

**FOUR YEAR UNDER GRADUATE PROGRAM(2024-28)**  
**DEPARTMENT OF MATHEMATICS**  
**COURSE CURRICULUM**

| <b>Part A: Introduction</b>                                     |                               |  |  |
|---|-------------------------------|--|--|
| <b>Program: Bachelor in Science<br/>(Diploma/Degree/Honors)</b> |                               | <b>Semester - III</b>  | <b>Session:2024-2025</b>                     |
| 1   | Course Code                   | <b>MASE-01</b>   |  |
| 2   | Course Title                  | Advanced Calculus  |  |
| 3   | Course Type                   | Discipline Specific Elective (DSE)   |  |
| 4   | Pre-requisite ( if any)       | Basic idea of elementary differential and integral calculus  |  |
| 5   | Course Learning Outcome (CLO) | <p><b>This Course will enable the students to:</b></p> <ul style="list-style-type: none"> <li>➤ Calculate the limit and examine the continuity and understand the concepts of limit , continuity and differentiability of functions of more than one variable with geometrical interpretation.</li> <li>➤ To Understand the concepts of mean value theorems with their applications .</li> <li>➤ To understand the concept of maxima and minima for functions of two and three variables with their uses and techniques</li> <li>➤ Understand conceptual variations while advancing from one variable to several variables in calculus.</li> <li>➤ Understand the concept of integration of functions of two and three variables and their evaluation technique with emphasis on beta and gamma functions .</li> </ul> |  |
| 6   | Credit Value                  | <b>4 C</b>   | 1Credit = 15 hours- Learning and observation |
| 7   | Total Marks                   | Maximum Marks :<br>100   | Minimum Passing Marks:40                     |

**Part B: Content of the Course**

**Total no of teaching – learning period =60 Periods (60 Hours)**

| UNIT       | Topics   | No of Periods |
|------------|--|---------------|
| <b>I</b>   | Limit and continuity of function of two and three variables. Mean value theorems of function of two variables- First mean value theorem and Taylor's theorem. Partial Differentiation and Euler's theorem on homogeneous functions, Change of variables. | <b>15</b>     |
| <b>II</b>  | Partial Derivation and differentiability of function of two variables. Schwartz's theorem, Young's theorem, Implicit function theorem. Fourier series, Fourier expansion of piece wise monotonic function.   | <b>15</b>     |
| <b>III</b> | Jacobians , Maxima, Minima and saddle points of function of two variables. Lagrange's multipliers method. Envelopes, Evolutes  | <b>15</b>     |
| <b>IV</b>  | Beta and Gamma function. Double and triple integrals .Dirichelet's integrals. Change of order of integration.  | <b>15</b>     |

*(Dr. S. Dashputra)*

*Dr. Ankan Lal Shrivastava*

*Mishra*

*(Dr. P. K. Sahu)*

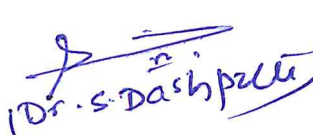
*eluv*


*Om*


*Pran*


| <b>Part C - Learning Resource</b>   |  |   |
|---|--|---|
| Text Books, Reference Books, Other Resources  |  |   |
| <b>Text Books Recommended-</b>  |  |   |
| 1. Gorakh Prasad (2016). Differential Calculus (19th edition). Pothishala Pvt. Ltd.   |  |   |
| 2. Mathematical Analysis, S.C. malik and S. Arora, New age international, Delhi   |  |   |
| 3. Howard Anton, I. Bivens & Stephan Davis (2016). Calculus (10th edition). Wiley India.  |  |   |
| 4. Gabriel Klambauer (1986). Aspects of Calculus. Springer-Verlag.  |  |   |
| 5. Wieslaw Krawcewicz & Bindhyachal Rai (2003). Calculus with Maple Labs.   |  |   |
| 6. Principles of Mathematical analysis, W. Rudin, McGraw Hill Publication   |  |   |
| 7. Jerrold Marsden, Anthony J. Tromba & Alan Weinstein (2009). Basic  |  |   |
| 8. James Stewart (2012). Multivariable Calculus (7th edition). Brooks/Cole. Cengage.  |  |   |
| <b>E-resources:</b> <a href="https://onlinecourses.nptel.ac.in">https://onlinecourses.nptel.ac.in</a><br><a href="https://epqp.inflibnet.aci.in">https://epqp.inflibnet.aci.in</a><br><a href="https://swayam.gov.in">https://swayam.gov.in</a> <a href="https://www.mooc.org">https://www.mooc.org</a> |  |   |
| <b>Part D: Assessment and Evaluation</b>  |  |   |
| <b>Suggested Continuous Evaluation Methods:</b>   |  |   |
| <b>Maximum Marks:</b>   |  | <b>100 Marks</b>  |
| <b>Continuous Internal Assessment (CIA):</b>  |  | <b>30 Marks</b>   |
| <b>End Semester Examination (ESE):</b>  |  | <b>70 Marks</b>   |
| <b>Continuous Internal Assessment (CIA)</b><br>(Conducted by course teacher)  | Test /Quiz – 20+20 Marks<br>Assignment/Seminar- 10 Marks   | Better marks out of two test/quiz + obtained marks in Assignment shall be considered against 30 marks |
| <b>End Semester Examination (ESE)</b>   | <b>Two Section-A&amp;B</b><br>Section-A: Q1. Objective- 10x1=10 marks Q2. Short answer type question-5x4=20marks<br>Section-B: Descriptive answer type question, 1 out of 2 from each unit- 10x4= 40 Marks |   |


Name and signature of convener & members of CBOS-


  
 Dr. S. Dashputra


  
 Dr. Amitkand Shivastava

  
 Dr. P. K. Sahu

  
 Dr. Anil Kumar

  
 Dr. Manish

  
 Dr. Anand

  
 Dr. Anand