specified by following reservation table:

	1	2	3	4
S1	X		X	
S2		X		
S3			X	
S4		X		X

(a) List the set of forbidden latencies and collision vector.

(b) Draw the state transition diagram.

(c) List all simple cycles from state diagram.

(d) Identify the simple cycles among greedy cycles.

11. What is Hit Ratio? Consider a system with 2 level caches. Access times of Level 1 cache, Level 2 cache and main memory are 2 ns, 20ns, and 600 ns, respectively. The hit rates of Level 1 and Level 2 caches are 0.7 and 0.8, respectively. What is the average access time of the system ignoring the search time within the cache?

No. of pages: 4 Registration No. .....

END SEMESTER ASSESSMENTS, AUTUMN 2023

Program: B.TECH COMPUTER SCIENCE & BUSINESS SYSTEMS/ B.TECH COMPUTER SCIENCE & BUSINESS SYSTEMS (LATERAL)/ B.TECH COMPUTER SCIENCE & ENGINEERING/B.TECH COMPUTER SCIENCE & ENGINEERING (LATERAL)/B.TECH COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)/B.TECH COMPUTER SCIENCE AND ENGINEERING (IOT, CYBERSECURITY AND BLOCKCHAIN TECHNOLOGY)	
Subject Name: FORMAL LANGUAGE AND AUTOMATA THEORY	
Subject Code: 1000012104/1000022104/1000032104/ 1000092104/1000102104/1000112104	**Semester:** III
Duration: *2 Hours*	**Maximum Marks:** *50*

Note: Answer the following questions as directed.

Group A
(Answer All questions)
(Each question carries 1 mark)

1. **Write the correct answer from the options given:** **(10 X 1)**

(i) DFA converted from an NFA with n states can have maximum_____ states
(a) 2^n (b) n!
(c) n (d) ${}^nC_2$

(ii) The transition table is a substitution of
(a) Merger Graph (b) Bipartite Graph
(c) Finite State Machine (d) Compatible Graph

(iii) Deterministic Finite Automata has
(a) More than one initial state (b) Single final state
(c) Unique path to all other state for every input symbol (d) All of these

(iv) A shift register is a
(a) Mealy Machine (b) Moore Machine
(c) Turing Machine (d) None of These

(v) Finite automata requires minimum _____ number of stacks
(a) 0 (b) 2
(c) 1 (d) 3

(vi) Regular grammar is
(a) Type 0 Grammar
(b) Type 3 Grammar
(c) Type 1 Grammar
(d) Type 2 Grammar

(vii) How many DFA's exits with two states over input alphabet {0,1} ?
(a) 16
(b) 26
(c) 21
(d) 64

(viii) Which one of the following languages over the alphabet {0,1} is described by the regular expression: (0+1)*1(0+1)*1(0+1)*?
(a) The set of all strings containing the substring 11.
(b) The set of all strings containing at most two 1's
(c) The set of all strings containing at least two 1's
(d) The set of all strings that begin and end with either 0 or 1.

(ix) If L={a^nb^n, n>0} then
(a) L is Regular
(b) L is undecidable
(c) L is Context Free Language
(d) L is not a regular language

(x) $a^*(a+b)^*$ is representing a language that
(a) must contain at least single 'a'
(b) must contain at least single 'ab'
(c) must contain any combination of a,b or null string.
(d) None of these

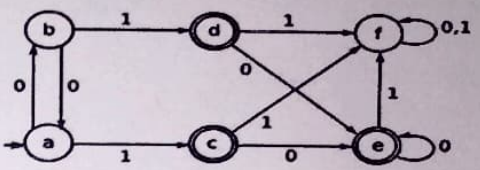
Group B
(Answer any Four questions out of Six)
(Each question carries 5 marks)

(4 X 5)

2. Remove the unit production from the grammar S→AB, A→E, B→C, C→D, D→b, E→a

3. Explain Deterministic Pushdown Automata with example? Design a CFG for the language ={a^nb^m | n!=m}

4. Minimize the following finite automata.

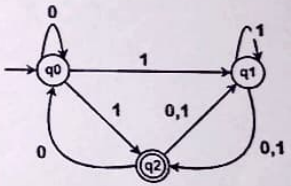


5. Prove that the language L={a^nb^n | n>=1} is not regular using pumping lemma.

6. (a) Draw a DFA for the language accepting strings such that each 'a' is immediately preceded and followed by 'b' over input alphabets ∑ = {a, b}.

(b) Draw a DFA for the language accepting strings containing at most two '0' over input alphabets ∑ = {0, 1} (2½ + 2½)

7. Convert the following NFA to its equivalent DFA



Group C
(Answer any Two questions out of Four)
(Each question carries 10 marks)

(2 X 10)

8. (a) Write a regular expression that representing language where each string should start and end with different symbols over input alphabets ∑ = {0, 1}.

(b) Show that $(0^*1^*)^* = (0+1)^*$

(c) Draw a Finite Automata for the regular expression a^*b^*

(4 + 3 + 3)

9. (a) Construct a PDA that recognizes all strings that contain equal number of 0's and 1's.

   (b) Construct finite automata for the following left linear grammar:

   $S \rightarrow X0 \mid Y1$

   $X \rightarrow Y1$

   $Y \rightarrow Y0 \mid 1$ (5 + 5)

10. (a) Draw a DFA for the language accepting strings containing at most two '0' over input alphabets $\sum = \{0, 1\}$

    (b) Draw a transition diagram for a Turing machine for the language of all palindromes over {0, 1} (5 + 5)

11. Define ambiguous grammar. Identify whether the following grammar is ambiguous or not

$S \rightarrow A|B$

$A \rightarrow aAb|ab$

$B \rightarrow abB| \varepsilon$

(2 + 8)

1 0 1

1 1 0 0 1 1

a b a

No. of pages: 4 Registration No. 22112 0000 1234

END SEMESTER ASSESSMENTS, AUTUMN 2023

Program: B.TECH COMPUTER SCIENCE & ENGINEERING/B.TECH COMPUTER SCIENCE & ENGINEERING (LATERAL)/B.TECH COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)/B.TECH COMPUTER SCIENCE AND ENGINEERING (IOT, CYBERSECURITY AND BLOCKCHAIN TECHNOLOGY)	
Subject Name: MICROPROCESSOR AND MICROCONTROLLER	
Subject Code: 3000012198/3000032198/3000102198/ 3000112198	**Semester**: III
Duration: *2 Hours*	**Maximum Marks**: *50*

Note: Answer the following questions as directed.

Group A
(Answer All questions)
(Each question carries 1 mark)

1. **Write the correct answer from the options given:** **(10 X 1)**

(i) How many bit Program counter is available in 8085?

(a) 8-bit (b) 16-bit

(c) 32-bit (d) 4-bit

(ii) The highest priority interrupt in 8085 is:

(a) TRAP (b) RST6.5

(c) INTR (d) RST7.5

(iii) The 8254 programmable interval timer/counter is a

(a) 40 pin IC (b) 28 pin IC

(c) 24 pin IC (d) 32 pin IC

(iv) Which of them is a non-vectored interrupt?

(a) RST 6.5 (b) INTR

(c) RST 5.5 (d) TRAP

(v) RET instruction is a

(a) 2-byte instruction
(b) 1-byte instruction
(c) 3-byte instruction
(d) None of the above

(vi) MVI B, 20H is an example of

(a) Immediate Addressing
(b) Register addressing mode
(c) Direct addressing mode
(d) Indirect addressing mode

(vii) Which of the following is true about control and status signal

(a) These signals are used to identify the nature of operation.
(b) There are 3 control signal and 3 status signals
(c) Three status signals are IO/M, S0 & S1
(d) All of these

(viii) Which signal are used as the system clock for device connected with the microprocessor

(a) X1,X2
(b) CLK Out
(c) CLK IN
(d) IO/M

(ix) There are _____ general purpose registers in 8085 processor

(a) 6
(b) 4
(c) 8
(d) 2

(x) 8085 has

(a) One 16-bit register
(b) Two 16-bit register
(c) Three 16-bit register
(d) Four 16-bit register

3000012198/3000032198/3000102198/3000112198

Group B
(Answer any Four questions out of Six)
(Each question carries 5 marks)

(4 X 5)

2. What are direct addressing mode and immediate addressing mode? Explain with the instruction set example in 8085 microprocessor. (2½ + 2½)

3. Calculate the total time delay for the execution of the instructions as shown below. Consider the internal frequency of the microprocessor to be 2 MHz

```
MVI C,05H
LOOP: DCR C
JNZ LOOP
RST3
```

Explain the operation of the instruction: RLC (4 + 1)

4. Explain in detail the 8085 addressing modes with examples.

5. If CLK frequency is 3.5 MHZ for 8085, find the execution time for MOV A, B and LDA 8700H.

6. What is a subroutine? What is the use of CALL and RET instructions? Give an example each for CALL and RET instruction.

7. What is vectored and Non-Vectored interrupt? What is TRAP and its significance? (3 + 2)

Group C
(Answer any Two questions out of Four)
(Each question carries 10 marks)

(2 X 10)

8. Write a program to subtract two 16-bit numbers. Illustrate a (256 x 8) bytes memory register considering the chip select to be the active low. Draw the hardware and specify the possible address range. (5 + 5)

9. Draw and explain the table for 8085 that how IO/M' read and write opcode fetch and interrupt acknowledge are selected using select lines What is DMA? (6 + 4

10. Explain different methods by which delay can be generated. Writ simple programs to generate delay using these different methods. (4 + 6

11. Write a program (8085) to add two 16-bit numbers. Mention th purpose of SID and SOD lines. Explain the priority of interrupts in 8085 (6 + 2 + 2

No. of pages: 4

Registration No. .....

END SEMESTER ASSESSMENTS, AUTUMN 2023

Program: B.TECH COMPUTER SCIENCE & ENGINEERING/B.TECH COMPUTER SCIENCE AND ENGINEERING (ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING)/B.TECH COMPUTER SCIENCE AND ENGINEERING (IOT, CYBERSECURITY AND BLOCKCHAIN TECHNOLOGY)/ B.TECH COMPUTER SCIENCE & ENGINEERING (LATERAL)	
Subject Name: PROBABILITY AND STATISTICS/PROBABILITY FOR COMPUTER SCIENCE	
Subject Code: CSENU021T01/7000012106/ 7000032106 /7000102106/7000112106	**Semester**: I/III
Duration: *2 Hours*	**Maximum Marks**: *50*

Note: Answer the following questions as directed.

Group A
(Answer All questions)
(Each question carries 1 mark)

1. **Write the correct answer from the options given:** **(10 X 1)**

(i) Which one is an example of continuous data
(a) Height (b) Weight
(c) Number of Family member (d) Both a & b

(ii) Which diagram can be used for both discrete & continuous data
(a) Ogive (b) Histogram
(c) Pie Chart (d) Frequency Polygon

(iii) Choose the correct mean of the observations 9, 12, 15, 19, 21
(a) 8 (b) 17
(c) 15.2 (d) None of these

(iv) Evaluate the range of the given observations -9, -7, -5, -3, -1
(a) 7 (b) -7
(c) -8 (d) 8

(v) Select the correct option, The product moment correlation coefficient r lies between
(a) $-1 \leq r \leq 1$ (b) $0 \leq r \leq 1$
(c) $1 \leq r \leq 2$ (d) None

(vi) Infer about two regression lines in case of r=0

(a) Perpendicular to each other (b) Parallel to each other

(c) Coincide (d) None

(vii) A={1,4,9,15} and B={4,9,15,31}, Find (A ∩ B)

(a) {4,9,15} (b) {4,9}

(c) {15} (d) { }

(viii) If a coin is tossed three times in succession, then what will be the total number of elementary events ?

(a) 8 (b) 7

(c) 16 (d) None

(ix) If A & B are two independent events, Choose the correct option

(a) $P(A \cap B) = P(A)P(B)$ (b) $P(A \cap B) = P(A)+P(B)$

(c) $P(A \cap B) = P(A)-P(B)$ (d) None

(x) Choose the correct option

(a) $P(A|B)=\frac{P(A \cap B)}{P(B)}$ (b) $P(A|B)=\frac{P(A \cap B)}{P(A)}$

(c) $P(A|B)=\frac{P(A)}{P(B)}$ (d) None

Group B

(Answer any Four questions out of Six)

(Each question carries 5 marks)

(4 X 5)

2. Discuss the different scale of measurement with one example

3. Determine the Bowley's measure of skewness for the following data:

Marks	0-10	10-20	20-30	30-40	40-50	50-60	60-70
No of students	14	25	42	30	18	12	9

4. Estimate Spearman Rank correlation for the following data:

Marks in Commerce	Marks in Mathematics
15	40
20	30
28	50
12	30
40	20
60	10
80	30

5. (a) What is the classical definition of probability?

(b) A fair dice is thrown twice and the events are

A: a number less than 4 appear

B: a number greater than 2 but less than 5 appear

Find i) A U B

ii) A ∩ B

iii) $A \cap B^c$ (2 + 3)

6. An integer is chosen at random from 50 integers 1,2,3.....50. What is the probability that the selected integer is divisible by 7 or 10?

7. The probability mass function f(x) of a random variable X is zero, except at the points x=0,1,2 and $f(0) = C$, $f(1) = 2C - 3C^2$, $f(2) = 4C - 1$. Find the expectation and variance of X.

Group C

(Answer any Two questions out of Four)

(Each question carries 10 marks)

(2 X 10)

8. Given below are the marks obtained in Statistics by a batch of 48 students of a college at the Bachelor's Degree examination.

43	34	43	32	87	35	71	65	12	52	19	48
17	24	52	65	40	54	62	45	2	13	18	49
57	21	64	71	45	81	52	40	35	78	43	45
44	55	79	37	19	14	31	71	51	35	27	74

(a) Construct a frequency distribution with class intervals of 10 marks.

(b) Evaluate the cumulative frequency distributions of both less-than and greater-than types and find the proportion of students scoring less than 30 marks and more than 75 marks. (6 + 4)

9. (a) Evaluate the standard deviation for the following frequency distribution:

Values	0-5	05-10	10-15	15-20	20-25
Frequency	2	5	7	13	21

(b) The mean, mode and coefficient of variation of the weekly wages of a group of workers are respectively Rs 50, Rs 58 and 40%. Find median, standard deviation and coefficient of skewness for the distribution of wages. (5 + 5)

10. (a) Out of two regression lines given by $x+2y-5=0$ and $2x+3y-8=0$ which one is the regression line of x on y?

(b) Estimate the correlation coefficient between age (x) and glucose level(y) for the following data:

Age (x)	Glucose level (y)
4	5
10	9
11	13
15	14

(5 + 5)

11. (a) In a factory which manufactures bolts, machines A, B and C manufacture respectively 25% 35% and 40% of the bolts. Of their outputs 5,4 and 2 percent are respectively defective bolts. A bolt is drawn at random from the product and is found to be defective. What is the probability that it is manufactured by the machine B?

(b) A pair of fair dice is thrown once. Consider the following events

A: an even number appear on the first die

B: an even number appear in the second die

Examine whether events A and B are independent or not. (4 +6)