

Code No. 7113 / E

FACULTY OF SCIENCE

B.Sc. IV-Semester (CBCS) Examination, May / June 2018

Subject: Mathematics

**(SEC-2) Paper – IV
Number Theory**

Time: 1½ Hour

Max.Marks: 40

Note: Answer all questions. Each question carries equal marks.

**PART – A (2x5 = 10 Marks)
[Short Answer Type]**

1 a) Show that 41 divides $2^{20} - 1$ using congruences.

OR

b) Evaluate $\sigma(8400)$, $\tau(8400)$.

2 a) If n is an even integer show that $\phi(2n) = 2\phi(n)$.

OR

b) For any integer a , show that $a^{37} \equiv a \pmod{1729}$ using Euler's theorem.

**PART – B (2x15 = 30 Marks)
[Essay Answer Type]**

Note: Answer ALL the questions. Each question carries equal marks.

3 a) Define Mobius function (μ). Show that the mobius function is multiplicative.

OR

b) For each integer $n \geq 1$, show that $\sum_{d|n} \mu(d) = \begin{cases} 1 & \text{if, } n=1 \\ 0 & \text{if, } n>1 \end{cases}$.

4 a) Prove that $\sum_{d|n} \phi(d) = n$, for $n > 1$.

OR

b) State and prove Euler's theorem.
