Gyanmanjari Innovative University

Course Syllabus
Gyanmanjari science college
Semester-1(M.Sc.)

Subject: Number Theory-MSCMA11502

Type of course: Major

Prerequisite: Divisibility , Chinese Remainder theorem , Fermat's little theorem

Rationale: Number Theory is a branch of mathematics that focuses on the properties and relationships of integers and their fundamental structures. The rationale of Number Theory lies in its significance and applications in various areas of mathematics and beyond.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	0	4	60	30	10	20	30	150

Legends: CI-Classroom Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment, ALA- Active Learning Activities.

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Continuous Assessment:

Sr. No	Active Learning Activities	Marks
1.	**Assignment:** Unit wise assignments will be given and students will prepare assignments and upload to Moodle.	10
2.	**Presentation :** Faculty will assign topics and students will prepare presentations(Slideshow/video) and upload them to Moodle	10
3.	**Brain writing :** Faculty will provide a picture, text passage or video clip, student observe,analyze and write about it.	10
4.	**Chain notes :** Faculty will provide a topic on that students have to prepare a series based on topic in chart form in hard copy and upload it to moodle.	10
5.	**Problem Solving:** Faculty will Provide a problem definition that students have to prepare a chart form in hard copy and upload it to moodle.	10
Total		50

Course Content:

Unit No.	Course content	Hrs	% Weightage
1.	**Chapter-1 :** ➢ Divisibility, the g.c.d. of two integers. ➢ Euclid's algorithm for determination of g.c.d. of two integers ➢ The property of g.c.d. and l.c.m.	15	25

2.	**Chapter-2 :** ➢ Prime and composite numbers. ➢ The fundamental theorem of arithmetic. ➢ The infinitude of primes.	15	25
3.	**Chapter-3 :** ➢ The definition of the congruence relation modulo n and its properties. ➢ The Chinese Remainder theorem. ➢ Fermat's little theorem and Wilson's theorem.	15	25
4.	**Chapter-4 :** ➢ Number theoretic functions. The multiplicative functions. ➢ Mobius inversion formula. The greatest integer function. ➢ Euler's totient function. Euler's generalization of Fermat's theorem.	15	25

Suggested Specification table with Marks (Theory) : 60

Distribution of Theory Marks **(Revised Bloom's Taxonomy)**						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	10%	40%	20%	10%	20%	0

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table.

Course Outcome:

After learning the course the students should be able to:	
CO1	Know the Theory of time complexity and efficiency of Euclid's algorithm .
CO2	The Knowledge of understanding of prime numbers and their significance in mathematics
CO3	Understand the time complexity of solving systems of congruences using CRT
CO4	Solve the Euler's Totient Theorem and its example.

Instructional Method:

The course delivery method will depend upon the requirement of content and the needs of students. The teacher, in addition to conventional teaching methods by black board, may also use any tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content 10% topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done on the basis of Active Learning Assignment

Practical/Viva examination will be conducted at the end of semester for evaluation of performance of students in the laboratory.

Reference Books:

[1] "An Introduction to the Theory of Numbers" by G.H. Hardy and E.M. Wright
[2] "Elementary Number Theory" by David M. Burton
[3] "A Course in Number Theory and Cryptography" by Neal Koblitz