VISVESVARAYA TECHNOLOGICAL UNIVERSITY, BELAGAVI

SYLLABUS FOR 2018 -2020

I Semester M.Tech-Mech-(Thermal)

Advanced Mathematical Methods in Engineering

Course Code : 18MTP11	**CIE Marks: 40**
Contact Hours/Week : 04	**SEE Marks: 60**
Total Hours: 50	**Exam Hours: 03**
Semester : I	**Credits: 04 (4:0:0)**

Course Learning Objectives: This course will enable the students

- To understand the technique of numerically computing for various accuracies in the modeling equations.
- To learn and use the fundamentals of most commonly occurring situations in the form of ODE's and PDE's for real life applications.
- To understand the concepts of probability and testing of hypothesis for a sample data and further general conclusion can be taken to the whole data using statistical methods.

MODULES	No.of Hrs
MODULE-I: **E**rror definition, round off errors and truncation errors. Mathematical modeling and Engineering problem solving: Simple mathematical model, Conservation Laws of Engineering. Roots of Equations by numerical methods: Secant Method, Newton- Raphson method, Horner's Method. (RBT Levels: **L1 & L2)**	**10 Hrs**
MODULE-II Solving ODE"s using: Picard's method, Runge Kutta f ourth order and Stiffness of ODE using shooting method. Solving PDE's by numerical method: one dimensional wave equation and heat equation (RBT Levels: **L1 & L2)**	**10 Hrs**
MODULE- III: Probability distributions: Binomial, Poisson. Normal. Sampling Theory: Testing of hypothesis using t andtest, Goodness of fit. (RBT Levels: **L1 & L2)**	**10 Hrs**
MODULE IV: F-test, Analysis of Variance: One – way with/without intera ctions, problems related to ANOVA, Design of experiments, RBD. (RBT Levels: **L2 & L3)**	**10 Hrs**
MODULE-V: Engineering Applications on : i) The swinging Pendulum (Article No:28.4, P.No:793, Ref. 3) ii) Vibrating string(Article No:4.5, P.No: 151, Ref. 2) (RBT Levels: **L2 & L4)**	**10 Hrs**

Course Outcomes: At the end of the course, students will demonstrate the ability to:

1. Acquire the idea of significant figures, types of errors during numerical computation.
2. Develop the mathematical models of thermal system using ODE's and PDE's.
3. Learn the deterministic approach for statistical problems by using probability distributions.
4. Demonstrate the validity of the hypothesis for the given sampling distribution using standard tests and understand the randomization on design of experiments.
5. Classify and analyze mathematical tools applied to thermal engineering study cases.

Question Paper Pattern:

The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 60.

- The question paper will have **ten** full questions carrying equal marks.
- Each full question consisting of **20** marks.
- There will be **two** full questions (with a **maximum** of **four** sub questions) from each module.
- Each full question will have sub question covering all the topics under a module.
- The students will have to answer **five** full questions, selecting **one** full question from each module.

Text Books:

1. C. Ray Wylie and Louis C Barrett, "Advanced Enginee ring Mathematics". 6 th edition, McGraw-Hill, 1995.
2. K Shankar Rao, "Introduction to Partial Differentia l Equations" Prentice - Hall of India Pvt. Lt. , 1995 Edition.
3. Steven C Chapra and Raymond P Canale, "Numerical Me thods for Engineers," 7 th Ed., McGraw-Hill Edition, 2015.

Reference books:

1. William W.H., Douglas C.M., David M.G.and Connie M.B., "Probability and Statistics in Engineering, 4th Edition, Willey Student edition, 2008.
2. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 44th Ed., 2017.
3. M K Jain, S.R.K Iyengar, R K. Jain, Numerical methods for Scientific and engg computation, New Age International, 2003.

Web links and Video Lectures:

1. http://nptel.ac.in/courses.php?disciplineId=111
2. http://www.class-central.com/subject/math(MOOCs)
3. http://ocw.mit.edu/courses/mathematics/