Mid-West University

Examinations Management Office

Surkhet, Nepal

End Semester Examination-2080

Level: B.Ed. / I Semester FM: 60

Time: 3.00 hrs PM: 30

Sub: Number Theories for Teachers (MATH 415/316)

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. Define rational numbers with examples and write the properties of rational number.

2. Define the greatest common divisor (GCD). find the greatest common divisor (gcd) of 256 and 1156 by using Division Algorithm.

3. Find the solutions of linear Diophantine equation $21x + 35y = 11$.

Or

For positive integers a and b prove that $gcd(a,b).LCM(a,b) = ab$

4. Define polynomial function.
An integer $N = a_m b^m + a_{m-1}b^{m-1} + a_{m-2}b^{m-2} + \ldots\ldots\ldots\ldots + a_2 b^2 + a_1 b^1 + a_0 b^0$ in decimal representation, with $0 \leq a_k \leq 9$ is divisible by 8 iff the number formed by its hundreds, tens and units digit is divisible by 8.

5. Define Linear Congruence. solve linear congruence $12x \equiv 48(mod\ 18)$

6. Let n be positive integer and $'a'$ be any integer with $gcd(a,n) = 1$ then $a^{\emptyset(n)} \equiv 1\ (mod\ n)$.

Or

State and prove Wilson's Theorem.

Group "C" **2×10 = 20**

7. Given integers a and b with $b > 0$, there exists unique q and r satisfying $a = qb + r,\ 0 \leq r < b$. The integers q and r respectively called quotient and reminder in the division of a by b.

8. The quadratic congruence $x^2 + 1 \equiv 0(mod\ p)$, where p is an odd prime, has a solution if and only if $p \equiv 1(mod\ 4)$.

Or

Let P be an odd prime and $gcd(a,p) = 1$. If n is the number of integers in the set S; $S = \{a, 2a, 3a, \ldots\ldots\ldots, \frac{p-1}{2}a\}$ whose remainders upon division of P exceeds $\frac{p}{2}$, then $\left(\frac{a}{p}\right) = (-1)^n$

THE END

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Roll No: .....

Group "A" **10 × 1 =10**

Tick (✓) the best answers:

1. A number that is in the form of a+bi is called...
   a. rational number
   b. irrational number
   c. complex number
   d. natural number

2. The algebraic number of the polynomial equation $2x^2 - 5x + 39 = 0$ is...
   a. -3
   b. -2
   c. -2
   d. 0

3. For some integers a, b, c, which one of the following conditions is not held?
   a. $a|b, 1|a$ and $a|a$
   b. If $a|b$ and $c|d$ then $ac|bd$
   c. If $a|b$ and $a|c$ then $a|bc$
   d. If $a|b$ and $c|d$ then $(a+c)|(b+d)$

4. The gcd (12, 18, 28) is ...
   a. 4
   b. 2
   c. 7
   d. 6

5. Let $n > 0$ be fixed and a, b, c, be arbitrary integers. If $a \equiv b(mod\ n)$ and $b \equiv c(mod\ n)$ then which one of the following is transitive property?
   a. $ab \equiv bc(mod\ n)$
   b. $ac \equiv bc\ (mod\ n)$
   c. $a \equiv c\ (mod\ n)$
   d. $b \equiv c\ (mod\ n)$

6. Which one of the followings is the form of linear Diophantine equation?
   a. $ax + by = c$
   b. $ax - by = c$
   c. $ax + by = 0$
   d. $ax = c$

7. The product of two or more integers of the form $4n + 1$ is of the form...
   a. $4n - 1$
   b. $4n$
   c. $4n + 1$
   d. $4n + 2$

8. Which one of the following numbers is not a prime number?
   a. 43
   b. 59
   c. 131
   d. 129

9. If n is prime then Euler's Phi-function is...
   a. $\emptyset(n) = n + 1$
   b. $\emptyset(n) = n - 1$
   c. $\emptyset(n) = n$
   d. $\emptyset(n) = 0$

10. For any prime p, which one of the following relations is true?
    a. $p! \equiv 1(mod\ p)$
    b. $(p-1)! \equiv 1(mod\ p)$
    c. $(p-1)! \equiv -1(mod\ p)$
    d. $p! \equiv -1(mod\ p)$