20BSM202T					BASIC MATHEMATICS III					
Teaching Scheme					Examination Scheme					
L	T	P	C	Hrs. / Week	Theory			Practical		Total Marks
					MS	ES	IA	LW	LE/Viva	
3	1	0	4	4	25	50	25	--	--	100

COURSE OBJECTIVES

- To understand the basic concepts of differential calculus.
- To study line integrals and their applications.
- To understand the maxima and minima concepts for the functions of several variable
- To study the vector field and its applications

UNIT I FUNCTIONS OF SEVERAL VARIABLES **8 Hrs.**

Functions from R^n to R^m, scalar vector fields, derivative of a scalar field w.r.t. a vector, directional derivatives and partial derivatives, partial derivatives of higher order, directional derivatives and continuity, the total derivative.

UNIT II VECTOR CALCULUS: **11 Hrs.**

The gradient of a scalar field, a sufficient condition for differentiability, a chain rule for derivatives of scalar fields, applications to geometry, level sets, tangent planes, derivatives of vector fields, Sufficient conditions for the equality of mixed partial derivatives.

UNIT III MAXIMA AND MINIMA OF SEVERAL VARIABLES **9 Hrs.**

Maxima, minima and saddle points, Taylor's formula for scalar fields, Extrema with constraints, Lagrange's multipliers, the extreme value theorem.

UNIT IV LINE INTEGRALS AND ITS APPLICATIONS **12 Hrs.**

Paths and line integrals, Basic properties of line integrals, Line integrals w.r.t. arc length, Applications of line integrals, Open connected sets, Path independence, Fundamental theorems of calculus for line integrals, Applications to Mechanics, Necessary and sufficient conditions for a vector field to be a gradient.

TOTAL **40 Hrs.**

COURSE OUTCOMES

On completion of the course, student will be able to

CO1 – Apply the functions of several variable concepts
CO2 – Demonstrate the concepts of scalars and vectors.
CO3 – Analyse the concepts of maxima and minima of functions of several variable.
CO4 – Apply the applications of maxima and minima.
CO5 – Analyse the basic concepts of line integrals
CO6 – Demonstrate the applications of line integrals

TEXTS AND REFERENCES

1. T.M. Apostole, Calculus: multi-variable calculus and linear algebra with applications to differential equations and probability, vol 2, 2ed.
2. G. B. Thomas and Ross L. Finney, Calculus and Analytic Geometry, 9th Edition, Pearson.
3. R. K. Jain & S. R. K. Iyengar, Higher Engineering Mathematics, 3rd Ed., Narosa (2007).
4. E.Kreyszig,Advanced Engineering Mathematics,8thEd., John Wiley (1999).

END SEMESTER EXAMINATION QUESTION PAPER PATTERN

Max. Marks: 100	**Exam Duration: 3 Hrs.**
Part A: 6 questions of 4 marks each	24 Marks
Part B: 6 questions of 8 marks each	48 Marks
Part C: 2 questions of 14 marks each	28 Marks