

Menoufia University  
 Faculty of Engineering, Shebin El-Kom  
 Electrical Engineering Department  
 Postgraduate-Ph.D.  
 Final Term Exam



Subject/Code: Computer Science/BES 702  
 Year : 2019-2020  
 Time Allowed : 3 hours  
 Exam Date : / 8 / 2020  
 Total Marks : 100 marks

Allowed Tables and Charts: (None)

**Answer the following questions**

**Question (1)**

(50 Marks)

(1-a) If the voltage across a charging capacitor is expressed as  $v(t) = 10(1 - e^{-0.2t})$ . Use MATLAB M-File to obtain a plot of the voltage across the capacitor for the period  $t = 1: 50$  seconds with increment of 1 second.

(1-b) The voltage across an electric circuit is expressed as;

$$v(t) = 10(1 + e^{-50t}) \sin(200\pi t)$$

Use MATLAB M-File to obtain a plot of  $v(t)$  for the period  $0 \leq t \leq 0.1$  second

(1-c) An electrical circuit has its voltage and current expressed as;

$$v(t) = 220\sqrt{2} \sin(100\pi t) \quad , \quad i(t) = 15\sqrt{2} \sin\left(100\pi t - \frac{\pi}{6}\right)$$

Use MATLAB M-File to obtain a plot of  $v(t)$  and  $i(t)$  for the period  $0 \leq t \leq 50$  ms using the subplot command.

(1-d) The frequency response of an amplifier is given by the following data:

Frequency Hz	20	40	80	100	150	330	2000	5000	8000	10000	12000	15000	21000
Gain dB	5	10	30	32	34	35	36	35	34	32	30	10	5

Use MATLAB M-File to draw a graph of gain versus frequency using a logarithmic scale for the frequency and a linear scale for the gain.

**Question (2)**

(50 Marks)

Use MATLAB SIMULINK to solve the following differential equations:

$$\frac{d^2y}{dt^2} + 5 \frac{dy}{dt} + 3y = 100$$

$$\frac{d^3y}{dt^3} - 10 \frac{d^2y}{dt^2} + 10 \frac{dy}{dt} + 3y = 100\sin(314t)$$

$$5 \frac{dy}{dt} + 10y = -50$$

$$\frac{d^2y}{dt^2} + 4 \frac{dy}{dt} = 10\cos(314t)$$