University of Asia Pacific

Department of Basic Sciences & Humanities

Final Examination, Fall 2020

Program: B.Sc. Engineering (Computer Science)

2nd Year /2nd Semester

Course Title: Math-IV | Course Code: MTH-205 | Credit: 3.00

Time: 2.00 Hours | Full Marks: 120

There are **Six** questions. Answer **Four**. All questions are of equal values, indicated in the right margin.

1. (a) Solve: $(D^2 - 1)y = 2.$ when x = 0, y = 1 and x = 0, $\frac{dy}{dx} = 1.$ **15**

(b) Solve: $x^2 \frac{d^2y}{dx^2} - 2y = 0$. where y (0) = 0, $y_1(0) = 0$ **15**

2. (a) Solve: Using by Variation of Parameter : $\frac{d^2y}{dx^2} - y = e^{-x}$ **15**

(b) Solve the differential equation: $\left(D^2 - 4D + 4\right) y = x^2.$ **15**

when x = 0, y = $\frac{3}{8}$ and x = 0, $\frac{dy}{dx} = 1.$

3. (a) Find the inverse Laplace transform of $\frac{s^2 + 1}{s(s-1)(s+1)(s-2)}$ **15**

(b) Solve DE $f''(t) + 9f(t) = 0,\ f(0) = 5,\ f'(0) = 0$ by applying Laplace Transform and Inverse Laplace Transform. **15**

OR

4. **(a)** Find the inverse Laplace transform of **12**

$$i)\left(\frac{1}{s^2}-\frac{1}{s}+\frac{1}{s-2}\right) \quad ii)\left(\frac{2s-6}{s^2+9}\right)$$

(b) Find the Laplace transform of **12**

$$i)\ (t^2-e^{-9t}+5) \quad ii)\ (\cos 5t+\sinh\ 2t)$$

(c) Find the Laplace transform of periodic function **6**

$$f(t)=\begin{Bmatrix}1, & 0\le t<1\\ 0, & 1\le t\le 2\end{Bmatrix} \text{ of period 2.}$$

5. Solve the following boundary value problem by the method of Separation of variables **30**

$$\frac{\partial U}{\partial t}=4\frac{\partial^2 U}{\partial x^2}, U(0,t)=20, U(\pi,t)=40, U(x,0)=50, 0<x<\pi$$

OR

6. Solve the Boundary value problem **30**

$$a^2\frac{\partial^2 u}{\partial x^2}=\frac{\partial^2 u}{\partial t^2}, 0<x<L, t>0$$

$$u(0,t)=0, \quad u(L,t)=0, t>0$$

$$u(x,0)=f(x), \quad \frac{\partial u}{\partial t}(t=0)=g(x), \quad 0<x<L$$