Sanjay Ghodawat University, Kolhapur

2020-21

Established as State Private University under Govt. of Maharashtra. Act No XL, 2017

EXM/P/09/00

Year and Program: S.Y. B. Sc. **School of Science** **Department: Mathematics**

Course Code: MTS204.2 **Course Title: Number Theory** **Semester : IV**

Day and Date: **End Semester Examination** **Time : 2 Hrs.**
Max Marks : 50

Instructions: 1) All Questions are compulsory.
2) Use of non-programmable calculator is allowed.
3) Assume standard number theoretic notations wherever necessary.

		Marks	Bloom's Level	CO
Q.1	**Solve the following (any two)**			
a)	Show that, $1\cdot 2+2\cdot 3+3\cdot 4+\cdots+n(n+1)=\frac{n(n+1)(n+2)}{3}$, for positive integer n.	8	L3	CO1
b)	Use the Euclidean algorithm to obtain integers x and y satisfying $\gcd(119,272)=119x+272y$.	8	L3	CO1
c)	For positive integer a and b, prove that $\gcd(a,b)\times \text{lcm}(a,b)=ab$.	8	L3	CO1
Q.2	**Solve the following (any two)**			
a)	Determine the all positive integer solutions of the following Diophantine equation $172x+20y=1000$.	8	L1	CO2
b)	If p is prime and $p \mid a_1a_2\cdots a_n$, then prove that $p \mid a_k$ for some k, where $1\le k\le n$.	8	L1	CO2
c)	Show that $2^{20}-1$ is divisible by 41.	8	L1	CO2
Q.3	**Solve the following (any two)**			
a)	With Usual notations, prove that for $n>2;\phi(n)$ is an even integer.	9	L2	CO3
b)	Solve the following set of simultaneous congruence $x\equiv 2(\text{mod }3),\ x\equiv 3(\text{mod }5),\ x\equiv 2(\text{mod }7)$.	9	L2	CO3
c)	With usual notations, calculate $\phi(180),\tau(180)$ and $\sigma(180)$.	9	L2	CO3

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