# Mathematics-III for EE Engineering (BMATE 301)
**(Effective from the academic year 2023-24)**

| Topics | Topics To be Covered | Hours |
|---|---|---|
| **Module-1: Ordinary Differential Equations of Higher Order** | | |
| Higher-order linear ODEs with constant coefficients. Inverse differential operator, Problems. | Discussion and coverage of contents as suggested in articles No. 13.1, 13.2(Proof of theorem is excluded), 13.3, 13.4 and 13.6 (Cases I, II, III only) of Textbook 1 (*P.I.* Restricted to $R(x) = e^{ax}, \ sinax/cosax, \ x^m$ for $f(D)y = R(x)$. | **3L** |
| Linear differential equations with variable Coefficients-Cauchy's and Legendre's differential equations–Problems. Application of linear differential equations to L-C circuit and L-C-R circuit. | Discussion of problems in Article No. 13.9 of Textbook-1 *(P.I.* Restricted to $R(X) = e^{ax}, \ sinax/cosax, \ x^n$ & log x for f(D)y = R(x)) for Cauchy's and Legendre's equations). Discussion of Problems 14.5 of Textbook 1 | **3L** |
| **Self-Study:** Finding the solution by the method of undetermined coefficients and method of variation of parameters. **(RBT Levels: L1, L2 and L3)** | Article No. 13.8 of Textbook 1. | |
| **Tutorials** | Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. applications by the Faculty, about the module. Guide the students on self-study topics | **2T** |
| | **Total** | **8 Hours** |
| **Module-2: Curve fitting, Correlation, and Regressions** | | |
| Principles of least squares, Curve fitting by the method of least squares in the form $y = a + bx$, $y = a + bx + cx^2$, and $y = ax^b$. | Discussion and coverage of contents as suggested in articles No.24.1, 24.4, 24.5, and 24.6(1) of Textbook 1 | **3L** |
| Correlation, Co-efficient of correlation, Lines of regression, Angle between regression lines, standard error of estimate, rank correlation. | Discussion of problems Article No. 25.12 to 25.16 of Textbook 1. | **3L** |
| **Self-study:** Fitting of curves in the form $y = ae^{bx}$ **(RBT Levels: L1, L2 and L3)** | Article No. 24.6 (2) of Textbook 1 | |
| **Tutorials** | Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. Applications by the faculty, about the module. Guide the students on self-study topics | **2T** |
| | **Total** | **8 Hours** |

| Module-3: Fourier series. | | |
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| Periodic functions, Dirchlet's condition, conditions for a Fourier series expansion, Fourier series of functions with period $2\pi$ and with arbitrary period. **Application to variation of periodic current.** | Discussion restricted to problems on Articles No.10.1 to 10.6 of Textbook 1 | **3L** |
| Half rang Fourier series. Practical harmonic analysis. | Discussion restricted to problems on Articles No.10.7 and 10.11 of Textbook 1 | **3L** |
| **Self-study:** Typical waveforms, complex form of Fourier series <br> **RBT Levels: L1, L2 and L3)** | Articles No. 10.8 and 10.10 of Textbook 1 | |
| **Tutorials** | Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. Applications by the faculty, about the module. Guide the students on self-study topics | **2T** |
| | **Total** | **8 Hours** |
| **Module-4: Fourier transforms and Z-transforms** | | |
| Infinite Fourier transforms, Fourier cosine and sine transforms, Inverse Fourier transforms, Inverse Fourier cosine and sine transforms. | Discussion and coverage of contents as suggested in Articles No. 22.1, 22.4, and 22.5 of Textbook 1. | **3L** |
| **Z-transforms:** Definition, Standard z-transforms, Damping, and shifting rules, Problems. Inverse z-transform and applications to solve difference equations. | Discussion and problems are restricted to Articles No.23.1 to 23.9, 23.15 (II), and 23.16 of Textbook 1 | **3L** |
| **Self-study**: Convolution theorems of Fourier and z-transforms <br> **(RBT Levels: L1, L2 and L3)** | Articles No. 22.6 and 23.12 of Textbook 1 | |
| **Tutorials** | Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. Applications by the faculty, about the module. Guide the students on self-study topics | **2T** |
| | **Total** | **8 Hours** |
| **Module-5: Probability distributions** | | |
| Review of basic probability theory, Random variables-discrete and continuous Probability distribution function, cumulative distribution function, Mathematical Expectation, mean and variance, Binomial, Poisson, Exponential | Discussion and coverage of contents as suggested in Articles No. 26.7 to 26.10(1 and 2), 26.14 to 26.17, and 26.19(6) of Textbook 1. | **3L** |

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| and Normal distribution (without proofs for mean and SD) ‑ Problems. | | |
| **Sampling Theory:** Introduction to sampling distributions, standard error, Type-I and Type-II errors. Student's t-distribution, Chi-square distribution as a test of goodness of fit. | Discussion and problems are restricted to Articles No. 27.1 to 27.4, 27.13, 27.14, 27.15, 27.17 and 27.18 of Textbook 1. | **3L** |
| **Self-study:** Test of hypothesis for means, single proportions only.<br>(RBT Levels: L1, L2 & L3) | Article No. 27.7 of Textbook 1 | |
| **Tutorials** | Involvement of faculty and students in identifying the problems & solutions, PPT presentations of Engg. Applications by the faculty, about the module. Guide the students for self-study topics | **2T** |
| | **Total** | **8 Hours** |

**Text Books:**
1. B.S. Grewal, **"Higher Engineering Mathematics"**, Khanna Publishers, 43rd Ed., 2015.
2. E. Kreyszig, **"Advanced Engineering Mathematics",** John Wiley & Sons, 10th Ed.(Reprint), 2016.

**Reference Books**:-
1. C. Ray Wylie, Louis C. Barrett, **"Advanced Engineering Mathematics"**, McGraw-Hill Book Co., New York, 6th Edition, 1995.
2. James Stewart**, "Calculus –Early Transcendentals"**, Cengage Learning India Private Ltd., 2017.
3. B. V. Ramana, **"Higher Engineering Mathematics"**, 11th Edition, Tata McGraw-Hill, 2010.
4. Srimanta Pal & Subobh C Bhunia, **"Engineering Mathematics"**, Oxford University Press,3rd Reprint, 2016.
5. Gupta C.B., Singh S.R. and Mukesh Kumar., **"Engineering Mathematics for Semester I & II"**, Mc-Graw Hill Education (India) Pvt. Ltd., 2015.

**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://academicearth.org/

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