Total No. of Printed Pages: 02

SUBJECT CODE NO: - YY-2349
FACULTY OF SCIENCE AND TECHNOLOGY
B. Sc. F.Y (Sem-II)
Examination March / April - 2023
Mathematics Paper -III
Number Theory

[Time: 1:30 Hours] **[Max. Marks: 40]**

Please check whether you have got the right question paper.

N. B 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q1 A. Attempt any one:
a. If $m > 0$, then prove that $[ma, mb] = m[a, b]$ 05
b. If plab , P being a prime, then prove that p/a or p/b. 05

B. Attempt any one:
c. Find the greatest common divisor of 7469 and 2464. 05
d. Prove that $n^3 - n$ is divisible by 6. 05

Q2 A. Attempt any one:
a. If $ax \equiv ay\ (mod\ m)$ and $(a, m) = 1$, then prove that $x \equiv y(mod\ m)$. 05

b. If P is a prime, then prove that $(p-1)! \equiv -1(mod\ p)$ 05

B. Attempt any one
c. Prove that if P is a prime and $a^2 \equiv b^2(mod\ p)$, then prove that $p \mid a + b \ \ or\ p|a - b$. 05

d. Find all integers that satisfy simultaneously : $x \equiv 2(mod\ 3)$, $x \equiv 3(mod\ 5), x \equiv 5(mod\ 2)$ 05

Q3 A. Attempt any one
a. If x is real number, then prove that $[x] \leq x < [x] + 1, x - 1 < [x] \leq x, 0 \leq x - [x] < 1$. 05

b. For every positive integer n, $\sum_{d/n} \Phi\ (d) = n$ 05

B. Attempt any one
c. Prove that $\mu(n)\mu(n+1)\mu(n+2)\mu(n+3) = 0$, n is positive integer. 05

d. Find all integers x and y such that $147x + 258y = 369$ 05

Q4 Choose the correct alternative and rewrite the sentences: 10

1. If a and b are integers with a > 0 then there exist unique integers q and r such that $b = qa + r, whree$
   a. $o \leq r \leq a$ b. $o \leq r \leq a$ c. $o < r \leq a$ d. $o < r < a$

2. The product of any three consecutive integers is divisible by ____
   a. 4 b. 5 c. 6 d. 7

3. If m is positive integer then $a \equiv b\ (mod\ m)$ if and only if _____
   a. $m/a + b$ b. $m/a - b$ c. m/ab d. $m/ma + b$

4. If d(n) denotes the _____ positive divisors of n, then d(12)= _____
   a. 28 b. 24 c. 12 d. 6

5. If μ is a Mobious function then $\mu(8) =$ ____
   a.-1 b. 1 c. 0 d. 8