MANGALORE UNIVERSITY

DEPARTMENT OF MATHEMATICS

MSC MATHEMATICS

MTS 510	Theory of Partitions	4 Credits (48 hours)

Prerequisite: Knowledge of syllabus prescribed for the course MTS 405 (Number Theory).

Course Outcome: This course motivates students towards research in the theory of partitions in the spirit of Ramanujan, whose contribution in the field is remarkable.Students will have the knowledge and skills to extensive use of generating functions and Ferrer's graph to derive properties of partition function, apply concepts of q-series to derive famous results theory of partitions like Jacobi's triple product identity, Ramanujan's $1\psi1$ - summation formula, the Rogers - Ramanujan Identities and exposed to Ramanujan's work on number theory and some open problems in the field to carry the research in the field.

Course Specific Outcome: At the end of the course Students will have the knowledge and skills to understand, explain in depth and apply in various situations the concepts -

- generating functions
- q-series
- Ramanujan's $1\psi1$ - summation formula,
- the Rogers - Ramanujan Identities.
- Restricted partitions, Gauss polynomials and Gaussian coefficients and their applications.

Unit I

Partitions - partitions of numbers, the generating function of $p(n)$, other generating functions, two theorems of Euler, Jacobi's triple product identity and its applications.

(12 Hours)

Unit II

$1\psi1$ - summation formula and its applications, combinatorial proofs of Euler's identity, Euler'spentagonal number theorem, Franklin's combinatorial proof.

(12 Hours)

Unit III

Congruence properties of partition function, the Rogers - Ramanujan Identities.

(12 Hours)

Unit IV

Elementary series - product identities, Euler's, Gauss's, Heine's, Jacobi's identities. Restricted Partitions - Gaussian, Frobinius partitions.

(12 Hours)

References

[1] G. H. Hardy and E. M. Wright, *An Introduction to Theory of Numbers*, 5th Ed., Oxford University Press, 1979.

[2] I. Niven, H. S. Zuckerman and H. L. Montgomery, *An Introduction to the Theory of Numbers*, 5th Ed., New York, John Wiley and Sons, Inc., 2004.

[3] Bruce C. Berndt, *Ramanujan's Note Books Volumes-1 to 5.*

[4] G. E. Andrews, *The Theory of Partitions*, Addison Wesley, 1976.

[5] A. K. Agarwal, Padmavathamma, M. V. Subbarao, *Partition Theory*, Atma Ram & Sons, Chandigarh, 2005.