**College of Engineering, Pune-5.**

**Department of Mathematics**

**( MA 15002 ) Univariate Calculus**

F.Y. B. Tech. Semester II (All Branches)

Teaching Scheme Examination Scheme

Lectures : 2 hrs / week Internal Test 1: 20 marks

Tutorial: 1 hr / week Internal Test 2: 20 marks

End Sem. Exam: 60 marks

**Objectives :** Basic necessity for the foundation of Engineering and Technology being mathematics, the main aim is, to teach mathematical methodologies and models, develop mathematical skills and enhance thinking power of students.

**Unit I :** Review of limits, continuity and differentiability of univariate functions, Mean value theorems, Taylor's theorem, local extrema, increasing and decreasing functions, concavity, points of inflection, Jensen's inequality. **[05 Hrs]**

**Unit II :** Integrals as limits of Riemann sums, fundamental theorem of calculus, logarithm and exponential functions through integrals, integrals by special techniques: reduction formulae, arc length, solids of revolution, surface area, improper integrals, Gamma and Beta functions, tests for convergence. **[07 Hrs]** **Unit III :** Sequences, recursively defined sequences, limits, subsequences, monotone sequences, infinite series, tests for convergence (Geometric series, p-series test, Ratio test, Root test, Comparison test, Leibnitz’s test for alternating series), absolute convergence, power series and its convergence. Fourier series: definition, full and half range expansions of functions of arbitrary period. **[14 Hrs]**

**Text Books** **:**

* Thomas’ Calculus (12th edition) by Maurice D. Weir, Joel Hass, Frank R. Giordano, Pearson Education.
* Advanced Engineering Mathematics (10th edition ) by Erwin Kreyszig, Wiley eastern Ltd.

**Reference Books** **:**

* Calculus for Scientists and Engineers by K.D Joshi, CRC Press.
* A Course in Calculus and Real Analysis (1st edition) by Sudhir Ghorpade and Balmohan Limaye, Springer-Verlag, New York.
* Advanced Engineering Mathematics by C.R. Wylie, McGraw Hill Publications, New Delhi.
* Advanced Engineering Mathematics (7th edition ) by Peter V. O’ Neil, Thomson.Brooks / Cole, Singapore.
* Differential Calculus by Shanti Narayan, S. Chand and company, New Delhi.
* Applied Mathematics Vol. I (Reprint July 2014) by P.N. Wartikar and J.N. Wartikar, Pune Vidyarthi Griha Prakashan Pune.

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**Outcomes :** Students will be able to

1. know and recall core knowledge of the syllabus. ( To measure this outcome, questions may be of the type- define, identify, state, match, list, name etc.)
2. understand basic concepts. ( To measure this outcome, questions may be of the type- explain, describe, illustrate, evaluate, give examples, compute etc.)
3. analyze the problem and apply the appropriate concept. ( To measure this outcome, questions will be based on applications of core concepts)
4. give reasoning. ( To measure this outcome, questions may be of the type- true/false with justification, theoretical fill in the blanks, theoretical problems, prove implications or corollaries of theorems, etc.)
5. apply core concepts to new situations. ( To measure this outcome, some questions will be based on self-study topics and also comprehension of unseen passages.)

Note:

Some topics from the syllabus will be taught from the notes prepared by Prof. K.D. Joshi (Emeritus Professor, COEP).

All the Course outcomes 1 to 3 will be judged by 75% of the questions and outcomes 4 and 5

will be judged by 25 % of questions.