

BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION)

CLASS: IMSC
BRANCH: MATHS AND COMPUTING

SEMESTER: III
SESSION: MO/2022

SUBJECT: MA202 MODERN ALGEBRA

TIME: 2 HOURS

FULL MARKS: 25

INSTRUCTIONS:

1. The total marks of the questions are 25.
 2. Candidates attempt for all 25 marks.
 3. Before attempting the question paper, be sure that you have got the correct question paper.
 4. The missing data, if any, may be assumed suitably.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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|--------|--|-----|-----|--------|
| Q1 (a) | Define the Mobius function. Find $\mu(2310)$. | [2] | CO1 | LO |
| Q1 (b) | Solve the linear congruence equation $25x \equiv 15 \pmod{29}$. | [3] | CO1 | IO |
| Q2 (a) | Define Euler's phi function. Find $\phi(1500)$. | [2] | CO1 | LO |
| Q2 (b) | Find the solution of Diophantine equation $56x+72y=40$. | [3] | CO1 | IO |
| Q3 | Define the left cosets. Find all the left cosets of $(H, +)$ in $(G, +)$ where $G = \mathbb{Z}(\text{integers})$ and $H = \{4x : x \in \mathbb{Z}\}$. | [5] | CO2 | LO, IO |
| Q4 | A group homomorphism $f: G \rightarrow G'$ is a one-one if and only if $\ker(f) = \{e\}$. | [5] | CO2 | IO |
| Q5 | State and prove fundamental theorem of group homomorphism. | [5] | CO2 | IO |

:::::: 29/09/2022 :::::M