| *Department of Mathematics* | | | | *Class: I B.Sc. Mathematics* | | | | |
|---|---|---|---|---|---|---|---|---|
| **Semester** | **Course Type** | **Course Code** | **Course Title** | **Credits** | **Contact Hours/ week** | **CIA** | **Ext** | **Total** |
| I | MCT 1 | 20U1MMC1 | Calculus | 3 | 5 | 25 | 75 | 100 |

*Course Objectives***:**
1. To obtain the knowledge of differential calculus.
2. To gain knowledge about solving double and triple integration.
3. To acquire idea to solve integration using beta and gamma functions.

**Unit-I:**
p-r(Pedal) equation**-**Curvature – Radius of curvature in Cartesian and Polar coordinates-involutes– Evolutes, Envelope.

**Unit-II:**
Asymptotes – singular points- multiple points(node, cusp and conjugate points)-Tracing of curves-Folium of Descartes- cycloid-cardioid and Lemniscate of Bernoulli.

**Unit-III:**
Integration by parts-Bernoulli's formula - Reduction formulae – Problems.

**Unit-IV:**
Double integrals **-** Evaluation of double integral – Triple integrals – Change of variables.

**Unit-V:**
Definition – Properties of Beta and Gamma functions – Problems.

**Text Book**
1. S. Arumugam, Calculus, 2014, Edition, New Gamma Publishing House

**Part I -** Chapters:2(2.7,2.8), 3,4.        **Part I -** Chapters: 3(3.3-3.6, 3.10-3.13),

**Book References:**
1. T. K. ManicavachagomPillay, Differential Calculus, 2003 Edition, S. Viswanathan (Printers & Publishers) Pvt. Ltd.
2. T. K. ManicavachagomPillay, Integral Calculus 2000 Edition, S. Viswanathan (Printers & Publishers) Pvt. Ltd.

**Web References:**
1. https://nptel.ac.in/courses/111/104/111104092/
2. http://www.freebookcentre.net/SpecialCat/Free-Mathematics-Books-Download.html

**Course Learning Outcomes**

On the successful completion of the course, students will be able to

| Number | Course Learning Outcome | Knowledge Level |
|--------|-------------------------|-----------------|
| **CLO1** | recall the basic concepts in differentiation and get the knowledge of p-r equation, Curvature, Radius of curvature, involutes, Evolutes, Envelope and apply it in problems | Upto K3 |
| **CLO2** | Understand the idea of Asymptotes, Tracing of curves-Folium of Descartes-cycloid-cardioid and Lemniscate and its related problems | Upto K3 |
| **CLO3** | Recall integration of by parts. Derive reduction formulae for trigonometric functions in integration process | Upto K3 |
| **CLO4** | Use the knowledge of double and triple integrals for finding area and volume | Upto K4 |
| **CLO5** | Acquire the information about beta, gamma function and evaluate it in various problems | Upto K3 |

K1- Recall,     K2 – Understanding,     K3 – Applying,     K4- Examining

**Mapping with Courses Learning Outcomes (CLOs)**

|  | PO1 | PO2 | PO3 | PO4 | PO5 | PSO1 | PSO2 | PSO3 | PSO4 | PSO5 | PSO6 | PS07 |
|------|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|
| **CLO1** | 3 | 2 | - | 2 | 1 | 3 | 1 | 3 | 1 | 3 | - | - |
| **CLO2** | 2 | 1 | - | - | 2 | 3 | 2 | 3 | 1 | 3 | - | - |
| **CLO3** | 2 | - | - | - | 1 | 2 | 3 | 2 | 1 | 1 | - | - |
| **CLO4** | 2 | 1 | - | 1 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | - |
| **CLO5** | 2 | - | - | - | 2 | 1 | 1 | 2 | 3 | 2 | 3 | - |

1. Basic level      2. Intermediate level      3. Advanced level

**Pedagogy**

Lecture, Seminar, Quiz, Problem Solving, Tutorial, Group Discussion and Power point presentation.

**Lesson Plan**

| S. No. | Unit | Description | Taking Hours | Total | Pedagogy |
|---|---|---|---|---|---|
| 1. | I | p-r(Pedal) equation-e –and -,. | 2 | 15 | Lecture, Quiz, |
| | | Curvature - Radius of curvature in Cartesian and Polar coordinate | 5 | | Lecture,Problem Solving |
| | | Involutes– Evolutes | 3 | | Chalk and Talk, Group Discussion |
| | | Envelope | 5 | | |
| 2. | II | Asymptotes –- | 3 | 15 | Lecture,Group Discussion |
| | | singular points- multiple points (node, cusp and conjugate points) | 5 | | Lecture, Problem Solving |
| | | Tracing of curves-Folium of Descartes | 3 | | Lecture,Quiz |
| | | cycloid-cardioid and Lemniscate of Bernoulli | 4 | | Lecture |
| 3. | III | Integration by parts- –— Problems. | 2 | 15 | Lecture, Seminar |
| | | Bernoulli's formula- problems | 2 | | Lecture, Quiz |
| | | Reduction formulae – examples | 4 | | Lecture |
| | | Reduction formulae- problems | 3 | | Chalk and Talk, Tutorial |
| 4. | IV | Double integralsand its problems | 2 | 15 | Lecture, Quiz |
| | | Evaluation of double integral and its examples | 5 | | Lecture, Problem Solving |
| | | Triple integrals and its problems | 4 | | Lecture,Tutorial |
| | | Evaluation of Change of variables. | 4 | | Lecture |
| 5. | V | Definition of Beta and Gamma functions – Problems | 2 | 15 | Lecture,Quiz |
| | | Properties of Beta and its problems | 3 | | Lecture |
| | | Properties of Gamma functions and its examples | 5 | | Lecture, Seminar |
| | | Relation between beta and gamma function and its problems | 5 | | Lecture,Tutorial. |
| | | **Total** | | **75** | |

**Course Designer**:   Dr. S. Usha, Assistant Professor, Department of Mathematics.