

## ASSIGNMENT 2

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MATRIK NO: 15/ENG04/0204

DEPARTMENT: ELECTRICAL/ELECTRONIC ENGINEERING

COURSE: ENG 311

$$1 \quad \frac{d^2y}{dx^2} + 4\frac{dy}{dx} + 5y = 6\sin\theta$$

$$m^2 + 4m + 5 = 0$$

$$y = C\cos\theta + D\sin\theta$$

$$\frac{dy}{d\theta} = -C\sin\theta + D\cos\theta$$

$$\frac{d^2y}{d\theta^2} = -(C\cos\theta - D\sin\theta)$$

$$-(C\cos\theta - D\sin\theta) + 4(-C\sin\theta + D\cos\theta) + 5(C\cos\theta + D\sin\theta) = 6\sin\theta$$

$$-C\cos\theta - D\sin\theta - 4C\sin\theta + 4D\cos\theta + 5C\cos\theta + 5D\sin\theta = 6\sin\theta$$

$$4C\cos\theta + 4D\sin\theta - 4C\sin\theta + 4D\cos\theta = 6\sin\theta$$

$$4C + 4D = 0$$

$$4C = -4D$$

$$C = -D$$

$$4D - 4C = 6$$

$$4D - 4(-D) = 6$$

$$4D + 4D = 6$$

$$8D = 6$$

$$D = \frac{6}{8} = \frac{3}{4}$$

$$C = -\frac{3}{4}$$

$$y = -\frac{3}{4}\cos\theta + \frac{3}{4}\sin\theta$$

$$y = \frac{3}{4}(-\cos\theta + \sin\theta)$$

$$\text{GF: } y = e^{-2\theta}(A\cos\theta + B\sin\theta) + \frac{3}{4}(-\cos\theta + \sin\theta)$$

$$y = e^{-2\theta}(A\cos\theta + B\sin\theta) - \frac{3}{4}\cos\theta + \frac{3}{4}\sin\theta$$

$$\text{at } \theta = 0, \quad \frac{dy}{d\theta} = 0$$

$$y = e^{-2\theta}$$

$$\frac{dy}{d\theta} = -2e^{-2\theta}$$

$$y = A\cos\theta + B\sin\theta$$

$$\frac{dy}{d\theta} = -A\sin\theta + B\cos\theta$$



$$e^{-2t} [-A \sin t + B \cos t] + [A \cos t + B \sin t] - 2e^{-2t}$$

$$dy/dt = e^{-2t} [-A \sin t + B \cos t] + [A \cos t + B \sin t] (-2e^{-2t}) + 1/2 \sin t + 1/2 \cos t$$

$$\text{At } t = 0 \quad dy/dt = 0$$

$$0 = 1/2 \sin 0 + 1/2 \cos 0$$

Limit Range by L.H.

$$0 = 1/2 \cos t + 1/2 \quad [dy/dt = \cos t]$$

$$-1/2 = 1/2 \cos t$$

$$-1 = \cos t$$

$$-1 = \cos t$$

$$t = \cos^{-1}(-1)$$

$$t = -45^\circ$$

$$2 \quad \text{ii} \quad dy/dx = 0 \quad (L-x)^2$$

$$dx^2 = 2$$

$$x^2 = 0$$

$$x = 0$$

$$\therefore y = A \cos 0 + B \sin 0$$

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| #(angle) | y        |
|----------|----------|
| 0        | -0.75    |
| 10       | 0.221288 |
| 20       | 0.378647 |
| 30       | -0.85671 |
| 40       | 1.059038 |
| 50       | -0.92051 |
| 60       | 0.485702 |
| 70       | 0.105429 |
| 80       | -0.66263 |
| 90       | 1.006553 |
| 100      | -1.02651 |
| 110      | 0.716084 |
| 120      | -0.17518 |
| 130      | -0.42211 |
| 140      | 0.88354  |
| 150      | -1.0606  |
| 160      | 0.896291 |
| 170      | -0.44351 |
| 180      | -0.15202 |
| 190      | 0.698619 |
| 200      | -1.02036 |
| 210      | 1.013697 |
| 220      | -0.68076 |
| 230      | 0.128724 |
| 240      | 0.464748 |
| 250      | -0.90864 |
| 260      | 1.060075 |
| 270      | -0.87032 |

