MAT 2155 Part A

Hi, [redacted]. When you submit this form, the owner will see your name and email address.

* Required

1. Name *

Enter your answer

2. Registration Number *

The value must be a number

3. Branch and Section *

- ◯ Computer & Communication A
- ◯ Computer & Communication B
- ◯ Computer Science A
- ◯ Computer Science B
- ◯ Computer Science C
- ◯ Computer Science D
- ◯ Information Technology A
- ◯ Information Technology B

4. Which of the following is a generator of the cyclic group $(\mathbb{Z}, +)$?

(1 Point)

- ◯ 0
- ◯ -1
- ◯ 3
- ◯ 2

5. The number of compositions of 9 into 3 positive part is _____.

(1 Point)

- ◯ 84
- ◯ 7
- ◯ 256
- ◯ 28

6. The diameter of the cycle graph on 9 vertices is _____.

(1 Point)

- ◯ 1
- ◯ 4
- ◯ 5
- ◯ 9

7. The sum of all 4-digit numbers containing **one 2**, **one 3**, and **two 4s** (*e.g., 4342; 2443*) is _____.

(1 Point)

- ◯ 43339
- ◯ 43329
- ◯ 43999
- ◯ 86658

8. Consider the poset $(P, |)$ where $P = \{1, 2, 4, 6, 8, 10, 24, 30, 60, 120\}$ and $|$ is the relation defined by "for all $a, b \in P$, $a \mid b$ if and only if a divides b". The length of the longest chain in P is _____.

(1 Point)

- ◯ 4
- ◯ 7
- ◯ 6
- ◯ 5

9. Which of the following is a self-complementary graph?

(1 Point)

- ◯ Cycle graph on 4 vertices.
- ◯ Complete graph on 5 vertices.
- ◯ Path graph on 4 vertices.
- ◯ Path graph on 5 vertices.

10. Given the marks 0, 1, 2, 3, 4, 5, 6, the permutation occurring immediately after 4635120 in lexicographical order is _____.

(1 Point)

- ◯ 4635102
- ◯ 3465120

- ◯ 4635201
- ◯ 6435120

11. Which of the following is **not** a bipartite graph?

(1 Point)

- ◯ A tree on an odd number of vertices.
- ◯ The complete graph on 6 vertices.
- ◯ A tree on an even number of vertices.
- ◯ The cycle graph on an even number of vertices.

12. The number of ways of distributing 10 identical objects into 4 distinct boxes such that each box contains at least 2 objects is _____.

(1 Point)

- ◯ 6
- ◯ 210
- ◯ 286
- ◯ 10

13. Which of the following algebraic systems does not form a group?

(1 Point)

- ◯ The set of all $n \times n$ matrices under matrix addition.
- ◯ The set of all non-singular matrices of order n under matrix multiplication.
- ◯ The set of all even integers under addition.
- ◯ The set of all real numbers under multiplication.

14. Which of the following is the Conjunctive Normal Form of the expression given below?

(1 Point)

$$E(x_1, x_2, x_3) = \begin{cases} 0, & x_1 = x_2 = x_3 \\ 1, & \text{otherwise} \end{cases}$$

- ◯ $(\bar{x}_1 \vee \bar{x}_2 \vee x_3) \wedge (\bar{x}_1 \vee x_2 \vee \bar{x}_3) \wedge (\bar{x}_1 \vee x_2 \vee x_3)$
- ◯ $(x_1 \vee x_2 \vee x_3) \wedge (\bar{x}_1 \vee \bar{x}_2 \vee \bar{x}_3)$
- ◯ $(x_1 \wedge x_2 \wedge x_3) \vee (\bar{x}_1 \wedge \bar{x}_2 \wedge \bar{x}_3)$
- ◯ $(x_1 \vee x_2 \vee \bar{x}_3) \wedge (x_1 \vee \bar{x}_2 \vee x3) \wedge (\bar{x}_1 \vee x_2 \vee x_3)$

15. If G is a graph, which of the following is FALSE?

(1 Point)

- ◯ Either G or $\overline{G}$ is connected.
- ◯ The sum of the numbers of edges in G and in $\overline{G}$ *is* $\frac{p(p-1)}{2}$, where the number of vertices is p.
- ◯ G and $\overline{G}$ have the same number of vertices.
- ◯ G and $\overline{G}$ have the same number of edges.

16. Consider the poset (P, |) where P = {1, 2, 3, 6} and | is the relation "for all a, $b \in P$, $a \mid b$ if and only if a divides b". Then (P, |) is _____.

(1 Point)

- ◯ a distributive but **not** complemented lattice.
- ◯ a complemented but **not** distributive lattice.
- ◯ not a lattice
- ◯ a Boolean lattice

17. Let $\mathbb{Q}^+$ be the set of all positive rational numbers. Define an operation * on $\mathbb{Q}$ given by $a*b = ab/2$. Then $(\mathbb{Q}^+, *)$ is a group. The inverse of $p \in \mathbb{Q}^+$ is _____.

(1 Point)

- $\frac{1}{p}$
- $\frac{p}{2}$
- $\frac{4}{p}$
- $\frac{2}{p}$

18. The maximum number of edges in a graph on n vertices is _____.

(1 Point)

- $n(n-1)$
- $\frac{n(n-1)}{2}$
- $\frac{n(n-1)}{3}$
- $\frac{n-1}{2}$

19. The number of permutations of 1, 2, 3, 4, 5 that contain no consecutive pair (i, $i+1$) for any $i = 1, 2, 3, 4$ is _____.

(1 Point)

- 60
- 53
- 47
- 44

20. The number of partitions of 9 into exactly 3 parts is equal to _____.

(1 Point)

- The number of partitions of 9 in which no part is larger than 3.
- The number of partitions of 6 in which no part is larger than 3.
- The number of partitions of 9 in which no part is larger than 4.
- The number of partitions of 9 into unequal parts.

21. The number of self-conjugate partitions of $n = 6$ is _____.

(1 Point)

- 0
- 1
- 4
- 2

22. Consider the group $\mathbb{Z}_5 = \{0, 1, 2, 3, 4\}$ under addition modulo 5. Then the order of the element 2 is _____.

(1 Point)

- 5
- 3
- 1
- 2

23. Let $n = p^2q$ where p and q are two distinct prime numbers. Then the number of positive integers less than n that are relatively prime (or coprime) to n is _____.

(1 Point)

- $p(pq - q)(pq - p)$
- $\left(1 - \frac{1}{p}\right)\left(1 - \frac{1}{q}\right)$
- $pq + p^2$
-

24. Consider the Boolean Lattice (P(S), ⊆), where S = {1, 2, 3, 4, 5}. Then the atoms are _____.
(1 Point)

- {2}, {4}
- ∅
- {1}, {2}, {3}, {4}, {5}
- {2}, {3}, {5}

25.
(1 Point)

The number of ways to arrange the letters of the word ENTERTAIN

is the coefficient of $\frac{x^9}{9!}$ in the generating function_____.

-
-
-
-

26.
(1 Point)

The number of edges in the graph $\overline{C_8}$ is

27. If G an Abelian group, then which of the following is necessarily true?

(1 Point)

- G has a non-Abelian subgroup.
- The order of G is a prime number.
- $(ab)^{-1} = a^{-1}b^{-1}$ for all $a, b \in G$.
- G is cyclic.

28. Let L be the set of all straights lines in three dimensional space. Define a relation $\perp$ on L as follows: For any $L_1, L_2 \in L$, $L_1 \perp L_2$ if and only if L_1 is perpendicular to L_2. Then $\perp$ is _____.

(1 Point)

- neither reflexive nor transitive
- symmetric and transitive
- an equivalence relation
- neither symmetric nor transitive

29. Given the five marks 1, 2, 3, 4, 5, the third permutation in Fike's order is _____.

(1 Point)

- 12543
- 15342

- ◯ 12435
- ◯ 13245

30. The number of **positive integers with any number of digits** that can be formed using digits taken from {0, 1, 2, 3, 4, 5} **without repetition** is _____.

(1 Point)

- ◯ 1956
- ◯ 1439
- ◯ 1630
- ◯ 1955

31. A question paper has two parts, A and B, each containing 10 questions. If a student has to choose 8 from Part A and 5 from Part B, in how many ways can she choose the questions?
(1 Point)

- ◯ 40
- ◯ 12750
- ◯ 11340
- ◯ 320

32. In a lattice, the lower bounds of the pair of elements *a, b* are 0, *b*, and *c*. Then $b \vee a =$ _____.

(1 Point)

- ◯ *a*
- ◯ 0
- ◯ *a*, *b*
- ◯ *b*

33. Let G be a graph on 5 vertices, where the first four vertices have degrees 1, 2, 3, 4. Then the fifth vertex can have degree _____.

(1 Point)

- ◯ 3
- ◯ 2
- ◯ 4
- ◯ 0

Submit