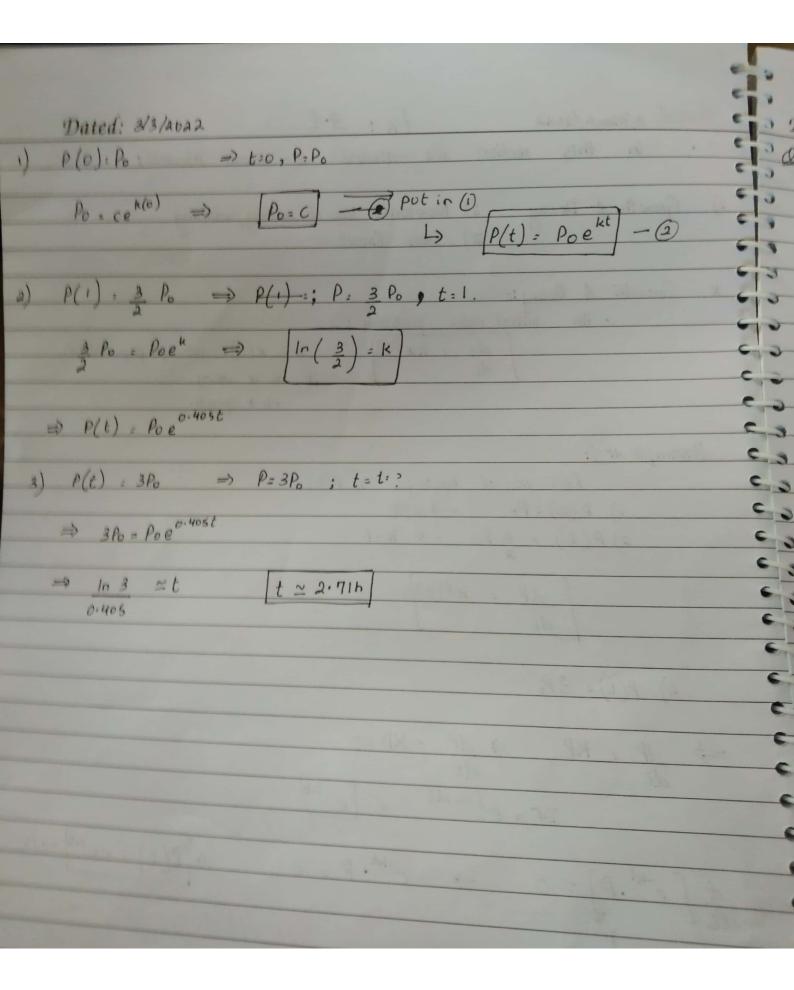
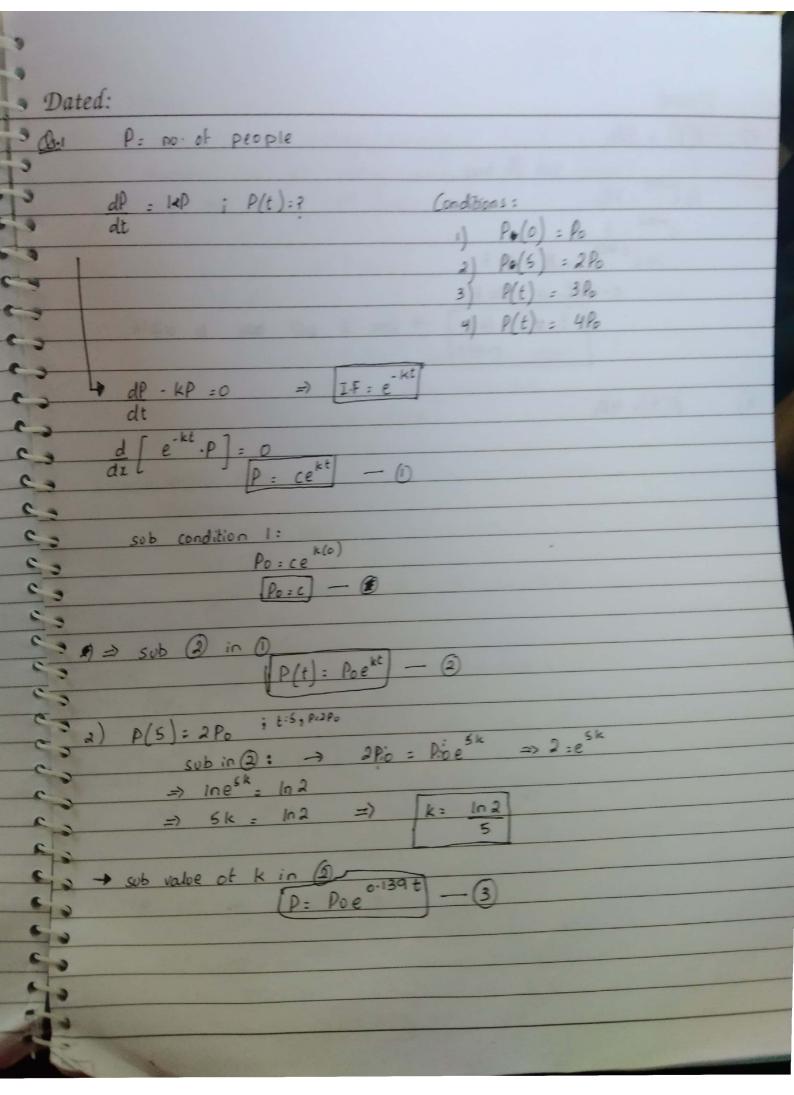
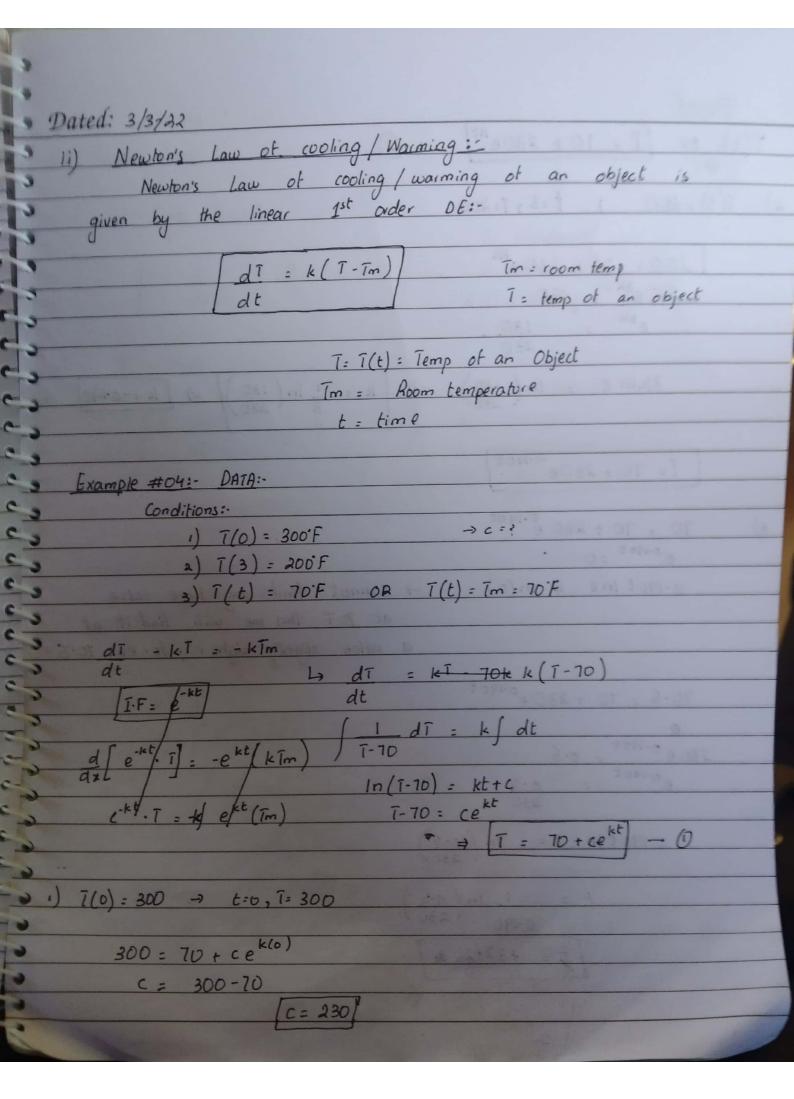
Dated: 3/mart/2012 /x: 3.1 In this section we discuss 3 - linear Models; 31) Growth of Decay ii) Newton's law of cooling functioning iii) Series Circuit * Growth & Decays: · An Initial value problem; $\begin{cases} dx = kx(t) \end{cases} \quad x = x(t) = no \cdot of population$ if -k = decoy+k + growth Example #1: Po: no of bacteria; P(t) 1) $P(0) = P_0 \longrightarrow C^{2}$ 2) $P(1) = 3P_0 \longrightarrow K^{2}$ dP = kP(t) 3) P(t) = 3Po $\frac{d\left[e^{-kt}.P\right]=0}{dt\left[e^{-kt}.P\right]=0}\rightarrow e^{-kt}.P=C\longrightarrow P(t)=ce^{-kt}-(1)$





| P(t) = 3Po | |
|--|--|
| Sob 3 here | |
| Poe = 3 Po (3) nere | MARKET STATE OF THE STATE OF TH |
| · n.Bat | |
| 0.139t = 103 | |
| t = 1n3 0.139 t | -> Time it will take to triple |
| P(t): 4Po | Party de la serie de la |
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```
T(t) or [T : 70 + 230e "]
    200: 70+ 230e3k
                                 | k = 1 ln (130) => [ 1 = 0.190]
     T = 70 + 230e O-ROE
   70 : 70 + 230 e 190t
    0.190 tine + In(0)
                              at 70°F thus we will find it at
                               a value slightly higher; forex: 70.5
   70.5 - 70 + 230 e 0.190 t
      0-190tine = in (0.5)
               [t = +32.26 a]
```

Dated: 3/3/2022

* Series Crevit :-

1) LA - Series Circuit :-

$$\begin{bmatrix} L & di & + Ri & = E(t) \\ dt & \end{bmatrix}$$

L: Inductance R: Resistance

E(t) = Voltage

RC - Series Circuit:

$$\begin{bmatrix} R & dq & + & i & q & = E(t) \end{bmatrix}$$

R = Resistance

q : Charge

C = capacitance

i(t) = dq dt

Example # 7:

di + 20 i = 24

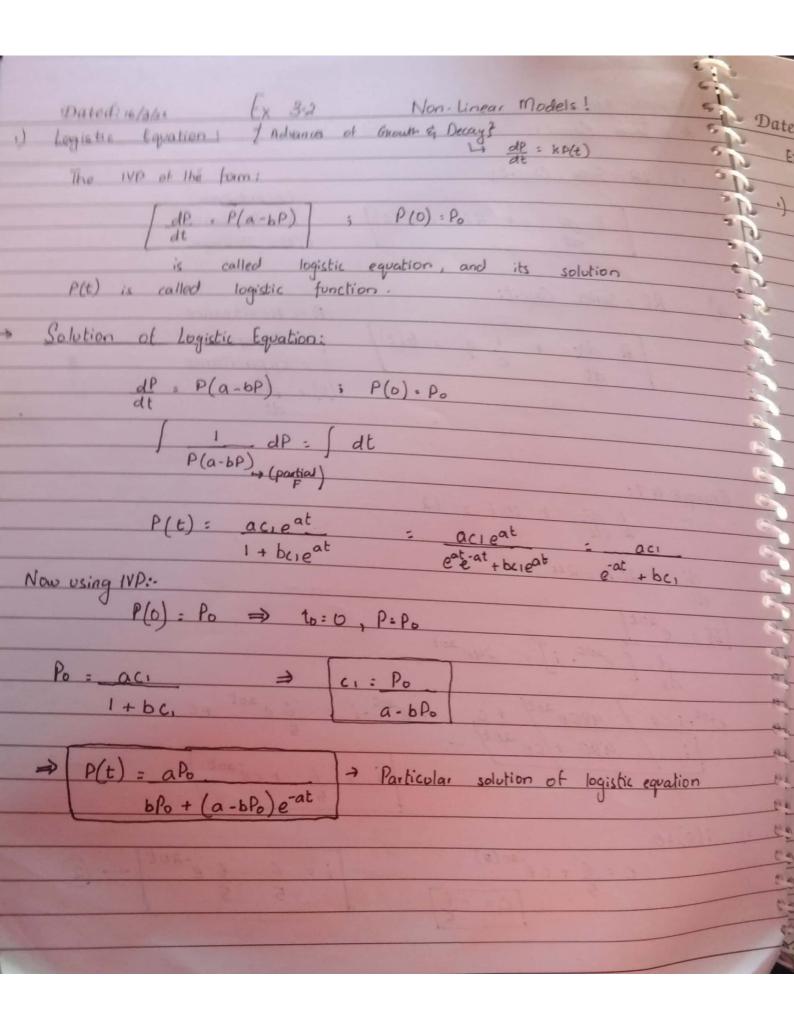
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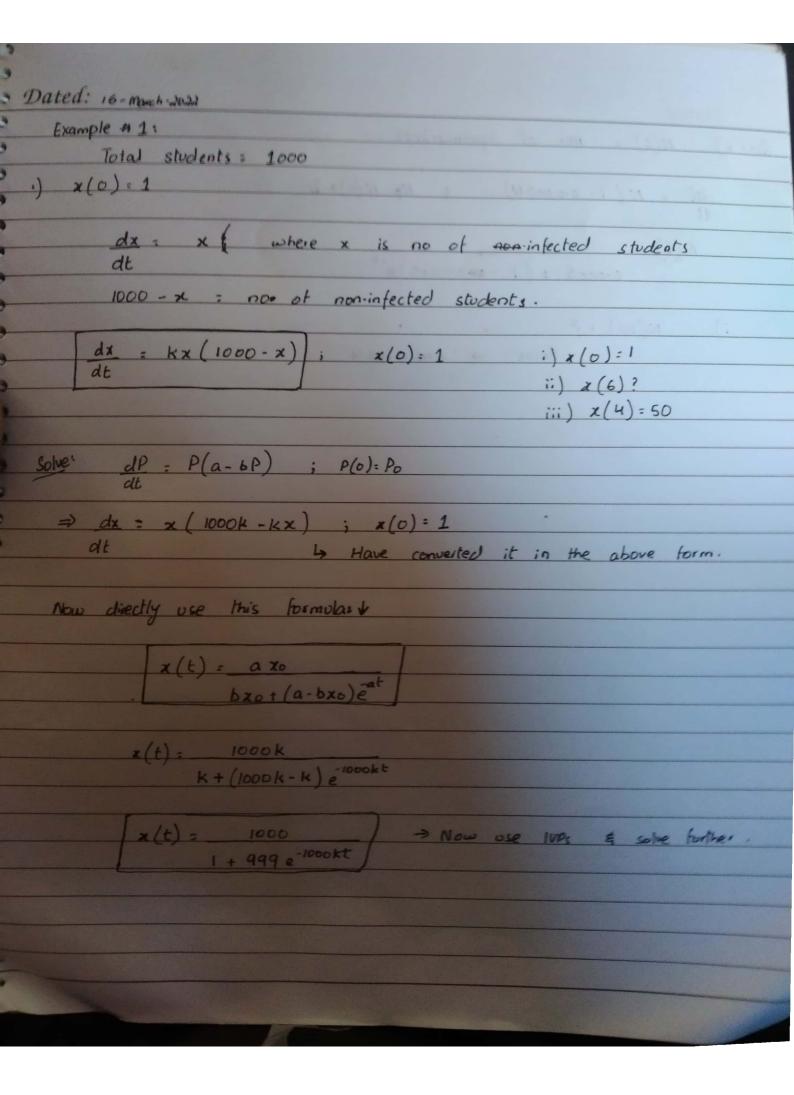
$$e^{20t}$$
. $i = /480e^{20t/} + c = e^{20t}$. $i = 6e^{20t} + c$

1) i(0)=0

$$0 = \frac{6}{5} + Ce^{-20(0)}$$

$$C = -\frac{6}{5}$$





Dated: Os. 16) N(t) = no. of supermarkets dN = N(1-0.0005N) ; A6 N(0)= 2 0.0005 + (1 - 00.0005)e-t N(10) = ? Solve -> Ans = 1834

CHR# 04 HIGHER ORDER D.E.

4.1 Presoliminary Theory - Linear Equations".

Example 103: A BUP can have, many, one or no solutions.

$$x'' + 16x = 0$$
; $x(0) = 0$; $x(\frac{\pi}{2}) = 0$

Apply BUP:

$$(i)$$
 $\times (\frac{\overline{A}}{2}) = 0$

SUB BVA :-

49 Given Bup has one solution and it has trivial solution.

c)
$$x(0):0$$
, $x(\frac{5}{2}):1$

1

(C1=0)

$$(i)$$
 $\times \left(\frac{\overline{\Lambda}}{2}\right) = 1$

1 = casin 4 (=)

1 = 0 -> Given BVP has no solution.

* Homogeneous Linear DE:

1) oth order Linear DE:

$$\left[a_{n}(x)y^{(n)}_{y}+...+a_{n}xy'+a_{n}(x)y=g(x)\right]$$

General form of 1th order LDE.

ii) nth-order homogeneous L.DE:-

$$a_0(x)y^{(n)} + \dots + a_1(x)y' + a_0(x)y = 0$$

NOTE: Every H.L.D.E must contain a trivial solution.

* Linear Combination:

The set of functions 2 y, , y2, y3?

Note: - If y, , ya & ys are the solutions of given DE than their linear combination is also a solution, ; y= ciy, + czyz + czyz

```
Dated: 17/3/22
* Linear Dependence / Linear Independence:
   . The set of solutions & y , ye, ys } can be linearly
 independent or dependent if;
               C, y, + C242 + C343 = 0
   1) If all scalars fc1, c2, c3 } are equals to zero then the
     set of solutions is linearly independent.
  ii) It any scalar among all is not equal to zero, then the set
     of solutions is linearly dependent.
```