BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO 2022)

CLASS: IMSC **SEMESTER : I**
BRANCH: QEDS **SESSION: MO2022**

SUBJECT: ED101 INTRODUCTORY ANALYSIS

TIME: 02 HOURS **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

				CO	BL
Q1	a.	Is the set of all the prime numbers in $[1,100]$ an open set? Justify your answer.	[2]	CO1	
	b.	Define uncountable set. Give an example of an uncountable set. Justify your answer.	[3]	CO1	
Q2	a.	Find the supremum, infimum, greatest element and least element, if exist, of the set $S = \{x \in \mathbb{R} \mid x^2 \geq 3x + 10\}$.	[3]	CO1	
	b.	Prove that $\sqrt{10}$ is an irrational number.	[2]	CO1	
Q3	a.	State and prove Cauchy's general principle for the convergence of a sequence of real numbers.	[3]	CO2	
	b.	Check the convergency of the sequence $\{S_n\}$, where $S_n = 1 + \frac{1}{4} + \frac{1}{7} + \cdots + \frac{1}{3n-2}$ by Cauchy's general principle for convergence.	[2]	CO2	
Q4	a.	Show that the sequence $\{x_n\}$, defined by $x_1 = 1, x_{n+1} = \sqrt{5x_n}, n > 1$ converges to 5.	[3]	CO2	
	b.	Check whether the alternating series $\sum_{n=2}^{\infty}(-1)^{n-1}\frac{1}{(n-1)^{\frac{5}{4}}}$ is absolute convergent or conditional convergent.	[2]	CO2	
Q5		Test for the convergency of the infinite series $1 + \frac{3}{7}x + \frac{3.6}{7.10}x^2 + \frac{3.6.9}{7.10.13}x^3 + \cdots, x > 0.$	[5]	CO2	

:::::16/01/2023::::M