**Engineering Mathematics – Midterm 1**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

|  |  |  |
| --- | --- | --- |
| 1. | Solve the ODE by any method. | 10 |
| Solution: |  |  |
| 2. | Solve the ODE by method of integration factor. | 10 |
| Solution: | Comparing with the standard equation we get,  Multiplying throughout by the integration factor we get, |  |
| 3. | Solve the ODE by method of variation of parameters. | 10 |
| Solution: | First, we solve for the homogeneous case  Varying A to A(x);  Substituting y and y’ in the given ODE we get, |  |
| 4. | Solve the ODE by any method that you prefer. | 10 |
| Solution: | Comparing with Bernoulli’s equation  Resubstituting |  |
| 5. | Solve the ODE by method of exact equations. | 10 |
| Solution: | Here,  Therefore, the given ODE is exact  Solution is where, |  |
| 6. | Suppose that a 9-th order homogeneous linear differential equation with constant coefficients has characteristic roots:  2, 2, 3, 4+2i, 4-2i, 4+2i, 4-2i, 7-3i, 7+3i  What are the general solutions of the differential equation? | 10 |
| Solution: |  |  |