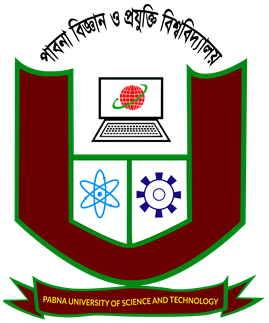
**Pabna University of Science and Technology**



Department of Computer Science and Engineering

Faculty of Engineering and Technology

**Assignment-1**

**Course Code : MATH 1201**

**Course Title :** Integral Calculus and Ordinary Differential Equations and Series Solutions

**Topic Name : Non-homogeneous differential equations**

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Date Of Submission: 26th July 2025

**NON-HOMOGENEOUS EQUATION:**

An equation of the form



or (

is called non-homogeneous equation.

**RULE-1:** 

If  then ,





**PROBLEM-1**:



Here, 



Let, 



Putting (2) into (1), then we have,







This is a separable equation, separating variables we get,



Integrating,





Where c is an arbitrary constant which is the required general solution.

***RULE-2:***



 then



……………. (2)





From (1) and (2) we get,





Linear but not homogeneous

If we put





Then equation (3) becomes,



This is a homogeneous equation



**B.D. Sharma book’s problems:**

**Starting from page-13**

**Ex.1.**



Let:





Since:



we make the substitution:



Substituting into the original equation gives:



To simplify, let:



Solving yields:



So the transformed equation becomes:



Letting:



We get:





Solving these integrals yields:





**where is an arbitrary constant**

**This is R.S.**

**Ex. 2.** Solve .

**Solution.**



Put , where  are some constants. Then



And the given equation becomes



Choose  such that  and , give .



Put .











Integrating, 











**Ex. 3.** Solve .

**Solution.**



Put , where  are constants.







Choose  such that . Solving these, we get .



Put .







Integrating, .







 is the solution



**Ex. 4.** Solve .

**Solution.** The equation is . Put , so that  or .









,separating the variables

**Integrating,**





+is the required solution

**Ex. 5. Solve**



**Solution.** Put , so 





**Integrating,**





 is the solution

**Ex. 6. Solve**



**Solution.**



Put 



 etc.

**Ex.7.**

**(i)**



Let , ; 

From (1) and (2), we get



To simplify:































# (ii)



**Solution using substitution** **:**



Rewrite the original equation:



Separate variables:



Integrate:



Substitute back:



# (iii)



**Solution by reducing to homogeneous form:**



Solving gives: , 





Substitute , so



Now:



Separate variables:



Integrate:



Substitute back:



# (iv)



**Substitute** **:**



Integrate:



# (v)



Substitute :



Rewrite:



Solve:



Integrate:



# (vi)



Substitute :



Rewrite:



Integrate:



# (vii)



Same method as (iii), different constants:



# (viii)



After similar transformation:



# (ix)



Substitute :



Rewrite:



Solve:



Integrate:

