International Islamic University Chittagong
Department of Electrical and Electronic Engineering

Final Examination Spring-2018 | Program: B.Sc. Engg. (EEE)
Course Code: Math-2303 | Course Title: Mathematics III
Time: 2 hours 30 minutes | Full Marks: 50

Part A

[Answer any ***two*** questions from the followings; figures in the right margin indicate full marks.]

1(a). Apply the method of series solution to find the solution of Bessel's equation **07**

$$x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} + (x^2 - n^2)y = 0$$

1(b). Show that $nP_n = (2n-1)xP_{n-1} - (n-1)P_{n-2}$ **03**

2(a). Apply the method of variation of parameters to solve **05**

$$\frac{d^2y}{dx^2} + 25y = \sec 5x$$

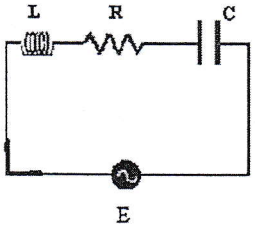
2(b). Apply the method of undetermined coefficient to solve **05**

$$(D^2 - 3D + 2)y = 4x^2$$

3(a). Using Rodrigue's formula to find the value of $P_1(x)$, $P_2(x)$ and $P_3(x)$ **03**

3(b). Show that $J_{-\frac{1}{2}}(x) = \sqrt{\left(\frac{2}{\pi x}\right)}\cos x$ **03**

3(c). A circuit consists of an inductance of 0.07 Henry, a resistance of 10 ohms, a condenser of capacitance 100 microfarads, and emf of E = 100 volts. Find I, Q, given the initial conditions Q = 0, I = 0 when t = 0. **04**



Part B

[Answer any ***three*** questions from the followings; figures in the right margin indicate full marks.]

4(a). Define linear and non-linear partial differential equation. Find the differential equations from $\emptyset(2x + 2y + 2z,\ x^2 + y^2 + z^2)$ **04**

4(b). Solve the following partial differential equations **2×03**

(i) $p\cos(x+y) + q\sin(x+y) = 3z$

(ii) $z - xp - yq = 7\sqrt{x^2 + y^2 + z^2}$

5(a). Find the integral surfaces of the partial differential equations which pass through the given line $x^2p + y^2q + z^2 = 0;\ xy = x + y, z = 1$ **04**

5(b). Apply Charpit's method to solve :$zpq = p + q$ **03**

5(c). Solve the partial differential equation : $yzp + zxq = xy$ **03**

6(a). Solve the partial differential equation with constant coefficients by short method:$(D^3 - 4D^2D' + 4DD'^2)z = 4\sin(2x + y)$ **04**

6(b). Solve the partial differential equation with constant coefficients : **06**

(i) $(D^3 - 3D^2D' + 4D'^3)z = e^{x+2y}$

(ii) $r - 6s + 9t = xy + x^2$

7(a). Obtain the Partial differential equation by eliminating arbitrary functions $z = x^m \emptyset(\frac{y}{x})$ **03**

7(b). Solve the partial differential equations by using Lagrange's method : $p\ tanx + q\ tany = tanz$ **03**

7(c). Solve the partial differential equation with constant coefficients: $r - t = x - y$ **04**