

< Today



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 DEPARTMENT: CHEMICAL  
 ATRIL NO: IS/ENG02/023  
 COURSE CODE: ENG282

Q.12

Question no. 1

Temp Initial = 10°C  
 T = 20°C @ 5min  
 T ambient = 25°C

$\frac{dT}{dt} \propto (T - T_A)$   
 = Actual Temp  
 $\frac{dT}{dt} = k(T - T_A)$   
 $\frac{dT}{dt} = k(T - 25)$

C-LT

$\frac{dT}{(T - 25)} = k dt$   
 Integrating both sides  
 $\ln(T - 25) = k t + c$   
 $\therefore T - 25 = e^{k t + c}$   
 $T - 25 = e^{k t} \cdot e^c$   
 where  $e^c = A$   
 $T - 25 = A e^{k t}$   
 $T = A e^{k t} - 25$

at Initial Conditions  
 $t = 0 \quad T = 10^\circ C$   
 $10 = A e^0 - 25$   
 $A = 35$   
 $\therefore T = 35 e^{k t} - 25$

at  $T = 20^\circ C \quad t = 5 \text{ min}$   
 $20^\circ C = 35 e^{5k} - 25$   
 $45 = 35 e^{5k}$   
 $e^{5k} = \frac{45}{35}$   
 $5k = \ln\left(\frac{45}{35}\right)$   
 $k = \frac{0.25}{5} = 0.05$

$T = 24.9$  at  $t = ?$   
 $24.9 = 35 e^{0.05t} - 25$   
 $49.9 = 35 e^{0.05t}$   
 $e^{0.05t} = \frac{49.9}{35}$   
 $e^{0.05t} = \ln(1.426)$   
 $0.05t = 0.355$   
 $t = 7.1 \text{ minutes}$



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Edit



Delete



yimaquiz2.m × +

```
- commandwindow  
- clear  
- clic  
- close all  
- format short g  
- mdata=xlsread('onlinequizdata','fluiddata')  
- x=mdata(1:2:250,1)  
- y=mdata(1:2:250,2)  
- plot(x,y)  
- grid on  
- grid minor
```

I

Command Window

```
86  
88  
90  
92  
94  
96  
96  
100  
102
```

