KOLHAN UNIVERSITY, CHAIBASA
JHARKHAND

Revised Curriculum and Credit Frame work for SEM – I as per FYUGP, NEP- 2020 (U.G. Mathematics – 2022 Onward)

University Department of Mathematics
Kolhan University, Chaibasa
West Singhbhum, Jharkhand-833202

UNIVERSITY DEPARTMENT OF MATHEMATICS
KOLHAN UNIVERSITY
CHAIBASA

Four-Year under Graduate Programme (FYUGP)

As per Provisions of NEP-2020 to be implemented from Academic Year 2022-23

COMPOSITION OF BOARD OF STUDIES

1. **Dr. Bijay Kumar Sinha**
   Head, University Department of Mathematics,
   Kolhan University Chaibasa

2. **Mr. Mahendra Kumar Rana**
   Assistant Professor,
   University Department of Mathematics,
   Kolhan University Chaibasa

3. **Dr. Md. Moiz. Ashraf**
   Head, P.G. Department of Mathematics
   Karim City, College, Jamshedpur

4. **Dr. P. C. Banerjee**
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   P.G. Department of Mathematics
   Karim City, College, Jamshedpur

(***Dr. Bijay Kumar Sinha***)
(Chairman & Head)
University Department of Mathematics,
Kolhan University, Chaibasa.

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Semester	**Paper**	**Code**	**Course Title**	**Credit**
I	Multi-Disciplinary /Introductory Regular Course	MDC/IRC	Introduction Course in Mathematics	3

Program: **Certificate** Class: **UG**	Year: **First**	Semester: **I**
Subject: **Mathematics**		
Course Code: **MDC/IRC**	Course Title: **Multi – Disciplinary/Introductory Regular Course**	

Course Learning Outcomes: This course will enable the students to:

a) Construct and evaluate formal proofs using various proof strategies, including mathematical induction, to demonstrate the validity of logical arguments.

b) Analyze and apply the properties of relations and functions, including reflexivity, symmetry, transitivity, injectivity, surjectivity, and bijectivity, to solve mathematical problems in various contexts.

c) Analyze and apply the concepts of modular arithmetic and congruence relations to solve problems related to divisibility, linear congruences, and arithmetic functions, as well as understand and apply advanced topics such as the Chinese remainder theorem, Fermat's little theorem, and Wilson's theorem to solve more complex problems.

d) Analyze and apply concepts related to the real number system, including its field and order structures, bounded sets, supremum and infimum of sets, and completeness property.

e) Analyze and determine the convergence or divergence of sequences and series using various techniques, including the comparison test and advanced tests such as the ratio test and root test.

Credit: **3 (Theory)**	**Compulsory**
Full Marks: **75**	Time: **3 Hours**

Unit	Content	Hours
I	**Logic**: Statement, Truth table, Quantifiers, Proof strategies, Mathematical induction.	**8 h**
II	**Sets and functions and relations**: Reflexive, Symmetric, Asymmetric and Transitive relations, Injective, Surjective and Bijective functions.	**10 h**
III	**Theory of numbers**: Modular arithmetic, Divisibility, Congruence relation, Linear congruence and Chinese remainder theorem, Fermat's little theorem, Wilson's theorem, Arithmetic functions and Set of residue classes modulo n: 'Z_n'.	**8 h**
IV	**Real number system**: Field and Order structure, Bounded sets, Supremum and Infimum of sets, Completeness property of set of Real number $\mathbb{R}$.	**8 h**
V	**Sequences and series**: Limit of a sequence, Convergent and non-convergent sequence, Limit points of a sequence, Positive term series, convergent and divergent series, Comparison test of positive term series.	**11 h**

***Remarks -: No Internal Exam**

Books Recommended:

1. R.G. Bartle and D. R. Sherbert (2002). Introduction to Real Analysis (3rd Edition), John Wiley and Sons (Asia) Pvt. Ltd., Singapore.
2. R. K. Dwivedi (2019). Real Analysis, 1 st Ed., Pragati Prakashan.
3. S.C. Mallik and S. Arora-Mathematical Analysis, New Age International Publications.
4. F. Cajori (1904). An Introduction to The Modern Theory of Equations. The Macmillan Company.
5. Kolman, Busby and Ross (2002). Discrete Mathematical Structure, 4 th Ed., Pearson Education Asia.
6. V. Rajaraman (1993). Computer oriented numerical methods, Prentice Hall India.