

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

CLASS: IMSC  
BRANCH: MATHEMATICS & COMPUTING

SEMESTER : III  
SESSION : MO/2023

SUBJECT: MA202 MODERN ALGEBRA

TIME: 3 HOURS

FULL MARKS: 50

**INSTRUCTIONS:**

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
  2. Attempt all questions.
  3. The missing data, if any, may be assumed suitably.
  4. Before attempting the question paper, be sure that you have got the correct question paper.
  5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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			CO	BL
Q.1(a)	Define and write general formula for the Mobius function. Find value of mobius function $\mu(5000)$ .	[5]	CO1	1,2
Q.1(b)	Define Euler's phi function. Find the value of Euler's phi function $\phi(1200)$ .	[5]	CO1	1,2
Q.2	A group homomorphism $f: G \rightarrow G'$ is a one-one if and only if kernel $\ker(f) = \{e\}$ , where $G$ and $G'$ are groups and $e$ is an identity element of group $G$ .	[10]	CO2	3
Q.3	State and prove Cayley's theorem.	[10]	CO3	3
Q.4	If $R$ is a commutative ring with unity, then an ideal $M$ of ring $R$ is maximal ideal if and only if $R/M$ is a field.	[10]	CO4	3
Q.5(a)	Show that $\sqrt{-3}$ is a prime element of the ring $\mathbb{Z}\sqrt{-3}$ .	[5]	CO5	2
Q.5(b)	Show that the ring of all integers $\mathbb{Z}$ is a Euclidean Domain with $d(a) =  a $ .	[5]	CO5	3

:::23/11/2023 E:::