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SEMESTER-II
MAT020104: Calculus
Total Marks: 100 (External: 60, Internal Assessment 40)
No. of Credits: 4
No. of Contact classes: 60
No. of Non-Contact classes: 0

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Prerequisites: Mathematics in 10+2 or equivalent standard

Course Outcomes: The students who take this course will be able to:

CO1   Describe asymptotic behavior in terms of limits involving infinity.

CO2   Recognize function of two variables and operate the partial derivatives.

CO3   Express continuity and differentiability in terms of limits.

CO4   Calculate integrations which can be solved by reduction formula

CO5   Use the mean value theorems.

UNIT 1: Limits and continuity of a function including different approaches, Properties of continuous functions including Intermediate value theorem.

[1] Chapter 1

(No. of classes: 15, Marks: 15)

UNIT 2: (a) Differentiability, Successive differentiation, Leibnitz theorem, Recursion formulae for higher derivatives.

(b) Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin^n x\, dx$, $\int \cos^n x\, dx$, $\int \tan^n x\, dx$, $\int \sec^n x\, dx$, $\int (\log x)^n\, dx$, $\int \sin^n x \cos^m x\, dx$.

 [2] Chapter 5(for part (a))

[3] Chapter 4 (4.1-4.6) (only for part (b))

(No. of classes: 15, Marks: 15)

UNIT 3: Rolle's theorem, Lagrange's mean value theorem with geometrical interpretations and simple applications, Maclaurin and Taylor polynomials and their sigma notations. Taylor's formula with remainder, Introduction to Maclaurin and Taylor series.

 [1] Chapter 9 (Sections 9.8 and 9.9 (without 'convergence' part))

 [2] Chapter 6

(No. of classes: 15, Marks: 15)

UNIT 4: Functions of two or more variables, Partial differentiation up to second order, Euler's theorem on homogeneous functions

[1] Chapter 13 (Sections 13.1 and 13.3)

[2] Chapter 10(10.81)

(No. of classes: 15, Marks: 15)

Text books:

[1] Anton, Howard, Bivens, Irl, & Davis, Stephen (2013). Calculus (10th ed.). John Wiley & Sons Singapore Pte. Ltd. Reprint (2016) by Wiley India Pvt. Ltd. Delhi

[2] Shanti Narayan and P.K. Mittal, Differential Calculus, S. Chand, 2005

[3] Shanti Narayan and P.K. Mittal, Integral Calculus, S. Chand, 2007.

Reference book:

[1] Thomas, Jr. George B., Weir, Maurice D., & Hass, Joel (2014). Thomas' Calculus (13th ed). Pearson Education, Delhi. Indian Reprint 2017.