UOM Exam Second half 2021_Question paper_R2019/CSC302 - Discrete Structures & Graph Theory /Sem-III / COMPUTER ENGINEERING / ARTIFICIAL INTELLIGENCE AND DATA SCIENCE / ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING / COMPUTER SCIENCE AND ENGINEERING (Artificial Intelligence and Machine Learning / COMPUTER SCIENCE AND ENGINEERING (Data Science) / COMPUTER SCIENCE AND ENGINEERING (Internet of Things and Cyber Security Including Block Chain Technology) / CYBER SECURITY / DATA ENGINEERING / INTERNET OF THINGS (IoT)

Dear Student,

Please note before you attempt this section of examination:

1. Q1, Q2, Q3 and Q4 carry 20 marks each.
2. This paper contains 20 Marks MCQ and 60 marks subjective section for 150 minutes duration.
3. It is mandatory for all the students to upload their answer papers in a single PDF format only.
4. You have to write Date of Examination, Seat number, Program, Scheme and semester, Subject name, Signature on EVERY PAGE.
5. Remain in the meet with your camera on and you in clear view throughout the duration of the exam.

* Required

1. Email *

2. Student Name (As per exam form filled) *

3. Seat No *

Refer Hall ticket

Solve Questions as per the instructions given separately.

- Please upload a single PDF for Q1 to Q4
- For MCQs Question write Question number & correct option with complete text in option.
- Q2 to Q4 are subjective questions - Solve Questions as per the instructions and marks allotted.

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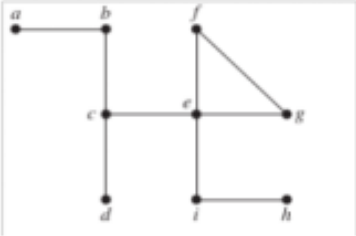
1.	Let a set S = {2, 3, 4, 6, 9, 12, 18, 24, 54} and R be the partial order relation of divisibility. Number of edges in its hasse diagram are _____
Option A:	10
Option B:	12
Option C:	14
Option D:	8
2.	The number of elements in the power set of A= {e, f, g, h} is
Option A:	9
Option B:	8
Option C:	16
Option D:	12
3.	Which of the following Poset is a Distributed Lattice?
Option A:	D_{50}
Option B:	D_{105}
Option C:	D_{20}
Option D:	D_{75}
4.	Let f and g be the functions from the set of integers to itself, defined by f(x) = 3x + 1 and g(x) = 4x + 4. Then the composition of f and g is _____
Option A:	12x+4
Option B:	12x+5
Option C:	12x + 13
Option D:	12x+8
5.	How many strings of length 8 either begin with 2 zeros or end with 4 ones?
Option A:	80
Option B:	42
Option C:	76
Option D:	64

6.	If every vertex of simple graph has same degree then it is called as _____.
Option A:	Bipartite Graph
Option B:	Regular Graph
Option C:	Planner Graph
Option D:	Sub graph
7.	What is the identity element in the group G = {1, 2, 3, 4, 5, 6, 7, 8) under multiplication modulo 9?
Option A:	1
Option B:	5
Option C:	4
Option D:	9
8.	Total how many Cut Vertices exist in the following graph? 
Option A:	2
Option B:	4
Option C:	3
Option D:	1
9.	A planer graph with 10 edges & 5 vertices has _____ regions.
Option A:	5
Option B:	7
Option C:	15
Option D:	13
10.	Consider the following subsets of the positive integers N. Which of the following is not closed under multiplication operation?
Option A:	A={0,1}
Option B:	E={1,3,5,….}
Option C:	C={x: x is prime}
Option D:	F={0,1,2}

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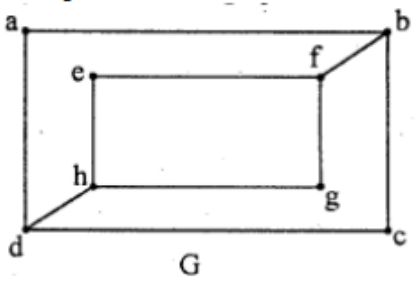
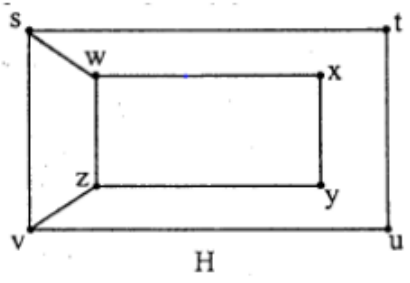
Q2 (20 Marks Each)	
A	**Solve any Two** **5 marks each**
i.	Prove using Mathematical Induction that $7^{2n} + 2^{3n-3} * 3^{n-1}$ is divisible by 25 for all $n \in N$
ii.	What is a lattice? Draw the hasse diagram of D_{66}. Whether it is a distributive lattice? Justify your answer.
iii.	What are the isomorphic graphs? Determine whether following graphs G & H are isomorphic.  G  H
B	**Solve any One** **10 marks each**
i.	Define the transitive property of a relation. Find the transitive closure of R using Warshall's algorithm where A={1, 2, 3, 4, 5, 6} & R={(1, 2), (2, 3), (3, 5), (5, 6), (5,2)}
ii.	Describe the following terms with suitable example- a) Disjunctive Normal Form (DNF) b) partition set c) Complement of a relation d) Ring e) Bipartite graphs

Q3 (20 Marks Each)	
A	**Solve any Two** **5 marks each**
i.	Define the equivalence relation. Let R be the relation on Z which is defined as xRy if 3x+5y is divisible by 8. Determine whether this is an equivalence relation.
ii.	What is a linearly ordered set? Draw the hasse diagram of D_{625}. Determine whether it is the linearly ordered set or not.
iii.	Let A = {1, 2, 3, 4, 6, 9} and let R be the relation on A defined by "x divides y " written x/y. a) Write R as a set of ordered pairs. b) Draw its directed graph. c) Find indegree & outdegree of each vertex. d) Write the relation matrix of it. e) Find the inverse relation of R.
B	**Solve any One** **10 marks each**
i.	a) Show that if 6 colors are used to paint 37 bicycles, then 7 of them must have same color. b) There are 6 Mathematics books, 8 Discrete Structures books, 9 Data Structures books. How many ways can be used by the student so that 2 books from different categories can be chosen?
ii.	Define minimum hamming distance. Find the code words generated by the parity check matrix H given below. $H = \begin{bmatrix} 1 & 0 & 1 \\ 1 & 1 & 0 \\ 0 & 1 & 1 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$

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Q4 (20 Marks Each)	
A	**Solve any Two** **5 marks each**
i.	How many integers between 1 & 250 are divisible by 3, 5 or 7?
ii.	$f: R \to R$ is defined as $f(x) = x^3$ $g: R \to R$ is defined as $f(x) = 4x^2+1$ $h: R \to R$ is defined as $h(x) = 7x-1$ find the rule of defining (hog)of, go(hof).
iii.	What is an adjacency matrix & incidence matrix? Give the suitable examples of both.
B	**Solve any One** **10 marks each**
i.	a) Define the term bijective function. Let $f: R \to (7/5) \to R - \left(\frac{2}{5}\right)$ be defined by $f(x) = \frac{2x-3}{5x-7}$. Prove that it is a bijection. Hence find f^{-1}.
ii.	What is a group? Let S= {0,3,6,9,12} Prepare the composition table w.r.t. the operation of addition modulo 15. Show that it is an abelian group. Find the inverses of all the elements. Whether it is a cyclic group?

4. Please Upload complete scanned answer copy in a single PDF file. *

Files submitted: