

**B.Sc. MATHEMATICS
FOURTH SEMESTER
ABSTRACT ALGEBRA
BSM – 742 OLD COURSE [REPEAT]
[USE OMR FOR OBJECTIVE PART]**

**SET
A**

Duration: 3 hrs.

Full Marks: 50

Time: 15 min.

(Objective)

Marks: 10

Choose the correct answer from the following:

1×10=10

1. A non-empty set A is termed as an algebraic structure _____
a. with respect to binary operation * b. with respect to ternary operation ?
c. with respect to binary operation ÷ d. with respect to unary operation -
2. The Condition for monoid is
a. $(a + e) = a$ b. $(a * e) = (a + e)$
c. $a = (a * (a + e))$ d. $(a * e) = (e * a) = a$
3. A group (M,*) is said to be abelian if _____
a. $(x + y) = (y + x)$ b. $(x * y) = (y * x)$
c. $(x + y) = x$ d. $(y * x) = (x + y)$
4. An algebraic structure _____ is called a semi-group.
a. $(P, +)$ b. $(Q, +, *)$
c. $(, +)$ d. $(+, +)$
5. A cyclic group is always
a. Abelian Group b. Monoid
c. Semi group d. Sub group
6. The inverse of $-i$ in the multiplication group $\{1, -1, i, -i\}$ is
a. 1 b. -1
c. i d. $-i$
7. What is order of this group $\{1, \omega, \omega^2\}$
a. 0 b. 1
c. 2 d. 3
8. What is the generator of this Group $\{1, -1, i, -i\}$
a. 1 b. -1
c. i d. $-i$

9. The length of a transposition is

- a. 0
- c. 2

- b. 1
- d. None

10. A map f is invertible if

- a. One-one
- c. onto

- b. Both one-one and onto
- d. None of these

(Descriptive)

Time : 1 hr. 15 mins.

Marks : 25

[Answer question no.1 & any two (2) from the rest]

1. Prove that $(A \cup B)^c = A^c \cap B^c$ and $(A \cap B)^c = A^c \cup B^c$. 5

2. a. If $f: A \rightarrow B$ and $g: B \rightarrow C$ are one-one mapping then $g \circ f$ is one-one. 5+5=10
b. Prove that A map f is invertible iff it is one-to one onto.

3. a. Prove that $A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$. 5+5=10
b. Lagrange's theorem: If G is a finite group and H is a subgroup of G then $O(H)$ divides $O(G)$

4. a. Show that $G = \{1, \omega, \omega^2\}$ is a Group. Is it abelian? Justify your answer. 5+5=10
b. Find the different powers of the cycle (1234). Write the order of the permutation.

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