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Test -1 (September, 2015)

Department of Electronics and Communications Engineering

M.Tech. (First Semester)

Course Code: 13M1WEC132 Duration: 1hour

Course Name: Mathematical Techniques for Engineering Maximum Marks: 15

Note: Answer all questions. Each question carries three marks.

1. Perform the Gram-Schmidt orthogonalization on the basis $\{u_1, u_2, u_3\} = \{1, x, x^2\}$.

2. Find the first four terms in each portion of the series solution around $x_0 = -2$ for the differential equation $y'' - xy = 0$.

3. Solve the system $\frac{dy}{dx} + 2y = 1.3e^{-x}, y(0) = 5$ using the Euler's method. Compare the solution with the exact solution.

4. Solve $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial t} + u = 0\,, x > 0, t > 0$ with $u(0,t) = 0, t > 0$ and $u(x,0) = \sin(x), x > 0$ using the Laplace transforms.

5. Solve the equation $\int_0^\infty f(t)\cos\omega t = \begin{cases} 1-\omega\,, & 0 \le \omega \le 1 \\ 0, & \omega > 1 \end{cases}$.