Mid-West University

Examinations Management Office

Surkhet, Nepal

End Semester Examination-2080

Level: B.Ed. / III Semester — FM: 60

Time: 3.00 hrs. — PM: 30

Sub: Algebra for Teachers (MATH 433/333)

Candidates are required to give their answers in their own words as far as practicable.

Attempt All the Questions:

Group "B" — **6×5 = 30**

1. Why is mathematics the representative way of systematic patterns and structure? Justify it with appropriate examples.

2. "A good education can change anyone. A good teacher can change everything. An effective change on the concept to study of relations and function should be done by a good mathematics teacher." Elaborate teachers' effective teaching strategy to teach day-to-day relations and function.

3. Explain why number theory is a bridging pedagogy in Algebra.

Or

Define group with an example. Prove that the set of numbers $S = \{1, i, -1, -i\}$ under multiplication ($i = \sqrt{-1}$), is a group.

4. Write the properties of equations. Find the nature of the roots of the equation $3x^4 + 12x^2 + 5x - 4 = 0$.

5. What are equivalent linear systems? Construct a model strategy to teach system of linear equation in two variables.

6. "Teaching is more than imparting knowledge". If you are a mathematics teacher, how can you teach the concept of rational and irrational numbers at grade VII students in your mathematics classroom?

Or

The students of grade VIII are unable to understand the problem of indices. As a mathematics teacher, make a teaching strategy to teach effective lesson plan to solve this problem.

Group "C" — **2×10 = 20**

7. Define bi-quadratic equation. Solve the bi-quadratic equation $x^4 - 22x^2 - 48x - 23 = 0$ by using radicals.

8. Define abelian group. Show that the set of matrices of the forms $B_\theta = \begin{bmatrix} Cos\theta & -Sin\theta \\ Sin\theta & Cos\theta \end{bmatrix}$ where θ is a number, then it is a forms a group under multiplication.

Or

Prove that the intersection of two subgroups of a group G is also a subgroup of G. Also, show that the set $G = \{1, \omega, \omega^2\}$, ω is a cube root of unity, is a group under usual rule of multiplication.

THE END

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Group 'A' **10 × 1 =10**

Tick (✓) the best answers.

1. Let $A = \{1,2,3\}$ and $B = \{1,4,9\}$. The a function $f: A \to B$ is defined by $y = x^2$ is the
   a. Descriptive Form
   b. IPO Form
   c. Graphical Form
   d. Formula Form

2. The multiplicative group $G = \{1, -1\}$ is a cyclic group of order
   a. 0
   b. 1
   c. 2
   d. 3

3. A group $(G,*)$ is said to be abelian iff
   a. $\forall\, a,b \in G$ implies $a * b = b * a$
   b. $\forall\, a,b \in G$ implies $a * a = a$
   c. $\forall\, a,b \in G$ implies $a * b = a * b$
   d. $\forall\, a,b \in G$ implies $a * b * c = b * a * c$

4. For any non-zero polynomials $f(x)$ and $g(x)$ over a field F, there exist unique polynomials $q(x)$ and $r(x)$ such that $f(x) = g(x)q(x) + r(x)$ where $r(x)$ is zero or of degree less than of $g(x)$, is referred to
   a. Division Algorithm
   b. Remainder Theorem
   c. Factor Theorem
   d. Rolle's Theorem

5. An equation $f(x) = 0$ cannot have more positive roots than the number of changes of sign in $f(x)$ and cannot have more negative roots than there are changes of sign in $f(-x)$. The property refers to
   a. Positive Sign Rule
   b. Negative Sign Rule
   c. Descartes' Rule of Sign
   d. None of Above.

6. If $\alpha_1 = \begin{pmatrix} 1 & 2 & 3 \\ 2 & 3 & 1 \end{pmatrix}$ and $\beta_1 = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix}$ then which of the followings is a correct product in symmetric group of degree 3?
   a. $\alpha_1\beta_1 = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 2 & 1 \end{pmatrix}$
   b. $\alpha_1\beta_1 = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 2 & 3 \end{pmatrix}$
   c. $\alpha_1\beta_1 = \begin{pmatrix} 1 & 2 & 3 \\ 3 & 1 & 2 \end{pmatrix}$
   d. $\alpha_1\beta_1 = \begin{pmatrix} 1 & 2 & 3 \\ 1 & 3 & 2 \end{pmatrix}$

7. The number which is of the form $\frac{p}{q}$, $p, q \in Z, q \neq 0$ is called
   a. Natural Number
   b. Whole Number
   c. Rational Number
   d. Irrational Number

8. Polynomial of degree 6 is called
   a. Linear
   b. Quadratic
   c. Quintic
   d. Sextic

9. Every equation in which the coefficient of the highest degree term is
   a. 0
   b. 1
   c. 2
   d. 3

10. An algebraic structure consisting of a set G with a binary operation $*$ defined on it is called a semi-group if it holds
    a. Associativity property
    b. Inverse Property
    c. Distributive Property
    d. Commutative Property