**University of Asia Pacific (UAP)**

**Department of Basic Sciences & Humanities**

**Course Code: MTH-205**

**Program: B.Sc. Engineering (CSE)**

**2nd Year / 2nd Semester**

**Teacher: Sk. Reza-E-Rabbi (Lecturer)**

**Topics: Basic Definitions and Solution of Differential Equations (First Order First Degree)**

1. **Definitions: Differential equation, ODE, PDE, Order and degree of a differential equation, Linear and non-linear differential equation.**
2. Form the following differential equations by eliminating arbitrary constants and write down the order and degree of the differential equations obtained. Hence also explain why the respective differential equation is either linear or non-linear.



1. Using the method of separation of variables solve the following differential equations.



1. Define homogeneous differential equation. Solve the following differential equations.



1. What is linear differential equation? Solve the following differential equations.



1. Define Bernoulli’s equation. Solve the following differential equations.



1. When a differential equation is said to be exact? Solve the following equations.



1. **Solve the given equations,**

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**Topics: Equation of First Order and Higher Degree**

1. **Solve **
2. **Solve **
3. **Solve **

**Topics: Linear Differential Equations with Constant Coefficients**

1. **Solve **
2. **Solve the following differential equations.**

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1. **Solve **
2. **Solve **
3. **Solve the differential equation **

**Topics: The Laplace Transform**

1. Define Laplace and inverse transform.
2. Find the Laplace transform of the function F(t), where 
3. Find the Laplace transform of



1. Find the Laplace transform of 
2. By applying first shifting theorem prove that



1. Find the Laplace transform of F(t), where 
2. Find the Laplace transform of cosat and sinhat using the change of scale property.
3. **Find the Laplace transform of t2cosat.**
4. **Prove the following, **
5. **Find the Laplace transform of **
6. **Using Laplace transform prove that **
7. **Prove that.**
8. **Find the Laplace transform of the function **
9. **Evaluate.**
10. **Evaluate by use of convolution theorem.**
11. **Solve the differential equation  by using Laplace transform.**
12. **Solve the differential equation  by using Laplace transform.**

**Topics: The Fourier Transform**

1. **Define Fourier series. Write down Drichlet’s conditions of Fourier series.**
2. **Obtain the Fourier series for in the interval 0<x<2π.**
3. **Find the Fourier series expansions of the function in the interval **
4. **Find the Fourier series expansion of the function. Hence evaluate the sum **
5. **If f(x) is given by  then expand f(x) in the Fourier series.**
6. **Show that.**
7. **Prove that.**
8. Find the Fourier integral of the function when x>0 and f(-x)= f(x) for k>0, and hence prove that .
9. Find the Fourier Sine transform of 
10. Find the Fourier Cosine transform of 
11. **Find the (a) finite Fourier Sine transform (b) finite Fourier Cosine transform of the function F(x)= 2x, 0<x<4.**
12. **Establish the relation between Fourier and Laplace transforms.**
13. **Use finite Fourier transform to solve**

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