**DEPARTMENT OF MATHEMATICS**

**B. G. S Institute of Technology**

**Course Outcomes**

**2010 Scheme**

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| 10MAT-11 | Sub : Engineering Mathematics-I |
| C01 | Apply the knowledge of calculus in engineering & real life problems. |
| CO2 | Learn the idea of partial differentiation to calculate the rate of change of multivariable functions and solve the problems related to composite functions and Jacobians. |
| CO3 | Use the idea of Integral & vector calculus to analyze the problems in engineering. |
| CO4 | Solve first order linear, nonlinear differential equations theoretically using standard methods. |
| CO5 | Use matrices techniques for solving systems of linear equations in the different areas of Linear Algebra. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.5 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| 10MAT-21 | Sub : Engineering Mathematics-II |
| C01 | Solve linear and nonlinear differential equations analytically using standard methods. |
| CO2 | Solve the differential equations and partial differential equations in physical situations using suitable techniques. |
| CO3 | Apply the knowledge of partial differentiation for the heat and wave equation. |
| CO4 | Apply the knowledge of integral calculus and vector integration in various methods. |
| CO5 | Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems in engineering field. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.5 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| 10MAT-31 | Sub : Engineering Mathematics-III |
| C01 | Apply periodic functions and Fourier series to analyze the circuit systems in engineering field. |
| CO2 | To adopt the Fourier transform in digital signal systems and Engineering Applications. |
| CO3 | Used to formulate the problems involving functions of many variables in the engineering field. |
| CO4 | To discuss curve fitting and graphical method in engineering ground. |
| CO5 | Students are able to understand the idea of Analytical, Numerical and Z-Transforms Techniques in engineering applications. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.5 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| 10MAT-41 | Sub : Engineering Mathematics-IV |
| C01 | Solve first and second order ordinary differential equations emerging in problems using single step and multistep numerical types. |
| CO2 | Evaluate the solution of complex analysis problems in Engineering field using appropriate methods. |
| CO3 | Use the idea of Bessel's and Legendre's to attempt the issues in Engineering problems. |
| CO4 | Students are able to solve discrete and continuous random probability distributions . |
| CO5 | Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.5 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

**DEPARTMENT OF MATHEMATICS**

**B. G. S Institute of Technology**

**Course Outcomes**

**2015 Scheme**

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| --- | --- |
| 15MAT-11 | Sub : Engineering Mathematics-I |
| C01 | Apply the knowledge of calculus in engineering & real life problems. |
| CO2 | Learn the idea of partial differentiation to calculate the rate of change of multivariable functions and solve the problems related to composite functions and Jacobians. |
| CO3 | Use the idea of vector calculus to analyze the problems in engineering. |
| CO4 | Solve first order linear, nonlinear differential equations theoretically using standard methods. |
| CO5 | Use matrices techniques for solving systems of linear equations in the different areas of Linear algebra. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.4 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| --- | --- |
| 15MAT-21 | Sub : Engineering Mathematics-II |
| C01 | Solve differential equations of electrical circuits, forced oscillation of mass spring and elementary heat transfer. Solve linear and nonlinear differential equations analytically using standard methods. |
| CO2 | Solve the differential equations in physical situations using suitable techniques. |
| CO3 | Apply the knowledge of partial differentiation for the heat and wave equation. |
| CO4 | Apply the knowledge of integral calculus in various methods. |
| CO5 | Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems in engineering field. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.4 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| 15MAT-31 | Sub : Engineering Mathematics-III |
| C01 | Apply periodic functions and Fourier series to analyze the circuit systems in engineering field. |
| CO2 | Adopt the Fourier transform in digital signal systems and Z-Transforms Techniques in engineering applications. |
| CO3 | Evaluate the solution of Engineering problems using suitable methods. |
| CO4 | Apply the knowledge of numerical methods in the models of various physical and engineering fields. |
| CO5 | Apply green’s theorem , Divergence and Stokes theorem in various applications in Engineering applications. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG | 3 | 2.4 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| --- | --- |
| 15MAT-41 | Sub : Engineering Mathematics-IV |
| C01 | Solve first order ordinary differential equations, arising in problems using single step and multistep numerical types. |
| CO2 | Solve second order ordinary differential equations, use the idea of Bessel's and Legendre's to attempt the issues in Engineering problems. |
| CO3 | Evaluate the solution of complex analysis problems in Engineering field using appropriate methods. |
| CO4 | Students are able to solve discrete and continuous random probability distributions . |
| CO5 | Demonstrate testing of hypothesis of sampling distributions and illustrate examples of Markov chains related to discrete parameter stochastic process. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.4 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

**DEPARTMENT OF MATHEMATICS**

**B. G. S Institute of Technology**

**Course Outcomes**

**2017 Scheme**

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| 17MAT-11 | Sub : Engineering Mathematics-I |
| C01 | Adopt the successive differentiations to analyse polar curves, evaluate radius of curvature, derivatives of arc length and Taylor’s and Maclaurin’s series expansion of function of single variable in engineering field. |
| CO2 | Use the partial differentiation to find total derivative and Jacobians of given functions. |
| CO3 | Apply the vector differential on scalar and vector functions in engineering field. |
| CO4 | Use the reduction formula to calculate definite integrals in different methods, also solve first order ODE and its applications in engineering field. |
| CO5 | Analyse the matrix techniques in quadratic forms to canonical forms and solution of system of linear equations in the different areas and methods |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.4 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| 17MAT-21 | Sub : Engineering Mathematics-II |
| C01 | Apply the higher order differential equations, undetermined coefficients and methods of variations of parameters problems in engineering field. |
| CO2 | Adopt the Cauchy’s, Legendre’s and nonlinear differential equations and solvable for P, Y, X and Clairauits equation problems. |
| CO3 | Solve the partial differential equations and also one dimensional heat and wave equations in engineering field |
| CO4 | The students are able to calculate the area, volume, surface average value of the functions and also beta and gamma in electronic component. |
| CO5 | Use the Laplace and inverse Laplace transforms in engineering field. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.4 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| 17MAT-31 | Sub : Engineering Mathematics-III |
| C01 | Use of periodic signals and Fourier series to analyse circuits and system communications in engineering field. |
| CO2 | Analysis the general linear system theory for signals and digital signal processing using the Fourier transforms and z-transforms. |
| CO3 | Solve the appropriate numerical problems and curve fitting using differential methods in engineering fields. |
| CO4 | Apply greens, divergence and stokes theorems in various applications in the field of electromagnetic and gravitational and fluid flow problems. |
| CO5 | Solve the extremal and calculus of variations problems. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.4 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| 17MAT-41 | Sub: Engineering Mathematics-IV |
| C01 | Use first and second order differential equations in flow problems and numerical methods. |
| CO2 | Apply the second order differential equations in numerical methods and properties of Bessel functions and Legendre’s. |
| CO3 | Solve the analytic and polar in complex form problems and conformal, bilinear transformations in field theory and signal processing. |
| CO4 | Adopt the probability distributions of discrete, continue and joint probability distributions in engineering field. |
| CO5 | Explain the testing of hypothesis in sampling distributions and Markov chain and Stochastic process problems. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.4 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

**DEPARTMENT OF MATHEMATICS**

**B. G. S Institute of Technology**

**Course Outcomes**

**2018 Scheme**

|  |  |
| --- | --- |
| 18MAT-11 | Sub : Engineering Mathematics-I |
| C01 | Solve the polar curves and its applications in determining the different curvatures. |
| CO2 | Adopt the partial differentiation to calculate rate of change of multivariate functions and solve the composite functions and Jacobeans. |
| CO3 | Apply the concept of double and triple integrals and their use to finding the area and volumes. |
| CO4 | Use the first order exact Bernoulli’s and applications of orthogonal trajectories and also Newton’s law of cooling, clairaut’s equations problems. |
| CO5 | Determine the Eigen values and Eigen vectors and also diagonalization forms of matrix. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.5 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| 18MAT-21 | Sub : Engineering Mathematics-II |
| C01 | Solve the solenoidal and irrotational vector and also surface and volume integral applications. |
| CO2 | Use the higher differential equations and solve linear ordinary differential equations in physical models. |
| CO3 | Adopt the partial differential equations and solutions by heat and wave equations methods |
| CO4 | Explain the infinite series and power series solutions of ordinary differential equations problems |
| CO5 | Apply the numerical methods in various physical and engineering phenomena. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.5 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| --- | --- |
| 18MAT-31 | Sub : Engineering Mathematics-III |
| C01 | Use Laplace transform and inverse laplace transform in differential equations, network analysis, control systems and other applications of engineering fields. |
| CO2 | Solve the Fourier series and periodic functions in Filed theory and digital signals. |
| CO3 | Adopt the Fourier transform problems in engineering field. |
| CO4 | Use the concept of first order ordinary differential equations in engineering problems using single step and multi step numerical methods. |
| CO5 | Determine the second order ordinary differential equations and also calculus of variation problems using dynamics of rigid bodies and vibrational analysis. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.5 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1

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| --- | --- |
| 18MAT-41 | Sub : Engineering Mathematics-IV |
| C01 | Use first and second order differential equations in flow problems and numerical methods. |
| CO2 | Apply the second order differential equations in numerical methods and properties of Bessel functions and Legendre’s. |
| CO3 | Solve the analytic and polar in complex form problems and conformal, bilinear transformations in field theory and signal processing. |
| CO4 | Adopt the probability distributions of discrete, continue and joint probability distributions in engineering field. |
| CO5 | Explain the testing of hypothesis in sampling distributions and Markov chain and Stochastic process problems. |

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| CO-PO Mapping | | | | | | | | | | | | |
| CO/PO | PO1 | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 |
| CO1 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO2 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO3 | 3 | 2 |  |  |  |  |  |  |  |  |  | 1 |
| CO4 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| CO5 | 3 | 3 |  |  |  |  |  |  |  |  |  | 1 |
| AVG. | 3 | 2.5 |  |  |  |  |  |  |  |  |  | 1 |

High-3: Medium-2: Low-1