

# UNITIZATION OF SYLLABUS & TEACHING PLAN

Department of MATHEMATICS

Bankura Christian College

**Mathematics (Major) (DSC)**

1<sup>st</sup> Semester (July to December, 2023), A.Y.: 2023 – 24

**Subject: Mathematics (Major) (MJC - 1)**

**Paper: Core T1\* (Unit 2 and Unit 4)**

**Course Title: Calculus, Geometry & Vector Analysis**

**[\* The Paper contains 4 units]**

**Course Instructor: Dr Subhasis Bandyopadhyay**

**Course Objectives:** The main objective of this course is to give a deep insight of the integration and its applications and to introduce of the concept vector calculus.

**Course Learning Outcomes:** After completion of this course a student would have acquire a significant knowledge of Integral Calculus and its application, which they can use for their further study. This course will also enable the students to develop a clear concept of product of three or more vectors and vector valued functions of a single variable and their applications.

## SYLLABUS:

### Unit 2:

Reduction formulae, derivations and illustrations of reduction formulae of the type  $\int \sin nx \, dx$ ,  $\int \cos nx \, dx$ ,  $\int \tan nx \, dx$ ,  $\int \sec nx \, dx$ ,  $\int (\log x)^n \, dx$ ,  $\int \sin nx \sin mx \, dx$ , Area under Cartesian and Polar curves, parametric equations, parameterizing of a curve, arc length, arc length of parametric curves, area and volume of surface of revolutions.

### Unit 4:

Product of three or more vectors, Applications in Geometry, introduction to vector functions of one independent variable, operations with vector-valued functions of one independent variable, limits and continuity of vector functions, differentiation and integration of vector functions of one independent variable.

## Reference Books:

- K.C. Ghosh and R.K. Maity, An Introduction to Analysis: Integral Calculus, New Central Book Agency (P) Ltd., 2013.
- G.B. Thomas and R. L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005.
- Stewart J., Calculus – Early Transcendental, Cengage Learning, 2015.
- M.J. Strauss, G.L. Bradley and K.J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi, 2007.
- H. Anton, I. Bivens and S. Davis, Calculus, 7th Ed., John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
- R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer-Verlag, New York, Inc., 1989.
- J.E. Marsden, and A. Tromba, Vector Calculus, 6 th Ed., McGraw Hill, 2011.
- K.C. Maity and R.K. Ghosh, Vector Analysis, New Central Book Agency (P) Ltd. Kolkata (India), 2011.
- M.R. Spiegel, Schaum's Outline of Vector Analysis, 2nd Ed. McGraw Hill, 2011.
- Shanti Narayan and Mittal P.K., A Textbook of Integral Calculus, S Chand, 2010.

## Teaching Plan:

MONTH & YEAR	WEEK	PORTIONS	No. of Lectures
<b>August 2023</b> [Date of Commencement of Regular Classes: 07 - 08 - 2023]	1	-----	-----
	2	<b>Integral Calculus:</b> Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin nx dx$ , $\int \cos nx dx$ , $\int \tan nx dx$ , $\int \sec nx dx$ , $\int (\log x)^n dx$	<b>2</b>
	3	Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin nx \sin mx dx$ , $\int \cos nx \sin mx dx$ , $\int \cos nx \cos mx dx$	<b>1</b>
	4	Reduction formulae – continued. Solving Problems related to Reduction formulae.	<b>2</b>
	5	Area under Cartesian and Polar curves.	<b>2</b>
<b>September 2023</b>	1	-----	-----
	2	Area under Cartesian and Polar curves – contd. <b>CLASS TEST / ASSIGNMENTS</b>	<b>2</b>
	3	Parametric Curve and parametrization of a curve. Arc Length	<b>2</b>
	4	Arc length of a parametric curve and related problems.	<b>2</b>
	5	Surface Area of a solid of revolutions.	<b>2</b>
<b>October 2023</b>	1	Volume of a solid of revolutions.	<b>1</b>
	2	<b>Vector Analysis:</b> Product of three vectors and related problems	<b>2</b>
	3	<b>REVISION/ CLASS TEST / ASSIGNMENTS</b>	<b>2</b>
	4	<b>Puja Holidays (18-10-2023 TO 28-10-2022) As per Academic Calendar</b>	-----
	5	<b>Puja Holidays</b>	-----
<b>November 2023</b>	1	-----	-----
	2	Product of three vectors – contd. Product of four vectors.	<b>2</b>
	3	<b>Holidays (Kali Puja, Bhatriidwitiya etc.)(12-11-23 To 16-11-23)</b>	-----
	4	Application to Geometry.	<b>1</b>
	5	Introduction to Vector valued functions, Limit and continuity of vector valued functions.	<b>1</b>
<b>December 2023</b>	1	-----	-----
	2	Differentiation of vector valued functions of one variable. Theorem and problems. Applications.	<b>2</b>
	3	Integration of vector valued functions of one variable. Theorem and problems. Applications	<b>2</b>
	4	Remaining portions of Unit – 2 and Unit – 4 (if any) <b>REVISION/ CLASS TEST / ASSIGNMENTS</b>	<b>2</b>
	5	<b>Christmas Holidays &amp; Study Leave</b>	-----