P.S.SCIENCE & H.D.PATEL ARTS COLLEGE, KADI
INTERNAL EXAMINATION

B.Sc. Sem -VI **Marks 40**

08/03/2018 **Number Theory** **Time: 1.45 to 3.45**

CC-MAT-603 (B)

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1. (A) State and Prove Division algorithm

OR

Let a and b are integers, not both zero then $gcd(a, b) = 1$ iff there exist integers x and y such that, $ax + by = 1$

(B) Attempt any two:

1. Prove that, a and b are both odd integers then

$$16 \mid a^4 + b^4 - 2$$

2. Find the lcm of 1769 and 2378

3. Solve: $172x + 20y = 1000$

2. (A) For arbitrary integers a and b, a $\equiv b \ (mod\ n)$ iff a and b leave the same non negative remainders when divided by n

OR

The linear congruence $ax \equiv b \ (mod\ n)$ has a solution

iff d | b. where d=gcd(a,n)

(B) Attempt any two:

1. Solve: $17x \equiv 9 \ (mod\ 276)$

2. Find the remainder when 4444^{4444} divided by 9.

3. Prove that, $7 \mid 2222^{5555}+5555^{2222}$.

3. (A) State and prove Fermat's theorem.

OR

State and prove Wilson's theorem.

(B) Attempt any two:

1. Prove that, if p and p+2 are pair of twin primes then,

$$4((p-1)!+1)+p \equiv 0 \ (mod\ p\ (p+2))$$

2. Prove that,

$$(p-1)! \equiv p-1 \ (mod\ 1+2+3+\cdots.+(p-1))$$

3. Find the last two digits of 9^{9^9}.

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