

**MODEL COURSE STRUCTURE FOR BA / BSC (GENERAL) STUDENTS WITH MATHEMATICS / APPLIED MATHEMATICS AS A SUBJECT AT UNDER-GRADUATE LEVEL UNDER THE CHOICE BASED CREDIT SYSTEM SCHEME FOR THE BATCH ADMITTED IN 2020 AND ONWARDS**

SEMESTER	COURSE CODE	TYPES OF COURSE	TITLE OF COURSE	CREDITS	
				THEORY	TUTORIAL
I	MM120C	DSC-1(6 CREDITS)	CALCULUS AND COMPLEX TRIGNOMTERY	4	2
II	MM220C	DSC-2(6 CREDITS)	DIFFRENTIAL EQUATIONS AND THEORY OF EQUATIONS	4	2
III	MM320C	DSC-3(6 CREDITS)	REAL ANALYSIS	4	2
IV	MM420C	DSC-4(6 CREDITS)	ALGEBRA	4	2
<b>MATHEMATICS (DISCIPLINE SPECIFIC ELECTIVES FOR 5<sup>th</sup> &amp; 6<sup>th</sup> SEMESTERS)</b>					
VA	MM520DA	DSE-(6 CREDITS)	PLANE AND SOLID GEOMETRY	4	2
OR	OR				
VB	MM520DB	DSE-(6 CREDITS)	NUMERICAL ANALYSIS	4	2
VIA	MM620DA	DSE-(6 CREDITS)	LINEAR ALGEBRA	4	2
OR	OR				
VIB	MM620DB	DSE-(6 CREDITS)	THEORY OF PROBABILITY	4	2
<b>APPLIED MATHEMATICS (DISCIPLINE SPECIFIC ELECTIVES FOR 5<sup>th</sup> &amp; 6<sup>th</sup> SEMESTERS)</b>					
VA	AM520DA	DSE-(6 CREDITS)	METHODS OF APPLIED MATHEMATICS-I	4	2
OR	OR				
VB	AM520DB	DSE-(6 CREDITS)	MECHANICS	4	2
VIA	AM620DA	DSE-(6 CREDITS)	METHODS OF APPLIED MATHEMATICS-II	4	2
OR	OR				
VIB	AM620DB	DSE-(6 CREDITS)	LAPLACE AND FOURIER TRANSFORMATIONS	4	2

**Generic Elective Courses for V & VI Semesters for The Students who have not opted for Mathematics / Applied Mathematics up to 4<sup>th</sup> Semester Level and need some exposure to Mathematics at UG Level:**

SEMESTER	COURSE CODE	TYPES OF COURSE	TITLE OF COURSE	CREDITS	
				THEORY	TUTORIAL
V	MM520G	GE(6 Credits)	Mathematics-I	4	2
VI	MM620G	GE(6 Credits)	Mathematics-II	4	2

**\*To expose the students having no background in mathematics to mathematical thinking and make them understand the basic concepts of mathematics and their applications in day to day problems.**

**1st SEMESTER**  
**DISCIPLINE SPECIFIC COURSE FOR BA / BSc**  
**(& GENERIC ELECTIVE COURSE FOR BCA)**

**MM0120C0X: MATHEMATICS / APPLIED MATHEMATICS: CALCULUS AND COMPLEX TRIGONOMETRY**  
**CREDITS THEORY-4, TUTORIAL: 2**

**THEORY (4 CREDITS: 60 HOURS)**

**MAXIMUM MARKS: 60,**  
**MINIMUM MARKS: 24**

**Objectives:** The aim of this course is to prepare the students:

- i). To know the basic concepts in Mathematics
- ii). To apply the concepts/rules of differentiation and integration in the day to day problems.
- i) To identify the situations where the limits fail to exist.
- ii) To study/extend the complex analogues of plane trigonometry.
- iii) To use these concepts day to day life.

**UNIT-1 (15 HOURS)**

Limit and Continuity ( $\epsilon$  and  $\delta$  definition), types of discontinuities, properties of continuous functions on closed intervals, uniform continuity and Heine's Theorem, Differentiability of functions, Successive differentiation, Leibnitz's theorem, partial differentiation, total differentials, Euler's theorem on homogenous functions.

**UNIT-2 (15 HOURS)**

Tangents and normals (polar coordinates only), pedal equations, curvature and radius of curvature, asymptotes, singular points, tracing of curves in cartesian and polar coordinates.

**UNIT-3 (15 HOURS)**

Review of complex number system, triangle inequality, equation of a circle and ellipse in complex form, De Moivre's theorem and its applications, expansion of  $\sin n\theta$ ,  $\cos n\theta$  etc. in terms of powers of  $\sin \theta$ ,  $\cos \theta$  and expansion of  $\sin^n \theta$  and  $\cos^n \theta$  in terms of multiples of  $\theta$ .

**UNIT-4 (15 HOURS)**

Functions of a complex variable, exponential, circular, hyperbolic, inverse hyperbolic and logarithmic functions of a complex variable and their properties, summation of trigonometric series, difference method,  $C + iS$  method, C-R equations, definition of analytic functions.

**TUTORIALS (2 CREDITS: 30 HOURS)      Maximum Marks: 30 Minimum Marks: 12**

1. **Credit-1:** Applications of Rolle's Theorem, Mean Value Theorems, Maclaurin's Theorem, Taylor's Theorem with different remainders.
2. **Credit-2:** Maxima and Minima and their determination, indeterminate forms and Reduction formulae for integrals.

**Books recommended**

1. G.B. Thomas and R. L. Finney, *Calculus*, Pearson Education, 2007.
2. H. Anton, I. Birens and S. Davis, *Calculus*, John Wiley and Sons, Inc., 2002.
3. S. D. Chopra, M. L. Kochar and A. Aziz, *Differential Calculus*, Kapoor Publications.
4. A. Aziz and Nissar. A. Rather, *Complex Trigonometry*, Kapoor Publications.
5. E.G. Philips, *Functions of a complex Variable*.