SEMESTER-II

F.Y.B.Sc [SKILL ENHANCEMENT COURSE (SEC)]		
Title of the Course and Course Code : VGVUSSE203	**CALCULUS -II**	**No. of Credits: 02**

Unit No.	Content	No. of Lectures
I	**Series** Infinite series of real numbers, convergent series, divergent series. Necessary condition for convergence of series. Algebra of convergent series, harmonic series, p-harmonic series, Comparison test, Limit comparison test, ratio test (without proof), root test (without proof) and examples, alternating series, Leibnitz test for alternating series, absolute convergence, conditional convergence.	**10 Hrs.**
II	**Continuity and Its Applications** Continuity of real valued functions with domain as intervals in R, examples, continuity of functions at end points of interval, Sequential continuity, Algebra of continuous functions, continuity of composite functions. Discontinuous functions, examples of removable and essential discontinuities. Sign preserving property of continuous function. Intermediate value theorem and its applications. Bolzano Weierstrass Theorem	**10 Hrs.**
III	**Differentiability and Its Applications** Notion of differentiability with geometrical and physical interpretation, non-differentiable functions, necessary condition for differentiability of real valued function, algebra of differentiable functions, derivative of inverse functions, chain rule. Higher order derivatives, Leibnitz rule, implicit differentiation, Rolle's theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, increasing and decreasing functions, extreme values, stationary points, first derivative test, second derivative test, point of inflection, convex and concave functions	**10 Hrs.**

Learning Objectives:

1) Defining continuity on an interval.

2) Understanding, and investigating uses of the Intermediate Value Theorem.

3) Understanding the types of functions that are always continuous over their entire domain.

4) The learning objectives of differentiability and its application include understanding the concepts like continuity at a point, continuity on an interval, derivative of functions and many more.

5) Differentiability has many applications in real life. For example, it can be used to find the maximum or minimum value of a function. It can also be used to find the rate of change of a function.

Learning Outcomes:

On studying the syllabi, the learner will be able to understand

• Convergence and divergence of Series

• Absolute & conditional convergence.

• Continuity & Sequential continuity

• Intermediate value theorem and Bolzano Weierstrass Theorem

• Differentiability with geometrical and physical interpretation

• Mean value theorem & its applications

Recommended Books:

1) Calculus by Latika Bonde, Nithya Sai Narayana, Vipul Prakashan,

2) Calculus by Dr.Neena A. Joshi, Dr.Anil S.Vaidya, Latika Bonde, Nithya Sai Narayana.

Reference Books :

1.Robert G. Bartle, Donald R. Sherbert, Introduction to Real Analysis, third edition, John Wiley & Sons, Inc.

2. R. R. Goldberg, Methods of real analysis, Indian Edition, Oxford and IBH publishing, New Delhi.

3. Tom M. Apostol, Calculus Vol.1, Second edition, John Wiley & Sons

4. Ajit Kumar, S. Kumaresan, A Basic Course in Real Analysis, CRC Press.

SEMESTER-II

F.Y.B.SC [Vocational Skill Course (VSC)]		
Title of the course and course code : VGVUSNMAP201	**CALCULUS-II (PRACTICAL)**	**No.of credits:02**
Practical /lab work to be performed in computer lab. **List of practicals to be done using SageMath/Scilab/Maxima/Python.**		
1. Learning series of real numbers.		
2. Check behavior of series using sequence of partial sums.		
3. Some tests for convergence.		
4. Alternating series.		
5. Continuous functions ε -δ definition.		
6. Sequential continuity.		
7. Applications of continuous functions.		
8. Leibnitz theorem,		
9. Mean value theorems..		
10. Increasing and decreasing functions.		
11. Extreme values.		
12. Stationary points.		
13. point of inflection.		
14. Convex and Concave functions.		
15. Taylor's Theorem.		