

Register Number:

Date: 20-04-2017

**ST. JOSEPH’S COLLEGE (AUTONOMOUS), BANGALORE-27**

**M.Sc. MATHEMATICS - IV SEMESTER**

**SEMESTER EXAMINATION: APRIL 2017**

**MT-0416 – Theory of Numbers**

**Time- 2 ½ hrs. Max Marks-70**

**This paper contains 2 printed pages.**

**Answer any seven questions. (7x10=70)**

1. Verify these for Euler’s totient function,
2. for prime and 
3.  where 
4. if 
5. implies 
6. is even for  Moreover, if has distinct odd prime factors, then 

 (10)

1. a) Prove that, if we have 

b) Prove that, if we have. (6+4)

1. a) Define Dirichlet product and give the precise notation.

b) Prove that Dirichlet multiplication is commutative and associative.

c) Verify the Mobius inversion formula. (2+4+4)

1. a) State and prove Chinese remainder theorem.

b) Solve: (6+4)

1. a) Prove that, for any prime all the coefficients of the polynomial are divisible by 

b) State and prove Wolstenholme’s theorem. (3+7)

**MT-0416-B-17**

1. a) If is an odd positive integer we have and.

b) If and are odd positive integers with then  (6+4)

1. Let be an odd prime and let be any positive divisor of .Then in every reduced residue system mod there are exactly numbers ‘a’ such that In particular, when  there are exactly  primitive roots mod. (10)
2. a) Generate all the partitions of the numbers 7 and 9.

b) State and prove Euler’s recursion formula for  (6+4)

1. Determine the upper bound for  (10)
2. State and prove Jacobi’s triple product identity. (10)