UNIVERSITY OF EDUCATION
"UExam" Semester-II, 2019
M.Sc Mathematics Session:2018-20

No. 108

Roll No. (in fig.)________

Roll No. (in words)________

Candidate's Signature. ________

Signature of Addl. Supdt. ________

Course Code: MATH3118
Subject: Number Theory

SECTION: I (MCQ's)

Time Allowed: 20 Minutes **Max. Marks: 18**

NOTE: Encircle the correct/ best answer in each of the followings. Each Question carries 1 mark. Use of remover carries zero mark. Cutting and Overwriting is not allowed.

Q1.

- The gcd of two numbers 272 and 1479 is

a) 17 b) 13 c) 19 d) 9

- The linear diaphontine equation 172x+20y =1000 has a solution if and only if

a) 2| 1000 b) 4|1000 c) 8|1000 d) All of these

- The prime factorization of the integer 10140 is

a) $2^2.3^2.13^2.5$ b) $2^2.3\ .13^2.5^2$ c) $2^2.3^2.13\ .5$ d) $2^2.3.13^2.5$

- 1949 and 1951 are

a) Twin primes b) Mersenn primes c) Fermat prime d) Both (a) and (b)

- When 2^{50}. is divided by 7, it gives remainder

a) 5 b) 4 c) 2 d) 1

- The integer 1010908899 is divisible by....

a) 7 b) 11 c) 13 d) 3

- The no of the form $2^n - 1$, $n \geq 1$ is......

a) Pseudo prime b) Fermat prime c) Mersenn prime d) None of these

- 19/51 has continued fraction of the form......

a) [0; 2, 1,2, 6] b) [0; 2, 1,2, 5, 1] c) [0; 2, 2,1, 6] d) Both (a) and (b)

- An odd prime p is expressible as a sum of two squares iff .....

a) $p \equiv 3 \pmod 4$ b) $p \equiv 1 \pmod 4$ c) $p \equiv 2 \pmod 4$ d) All of these

- The number 65537 is called.....

a) Fermat prime b) Mersenn Prime c) Pseudo prime d) None

- For p=19 there are .... pairs of quadratic residues

a) 4 b) 2 c) 3 d) 5

- The number 13 has exactly .....primitive roots

a) $\varphi(12)$ b) $\varphi(11)$ c) $\varphi(10)$ d) No

- $\left\lceil \dfrac{\pi - \lfloor e \rfloor + 3}{\lfloor e \rfloor} \right\rceil$ =......

a) 3 b) 2 c) -2 d) -3

- [72, 44] =......

a) 788 b) 798 c) 792 d) 784

- The number 1009 is

a) An odd prime b) Fermat prime c) Mersenn prime d) None of these

- $\pi\ (15) =$ ......

a) 6 b) 5 c) 4 d) 3

- Z_p = {0,1, 2, ...p-1} forms a

a) (G, +) b) Field c) Ring d) (G, .)

- $\tau(\phi(31)) =$ .....

a) 7 b) 15 c) 8 d) 4

UNIVERSITY OF EDUCATION
"UExam" Semester-II, 2019
Msc. Mathematics Session:2018-20

Course Code: MATH3118
Subject: Number Theory

Time Allowed: 100 Minutes. **Max. Marks: 42**

Section II (Short Answer)

Q.2- Write short answers of the following. **3x6 = 18**

i. Verify that 1951 and 1949 are twin primes.
ii. Enlist all the primitive roots of 19.
iii. Find the last two digits of 7^{100} in its decimal expansion.
iv. Show that the congruence relation is an equivalence relation.
v. Show that 1387 is a Pseudo Prime.
vi. Obtain all the Quadratic residues mod 17.

Section III (Essay Type)

Answer the following Questions **6x4 = 24**

Q.3:- State and prove "LIFTING LEMMA"

Q.4:- The linear congruence $ax \equiv b \pmod{m}$ has a solution if and only if $d \mid b$. where $d = \gcd(a,b)$. If $d \mid b$, then it has d mutually incongruent solutions modulo m.

Q.5:- Find all possible solution(s) of $x^2 + x + 3 \equiv 0 \ (mod\ 3^3)$

Q.6:- If p is a prime then the congruence $f(x) \equiv 0 \pmod{p}$ of degree n has at most n solutions.