

UNIVERSITY OF MADRAS
B.Sc. DEGREE COURSE IN MATHEMATICS
SYLLABUS WITH EFFECT FROM 2020-2021

BMA-CSC04

CORE-IV: INTEGRAL CALCULUS AND VECTOR ANALYSIS
(Common to B.Sc. Maths with Computer Applications)

Inst.Hrs : 5
Credits : 4

YEAR: I
SEMESTER: II

Learning outcomes:

Students will acquire Knowledge about

- Integration and its geometrical applications, double, triple integrals and improper integrals.
- Vector differentiation and Vector integration.

UNIT I

Reduction formulae– Types, $\int x^n e^{ax} dx$, $\int x^n \cos ax dx$, $\int x^n \sin ax dx$, $\int \cos^n x dx$, $\int \sin^n x dx$, $\int \sin^m x \cos^n x dx$, $\int \tan^n x dx$, $\int \cot^n x dx$, $\int \sec^n x dx$, $\int \operatorname{cosec}^n x dx$, $\int x^n (\log x)^m dx$ - Bernoulli's formula.

Chapter 1 Section 13, 13.1 to 13.10,14,15.1.

UNIT II

Multiple Integrals- definition of the double integrals- evaluation of the double integrals- double integrals in polar coordinates – triple integrals – applications of multiple integrals – volumes of solids of revolution – areas of curved surfaces – change of variables – Jacobians.

Chapter 5 Section 1, 2.1, 2.2, 3.1, 4, 6.1, 6.2, 6.3, 7

Chapter 6 Section 1.1, 1.2, 2.1 to 2.4.

UNIT III

Beta and Gamma functions - infinite integral – definitions – recurrence formula of Γ functions - properties of β -functions - relation between β and Γ functions.

Chapter 7 Sections 1.1 to 1.4 , 2.1, 2.3, 3, 4, 5.

UNIT IV

Introduction - directional derivative- Gradient- divergence- curl- Laplacian Differential Operator.

Chapter 2 Sections 2.1 - 2.13.

UNIT V

Line, surface and volume integrals - Integral Theorems - Gauss, Greens and Stokes (Without proof) – Problems.

Chapter 3 Sections 3.1 to 3.6 and Chapter 4 Sections 4.1 to 4.5.

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Content and treatment as in

1. "Calculus", Vol- II by S. Narayanan and T.K. Manicavachagampillay - S. Viswanathanpublishers– 2007 for Unit 1 , Unit 2 , Unit 3.
2. "Vector Analysis" by P.Duraipandian and KayalalPachaiyappa, S.ChandFor Unit 4, Unit 5.

Reference:-

1. Integral Calculus and differential equations : Dipak Chatterjee (TATA McGraw Hill Publishing companyLtd.).
2. Vector Algebra and Analysis by Narayanan and T.K.Manickvachagam Pillay S .Viswanathan Publishers.
3. Vector Analysis: Murray Spiegel (Schaum Publishing Company, NewYork).

e-Resources:

1. <http://mathworld.wolfram.com>.
2. <http://www.sosmath.com>.