

# GANPAT UNIVERSITY

## FACULTY OF U. V. PATEL COLLEGE OF ENGINEERING

|   |  |         |                 |    |                                     |                        |     |           |     |
|---|--|---------|-----------------|----|-------------------------------------|------------------------|-----|-----------|-----|
| Programme   | Degree Engineering   |         |                 |    | Branch/Spec.                        | Automobile Engineering |     |           |     |
| Semester  | III  |         |                 |    | Version                             | 1.0.0.0                |     |           |     |
| Effective from Academic Year  |  | 2018-19 |                 |    | Effective for the batch Admitted in |                        |     | July 2017 |     |
| Subject code  | 2HS402   |         | Subject Name    |    | <b>Applied Mathematics</b>          |                        |     |           |     |
| Teaching scheme   |  |         |                 |    | Examination scheme (Marks)          |                        |     |           |     |
| (Per week)  | Lecture(DT)  |         | Practical(Lab.) |    | Total                               | CE                     | SEE | Total     |     |
|   | L  | TU      | P               | TW |                                     |                        |     |           |     |
| Credit  | 4  | 0       | 0               | 0  | 4                                   | Theory                 | 40  | 60        | 100 |
| Hours   | 4  | 0       | 0               | 0  | 4                                   | Practical              | 0   | 0         | 0   |
| Pre-requisites:   |  |         |                 |    |                                     |                        |     |           |     |
| None  |  |         |                 |    |                                     |                        |     |           |     |
| Learning Outcome:   |  |         |                 |    |                                     |                        |     |           |     |
| <b>Learning Outcomes:</b>   |  |         |                 |    |                                     |                        |     |           |     |
| After completion of this course, student will be able to  |  |         |                 |    |                                     |                        |     |           |     |
| <ul style="list-style-type: none"> <li>• Express physical phenomenon in mathematical formulation and Complex variables.</li> <li>• Understand and solve partial and ordinary differential equations for higher order.</li> <li>• Basic knowledge of widely used Fourier transform and Laplace transform techniques and their applications in Automobile Engineering.</li> </ul> |  |         |                 |    |                                     |                        |     |           |     |
| Theory syllabus   |  |         |                 |    |                                     |                        |     |           |     |
| Unit  | Content  |         |                 |    |                                     |                        |     |           | Hrs |
| 1   | <b>Laplace Transforms:</b><br>Definition, Laplace transform of some elementary functions, Formulas of laplace transform, Inverse laplace transforms, Laplace transform of derivatives, Laplace transform of integration, Multiplication by $t^n$ , Division by $t$ , Convolution theorem, Unit step and Heaviside's unit function, Dirac-delta function, Periodic functions, Solution of ordinary linear differential equations, Simultaneous equation with constant co-efficient applied to electrical circuits |         |                 |    |                                     |                        |     |           | 10  |
| 2   | <b>Fourier Series</b><br>Definition of periodic function, Euler's formula, Functions having points of discontinuity, Change of intervals, Odd and Even functions, Expansion of odd or even periodic functions, Half range sine and cosine series, Elements of harmonic analysis.   |         |                 |    |                                     |                        |     |           | 10  |
| 3   | <b>Fourier Transforms</b><br>Definition, Fourier integral, Fourier sine and cosine integration, Complex form of Fourier integral, Fourier sine transform, Fourier cosine transform, Inverse Fourier transforms.  |         |                 |    |                                     |                        |     |           | 4   |
| 4   | <b>Theory of Complex Variables</b><br>Analytic functions, Cauchy-Riemann equation, Line integral, Cauchy's theorem and Cauchy's integral formula, Simple form of conformal transformation with application of the solution of two-dimensional problems.  |         |                 |    |                                     |                        |     |           | 7   |
| 5   | <b>Partial differential equations</b><br>Formation of partial differential equations, Lagrange's first order partial differential equations, Directly integrable equations, Method of separable of variables, Application to wave equations, diffusion equation and Laplace equation.  |         |                 |    |                                     |                        |     |           | 7   |
| 6   | <b>Ordinary differential equation (higher order) :</b><br>Ordinary differential equation with constant coefficient, Variation of parameter methods, Cauchy- Euler differential equations, Simultaneous differential equations with constant coefficient, Applications of ordinary differential equation.   |         |                 |    |                                     |                        |     |           | 7   |
| 7   | <b>Statistics:</b><br>Total probability, Independent events, Theorem of compound probability, Bay's theorem Random variable, Discrete probability distribution, Continuous probability distribution Expectation, Moment generating function, Repeated trials, Binomial Poisson's and normal distribution applications, Calculation of errors, Probable errors, Standard error.   |         |                 |    |                                     |                        |     |           | 3   |

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| Practical content |  |
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| Text Books        |  |
| 1                 | B.S.Grewal. "Higher Engineering Mathematics". Khanna Publishers 43rd Edition               |
| 2                 | Shanti Narayan. "Theory of Functions of Complex Variables" S.Chand Publishing 2nd Edition. |
| Reference Books   |  |
| 1                 | Srivastava. "Engineering Mathematics". PHI Learning Pvt. Ltd. 2010                         |
| 2                 | A.B.Mathur and V.P.Jaggi. "Engineering Mathematics-I". Krishna Prakashan Media. 2010       |
| 3                 | M.D.Raisinghania. "Ordinary and Partial Differential Equations" S. Chand Publishing, 2008  |
| 4                 | Erwin Kreyzing. "Advanced Engineering Mathematics" Wiley India, 10th Edition               |